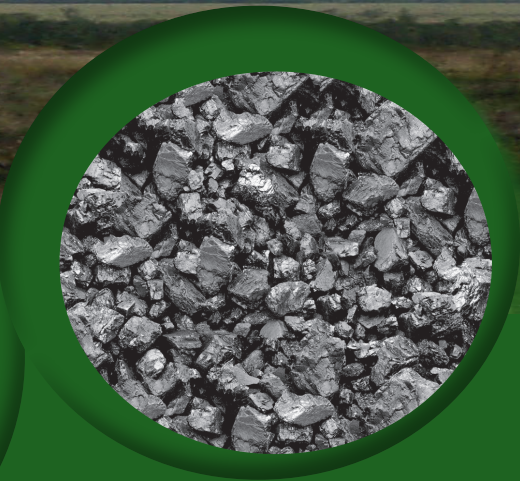




ADDITIONAL ENVIRONMENTAL IMPACT STATEMENT

South Galilee Coal Project

Volume 2

2014

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9.10 Management Plans

9.10 Management Plans

9.10.1 Management Plan Summary

The proponent has adopted the Queensland July 2013 Social Impact Policy. Combined with the issues raised during the public review it has necessitated a review of the Management Plans.

The Social Impact Assessment in Section 9.14 incorporates a number of management plans, a summary of which is provided in Section 9.10.2. The balance of the management plans are summarised in the same section.

The Management Plans are provided in Section 9.10.3.

Specific answers to the Management Plan issues are provided in Section 10.

9.10.2 Management Plan Matrix

Table 9.10.1 and 9.10.2 contain a summary of the Management Plans.

Table 9.10.1 Social Impact Management Plans

Social Impact Assessment (refer to Section 9.14) has been prepared to address core SIA principles as set out in Queensland Government Social impact assessment guideline (July 2013). The plan comprises 4 key action plans, and stakeholder, community and landholder management plans that are supported by a range of related plans, policies and programs that will primarily be developed prior to construction. However, timing is aligned with project phases and this is set out in the SIA.										
Stakeholders (Refer to SIA Table 3.3) that will partner with the proponent to deliver the SIA.										
SIA Plans	Related Plans / Policies / Programs referred to in SIA.									
	Good	Local	Training Programs: Graduate Support, Traineeships, Indigenous Apprenticeship		Buy Local			Fit for Work (Drug and Alcohol Policy & Fatigue	FIFO	Enquiry and
Housing and	●	●					●			
Workforce	●	●	●				●	●		
Regional Business				●	●					
Community Safety and Wellbeing Action Plan	●	●					●	●	●	
Stakeholder and Community	●				●					●
Landholder	●									●

Table 9.10.2 Management Plans

Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Environmental	Environmental Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	All Tier one stakeholders which includes Landholders (within MLA 70453 and along the Infrastructure Corridor) Indigenous groups and regulatory approval and advisory agencies.	The Environmental Management Plan will be implemented prior to commencement at the SGCP.	Environmental Management Plan (Section 9.11).
	Acid Mine Drainage Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Department of Natural Resources and Mines. Queensland Department of Environment and Heritage Protection. Barcaldine Regional Council.	The Acid Mine Drainage Management Plan will be implemented prior to commencement at the SGCP.	Acid Mine Drainage Management Plan (Section 9.10.1).
	Air Quality Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Department of Natural resources and Mines. Queensland Department of Environment and Heritage Protection. Barcaldine Regional Council.	The Air Quality Management Plan will be implemented prior to commencement at the SGCP.	Air Quality Management Plan (Section 9.10.2).
	Biodiversity Offset Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Commonwealth Department of the Environment. Queensland Department of Environment and Heritage Protection.	The Biodiversity Offset Management Plan will be implemented prior to commencement at the SGCP.	Biodiversity Offset Management Plan (Section 9.10.3).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Environment	Conservation Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Commonwealth Department of the Environment. Queensland Department of Environment and Heritage Protection. Barcaldine Regional Council.	The Conservation Management Plan will be implemented prior to commencement at the SGCP.	Conservation Management Plan (Section 9.10.4).
	Threatened Species Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Conservation Management Plan	The Threatened Species Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within the Conservation Management Plan (Section 9.10.4).
	Migratory Species Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Conservation Management Plan	The Migratory Species Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within the Conservation Management Plan (Section 9.10.4).
	Weed and Pest Animal Management. Plan	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Department of Agriculture, Fisheries and Forestry. Queensland Department of Environment and Heritage Protection. Queensland Health. Barcaldine Regional Council.	The Weed and Pest Animal Management Plan will be implemented prior to commencement at the SGCP.	Weed and Pest Animal Management Plan (Section 9.10.5).

Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Environment	Hazardous Materials Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Dangerous Goods and Hazardous Substances Management Plan	The Hazardous Materials Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within Dangerous Goods and Hazardous Substances Management Plan (Section 9.10.16).
	MNES Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Rail. Waratah Coal Pty Ltd. Hancock Prospecting Pty Ltd. Queensland Thermal Coal Pty Ltd. Australia Pacific LNG Pty Limited. Wangan Jagalingou People. Bidjara People # 3. Commonwealth Department of the Environment. Queensland Department of Environment and Heritage Protection. Queensland Department of Transport and Main Roads. Queensland Department of Agriculture, Fisheries and Forestry. Queensland Department of Natural Resources and Mines. Barcaldine Regional Council.	The MNES Management Plan will be implemented prior to commencement at the SGCP.	MNES Management Plan (Section 9.10.6).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Environment	Noise and Vibration Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Department of Environment and Heritage Protection.	The Noise and Vibration Management Plan will be implemented prior to commencement at the SGCP.	Noise and Vibration Management Plan (Section 9.10.7).
	Erosion and Sediment Control Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Department of Natural Resources and Mines. Queensland Department of Environment and Heritage Protection. Queensland Department of Agriculture, Fisheries and Forestry.	The Erosion and Sediment Control Plan will be implemented prior to commencement at the SGCP.	Erosion and Sediment Control Plan (Section 9.10.8).
	Rehabilitation Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Mine Closure Plan	The Rehabilitation Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within Mine Closure Plan (Section 9.10.13).
	Topsoil Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Mine Closure Plan	The Topsoil Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within Mine Closure Plan (Section 9.10.13).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Environment	Waste Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Department of Environment and Heritage Protection. Department of Natural Resources and Mines. Barraldine Regional Council.	The Waste Management Plan will be implemented prior to commencement at the SGCP.	Waste Management Plan (Section 9.10.9).
	Coal Rejects Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Department of Environment and Heritage Protection.	The Coal Rejects Management Plan will be implemented prior to commencement at the SGCP.	Coal Rejects Management Plan (Section 9.10.10).
	PAF Material Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Department of Environment and Heritage Protection. Queensland Department of Agriculture, Fisheries and Forestry. Queensland Health.	The PAF Management Plan will be implemented prior to commencement at the SGCP.	PAF Material Management Plan (Section 9.10.11).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Environment	Water Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Commonwealth Department of the Environment. Queensland Department of Environment and Heritage Protection. Queensland Department of Agriculture, Fisheries and Forestry	The Water Management Plan will be implemented prior to commencement at the SGCP.	Water Management Plan (Section 9.10.12).
	Surface Water Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Water Management Plan	The Surface Water Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within the Water Management Plan (Section 9.10.12).
	Groundwater Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Water Management Plan	The Groundwater Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within the Water Management Plan (Section 9.10.12).
	Waterways Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Water Management Plan	The Waterways Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within the Water Management Plan (Section 9.10.12).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Operational	Mine Closure Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Rail. Waratah Coal Pty Ltd. Hancock Prospecting Pty Ltd. Queensland Thermal Coal Pty Ltd. Australia Pacific LNG Pty Ltd. Wangan Jagalingou People. Bidjara People # 3. Commonwealth Department of the Environment. Queensland Department of Environment and Heritage Protection. Queensland Department of Natural Resources and Mines. Barcaldine Regional Council.	The Mine Closure Plan will be implemented prior to the commencement of the SGCP.	Mine Closure Plan (Section 9.10.13).
	Transport Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS	As Road Users Management Plan	The Transport Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within Road Users Management Plan (Section 9.10.14).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Environment	Road Users Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Department of Transport and Main Roads. Queensland Department of State Development, Infrastructure and Planning. Queensland Department of Natural Resources and Mines. Barcaldine Regional Council.	The Road Users Management Plan will be implemented prior to commencement at the SGCP.	Road Users Management Plan (Section 9.10.14).
	Decommissioning Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Mine Closure Plan	The Decommissioning Plan will be implemented prior to commencement at the SGCP.	Incorporated within Mine Closure Plan (Section 9.10.13).
Safety	Risk Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Barcaldine Regional Council. Queensland Department of Natural Resources and Mines. Queensland Department of Environment and Heritage Protection. Public Safety Business Agency.	The Risk Management Plan will be implemented prior to commencement at the SGCP.	Section 19.6 of the EIS.

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Safety	Emergency Response Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Barraldine Regional Council. Queensland Department of Natural Resources and Mines. Queensland Department of Environment and Heritage Protection. Queensland Health. Public Safety Business Agency. Queensland Police Service.	The Emergency Response Management Plan will be implemented prior to commencement at the SGCP.	Emergency Response Management Plan (Section 9.10.15), Section 19.5 of the EIS.
	Communication Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Emergency Response Management Plan	The Communication Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within Emergency Response Management Plan (Section 9.10.15).
	Dangerous Goods and Hazardous Substances Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Barraldine Regional Council. Queensland Health. Department of Transport and Main Roads. Queensland Department of Natural Resources and Mines. Queensland Department of Environment and Heritage Protection. Public Safety Business Agency	The Dangerous Goods and Hazardous Substances Management Plan will be implemented prior to commencement at the SGCP.	Dangerous Goods and Hazardous Substances Management Plan (section 9.10.16).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Safety	Bushfire Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	As Fire Management Plan	The Bushfire Management Plan will be implemented prior to commencement at the SGCP.	Incorporated within the Fire Management Plan (Section 9.10.17).
	Fire Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Barraldine Regional Council. Queensland Department of Natural Resources and Mines. Queensland Department of Environment and Heritage Protection. Public Safety Business Agency.	The Fire Management Plan will be implemented prior to commencement at the SGCP.	Fire Management Plan (Section 9.10.17).
	Tyre and Rim Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Department of Mines and Natural Resources.	The Tyre and Rim Management Plan will be implemented prior to commencement at the SGCP.	Tyre and Rim Management Plan (Section 9.10.18).
Community	Social Impact Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	All Tier one stakeholders which includes Landholders (within MLA 70453 and along the Infrastructure Corridor), indigenous groups and regulatory approval and advisory agencies.	The Social Impact Assessment will be implemented prior to commencement at the SGCP.	SIA (Section 9.14) , Appendix R in EIS.

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Community	Community and Stakeholder Engagement Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Department of Communities, Child Safety and Disability Services. Queensland Department of Environment and Heritage Protection.	The Community and Stakeholder Engagement Plan will be implemented prior to the commencement of the SGCP.	SIA (Section 9.14), Appendix R in EIS.
	Enquiries Grievances and Disputes 24hr Hotline.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek.	The Enquiries Grievances and Disputes 24hr Hotline will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Enquiries and Complaints Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek.	The Enquiries and Complaints Management Plan will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Complaint and Dispute Resolution Procedures.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Barcaldine Regional Council.	The Complaint and Dispute Resolution Procedures will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Community	SGCP website.	List current and proposed Project information about the SGCP to inform stakeholders and the wider community.	All stakeholders at the SGCP.	The SGCP website is currently live and updated on a regular basis with Project information.	http://www.southgalilee.com.au/
	Media Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Media Groups. Barcaldine Regional Council.	The Media Management Plan will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Landholder Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek.	The Landholder Management Plan has been completed and will be implemented prior to commencement of the SGCP.	SIA (Section 9.14), Appendix G of Appendix R in EIS.
	Land Access Agreements.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek.	The Land Access Agreements will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Community	Make Good Agreements.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Queensland Department of Environment and Heritage Protection.	The Make Good Agreements will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Land Acquisition Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek.	The Land Acquisition Plan will be implemented prior to commencement at the SGCP.	SIA (Section 9.14), Tenure Policy (Section 9.8).
	Housing and Accommodation Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Department of Education, Training and Employment. Queensland Department of Communities, Child Safety and Disability Services. Office of Economic and Statistical Research. Barralpine Regional Council.	The Housing and Accommodation Plan will be implemented prior to commencement at the SGCP.	SIA (Section 9.14), Appendix D of Appendix R in EIS.
	Good Neighbour Policy.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Department of Communities, Child Safety and Disability Services. Barralpine Regional Council. Queensland police Service.	The Good Neighbour Policy will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Community	Workforce Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Department of Education, Training and Employment. Queensland Department of Communities, Child Safety and Disability Services. Barrabine Regional Council.	The Workforce Management Plan will be implemented prior to commencement at the SGCP.	SIA (Section 9.14), Appendix B of Appendix R in EIS.
	Code of Conduct.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Barrabine Regional Council. Queensland Police Service.	The Code of Conduct will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Fit for Work (Drug and Alcohol) Policy.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Health. Public Safety Business Agency. Queensland Police Service.	The Fit for Work (Drug and Alcohol) Policy will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Fit for Work (Fatigue Management) Policy.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Health. Public Safety Business Agency. Queensland Police Service.	The Fit for Work (Fatigue Management) Policy will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Community	Accommodation Village Behaviour Policy.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Barcaldine Regional Council. Queensland Police Service.	The Accommodation Village Behaviour Policy will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	FIFO Workforce Family Support Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Department of Education, Training and Employment. Queensland Department of Communities, Child Safety and Disability Services. Barcaldine Regional Council.	The FIFO Workforce Family Support Plan will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Mining Family Support Group.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Department of Communities, Child Safety and Disability Services.	The Mining Family Support Group will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Workforce Quarantining Employees with Communicable Disease.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Health. Public Safety Business Agency. Barcaldine Regional Council.	The Workforce Quarantining Employees with Communicable Disease Policy will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Community	Local Employment Policy.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Department of Education, Training and Employment. Mining Industry Skills Centre. Barcaldine Regional Council and other surrounding Councils. Local training providers.	The Local Employment Policy will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Indigenous Liaison Officer.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Torres Strait Islander and Multi-cultural Affairs. Indigenous Groups/Organisations. Commonwealth Department of Employment. Job Services Australia.	The Indigenous Liaison Officer will be employed prior to commencement at the SGCP.	SIA (Section 9.14).
	Graduate Support Program.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Barcaldine Regional Council. Queensland Department of Education, Training and Employment. Central Western Regional Organisation of Councils. Local schools. Not-for-profit organisations/training providers.	The Graduate Support Program will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Traineeship Program.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Barcaldine Regional Council. Local schools. Queensland Department of Education, Training and Employment. Central Western Regional Organisation of Councils. Not-for-profit organisation/training providers.	The Traineeship Program will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Community	Indigenous Training Programs.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Indigenous Groups Barcaldine Regional Council. Local schools. Queensland Department of Education, Training and Employment. Central Western Regional Organisation of Councils. Not-for-profit organisation/training providers.	The Indigenous Training Programs will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Apprentice Programs.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Barcaldine Regional Council. Local schools. Queensland Department of Education, Training and Employment. Central Western Regional Organisation of Councils. Not-for-profit organisation/training providers.	The Apprentice Programs will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Employee Training and Development Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Department of Education, Training and Employment. Queensland Department of Communities, Child Safety and Disability Services. Barcaldine Regional Council.	The Employee Training and Development Plan will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Local Industry Participation Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Barcaldine Regional Council	The Local Industry Participation Plan will be implemented prior to commencement at the SGCP.	SIA (Section 9.14), Appendix R in EIS.

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Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Community	Local Content Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Queensland Department of State Development, Infrastructure and Planning. Industry Capability Network. Barrabool Regional Council.	The Local Content Plan will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Procurement Policy.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Contractors. Barrabool Regional Council. Local businesses. Queensland Department of State Development, Infrastructure and Planning. groups. Capability Network. Indigenous Industry	The Procurement Policy will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Local Supplier Register.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Barrabool Regional Council. Local businesses.	The Local Supplier Register will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).
	Buy Local Program - Black Business Finder.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Contractors. Barrabool Regional Council. Local Businesses. Queensland Department of State Development, Infrastructure and Planning. Indigenous Groups.	The Buy Local Program- Black Business Finder will be implemented prior to commencement at the SGCP.	SIA (Section 9.14).

Category	Plan Committed To	Purpose	Stakeholder	Timing	Location in AEIS
Community	Yearly Communication Planner.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within MLA 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Barraldine Regional Council. Queensland Department of Environment and Heritage Protection. Galilee Roundtable.	The Yearly Communication Planner will be implemented prior to commencement at the SGCP	SIA (Section 9.14)
	Cultural Heritage Management Plan.	Comply with relevant legislation and meet best practice management. Further develop commitments made in the SGCP EIS.	Landholders within Mining Lease Application area (MLA) 70453 or the infrastructure corridor excluding Creek Farm, Betanga and Sapling Creek. Wangan Jagalingou People. Queensland Bidjara People # 3. Department of Environment and Heritage Protection.	The Cultural Heritage Management Plan will be implemented prior to commencement at the SGCP.	Cultural Heritage Management Plan (Section 9.10.19).

9.10.3 Management Plans

MP10.1 Acid Mine Drainage Management Plan

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MP10.1.4	Management Measures	MP10.13
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MP10.1.5	Related Management Plans.....	MP10.13
MP10.1.6	Implementation	MP10.13
	Roles and Responsibilities	
	Training and Awareness	
MP10.1.7	Incident Reporting.....	MP10.13
MP10.1.8	Monitoring	MP10.13
MP10.1.9	Corrective Action	MP10.13
MP10.1.10	Management Plan Review	MP10.13
MP10.1.11	References.....	MP10.13

MP10.1.1 Introduction

This Acid Mine Drainage Management Plan (AMDMP) addresses the management and prevention of acid mine drainage (AMD) at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The AMDMP details management measures applicable to pre impacts in accordance with relevant legislation and government requirements.

This document provides a structure for the AMDMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

A description of the geology of the SGCP area is available in Section 7 of the SGCP EIS.

Technical assessments of the geochemistry of the SGCP are available in Appendix I of the SGCP EIS and in Section 9.6 of the AEIS.

MP10.1.2 Purpose

This AMDMP structure is provided in support of the SGCP AEIS. The purpose of the AMDMP is to:

- Comply with relevant legislation and meet best practice management; and
- To address comments made by:
 - Barcaldine Regional Council (BRC)

The AMDMP will be created to limit the occurrence and impact of AMD at the SGCP.

Key Stakeholders

Category	Stakeholder
	Queensland Department of Environment and Heritage Protection
	BRC

Legislation and Guidelines

The relevant legislation for the development of the AMDMP is provided below.

Environmental Protection Act 1994

As stated in the Act, “The object of this Act is to protect Queensland’s environment while allowing for develop that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecological sustainable development).”

Managing Acid and Metalliferous Drainage – Leading Practice Sustainable Development Program for the Mining Industry (2007).

Published by the Australian Government, Department of Tourism and Resources.

Timing

The AMDMP will be implemented prior to the commencement of the SGCP and management measures outlined within the AMDMP will be fulfilled over the entirety of the mine life, as required.

MP10.2 Air Quality Management Plan

Table of Contents

MP10.2.1	Introduction	MP10.2-2
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	Key Stakeholders	
	Legislation and Guidelines	
	Timing	
MP10.2.3	Management Measures	MP10.2-3
	Control Strategies	
	Mining Area	
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	Stockpiles	
	Haul Road	
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MP10.2.4	Implementation	MP10.2-3
	Roles and Responsibilities	
	Training and Awareness	
MP10.2.5	Incident Reporting.....	MP10.2-3
MP10.2.6	Monitoring	MP10.2-3
	Dust Gauges	
MP10.2.7	Corrective Action.....	MP10.2-3
MP10.2.8	Management Plan Review	MP10.2-3
MP10.2.9	References.....	MP10.2-3

MP10.2.1 Introduction

The Air Quality Management Plan (AQMP) addresses the management of air quality at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The AQMP details management measures applicable to air quality impacts in accordance with relevant legislation and government requirements.

This document provides a structure for the AQMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

Additional information on air quality at the SGCP can be found in Section 9.9 of the AEIS.

MP10.2.2 Purpose

This AQMP structure is provided in support of the SGCP AEIS. The purpose of the AQMP is to:

- Comply with relevant legislation and meet best practice management; and
- To address comments made by:
 - Barcaldine Regional Council (BRC).

Key Stakeholders

Category	Stakeholder
	Queensland Department of Environment and Heritage Protection
	BRC

Legislation and Guidelines

The relevant legislation for the development of the AMDMP is provided below.

Environmental Protection Act 1994

As stated in the Act, “The object of this Act is to protect Queensland’s environment while allowing for develop that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecological sustainable development).”

Environmental Protection (Air) Policy 2008

This Policy addresses environmental values to be protected, namely those conducive to:

- protecting the health and biodiversity of ecosystems,
- human health and well-being,
- protecting the aesthetics of the environment, including the appearance of buildings, structures and other property; and
- protecting agricultural use of the environment.

The National Environmental Protection Measure (Air) 2003

This Measure was developed by the National Environment Protection Council. The desired environmental outcome of the measure is to provide ambient air quality that allows for the adequate protection of human health and well-being.

Australian Standard 3580

AS3580: Methods for Sampling and Analysis of Ambient Air – Method 10.1: Determination of Particulate Matter – Deposited Matter – Gravimetric Method

Timing

The AMDMP will be implemented prior to the commencement of the SGCP and management measures outlined within the AMDMP will be fulfilled over the entirety of the mine life, as required.

MP10.4 Conservation Management Plan

Table of Content

MP10.4.1	Introduction	MP10.4-2
	Background	
MP10.4.2	Purpose.....	MP10.4-2
	Key Stakeholders	
	Legislation and Guidelines	
	Timing	
MP10.4.3	Conservation Values	MP10.4-3
MP10.4.4	Threatened Species Management.....	MP10.4-3
	Land Clearance	
	Fauna Spotter Catcher	
	Hollow Bearing Trees	
	Timing	
	Remnant Vegetation Management	
	Cattle Exclusion	
	Revegetation	
	Staged Rehabilitation	
	Altered Fire Regime	
MP10.4.5	Migratory Species Management	
MP10.4.6	Implementation	
	Roles and Responsibilities	
	Training and Awareness	
MP10.4.7	Incident Reporting	
MP10.4.8	Monitoring	
MP10.4.9	Corrective Action	
MP10.4.10	Management Plan Review	

MP10.4.1 Introduction

This Conservation Management Plan (CMP) addresses conservation matters at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The CMP details conservation management measures in accordance with relevant legislation and government requirements.

This document provides a structure for the CMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

The terrestrial, aquatic and subterranean ecology of the SGCP is described in Chapter 8 of the SGCP EIS. Terrestrial Ecology is further described in Appendix N of the SGCP EIS, and Aquatic Ecology in Appendix O of the SGCP EIS.

Additional ecological analysis is presented in Section 9.13 of the AEIS. Additional information on Rehabilitation at the SGCP can be found in Section 9.7 of the AEIS.

A Biodiversity Offsets Management Plan has also been compiled in support of the AEIS.

MP10.4.2 Purpose

The CMP structure is provided in support of the SGCP AEIS. The purpose of the CMP is to comply with relevant legislation and meet best practice management.

Key Stakeholders

Category	Stakeholder
Government departments and advisory agencies	Australian Government Department of the Environment
	Queensland Department of Environment and Heritage Protection

Legislation and Guidelines

The relevant legislation for the development of the CMP is provided below.

Environment Protection and Biodiversity Conservation Act 1999

The Act is the key piece of Commonwealth legislation to protect and manage important flora, fauna and ecological communities. The Act provides for the identification and management of matters of national environmental significance, including threatened flora and fauna species, ecological communities, migratory animals protected under the China-Australia Migratory Bird Agreement (CAMBA), migratory birds protected under the Japan-Australia Migratory Bird Agreement (JAMBA) and the Bonn Convention, wetlands of international importance (Ramsar) and critical habitat areas. Under the Act, an action will require approval from the Federal Environment Minister if the action has, will have, or is likely to have a significant impact on a matter of national environmental significance.

Environmental Protection Act 1994

The Act regulates environmental management and aims to achieve ecologically sustainable development. The Act outlines legal obligations and the duty of care all persons have to the environment and directions for preparing environmental protection policies.

Biodiversity Offset Policy 2011

The Policy provides a framework to increase the long-term protection and viability of the state's biodiversity values where residual impacts from a development, on an area containing State significant biodiversity values, cannot be avoided.

Fisheries Act 1994

The Act provides a framework for the management, use and protection of fishery resources in Queensland. This includes fish resources and fish habitats.

Land Protection (Pest and Stock Route Management) Act 2002

The Act imposes a legal responsibility for, and provides directives to, control of weeds and pest animals by all landholders on land under their management.

Nature Conservation Act 1992

The Act regulates native flora, fauna and habitat conservation within Queensland.

Vegetation Management Act 1999

The Act provides a planning framework for the management of native vegetation across Queensland. It regulates clearing of vegetation and aims to conserve Queensland's biodiversity through vegetation management.

Water Act 2000

The Act regulates the management of water resources and water authorities to achieve sustainable use of water in Queensland.

Timing

The AMDMP will be implemented prior to the commencement of the SGCP and management measures outlined within the AMDMP will be fulfilled over the entirety of the mine life, as required.

MP10.5 Weed and Pest Animal Management Plan

Table of Contents

MP10.5.1	Introduction	MP10.5-3
	Background	
MP10.5.2	Purpose.....	MP10.5-3
	Key Stakeholders	
	Legislation	
	Queensland Legislation	
	Environmental Protection Act 1994	
	Local Government Legislation	
	Timing	
MP10.5.3	Potential Impacts	MP10.5-5
	Potential Weed Impacts	
	Potential Pest Animals	
MP10.5.4	Management Measures	MP10.5-5
	Weed Management	
	Weed Hygiene and Prevention Program	
	Manual Removal	
	Herbicide Application	
	Vehicle Movement	
	Integration Weed Management	
	Pest Animal Management	
	Baiting	
	Trapping	
	Integrated Pest Animal Management	
MP10.5.5	Implementation	MP10.5-5
	Roles and Responsibilities	
	Training and Awareness	
MP10.5.6	Incident Reporting	MP10.5-5
MP10.5.7	Monitoring	MP10.5-5
	Short Term Monitoring	
	Long Term Monitoring	

MP10.5.8	Corrective Actions	MP10.5-5
MP10.5.9	Management Plan Review	MP10.5-5

MP10.5.1 Introduction

This Weed and Pest Animal Management Plan (WPAMP) addresses the management of weeds and pest animals at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The WPAMP details management measures applicable to weeds and pest animals that may be found within the SGCP and describes how they will be managed in accordance with the Land Protection (Pest and Stock Route Management) Act 2002 (LP Act) and local government requirements for weeds not declared under the state legislation.

This document provides a structure for the WPAMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

MP10.5.2 Purpose

This WPAMP structure is provided in support of the SGCP AEIS. The purpose of the WPAMP is to:

- Accord with the Barcaldine Regional Council- Pest Management Plan;
- Comply with relevant legislation and meet best practice management; and
- To address comments on the SGCP EIS made by:
 - Queensland Department of Agriculture, Fisheries and Forestry (DAFF);
 - Queensland Health (QH); and
 - Barcaldine Regional Council (BRC)

Key Stakeholders

Stakeholders which are relevant to the WPAMP include the following:

Category	Stakeholder
Landholders within Mining Lease Application area (MLA) 70453 or the infrastructure corridor. The list of landholders excludes the properties (Creek Farm, Betanga and Sapling Creek) which will be acquired by the Proponent. Refer to Section 9.8-Tenure Policy.	Chesalon
	Armagh
	Tallarenha
	Oakleigh
	Saltbush
	Gadwell
	Mentmore
	Monklands
	Tressilian
Government departments and advisory agencies	DAFF
	Queensland Department of Environment and Heritage Protection
	QH
	BRC

Legislation

The relevant legislation for the development of the WPAMP is provided below.

Queensland Legislation

Land Protection (Pest and Stock Route Management) Act 2002 and Land Protection (Pest and Stock Route Management) Regulation 2003

The LP Act and the Land Protection (Pest and Stock Route Management) Regulation 2003 (LP Regulation) provides for management of weeds and animal pests in Queensland.

Declared pest and weeds are listed under three classes:

- Class 1 pest or weed is a species that has the potential of having serious agricultural, environmental or social impacts;
- Class 2 pest or weed is a species that has spread over substantial areas of Queensland but have serious impacts on agricultural, environmental or social aspects; and
- Class 3 pest or weed is a species that is commonly established in Queensland. The primary objective is to prevent the sale of listed species.

Landholders have an obligation to control Class 1 and 2 declared pests and weeds that are known to occur on their property and to control Class 3 pests and weeds when their property is adjacent to environmentally significant areas.

Nature Conservation Act 1992 and Nature Conservation (Wildlife) Regulation 2006

The Nature Conservation Act 1992 (NC Act) provides for the conservation and management of Queensland's native flora and fauna. The Act prohibits the taking or destruction, without authorisation, of certain listed flora and fauna species.

The Nature Conservation (Wildlife) Regulation 2006 (NC Regulation) lists the flora and fauna species presumed extinct in the wild, endangered, vulnerable, near threatened, least concern, international and prohibited. It states the declared management intent and the principles to be observed in any taking of or destruction for each group.

Environmental Protection Act 1994

Under the Environmental Protection Act 1994 (EP Act) and the Environmental Protection Regulation 2008 (EP Regulation) certain environmental features are protected within mining lease areas. These are termed 'environmentally sensitive areas' and include such features as national parks, conservation reserves, wetlands of international importance, heritage places and endangered regional ecosystems (EREs).

Local Government Legislation

The BRC has endorsed the BRC Pest Management Plan 2010-2014, which outlines a four year strategy and focuses on integrated pest plant and animal control across the entire BRC area.

The SGCP will consult with BRC regarding pest and weed management strategies.

Timing

The BRC has endorsed the BRC Pest Management Plan 2010-2014, which outlines a four year strategy and focuses on integrated pest plant and animal control across the entire BRC area.

The SGCP will consult with BRC regarding pest and weed management strategies.

MP10.5.3 Potential Impacts

[Potential Weed Impacts](#)

[Potential Pest Animals](#)

MP10.5.4 Management Measures

[Weed Management](#)

Weed Hygiene and Prevention Program

Manual Removal

Herbicide Application

Vehicle Movement

Integration Weed Management

[Pest Animal Management](#)

Baiting

Trapping

Integrated Pest Animal Management

MP10.5.5 Implementation

[Roles and Responsibilities](#)

[Training and Awareness](#)

MP10.5.6 Incident Reporting

MP10.5.7 Monitoring

[Short Term Monitoring](#)

[Long Term Monitoring](#)

MP10.5.8 Corrective Actions

MP10.5.9 Management Plan Review

MP10.6 MNES Management Plan

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MP10.6.1	Introduction	MP10.6-3
	Background	
MP10.6.2	Purpose.....	MP10.6-3
	Key Stakeholders	
	Legislation	
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MP10.6.3	MNES Relevant to SGCP	MP10.6-4
	Migratory Species	
	Water Resources	
MP10.6.4	Potential Impacts on MNES	MP10.6-4
	Assessment of Flora and Fauna Impacts	
	Nationally Threatened Species and Ecological Communities	
	Migratory Species	
	Assessment of Water Resources Impacts	
	Surface Water	
	Groundwater	
MP10.6.5	Management of MNES.....	MP10.6-4
	Flora and Fauna Management	
	Nationally Threatened Species and Ecological Communities	
	Migratory Species	
	Biodiversity Offset Management	
	Water Resources Management	
	Surface Water	
	Groundwater	
MP10.6.6	Implementation	MP10.6-4
	Roles and Responsibilities	
	Training and Awareness	
MP10.6.7	Incident Reporting	MP10.6-4
MP10.6.8	Monitoring	MP10.6-4

MP10.6.9	Corrective Actions	MP10.6-4
MP10.6.10	Management Plan Review	
MP10.6.11	Related Management Plans.....	
	Biodiversity Offset Management Plan	
	Water Management Plan	
MP10.6.12	References.....	

MP10.6.1 Introduction

This Matters of National Environmental Significance (MNES) Management Plan (MNESMP) addresses the management of MNES at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The MNESMP details management measures applicable to MNES in accordance with relevant legislation and government requirements.

This document provides a structure for the MNESMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

A description of matters of national environmental significance is outlined in Section 9.13 of the AEIS.

MP10.6.2 Purpose

This MNESMP structure is provided in support of the SGCP AEIS. The purpose of the MNESMP is to:

- Comply with relevant legislation and meet best practice management; and
- To address comments on the SGCP EIS made by:
 - Commonwealth Department of the Environment (DoE).

Key Stakeholders

Category	Stakeholder
Government departments and advisory agencies	DoE
	Queensland Department of Environment and Heritage Protection
	Queensland Department of Agriculture, Fisheries and Forestry

Legislation

The relevant legislation for the development of the MNESMP is provided below.

Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as matters of national environmental significance.

The nine MNES are:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed);
- Nationally threatened species and ecological communities;
- Migratory species;

- Commonwealth marine areas;
- The Great Barrier Reef Marine Park;
- Nuclear actions (including uranium mining); and
- A water resource, in relation to coal seam gas development and large coal mining development.

Timing

The MNESMP will be implemented prior to the commencement of the SGCP and management measures outlined within the MNESMP will be fulfilled over the entirety of the mine life, as required.

MP10.7 Noise and Vibration Management Plan

Table of Contents

MP10.7.1	Introduction	MP10.7-2
MP10.7.2	Purpose.....	MP10.7-2
MP10.7.3	Potential Impacts	MP10.7-3
MP10.7.4	Management Measures	MP10.7-3
	Mine Noise	
	Railway Noise	
	Blasting Noise	
	Accommodation Village	
	Blasting Vibration	
MP10.7.5	Implementation	MP10.7-3
MP10.7.6	Incident Reporting	MP10.7-3
MP10.7.7	Monitoring	MP10.7-3
MP10.7.8	Corrective Actions	MP10.7-3
MP10.7.9	Management Plan Review	MP10.7-3
MP10.7.10	References.....	MP10.7-3

MP10.7.1 Introduction

This Noise and Vibration Management Plan (NVMP) addresses the management of noise and vibration at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The NVMP details management measures applicable to noise and vibration impacts at the SGCP and describes how they will be managed in accordance with relevant legislation and government requirements.

This document provides a structure for the NVMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

Additional information on noise and vibration is presented in Section 9.9 of the AEIS.

MP10.7.2 Purpose

This NVMP structure is provided in support of the SGCP AEIS. The purpose of the NVMP is to:

- Comply with relevant legislation and meet best practice management; and
- To address comments on the SGCP EIS made by:
 - Queensland Department of Environment and Heritage Protection (DEHP).

Key Stakeholders

Stakeholders which are relevant to the NVMP include the following:

Category	Stakeholder
Government departments and advisory agencies	DEHP

Legislation

The relevant legislation for the development of the NVMP is provided below.

Environmental Protection (Noise) Policy 2008

The Environmental Protection Act 1994 provides a framework for the management of noise in Queensland. Acoustic environmental values to be enhanced or protected within the state of Queensland are specifically identified in the Queensland Environmental Protection (Noise) Policy 2008 (EPP (Noise)). These values include:

- the protection of human health and wellbeing by ensuring a suitable acoustic environment for individuals
- the protection of the amenity of the community
- the protection of the health and biodiversity of ecosystems.

The EPP (Noise) came into effect on 1 January 2009. There are two main considerations for the SGCP from the EPP (Noise), namely:

- acoustic quality objective (noise levels that are conducive to human health and wellbeing, ensuring a suitable acoustic environment for individuals to sleep, study or learn, be involved in recreation, including relaxation and conversation; and preserve

the qualities of the acoustic environment that are conducive to protecting the amenity of the community)

- controlling background creep.

Timing

This NVMP will be implemented prior to the commencement of the SGCP and management measures outlined within the NVMP will be fulfilled over the entirety of the mine life, as required.

MP10.9 Waste Management Plan

Table of Contents

MP10.9.1	Introduction	MP10.9-2
	Background	
MP10.9.2	Purpose.....	MP10.9-2
	Key Stakeholders	
	Legislation	
	Timing	
MP10.9.3	Waste Characterisation	
MP10.9.4	Waste Management	
	Waste Management Hierarchy	
	General Waste Management Strategy	
	Waste Minimisation	
	Regulated Waste Segregation and Storage	
	Waste Tracking Systems	
	Waste Contractor	
	Regulated Waste Disposal	
MP10.9.5	Implementation	
MP10.9.6	Incident Reporting	
MP10.9.7	Monitoring	
MP10.9.8	Corrective Actions	
MP10.9.9	Management Plan Review	
MP10.9.10	References.....	

MP10.9.1 Introduction

This Waste Management Plan (WasteMP) addresses the management of wastes at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The WasteMP details management measures applicable to waste impacts in accordance with relevant legislation and government requirements.

This document provides a structure for the WasteMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

MP10.9.2 Purpose

This WasteMP structure is provided in support of the SGCP AEIS. The purpose of the WasteMP is to:

- Comply with relevant legislation and meet best practice management; and
- To address comments on the SGCP EIS made by:
 - Queensland Department of Environment and Heritage Protection (DEHP);
 - Queensland Department of Natural Resources and Mines (DNRM); and
 - Barcaldine Regional Council (BRC).

Key Stakeholders

Stakeholders relevant to the WasteMP include the following:

Category	Stakeholder
Government departments and advisory agencies	DEHP
	DNRM
	BRC

Legislation

The relevant legislation for the development of the WasteMP is provided below.

Environmental Protection Act 1994

The object of the Environmental Protection Act (EP Act) is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

Environmental Protection (Waste) Policy (EPP Waste) 2000

The purpose of the EPP Waste is to achieve the object of the EP Act in relation to the protection of the environment by minimising the impact of waste and by establishing an integrated framework for minimising and managing waste under the principles of ecologically sustainable development.

The goal of the EEP Waste is to:

- Reduce the actual and potential impacts on human health and the environment caused by waste;
- Establish an integrated framework for the minimisation and management of waste in accord with the principles of ecologically sustainable development;

- Reduce the overall quantity and toxicity of waste generated by households, and the community;
- Promote efficiency in the use of resources; and
- Achieve continuous improvement in the standard of waste management activities, public and private.

Waste Reduction and Recycling Act 2011

The object of the Waste Reduction and Recycling Act 2011 include the following:

- To promote waste avoidance and reduction, and resource recovery and efficiency actions;
- To reduce the consumption of natural resources and minimise the disposal of waste by encouraging waste avoidance and the recovery, reuse and recycling of waste;
- To minimise the overall impact of waste generation and disposal;
- To ensure a shared responsibility between government, business and industry and the community in waste management and resource recovery; and
- To support and implement national frameworks, objectives and priorities for waste management and resource recovery.

Timing

The WasteMP will be implemented prior to the commencement of the SGCP and management measures outlined within the WasteMP will be fulfilled over the entirety of the mine life, as required.

MP10.10 Coal Rejects Management Plan

Table of Contents

MP10.10.1	Introduction	MP10.10-3
	Background	
MP10.10.2	Purpose.....	MP10.10-3
	Key Stakeholders	
	Legislation	
	Timing	
MP10.10.3	Coal Rejects Processing	
MP10.10.4	Coal Rejects Characterisation	
MP10.10.5	Coal Rejects Management Measures	
	Coal Rejects Handling	
	Coal Rejects Movement	
	Coal Rejects Cover Design	
	Cover Design	
	Cover Integrity	
	Coal Rejects Cover	
	Runoff	
	Revegetation	
	Erosion Control	
MP10.10.6	Implementation	
	Roles and Responsibilities	
	Training and Awareness	
MP10.10.7	Incident Reporting	
MP10.10.8	Monitoring	
MP10.10.9	Corrective Actions	
MP10.10.10	Management Plan Review	

MP10.10.11	Related Management Plans.....
	Acid Rock Drainage Management Plan
	PAF Material Management Plan
MP10.10.12	References.....

MP10.10.1 Introduction

This Coal Rejects Management Plan (CRMP) addresses the management of coal rejects at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The CRMP details management measures applicable to coal rejects in accordance with relevant legislation and government requirements.

This document provides a structure for the CRMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

A description of the geochemical properties of coal rejects material at the SGCP is outlined in Section 9.6 of the AEIS.

MP10.10.2 Purpose

This CRMP structure is provided in support of the SGCP AEIS. The purpose of the CRMP is to:

- Comply with relevant legislation and meet best practice management; and
- To address comments on the SGCP made by:
 - Queensland Department of Environment and Heritage Protection (DEHP).

Key Stakeholders

Stakeholders relevant to the CRMP include the following:

Category	Stakeholder
Government departments and advisory agencies	DEHP

Legislation

The relevant legislation for the development of the CRMP is provided below.

Environmental Protection Act 1994

As stated in the Environmental Protection Act (EP Act), “The object of this Act is to protect Queensland’s environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecological sustainable development).”

The CRMP for the SGCP will be developed in accordance with the requirements of the EP Act.

Timing

The CRMP will be implemented prior to the commencement of the SGCP and management measures outlined within the CRMP will be fulfilled over the entirety of the mine life, as required.

MP10.11 PAF Material Management Plan

Table of Contents

MP10.11.1	Introduction	MP10.11-2
MP10.11.2	Purpose.....	MP10.11-2
MP10.11.3	Geochemical Characterisation	
MP10.11.4	Geological Setting	
MP10.11.5	PAF Management Measures	
	Cover Design	
	Cover Integrity	
	PAF Cells Cover	
MP10.11.6	Implementation	
MP10.11.7	Incident Reporting	
MP10.11.8	Monitoring	
MP10.11.9	Corrective Actions	
MP10.11.10	Management Plan Review	
MP10.11.11	Related Management Plans.....	
MP10.11.12	References.....	

MP10.11.1 Introduction

This Potentially Acid Forming (PAF) Material Management Plan (PAFMMP) addresses the management of PAF material at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The PAFMMP details management measures applicable to PAF material in accordance with relevant legislation and government requirements.

This document provides a structure for the PAFMMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

A description of the geochemical properties of PAF material at the SGCP is outlined in Section 9.6 of the AEIS.

MP10.11.2 Purpose

This PAFMMP structure is provided in support of the SGCP AEIS. The purpose of the PAFMMP is to:

- Accord with the Managing Acid and Metalliferous Drainage- Leading Practice Sustainable Development Program for the Mining Industry (DITR, 2007);
- Comply with relevant legislation and meet best practice management; and
- To address comments on the SGCP EIS made by:
 - Queensland Department of Environment and Heritage Protection (DEHP).

Key Stakeholders

Stakeholders relevant to the PAFMMP include the following:

Category	Stakeholder
Government departments and advisory agencies	DEHP

Legislation

The relevant legislation for the development of the PAFMMP is provided below.

Environmental Protection Act 1994

As stated in the Environmental Protection Act (EP Act), “The object of this Act is to protect Queensland’s environment while allowing for develop that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecological sustainable development).”

The PAFMMP for the SGCP will be developed in accordance with the requirements of the EP Act.

Timing

The PAFMMP will be implemented prior to the commencement of the SGCP and management measures outlined within the PAFMMP will be fulfilled over the entirety of the mine life, as required.

MP10.13 Mine Closure Plan

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	Flora and Fauna	
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	Methodology	
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Rehabilitation Plan

Rehabilitation Methodology

Decommissioning

Hazardous Materials

Contaminated Land

Soil Management

Erosion and Sediment Control

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Rehabilitation Performance Criteria

MP10.13.8 Topsoil Management

Topsoil Stripping and Handling

Respreding Topsoil

MP10.13.9 Closure Strategy

Infrastructure Areas

Conceptual Closure Plan

Current Closure Status

Proposed Actions

Stockpiles

Conceptual Closure Plan

Current Closure Status

Proposed Actions

Final Low Wall, Void and Ramps

Conceptual Closure Plan

Current Closure Status

Proposed Actions

Water Management Structures

Conceptual Closure Plan

Current Closure Status

Proposed Actions

Waste Rock Emplacement Facility

Conceptual Closure Plan

Current Closure Status

Proposed Actions

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Stakeholder Consultation

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Sudden Closure

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MP10.13.13	Monitoring and Reporting.....
MP10.13.14	Corrective Actions
MP10.13.15	Management Plan Review
MP10.13.16	References.....

MP10.13.1 Introduction

This Mine Closure Plan (MCP) addresses the management of mine closure at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The MCP details management measures applicable to mine closure, decommissioning and rehabilitation in accordance with relevant legislation and government requirements.

This document provides a structure for the MCP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

MP10.13.2 Purpose

This MCP structure is provided in support of the SGCP AEIS. The purpose of the MCP is to:

- Comply with relevant legislation and meet best practice management; and
- To address comments on the SGCP EIS made by:
 - Queensland Department of Environment and Heritage Protection (DEHP); and
 - Queensland Department of Natural Resources and Mines (DNRM).

Key Stakeholders

Stakeholders relevant to the MCP include the following:

Category	Stakeholder
Landholders within Mining Lease Application area (MLA) 70453 or the infrastructure corridor. The list of landholders excludes the properties (Creek Farm, Betanga and Sapling Creek) which will be acquired by the Proponent. Refer to Section 9.8-Tenure Policy.	Chesalon
	Armagh
	Tallarenha
	Oakleigh
	Saltbush
	Gadwell
	Mentmore
	Monklands
	Tressilian
	Queensland Rail
	Waratah Coal Pty Ltd
	Hancock Prospecting Pty Ltd
	Queensland Thermal Coal Pty Ltd
	Australia Pacific LNG Pty Limited
Indigenous Traditional Owners	Wangan Jagalingou People
	Bidjara People # 3
Government departments and advisory agencies	Commonwealth Department of the Environment
	DEHP
	DNRM
	Barcaldine Regional Council

Legislation

The relevant legislation for the development of the MCP is provided below.

Environmental Protection Act 1994

As stated in the Environmental Protection Act (EP Act), “The object of this Act is to protect Queensland’s environment while allowing for develop that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecological sustainable development).”

The Closure Plan for the SGCP will be developed in accordance with the requirements of the EP Act.

Mineral Resources Act 1989

The principal objectives of the Mining Resources Act are to—

- Encourage and facilitate prospecting and exploring for and mining of minerals;
- Enhance knowledge of the mineral resources of the State;
- Minimise land use conflict with respect to prospecting, exploring and mining;
- Encourage environmental responsibility in prospecting, exploring and mining;
- Ensure an appropriate financial return to the State from mining;
- Provide an administrative framework to expedite and regulate prospecting and exploring for and mining of minerals; and
- Encourage responsible land care management in prospecting, exploring and mining.

Environmental Protection (Waste Management) Regulation 2000

The goal of the Environmental Protection (Waste Management) Regulation is to achieve the objective of the Environmental Protection Act 1994 in relation to waste management. The Waste Management Regulation states “ the object of this regulation is to protect the environment by (a) minimising the impact of waste on the environment including, in particular, the impact of waste so far as it directly affects human health; and (b) establishing an integrated framework for minimising the managing waste under the principle of ecological sustainable development.”

Environmental Protection (Air) Policy 2008

The purpose of the Environmental Protection (Air) Policy is to achieve the objective of the Environmental Protection Act 1994 in relation to air environment. The purpose of the Air Policy is achieved by—

- Identifying environmental values to be enhanced or protected;
- Stating indicators and air quality objectives for enhancing or protecting the environmental values; and
- Providing a framework for making consistent, equitable and informed decisions about the air environment.

Environmental Protection (Water) Policy 2009

The purpose of the Environmental Protection (Water) Policy is to achieve the objective of the Environmental Protection Act 1994 in relation to Queensland waters. The purpose of the Water Policy is achieved by—

- Identifying environmental values and management goals for Queensland waters;

- Stating water quality guidelines and water quality objectives to enhance or protect the environmental values;
- Providing a framework for making consistent, equitable and informed decisions about Queensland waters; and
- Monitoring and reporting on the condition of Queensland waters.

Timing

The MCP will be implemented prior to the commencement of the SGCP and management measures outlined within the MCP will be fulfilled over the entirety of the mine life, as required.

MP10.14 Road Users Management Plan

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MP10.14.8	Implementation
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MP10.14.10	Monitoring
MP10.14.11	Corrective Actions
MP10.14.12	Management Plan Review
MP10.14.13	References.....

MP10.14.1 Introduction

This Road User Management Plan (RUMP) addresses the management of traffic and transport infrastructure at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The RUMP details management measures applicable to Road User impacts in accordance with relevant legislation and government requirements.

This document provides a structure for the RUMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

A description of relevant transport and transport infrastructure conditions associated with the SGCP is included in Section 9.12 of the AEIS.

MP10.14.2 Purpose

This RUMP structure is provided in support of the SGCP AEIS. The aims of the RUMP are to:

- Comply with relevant legislation and meet best practice management; and
- To address comments made by:
 - Queensland Department of Transport and Main Roads (DTMR)
 - Queensland Department of State Development, Infrastructure and Planning
 - Barcaldine Regional Council (BRC)

The RUMP will be developed in consultation with DTMR and other stakeholders and implemented for the mine development works so as to manage or mitigate potential hazards/impacts to the surrounding community.

Key Stakeholders

Stakeholders relevant to the RUMP include the following:

Category	Stakeholders
Government	DTMR
	Queensland Department of State Development Infrastructure and Planning
	Queensland Department of Natural Resources and Mines
	BRC

Legislation

The relevant legislation for the development of the RUMP is provided below.

Transport Infrastructure Act 1994

The objectives of the Transport Infrastructure Act 1994 (TI Act) are to permit and promote integrated planning and management of transport infrastructure. It outlines the various regimes for all modes of transport including air, rail, sea, bus ways and light rail. It is the primary legislation administered by DTMR in that it sets out the powers DTMR has for

managing the State Controlled Road (SCR) network. A permit is required under this Act if there is interference proposed with an SCR.

Transport Operation (Road Use Management) Act 1995

The overall objectives of the Transport Operation (Road Use Management) Act 1995 (TO Act) are to provide for the effective and efficient management of road use in Queensland and to provide a scheme that will promote the effective and efficient movement of people, goods and services.

The TO Act seeks to contribute to the strategic management of road infrastructure in ways consistent with the TI Act. It also provides mechanisms to improve road safety and the environmental impact of road use in ways that contribute to overall transport effectiveness and efficiency.

Transport Planning and Coordination Act 1994

The objectives of the Transport Planning and Coordination Act 1994 (TPC Act) are to improve the economic, trade and regional development performance of Queensland, and the quality of life of people living in Queensland by achieving overall transport effectiveness and efficiency through strategic planning and management of transport resources.

Guidelines for Assessment of Road Impacts of Developments

The purpose of the Guidelines for Assessment of Road Impacts of Developments (GARID) (Department of Transport and Main Roads (DTMR), 2006) is to assist industry to assess the road impacts of their development proposals. While use of the GARID is not mandatory, they provide the basis for open and expeditious dealings between developers and DTMR on road issues.

Timing

The RUMP will be implemented prior to the commencement of the SGCP and management measures outlined within the RUMP will be fulfilled over the entirety of the mine life, as required.

MP10.15 Emergency Response Management Plan

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Roles and Responsibilities

Training and Awareness

MP10.15.17	Incident Reporting
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MP10.15.20	Management Plan Review
MP10.15.21	References.....

MP10.15.1 Introduction

The Emergency Response Management Plan (ERMP) addresses the management of emergencies at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The ERMP details management measures required in preparation for – and implementation during – emergency situations in accordance with relevant legislation and government requirements.

This document provides a structure for the ERMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

Information on hazard and risk is presented in Section 19 of the SGCP Environmental Impact Statement (EIS). Information on risks posed by climatic conditions and natural hazards is provided in Section 6 of the SGCP EIS.

MP10.15.2 Purpose

This ERMP structure is provided in support of the SGCP AEIS to address comments made by:

The aims of the ERMP are to:

- Comply with relevant legislation and meet best practice management; and
- To address comments made in response to the SGCP EIS by:
 - Barcaldine Regional Council (BRC).

Key Stakeholders

Stakeholders relevant to the ERMP include the following:

Category	Stakeholders
Government	Queensland Department of Natural Resources and Mines
	Queensland Department of Environment and Heritage Protection
	Public Safety Business Agency
	Queensland Health
	Queensland Police Service

Legislation

The relevant legislation for the development of the ERMP is provided below.

Coal Mining Safety and Health Act 1999

This Act aims to protect the safety and health of persons at coal mines as well as persons who may be affected by coal mining operations. It requires that the risk of injury or illness to any person resulting from coal mining operations be at an acceptable level and aims to provide a way of monitoring the effectiveness and administration of provisions relating to

health and safety.

Coal Mining Health and Safety Regulation 2001

This Regulation provides a regulatory framework to ensure that the management of safety and health at Queensland coal mines incorporates, risk identification and assessment, hazard analysis, hazard management and control as well as reporting and recording important safety and health information data.

Explosives Act 1999

This Act provides the legislative requirements for the safe handling, storage, transport and manufacturing of explosives.

Explosives Regulation 2003

This Regulation provides specific limits and requirements for the safe handling, storage, transport and manufacturing of explosives.

AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines

This standard provides a generic guide for managing risk and specifies the elements of the risk management process. As this is a generic guidance document, the particular characteristics of the SGCP form a key component in the application of the Standard and the assessment of hazards and risks associated with the SGCP.

AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids:

This standard sets out the requirements and recommendations for the safe storage handling of flammable liquids and dangerous goods Class 3, as classified in the United Nations (UN) Recommendations for the Transport of Dangerous Goods. The Standard also provides requirements and recommendations for the storage and handling of combustible liquids and provides minimum acceptable safety requirements for storage facilities, operating procedures, emergency planning and fire protection. It provides technical guidance that may assist in the storage and handling of flammable and combustible liquids.

AS 2187.1/1-2000 Explosives– Storage, Transport and Use – Storage

This standard establishes requirements and precautions for the storage of explosives, including pyrotechniques as defined in AS 2187.2:1998 and for the location, design, construction and maintenance of magazines.

AS 2187.2:2006 Explosives – Storage and Use – Use of Explosives

This standard provides the requirements and precautions for the use of factory-made, commercially available explosives and certain explosives mixed or assembled at sites.

Timing

The ERMP will be implemented prior to the commencement of the SGCP and management measures outlined within the ERMP will be fulfilled over the entirety of the mine life, as required.

MP10.16 Dangerous Goods and Hazardous Materials Management Plan

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MP10.16.4	Communication	
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MP10.16.9	Incident Reporting	
MP10.16.10	Monitoring	
MP10.16.11	Corrective Actions	
MP10.16.12	Management Plan Review	
MP10.16.13	References.....	

MP10.16.1 Introduction

This Dangerous Goods and Hazardous Materials Management Plan (DGHMMP) addresses the management of dangerous goods and hazardous materials at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The DGHMMP details management measures applicable to risks and potential impacts related to dangerous goods and hazardous materials in accordance with relevant legislation and government requirements.

This document provides a structure for the DGHMMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

MP10.16.2 Purpose

This DGHMMP structure is provided in support of the SGCP AEIS. The purpose of the DGHMMP is to:

- Comply with relevant legislation and meet best practice management; and
- To address comments made in response to the SGCP EIS by:
 - Queensland Health (QH);
 - Queensland Department of Transport and Main Roads (DTMR); and
 - Barcaldine Regional Council (BRC).

Key Stakeholders

Stakeholders relevant to the DGHMMP include the following:

Category	Stakeholders
Government departments and advisory agencies	BRC
	QH
	DTMR
	Queensland Department of Natural Resources and Mines
	Queensland Department of Environment and Heritage Protection
	Public Safety Business Agency

Legislation

The relevant legislation, standards and guidelines for the development of the DGHMMP are provided below.

Coal Mining Safety and Health Act 1999

This Act aims to protect the safety and health of persons at coal mines as well as persons who may be affected by coal mining operations. It requires that the risk of injury or illness to any person resulting from coal mining operations be at an acceptable level and aims to provide a way of monitoring the effectiveness and administration of provisions relating to health and safety.

Coal Mining Health and Safety Regulation 2001

This Regulation provides a regulatory framework to ensure that the management of safety and health at Queensland coal mines incorporates, risk identification and assessment, hazard analysis, hazard management and control as well as reporting and recording important safety and health information data.

Explosives Act 1999

This Act provides the legislative requirements for the safe handling, storage, transport and manufacturing of explosives.

Explosives Regulation 2003

This Regulation provides specific limits and requirements for the safe handling, storage, transport and manufacturing of explosives.

Work Health and Safety Regulation 2011

This Regulation covers workplace hazardous substances and dangerous goods under a single framework for hazardous chemicals and introduces a new hazard classification and hazard communication system based on the United Nations' Globally Harmonised System of classification and labelling of chemicals.

The Australian Dangerous Goods Code

This Code provides consistent technical requirements for the land transport of dangerous goods across Australia.

AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines

This standard provides a generic guide for managing risk and specifies the elements of the risk management process. As this is a generic guidance document, the particular characteristics of the SGCP form a key component in the application of the Standard and the assessment of hazards and risks associated with the SGCP.

AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids:

This standard sets out the requirements and recommendations for the safe storage handling of flammable liquids and dangerous goods Class 3, as classified in the United Nations (UN) Recommendations for the Transport of Dangerous Goods. The Standard also provides requirements and recommendations for the storage and handling of combustible liquids and provides minimum acceptable safety requirements for storage facilities, operating procedures, emergency planning and fire protection. It provides technical guidance that may assist in the storage and handling of flammable and combustible liquids.

AS 2187.1/1-2000 Explosives– Storage, Transport and Use – Storage

This standard establishes requirements and precautions for the storage of explosives, including pyrotechniques as defined in AS 2187.2:1998 and for the location, design, construction and maintenance of magazines.

AS 2187.2:2006 Explosives – Storage and Use – Use of Explosives

This standard provides the requirements and precautions for the use of factory-made, commercially available explosives and certain explosives mixed or assembled at sites.

Timing

The DGHMMP will be implemented prior to the commencement of the SGCP and management measures outlined within the DGHMMP will be fulfilled over the entirety of the mine life, as required.

MP10.17 Fire Management Plan

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	Training and Awareness	
MP10.17.14	Incident Reporting	
MP10.17.15	Monitoring	
MP10.17.16	Corrective Actions	

MP10.17.17 Management Plan Review

MP10.17.18 References

MP10.17.1 Introduction

The Fire Management Plan (FMP) addresses the management and prevention of fire at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The FMP details management measures applicable to fire risks and impacts in accordance with relevant legislation and government requirements.

This document provides a structure for the FMP, which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

MP10.17.2 Purpose

This FMP structure is provided in support of the SGCP AEIS. The aim of the FMP is to comply with relevant legislation and meet best practice management.

Key Stakeholders

Stakeholders relevant to the FMP include the following:

Category	Stakeholders
Landholders within Mining Lease Application area (MLA) 70453 or the infrastructure corridor. The list of landholders excludes the properties (Creek Farm, Betanga and Sapling Creek) which will be acquired by the Proponent. Refer to Section 9.8-Tenure Policy.	Chesalon
	Armagh
	Tallarenha
	Oakleigh
	Saltbush
	Gadwell
	Mentmore
	Monklands
	Tressilian
Government departments and services	Barcaldine Regional Council
	Queensland Department of Natural Resources and Mines
	Queensland Department of Environment and Heritage Protection

Legislation

The relevant legislation for the development of the FMP is provided below.

Coal Mining Safety and Health Act 1999

This Act aims to protect the safety and health of persons at coal mines as well as persons who may be affected by coal mining operations. It requires that the risk of injury or illness to any person resulting from coal mining operations be at an acceptable level and aims to provide a way of monitoring the effectiveness and administration of provisions relating to health and safety.

Coal Mining Health and Safety Regulation 2001

This Regulation provides a regulatory framework to ensure that the management of safety and health at Queensland coal mines incorporates, risk identification and assessment, hazard analysis, hazard management and control as well as reporting and recording important safety and health information data.

Explosives Act 1999

This Act provides the legislative requirements for the safe handling, storage, transport and manufacturing of explosives.

Explosives Regulation 2003

This Regulation provides specific limits and requirements for the safe handling, storage, transport and manufacturing of explosives.

AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids:

This standard sets out the requirements and recommendations for the safe storage handling of flammable liquids and dangerous goods Class 3, as classified in the United Nations (UN) Recommendations for the Transport of Dangerous Goods. The Standard also provides requirements and recommendations for the storage and handling of combustible liquids and provides minimum acceptable safety requirements for storage facilities, operating procedures, emergency planning and fire protection. It provides technical guidance that may assist in the storage and handling of flammable and combustible liquids.

AS 2187.1/1-2000 Explosives– Storage, Transport and Use – Storage

This standard establishes requirements and precautions for the storage of explosives, including pyrotechniques as defined in AS 2187.2:1998 and for the location, design, construction and maintenance of magazines.

AS 2187.2:2006 Explosives – Storage and Use – Use of Explosives

This standard provides the requirements and precautions for the use of factory-made, commercially available explosives and certain explosives mixed or assembled at sites.

Timing

The FMP will be implemented prior to the commencement of the SGCP and management measures outlined within the FMP will be fulfilled over the entirety of the mine life, as required.

MP10.18 Tyre and Rim Management Plan

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MP10.18.8	Monitoring
MP10.18.9	Corrective Actions
MP10.18.10	Management Plan Review
MP10.18.11	References.....

MP10.18.1 Introduction

The Tyre and Rim Management Plan (TRMP) addresses the management of vehicle tyres and rims at the South Galilee Coal Project (SGCP), incorporating the Epsilon Project.

The TRMP details management measures associated with vehicle tyre and rim maintenance, replacement and failure in accordance with relevant legislation and government requirements.

This document provides a structure for the TRMP which will be completed in consultation with relevant stakeholders, prior to project commencement.

Background

A project description outlining the mine life and production is provided in Section 2 and Section 9.1 of the Additional Information to the Environmental Impact Statement (AEIS).

MP10.18.2 Purpose

This TRMP structure is provided in support of the SGCP AEIS. The purpose of the TRMP is to comply with relevant legislation and meet best practice management.

The TRMP will be developed with procedures to lift, fit, remove, test, repair, maintain and change tyres and rims on mobile earthmoving equipment and workshop plant and equipment, as well as the safe transport, storage and disposal of new and used tyres and rims.

Key Stakeholders

Stakeholders relevant to the TRMP include the following:

Category	Stakeholders
Government departments and services	Queensland Department of Mines and Natural Resources
	Queensland Department of Environment and Heritage Protection
	Queensland Department of Transport and Main Roads

Legislation

The relevant legislation for the development of the TRMP is provided below.

Environmental Protection Act 1994

The object of the Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

Work Health and Safety Regulation 2011

This Regulation covers workplace hazardous substances and dangerous goods under a single framework for hazardous chemicals and introduces a new hazard classification and hazard communication system based on the United Nations' Globally Harmonised System of classification and labelling of chemicals.

Australian Standards

AS4457:1 2007 Earthmoving Machinery – Off the road wheels, rims and tyres – Maintenance and repair Part 1: Wheel assemblies and rim assemblies.

AS4457:2 2008 Earthmoving Machinery – Off the road wheels, rims and tyres – Maintenance and repair Part 2: Tyres.

Timing

The TRMP will be implemented prior to the commencement of the SGCP and management measures outlined within the TRMP will be fulfilled over the entirety of the mine life, as required.



9.11 Environmental Management Plan

9.11 Environmental Management Plan



Environmental Management Plan

March 2014

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1. INTRODUCTION

This Environmental Management Plan (EM Plan) addresses the Terms of Reference (ToR) requirements for the South Galilee Coal Project (SGCP) and takes into account the findings of the SGCP Environmental Impact Statement (EIS).

Section 39 of the *Environmental Protection Act 1994 (EP Act)* defines an EM Plan as an environmental management document that proposed conditions and mechanisms to manage the potential environmental impact of the project.

The commitments presented in this EM Plan are expressed so as to be measurable and auditable; they set objectives, standards and measurable indicators, and include control strategies to ensure achievement of the objectives.

This EM Plan also addresses comments made on the draft EIS, is presented in support of the Additional Information to the EIS (AEIS) and refers to other environmental management documentation presented as part of the AEIS.

1.1. BACKGROUND

Alpha Coal Management Pty Ltd (ACM) proposes to develop the SGCP, a combined open cut and underground coal mine. The development and implementation of the SGCP is dependent on the approval and successful development of supporting external infrastructure (e.g. electricity and water supply infrastructure and a rail link to a coal export terminal). The SGCP will be supported by privately owned rail and port facilities that do not form part of the Project scope.

The Coordinator-General has declared the SGCP to be a 'significant project' requiring an EIS under Section 26(1)(a) of the *State Development and Public Works Organisation Act 1971*. In November 2010, the Coordinator-General issued the ToR for the Project. The ToR outlined the requirements, both specific and general, that are to be addressed in the EIS and the EM Plan.

The ToR for the SGCP states:

- The EM Plan included within the EIS will comply with Section 203 of the *EP Act*.
- The EM Plan must comprise the following components for performance criteria and implementation strategies:
 - commitments to acceptable levels of environmental performance, including environmental objectives, performance standards and associated measurable indicators, performance monitoring and reporting;
 - impact prevention or mitigation actions to implement the commitments;
 - corrective actions to rectify deviation from performance standards; and

- an action program to ensure environmental protection commitments are achieved and implemented. This will include strategies in relation to:
 - continuous improvement;
 - environmental auditing;
 - monitoring;
 - reporting;
 - staff training; and
 - a rehabilitation program for land proposed to be disturbed under each relevant aspect of the proposal.

This EM Plan has been drafted as part of the SGCP AEIS to address comments raised on the EM Plan submitted as part of the draft EIS. Further information on each of the elements described in the EM Plan can be found in the EIS and throughout further sections in the AEIS. Section 9.10 of the AEIS provides frameworks for additional specific Management Plans.

1.2. THE PROJECT

The SGCP coal deposit has been defined by exploration activities undertaken in accordance with two Exploration Permits for Coal (EPCs) (1049 and 1180), held by Alpha Coal. The SGCP will be located within Mining Lease Application (MLA) 70453.

MLA 70453 provides sufficient area to design and locate the following key infrastructure:

- mine access road;
- accommodation village road;
- water supply and reticulation infrastructure;
- water management facilities;
- open-cut pit;
- underground;
- accommodation village;
- power supply including electrical and telecommunications infrastructure;
- dragline and dragline pad;
- run of mine (ROM) dumps and sizing stations;
- Coal Handling and Preparation Plant (CHPP);

- on-site rail component;
- potable water treatment plant;
- waste water treatment plant;
- main infrastructure area (MIA) including administration building;
- bath house;
- workshops;
- hardstand area and warehouses; and
- other material handling infrastructure.

1.3. LOCATION

The SGCP is located within the Barcaldine Regional Council Local Government Area (LGA), approximately 12 kilometres (km) south-west of the township of Alpha. Alpha is situated approximately 170 km west of Emerald and 450 km west of Rockhampton in Central Queensland.

1.4. PROJECT PROPONENT

ACM is the manager of the joint venture proponents and is responsible for preparation of the EIS

1.5. LAND USE AND TENURE

Land within the SGCP area is predominantly cleared farmland currently used for low-intensity beef cattle grazing. The SGCP crosses the catchments of Tallarenha Creek in the north, and Sapling Creek and Dead Horse Creek in the south.

Fifteen properties are located within or partly within MLA 70453 and the infrastructure corridor area. The infrastructure corridor is required to accommodate the SGCP railway connection to transport construction materials and equipment in the construction phase and transport coal via third party rail systems onto the port in the operational phase. **Table 1-1** identifies the mining and exploration tenements and land tenure in the SGCP area. The Proponent's Tenure Policy is presented in **Section 9.8** of the AEIS.

Table 1-1 Real Property Description for Land Located Within or Partly Within MLA 70453 and the Infrastructure Corridor

Tenure/Tenement ¹	Real Property Description	Property Name	Land Owner
MLA 70453			
EPC 1049, EPC 1180, EPC 1040 and EPP 668	4315PH720 ²	Creek Farm	A
EPC 1049, EPC 1180 and EPP 668	1DM3	Chesalon	B
EPC 1049, EPC 1040 and EPP 668	7BF57	Tallarenha	C
EPC 1049, EPC 1040, EPC 1155 and EPP 668	31BF11	Betanga	D
EPC 1049, EPC 1155 and EPP 668	1160PH286	Armagh	E
EPC 1049, EPC 1180, EPC 1155 and EPP 668	3BF53	Sapling Creek	F
Infrastructure Corridor			
EPC 1040, EPC 1263 and EPP 668	5BF5	Oakleigh	G
EPC 1210, EPC 1263 and EPP 668	3CP860083	Tresillian	H
EPC 1210, EPC 1040 and EPP 668	2SP136836	Monklands	I
EPC 1210, EPC 1263 and EPP 668	4BF50	Mentmore	J
EPC 1263 and EPP 668	6BF16	Gadwell	J
EPC 1263 and EPP 668	7BF16	Saltbush	K
EPC 1040 and EPP 668	301SP108315	N/A	L
EPC 1049, EPC 1180, EPC 1040 and EPP 668	4315PH720 ²	Creek Farm	A
EPC 1040 and EPP 668	2BF38	Leased Reserve	A

- 1 EPC 1040 is held by Waratah Coal Pty Ltd
 EPC 1155 is held by Waratah Coal Pty Ltd
 EPC 1210 is held by the GVK Group
 EPC 1263 is held by Queensland Thermal Coal Pty Ltd
 EPP 668 is held by Australia Pacific LNG Pty Limited
- 2 4315PH720 is affected by MLA 70453 as well as the infrastructure corridor

1.6. STAKEHOLDERS

The Proponent is currently implementing a comprehensive community engagement strategy which identifies stakeholders, their values, concerns and issues with the SGCP. It provides a foundation for long-term relationships between the SGCP and the community based on trust and mutual respect. Further discussion of stakeholder engagement is provided in **Section 9.14** of the AEIS.

Key Project stakeholders include:

- landowners;
- community members and organisations;

- local council;
- local and regional emergency services (i.e. fire and rescue, ambulance and police);
- local education and health providers, including Queensland Health and the Department of Education and Training;
- indigenous groups;
- Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC);
- Queensland Department of Environment and Heritage Protection (DEHP);
- Queensland Department of State Development, Infrastructure and Planning ;
- Queensland Department of Local Government and Planning;
- Queensland Department of Transport and Main Roads;
- Queensland Department of the Premier and Cabinet;
- Queensland Department of Communities; and
- other regional mining proponents.

1.7. ACTIVITIES POTENTIALLY CAUSING ENVIRONMENTAL HARM

Mining operations have the potential to cause environmental harm unless effective management programs are developed and implemented to mitigate and rehabilitate associated environmental impacts.

The Environmentally Relevant Activities (ERAs) proposed to be carried out at the Project are outlined in

Table 1-2.

Table 1-2 Environmentally Relevant Activities

ERA Number	ERA	Description
6	Asphalt manufacturing	In a year, asphalt manufacturing consists of: a) less than 1,000 tonnes (t) of asphalt b) 1,000 t or more of asphalt.
8	Chemical storage	Chemical storage consists of storing: a) 50 t or more of chemical of dangerous goods Class 1 or Class 2, Division 2.3 in containers of at least 10 cubic metres (m ³); b) 50 t or more of chemicals in dangerous good class 6, division 6.1 in containers capable of holding at least 900 kilograms (kg) of said chemicals; c) 10 m ³ or more of chemicals of class C1 or C2 combustible liquids under Australian Standard 1940: The storage and handling of flammable and combustible liquids or dangerous goods class 3; or d) the following quantities of other chemicals in containers of at least 10 m ³ : i. 200 t or more, if they are solids or gases; or ii. 200 m ³ or more, if they are liquids.
14	Electricity generation	Electricity generation consists of: a) generating electricity by using fuel at a rated capacity of 10 megawatts (MW) electrical or more; b) generating electricity by using a fuel, other than gas, at a rated capacity of 10 MW electrical to 150 MW electrical; and c) generating electricity by using a fuel, other than gas, at a rated capacity of more than 150 MW.
15	Fuel burning	Fuel burning consists of using equipment that is capable of burning at least 500 kg of fuel in an hour.
16	Extractive and screening activities	Extractive and screening activities consists of any of the following: a) dredging a total of 1,000 t or more of material from the bed of a natural occurring surface waters, in a year; b) extraction, other than by dredging, material from a wild river area; c) extracting, other than by dredging, a total of 5,000 t or more of material in a year from an area other than a wild river area; d) screening 50 t or more of material in a year, in a wild river area; and e) screening 5,000 t or more of material in a year, other than in a wild river area

ERA Number	ERA	Description
17	Abrasive blasting	Abrasive blasting consists of cleaning equipment or structures on a commercial basis using a stream of abrasives in either a wet or dry pressure stream. The relevant Activity includes: a) spraying a coating on equipment or a structure that has been subject to abrasive blasting; and b) carrying out the activity at any site.
18	Boilermaking or engineering	Boilermaking or engineering consists of boilermaking, assembling, building or manufacturing a total of 200 t or more of metal product in a year.
21	Motor vehicle workshop	Motor vehicle workshop consists of operating a workshop on a commercial basis, or in the course of carrying on a commercial enterprise, involving any of the following relating to motor vehicles: a) maintaining mechanical components, engine cooling radiators or body panels; b) spray-painting body panels; and c) detailing or washing.
31	Mineral processing	Mineral processing consists of processing, in a year, a total of 1000 t or more of coke or mineral products. Coke processing consists of quenching, cutting, crushing and grading. Mineral processing consists of washing, leaching, classifying, mixing and concentrating.
33	Crushing, milling, grinding or screening	Crushing, milling, grinding or screening consists of crushing, grinding, milling or screening more than 5,000 t of material in a year. The activity includes crushing waste, other than putrescible waste, to extract resources for reuse or recycling.
43	Concrete batching	Concrete batching consists of producing 200 t or more of concrete or concrete products in a year, by mixing cement with sand, rock aggregate or similar materials.
56	Regulated waste storage	Regulated waste storage consists of operating a facility for receiving and storing regulated waste for more than 24 hours.
60	Waste disposal	Waste disposal consists of only one of operating a facility for disposing of: a) only regulated waste or b) regulated waste and any, or any combination, of the following: general waste limited regulated waste If the facility is in a scheduled area – no more than 5 t of untreated clinical waste in a year.

ERA Number	ERA	Description
63	Sewage treatment	Sewage treatment consists of: a) operating one or more sewage treatment works at a site that has a total daily peak design capacity of at least 21 Equivalent Persons (EP); or b) operating a sewage pumping station with a total design capacity of more than 40 kilolitres in an hour, if the operation of the pumping station is not an essential part of the operation of sewage treatment works to which paragraph (a) applies.
64	Water treatment	Water treatment consists of carrying out any of the following activities in a way that allows waste, whether treated or untreated, to be released into the environment: a) desalinating 0.5 megalitres (ML) or more of water in a day; b) treating 10 ML or more of raw water in a day; and c) carrying out advanced treatment of 5 ML or more of water in a day.

The Notifiable Activities (NAs) proposed to be carried out at the Project include the following:

- Abrasive blasting – carrying out abrasive blast cleaning (other than cleaning carried out in fully enclosed booths) or disposing of abrasive blasting material.
- Asphalt or bitumen manufacture – manufacturing asphalt or bitumen, other than at a single-use site used by a mobile asphalt plant.
- Chemical storage – storing more than 10t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code.
- Explosives production or storage – operating an explosives factory under the *Explosives Act 1999*.
- Landfill – disposing of waste (excluding inert construction and demolition waste).
- Mine wastes:
 - a) storing hazardous mine or exploration wastes, including, for example, tailings dams, overburden or waste rock dumps containing hazardous contaminants; or
 - b) exploring for, or mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants

- Waste storage, treatment or disposal – storing, treating, reprocessing or disposing of waste prescribed under a regulation to be regulated waste for this item (other than at the place it is generated), including operating a nightsoil disposal site or sewage treatment plant where the site or plant has a design capacity that is more than the equivalent of 50,000 persons having sludge drying beds or on-site disposal facilities.

Management of the environmental impacts associated with the ERAs and NAs listed are discussed further in **Section 3**.

1.7.1. Standard Environmental Conditions

The SGCP will be subject to the conditions of an EA (mining activities) and the conditions of a Mining Lease. The EM Plan provides the proposed EA conditions, to assist DEHP in the development of the EA for the SGCP.

2. PROJECT DESCRIPTION

A detailed project description of the SGCP outlining the open cut and underground operations along with CHPP and infrastructure is provided in **Sections 2** and **3** of the AEIS.

3. ENVIRONMENTAL VALUES, IMPACTS, COMMITMENTS, AND DRAFT CONDITIONS

3.1. EM PLAN DEVELOPMENT METHODOLOGY

The EM Plan was developed by following the process outlined by the EM Plan information guidance as published by DEHP and the requirements of the ToR.

This document has been prepared in accordance with the following stages as described below:

- identify the environmental value, together with the background;
- identify and develop the environmental protection objectives, in order to minimise impacts on the environmental values;
- develop commitments to achieve compliance with the environmental protection objectives and standards; and
- develop proposed EA conditions to be included in the EA for the SGCP.

The guiding definitions for the terms that are used throughout the EM Plan are as follows:

- Environmental Values: Environmental values are those qualities or physical characteristics of the environment that are conducive to ecological health, public amenity or safety.
- Section 9 of the *EP Act* describes an Environmental Value as:
 - a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety or
 - another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.
- Environmental Protection Objectives: Describe the key elements of the environment and the outcomes to be protected in order to minimise impacts on the environmental values.
- Performance Criteria: These are indicators by which the level of achievement of the environmental protection objectives can be determined in a measurable and auditable way.
- Control Strategies: These provide a contextual framework for the proposed EA conditions and describe the strategies proposed to meet the environmental protection objectives.

- Proposed EA Conditions: Draft conditions containing measurable indicators and standards that are proposed to be included in the EA to protect identified environmental values that may be impacted on by SGCP operations.
- Monitoring: Detailing the monitoring requirements that the Proponent is proposing for the future monitoring of the site.

3.2. GENERAL CONDITIONS

3.2.1. Background

There are a number of general issues that do not relate to environmental values or control strategies, but are to be included in the EA. Conditions of the EA are proposed below.

3.2.2. Proposed EA Conditions

Financial Assurance

- A1** Provide financial assurance in the amount and form required by the administering authority prior to the commencement of activities proposed under this EA.

NOTE: The calculation of financial assurance for Condition A1 must be in accordance with the administering authority's guideline for calculating financial assurance for mining activities, and may include a performance discount. The amount is defined as the maximum total rehabilitation cost for complete rehabilitation of all disturbed areas, which may vary on an annual basis due to progressive rehabilitation. The amount required for the financial assurance must be the highest Total Rehabilitation Cost calculated for any year of the Plan of Operations and calculated using the formula: (Financial Assurance = Highest total annual rehabilitation cost x Percentage required).

- A2** The financial assurance is to remain in force until the administering authority is satisfied that no claim on the assurance is likely.

Prevent and/or Minimise Likelihood of Environmental Harm

- A3** In carrying out the environmentally relevant activities, you must take all reasonable and practicable measures to prevent and/or to minimise the likelihood of environmental harm being caused. Any environmentally relevant activity, that, if carried out incompetently, or negligently, may cause environmental harm, in a manner that could have been prevented, shall be carried out in a proper manner in accordance with the conditions of this authority.

NOTE: This authority authorises the environmentally relevant activity. It does not authorise environmental harm unless a condition contained within this authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

Maintenance of Measures, Plant and Equipment

A4 The EA holder must ensure:

- a) that all measures, plant and equipment necessary to ensure compliance with the conditions of this EA are installed;
- b) that such measures, plant and equipment are maintained in a proper condition; and
- c) that such measures, plant and equipment are operated in a proper manner.

Monitoring and Records

A5 Record, compile and keep for a minimum of five (5) years all monitoring results required by this EA and make available for inspection all or any of these records upon request by the administering authority.

A6 Where monitoring is a requirement of this EA, ensure that a competent person(s) conducts all monitoring.

Storage and Handling of Flammable and Combustible Materials

A7 Spillage of all flammable and combustible liquids must be contained within an on-site containment system and controlled in a manner that prevents environmental harm (other than trivial harm) and maintained in accordance with **Section 5.9** of AS 1940.

A8 Where monitoring is a requirement of this EA, ensure that a competent person(s) conducts all monitoring.

Notification of Emergencies, Incidents and Exceptions

A9 All reasonable actions are to be taken to minimise environmental harm, or potential environmental harm, resulting from any emergency, incident or circumstances not in accordance with the conditions of this EA.

A10 As soon as practicable after becoming aware of any emergency, incident or information about circumstances which results or may result in environmental harm not in accordance with the conditions of this EA, the administering authority must be notified in writing.

A11 Not more than ten (10) business days following the initial notification of an emergency, incident or information about circumstances which result or may result in environmental harm, written advice must be provided to the administering authority in relation to:

- a) proposed actions to prevent a recurrence of the emergency or incident;
- b) the outcomes of actions taken at the time to prevent or minimise environmental harm; and
- c) proposed actions to respond to the information about circumstances which result or may result in environmental harm.

A12 As soon as practicable, but not more than six (6) weeks following the initial notification of an emergency, incident or information about circumstances which result or may result in environmental harm, environmental monitoring must be performed and written advice must be provided of the results of any such monitoring performed to the administering authority.

A13 The notification of emergencies, incidents or circumstances (incident) which result or may result in environmental harm in accordance with Condition A10 must include but not be limited to the following:

- a) the holder of the EA;
- b) the location of the incident;
- c) the number of the EA;
- d) the name and telephone number of the designated contact person;
- e) the time of the incident;
- f) the time the holder of the EA became aware of the incident;
- g) the suspected cause of the incident;
- h) the environmental harm caused, threatened, or suspected to be caused by the incident; and
- i) actions taken to prevent any further incident and mitigate any environmental harm caused by the incident.

A14 Contaminants must not be released to the receiving environment unless they are in accordance with the contaminant limits authorised by this EA.

A15 This EA does not authorise environmental harm unless a condition contained within the authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

Definitions

A17 Words and phrases used throughout this EA are defined in the Definitions Section of this EA. Where a definition for a term used in this EA is sought and the term is not defined within this EA, the definitions in the *Environmental Protection Act 1994*, its regulations and policies must be used.

Conditions

A18 The conditions of this EA are in force until a surrender of this EA is accepted pursuant to the *Environmental Protection Act 1994*. The conditions of this EA apply unless an amendment is approved pursuant to the *Environmental Protection Act 1994*.

3.3. AIR QUALITY

The SGCP operations will include the extraction, handling and placement of soil, waste rock and coal. These activities have the potential to generate air emissions (primarily dust) that may impact on nearby sensitive receptors. The potential air quality impacts from the SGCP have been assessed by:

- reviewing legislative requirements and ambient air quality goals;
- describing existing air quality and dispersion meteorology within and surrounding the SGCP site;
- identifying the nearest sensitive receptors;
- modelling air dispersion to predict concentrations of particulate matter at nearest sensitive receptors;
- determining the potential air quality impacts through comparison with air quality goals; and
- identifying mitigation measures to assist with management of the potential air quality impacts from the SGCP.

Greenhouse Gases (GHG) are also generated by a number of mining activities and potentially from the coal seam itself.

3.3.1. Environmental Values

The environmental values to be enhanced or protected are:

- the qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems;
- the qualities of the air environment that are conducive to human health and well-being;
- the qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property;
- the qualities of the air environment that are conducive to protecting agricultural use of the environment; and

- baseline levels of the existing air environment at the SGCP and surrounding sensitive receptors.

Baseline air quality monitoring results are presented in the EIS.

3.3.2. Environmental Protection Objectives

The environmental protection objective for air quality is to minimise the impacts of dust generated at the SGCP on sensitive receptors within close proximity to the mining lease so that the air environment is conducive to the life, health, well-being of humans.

3.3.3. Performance Criteria

Air emissions from the Project comprise mainly particulate matter (dust). Particulate matter for the SGCP has been assessed on the basis of three standard categories:

- particulate matter less than 2.5 micrometres (μm) in diameter ($\text{PM}_{2.5}$);
- particulate matter less than 10 μm in diameter (PM_{10}); and
- total suspended particulates (TSP).

The applicable air quality criteria (from *Environmental Protection (Air) Policy 2008*, National Environmental Protection Measure (Air) 1998 and EPA License and Permits-Guideline 8) -are:

- dust concentration of $\text{PM}_{2.5}$ of $25 \mu\text{g}/\text{m}^3$ averaged over 24 hours;
- dust concentration of $\text{PM}_{2.5}$ of $8 \mu\text{g}/\text{m}^3$ averaged over a year;
- dust concentration of PM_{10} of $50 \mu\text{g}/\text{m}^3$ over a 24 hour averaging time and no more than five occurrences per annum;
- total suspended particulate of $90 \mu\text{g}/\text{m}^3$ averaged over a year; and
- dust deposition of 120 milligrams per square metre per day ($\text{mg}/\text{m}^2/\text{day}$).

These criteria (excluding deposition) represent air qualities that are important in protecting human health and wellbeing. The deposition goal (or dust fallout) is used to assess dust nuisance. The indicators apply at any sensitive or commercial place, such as residences, parks, gardens, schools, shopping precincts, etc. Further discussion of performance criteria is provided in **Section 9.9** of the AEIS.

3.3.4. Control Strategies

Dust

An Air Quality Management Plan has been developed (refer Section 9.10 of the AEIS) and will be implemented to mitigate adverse air quality impacts under worst case meteorological conditions.

Although many of these measures will be standard operating procedures for the SGCP, **Table 3-1** provides a summary of control procedures to mitigate dust emissions.

Table 3-1 Dust Mitigation Measures

Source	Mitigation Measure
Mining Areas	Disturb the minimum area necessary for mining and rehabilitate promptly.
Coal Handling Area	Use water sprays and water trucks to suppress dust in coal handling areas.
Stockpiles	Maintain water sprays on raw and product coal stockpiles and transfer points. Topsoil stockpiles will be sown with an appropriate plant mix and managed to provide adequate ground cover is maintained.
Haul Roads	Maintain haul roads in good condition and use water trucks regularly to suppress dust. Investigate use of chemical suppressants if haul roads become too slippery.
Other Roads	Keep usage to a minimum and maintain in good condition. Use water trucks regularly to suppress dust.
Waste Rock Emplacements	Keep these areas moist, particularly if used by dump trucks. Keep recently spread material moist to encourage crusting of surface.

Rehabilitation of disturbed areas will be undertaken progressively to minimise dust generation of non-vegetated areas. Further discussion of air quality management is provided in **Section 9.9** of the AEIS.

Greenhouse Gas

The SGCP will initially develop an opencut pit followed by an underground mine. At times the two operations will run concurrently. Thus, over the life of the mine the major energy users will be a dragline and two longwall units together with diesel truck use, conveyers and the CHPP.

The following management measures are proposed to minimise GHG emissions:

Electrical Efficiency

- a dragline is more energy efficient than a truck and shovel operation in removing overburden;
- a number of measures to maintain efficiency of the dragline will be implemented including load monitoring, regular bucket maintenance and electrical calibration checks;
- similarly, longwall efficiency will be monitored;

- the compressed air circuit will be regularly monitored as leaks degrade the efficiency of the compressor; and
- the energy efficiency of electrical equipment will be a consideration during purchase.

Diesel Efficiency

- the fuel efficiency of haul trucks will be a consideration during purchase;
- access ramps will be designed to optimise truck diesel use efficiency; and
- a conveyor will transport coal to the CHPP from the underground operation. Since this infrastructure passes the open pit, there are dump stations to the conveyor to significantly shorten the coal haul route.

Fugitive Emissions

It is difficult to reduce Coal Seam Gas (CSG) fugitive emissions from the open-pit as it is too shallow to generate sufficient methane to extract and too difficult to collect over the wide area of the pit. CSG will be emitted from the underground via the ventilation shafts and will be monitored.

No significant indications of gas have been reported during SGCP exploration activities. Work undertaken on the tenements located immediately north of the SGCP has not identified economically recoverable gas reserves, nor was methane considered to be a likely significant operational management issue. Pre-drainage and flaring methane to reduce emissions is thus not considered viable.

Other direct means of reducing greenhouse gas emissions could include such measures as:

- minimising clearing at the site;
- utilising the existing Central Line Railway where practicable to transport construction material/equipment;
- utilising the Galilee Basin common user rail line to transport supplies/equipment during the operations phase, where practicable;
- maximising the use of renewable energy sources; and
- improved accuracy in greenhouse gas measurement by advancing from default factors to direct measurement methodologies.

Other indirect means of reducing greenhouse gas emissions could include such measures as:

- carbon sequestration at nearby or remote locations;
- progressive rehabilitation of disturbed areas;
- planting trees or other vegetation to achieve greater biomass than that cleared for the SGCP; and
- carbon trading through recognised markets.

Specific modules to address greenhouse abatement include:

- commitments to the abatement of greenhouse gas emissions from the development with details of the intended objectives, measures and performance standards to avoid, minimise and control emissions;
- commitments to energy management, including undertaking periodic energy audits with a view to progressively improving energy efficiency;
- a process for regular review of new technologies to identify opportunities to reduce emissions and use energy efficiently, consistent with best practice environmental management;
- any voluntary initiatives such as projects undertaken as a component of the national Energy Efficiency Opportunities program, or research into improving the lifecycle and reducing the embodied energy and carbon intensity of the SGCPs processes or products; and
- opportunities for offsetting greenhouse emissions, including, if appropriate, carbon sequestration and renewable energy uses; and commitments to monitor, audit and report on greenhouse emissions from all relevant sources and the success of offset measures.

The Proponent is fully committed to sustainable development and complies with its obligations under the National Greenhouse Energy Reporting (NGER) program and specifically annual reporting of greenhouse gas emissions. The Proponent is committed to reducing the greenhouse gas emissions of its operations, accelerating the uptake of energy efficiency, integrating greenhouse issues into business decision making and providing consistent reporting of greenhouse gas emission levels.

3.3.5. Monitoring

Long-term dust monitoring is proposed for the SGCP. The existing long-term real-time dust concentration monitoring network will be maintained to record seasonal variations in the air quality of the area. Two monitoring units will be installed at the Creek Farm Homestead and Alpha Township prior to the commencement of construction to provide background data on the existing dust levels from non-SGCP activities.

Dust monitoring results will be reviewed regularly to determine if the site is causing an increase in dust concentrations above acceptable levels. An analysis of the prevailing meteorological extraction rates and processes will be included.

Local meteorological data will be collected from a monitoring station installed by the SGCP at the Creek Farm Homestead. This station will continue to collect temperature, relative humidity, rainfall and wind speed data over the life of the SGCP.

A network of seven dust deposition gauges has been installed at sensitive receptors surrounding the SGCP. Dust deposition (fallout) monitoring will continue at these locations over the life of the SGCP.

3.3.6. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs; and
- compliance and other audits of regulatory requirements.

3.3.7. Reporting

A monthly report will be prepared to include details of air quality monitoring results and to document the occurrence of any complaints. All regulatory reporting requirements will be met.

3.3.8. Commitments

The following commitments will be upheld at the SGCP to protect or enhance the environmental values of air quality:

- dust and greenhouse gas management measures will be implemented during the construction and operational phases of the Project;
- a monthly report will be prepared to detail the monthly air quality monitoring results;
- results of the air quality monitoring report will be reviewed to identify trends and implement corrective actions when deemed necessary;

- upon receiving a valid complaint in relation to dust nuisance, the complaint will be investigated and air quality mitigation measures will be implemented as soon as practicable if the complaints are substantiated by investigation results;
- maintain a register of dust complaints; and
- all monitoring and sampling techniques will be in compliance with the Government's Air Quality Sampling Manual (EPA, 1997) and applicable Australian Standards.

3.3.9. Corrective Action

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.3.10. Proposed EA Conditions

Air

Dust Nuisance

- B1** Subject to conditions B2 and B3 the release of dust or particulate matter or both resulting from the mining activity must not cause an environmental nuisance, at any sensitive or commercial place.
- B2** When requested by the administering authority, dust and particulate monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- B3** If the EA holder can provide evidence through monitoring that the following limits are not being exceeded then the holder is not in breach of B1:
- a) dust deposition of 120 milligrams (mg) per square metre per day, averaged over one month, when monitored in accordance with AS 3580.10.1 *Methods for sampling and analysis of ambient air - Determination of particulates – Deposited matter – Gravimetric method of 1991 (or more recent editions)*; or
 - b) a concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM_{10}) suspended in the atmosphere of 50 micrograms (μg) per cubic metre over a 24 hour averaging time, at a sensitive or commercial place downwind of the operational land, when monitored in accordance with:

- i) particulate matter – Determination of suspended particulate PM₁₀ high-volume sampler with size-selective inlet - Gravimetric method, when monitored in accordance with AS 3580.9.6 *Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM (sub) 10 high volume sampler with size-selective inlet – Gravimetric method of 1990 (or more recent editions); or*
- ii) any alternative method of sampling PM₁₀, which may be permitted by the Air Quality Sampling Manual as published from time to time by the administering authority.

B4 If monitoring indicates exceedence of the relevant limits in condition B3, then the EA holder must:

- a) address the complaint including the use of appropriate dispute resolution if required; and
- b) immediately implement dust abatement measures so that emissions of dust from the activity do not result in further environmental nuisance.

3.4. WATER RESOURCES

The SGCP is located in the upper catchment of the Burdekin River Basin. With a catchment area of approximately 130,500 square kilometres (km²), the Burdekin River Basin is one of Queensland's largest. The river flows into coastal waters near the Great Barrier Reef.

Land use varies, ranging from beef cattle production and mining in the inland areas, to irrigated sugarcane and crop cultivation on the coastal delta and floodplains. This includes the Burdekin River Irrigation Area (BRIA). The BRIA is supplied from Lake Dalrymple, Queensland's largest reservoir, which has a capacity of 1,860 gigalitre (GL) and is formed by Burdekin Falls Dam.

The SGCP MLA crosses the upper tributaries of Sandy Creek and Native Companion Creek, which are both tributaries of the Belyando River. The Belyando River is part of the Suttor River sub-basin, which has a catchment area of approximately 52,550 km².

The MLA covers an area of approximately 310 km², which is approximately 0.2 % and 0.6 % of the Suttor River and Burdekin River catchments respectively. The MLA is located approximately 350 km upstream of the Burdekin Falls Dam and 510 km upstream of the river mouth. The SGCP crosses the catchments of Tallarenha Creek in the north, and Sapling Creek and Dead Horse Creek in the south.

Tallarenha Creek flows north to Lagoon Creek then Sandy Creek before joining the Belyando River 120 km to the north. Tallarenha Creek has a catchment area of approximately 210 km², and elevations from approximately 530 m Australian Height Datum (AHD) at the catchment ridge to approximately 365 m AHD at the Capricorn Highway crossing just downstream of the MLA boundary. Almost all of the Tallarenha Creek catchment to this location is within the MLA.

Sapling Creek and Dead Horse Creek are east-flowing tributaries of Alpha Creek, which flows to the north through the township of Alpha before joining Native Companion Creek.

Water balance modelling indicates that the mine will generally operate with a water deficit and will have to import water to make-up the balance. Further discussion of the Project water balance is provided in **Section 9.3** of the AEIS.

Process water demand varies inversely with the ash in the product coal, which will depend on international market conditions. Hence, the water demand throughout the SGCP life will vary and the water allocation provides flexibility in terms of the site water balance.

The potential impacts on surface water during the life of the SGCP include potential change in runoff quality from disturbed catchments; potential reduction in streamflows due to the need to contain mine-affected water; potential changes to Tallarenha Creek flooding due to construction of clean water diversion around the disturbed areas.

The potential impacts on groundwater during the life of the SGCP are:

- dewatering of coal seams;
- aquifer interconnection due to subsidence;
- diminished groundwater recharge;
- lowering of quality due to mine waste and water infrastructure;
- alteration of evapotranspiration rates due to lowering groundwater; and
- alteration of water table level, bore level and quality impacts from the final void.

3.4.1. Environmental Values

Surface Water

Environmental values for surface water are set and described under various documents, including the:

- Guideline: Establishing draft environmental values, management goals and water quality objectives (DERM, 2011)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) (ANZECC Guidelines)
- *Environmental Protection (Water) Policy 2009 (EPP (Water))*.

The environmental values for surface water in the SGCP area remain relatively consistent between the documents, as shown in **Table 3-2**.

Table 3-2 SSCP Environmental Values – Water

Guideline (DERM, 2011)	ANZECC Guidelines	EPP (Water)
• Aquatic – Slightly to Moderately disturbed (SMD) system. • Primary Industries – Stock watering. • Cultural and spiritual.	'Environmental values' of receiving waters as those values or uses of water that the community believes are important for a healthy ecosystem. The receiving waterways relevant for the SSCP are classed as slightly to moderately disturbed.	Under Section 7 of the <i>EPP (Water)</i>, there are no particular environmental values attributed to the specific waterways located within the SSCP as they are not listed in Schedule 1. Section 7 (2) however, assigns the environmental values in the receiving water to be protected under the category 'other waters' as: • ecosystem protection (Level 2 – disturbed ecosystems, Queensland Water Quality Guidelines 2009 (DERM, 2009) (QWQG); and • agricultural uses (Irrigation and Stock Watering).

Environmental values must consider that the catchment has seen significant changes in land use over the past 150 years, with rapid changes in the last 50 years. Widespread land clearing for agricultural use has occurred throughout much of the receiving water catchments.

Groundwater

The following environmental values are recognised by the National Water Quality Management Strategy guidelines:

- aquatic ecosystems;
- primary industries;
- recreation and aesthetics;
- drinking water;
- domestic use other than drinking;
- industrial water; and
- cultural and spiritual values.

The environmental values considered in this Section include the water quality, quantity and standing water levels relating to both the existing and potentially impacted values for the local and regional groundwater area. The main environmental value associated with groundwater at the SSCP is for the purposes of stock watering. No groundwater dependent ecosystems of concern or water related culturally significant areas have been identified.

3.4.2. Environmental Protection Objectives

Surface Water Objectives

The environmental protection objectives for surface water values include to:

- maintain the existing chemical, physical and biological integrity of downstream water quality to protect aquatic ecosystems;
- minimise detrimental impact on the suitability of water for irrigation, stock watering, farm use and visual amenity; and
- minimise detrimental impact on the sustainability of geomorphologic characteristics of the watercourses.

Groundwater Objectives

The environmental protection objectives for groundwater include:

- minimise detrimental impact on the suitability of groundwater for agricultural use (stock watering); and
- implement commitments to mitigate any adverse effects on the groundwater resources.

3.4.3. Performance Criteria

Performance criteria of water resources at the SGCP will be monitored against the following to meet environmental protection objectives:

- *Environmental Protection (Water) Policy 2009;*
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000);
- *Fisheries Act 1994; and*
- Australian Drinking Water Guidelines (NHMRC, 2004).

The performance criteria for the SGCP are detailed below.

Environmental Protection (Water) Policy 2009

The objective of the *EPP (Water)* is to protect Queensland's waters while allowing for development that is ecologically sustainable. The *EPP (Water)* is subordinate legislation under the *EP Act*. Under the *EPP (Water)*, water quality must be assessed against established QWQG, however as the SGCP falls within the headwaters of the Central Coast Region where the QWQG are not complete, the use of ANZECC Guidelines is required. Queensland waters include water in rivers, streams, wetlands, lakes, aquifers, estuaries and coastal areas.

This purpose is achieved within a framework that includes:

- identifying environmental values for aquatic ecosystems and for human uses (e.g. water for drinking, farm supply, agriculture, industry and recreational use); and
- determining water quality guidelines (WQGs) and water quality objectives (WQOs) to enhance or protect the environmental values.

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000)

The primary objective of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, developed by the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Agriculture and Resources Management Council of Australia and New Zealand (ARMCANZ), is:

'To provide an authoritative guide for setting water quality objectives required to sustain current, or likely future, environmental values (uses) for natural and semi-natural water resources in Australia and New Zealand.'

These guidelines play a vital role in the management of water quality in both New Zealand and Australia. They provide methods for setting limits on pollutant concentrations in freshwater, coastal and marine environments.

Fisheries Act 1994

The primary objective of the *Fisheries Act 1994* is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to apply, balance and promote the principles of ecological sustainable development.

A permit may be required for any activities that involve constructing waterway barrier works or works in declared fish habitat areas.

Australian Drinking Water Guidelines (NHMRC, 2004)

These guidelines provide information on acceptable water quality for human consumption and provide information on measures to maximise safety of drinking water. It provides a framework for identifying acceptable water quality and is intended for use by the Australian community and all agencies with responsibilities associated with the supply of drinking water. These guidelines are relevant for the provision of potable water at the SGCP and potable water supplies will be monitored against these guidelines.

3.4.4. Control Strategies

Surface Water

The proposed management and mitigation strategies are provided in the proposed Mine Water Management System (MWMS). A Water Management Plan has been prepared as part of the AEIS (refer **Section 9.3**).

The overarching operational water management strategy for the SGCP seeks to:

- minimise the amount of surface run-off impacted by mining operations by diverting clean water flows around the mining operations;
- minimise the amount of raw water to be imported to site by maximising the recycling of stored water resources within the SGCP;
- minimise or prevent the need for mine water to be released from site. If controlled releases are required to maintain freeboard in dams during high rainfall events, water quality would need to meet Environmental Authority conditions and release criteria;
- minimise impacts to water quality and quantity on existing downstream water users; and
- provide adequate protection of internal water management infrastructure and external surface water values during flood events.

It is envisaged that during the course of the mine life, progressive rehabilitation of available (i.e. no longer required) disturbed areas will be undertaken and once established and demonstrated to produce acceptable quality runoff, runoff from these areas will be diverted away from the MWMS through clean water bypass drains.

The following MWMS classifications have been nominated for the site:

- clean water management system;
- saline/waste rock water system; and
- raw water system.

Water Quality – Construction

Potential impacts on water quality throughout the construction phase are summarised in **Table 3-3**, and corresponding mitigation measures are provided. Residual impacts are expected to be minimal with the implementation of these management strategies.

Table 3-3 SGCP Surface Water Quality Impacts and Mitigation Measures – Construction Phase

Construction Impacts	Mitigation Measures
Sediment from construction entering surface water runoff during rainfall events, discharged to watercourses reducing water quality	Areas of disturbed or exposed soil will be minimised and managed to reduce sediment mobilisation and erosion.
	An Erosion and Sediment Control Plan (refer Section 9.10 of the AEIS) will be prepared and executed.
	Disturbance by heavy earth moving equipment will be minimised especially in riparian areas.
	The number of passes over water crossings will be minimised.
	Topsoil will be stripped and stockpiled away from drainage lines.
	Bunds will be constructed to restrict flow velocities across the site.
	Vegetation clearing will not be carried out during heavy rainfall.
	Dust suppression measures will be adopted such as water sprays or stockpile covers.
	Vehicle washdowns will be located away from drainage lines or watercourses.
	Construction activities that will affect existing drainage lines and control measures will only be carried out after suitable stormwater management infrastructure has been installed on-site.
	Sedimentation dams will be constructed to capture dirty water runoff and used preferentially for dust suppression.
	Any site dewatering activities will be treated and/or appropriately managed.
	Groundcovers will be established to rehabilitate areas disturbed by road crossings and slope protection material will be used on road batters.
	Mitre drains will be used to divert runoff from road shoulders and table drains into sedimentation dams.
Potentially contaminated aqueous waste streams from temporary refuelling facilities, chemical storage facilities and vehicle washdown areas could enter into drainage lines	Temporary and permanent chemical and fuel storage areas will be appropriately bunded in accordance with AS 1940.
	All transfers of fuels and chemicals will be controlled to prevent spillage outside bunded areas.
	Bunds and sumps will be frequently drained and treated/disposed of appropriately.
	Contaminants and major spillage will be collected by a licensed waste collection and transport contractor for disposal at an off-site licensed facility.
	Spill cleanup kits, in accordance with Australian Standards (AS 1940 and AS 3780), will be located in appropriate locations, including inside machinery and vehicles.
	Refuelling will occur within bunded areas in accordance with AS 1940.
	In the event of a spill occurring, it will be controlled, contained and cleaned up to prevent the mobilisation of pollutants in drainage lines or watercourses.
	Site selection of storage and refuelling areas will minimise stormwater inundation and reduce the potential for clean runoff to mix with contaminated water.
	Wastewater from washdown areas will be directed through oil and grease separators and effluent directed to construction ponds for reuse.

Construction Impacts	Mitigation Measures
Erosion and damage to sediment control infrastructure from significant rainfall events during construction.	Construction works will be scheduled to minimise exposure to flooding during the wet season (October to April).
	Stormwater management measures such as drainage diversion and flood defence bunds will be implemented before construction commences.
	Emergency response procedures and flood warning system.
	Infrastructure will be designed with floor levels above an appropriate Annual Exceedence Probability (AEP) flood level.
	Monitoring equipment with telemetry system will be maintained on creeks, dams, release points.
	Flexible water management system will cater for a variety of conditions and operational needs - including sufficient storage capacity on-site.
	Dams and water management infrastructure (pumps and pipelines) will be monitored and maintained.
	Separation of clean and dirty water systems will be implemented.
	Standard operating procedures for water management will be implemented.

Water Quality – Operations

Potential impacts on water quality during the operation of the SGCP are summarised in **Table 3-4**, together with proposed mitigation measures. The residual impact on surface water quality is expected to be minimal with the implementation of these management strategies.

Table 3-4 SGCP Surface Water Quality Impacts and Mitigation Measures – Operations Phase

Operations Impacts	Mitigation Measures
Failure of water storages, storage embankments, pipelines, levees or bunds has the potential to result in non-compliant discharge and environmental impacts for downstream receiving waters, ecosystems and landholders	Design of water storages will utilise a Water Balance Model which considers all inputs and outputs which has run through a long-term period of climatic data to test storage capacities particularly in high rainfall wet seasons.
	Water storages will be designed in accordance with applicable Guidelines.
	Monitoring equipment will be installed to monitor storage volume during operation combined with a water management system to prevent overfilling.
	Design and construction supervision of dam embankments will be undertaken by a Registered Professional Engineer of Queensland (RPEQ).
	Regular dam inspections will be undertaken by RPEQ.
	Regular inspections will be undertaken during operation of water storages, tailings dams levels, integrity of embankment and spillways.
	Regular pipeline, drain, bund and levee inspections and maintenance will be undertaken during operation.

Operations Impacts	Mitigation Measures
Erosion and sediment mobilisation from mining and processing operations can cause deleterious effects on downstream water quality and aquatic habitats.	All potentially acid forming (PAF) material will be selectively handled where practicable to ensure that the potential for acid rock drainage is limited. Once all PAF material has been placed, a cover of non-acid forming (NAF) material will be applied over the entire waste rock emplacement facilities area to ensure that the PAF waste is not exposed
	Potential impacts will be mitigated using appropriate design for erosion and scour protection and a comprehensive Water Management Plan (WMP)(refer Section 9.3 of AEIS).
	Swales and buffer strips are proposed to provide stormwater filtration prior to discharge to receiving waters. Swales are open vegetated (generally grass) drains, while buffers or filter strips are grassed surfaces aligned perpendicular to the direction of flow, which were used to filter particulate matter and associated pollutants from stormwater prior to its entry into adjacent receiving waters. Both swales and buffers provide water treatment through physical filtration of water through the vegetation and depending on the retention time some additional pollutants may be taken up by the vegetation
	Progressive rehabilitation of waste rock emplacement facilities will be undertaken to reduce erosion and sedimentation potential
	An on-going monitoring program will be implemented to monitor the impacts of mine operations on the receiving watercourses. Site-specific trigger values for assessing water quality data against are proposed to be developed based on the baseline monitoring program

Mine Flood Protection

Levees are proposed to prevent flow down the Tallarenha Creek tributaries into the mining area, and a north-south channel collects flow and diverts it north around the pit back to Tallarenha Creek. During operations, the levees will be designed to protect the pit from flooding in the 3000 year average recurrence interval (ARI) flood event. Before mine closure, the levees will be upgraded to protect the pit from flooding up to the Probable Maximum Flood.

The levee embankment would be designed for the following:

- slope stability;
- erosion from flooding in the creeks and from direct rainfall;
- piping failure in the foundation;
- piping failure through the levee embankment; and
- ease of maintenance, including sufficiently wide crest for light and heavy vehicle access, if desired, and flat batter slopes for vegetation maintenance.

The flood protection levee banks will be regulated structures with conditions administered through the EA.

Erosion and deposition will be monitored at fixed control locations with periodic (e.g. bi-annual) photographic surveys.

Subsidence

Changes in the profile of Tallarenha Creek due to subsidence may affect the movement of sediment through downstream Quarry Material Allocation Notice (QMAN) areas is intended to be mitigated by engineering works designed to maintain free-draining stream channels post subsidence.

The establishment of a monitoring plan over the subsidence impacted areas of Tallarenha Creek will allow the identification of any changes to drainage that could have downstream impacts, and their mitigation through further channel engineering works.

Cumulative Impact Mitigation

Depending on the arrangement of the downstream projects, there will be some potential for cumulative impacts on downstream streamflow. However, given the contribution to streamflow from the catchment containing the SGCP relative to large downstream and adjacent catchments, the percentage cumulative reduction in flows is expected to be minor.

Groundwater

The SGCP has the potential to impact on groundwater resources. Mitigation and management measures to be implemented, to reduce or eliminate the risks identified, are required to:

- not detrimentally impact on the availability and suitability of groundwater for agricultural use (stock watering);
- prevent adverse changes to groundwater quality as a direct result of the mine project outside the mine footprint;
- address landholders concerns over impacts on their groundwater supplies promptly;
- a final void will remain at the end of mining to ensure the zone of influence, both groundwater level changes and hydrochemistry, will be managed and maintained and after mining ceases;
- protect cultural heritage or spiritual values associated with surface water features that are maintained by groundwater (if any); and
- no alteration of the diffuse recharge areas so as to ensure recharge during the life of the mine and after mining ceases.

Further discussion of surface water and groundwater is provided in the AEIS (refer **Sections 9.3** and **9.4** respectively).

3.4.5. Monitoring

Surface Water

The proposed surface water monitoring for the SGCP will include surface water quality monitoring program. The proposed monitoring program is outlined in this Section.

Surface Water Quality

Two programs are proposed for surface water quality monitoring. A baseline monitoring program and an on-going water quality monitoring program are proposed to assess the impact of the Project operations on the receiving environment.

Both programs would be undertaken in accordance with the Monitoring and Sampling Manual 2009 (DERM, 2010).

Baseline

The baseline monitoring program has commenced as part of the EIS and will continue until the mine is operational. As limited site-specific background water quality data is available, the monitoring program will be used to establish a data set for developing site-specific water quality trigger values.

Operations

An on-going monitoring program will be implemented to measure the impact of mine operations by monitoring watercourses upstream and downstream of the SGCP. This program will provide information to determine compliance with the EA conditions. The data will also allow performance reviews of various management plans and mitigation measures implemented to protect the watercourses in the SGCP.

Monitoring points will be provided at locations where contaminants could potentially be released from the MWMS. **Table 3-5** lists the release points from the mine water management system and the associated receiving waters. Further information and specific release point co-ordinates are provided in the Water Management Plan (refer Section 9.3 of the AEIS).

Monitoring points will also measure receiving water quality upstream and downstream of the release points (**Table 3-6**).

Table 3-5 Release Points

Release Point	Contaminant Source and Location	Monitoring Point	Receiving Waters
SGCP RP1 (Release Point 1)	Dirty Water Dam	Low Level Pipe Outlet	Tallarenha Creek
SGCP RP2 (Release Point 2)	Pit Water Dam North	Low Level Pipe Outlet	Tallarenha Creek
SGCP RP3 (Release Point 3)	Sediment Dam N1	Spillway	Tallarenha Creek
SGCP RP4 (Release Point 4)	Sediment Dam Central	Spillway	Tallarenha Creek
SGCP RP5 (Release Point 5)	Sediment Dam S1	Spillway	Sapling Creek
SGCP RP6 (Release Point 6)	Sediment Dam S2	Spillway	Tallarenha Creek

SGCP RP7 (Release Point 7)	Sediment Dam N2	Spillway	Tallarenha Creek
SGCP RP8 (Release Point 8)	Sediment Dam N3	Spillway	Tallarenha Creek
SGCP RP9 (Release Point 9)	Pit Water Dam South	Low Level Pipe Outlet	Sapling Creek
SGCP RP10 (Release Point 10)	Pit Water Dam South	Low Level Pipe Outlet	Tallarenha Creek

Gauge boards will be installed at all dams to monitor storage water levels and volumes to enable inflows and outflows to be estimated. Automatic monitoring equipment may be installed at key storages.

The event-based sampling will enable quantification of released water quality from the site and any potential corresponding impact on receiving waters. On-site monthly sampling of the water storages allows for any potential pollutant generation to be identified as early as possible to trigger appropriate remedial action to be taken.

Table 3-6 Proposed Receiving Water Monitoring Points

Monitoring Point	Description	Water Level (Flow)	REMP Water Quality Sampling	Continuous Sampling of Trigger Levels	Frequency
SGCP TCU	Tallarenha Creek (Upstream Monitoring Point)	X	During Flow Event	X	Daily During Release
SGCP TCD	Tallarenha Creek (Downstream Monitoring Point)	X	During Flow Event	X	Daily During Release
SGCP SCU	Sapling Creek (Upstream Monitoring Point)	-	During Flow Event	-	Daily During Release
SGCP SCD	Sapling Creek (Downstream Monitoring Point)	-	During Flow Event	-	Daily During Release
SGCP DCD	Dead Horse Creek (Downstream Monitoring Point)	-	-	-	-
SGCP ACU	Alpha Creek (Upstream Monitoring Point)	X	During Flow Event	X	Daily During Release
SGCP ACD	Alpha Creek (Downstream Monitoring Point)	X	During Flow Event	X	Daily During Release
SGCP HC	Highwall Channel (Downstream Monitoring Point)	-	-	-	Daily During Release
SGCP LC	Lowwall Channel (Downstream Monitoring Point)	X	-	-	Daily During Release

Emergency Response

Emergency response water management procedures are described in the Water Management Plan provided in **Section 9.3** of the AEIS.

Regulated Dams

Regulated dams will be managed in accordance with the Regulated Dams Operational Plan (refer **Section 9.3** of the AEIS).

Decommissioning

After mining has ceased and decommissioning and rehabilitation works are complete, the Proponent will seek to relinquish the SGCP leases. Prior to relinquishment, the Proponent will discuss the nature, scope and resourcing of an ongoing surface water monitoring program with the administering authority and any parties with ongoing interests in the surface water resources and infrastructure associated with the site if required. The proposed surface water monitoring locations are discussed in the Water Management Plan (refer **Section 9.3** of the AEIS) and are provided in **Table 3-6**.

Subsidence

The subsidence monitoring program will monitor erosion, sedimentation, and surface cracking. Mapping of the downstream and upstream active subsidence zone will be undertaken to determine if erosion and sedimentation is occurring in the channel to an unsustainable level and/or any significant surface flow losses into cracks are occurring between longwall blocks. The mapping will be used to evaluate the significance of subsidence impacts on the creek environment and trigger the need for any corrective action.

The monitoring strategy will be comprised of the following elements:

- Annual photographic surveys of each channel reach downstream and upstream of subsidence panels at and between the longwall panels to provide a benchmark for future reference.
- Annual GPS mapping and photographic documentation of surface cracking that has occurred during subsidence until it is demonstrated that cracks are effectively sealed.
- Repetition of surveys (listed above) after three flood events have passed through subsidence areas (at which time a reasonably balanced regime of erosion and deposition cycles along the channels should become evident) to provide a secondary benchmark for future reference.

- An aerial survey of the mine lease during the dry season to document the size and potential volume of channel bed depressions (water ponding areas) within subsidence areas and to identify any lateral shifting or sedimentation within the stream beds.
- In the event that significant erosion and sedimentation is occurring at rates that are not sustainable in the stream systems (i.e. visual loss of riparian vegetation, or rapid bank erosion and undercutting) or in the event that pooled areas are not decreasing between aerial surveys, a stream restoration program will be developed by a qualified fluvial geomorphologist and administered.

Groundwater Monitoring

Following installation and during mining, groundwater levels in the bore network will be measured quarterly. Post-mining, groundwater levels in the bores will be measured quarterly for the first two years following cessation of mining and annually thereafter. Water-levels will be collected at least annually from surrounding domestic bores. If data is available, the SGCP water levels recorded should be compared with groundwater levels collected at neighbouring coal mines. Further discussion of Groundwater is provided in **Section 9.4** of the AEIS.

3.4.6. Commitments

The following commitments will be upheld at the SGCP to protect or enhance environmental values of water resources:

- The Preparation and implementation of a WMP which outlines management and mitigation measures for surface and groundwater at the SGCP (refer **Section 9.3** of the AEIS).
- Minimisation of impact on downstream water bodies, groundwater and the local community by adherence to management and mitigation measures in the MWMP.
- Minimisation of the amount of surface runoff impacted by mining operations by diverting clean water flows around the mining operations.
- Investigation of all water related complaints and implementation of mitigation measures as soon as practicable, if the complaints are substantiated.
- Minimisation of contamination of surface and groundwater at the SGCP.

- Monitoring and sampling techniques will be in accordance with the *Monitoring and Sampling Manual* (2009) and analysis will be conducted by a NATA accredited laboratory.
- Water storages will be designed in accordance with applicable Guidelines.
- The containment, treatment and reuse of mine affected water, as described in the MWMP, will be conducted in preference to discharge.
- EA conditions will also require certified annual surveillance inspections of hazardous dams by a suitably qualified and experience engineer and obligation for the EA holder to rectify deficiencies identified in the annual surveillance outcomes.

3.4.7. Corrective Action

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.4.8. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs; and
- compliance and other audits of regulatory requirements.

3.4.9. Reporting

A monthly report will be prepared and submitted by the Proponent to include details of monthly surface and groundwater monitoring results and the occurrence of any complaints. All surface water and groundwater related regulatory reporting requirements will be met.

3.4.10. Proposed EA Conditions

Surface Water

Contaminant Release

- W1** Contaminants that will, or have the potential to, cause environmental harm must not be released directly or indirectly to any waters except as permitted under the conditions of this EA.
- W2** The release of contaminants to waters must only occur from the release points specified in **Table 3-7**.

Table 3-7 Contaminant Release Points, Sources and Receiving Waters

Release Point	Contaminant Source and Location	Monitoring Point	Receiving Waters
SGCP RP1 (Release Point 1)	Dirty Water Dam	Low Level Pipe Outlet	Tallarenha Creek
SGCP RP2 (Release Point 2)	Pit Water Dam North	Low Level Pipe Outlet	Tallarenha Creek
SGCP RP3 (Release Point 3)	Sediment Dam N1	Spillway	Tallarenha Creek
SGCP RP4 (Release Point 4)	Sediment Dam Central	Spillway	Tallarenha Creek
SGCP RP5 (Release Point 5)	Sediment Dam S1	Spillway	Sapling Creek
SGCP RP6 (Release Point 6)	Sediment Dam S2	Spillway	Tallarenha Creek
SGCP RP7 (Release Point 7)	Sediment Dam N2	Spillway	Tallarenha Creek
SGCP RP8 (Release Point 8)	Sediment Dam N3	Spillway	Tallarenha Creek
SGCP RP9 (Release Point 9)	Pit Water Dam South	Low Level Pipe Outlet	Sapling Creek
SGCP RP10 (Release Point 10)	Pit Water Dam South	Low Level Pipe Outlet	Tallarenha Creek

- W3** The release of contaminants to waters must not exceed the release limits stated in **Table 3-8** when measured at the monitoring points specified in **Table 3-7** for each quality characteristic.

Table 3-8 Contaminant Release Limits

Quality Characteristic	Release Limits	Monitoring Frequency
Electrical conductivity (EC) (microSeimens per centimetre (µS/cm))	Aquatic ecosystem protection (no drinking water value): An end-of-pipe limit to achieve in the range 0 to 1000 µS/cm in the receiving waters - (Must have natural flow i.e. the 20th percentile flow trigger and achieve a 1:4 dilution).	Daily during release
pH (pH Unit)	Limit to be determined based on receiving water reference data.	Daily during release
Turbidity (Nephelometric Turbidity Units (NTU))	Site-specific release limits to be determined from the Baseline Monitoring Program.	Daily during release
Suspended solids (milligrams per litre (mg/L))	Site-specific release limits to be determined from the Baseline Monitoring Program and achievable best practice sedimentation control and treatment.	Daily during release
Sulfate (SO ₄ ²⁻) (mg/L)	Site-specific release limits to be determined from the Baseline Monitoring Program.	Daily during release

W4 The release of contaminants to waters from the release points must be monitored at the locations specified in **Table 3-7** for each quality characteristic and at the frequency specified in **Table 3-8** and **Table 3-9**.

Table 3-9 Contaminant Release Limits – Trigger Levels

Quality Characteristic	Release Limits (µg/L)	Comment on Trigger Level	Monitoring Frequency
Aluminium	55	For aquatic ecosystem protection, based on SMD guideline	Commencement of release and thereafter weekly during release.
Arsenic	13	For aquatic ecosystem protection, based on SMD guideline	
Cadmium	0.2	For aquatic ecosystem protection, based on SMD guideline	
Chromium	1	For aquatic ecosystem protection, based on SMD guideline	
Copper	2	For aquatic ecosystem protection, based on LOR for inductively coupled plasma mass spectrometry (ICPMS)	
Iron	300	For aquatic ecosystem protection, based on low reliability guideline	
Lead	4	For aquatic ecosystem protection, based on SMD guideline	
Mercury	0.2	For aquatic ecosystem protection, based on LOR for cold vapour / flow injection mercury system (CV/FIMS)	
Nickel	11	For aquatic ecosystem protection, based on SMD guideline	
Zinc	8	For aquatic ecosystem protection, based on SMD guideline	
Boron	370	For aquatic ecosystem protection, based on SMD guideline	
Cobalt	90	For aquatic ecosystem protection, based on low reliability guideline	
Manganese	1,900	For aquatic ecosystem protection, based on SMD guideline	
Molybdenum	34	For aquatic ecosystem protection, based on low reliability guideline	
Selenium	10	For aquatic ecosystem protection, based on LOR for ICPMS	
Silver	1	For aquatic ecosystem protection, based on LOR for ICPMS	
Uranium	1	For aquatic ecosystem protection, based on LOR for ICPMS	
Vanadium	10	For aquatic ecosystem protection, based on LOR for ICPMS	
Ammonia	900	For aquatic ecosystem protection, based on SMD guideline	

Nitrate	1,100	For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for total nitrogen	
Petroleum hydrocarbons (C6-C9)	20		
Petroleum hydrocarbons (C10-C36)	100		
Fluoride (total)	2,000	Protection of livestock and short term irrigation guideline	

Table 3-9- Contaminant Release Limits notes:

1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.

2. The quality characteristics required to be monitored as per **Table 3-9 – Contaminant Release Limits**, can be reviewed once the results of 2 years monitoring data is available, or if sufficient data is available to adequately demonstrate negligible environmental risk, and it may be determined that a reduced monitoring frequency is appropriate or that certain quality characteristics can be removed from **Table 3-9 – Contaminant Release Limits** by amendment.

3. SMD – slightly moderately disturbed level of protection, guideline refers ANZECC & ARMCANZ (2000).

4. LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.

W5 If quality characteristics of the release exceed any of the release limits specified in **Table 3-9** during a release event, the EA holder must compare the downstream results in the receiving waters to the trigger values specified in **Table 3-9** and:

- a) where the trigger values are not exceeded then no action is to be taken; or
- b) where the downstream results exceed the trigger values specified **Table 3-9** for any quality characteristic, compare the results of the downstream site to the data from background monitoring sites and:
 - i. if the result is less than the background monitoring site data, then no action is to be taken; or
 - ii. if the result is greater than the background monitoring site data, complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - 1. details of the investigations carried out; and
 - 2. actions taken to prevent environmental harm.

NOTE: Where an exceedence of a release limits has occurred and is being investigated, in accordance with W5 (b)(ii) of this condition, no further reporting is required for subsequent release events for that quality characteristic.

W6 If an exceedence in accordance with condition W5 (b)(ii) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.

Contaminant Release Events

- W7** The holder must install, operate and maintain a stream flow gauging station to determine and record stream flows (in cubic metres per second (m³/s)) at the locations upstream of each release point as specified in **Table 3-10** for any receiving water into which a release occurs.
- W8** Notwithstanding any other condition of this EA, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in **Table 3-10** for the contaminant release point(s) specified in **Table 3-7**.
- W9** Contaminant release flow rate must not exceed 20 % of receiving water flow rate.
- W10** The daily quantity of contaminants released from each release point must be measured and recorded at the monitoring points in **Table 3-7**.
- W11** Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build-up of sediment in such waters.

Table 3-10 Contaminant Release during Flow Events

Receiving Waters	Release Point (RP)	Gauging Station Description	Minimum Flow in Receiving Water Required for a Release Event	Flow Record Frequency
Tallarenha Creek	SGCP RP1 (Release Point 1)	TBA	0.5 m ³ /s	Continuous (minimum daily)
Tallarenha Creek	SGCP RP2 (Release Point 2)	TBA	0.5 m ³ /s	Continuous (minimum daily)
Tallarenha Creek	SGCP RP3 (Release Point 3)	TBA	0.5 m ³ /s	Continuous (minimum daily)
Tallarenha Creek	SGCP RP4 (Release Point 4)	TBA	0.5 m ³ /s	Continuous (minimum daily)
Sapling Creek	SGCP RP5 (Release Point 5)	TBA	0.5 m ³ /s	Continuous (minimum daily)
Tallarenha Creek	SGCP RP6 (Release Point 6)	TBA	0.5 m ³ /s	Continuous (minimum daily)
Tallarenha Creek	SGCP RP7 (Release Point 7)	TBA	0.5 m ³ /s	Continuous (minimum daily)
Tallarenha Creek	SGCP RP8 (Release Point 8)	TBA	0.5 m ³ /s	Continuous (minimum daily)
Sapling Creek	SGCP RP9 (Release Point 9)	TBA	0.5 m ³ /s	Continuous (minimum daily)
Tallarenha Creek	SGCP RP10 (Release Point 10)	TBA	0.5 m ³ /s	Continuous (minimum daily)

Notification of Release Event

W12 The authority holder must notify the administering authority as soon as practicable (no later than six (6) hours of having commenced releasing mine affected water to the receiving environment). Notification must include the submission of written verification to the administering authority of the following information:

- a) release commencement date/time;
- b) expected release cessation date/time;
- c) release point/s;
- d) release volume (estimated);
- e) receiving water/s including the natural flow rate; and
- f) any details (including available data) regarding likely impacts on the receiving water(s).

NOTE: Notification to the administering authority must be addressed to the Manager and Project Manager of the local administering authority via email or facsimile.

W13 The authority holder must notify the administering authority as soon as practicable, (nominally within 24 hours after cessation of a release) of the cessation of a release notified under condition W12 and within 28 days provide the following information in writing:

- a) release cessation date/time;
- b) natural flow volume in receiving water;
- c) volume of water released
- d) details regarding the compliance of the release with the conditions of Department interest: Water of this EA (i.e. contamination limits, natural flow, discharge volume);
- e) all in-situ water quality monitoring results; and
- f) any other matters pertinent to the water release event.

Notification of Release Event Exceedence

W14 If the release limits defined in **Table 3-8** are exceeded, the holder of the EA must notify the administering authority within 24 hours of receiving the results.

W15 The authority holder must, within 28 days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:

- a) the reason for the release;
- b) the location of the release;
- c) all water quality monitoring results;
- d) any general observations;
- e) all calculations; and
- f) any other matters pertinent to the water release event.

Monitoring of Water Storage Quality

W16 Water storages stated in **Table 3-11** which are associated with the release points must be monitored for the water quality characteristics specified in **Table 3-12** at the monitoring locations and at the monitoring frequency specified in **Table 3-11**.

Table 3-11 Water Storage Monitoring

Water Storage Description	Northing (GDA 94)	Easting (GDA 94)	Monitoring Location*	Frequency of Monitoring
Dirty Water Dam	TBA*	TBA*	TBA*	Monthly
Pit Water Dam North	TBA*	TBA*	TBA*	Monthly
Sediment Dam N1	TBA*	TBA*	TBA*	Monthly
Sediment Dam Central	TBA*	TBA*	TBA*	Monthly
Sediment Dam S1	TBA*	TBA*	TBA*	Monthly
Sediment Dam S2	TBA*	TBA*	TBA*	Monthly
Sediment Dam N2	TBA*	TBA*	TBA*	Monthly
Sediment Dam N3	TBA*	TBA*	TBA*	Monthly
Pit Water Dam South	TBA*	TBA*	TBA*	Monthly
Pit Water Dam South	TBA*	TBA*	TBA*	Monthly

NOTE: *To be finalised by holder upon completion of detailed design.

W17 In the event that waters storages defined in **Table 3-11** exceed the contaminant limits defined in **Table 3-12**, the holder of the EA must implement measures, where practicable, to prevent access to waters by all livestock.

Table 3-12 On-site Water Storage Contaminant Limits

Quality Characteristic	Value Type	Contaminant Limit
pH (pH unit)	Range	Site-specific contaminant levels to be determined from the Baseline Monitoring Program.
EC (µS/cm)	Maximum	
Sulfate (mg/L)	Maximum	
Fluoride (mg/L)	Maximum	
Aluminium (mg/L)	Maximum	
Arsenic (mg/L)	Maximum	

Cadmium (mg/L)	Maximum	
Cobalt (mg/L)	Maximum	
Copper (mg/L)	Maximum	
Lead (mg/L)	Maximum	
Nickel (mg/L)	Maximum	
Zinc (mg/L)	Maximum	

NOTE: Total measurements (unfiltered) must be sampled and analysed.

Receiving Environment Monitoring and Contaminant Limits

W18 The quality of the receiving waters must be monitored at the locations specified in **Table 3-14** for each quality characteristic and at the monitoring frequency stated in **Table 3-13**.

Table 3-13 Receiving Waters Contaminant Trigger Levels

Quality Characteristic	Contaminant Level	Monitoring Frequency
pH (pH units)	Site-specific contaminant levels to be determined from the Baseline Monitoring Program.	Daily during the release
EC (µS/cm)		
Suspended solids (mg/L)		
Sulfate (SO ₄ ²⁻) (mg/L)		

Table 3-14 Receiving Water Upstream Background Sites and Downstream Monitoring Points

Site ID	Receiving Waters Location Description	Coordinates	
		Easting (GDA94)	Northing (GDA94)
SGCP TCU	Tallarenha Creek (Upstream Monitoring Point)	TBA	TBA
SGCP TCD	Tallarenha Creek (Downstream Monitoring Point)	TBA	TBA
SGCP SCU	Sapling Creek (Upstream Monitoring Point)	TBA	TBA
SGCP SCD	Sapling Creek (Downstream Monitoring Point)	TBA	TBA
SGCP DCD	Dead Horse Creek (Downstream Monitoring Point)	TBA	TBA
SGCP ACU	Alpha Creek (Upstream Monitoring Point)	TBA	TBA
SGCP ACD	Alpha Creek (Downstream Monitoring Point)	TBA	TBA
SGCP HC	Highwall Channel (Downstream Monitoring Point)	TBA	TBA
SGCP LC	Lowwall Channel (Downstream Monitoring Point)	TBA	TBA

NOTE: The data from background monitoring points must not be used where they are affected by releases from other mines.

W19 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in **Table 3-13** during a release event the EA holder must compare the downstream results to the upstream results in the receiving waters and:

- a) where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or

- b) where the downstream results exceed the upstream results complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - i) details of the investigations carried out; and
 - ii) actions taken to prevent environmental harm.

NOTE: Where an exceedence of a trigger level has occurred and is being investigated, in accordance with W19 (b) (ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Receiving Environment Monitoring Program (REMP)

W20 A REMP must be developed and implemented before the commencement of construction to monitor and record the effects of the release of contaminants on the receiving environment periodically and while contaminants are being released from the site, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water. A copy of the REMP must be provided to the administering authority prior to its implementation and due consideration given to any comments made on the REMP by the administering authority. For the purposes of the REMP, the receiving environment is the waters of Tallarenha Creek, Sapling Creek, Dead Horse Creek and Alpha Creek and connected waterways downstream of the release.

W21 The REMP must address (but not necessarily be limited to) the following items:

- a) A description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality).
- b) A description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the *Environmental Protection (Water) Policy 2009*).
- c) Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed.
- d) Water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.
- e) Monitoring for any potential adverse environmental impacts caused by the release.

- f) Monitoring of stream flow and hydrology.
- g) Monitoring of toxicants should consider the indicators specified in **Table 3-9** to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC & ARMCANZ 2000 guidelines for slightly to moderately disturbed ecosystems.
- h) Monitoring of physical chemical parameters as a minimum those specified in **Table 3-8** (in addition to dissolved oxygen saturation and temperature).
- i) Monitoring biological indicators (for macroinvertebrates in accordance with the AusRivas methodology) and metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, BATLEY and/or the most recent version of AS 5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages.
- j) The locations of monitoring points (including the locations specified in **Table 3-14** which are background and downstream impacted sites for each release point).
- k) The frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site-specific reference values within two years (depending on wet season flows) in accordance with the most recent version of the Queensland Water Quality Guidelines. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges.
- l) Specify sampling and analysis methods and quality assurance and control.
- m) Any historical datasets to be relied upon.
- n) Description of the statistical basis on which conclusions are drawn.
- o) Any spatial and temporal controls to exclude potential confounding factors.

W22 A report outlining the findings of the REMP, including all monitoring results and interpretations in accordance with condition W20 must be prepared and submitted in writing to the administering authority by the commencement of operations. This should include an assessment of background water quality, any assimilative capacity for those contaminants monitored and the suitability of current release limits to protect downstream environment values.

Water Reuse

W23 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying stock water to properties directly adjoining properties owned by the EA holder or a third party and subject to compliance with the quality release limits specified in **Table 3-15**.

Table 3-15 Stock Water Release Limits

Quality Characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
EC	µS/cm	N/A	5000

W24 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying irrigation water to properties directly adjoining properties owned by the EA holder or a third party and subject to compliance with quality release limits in **Table 3-16**.

Table 3-16 Irrigation Water Release Limits

Quality Characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
EC	µS/cm	N/A	Site-specific value to be determined in accordance with ANZECC & ARMCANZ (2000) Irrigation Guidelines and provided through an amendment process.

W25 Water contaminated by mining activity may be piped or trucked off the mining lease for the purpose of supplying water to a third party for purpose of construction and/or road maintenance in accordance with the conditions of this EA.

W26 If the responsibility of water contaminated by mining activities (the water) is given or transferred to another person in accordance with conditions W23, W24, W25:

- a) the responsibility of the water must only be given or transferred in accordance with a written agreement (the third party agreement); and
- b) a commitment must be included in the third party agreement from the person utilising the water to use water in such a way as to prevent environmental harm or public health incidences and specifically make the persons aware of the General Environmental Duty (GED) under Section 319 of the *Environmental Protection Act 1994*, environmental sustainability of the water disposal and protection of environmental values of waters.

Water General

W27 All determinations of water quality must be:

- a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements;
- b) made in accordance with methods prescribed in the latest edition of the administering authority's Water Quality Sampling Manual;
- c) collected from the monitoring locations identified within this EA, within ten (10) hours of each other where possible;
- d) carried out on representative samples; and
- e) laboratory testing must be undertaken using a laboratory accredited (e.g. NATA) for the method of analysis being used.

NOTE: Condition W27 requires the Water Quality Manual to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.

W28 The release of contaminants directly or indirectly to waters:

- a) must not produce any visible discolouration of receiving waters; and
- b) must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Annual Water Monitoring Reporting

W29 The following information must be recorded in relation to all water monitoring required under the conditions of this EA and submitted to the administering authority in the specified format with each annual return:

- a) the date on which the sample was taken;
- b) the time at which the sample was taken;
- c) the monitoring point at which the sample was taken;
- d) the measured or estimated daily quantity of the contaminants released from all release points;
- e) the release flow rate at the time of sampling for each release point;
- f) the results of all monitoring and details of any exceedence with the conditions of this EA; and
- g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Temporary Interference with Waterways

- W30** Temporarily destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with the administering authority's guideline for activities in a watercourse, lake or spring associated with mining activities.

Water Management Plan

- W31** A Water Management Plan must be developed and implemented by the commencement of operations that provides for the proper and effective management of the actual and potential environmental impacts resulting from the mining activity and to ensure compliance with the conditions of this EA.
- W32** The Water Management Plan must be developed in accordance with the administering authority's guidelines for preparing a Water Management Plan and must include at least the following components:
- a) contaminant source study;
 - b) site water balance and model;
 - c) water management system;
 - d) saline drainage prevention and management measures;
 - e) acid rock drainage prevention and management measures (if applicable);
 - f) emergency and contingency planning; and
 - g) monitoring and review.
- W33** Each year the holder of the EA must undertake a review of the Water Management Plan prior to the wet season (i.e. by 1 November) and a further review following the wet season (i.e. by 1 May the following year) to ensure that proper and effective measures, practices or procedures are in place so that the mine is operated in accordance with the conditions of this EA and that environmental harm is prevented or minimised.
- W34** A copy of the Water Management Plan and/or a review of the Water Management Plan must be provided to the administering authority on request.

Saline Drainage

- W35** The holder of this EA must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.

Acid Rock Drainage

- W36** The holder of this EA must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Stormwater and Water Sediment Controls

- W37** An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.
- W38** The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any receiving waters.
- W39** Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or receiving waters.

Groundwater

- W40** Groundwater affected by the mining activities must be monitored at the locations and frequencies specified in **Table 3-17** and carried out in accordance with the latest edition of the administering authority's Monitoring and Sampling Manual.
- W41** In the event that groundwater fluctuations in excess of two metres per year are detected at the groundwater monitoring locations nominated in **Table 3-17** and the fluctuations are not the result of pumping from licensed bores, the administering authority must be notified within 14 days.

Table 3-17 Groundwater Monitoring Locations and Frequency

Monitoring Point	Easting (MGA)	Northing (MGA)	Comments	Monitoring Frequency
BH06	444010	7374020	Located on southern boundary of MLA and will remain undisturbed for 10 years, so this will also provide useful background information, including monitoring the impact on groundwater from waste rock dumps.	Quarterly
BH21	446111	7378014	To monitor dewatering of southern operations and baseline for future mining. Located at eastern boundary and will remain undisturbed for 25 years.	
BH33	441533	7382067	Will remain undisturbed for at least 25 years.	
BH42	445067	7384006	To monitor dewatering of the northern operations. Located on the northern boundary and may remain undisturbed throughout the mine life.	

BH85	445501	7381000	To monitor dewatering of the northern operations. Will also provide background data prior to expansion and will likely remain undisturbed throughout the mine life.
BH34	444148	7382453	Located near northern proposed "dirty water" dam, and will likely remain undisturbed through the mine life.
SP142	445299	7374183	Located near southern proposed "dirty water" dam, and will likely remain undisturbed. Will also be useful to monitor the impact on groundwater from waste rock dump.
BH27	442900	7379447	Located in the middle of the model domain and possibly will remain undisturbed for 20 years.
CK110	446300	7380050	Located on eastern side of operation and will be useful to monitor groundwater impact from waste rock dump. May remain undisturbed for 10-15 years.
BH05	442094	7374161	Located at south western corner and will remain undisturbed for 10 years.
BH18	440058.000	7378132.000	Located at western side and may remain undisturbed for 15 years or more.
CK177	439044	7380762	Located at western side and may remain undisturbed for 25 years or more.
BH39	438973	7383544	Located at north western corner and will remain undisturbed for 25 years or more
CK226	442113	7378175	Located at the middle of the mining domain and will remain undisturbed for about 15 years.

Sewage Effluent

W42 All effluent released from the treatment plant must be monitored at the frequency and for the parameters specified in **Table 3-18**.

Table 3-18 Sewage Treatment Effluent Quality Targets for Dust Suppression and Irrigation

Monitoring Point	Quality characteristics	Release limits	Frequency
STP	5 day biological oxygen demand (mg/L)	20	Monthly
	Suspended solids (mg/L)	30	
	Thermotolerant coliforms (Colony-Forming Units (CFU/100 mL))	10	
	Total phosphorous (mg/L)	15	
	Total nitrogen (mg/L)	30	
	pH (pH units)	6.5 to 8.5	

W43 Sewage effluent used for dust suppression or irrigation must not exceed sewage effluent release limits defined in **Table 3-18**.

W44 Sewage effluent used for dust suppression or irrigation must not cause spray drift or over spray to any sensitive or commercial place.

- W45** Subject to conditions W42 to W44 inclusive, sewage effluent from sewage treatment facilities must be reused or evaporated and must not be directly released from the STP to any waters or the bed and banks of any waters.
- W46** The effluent irrigation areas must have a separation distance of at least 30 m from any groundwater bores and surface waters.
- W47** The irrigation of treated effluent must be carried out in a manner such that:
- a) vegetation is not damaged;
 - b) soil erosion and soil structure damage is avoided;
 - c) there is no surface ponding of treated effluent;
 - d) percolation of treated effluent beyond the plant root zone is minimised;
 - e) the capacity of the land to assimilate nitrogen, phosphorus, salts, water and organic matter (as measured by oxygen demand) is not exceeded; and
 - f) the quality of groundwater is not adversely affected.
- W48** Notices must be prominently displayed on any treated effluent irrigation area warning staff and the public that the area is irrigated with treated effluent and not to use or drink the treated effluent. These notices must be maintained in a visible and legible condition.
- W49** The daily volume of contaminants released to land must be determined by an appropriate method, for example a flow meter and records kept of such determinations.

Dams

All Dams

- G1** The holder of this EA must ensure that dams are designed, constructed, operated and maintained in accordance with accepted engineering standards.
- G2** Except for dams affected by condition G3, the hazard category of dams must be assessed by a suitably qualified and experienced person prior to their construction, and then not less frequently than on an annual basis.
- G3** The hazard category of dams constructed prior to grant of this EA, must be assessed by a suitably qualified and experienced person within six (6) months of this EA taking effect, and not less frequently than on an annual basis.
- G4** Where the hazard category of a dam is assessed as significant or high, the holder of the EA must act immediately to ensure:
- a) the administering authority is advised of the current location and details of that dam; and

- b) that dam meets the hydraulic performance required of the assessed hazard category within six (6) months of that assessment.

- G5** The condition of dams must be monitored for early signs of loss of structural or hydraulic integrity, based on the advice of a suitably qualified and experienced person. The methods of monitoring and frequency of monitoring shall be as assessed by that suitably qualified and experienced person, based on the hazard category and particular circumstances of each dam.
- G6** In the event of early signs of loss of structural or hydraulic integrity, the holder of this EA must immediately take action to prevent or minimise any actual or potential environmental harm and report in writing any findings and actions taken to the administering authority within 28 days.
- G7** The holder of this EA must decommission each dam to a situation where ongoing environmental harm is prevented.
- G8** Dams must be decommissioned such that they:
- a) no longer contain flowable substances;
 - b) become stable landforms; and
 - c) comply with the rehabilitation requirements of this EA.

Location and Basic Specifications

- G9** All regulated dams are to be located within the control points defined in **Table 3-19**.

Table 3-19 Location of Regulated Dams

Name of Regulated Dam	Easting (GDA94)	Northing (GDA94)
Pit Water Dam N	TBA*	TBA*
Pit Water Dam S		
ROM Stockpile Dam N	TBA*	TBA*
ROM Stockpile Dam S	TBA*	TBA*
ROM Dump N Dam	TBA*	TBA*
ROM Dump S Dam	TBA*	TBA*
MIA Dam N	TBA*	TBA*
MIA Dam S	TBA*	TBA*
Dam A	TBA*	TBA*
Dam B	TBA*	TBA*

NOTE: *To be finalised by holder upon completion of detailed design.

- G10** The following regulated dams are to be constructed and used in accordance with **Table 3-20**.

Table 3-20 Basic Specification of Regulated Dams

Name of Regulated Dam	Hazard Category	Maximum Surface Area of Dam (ha)	Maximum Volume of Dam (m ³)	Maximum Depth of Dam (m)	Purpose
Pit Water Dam N	TBA*	TBA*	TBA*	TBA*	Saline Water System
Pit Water Dam S	TBA*	TBA*	TBA*	TBA*	Saline Water System
ROM Stockpile Dam N	TBA*	TBA*	TBA*	TBA*	Saline Water System
ROM Stockpile Dam S	TBA*	TBA*	TBA*	TBA*	Saline Water System
ROM Dump N Dam	TBA*	TBA*	TBA*	TBA*	Saline Water System
ROM Dump S Dam	TBA*	TBA*	TBA*	TBA*	Saline Water System
MIA Dam N	TBA*	TBA*	TBA*	TBA*	Saline Water System
MIA Dam S	TBA*	TBA*	TBA*	TBA*	Saline Water System
Dam A	TBA*	TBA*	TBA*	TBA*	Saline Water System
Dam B	TBA*	TBA*	TBA*	TBA*	Saline Water System

NOTE: * To be finalised by holder upon completion of detailed design.

G11 The following regulated dams are to be designed, constructed and operated in accordance with **Table 3-21**.

Table 3-21 Hydraulic Performance of Regulated Dams

Regulated Dam	Spillway Capacity	Design Storage Allowance	Mandatory Reporting Level
Pit Water Dam N	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall
Pit Water Dam S	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall
ROM Stockpile Dam N	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall
ROM Stockpile Dam S	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall
ROM Dump N Dam	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall
ROM Dump S Dam	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall
MIA Dam N	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall
MIA Dam S	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall
Dam A	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall
Dam B	1:1000 AEP	1:20 AEP for 3 month wet season	1:10 AEP 72 hour rainfall

Certification and Operation

G12 The holder of this EA must not commence construction of a regulated dam unless:

- a) the holder has submitted to the administering authority two (2) copies of a design plan, together with the certification of a suitably qualified and experienced person that the design of the regulated dam is fit for purpose, compliant in all respects with this EA and in accordance with engineering best practice; and
 - b) at least 28 days has passed since the submission of the design plan.
- G13** When construction or modification of any regulated dam is complete, or within 12 months of a dam becoming a regulated dam by virtue of G2 or G3, the holder of this EA must submit to the administering authority two copies of a set of 'as constructed' drawings, together with the certification by a suitably qualified and experienced person that the dam 'as constructed' is fit for purpose, compliant in all respects with this EA and in accordance with engineering best practice.
- G14** The holder of this EA must ensure that there is always a current operational plan for each regulated dam, which may form part of other plans required by legislation.
- G15** The holder of this EA must ensure that, where a current operational plan covers decommissioning and rehabilitation, those operations are consistent with the objectives in any design plan for the dam.
- G16** The holder of this EA or approval must notify the administering authority when the level in any regulated dam reaches the mandatory reporting level (MRL).

Annual Inspection and Report

- G17** The holder of this EA must arrange for each regulated dam to be inspected annually by a suitably qualified and experienced person, in accordance with conditions G18 to G21.
- G18** The annual inspection may be conducted as early as 1 September each year, but not later than 1 November each year, except that the assessment of adequacy of available storage in a dam must be based on dam levels observed within the month of October in the year that the inspection is conducted.
- G19** At each annual inspection, the condition of each regulated dam must be assessed, including the structural, geotechnical and hydraulic adequacy of the dam and the adequacy of the works with respect to dam safety.
- G20** At each annual inspection, the adequacy of the available storage against the design storage allowance must be assessed, and a mandatory reporting level must be determined and marked on each regulated dam.
- G21** For each inspection, two copies of a report certified by the suitably qualified and experienced person, including any recommendations to ensure the integrity of each regulated dam must be provided to the administering authority within 28 days of the inspection.

3.5. NOISE AND VIBRATION

The SGCP is situated approximately 12 km south-west of the township of Alpha in a well-established grazing region. The area surrounding the site has undulating topography comprising open farmlands and native scrublands.

Potential sources of noise and/or vibration from the surrounding environment primarily comprise:

- farming and grazing activities;
- residential activity noise;
- environmental noise (e.g. insects, wind etc.); and
- road and rail traffic.

Ten sensitive receptors have been identified within 19 km of the closest approach of the SGCP. The closest sensitive receptor is located within 1 km of the MLA 70453 boundary.

The sensitive receptors in the vicinity of the SGCP comprise the homesteads of grazing properties and the Alpha township. The locations and separation distances are contained in **Table 3-22**.

Table 3-22 Sensitive Receptors Adjacent to SGCP

Sensitive Receptor	Separation Distance (km) from Sensitive Receptor to:		
	MLA 70453	Surface Works	Railway Corridor
Alpha Township	7	14	8
Eureka Station Homestead	12	14	11
Villafield Station Homestead	1	9	6
Bonanza Station Homestead	2	10	9
Creek farm Station Homestead	1	8	8
Chesalon Station Homestead	1	6	15
Betanga Station Homestead	2	12	18
Corn Top Station Homestead	3	12	18
Oakleigh Station Homestead	6	8	2
Saltbush Station Homestead	17	19	2

3.5.1. Environmental Values

The environmental values to be enhanced or protected are the qualities suitable for the well-being of a community, including its social and economic amenity, and for the well-being of the individual, including the individual's opportunities to sleep, relax and converse without unreasonable interference from intrusive noise or vibration.

The environmental values to be enhanced or protected, as set out in the Queensland *Environmental Protection (Noise) Policy 2008 (EPP (Noise))*, are:

- the qualities of the environment that are conducive to protecting the health and biodiversity of ecosystems; and
- the qualities of the environment that are conducive to human health and wellbeing, including by ensuring a suitable environment for individuals to do any of the following:
 - sleep;
 - study or learn;
 - be involved in recreation, including relaxation and conversation; and
 - the qualities of the environment that are conducive to protecting the amenity of the community.

3.5.2. Environmental Protection Objectives

Acoustic quality objectives, as defined in the *EPP (Noise)* seek to protect the amenity of an acoustic environment. The indoor night-time goals effectively address sleep disturbances, while during the day it protects the ability to have a conversation.

The environmental protection objective for noise and vibration is to minimise the impacts of noise and vibration generated by the SGCP on sensitive receptors within close proximity to the mining lease so that the acoustic environment is conducive to the health and well-being of humans.

3.5.3. Performance Criteria

Acoustic Quality Objectives

The acoustic quality objectives are expressed as indoor noise level goals for dwellings at night (10 pm to 7 am) and outdoor noise level goals during the day (7 am to 6 pm) and evening (6 pm to 10 pm). Furthermore the *EPP (Noise)* also includes acoustic quality objectives for critical habitats (as defined in a Conservation Plan under the *Nature Conservation Act 1992*). These objectives are contained in **Table 3-23**.

Objectives in **Table 3-23** are listed as adjusted A-weighted statistical noise levels over one hour, with $L_{Aeq\ adj.\ 1\ hour}$ being the constant noise level containing the same energy as the fluctuating noise level over the period of one hour, $L_{A10\ adj.\ 1\ hour}$ representing the noise level exceeded 10 % of the time, and $L_{A90\ adj.\ 1\ hour}$ the noise level exceeded 90 % of the time. All objectives are listed in A-weighted decibels (dB(A)).

Table 3-23 Acoustic Quality Objectives for Dwellings during the Day (7 am – 6 pm), Evening (6 pm – 10 pm) and Night (10 pm – 6 am)

Location	Time of Day	Acoustic Quality Objectives (Measured at the receptors) dB(A)			Environmental Value
		$L_{Aeq, adj, 1 \text{ hour}}$	$L_{A10, adj, 1 \text{ hour}}$	$L_{A1, adj, 1 \text{ hour}}$	
Dwelling outdoors	Daytime and evening	50	55	65	Health and wellbeing
Dwelling indoors	Daytime and evening	35	40	45	Health and wellbeing
Dwelling indoors	Night-time	30	35	40	Health wellbeing in relation to the ability to sleep
Protected area, or an area identified under a Conservation Plan under the <i>Nature Conservation Act 1992</i> as a critical habitat or an area of major interest	Anytime	The level of noise that preserves the amenity of the existing area or place			Health and biodiversity of ecosystems

The potential for low frequency noise in the range of 20 - 200 hertz (Hz) should be assessed in accordance with the DEHP Ecoaccess Guideline: Assessment of Low Frequency Noise.

Further discussion of performance criteria is provided in **Section 9.9** of the AEIS.

Controlling Background Creep

The controlling background creep objective seeks to avoid intrusiveness. When setting limits it is not intended that the acoustic environment be permitted to deteriorate and this is achieved by controlling background creep. To the extent that it is reasonable to do so, noise from an activity must not be:

1. For noise that is continuous noise measured by $L_{A90,T}$, more than nil dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$; or
2. For noise that varies over time measured by $L_{Aeq,adj,T}$, more than 5 dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$.

These are measured noise level goals. Hence when developing a limit for the purposes of assessing a "modelled" noise level the cumulative effect of the background noise level needs to be addressed. For a noise that varies over time the limit is an $L_{Aeq,adj,T} = L_{A90,T} + 3dB(A)$.

The DERM Ecoaccess Guideline "Planning for Noise Control" provides methods and procedures that are applicable for setting conditions relating to noise emitted from industrial premises, commercial premises and mining operations, and are intended for planning purposes. The Guideline is applicable to sounds from all sources, individually and in combination, which contribute to the total noise from a site. The guideline takes into account three factors:

- firstly, the control and prevention of background noise creep in the case of a steady noise level from equipment such as that caused by ventilation fans and other continuously operating machinery;
- secondly, the containment of variable noise levels and short-term noise events, such as those caused by forklift trucks and isolated hand tools, to an 'acceptable' level above the background noise level. This will not be considered further as these types of noises do not occur with this mining operation;
- thirdly, the setting of noise levels that should not be exceeded to avoid sleep disturbance.

To prevent background noise levels from progressively creeping higher and higher over time with the establishment of new developments in an area, it is recommended that the $\text{min}L_{A90,1\text{hour}}$ outdoor background noise planning levels given in **Table 3-24** not be exceeded.

Table 3-24 Recommended outdoor background noise planning levels

Receiver Land Use	Receiver Area Dominant Land Use	Background noise Level $\text{min}L_{A90,1\text{hour}}$ [dB(A)] During Time Period		
		Day	Evening	Night
Purely residential	Very Rural	35	30	25
	Rural residential	40	35	30
	Shop or commercial office	45	40	35
	Light industry	50	45	40
Residential area on a busy road or near an industrial area or commercial area	Residential, church, hospital, school	45	40	35

Blasting Criteria

Open cut coal mining procedures often include drilling and blasting of overburden material above the coal to make removal of that material easier.

According to the guideline "Noise and Vibration from Blasting" (EPA, 2006), blasting should generally be limited to the hours of 9 am to 3 pm, Monday to Friday, and from 9 am to 1 pm on Saturdays. Blasting should not generally take place on Sundays or public holidays.

Blasting outside these recommended times will be approved only where:

- blasting during the preferred times is clearly impracticable (in such situations blasts will be limited in number and stricter airblast overpressure and ground vibration limits will apply); or
- there is no likelihood of persons in a noise-sensitive place being affected because of the remote location of the blast site.

Blasting activities must be carried out in such a manner that if blasting noise should propagate to a noise-sensitive place, then:

- the airblast overpressure must be not more than 115 dB (linear) peak for nine out of any 10 consecutive blasts initiated, regardless of the interval between blasts
- the airblast overpressure must not exceed 120 dB (linear) peak for any blast.

Blasting operations must be carried out in such a manner that if ground vibration should propagate to a vibration-sensitive place:

- the ground-borne vibration must not exceed a peak particle velocity of 5 mm per second for nine out of any 10 consecutive blasts initiated, regardless of the interval between blasts; and
- the ground-borne vibration must not exceed a peak particle velocity of 10 mm per second for any blast.

3.5.4. Control Strategies

Modelling indicates that the *EPP (Noise)* acoustic quality objectives to protect human health and wellbeing will be met at all locations (excluding the accommodation village).

For the on-site accommodation village to comply with the indoor acoustic quality objectives, the accommodation units will require air conditioning to allow windows to remain closed to provide sufficient noise reduction.

The calculated noise levels in Alpha comply with the goals to avoid background creep for all time periods.

However, noise levels at the homesteads close to and east of the SGCP are likely to exceed the goals to avoid background creep during the evening and night. Noise levels at the two most adversely affected locations, the Creek Farm Station Homestead and Chesalon Station Homestead, will exceed the night goal for approximately 15 % of the time.

The main contributors will be the trucks operating in exposed locations and the shovel operating close to natural surface (while in the pit).

To reduce background creep at the Creek Farm Station Homestead and Chesalon Station Homestead the following mitigation methods will be undertaken where practicable:

- optimisation of mine layout to shield noise generation; reductions in noise levels can be achieved by 6 dB(A) by operating trucks behind mounding; and
- shovels and other heavy equipment operated during the evening will be used deep in the pit rather than close to the pit surface.

Any noise control designed for these homesteads will be equally effective for other receptors to the east of SGCP.

The noise goals to protect background creep will be exceeded at the accommodation village during all time periods however once the village is constructed and occupied it will generate self-noise (i.e. air conditioning, refrigeration and general activities) which will result in an increase in ambient noise levels.

The blast vibration guideline levels are expected to be met at all sensitive receptors for a maximum instantaneous charge (MIC) of 500 kilograms (kg) therefore no mitigation measures are proposed.

Road Traffic noise is expected to be below the recommend dB(A) noise increase, therefore no specific mitigation measures are proposed.

Due to the large separation distances between the railway and sensitive receptors, all sensitive receptors readily comply with the QR noise level goals for railways, therefore no specific mitigation measures are proposed. A Noise and Vibration Management Plan has been prepared and provided in **Section 9.10** of the AEIS.

3.5.5. Monitoring

It is proposed to monitor noise at the accommodation village and initially monitor background creep at the Creek Farm and Chesalon Station homesteads. A Noise and Vibration Management Plan will detail ongoing noise monitoring requirements including responses to noise complaints.

3.5.6. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs; and
- compliance and other audits of regulatory requirements.

3.5.7. Reporting

Reporting will be conducted internally on monitoring results, incidents and complaints and externally to relevant regulatory bodies on request.

3.5.8. Commitments

The following commitments will be upheld at the SGCP to protect or enhance the environmental values of noise and vibration:

- upon receiving a valid complaint in relation to noise and vibration nuisance, the complaint will be investigated and noise and vibration mitigation measures must be implemented as soon as practicable if the complaints are substantiated;
- ongoing noise and vibration monitoring will be completed in accordance with the requirements in the Environmental Protection Act 1994, Environmental Protection (Noise) Policy 2008, Environmental Protection Regulation 2008 and the Administering Authorities Noise Measurement Manual;
- regular consultation with surrounding landholders will be ongoing in relation to potential noise impacts; and
- consultation will be given with surrounding landholders relative to developing procedures for the notification of blasts while taking into consideration the legislative constraints.

The SGCP will achieve and maintain the level of noise and vibration which is outlined in the EA. Where site activities are the cause of a complaint, a revision of noise and vibration management procedures will occur for the activities identified as causing noise or vibration nuisance or a high noise event.

3.5.9. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.5.10. Proposed EA Conditions

Noise and Vibration

Noise Nuisance

- D1** Subject to conditions D2 and D3 noise from the mining activity must not cause an environmental nuisance, at any sensitive or commercial place.
- D2** When requested by the administering authority, noise monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- D3** If the EA holder can provide evidence through monitoring that the limits defined in **Table 3-25** and **Table 3-26**, are not being exceeded then the holder is not in breach of condition D1. Monitoring must include:
- the A-weighted maximum noise level per unit time ($L_{A, \max \text{ adj, T}}$);
 - relevant background sound level;
 - the level and frequency of occurrence of impulsive or tonal noise;
 - atmospheric conditions including wind speed and direction; and
 - location, date and time of recording.
- D4** If monitoring indicates exceedence of the limits in **Table 3-25** and **Table 3-26**, then the EA holder must:
- address the complaint including the use of appropriate dispute resolution if required; and
 - immediately implement noise abatement measures so that emissions of noise from the activity do not result in further environmental nuisance.
- D5** The method of measurement and reporting of noise levels must comply with the latest edition of the administering authority's noise measurement manual.

Table 3-25 Noise Limits

Noise level dB(A)	Monday to Sunday (including Public Holidays)		
	7 am – 6 pm	6 pm – 10 pm	10 pm – 7 am
	Noise Measured at a 'Sensitive or Commercial Place'		
$L_{A10, \text{adj, 10 mins}}$	$B/g + 5$	$B/g + 5$	$B/g + 3$
$L_{A1, \text{adj, 10 mins}}$	$B/g + 10$	$B/g + 10$	$B/g + 5$

NOTE: "B/g" means background sound pressure level measured in accordance with the latest edition of the administering authority's noise measurement manual. **Table 3-25** does not purport to set operating hours for the mining activities.

Table 3-26 Airblast Overpressure Level

Parameter	Airblast Overpressure Measured at a Sensitive or Commercial Place	
	Monday to Sunday 9 am – 7 pm	Other Times and Public Holidays
Air blast overpressure level (dB [Lin] Peak)	Maximum 115 dB for 4 out of 5 consecutive blasts	No blasting to occur
Air blast overpressure level (dB [Lin] Peak)	120 dB maximum	No blasting to occur

Note: **Table 3-26** does not purport to set limits applicable to any particular explosive blast, rather it sets design criteria for every explosive blast.

Vibration Nuisance

- D6** Subject to Conditions D7 and D8 vibration from the mining activity must not cause an environmental nuisance, at any sensitive place.
- D7** When requested by the administering authority, vibration monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- D8** If the EA holder can provide evidence through monitoring that the limits defined in **Table 3-27**, are not being exceeded then the holder is not in breach of condition D6. Monitoring must include:
- peak particle velocity (millimetres per second (mm/s));
 - air blast overpressure level (dB linear peak);
 - location of the blast/s within the mining area (including which bench level);
 - atmospheric conditions including temperature, relative humidity and wind speed and direction; and
 - location, date and time of recording.

Table 3-27 Vibration Limits

Vibration Parameter	Vibration Measured at a Sensitive Place	
	Monday to Sunday 9 am – 7 pm	Other Times and Public Holidays
Peak particle velocity (mm/s)	Maximum 5 mm/s for 9 out of 10 consecutive blasts	No blasting to occur
Peak particle velocity (mm/s)	10 mm/s maximum	No blasting to occur

- D9** For the purposes of condition D6 the mining activities will not cause environmental nuisance where noise from the mining activities does not exceed the criteria specified in **Table 3-27**.

D10 If monitoring indicates exceedence of the limits in **Table 1-28** then the EA holder must:

- a) address the complaint including the use of appropriate dispute resolution if required
- b) immediately implement noise abatement measures so that emissions of noise from the activity do not result in further environmental nuisance.

D11 Every explosive blast for the mining activity shall be designed by a competent person to achieve the criteria specified in **Table 1-27** and **Table 1-28**.

D12 All relevant information pertaining to the design of every explosive blast for the mining activity in relation to the criteria specified in **Table 3-26** and **Table 3-27** shall be kept in written and diagrammatic form.

3.6. WASTE MANAGEMENT

Wastes will be generated throughout the construction, operational and decommissioning phases of the SGCP. Natural resource efficiency, cleaner production, pollution prevention and waste minimisation are all important components of the overall SGCP waste management strategy. Waste management strategies will apply over the construction, operational and decommissioning phases to minimise potential impacts of waste generation on the environment or health of the SGCP personnel or the local community. Waste is generally split into two types:

- mining waste; and
- non-mining waste (general and regulated).

The potential impacts associated with general and regulated waste are:

- gross waste accumulation;
- loss of aesthetic value;
- risk of vector-borne diseases from waste disposal sites; and
- land contamination through inappropriate storage and handling of wastes.

A potential impact associated with mine waste management is the degradation of water quality through contact with mine waste products in operational areas, including potentially saline or acid generating overburden material.

The scale of the SGCP requires a suitable waste disposal facility for long-term effective treatment of wastes generated during construction and operational phases. An on-site landfill facility will be established at the start of the construction phase following the approval of MLA 70453 to accommodate residual wastes that cannot be practically reused or recycled.

Further discussion of mine wastes is provided in **Section 9.6** of the AEIS. A Waste Management Plan is provided in **Section 9.10** of the AEIS.

3.6.1. Environmental Values

The environmental values at the SGCP that may potentially be impacted upon by mine waste include:

- the life, health and wellbeing of people;
- biological integrity and diversity of ecosystems and processes found on and surrounding the Project site;
- the integrity of receiving environments, including land, air, and water;
- the stability of disturbed land and its suitability for post mining use; and
- visual amenity.

3.6.2. Environmental Protection Objectives

The protection of water quality, air quality and land resources are the main objectives of the waste management strategy, along with responsible management of wastes so that any direct or indirect impacts on the health and well-being of people and the environment are avoided.

Waste management will aim to promote sustainable waste management practices in accordance with the *Waste Reduction and Recycling Act 2011 (WRR Act)*.

3.6.3. Performance Criteria

The Proponent is committed to minimising the impact of waste on the environment and the community, wherever practicable, through the adoption of the waste and resource management hierarchy from the *WRR Act*, as well as the goals identified in the *QLD Waste Reduction and Recycling Strategy 2010 – 2020 (DERM, 2010)*.

The *QLD Reduction and Recycling Strategy* aims to:

- reduce waste;
- optimise recovery and recycling; and
- develop sustainable waste industries and jobs.

A continuous improvement approach will be adopted for the SGCP over the life of the mine. This approach will involve reviewing and modifying processes, materials and operating practices throughout the mine life when required. The development of quantifiable key performance indicators will be included in the Waste Management Plan (WMP) presented in Section 9.10 of the AEIS.

3.6.4. Control Strategies

Regulated and General Wastes

A WMP (refer **Section 9.10** of the AEIS) will be further developed prior to commencement of the SGCP and will be based on the following principles:

- effective implementation of the waste management hierarchy by focusing on:
 - waste avoidance and reduction – by implementing practices that aim to reduce the amount of waste produced;
 - waste reuse – by encouraging reuse practices and regular monitoring of industry developments to identify opportunities for external reuse programs;
 - waste recycling – by implementing a recycling program with the aim of recycling all waste materials that have some value and where recycling options are available. Materials such as metals, oils, solvents, glass, paper and plastics will be assessed for recycling suitability;
 - energy recovery – monitoring of developments within the industry to identify potential opportunities for the generation of energy from waste materials; and
 - waste disposal – If no other options are available, non-recyclable wastes generated will be disposed of at the landfill facility.
- continual development and improvement of waste management practices involving water conservation, treatment and reuse, waste reduction and resource recovery; and
- compliance with national and state waste management policies, the *EP Act* and associated regulatory instruments as a minimum.

The Proponent recognises that cleaner production has both economic and environmental benefits. Techniques to maximise the reuse of waste water and recycling of waste products will be applied to the SGCP with appropriate refinement on the basis of operational experience.

The cleaner production techniques that apply to the SGCP include:

- production process modification – CHPP will comprise a facility that employs leading practice technology in terms of coal resource recovery and waste minimisation;
- input substitution – this refers to the selection and use of products which are less polluting and have a longer 'product life' (such as lubricants and coolants);
- product reformulation – this technique is not currently available for the SGCP;
- production selection – wherever practicable, non-hazardous products will be selected in preference to hazardous materials;
- improved operation and maintenance – this will involve the selection and use of the most appropriate and practicable fixed and mobile plant and equipment for use in coal extraction, transportation and processing including vehicles, and high levels of maintenance to maximise operating efficiency at the SGCP;
- reuse of resources - reuse of resources that will otherwise be classified as wastes is the most common cleaner production technique applicable to the SGCP (e.g. reuse wooden pallets, cleared vegetative material, waste water, metals, lead from batteries) (refer to **Table 3-28** and **Table 3-29**); and
- closed-loop recycling – where a product is recycled and used again in the same form (e.g. wooden pallets), is applicable to the SGCP.

Construction Phase

Indicative estimates of waste streams and volumes produced during the two year SGCP construction phase are shown in **Table 3-28**.

Where appropriate, the justification for waste volumes is described in **Table 3-28**. Where justification is not specifically provided, waste volumes have been generated by extrapolation from publicly available waste generation rates for similar existing or proposed coal mines (on the basis of workforce numbers or production rates).

A detailed inventory of waste streams and volumes will be developed as part of the Definitive Feasibility Study (DFS) and detailed engineering design processes.

Operational Phase

The type, source, projected quantities and management of other operational wastes (apart from waste rock and coal washing wastes) to be produced during the operational phase of the SGCP are presented in **Table 3-29**.

Where appropriate, the justification for waste volumes is described in **Table 3-29**. Where justification is not specifically provided, waste volumes have been generated by extrapolation from publicly available waste generation rates for similar existing or proposed coal mines (on the basis of workforce numbers or production rates).

A detailed inventory of waste streams and volumes will be developed as part of the DFS and detailed engineering design processes.

Table 3-28 General and Regulated Waste Management – SGCP Construction Phase

Type	Source(s)	Management	Approximate Quantity of Waste
Concrete and masonry	Mine infrastructure area, accommodation village, CHPP, conveyors, power transmission lines, water management infrastructure.	Only procure the amount necessary. Reuse where practicable (e.g. by crushing and using as road base). Disposal at the on-site landfill facility.	1,705 tonnes (t)
Wooden pallets and other processed timber	Construction activities (e.g. CHPP, warehouse).	Those that are reusable will be reused on-site or returned to the supplier/owner. Any unserviceable pallets will be sent to general waste.	1,705 t
Steel and scrap metal	Accommodation village, CHPP, mine infrastructure area, power transmission lines.	Only procure the amount necessary. Segregation and collection with transportation off-site by a licensed regulated transporter for recycling at a licensed waste recycling facility. Non-recyclable scrap metal will be disposed of to landfill as a last resort.	500 t
Sealants, paints and resins	Mine infrastructure area, CHPP.	Procure only the amount necessary. Collection on-site and storage in a bunded area. Transportation to occur off-site by a licensed regulated waste transporter.	Minor amounts
Electrical wastes	Waste from construction activities or temporary structures.	Segregation and collection on-site. Transportation by a waste contractor for off-site recycling or reprocessing where possible.	570 t
Green waste	Cleared vegetation for construction phase.	Reuse on-site as habitat features, erosion control or rehabilitation material where practicable.	105,300 t (based on 585 hectares [ha] of vegetation clearance, with 180 t biomass/ha) (Westman and Rogers, 1977).
General wastes including putrescible and organic (food waste), some plastics and paper	Construction offices, accommodation village, workshops.	General waste will be disposed of at the on-site landfill facility.	28,800 t
Paper and cardboard, plastics, glass, aluminium cans	Construction offices, accommodation village.	Collection and segregation on-site. Transportation by a waste contractor for off-site recycling.	2,000 t
Grease trap wastes	Accommodation village.	Placed in a bunded storage container and collected by a licensed waste contractor for reuse, reprocessing, recycling or disposal.	6 t

Type	Source(s)	Management	Approximate Quantity of Waste
Waste oil and containers	Servicing of vehicles and equipment, construction and assembly of mining equipment, workshops.	Collected and stored on-site in a bunded area. Transported off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling.	5,100 t
Batteries	Light vehicles, machinery, radios, mobile phones.	Collection and segregation on-site. Transported by a licensed waste contractor for off-site recycling or reprocessing.	34 t
Tyres	Light and heavy vehicles.	Where an economic off-site tyre recycling option is identified, the Proponent will consider tyre recycling. Until then tyres will be stored and appropriately disposed of in overburden material at a designated location to be recorded in the Environmental Management Register (EMR) administered by DEHP. Tyre disposal will be in accordance with the <i>Operational Policy for the Disposal and Storage of Scrap Tyres at Mine Sites</i> .	1,070 t (based on the assumption that heavy vehicle tyres are changed every 12 months and weigh 3 t, while light/medium vehicle tyres are changed every 24 months and weigh 50 kg.
Sewage effluent	Construction offices, accommodation village, mine infrastructure area.	Sewage pump stations will be located at the accommodation village, mine infrastructure area and CHPP. The sewage wastewater will feed directly into the STP where it will be treated to meet a Class B quality standard (Public Health Regulation 2005, Schedule 3D). During construction an additional modular system will be required to deal with the waste flow associated with the workforce of 1,600 personnel.	280 ML
Sewage sludge	STP	Collected and transported off-site by a licensed waste contractor for disposal at a licensed waste disposal facility.	80 t
Gaseous emissions of CO ₂ , NO _x , SO ₂ and CH ₄	Combustion of diesel.	Direct and indirect measures.	19,600 t

Table 3-29 General and Regulated Waste Management – SGCP Operational Phase

Type	Source(s)	Management	Annual Quantity
Concrete and masonry	Minor maintenance works.	Stockpiled for reuse on-site (e.g. as road base) or disposed of to landfill.	Minimal
Wooden pallets and other processed timber	MIA, CHPP, minor maintenance works.	Wooden pallets or wood that is reusable will be reused on-site or returned to the supplier/owner. Any unserviceable pallets will be sent to general waste.	600 kg
Green waste	Cleared vegetation for construction phase and early works.	Reused on-site as habitat, erosion control or rehabilitation material where practicable.	105,300 t (based on 585 ha of vegetation clearance, with 180 t biomass/ha) (Westman and Rogers, 1977).
General wastes including putrescible and organic (food waste), some plastics and paper	Offices, kitchenettes, crib rooms, administration area, workshop, accommodation areas.	General waste will be disposed of at the on-site landfill facility.	3,000 t
Paper and cardboard, glass, plastics and aluminium cans	Workshop, offices, accommodation areas.	Collection and segregation on-site. Transportation off-site by a licensed regulated waste contractor for off-site recycling.	180 t
Scrap metal	CHPP, MIA, accommodation village.	Only procure the amount necessary. Segregation and collection on-site. Transportation off-site for recycling.	1,200 t
Waste oil	Vehicle and plant maintenance operations, CHPP, workshop.	Oil will be collected, and then transported off-site by a licensed regulated waste transporter to a licensed regulated waste receiver, for recycling.	1,200 t
Oily sludge, absorbent, grease and oily rags (hydrocarbon contaminated material)	CHPP, workshop.	These will be collected on-site before being transported off-site by a licensed regulated waste contractor, for recycling or treatment and disposal.	1,700 t
Waste oil/hydrocarbon drums	Vehicle and plant maintenance operations, CHPP, workshop.	Drums will be transported off-site by waste contractor for off-site reuse, recycling or disposal. Oil will be collected, and then transported off-site by a licensed regulated waste transporter to a licensed regulated waste receiver, for recycling.	185 t
Batteries	MIA.	Collection and segregation on-site. Transported by a licensed waste contractor for off-site recycling or reprocessing.	23 t

Type	Source(s)	Management	Annual Quantity
Conveyor belts	Conveyors, workshops.	Where an economic off-site conveyor belt recycling option is identified, the Proponent will consider conveyor belt recycling. Until then conveyor belts will be stored and appropriately disposed of in overburden material once mining operations commence.	100 t
Blasting waste (detonating cord)	Blasting.	No specialist management is proposed as most detonating cord becomes buried during blasting and is disposed of in waste rock emplacement facilities during the overburden removal process.	Minimal
Electrical wastes	Minor maintenance.	Stockpiled for removal by a licensed waste contractor for reuse, recycling or disposal.	500 kg
Waste water	CHPP, washdown areas, contaminated drainage.	Where practicable, runoff water (i.e. 'clean water') will be diverted away from mining operations and redirected back into existing drainage and creek systems. Runoff that cannot be diverted away from mining operations (i.e. 'mine affected water') will be collected in sediment ponds or sumps and where practicable, reused for operational purposes (e.g. at the CHPP, for dust suppression on haul roads or for vehicle washdown). The consumption of raw water will be kept to a minimum by implementing water efficient work practices and recycling where practicable.	Approximately 3,650 ML per annum of treated waste water will be piped to the Sediment Dam from the Waste Water Treatment Plant. Approximately 131 ML per annum of washdown area waste water will be produced.
Sewage sludge	STP.	Collected and transported off-site by a licensed waste contractor for disposal at a licensed waste disposal facility.	34 t
Sewage effluent	Construction offices, accommodation village, mine infrastructure area.	Sewage pump stations will be located at the accommodation village, mine infrastructure area and CHPP. The sewage wastewater will feed directly into the STP where it will be treated to meet a Class B quality standard (Public Health Regulation 2005, Schedule 3D).	112 ML
Grease trap wastes	Accommodation village, workshops.	Waste grease to be placed in a bunded storage container to be collected by a licensed contractor for reuse, reprocessing, recycling or disposal.	2.5 t

Type	Source(s)	Management	Annual Quantity
Tyres	Workshops.	Where an economic off-site tyre recycling option is identified, The Proponent will consider tyre recycling. Otherwise burial of scrap tyres will be in the waste rock emplacement facilities at a designated location to be recorded in the EMR administered by DEHP. Tyre disposal will be in accordance with the <i>Operational Policy for the Disposal and Storage of Scrap Tyres at Mine Sites</i> . Tyres will be stored further than 10 m from any combustible or flammable material. The size of scrap tyre stacks will be managed by storing for the least amount of time possible prior to disposal.	1,895 t
Gaseous emissions of CO, NO _x , SO ₂ and CH ₄ .	Combustion of diesel, blasting, burning of cleared vegetation, and methane emissions (fugitive) from coal.	Direct and indirect measures.	12.50 Mt

Mine Wastes

Appropriate storage of the waste rock and coal rejects has been a major component of the planning process for the SGCP. Prior to the commencement of mining operations, topsoil will be removed and stockpiled for later use in progressive mine rehabilitation on re-profiled slopes. The final landform will be physically stable and suitable for the agreed post mining land use. The landform will be shaped to shed runoff in order to minimise any potential leaching or erosion.

A portion of the boxcut waste material will be used for the construction of flood prevention berms and the remainder will be stored in waste rock emplacement facilities. Overburden removed by draglines will be placed in previous strips.

Any PAF material will be selectively handled where practicable to minimise the potential for acid rock drainage.

The interburden waste will be dumped in-pit where practicable. Reject material from coal washing will also be dumped within the dragline waste rock piles.

Further discussion of mine wastes is provided in **Section 9.6** of the AEIS.

Landfill Facility

A landfill facility is proposed to be constructed on-site due to the remote location of the SGCP and the anticipated waste volumes (refer to **Table 3-28** and **Table 3-29**).

The SGCP landfill facility will be constructed and managed in accordance to the Guidelines for Landfill Siting, Design, Operation and Rehabilitation, Queensland (DERM, 2010). All relevant approvals will be sought prior to the construction of the landfill facility.

The proposed landfill will be a long-term engineered facility which will receive general waste from construction and operational activities. The landfill facility will be located approximately 1.5 km north-east of the CHPP.

The following hierarchy of aspects has been considered in the preliminary screening of potential landfill sites:

- community needs and expectations;
- landfill type and ancillary activities;
- adjacent and future land users (appropriate buffer distances will be maintained between the landfill and incompatible land uses e.g. surface waters, noise, dust or odour sensitive places, unstable areas, aerodromes);
- groundwater resources;
- surface water system;
- biodiversity;
- external infrastructure; and

- geological setting.

The landfill site will feature a liner and leachate collection system. The liner system will consist of a prepared sub-base of 300 mm, a low permeability clay layer of at least 600 mm thickness and a drainage layer of 300 mm. The sub-base and clay liner construction will be accompanied by level one geotechnical testing as set out in Appendix B of AS 3798 – *Guidelines on earthworks for commercial and residential developments*. The landfill facility will be fenced to prevent unauthorised entry. A gatehouse and weighbridge will be installed to ensure site security and to facilitate waste record keeping.

The design of the on-site landfill facility will be finalised during the DFS and detailed engineering processes.

The landfill site will be monitored over the life of the SGCP and will be rehabilitated to a stable landform with a self-sustaining vegetation cover.

3.6.5. Monitoring

The movement of regulated waste other than that specified in Schedule 7 of the *Environmental Protection Regulation 2008 (EP Regulation)* is required to be monitored by a waste tracking system. Waste tracking will be undertaken at the SGCP with any wastes generated to be tracked in accordance with the *EP Regulation*.

The WMP will include procedures for identification and management of trackable wastes associated with the SGCP. All employees and waste management contractors must act in compliance with these procedures. Trackable wastes will be transported by licensed waste transport contractors to a facility licensed to accept waste of this nature.

The site where the regulated waste is disposed of must be licensed by DEHP. Where the Proponent and/or a contractor carry out these activities, the Proponent and the contractor will be required to hold the appropriate approvals. This requirement will be incorporated into the WMP. Monthly waste monitoring and auditing will be undertaken at the SGCP and be included as a component of the site WMP. The WMP will include continuous improvement mechanisms through auditing and review.

Monitoring will include the recording of waste types and volumes generated on-site (e.g. general waste, bulk general waste, regulated waste, scrap metal and recyclables) and waste transported off-site. Records will be maintained in order to determine where large quantities of certain wastes are being produced. Records will be reviewed on a regular basis and appropriate corrective actions formulated to reduce or eliminate waste generation or impacts associated with waste.

Ongoing geochemical sampling and monitoring of potential impacts of waste on surface water/groundwater will occur.

3.6.6. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs; and
- compliance and other audits of regulatory requirements.

3.6.7. Reporting

In addition to the Queensland Government's regulatory requirements for waste management, the SGCP will be required to comply with relevant National Environmental Protection Measures (NEPM) developed by the National Environmental Protection Council (NEPC). The relevant NEPM for the SGCP is the National Pollutant Inventory (NPI), under which emissions and wastes are reported. All NPI information is accessible to the community, industry and government through the NPI website.

The NPI is a database designed to provide the community, industry and government with information on the types and amounts of certain substances being emitted to land, air and water. The NPI NEPM provides the framework for the establishment of the NPI and sets out the requirements for reporting, including how a facility triggers a reporting obligation and what substances are on the reporting list.

The SGCP will trigger a reporting obligation under the NPI and consequently, the SGCP will be required to estimate and report mine emissions to the NPI on an annual basis in accordance with the National Pollutant Inventory Guide (Department of Sustainability, Environment, Water, Population and Communities [SEWPaC], 2011) and associated manuals (e.g. Emission Estimation Technique Manual for Mining [SEWPaC, 2011]).

3.6.8. Commitments

The following commitments will be upheld at the SGCP to protect or enhance the environmental values of waste:

- a register of all chemicals stored at the SGCP will be maintained;
- the storage and handling of flammable and combustible liquids will be in accordance with AS 1940 – *Storage and Handling of Flammable and Combustible Liquids*;
- all regulated waste will be appropriately disposed of to a facility licensed to receive such wastes and, where required, be tracked;
- as part of the staff awareness and induction program, re-use and recycling will be encouraged;

- a WMP will be developed prior to the construction phase and will detail waste management for the construction and operational phases; and
- geochemical sampling and assessment will continue to be undertaken over the life of the SGCP to validate mine waste characteristics and the proposed management measures.

3.6.9. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.6.10. Proposed EA Conditions

Waste Management

Storage of Tyres

- E1** Scrap tyres stored awaiting disposal or transport for take-back and recycling, or waste-to-energy options must be stored in stable stacks and at least 10 m from any other scrap tyre storage area, or combustible or flammable material, including vegetation.
- E2** All reasonable and practicable fire prevention measures must be implemented, including removal of grass and other materials within a 10 m radius of the scrap tyre storage area.
- E3** Where no feasible recycling or waste-to-energy options are available, disposing of scrap tyres resulting from the mining activities in waste rock emplacement facilities is acceptable, provided tyres are placed as deep in the waste rock as reasonably practicable.
- E4** Scrap tyres resulting from the mining activities disposed within the operational land must not impede saturated aquifers or compromise the stability of the consolidated landform.
- E5** A WMP, in accordance with the *Waste Reduction and Recycling Act 2011* must be implemented and must cover:
 - a) how the EA holder will recognise and apply the waste management hierarchy;
 - b) identify characterisations of wastes generated from the Project and general volume trends over the past five (5) years;

- c) waste management control strategies including:
 - i) the type of wastes;
 - ii) segregation of the wastes;
 - iii) storage of the wastes;
 - iv) transport of the wastes;
 - v) monitoring and reporting matters concerning the waste;
 - vi) emergency response planning; and
 - vii) disposal, reuse and recycling options.
 - d) identify the potential adverse and beneficial impacts of the wastes generated;
 - e) hazardous characteristics of the wastes generated including disposal procedures for hazardous wastes;
 - f) processes to be implemented to allow for continuous improvement of the waste management systems;
 - g) identification of responsible staff (positions) for implementing, managing and reporting the WMP; and
 - h) staff awareness and induction programs that encourage re-use and recycling.
- E6** Where possible and practical, vegetation waste from clearing shall be spread on rehabilitated areas. Vegetation waste only may be burnt as a last resort and only if there is minimal risk of causing nuisance to the neighbouring sensitive receptors. General waste must not be burnt or allowed to burn on the licensed site unless permitted by the administering authority.
- E7** All regulated waste removed from the site must be removed by a person who holds a current approval to transport such waste under the provisions of the *EP Act*.
- E8** Regulated waste must only be removed to a facility licensed under the *EP Act* to receive such waste.

Waste Rock Emplacement Facilities

Certification and Operation

- E9** The disposal of mine waste on-site will only take place in authorised waste rock emplacement facilities.
- E10** Waste rock emplacement facilities shall be designed to prevent environmental harm arising from contaminants being generated in the facility, leachate and runoff from the facility or other sources.

- E11** Authorised waste rock emplacement facilities must be constructed and maintained in accordance with certified design plans, submitted to the administering authority.
- E12** Design plans for the authorised waste rock emplacement facilities must include performance indicators, such that:
- a) during operations the waste rock emplacement facilities will be operated with minimal or no potential for adverse environmental harm resulting from collapse of any component of facility;
 - b) the potential for leachate generation will be minimal or non-existent; and
 - c) adequate drainage structures, erosion protection and storage are provided to manage seasonal and rare rainfall events with minimal or no environmental harm.
- E13** Construction of any waste rock emplacement facilities must not commence unless:
- a) the EA holder has submitted to the administering authority two (2) copies of a design plan;
 - b) certification from a suitably qualified and experienced person that the design of the waste rock emplacement facilities will deliver the performance stated in that design plan and that it will be compliant in all other respects with this EA; and:
 - i) at least 20 business days has passed since the receipt of those documents by the administering authority; or
 - ii) the administering authority notifies the EA holder that a design plan and certification has been submitted for that emplacement facility.

Operational Plan

- E14** An Operational Plan must be developed and maintained for the waste rock emplacement facility. The Operational Plan must include but not be limited to:
- a) description of landform development stages of the waste rock emplacement facility;
 - b) placement technique for waste rock and waste material from the coal handling and processing plant on the SGCP;
 - c) management of any containment structures within the waste rock emplacement facility designed to contain materials from the coal handling and processing plant on the SGCP;
 - d) demonstration of how operations of the waste rock facility are consistent with the accepted design plan for the facility; and

- e) decommissioning and rehabilitation strategies for the waste rock emplacement facility that demonstrate consistency with conditions of this EA.

3.7. REHABILITATION AND DECOMMISSIONING

Rehabilitation

The overriding principle for the SGCP rehabilitation program is that areas disturbed by mining activities will be progressively rehabilitated to a stable landform with a self-sustaining vegetation cover.

To manage and monitor progressive rehabilitation, a Rehabilitation Management Plan (RMP) will be prepared and updated as required. The RMP will be incorporated into the overarching Mine Closure Plan (Section 9.10 of the AEIS).

A progressive rehabilitation program will be implemented throughout the life of the SGCP. The indicative rehabilitation schedule for the SGCP is shown in **Table 3-30**.

Table 3-30 Indicative Mine Rehabilitation Schedule

Mine Year	Cumulative Area Rehabilitated (ha)
Construction	Minor as required
1	0
2	122
3	231
4	360
5	360
10	671
15	1,048
20	1,410
25	1,686
30	1,932
33	2,272

The indicative program for rehabilitation will include the following:

- Year 1 – mining will commence in 2017. The first activity associated with mining of the SGCP will be clearing and topsoil recovery ahead of the excavation of the initial box-cut. Expansion of the pit will continue, with waste rock placed on the waste rock emplacement. Topsoil from this area will be stripped and stockpiled.

- Year 2 – excavation of the pit will continue to the north and south and the waste rock emplacement will progress north. Topsoil spreading and rehabilitation will have commenced on the southern portion of the out-of-pit waste rock emplacement facility.
- Year 3 – the pit will continue to the west and the in-pit waste rock emplacement will progress to the north. Topsoil spreading and rehabilitation of the out-of-pit waste rock emplacement facility will continue to the north.
- Year 4 – open pit mining will continue to the west and topsoil spreading and rehabilitation of the out-of-pit waste rock emplacement facilities will continue to the north.
- Year 5 – open pit mining and underground mining will continue. No additional topsoil spreading or rehabilitation will be undertaken during this period.
- Year 10 – the southern portion of the open pit mining area will continue to progress to the west, along with topsoil spreading and rehabilitation. Underground mining will have commenced to the west of the open-cut mining area. Mining in the northern portion of the open pit mining area will have commenced, with topsoil spreading and rehabilitation undertaken in the north-eastern portion of the out-of-pit waste rock emplacement.
- Year 15 – open-cut mining will continue to advance to the west in Year 15. Topsoil spreading and rehabilitation of the waste rock emplacement facilities will also progress westwards. Underground mining of the D1 and D2 seams will continue to the south-west and west of the open-cut mining area.
- Year 20 – open pit mining will continue to the west, with topsoil spreading and rehabilitation also progressively moving west. Underground mining of the D1 and D2 seams will continue to the west of the open-cut mining area.
- Year 25 – open pit mining will continue to the west, with topsoil spreading and rehabilitation also progressively moving west. Underground mining of the D1 and D2 seams will continue to the west of the open-cut mining area.
- Year 30 – open pit mining will continue to the west, with topsoil spreading and rehabilitation also progressively moving west. Underground mining of the D1 and D2 seams will continue to the west of the open-cut mining area.

- Year 33 – the open pit will have reached its maximum footprint. All out-of-pit waste rock emplacement facilities and the majority of the in-pit waste rock emplacement facilities will have been progressively rehabilitated (approximately 2,272 ha). The final void of the pit will remain with the western-most in-pit waste rock emplacement facilities ready for final reshaping to form the low wall of the void. The low wall will be benched from the top of the in-pit waste rock emplacement to the floor of the final void. Rehabilitation of the remaining in-pit waste rock emplacement facilities will be undertaken progressively and will be completed following the cessation of mining in Year 33.

Further discussion of rehabilitation activities is provided in **Section 9.7** of the AEIS. A Mine Closure Plan framework incorporating rehabilitation activities is provided in **Section 9.10** of the AEIS.

Decommissioning

Decommissioning will occur at the cessation of mining operations but prior to formal mine closure and will involve the removal of mine infrastructure and services, and the remediation of all disturbed areas.

Decommissioning and rehabilitation of the SGCP will be undertaken in a manner that minimises environmental harm and risk to human health. Any dangerous goods or chemicals will be removed from site and any contaminated areas will be managed and rehabilitated to minimise danger posed to the wider public.

The decommissioning and final rehabilitation of the SGCP will be staged over several years. A contaminated site assessment will be conducted as part of the Final Rehabilitation Report. This assessment will recommend appropriate remediation activities for any identified contaminated land. Following remediation works, no sites will require registration on the CLR.

Rehabilitation domains have been described in detail below and illustrated in **Figure 1**.

Exploration Areas

Any exploration areas will be rehabilitated in accordance with the *Code of Environmental Compliance for Exploration and Mineral Development Projects* (EPA, 2001). These areas will be seeded and returned to their predetermined post disturbance land use.

Waste Rock Emplacement Facilities

The waste rock emplacement facilities will be rehabilitated as follows:

- outer waste rock emplacement facility slopes will be designed at no greater than 1 (vertical):3(horizontal) average gradient; and

- the surface of waste rock emplacement facilities will be shaped with a gently undulating topography to mimic the surrounding landscape and naturally promote some localised ponding where appropriate, thereby enhancing habitat values.

The waste rock emplacement facilities will also be rehabilitated as per the indicative program for rehabilitation outlined above and will remain as final elevated landforms.

Final Low Wall, Voids and Ramps

It is standard mining practice for open-cut mines in Queensland to leave the last strip of mining as a final void as there is no economically available waste rock to fill the void. Consequently, the final void will form a significant feature of the post-mining landform, creating a water body that will be fenced off for safety along with the geotechnical stability assessed and reviewed by a RPEQ at the end of mine life.

Ramps will be retained in the final landform and where geotechnically stable, the ramp slope benches will be left at angle of repose. Some benching, battering or drainage control works may be required along ramps to control erosion and/or allow for rehabilitation activities.

The highwall slope will remain at the final batter angles and made safe to minimise the potential for humans or animals to be harmed. All exposed coal seams will be covered with inert material wherever practicable.

An investigation into the final void will be undertaken to develop mine decommissioning acceptance criteria. The investigation will at a minimum include:

- a study of options available for minimising final void area and volume;
- develop design and success criteria for rehabilitation of final void;
- a void hydrology study, addressing the long-term water balance in the void, connections to groundwater resources and water quality parameters in the long-term;
- a pit wall stability study, considering the effects of long-term erosion and weathering of the pit wall and the effects of significant hydrological events; and
- a study of void capability to support native flora and fauna.

Open pits have been modelled indicating that they do not overflow during extreme rainfall events.

Water Management Structures

Where nominated as beneficial by the landowner, water management structures may be left in an operational state after mining has ceased. If the water management structure is not required, it will be decommissioned, the walls removed and/or the excavation backfilled and fully rehabilitated.

As a minimum, decommissioning will be conducted such that each dam has been approved or authorised under relevant legislation for a beneficial use.

Access/Haul Roads

At the end of mine life, haul roads will be rehabilitated to blend in with the surrounding landform, or retained if required by the landowner. Decommissioned roads will be revegetated. Any compacted areas will be ripped, topsoiled and re-seeded in accordance with the predetermined post-mine land use.

Overhead Power Lines

Any overhead power lines no longer required will be dismantled and disposed of off-site by a licensed contractor. Any compacted areas around power line footings will be ripped, topsoiled and re-seeded in accordance with the predetermined post-mine land use.

Infrastructure

Where nominated as beneficial by the landholder, mine infrastructure (inclusive of the infrastructure corridor) may be left in an operational state after the cessation of mining. Any infrastructure which is not required will be decommissioned.

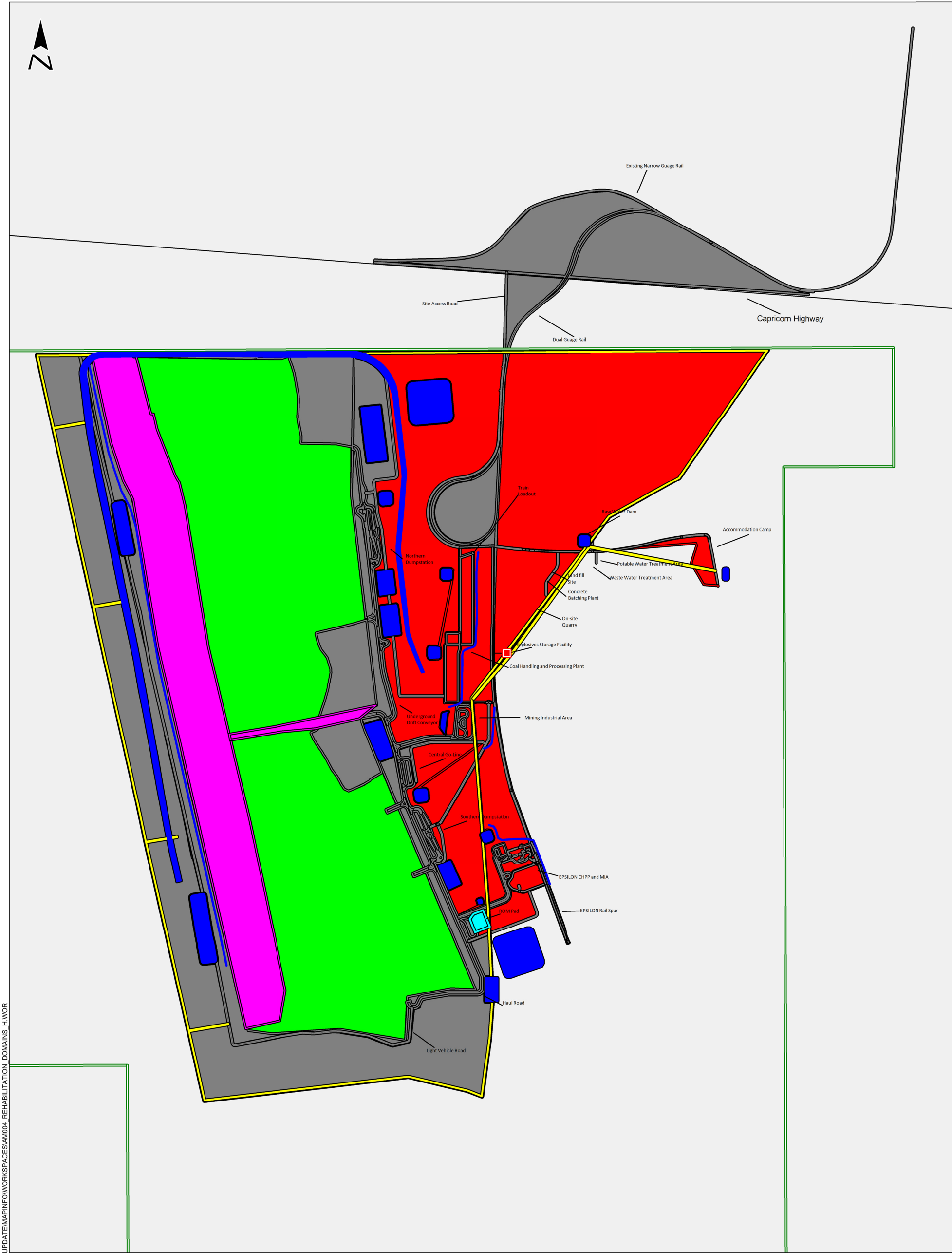
All infrastructure areas will be assessed for contamination prior to demolition, with contaminated material collected separately and treated in accordance with regulated waste procedures on-site. Inert concrete footings and foundations will be buried. Buildings and storage tanks will be dismantled or demolished and removed from site for recycling or disposal.

Once all surface and sub-surface materials have been removed, hardstand areas will be deep-ripped, covered with a layer of topsoil where required and seeded in accordance with the predetermined post-mine land use.

Post-Mine Land Use

The major post-mine land use goal for the all areas disturbed by mining will be a native bushland ecosystem. Rehabilitation will be undertaken in consideration of the surrounding areas managed as part of the Environmental Offsets Plan (refer **Section 9.13.1** of the AEIS).

Post-mine topography will mimic the surrounding landscape wherever possible. Rehabilitation of the waste rock emplacement facilities will be achieved by benching the low wall from the top of the in-pit waste emplacement in the final void and reshaping material above original topography to create a gently undulating landform.



S:\PROJECTS\AM004_SUPPLEMENTARY_EISEMP_UPDATE\MAP\WORKSPACES\AM004_REHABILITATION_DOMAINS_H.WOR



- Access/ Haul Roads & Rail
- Final Low Wall, Void & Ramps
- Infrastructure
- Overhead Powerlines
- Road (principal)
- ROM
- Waste Rock Emplacements
- Water Management Structures
- MLA70453

Alpha Coal Pty Ltd

South Galilee Coal Project

Rehabilitation Domains

1 0 1 2

Kilometres

Scale: A3@ 1:57,000

11/03/2014

Proj. : MGA Z55

Datum: GDA 1994

FIGURE 1-2

3.7.1. Environmental Values

The environmental values that have been considered in relation to rehabilitation and decommissioning at the SGCP include:

- the health and well-being of people;
- the diversity of ecological processes and associated ecosystems;
- the maintenance of soil resources and agricultural land suitability;
- the maintenance of water quality and flows in waterways; and
- the creation of safe, stable, non-polluting and sustainable landforms.

3.7.2. Environmental Protection Objectives

Specifically, the rehabilitation strategy for the SGCP will have the following objectives:

- mining and rehabilitation will aim to create a landform with land use suitability similar to that prior to disturbance unless other beneficial land uses are pre-determined and agreed.
- mine wastes and disturbed land will be rehabilitated to a condition that is self-sustaining or to a condition where the maintenance requirements are consistent with an agreed post-mining land use.
- the water management system will aim to capture all mine affected water and will aim to maximise on-site storage capacity so existing and future use of downstream water is not compromised.

3.7.3. Performance Criteria

The guideline, Rehabilitation Requirements for Mining Resource Activities (DEHP, 2014), provides information on both progressive and final rehabilitation requirements for mining projects operating in Queensland under the provisions of *EP Act*. This was the overarching guideline used in determining the SGCP rehabilitation and decommissioning management strategy.

The SGCP will adhere to the guideline by:

- setting progressive rehabilitation goals and objectives, in consideration of the rehabilitation hierarchy
- setting rehabilitation indicators and appropriate monitoring programs

- setting completion criteria to be achieved prior to release of rehabilitated land.

Rehabilitation Success Criteria have been developed for native bushland at the SGCP and are presented below in **Table 3-31**.

Table 3-31 Rehabilitation Success Criteria for Native Bushland

Objective	Measurement	Frequency/Location	Success Criteria
Slope	Slope measured by aerial survey.	Check areas that have been rehabilitated in the previous two years.	80 % of areas with slope less than 1 (V):3(H)
Ground Cover	Ground cover measured by quadrat method along 100 m transects at nominated monitoring sites.	All sites every two years, alternate between wet and dry season.	>60 % where ground cover is defined as any cover that assists in controlling erosion and may include live or dead cover and possibly rocky debris.
	Incorporation of remote sensing techniques for extrapolation of quadrat data (above) across broad areas.	To be determined.	
Trees and Shrubs	Species composition, health and density.	All sites every two years, alternate between wet and dry season.	Vegetative community is deemed by suitably qualified third party to have reached an acceptable and self-sustaining state. The communities are to be healthy, regenerating with a mixture of predominantly native trees, shrubs and grasses.
Active Erosion	Field erosion survey.	Every two years.	None proposed.
	Incorporation of remote sensing techniques across broad areas. (Currently subject of coal industry research).	To be determined.	Area deemed to have acceptable stability by suitably qualified third party.
Soil Chemistry	Surface soil sampling. Full detailed fertility analysis is to be conducted only on surface soil samples.	Every four years, all sites.	EC < 0.6 deciSiemens per metre (dS/m) and pH < 8.9 and > 5.0 to at least 35 cm depth.
	Subsoil sampling of five layers (10, 20, 30, 40, 50 and 60 centimetres (cm)) for pH, EC, R1 dispersion and major cations (to determine subsoil calcium-magnesium ratio (Ca:Mg), Exchangeable Sodium Percentage (ESP) and dispersion).	Every four years, all sites.	Trending to meet above criteria.

In addition to the guideline, the rehabilitation strategy for the SGCP will consider the requirements contained in:

- Environmental Management Policy for Mining in Queensland 1991 (Department of Mines and Energy, 1991);

- A Policy Framework to Encourage the Progressive Rehabilitation of Large Mines (Environmental Protection Agency (EPA), 2004);
- Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland 1995 (Department of Minerals and Energy, 1995);
- Leading Practice Sustainable Development Program for the Mining Industry: Mine Rehabilitation (Department of Industry, Tourism and Resources, 2006a); and
- Leading Practice Sustainable Development Program for the Mining Industry: Mine Closure and Completion (DITR, 2006b).

3.7.4. Control Strategies

Erosion Mitigation

Erosion and sediment control is an essential component to achieving site stability, particularly on rehabilitated landforms that have steep or long slopes, and is usually achieved through a combination of vegetation establishment, structural cladding and surface drainage control.

Major earth works programs will be scheduled to avoid the high rainfall period between December and March, where practicable.

Disturbed areas will be stabilised as quickly as possible to limit erosion. Progressive revegetation will be undertaken and erosion and sediment control measures will be employed, including:

- minimising the area disturbed;
- undertaking topsoil stripping and stockpiling immediately prior to earthworks, where practicable;
- progressively rehabilitating available areas;
- installing runoff control devices to reduce slope length (e.g. 'whoa boys', berms, temporary sediment fences, straw bale banks or geotextile socks);
- treating runoff in sediment traps and dams;
- removing all temporary control measures after the disturbed site is stabilised;
- minimising the gradient of the final landform; and
- establishing groundcover as soon as practicable.

Waste Water Mitigation

Water management designs will allow for the segregation of clean and mine affected water, by directing all water that comes into contact with coal stockpiles, hardstands, workshop areas, waste rock emplacement facilities and haul roads into adequately sized sediment retention ponds.

This water will be used for dust suppression on roads and product stockpiles when necessary. The SGCP will recycle water stored in these dams for use in the CHPP and for haul road watering purposes.

Rainwater falling on undisturbed areas is classified as clean water and diverted away from disturbed areas by grass and/or rock-lined drainage lines. Water management designs for the SGCP will enable the separation of clean and mine affected water.

Clearing Vegetation

Clearing of vegetation will be undertaken using a staged approach. Staged clearing of vegetation allows animals to move away from clearing operations into adjacent, uncleared habitats. Clearing will also be conducted with fauna spotter-catchers in communication with the operators of the clearing machinery. Fauna removal will be undertaken immediately prior to clearing.

Rehabilitation and Revegetation

Rehabilitation of disturbance areas will be undertaken throughout the life of the SGCP in accordance with a RMP. The RMP has been prepared to direct land rehabilitation during and after the operational life of the mine. Re-establishing vegetation cover will be undertaken with a view to creating self-sustaining ecosystems similar to surrounding ecosystems. The final land use will be native bushland.

Only native species will be used for revegetation, apart from any sterile grass cultivars that are required to ensure soil stability. The use of exotic grass species (e.g. buffel grass) in the rehabilitation of native bushland areas is strongly discouraged as such activities may promote the spread of the exotic grass species into otherwise unaffected areas, and restrict the development of the native groundcover vegetation. Locally collected seed will be used where practicable to preserve local genetic integrity.

Buffer zones will be established around areas of threatened ecological communities and communities with a conservation-significant biodiversity status, where clearing is adjacent to these areas.

Retained areas of native vegetation will be monitored and managed for the life of the project to reduce weed infestation and promote biodiversity values.

Trees will be felled into the construction zone to avoid impacting on vegetated margins.

Topsoil and mulch will be stockpiled where practicable for use on retained vegetation and rehabilitation areas to promote revegetation and retention of soil quality.

Vegetation clearing and construction will be limited to dry weather conditions where practicable to minimise erosion, runoff and soil disturbance.

Disturbed vegetation areas that are no longer required post-construction will be stabilised and revegetated as soon as practicable and monitored for weeds as per the Weed and Pest Animal Management Plan (WPAMP) in **Section 9.10** of the AEIS).

Topsoil Management

The Proponent is committed to the salvage and use of all topsoil suitable for rehabilitation. Topsoil will be strategically stripped ahead of mining in accordance with a Topsoil Management Plan (TMP) (**Section 9.10** of the AEIS). The TMP will indicate how topsoil is to be removed, transported and stored to maximise soil condition.

A topsoil stockpile inventory will be developed indicating the locations, types, volumes and storage timeframes.

Stripping operations will be staged so that the minimum area is disturbed at any one time. Topsoil from all areas cleared of vegetation will be segregated for rehabilitation purposes where suitable. Topsoil will not intentionally be mixed with waste rock or subsoil unless proven to be structurally or chemically advantageous.

Stripped topsoil will be placed directly onto final landforms where practicable. This avoids double handling, eliminates the need to stockpile, and maintains the quality of topsoil. If the topsoil cannot be placed on prepared landforms immediately, it will be stockpiled in pre-determined locations as close as practicable from where it was removed and within the area suitable for future rehabilitation works. This allows topsoil to be used in the progressive rehabilitation of areas where mining, backfilling and final shaping have occurred.

Some form of surface protection (e.g. quick establishing pastures or mulches) will be used to stabilise stockpiled topsoil. Rather than stockpiling in a small number of high dumps, soil will be stockpiled in a number of low (e.g. < 2 m high) mounds.

Some topsoil can be detrimental to rehabilitation due to the presence of weeds. A visual assessment for weeds will be undertaken prior to topsoil stripping. If weeds are present within the topsoil stripping area, appropriate measures will be applied in accordance with the WPAMP. If there is a high risk of weeds spreading during stripping, specific measures will be taken to prevent such spread (e.g. equipment will be washed down prior to starting work in a new area).

The SGCP includes considerable reserves of topsoil that may be used in mine rehabilitation programs. As a general guide, all soils used in rehabilitation should be applied to no less than 100 mm depth, where practicable. This will provide sufficient depth for re ripping should follow-up maintenance work be required.

Approximately 80 % of the SGCP area has very thick layer(s) suitable for topsoil and therefore has no topsoil depth constraint. The recommended topsoil stripping depths have been determined by a soil survey and are summarised in **Table 3-32**.

Table 3-32 Recommended Topsoil Stripping Depths

Soil Type	Recommended Soil Stripping Depth (mm)
<i>Rocky sands and sandy loams</i>	100
<i>Ironstone sands and sandy loams</i>	50–100
<i>Shallow red-yellow earths</i>	300
<i>Deep red-yellow earths</i>	300
<i>Shallow red-grey TC soils</i>	250–400
<i>Deep red-grey TC soils</i>	100–350
<i>Deep yellow-grey TC soils</i>	100–300
<i>Alluvial red TC soils</i>	300
<i>Alluvial yellow-grey TC soils</i>	150–300

Subsidence Management

If detected, any minor deleterious surface expressions of subsidence (e.g. surface cracking) will be rectified as soon as practicable. Rehabilitation will include deep ripping to a minimum 300 mm depth to fill and smooth surface disturbance for re-seeding where practicable.

In order to mitigate the effects of ponded water in subsidence areas from self-contained catchments, the progressive reestablishment of free drainage will be completed, as far as practicable. This will include the construction of excavated trapezoidal drainage channels.

These will be designed with sufficient capacity to cater for contributing catchments and with stable batter slopes. These channels will enable drainage of subsidence troughs along pre-existing drainage lines. Excavated material from the channels will be used for filling in any nearby ponding areas.

Subsidence-induced cracking will enhance infiltration in the affected catchment areas. However, it is expected that these areas will be self-sealing within 1 wet-season of subsidence occurring. As a result, if the free drainage is maintained, it is unlikely that additional infiltration losses will significantly impact on downstream streamflow.

Surface cracks within drains and waterways that have not naturally filled after approximately three storm events will be sealed with clay.

3.7.5. Monitoring

Erosion Monitoring

The extent of soil loss from rehabilitated sites relative to background rates of soil loss (from reference sites) is an indicator of landform stability. Rehabilitated sites will be monitored on final slopes to track and identify erosion.

The erosion monitoring program will include the following:

- the logging of rainfall and climatic conditions;

- an assessment of vegetation cover at permanent, representative monitoring sites (i.e. reference sites);
- documenting evidence of failure or instability on rehabilitated slopes at reference sites;
- maintaining photographic records at permanent representative photographic stations, recorded on a regular basis; and
- an assessment of upstream and downstream water quality, including parameters that may be indicative of excessive erosion, such as sediment concentration.

This qualitative surveying will be undertaken to directly determine sediment loss from landforms. Sediment traps may also be used as an indicator of soil loss.

Diversion Drains

Water diversion drains will be required to divert clean water around the SGCP disturbance areas. Monitoring of impacts associated with alterations to the drainage regime will be conducted on regular intervals and if necessary rectification works will be undertaken to mitigate affected areas.

Rehabilitation

Rehabilitation will be monitored during operations and after final rehabilitation has been completed to validate rehabilitation performance and identify any additional work required to meet success criteria. This monitoring will include an assessment of:

- plant establishment, growth, diversity and cover; and
- evidence and type of erosion.

Rehabilitation performance criteria will be submitted to the DEHP for review and comment in a RMP. The RMP will, at a minimum:

- develop design objectives for rehabilitation of disturbed areas and post-mining land uses across the mine;
- specify soil and waste rock characteristics for use in rehabilitation;
- detail rehabilitation methods applied to different areas of the SGCP;
- identify rehabilitation performance criteria for different rehabilitation areas;
- explain planned native vegetation rehabilitation areas and corridors;
- identify rehabilitation sites to be used to develop rehabilitation success criteria;

- develop a contingency plan for rehabilitation maintenance or redesign;
- describe end of mine landform design plan and post mining land uses across the mine; and
- propose endangered regional ecosystem (ERE) management and offset protection.

In addition to rehabilitated areas, reference sites will be monitored to compare the development and success of the rehabilitation against a control. Monitoring will be conducted periodically by independent, suitably skilled and qualified persons at locations which will be representative of the range of conditions on the rehabilitating areas. Annual reviews will be conducted of monitoring data to assess trends and monitoring program effectiveness.

3.7.6. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs
- compliance and other audits of regulatory requirements.

3.7.7. Reporting

A report will be prepared periodically to include details of rehabilitation monitoring results and the issues which occurred with rehabilitation processes.

At the end of mine life, a RPEQ will assess the geotechnical issues and erosivity of the proposed final landforms, including the final void, to demonstrate long-term landform stability.

3.7.8. Commitments

The following commitments will be upheld at the SGCP to protect or enhance the environmental values of rehabilitation and decommissioning:

- a RMP will be prepared which outlines management measures which will be implemented during the rehabilitation process;
- at closure the SGCP will rehabilitate disturbed land to achieve the agreed success criteria;
- the SGCP will decommission the site in consultation with the landowner;
- progressive rehabilitation of the disturbed areas will be undertaken on an availability basis; and

- an ongoing rehabilitation monitoring program will be undertaken against the agreed success criteria.

3.7.9. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.7.10. Proposed EA Conditions

Rehabilitation and Decommissioning

Rehabilitation Landform Criteria

- F4** All areas significantly disturbed by mining activities must be rehabilitated to a stable landform with a self-sustaining vegetation cover in accordance with **Table 3-33** and **Table 3-34**.

Table 3-33 Final Land Use and Rehabilitation Approval Schedule

Details	Disturbance Type					
	Residual Voids	Waste Rock Emplacement Facility(s)	Sediment/Supply Dams	Infrastructure	ROM Area	Road(s) and Tracks
Projective surface area (ha)	806 ha	2577 ha	346 ha	2310 ha	7 ha	2095 ha
Map reference	Figure 1-2	Figure 1-2	Figure 1-2	Figure 1-2	Figure 1-2	Figure 1-2
Pre-mine land use	Grazing	Grazing	Grazing	Grazing	Grazing	Grazing
Post-mine land use	Water storage	Native Ecosystem	Water storage	Native Ecosystem	Native Ecosystem	Native ecosystem or to remain as farm access upon agreement with landholder
Post-mine land suitability classification	Class 4	Class 4	Class 4	Class 4	Class 4	Class 4

Table 3-34 Landform Design Criteria

Disturbance Type	Maximum Slope Range %	Projective Surface Area (ha)
Waste rock emplacement facility – external wall	33	2577
Waste rock emplacement facility – low wall	30	638
Boxcut batter	90	308

- F5** Progressive rehabilitation must commence when areas become available within the operational land.
- F6** Complete an investigation into rehabilitation of proposed areas of disturbance and submit a report to the administering authority proposing acceptance criteria to meet the outcomes in **Table 3-34** by Year 5 of operations. Development of acceptance criteria is to consider the re-establishment of representative regional ecosystems (reference sites or another suitable alternative approved by the administering authority) and functioning habitat of areas equal to or greater than areas to be cleared and specific revegetation performance descriptors (e.g. rehabilitated areas are to display characteristics of the existing (pre-mining) regional ecosystems).
- F7** Areas which are to be rehabilitated to native ecosystem must achieve a self-sustaining native ecosystem with species composition and distribution similar to an analogue site or another suitable alternative approved by the administering authority.
- F8** Areas to be rehabilitated must be rehabilitated to the landform design criteria defined in **Table 3-34** and the landforms must be stable.
- F9** In the event areas of the site are nominated with a post mine land-use of grazing, land use must include native grass species endemic to the area.

Residual Void Outcome

- F10** Residual voids must comply with the following outcomes:
- a) Residual voids must not cause any serious environmental harm to land, surface waters or any recognised groundwater aquifer, other than the environmental harm constituted by the existence of the residual void itself and subject to any other condition within this EA
 - b) Residual voids must comply with **Table 3-35**.

Table 3-35 Residual Void Design

Void Identification	Void Wall – Competent Rock Slope (%)	Void Low Wall – Incompetent Rock Slope (%)	Void Maximum Surface Area (ha)
Pit	TBA	TBA	TBA

3.8. LAND RESOURCES

Land within the SGCP area is primarily used for low intensity beef cattle grazing. The majority of the area has been cleared for improved pasture. There is no evidence of any cropping in the area and there are no protected areas (e.g. National Park, State Forest, Reserve, Conservation Park, Nature Refuge etc.) within the SGCP area.

Background land tenures and tenure holders are indicated in **Table 3-36**. The predominant tenure type is leasehold.

Table 3-36 Real Property Description for Land Located Within or Partly Within MLA 70453 and Infrastructure Corridor

Tenure/Tenement ¹	Real Property Description	Property Name	Landholder
MLA 70453			
EPC 1049, EPC 1180, EPC 1040 and EPP 668	Lot 4315 PH720 ²	Creek Farm	A
EPC 1049, EPC 1180 and EPP 668	Lot 1 DM3	Chesalon	B
EPC 1049, EPC 1040 and EPP 668	Lot 7 BF57	Tallarenha	C
EPC 1049, EPC 1040, EPC 1155 and EPP 668	Lot 31 BF11	Betanga	D
EPC 1049, EPC 1155 and EPP 668	Lot 1160 PH286	Armagh	E
EPC 1049, EPC 1180, EPC 1155 and EPP 668	Lot 3 BF53	Sapling Creek	F
Infrastructure Corridor			
EPC 1040, EPC 1263 and EPP 668	Lot 5 BF5	Oakleigh	G
EPC 1210, EPC 1263 and EPP 668	Lot 3 CP860083	Tresillian	H
EPC 1210, EPC 1040 and EPP 668	Lot 2 SP136836	Monklands	I
EPC 1210, EPC 1263 and EPP 668	Lot 4 BF50	Mentmore	J
EPC 1263 and EPP 668	Lot 6 BF16	Gadwell	J
EPC 1263 and EPP 668	Lot 7 BF16	Saltbush	K
EPC 1040 and EPP 668	Lot 301 SP108315	N/A	L
EPC 1049, EPC 1180, EPC 1040 and EPP 668	Lot 4315 PH720	Creek Farm	A
EPC 1040 and EPP 668	Lot 2 BF38	Leased Reserve	A

¹ EPC 1040 is held by Waratah Coal Pty Ltd
EPC 1155 is held by Waratah Coal Pty Ltd
EPC 1210 is held by the GVK Group
EPC 1263 is held by Queensland Thermal Coal Pty Ltd
EPP 668 is held by Australia Pacific LNG Pty Limited

² 4315PH720 is affected by MLA 70453 as well as the infrastructure corridor

Land Use Suitability

The Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland – Land Suitability Techniques (DME, 1995) provide criteria for the assessment of land use suitability.

Land use suitability is described according to a five rank class system, including:

- Class 1 – suitable land with negligible limitations;
- Class 2 – suitable land with minor limitations;
- Class 3 – suitable land with moderate limitations;
- Class 4 – land which is marginally suited for a proposed use; and
- Class 5 – unsuitable land with extreme.

The SGCP area comprises land suitability Class 4, which correlates to Class C Good Quality Agricultural Land (GQAL).

Land Class

The *State Planning Policy 1/92: Development and the Conservation of Agricultural Land* (SPP 1/92) defines four classes of agricultural land for Queensland. Class A land in all areas is considered to be GQAL. In some areas, Class B land (where agricultural land is scarce) and better quality Class C land (where pastoral industries predominate) may also be considered GQAL. The description of the classes is as follows:

- Class A: Crop Land;
- Class B: Limited Crop Land;
- Class C: Pasture; and
- Class D: Non-agricultural Land.

The land suitability assessment undertaken by Land Resources Assessment and Management Pty Ltd (LRAM) in July 2011 found that the SGCP area is comprised of approximately 97.5 % Class C2 pasture land and 2.5 % Class C1 land. These two subclasses of pasture land are:

- Class C1 – higher productivity pasture land based on high quality native pastures or on pastures that can be readily improved (represents GQAL)
- Class C2 – lower productivity pasture land based on low quality native pastures on which pasture improvement is not economically viable (does not constitute GQAL).

Approximately 780 ha of GQAL are located within the SGCP area.

Soils

As described in **Table 3-37** eleven soil types were identified within the SGCP area.

Table 3-37 Soil Types and Areas within the SGCP

Soil Type	Area (ha)
Rocky sands and sandy loams	1,960
Ironstone sands and sandy loams	245
Shallow red-yellow earths	20,535

Deep red-yellow earths	3,370
Shallow red-grey texture contrast (TC) soils	40
Deep red-grey TC soils	660
Deep yellow-grey TC soils	1,415
Alluvial red TC soils	1,120
Alluvial yellow-grey TC soils	1,875
Alluvial sands and sandy loams	nd ³
Alluvial loams and earths	nd ³

NOTE: "nd" - The 'Alluvial sands and sandy loams' and 'Alluvial loams and earths' only occur as minor soils associated with other dominant soils and therefore their areas could not be readily determined (nd)

Environmentally Sensitive Areas

Land clearing, grazing and track construction have affected the vegetation communities at the SGCP site. The levels of disturbance vary across the area. No Category A, B or C Environmentally Sensitive Areas (ESAs) are located within the SGCP area.

The soil survey data indicates that there is no potential within the top 1.8 m of all soil profiles at the SGCP for acid generation by disturbance of PAF materials during earthworks and construction. The potential for soil erosion will be mitigated by progressive rehabilitation and minimising the development of steep slopes.

The potential land contamination risks associated with the SGCP include:

- storage and use of fuel and chemicals;
- landfill; and
- waste rock and reject handling and storage.

The primary visual impact will be from the waste rock emplacement facilities. Visual impacts will be minimised by landform design and rehabilitation.

3.8.1. Environmental Values

The environmental values of the land at the SGCP to be protected or enhanced are:

- the integrity of undisturbed land and ecosystems on the SGCP site;
- the integrity of topsoil as a resource to be used in rehabilitation;
- a stable, non-polluting landform (including the prevention of contaminated land);
- scenic or visual amenity qualities; and
- maintaining land use suitability.

3.8.2. Environmental Protection Objectives

The objectives to protect the land environmental values are:

- to provide a stable landform which is non-polluting;
- Land disturbed by mining activities will be made stable to ensure that the post mine landforms are not compromised by instability;
- to provide a beneficial post mining land use;
- The post-mine land uses for areas disturbed by mining will be a mosaic of self-sustaining vegetation, using appropriate native tree, shrub and grass species, as appropriate;
- to minimise the extent and degree of disturbance on land and remnant vegetation as mining continues and will continue to rehabilitate available land disturbed by mining;
- to maximise the recovery and reuse of topsoil;
- to minimise land contamination and to continue to remediate areas of contamination, as appropriate within the constraints of the continuing operations; and
- to minimise pre-mining disturbance and to continue to rehabilitate exploration areas.

3.8.3. Performance Criteria

The SGCP will consider the *SPP 1/92*, which is implemented under the *Sustainable Planning Act 2009* in order to protect GQAL.

Due to the absence of Queensland or Australian guidelines for the assessment of landscape and visual impact for mining or similar developments, the United Kingdom's Landscape Institute - Institute of Environmental Management and Assessment Guidelines were used to determine impacts in the EIS.

The SGCP is located within the Barcaldine Regional Council Local Government Area (LGA), an amalgamation of the previous Aramac, Barcaldine and Jericho Shires. The Jericho Shire Planning Scheme (Campbell Higginson Town Planning, 2006) was consulted for any relevant visual amenity requirements. The Jericho Shire Planning Scheme stipulates that ridgelines and escarpments must be maintained in a natural state to protect rural character and landscape values. The Jericho Shire Planning Scheme also requires that the design of lighting does not prejudice the amenity of the Rural Landscape.

3.8.4. Control Strategies

Topsoil Management

Topsoil resources directly impacted by mining activities will be stripped ahead of mining for reuse in the rehabilitation program. Appropriate erosion, sediment and dust controls will be established prior to and during soil disturbance.

Prior to stripping the soil, vegetation on areas to be disturbed will be cleared, windrowed and mulched or retained for fauna habitat.

Care will be taken to ensure that dispersive clay subsoils are not stripped and mixed with topsoil. Designated topsoil stockpiling areas will be suitably prepared to minimise topsoil losses.

The duration of topsoil stockpiling will be minimised where practicable to reduce soil deterioration and weed colonisation. Where stockpiles are to remain in place until the decommissioning phase, they will be sown with an appropriate seed mix.

Topsoil stockpile heights will be kept to a minimum and, depending on topsoil structure, will be no greater than 2 m high mounds, where practicable.

Soil Erosion

An Erosion and Sediment Control Plan (ESCP) will be developed and implemented prior to the commencement of construction. The ESCP will contain standard erosion control measures as well as specific measures applicable to particular areas/processes. The ESCP will also detail the monitoring and reporting program for erosion and sediment control structures and practices. An indicative erosion monitoring program has been developed.

The standard erosion control measures will include:

- scheduling major earth works to avoid the high rainfall period of December to March, where practicable;
- diverting water away from bare earth;
- constructing runoff control devices (e.g. 'whoa boys', berms, temporary sediment fencing, straw bale banks or geotextile socks filled with coarse filter media);
- disturbed areas will be rehabilitated following the completion of works, where practicable; and
- rock filter dams, sediment traps and/or sediment basins will be incorporated into the design of stormwater runoff controls.

The ESCP will include specific mitigation measures for areas of dissected terrain, areas with dispersive texture contrast soils, areas with severe subsoil salinity, waste rock emplacement facilities, subsidence areas, borrow pits and minor stream crossings. A summary of these specific measures is provided in **Table 3-38**.

Table 3-38 Summary of Specific Erosion Controls

Area	Control Measure
Dissected terrain	Exclude these areas from development, where practicable.
	Avoid location of ancillary facilities within this area.
	Minimise the number of access tracks.
	Locate any essential access tracks on gentle grades diagonally across the slope.
	Minimise drainage to line crossings, where practicable.
	Incorporate general all-purpose fertilisers into local topsoil material used as planting media during rehabilitation.
	Implement all erosion control measures applicable to sloping areas with dispersive texture contrast soils (below).
Sloping areas with dispersive texture contrast soils	Avoid inverting the soil or leaving clay subsoil exposed during clearing and/or grubbing.
	Treat any exposed clay subsoil as soon as practicable through amelioration and capping with planting media and/or impermeable material.
	Leave at least 100 mm of undisturbed soil material on top of clay subsoil during grubbing operations.
	Level and lightly compact the land surface as soon as practicable following the completion of clearing/grubbing operations in a manner that spreads runoff water away from the disturbed area.
	Fill any holes with soil material so clay subsoil is not exposed.
	Reshape the land surface on top of pipelines and adjacent service tracks in a manner that spreads runoff water away from the disturbed area.
	Cap pipeline mounds with at least 100 mm of ameliorated topsoil and seed.
	Where pipelines or access tracks are not mounded, reduce slope length by installing runoff control devices at regular intervals (e.g. 'whoa boys', sediment fences, straw bale banks or geotextile socks).
Areas with severe subsoil salinity	Bury excavated subsoils deep or cap with at least 300 mm of suitable topsoil following completion of construction activities.
	If saline subsoil is required to be stockpiled for a short period, the stockpile will be surrounded with a berm to prevent water running onto the stockpile from further upslope and to detain runoff water within the stockpile area.
Waste rock emplacements	Design the final surface topography to adequately control surface water runoff.
	Maximum slope of external batters will be 33 % (1V:3H).
	Cap emplacement facility with a minimum of 100 mm of suitable topsoil.
	If there is insufficient topsoil, mulch with rock fragments of at least 60 mm diameter.
	Revegetate with appropriate plant species.
Subsidence areas	Rehabilitate areas with significant subsidence-induced surface cracks by ripping to a minimum 300 mm depth, regrading and seeding.
Borrow pits	Implement standard erosion control measures and erosion control measures applicable to sloping areas with dispersive texture contrast soils (above).
	Careful location of borrow pits in dissected terrain.
	Surround any pits that expose saline subsoil with a berm.
	Implement runoff control devices to prevent water running over the cut faces from further upslope and to detain runoff water within the disturbed area.
	Minimise erosion due to rainfall splash by leaving final cut faces as close to vertical as practicable.

Area	Control Measure
Minor stream crossings	Stream crossings will avoid sections of active, unstable stream flow with a potential high risk of stream bank erosion.
	Minimise disturbance to stream banks.
	Restabilise crossing points as soon as practicable following disturbance by refilling and slightly compacting, capping with at least 100 mm suitable topsoil and revegetating.

Land Contamination

Waste management measures will be implemented to minimise the risk of land contamination at the site. Waste management will aim to promote sustainable waste management practices in accordance with the *Waste Reduction and Recycling Act 2011 (WRR Act)*.

Strategies for the prevention of land contamination due to the storage, spillage or disposal of hazardous materials will include:

- maintaining Material Safety Data Sheets (MSDS) for all chemicals used on-site shall be kept in a central register and be available to all staff at all times;
- constructing appropriate spill containment facilities for process reagents and petroleum products;
- establishing and maintaining a register of location and quantities of hazardous substances;
- training operators in the implementation of safe work practices for minimising the risk of spillage;
- develop remediation plans for contaminated sites; and
- develop emergency plans in the event of a spill.

The key planning document to prevent or minimise land contamination will be the WMP. Following completion, remediation and rehabilitation of the SGCP, no areas within MLA 70453 are anticipated to require inclusion on the CLR.

The site will be registered on the CLR if it has been scientifically proven to be contaminated and action needs to be taken to remediate and manage the land. No sites within MLA70453 and the infrastructure corridor are currently listed on the CLR.

Environmental Management Register

The EMR is a land-use planning and management register. It provides a list of current and historic land uses that have been used for NAs. A search of the EMR was conducted for all lots covered by ML70453 and the infrastructure corridor, determining no sites on the SGCP are included on the register.

In the past, the SGCP site has been used for cattle grazing and contamination may have occurred through the use of agricultural chemicals (e.g. dips, drenches and herbicides), however, no such facilities have been identified within MLA70453 or the infrastructure corridor.

Activities identified as being likely to cause contamination are listed as NAs under Schedule 2 of the *EP Act*. A requirement of the *EP Act* is for any area which is being utilised for a NA or contaminated by a hazardous contaminant be provided to DEHP. Any NAs associated with the Project will be entered into the EMR as per requirements of the *EP Act*.

Scenic Amenity Mitigation and Management

Where direct light impacts could potentially occur, appropriate mitigation measures will be impacted, including the installation of light fixtures in accordance with AS 4282:1997 *Control of the obtrusive effects of outdoor lighting*.

Other mitigation measures to reduce impacts on the visual amenity of the area include:

- use of high pressure sodium lights where practicable;
- consideration of appropriate colour selection and finishes for mine infrastructure to reduce visual contrast;
- consideration of the orientation of lighting emitting infrastructure;
- establishment of buffer vegetation between the proposed new surface infrastructure and sensitive receptors; and
- retaining existing vegetation on-site wherever practicable.

Based on the above assessment, the SGCP is assessed as having a low to moderate visual impact on the surrounding area.

3.8.5. Monitoring

Erosion Monitoring

An indicator of landform stability is the extent of soil loss from rehabilitation sites relative to background rates of soil loss. Selected final slopes on rehabilitation sites will be monitored to identify any exceedence of background soil loss rates.

An erosion monitoring program will be implemented and will include the following:

- the monitoring of rainfall and climatic conditions;
- regular monitoring of temporary and permanent erosion and sediment control structures during construction, operations and decommissioning;
- an assessment of vegetation cover at permanent, representative monitoring locations;
- documenting evidence of failure or instability on rehabilitated slopes at permanent, representative monitoring sites;
- maintaining photographic records at permanent, representative photographic stations, taken on a regular basis; and

- reporting as part of annual environmental reporting requirements.

Qualitative surveying (described above) will be undertaken to indicate excessive sediment loss from landforms. If necessary, sediment traps may also be utilised as an indicator of soil loss.

3.8.6. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs; and
- compliance and other audits of regulatory requirements.

3.8.7. Reporting

At the end of mine life, a RQEP will assess the geotechnical issues and erosivity of the proposed final landforms, including the final void, to demonstrate long-term landform stability.

3.8.8. Commitments

The following commitments will be upheld at the SGCP to protect or enhance the environmental values of land resources:

- at closure the SGCP will achieve the agreed rehabilitation success criteria.
- a TMP will be implemented and maintained to protect and manage the topsoil resource.
- an ESCP will be implemented prior to the construction phase which will outline management measures applicable to particular areas/processes.
- an erosion monitoring program will be implemented to determine soil loss at the SGCP.
- available disturbed areas will be progressively rehabilitated to reduce the potential visual impact.
- visual amenity management measures will be undertaken where practicable.
- land contamination management measures will be implemented to reduce the risk land contamination at the SGCP.
- sites which become contaminated will be investigated and managed in accordance with the *EP Act*.

- contaminated sites will be assessed at closure as part of the Final Rehabilitation Report.

3.8.9. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.8.10. Proposed EA Conditions

Land

Preventing Contaminant Release to Land

- F1** Contaminants must not be released to land in manner which constitutes nuisance, material or serious environmental harm.

Topsoil

- F2** Topsoil must be strategically stripped ahead of mining in accordance with a topsoil management plan.
- F3** A topsoil inventory which identifies the topsoil requirements for the SGCP and availability of suitable topsoil on-site must be detailed in the Plan of Operations.

General

- F4** The environmental management plan and plan of operations must be consistent with the geotechnical and erosivity assessment within three months of the completion of the assessment outlined in condition F12.
- F5** Complete an assessment report, to be undertaken by a Registered Professional Engineer of Queensland (RPEQ), of geotechnical issues and erosivity of the proposed final landforms, including final voids, at least 1 year before the end of mining to demonstrate long-term landform stability. Reference is to be made to the Queensland Mining Guidelines (or subsequent reprints) in making this assessment.
- F6** Cleared vegetation from the site must be managed in accordance with the following hierarchy:
- a) reuse, e.g. use of logs and tree stumps as shelter for fauna in rehabilitated areas;
 - b) recycle, e.g. mulching of vegetation and use in rehabilitation on the site; and

- c) other alternative management options implemented in a way that causes the least amount of environmental harm.

F7 A weed management plan must be developed and implemented during the continuation of this EA, and prior to the commencement of construction activities. The weed management plan must describe how the weeds are to be managed in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002* and/or local government requirements for weeds not declared under state legislation.

Infrastructure

F8 All infrastructure constructed by or for the EA holder during the licensed activities including water storage structures, must be removed from the site prior to surrender, except where agreed in writing by the post mining land owner/holder.

NOTE: This is not applicable where the landowner/holder is also the EA holder.

Exploration

F9 Disturbance due to exploration activities in areas not authorised to be mined must be rehabilitated in accordance with provisions detailed in the Code of Environmental Compliance for Exploration and Mineral Development Projects.

3.9. CULTURAL HERITAGE

Indigenous Cultural Heritage

Heritage Register Search

A search was undertaken of the following heritage registers for items or places of heritage significance on the SGCP site:

- the World Heritage Register;
- the (former) Register of the National Estate;
- the National Heritage List;
- the Commonwealth Heritage List;
- the State Heritage Register;
- the Department of Environment and Heritage Protection (DEHP) Cultural Heritage Database and Register; and
- the Barcaldine Regional Council heritage register including the former Jericho Shire Planning Scheme.

No items or places were identified within the SGCP in any of these registers. However, sites may exist within the SGCP area that have not yet been recorded.

Field Survey

Initial Indigenous cultural heritage inspections were undertaken prior to the commencement of exploration drilling and/or geotechnical investigations, with subsequent inspections conducted on an 'as needs' basis. Indigenous cultural heritage inspections of specific exploration drilling sites were conducted by representatives of the Wangan and Jagalingou People in August 2011 under the approved Cultural Heritage Management Plan (CHMP). No Indigenous cultural heritage was identified during this process.

Comprehensive indigenous cultural heritage field surveys across the proposed SGCP area commenced in October/November 2011 and were prioritised according to the order in which areas are to be disturbed.

Non-Indigenous Cultural Heritage

Heritage Register Search

A search was undertaken of the following heritage registers for items or places of heritage significance on the SGCP site:

- the World Heritage Register
- the Australian Heritage Places Inventory (including entries from the (former) Register of the National Estate, Commonwealth Heritage List and National Heritage List)
- the Queensland Heritage Register
- Queensland National Trust Register
- Barcaldine Regional Council heritage register including the former Jericho Shire Planning Scheme.

No items or places were identified within or close to the SGCP in any of these registers. However, sites may exist within the SGCP area that has not yet been recorded.

Field Survey

As presented in **Table 3-**, five non-indigenous cultural heritage features were identified within MLA 70453. An additional four features were identified outside, but in close proximity to MLA 70453 or the infrastructure corridor (refer to **Table 3-**). The naming protocol for the identified features indicates whether they lie within (numerals) or outside of (letters) MLA 70453 and the infrastructure corridor.

Table 3-39 Identified Non-Indigenous Cultural Heritage Features

Feature	Description	Location	Condition
1	Bore Site 1	Within MLA 70453	Poor – largely destroyed
2	Bore Site 2	Within MLA 70453	Poor
3	Creek Farm Outstation Complex	Within MLA 70453	Poor
4	Sapling Creek Overshot	Within MLA 70453	Excellent
5	Chesalon Yard Complex	Within MLA 70453	Poor – largely destroyed
A	Old Betanga Homestead Site	Outside MLA 70453 and the infrastructure corridor	Poor – largely removed
B	Creek Farm Overshot	Outside MLA 70453 and the infrastructure corridor	Excellent
C	Oakleigh Yard Complex	Outside MLA 70453 and the infrastructure corridor	Fair
D	Oakleigh Fence	Outside MLA 70453 and the infrastructure corridor	Poor – largely destroyed

3.9.1. Environmental Values

The cultural and scientific significance of European and Aboriginal occupation in the vicinity of the SGCP and resulting cultural heritage values.

Indigenous

Cultural heritage is the value people have given to items and places through their association with those items and places. These values include items and places of significance to Indigenous people and places of scientific significance.

Non-Indigenous

Cultural heritage is the value people have given to items and places through their association with those items and places. These values include items and places of social value to the local community and places of historic, architectural or scientific significance.

Non-indigenous cultural heritage is generally associated with human activities since the beginning of non-indigenous settlement of an area, as well as natural places which have meaning for people of the current day.

3.9.2. Environmental Protection Objectives

The environmental protection objective is to preserve the cultural heritage values (indigenous and non-indigenous) of the SGCP area.

3.9.3. Performance Criteria

All known indigenous and non-Indigenous archaeological records which have been identified by the EIS will be preserved and not impacted on by the SGCP.

All unknown indigenous and non-indigenous records found during the construction and operation of the SGCP will be reported to DEHP and the Proponent.

3.9.4. Control Strategies

The Proponent is committed to avoiding and/or minimising harm to all cultural heritage values within the SGCP operations.

Indigenous Cultural Heritage – Mitigation & Management

The following general mitigation and management measures will be implemented at the SGCP to minimise impacts on indigenous cultural heritage:

- a comprehensive field survey will be conducted prior to surface disturbance.
- where identified Indigenous cultural heritage features are located proximal to proposed surface disturbance, these sites will be demarcated where practicable to minimise the risk of accidental damage.
- where direct disturbance is unavoidable, consideration will be given to collecting and relocating significant indigenous cultural heritage features.
- all SGCP employees and contractors will be made aware of their responsibilities and obligations in relation to cultural heritage as part of the induction and training process.
- in the event that significant indigenous cultural heritage features are identified, a monitoring program will be developed in consultation with the Wangan and Jagalingou People prior to the commencement of construction in order to monitor the potential impact of the SGCP activities against baseline values.

A CHMP was executed by all parties on 11 July 2011 and approved by DEHP on 5 August 2011.

Practical strategies to manage potential impacts on indigenous cultural heritage sites and artefacts/items have been formulated in consultation with the Wangan and Jagalingou Traditional Owners and are contained within the CHMP.

Site avoidance is the preferred option for cultural heritage protection, although where impacts are unavoidable, alternative management practices will be necessary.

Non-Indigenous Cultural Heritage – Mitigation & Management

General control measures will be adopted to manage any unexpected discovery of items or places located within the Proponent's operations. Should any further sites or places be identified, they will be managed in accordance with the applicable legislation.

In order to minimise the risk of accidental damage to identified and unidentified non-indigenous features, the following strategies will be implemented:

- a clearing permit must be obtained prior to clearing or excavating; and
- SGCP personnel will undergo an induction informing them of their responsibilities in relation non-indigenous cultural heritage finds.

A non-indigenous CHMP will be developed prior to the commencement of construction. The non-Indigenous CHMP will be a key tool in the management of non-indigenous cultural heritage at the SGCP. The non-indigenous CHMP will provide:

- the general principles of non-indigenous cultural heritage management;
- general mitigation and management measures (including responsibilities and channels of communication);
- mitigation and management measures for known non-indigenous cultural heritage features;
- a find strategy for items of potentially significant cultural heritage; and
- periodic review requirements.

3.9.5. Monitoring

Indigenous

In the event that significant indigenous cultural heritage features are identified, a monitoring program will be developed in consultation with the Wangan and Jagalingou People prior to the commencement of construction in order to monitor the potential impact of the SGCP activities against baseline values.

Non-Indigenous

If significant non-indigenous cultural heritage features are identified, a monitoring program will be developed in order to monitor the potential impact of the SGCP activities against baseline values.

3.9.6. Commitments

With respect to cultural heritage the SGCP will:

- conduct regular cultural heritage education sessions/trainings for employees;
- develop and implement the agreed CHMP in consultation with the traditional owners, and in accordance with the requirements of the ACH Act; and
- implement management measures outlined in the CHMP to manage known and potential indigenous and non-indigenous cultural heritage sites.

3.9.7. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.9.8. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs; and
- compliance and other audits of regulatory requirements.

3.9.9. Reporting

Any Indigenous or non-Indigenous archaeological items discovered at the SGCP will be reported to the site supervisor in accordance with the CHMP.

3.9.10. Proposed EA Conditions

There are no proposed conditions for cultural heritage.

3.10. SOCIAL

The project is located in a rural area with neighbours involved in grazing and coal mining activities. The Proponent is undertaking a comprehensive community engagement with the objectives to:

- identify stakeholders and their values, concerns and issues;
- develop a consultation process that can be integrated into the community with minimal disturbance and which provides a foundation for long-term relationships between the SGCP and the community that is based on trust and mutual respect;
- promote stakeholder confidence by ensuring open and transparent two-way communication;
- develop a range of communication activities and tools that deliver regular, consistent and accurate information;
- provide factual information about the SGCP and ensure all stakeholders understand any potential benefits and/or impacts;
- acknowledge and manage the expectations of stakeholders;
- ensure community feedback mechanisms are in place to maximise opportunities for input into the Environmental Impact Assessment (EIA) process and actively seek opinions from stakeholders on matters of relevance to the SGCP;
- work with stakeholders to develop agreed outcomes and solutions to issues where practicable;
- meet the statutory requirements for community involvement in the formal approvals process and ensure stakeholder issues are appropriately addressed as part of the EIA process; and
- continually improve the acceptance and reputation of the SGCP on a local, regional and state level and monitor and evaluate community acceptance of the SGCP.

The community consultation process to date has engaged stakeholders at both local and regional levels, and provided SGCP specific information as well as information on the potential social, economic and environmental impacts, relating to the project.

Mining activities can impact on the following community values:

- sense of community;
- social cohesion;
- sense of identity;
- housing affordability;
- service capacity and provision;
- air quality;
- acoustic amenity;
- ground vibration;

- surface water and groundwater;
- economy;
- traffic and transport; and
- visual amenity.

3.10.1. Environmental Values

The environmental values to be protected include lifestyle, the wealth, health, safety, and well-being of the community surrounding the SGCP.

3.10.2. Proposed Environmental Protection Objectives

The environmental protection objective is to minimise environmental nuisance to neighbours from mining and associated activities and to respond to concerns expeditiously.

3.10.3. Control Strategies

A draft Social Management Plan (SMP) has been developed and is presented in **Section 9.14** of the AEIS. The SMP provides a framework for ongoing management, audit and review of social impacts during the operation and decommissioning of the SGCP.

The Community Reference Group (CRG) for the SGCP operations is an overarching management tool to enable the Proponent to monitor impacts on the community and facilitate the provision of project information and feedback.

The Proponent is committed to the continuation of the CRG meetings that commenced as part of the SGCP EIS. Through the CRG, the Proponent will have a mechanism to:

- respond to community enquiries and complaints;
- resolve disputes with stakeholders;
- develop action plans with stakeholder involvement for ongoing social and community support;
- report on progress of activities and commitments;
- monitor, through stakeholder feedback the effectiveness of their community engagement processes; and
- adjust mitigation strategies to achieve the best outcomes for all parties.

The success of the CRG will depend largely on the continued interest and involvement of the local community and interested stakeholders.

The SGCP will maintain a complaints procedure that includes:

- maintenance of a register of complaints held on-site;
- a process for receiving, handling and investigating complaints;
- prompt investigation and provision of a response as soon as practicable; and
- a non-compliance notification will be given to any party whose actions result in a non-compliance with site environmental requirements, particularly in the event of a complaint.

The Proponent will continue to undertake stakeholder engagement throughout the construction, operational and final decommissioning phases of the SGCP.

3.10.4. Monitoring

Monitoring will be conducted as outlined in the SMP.

3.10.5. Commitments

The following commitments will be upheld at the SGCP to protect or enhance the social values:

- develop and implement a SIA to provide management measures for potential social impacts (refer **Section 9.14** of the AEIS);
- maintenance of a complaints register at the SGCP;
- investigate complaints expeditiously and provide a response as soon as practicable; and
- a process for receiving, handling and investigating complaints.

3.10.6. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.10.7. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs; and

- compliance and other audits of regulatory requirements.

3.10.8. Reporting

SMP reports will be prepared annually during construction and three-yearly during the operations phase. SMP reports will include:

- a summary of stakeholder engagement undertaken during the preceding period and its effectiveness;
- a summary and analysis of all grievances/disputes reported during the preceding period; and
- an assessment of progress in implementing proposed management and mitigation strategies and achieving key performance indicators is stipulated in the following:
 - Housing and Accommodation Action Plan;
 - Workforce Management Action Plan;
 - Regional Business Development and Local Content Action Plan; and
 - Community Safety and Wellbeing Action Plan; and
 - a description of any proposed updates/revisions to the SMP document.

3.10.9. Proposed EA Conditions

Complaint response

- H1** All complaints received must be recorded including details of complainant, reasons for the complaint, investigations undertaken, conclusions formed and actions taken. This information must be made available for inspection by the administering authority on request.

3.11. NATURE CONSERVATION

The SGCP area is predominantly low-lying, undulating land with shallow relief, ranging from 378 m above sea level to 450 m above sea level. In the western portion of the SGCP area lays the northern limit of the Carnarvon Range. Remnant vegetation along this range is contiguous with vegetation in the Carnarvon Ranges and Carnarvon National Park, approximately 135 km to the south. The SGCP area has historically been used for cattle grazing and occurs within both remnant and non-remnant vegetation. Remnant vegetation occurs over approximately 54 % of the SGCP area.

Ten plant species of conservation significance potentially occur in the SGCP area based on desktop surveys. Three species were confirmed during flora surveys:

- Round-leaved Heath Myrtle (*Micromyrtus rotundifolia*) is listed as Vulnerable under the *Nature Conservation Act 1992 (NC Act)*. It was found growing in the mine survey area within RE 10.7.7.
- The species is likely to occur elsewhere within the SGCP area due to the availability of suitable habitat.
- Large-podded Trefoil (*Desmodium macrocarpum*) is listed as Near Threatened under the NC Act. It was located within the infrastructure corridor survey area, on the properties Saltbush and Tresillian. The population within the SGCP area occurred in RE 11.5.3 and non-remnant vegetation. The species is likely to occur elsewhere within the SGCP area due to its ability to grow in both remnant and non-remnant vegetation across the site.
- *Eleocharis blakeana* is listed as Near Threatened under the NC Act. It was located in the infrastructure corridor survey area in a coolibah-dominated wetland (RE 10.3.15i). The species is unlikely to be widespread within the SGCP area due a lack of suitable habitat.
- Four species of threatened (Endangered or Vulnerable) and Near Threatened fauna were confirmed from the SGCP area. The Brigalow Scaly-foot (*Paradelma orientalis*), little pied bat (*Chalinolobus picatus*), square-tailed kite (*Lophoictinia isura*) and the koala (*Phascolarctos cinereus*), are listed as Vulnerable or Near Threatened under the NC Act and/or EPBC Act. Threatened species not recorded during ecological surveys were assigned a likelihood of occurrence within the SGCP survey area based on historical records, known geographic range and habitat availability.

Aquatic ecology assessments were undertaken to describe the environmental aspects of on-site surface waterways in terms of surface water quality, aquatic flora and fauna and the relevant habitats across the SGCP area. No species of high conservation value were identified within the SGCP area, as the majority of the fish species and macroinvertebrates present are generalists.

The lack of stygofauna and troglafauna and the unfavourable habitat conditions present suggest that significant subterranean communities do not exist within the SGCP area and is therefore not considered to be a relevant environmental factor.

The SGCP has the potential to cause habitat loss, introduce weeds, release contaminants, and contaminate surface and groundwater.

3.11.1. Environmental Values

The environmental values of the land that are to be protected or enhanced are the qualities and physical characteristics of the environment conducive to ecological health.

3.11.2. Environmental Protection Objectives

The performance criteria for nature conservation are:

- compliance with the requirements of SGCP EA;
- protection of conservation significant species, communities and habitat;
- minimise project impacts upon species and communities during the construction and operation at the SGCP; and
- no unplanned or unapproved disturbance/clearing of flora and fauna.

3.11.3. Performance Criteria

Environmental values at the SGCP during all phases of construction, operation and decommissioning will be maintained in accordance with the following protection performance criteria:

- compliance with the requirements of the SGCP EA;
- implementation of surface water quality guidelines presented in the Queensland Water Quality Guidelines (2009) and (where data is not available for reference in the Queensland Guidelines) the ANZECC (2000) water quality guidelines will be used as standards;
- development and implementation of management plans for fire, weeds, pest animals and threatened species known to occur on-site (refer Section 9.10 of the AEIS);
- development and implementation of a Biodiversity Offsets Plan as required under the *Queensland Biodiversity Offset Policy 2011*;
- compliance with rehabilitation success criteria for the SGCP with reference to the guideline: Rehabilitation Requirements for Mining Projects (DERM, 2012).

The sampling for stygofauna and troglafauna was undertaken in accordance with WA Guidance Statements (EPA 2003, 2007).

This SGCP has adopted the WA protocols for sampling stygofauna and troglotauna such that study results fully satisfy DEHP requirements.

3.11.4. Control Strategies

Terrestrial Flora and Fauna

Clearing of Vegetation

Clearing of vegetation will be staged. Staged clearing of vegetation allows animals to move away from clearing operations into adjacent, uncleared habitats.

Clearing will also be conducted with fauna spotter-catchers in communication with the operators of the clearing machinery. Fauna removal will be undertaken immediately prior to clearing.

Any flora species of conservation significance within the clearing footprint will be surveyed, marked and recorded for purposes of biodiversity offsets prior to the undertaking of clearing operations.

Rehabilitation and Revegetation

Rehabilitation of disturbance areas will be undertaken throughout the life of the SGCP in accordance with the Mine Closure Plan (MCP) (refer **Section 9.10** of the AEIS).

The MCP has been prepared to direct land rehabilitation during and after the operational life of the mine.

Control strategies outlined in the RMP include:

- native species will be used for revegetation, apart from any sterile grass cultivars that are required to ensure soil stability.
- buffer zones will be established around areas of threatened ecological communities and communities with a conservation-significant biodiversity status, where clearing is adjacent to these areas.
- retained areas of native vegetation will be monitored and managed for the life of the project to reduce weed infestation and promote biodiversity values in the areas.
- trees will be felled into the construction zone to avoid impacting on vegetated margins.
- felled trees will be placed in areas away from the mine's impacts, to act as shelter for fauna.
- topsoil and mulch will be stockpiled where practicable for use on retained vegetation and rehabilitation areas to promote revegetation and retention of soil quality.

- vegetation clearing and construction will be limited to dry weather conditions where practicable to minimise erosion, runoff and soil disturbance.
- large tracts of non-remnant vegetation away from the mine footprint will be revegetated and rehabilitated to link existing fragments of habitat.

Weeds and Pest Animal Management Plan

A WPAMP will be prepared and implemented over the life of the SGCP (refer **Section 9.10** of the AEIS).

The introduction and/or spread of weed species will be mitigated by:

- restricting light vehicle movement in areas outside of regular activity, particularly on irregularly used tracks;
- restricting vehicle movement during and following rainfall, where practicable;
- implementing strict wash-down procedures for all vehicles (including clearing and construction machinery) entering clearance zones, grazing areas or conservation areas;
- controlling weeds according to guidelines under the relevant Weed Fact Sheet from Department of State Development, Infrastructure and Planning (DSDIP);
- training and awareness of all staff.

Threatened Species Management Plan

The Threatened Species Management Plan (TSMP) (provided in **Section 9.10** of the AEIS) will include specific mitigation and management measures to address predicted impacts on threatened species and communities. Such measures include:

- remnant vegetation in the SGCP area will be managed for biodiversity values, including implementation of an appropriate fire regime, pest animal and weed management and exclusion of stock.
- maintaining awareness of all staff on-site regarding the presence of species of conservation significance and the requirements of the TSMP.
- revegetating cleared areas that do not form part of the operational mine (e.g. infrastructure corridor edges).
- staged rehabilitation and revegetation of overburden as the mine operational life progresses in areas that are no longer being mined.

- fire regime management including precautions such as clearing fire breaks.
- where practicable, restricting unnecessary vehicle movement during and following rainfall.
- exclusion of cattle from waterways and remnant vegetation to prevent fouling and habitat degradation.

Environmental Offsets

Environmental offsets are measurable conservation outcomes undertaken to counterbalance an impact that causes a loss in biodiversity values, and achieve an equivalent or better environmental outcome for the biodiversity values impacted (DERM, 2011b). Offset proposals are presented in the Biodiversity Offsets Plan and outline measures to ensure that these offsets are managed to maintain and enhance biodiversity values.

Surface Aquatic Ecology

Modification of In-stream habitats

The revised mine plan layout (Section 2 of the AEIS) avoids significant disturbance to the majority of the previously proposed in-stream impacts.

Reductions in the potential for impacts on in-stream habitat will be achieved through minimising the number of creek crossings or temporary levees required, where practicable and using bridge crossing designs that minimise the number of pylons required, or only require pylons on upper banks for support.

Runoff and Chemical Spills

The key mitigation measures to reduce the potential impacts from runoff include:

- wherever practicable, avoid construction works near streams.
- where the avoidance of construction works in, near, or adjacent to streams is not practicable, these works will be performed during the dry season. If exposed soils cannot be rehabilitated prior to the wet season, appropriate barriers to reduce sediment transport (e.g. silt curtains) will be installed well before significant rainfall occurs. Such measures must be adequate to manage the heavy rainfall events experienced at the site.
- where practicable, construction in stages will be carried out such that cleared areas can be rehabilitated quickly while construction progresses.
- stockpiled excavated earth material will be stored away from waterways and bunded such that runoff does not enter the waterway, but is captured in a temporary storage reservoir and either treated or removed from site.

- the use of vegetation such as grasses and macrophytes as sediment filters will be considered where practicable. Where this is not practicable, geotextile, rip rap and stabilisation techniques will be considered.

The key mitigation measures to reduce the potential impacts from chemical spills include:

- current best practice for the management of fuels, oils and chemicals on-site including bunding to AS 1940.
- all chemicals will be stored appropriately in a secure area with MSDS's for each chemical stored and spills kits made readily available in that area.
- construction staff will be trained to use spill kits to contain spills.
- all spills will be reported, no matter how minor, and the impacts and reasons for their occurrence investigated.
- all chemical loads will be properly secured during transport and MSDS's sheets for each are to be stored with the transport vehicle.
- safe driving and general safe work practices will be required when transporting chemicals.

Subterranean Fauna

No specific subterranean fauna management measures are proposed as it is unlikely that the site supports subterranean fauna.

3.11.5. Monitoring

The proposed monitoring will include:

- retained areas of native vegetation will be monitored and managed for the life of the project to reduce weed infestation and promote biodiversity values in the areas.
- disturbed vegetation areas that are no longer required post-construction will be stabilised and revegetated as soon as practicable and monitored for weeds as per the WPAMP.
- a WPAMP will be prepared and implemented over the life of the SGCP. The WPAMP will include a monitoring program and auditable performance measures, including reductions in class 1 and 2 pest animals and noxious weeds.

- the TSMP will contain the proposed monitoring and reporting timeframes for management of each threatened species impacted on by the SGCP to facilitate auditing of environmental performance measures.
- a rehabilitation monitoring program.
- the location of known weed infestations (particularly Parthenium).

3.11.6. Commitments

The following commitments will be upheld at the SGCP to protect or enhance the environmental values of nature conservation:

- a WPAMP will be developed and implemented over the life of the SGCP, which will include a monitoring program with auditable performance measures to determine the success of the program.
- reasonable steps will be taken to keep land free from Class 2 and 3 pests such as Parthenium (*Parthenium hysterophorus*) and Lantana (*Lantana camara*) which are known to occur in the study region, in compliance with the LP(PSRM) Act 2002.
- mandatory measures to control the spread of these weeds including vehicle washdowns will be adopted across the SGCP.
- vegetation will only be removed where required with appropriate approvals sought where necessary. Vegetation outside mining and infrastructure areas will remain undisturbed where possible.
- Where possible, infrastructure will be placed in areas to minimise the disturbance of existing native vegetation and existing tracks and cleared areas will be utilised.
- progressive rehabilitation of disturbed areas will be undertaken.
- a Mine Closure Plan (refer **Section 9.10** of the AEIS) will be prepared to direct land rehabilitation during and after the operational life of the mine. Management measures outlined in the Plan will be implemented over the life of the mine.
- a Biodiversity Offsets Plan will be developed and implemented to manage the offsetting of cleared significant vegetation communities. The plan will be developed in line with the objectives of the current Commonwealth and State legislation and relevant policies and guidelines such as:
 - Galilee Basin Offset Strategy;
 - Queensland Biodiversity Offset Policy; and
 - EPBC Act 1999 Environmental Offsets Policy.

3.11.7. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly. SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.11.8. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs; and
- compliance and other audits of regulatory requirements.

3.11.9. Reporting

A land conservation report will be prepared periodically and submitted to the Proponent. SGCP will comply with any regulatory land conservation requirements.

3.11.10. Proposed EA Conditions

There are no proposed conditions for the Nature Conservation section.

3.12. TRANSPORT

The SGCP site is accessed from the Capricorn Highway. When travelling to and from the SGCP site, the majority of vehicles will utilise the following roads:

- the Capricorn Highway – the predominant road infrastructure in the vicinity of the SGCP. The highway is a State Controlled Road (SCR) connecting Rockhampton to the east with Barcaldine to the west. The highway is fully sealed, with sealed shoulders and overtaking lanes and a speed limit of up to 100 kilometres per hour (km/hr) except through townships.
- the Gregory Highway – a SCR connecting Springsure to Clermont where it connects with the Peak Downs Highway. The highway is fully sealed with sealed shoulders and overtaking lanes and a speed limit of up to 100 km/hr.
- the Dawson Highway – is a SCR that connects Springsure and Gladstone. The Highway is fully sealed, with sealed shoulders, overtaking lanes, and speed limits of up to 100 km/hr.

The SGCP will connect directly to the Capricorn Highway by a sealed mine access road. No existing local roads will be required for mine access. The connection to the Capricorn highway will consist of a priority controlled, three-way T-intersection. Further discussion of Transport operations is provided in **Section 9.12** of the AEIS.

Construction and Operation Phases

Road transport would be required for transport of the following during the construction period:

- road base, ballast and fill materials;
- trucks and vehicles;
- parts for construction of draglines and shovels;
- diesel-powered generators and fuel;
- CHPP construction equipment and materials;
- workshops, warehouses and associated mine infrastructure building materials and equipment;
- pre-fabricated accommodation buildings and site offices;
- construction personnel; and
- other construction materials and equipment.

Road transport would also be used to transport personnel to site during operations and for delivery of some materials and equipment (e.g. equipment maintenance parts, food and supplies to the accommodation village, ammonium nitrate and fuel oil etc.).

It is expected that traffic volumes on local roads as well as pavement impacts will increase. After an upgrade, traffic through the Alpha Aerodrome will increase. Further discussion of Transport operations is provided in **Section 9.12** of the AEIS.

3.12.1. Environmental Values

The values of the existing transport network to be enhanced or protected are the qualities and characteristics that are conducive to safety and public amenity.

The environmental values considered in this transport section include the existing utilisation of transport infrastructure, including traffic volumes and all subsequent changes to transport infrastructure and its level of utilisation resulting from the SGCP.

Potential impacts of transport associated with amenity, human health and ecological values as a result of dust, noise, vibration and any other environmental impact. The objective of the proposed mitigation measures is to minimise the potential impacts on the environmental values identified.

Although there is potential for air quality impacts associated with vehicle movements on unsealed roads, rail load-out and coal dust entrainment from train wagons, these impacts are anticipated to be minimal.

3.12.2. Proposed Environmental Protection Objectives

The environmental protection objective for transport is to minimise the impacts on the transport network and public safety.

3.12.3. Performance Criteria

The performance criteria for traffic management of the SGCP are:

- minimisation of potential disruptions to traffic on the Capricorn Highway and surrounding communities caused by the SGCP construction and operational phases;
- maintenance of safe access near all project work areas for road users; and
- the number of related traffic health and safety incidents.

3.12.4. Control Strategies

Mitigation Measures for Road Impacts

The following road impact mitigation techniques are proposed:

- the development and implementation of a Road Users Management Plan (RUMP) (presented in **Section 9.10** of the AEIS) prior to the commencement of the construction phase of the SGCP.
- the construction of auxiliary right turn and auxiliary left turn treatments at the intersection of the Capricorn Highway and the SGCP Mine Access road.
- the case-by-case assessment of pavement impacts and subsequent maintenance and rehabilitation costs.

Mitigation Measures for Air Impacts

An upgrade to the Alpha Aerodrome will be required as a result of the SGCP and other significant projects in the Alpha area. The upgrade will include a runway extension and it is anticipated that commercial air service providers will meet the associated costs.

Mitigation Measures for Port Impacts

The Proponent is currently in negotiation for the allocation of port capacity at the Abbot Point Coal Terminal (APCT).

No construction works on sea transport infrastructure are proposed to be directly undertaken by the Proponent. Further discussion of Transport operations is provided in **Section 9.12** of the AEIS.

3.12.5. Monitoring

Road network performance to be monitored on a continual basis to confirm specified performance objectives set out within the RUMP are adhered to.

3.12.6. Commitments

The proponent is committed to the following:

- implementation of control strategies outlined in **Section 9.12** of the AEIS;
- implementation of road works identified in the control strategies to mitigate the traffic impacts of the project;
- development and implementation of a RUMP (refer **Section 9.10** of the AEIS) ; and
- adherence to the RUMP to confirm specified performance objectives.

3.12.7. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

3.12.8. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programs; and
- compliance and other audits of regulatory requirements.

3.12.9. Reporting

Health and safety incidents or any complaints will be reported to the administering authority.

3.12.10. Proposed EA Conditions

There are no proposed conditions for the Transport section.

3.13. ENVIRONMENTAL MANAGEMENT SYSTEM

The Project operations will take place under an environmental management system (EMS). The Proponent's approach will be to certify the EMS against the *ISO 14001* Standard within the initial years of operation.

The EMS is the cornerstone of the operation's due-diligence approach to environmental management, and encompasses the measures used to prevent or minimise environmental harm, maintain compliance and promote continuous improvement.

3.13.1. Risk

Under the EMS the SGCP will assess the significant aspects and impacts interacting and changing the environment. A risk register will be developed and action plans and strategies put in place to mitigate the assessed risks.

3.13.2. Monitoring

Environmental monitoring is performed in accordance with the EA to provide data to measure the impact of the SGCP on the surrounding environment and to measure the efficiency/effectiveness of the various environmental impact control strategies.

Monitoring will be in place to assess the performance of the EMS and compliance with the EA. Rehabilitation success, surface water quality, groundwater quality and level, particulate and dust deposition and noise will be monitored. Commitments and EA conditions have been included in the relevant sections of this EM Plan.

3.13.3. Reporting

External

The Proponent aims to provide timely, relevant and appropriately presented information to government authorities, the local community and the general public on the environmental performance of the SGCP.

Reporting commitments under the EA and other legislation will be complied with and includes:

- prepare Annual Returns as required under the Environmental Protection Act 1994;
- submit National Pollutant Inventory (NPI) reports as necessary;

- report incidents that may potentially compromise compliance with the conditions of the Environmental Authorities immediately to operations management; and
- preparing reports as required under other legislation, for example, the National Greenhouse and Energy Reporting System and Energy Efficiency Opportunities.

Internal

The site Environmental Manager will (in a timely manner) report any incidents or breaches of the EM Plan or EA conditions to the Site Senior Executive and report to the DEHP in accordance with the requirements of the project's EA.

Staff Training

The Proponent will provide employees, contractors and visitors with appropriate environmental awareness through inductions, formal presentations, and impromptu meetings.

Specifically, the Proponent requires that employees, contractors and visitors are aware of:

- their roles and responsibilities (including environmental incident reporting);
- the environmental impacts, potential or actual, of their activities on-site;
- the potential consequences of poor environmental performance; and
- site emergency procedures.

Records of training content and attendance will be maintained.

3.13.4. Environmental Auditing and Review

The Proponent will conduct environmental audits to assess compliance with regulatory requirements and the performance of the EMS.

The objectives of the Environmental Auditing and Review programs are to:

- monitor and report on compliance with statutes, the EM Plan commitments and Plan of Operations;
- environmental policy, company standards, best practice guidelines and signatory codes;
- monitor the EMS for consistency with the principles of ISO14001; and



9.12 Transport

9.12 Transport

9.12.1 Transport Assessment Summary

Issues raised from the public review of the EIS together with the inclusion of Epsilon, in particular its east/west railway supply chain, necessitated a transport reassessment. ACM retained Aurecon to do the reassessment. Their report follows as section 9.12.2

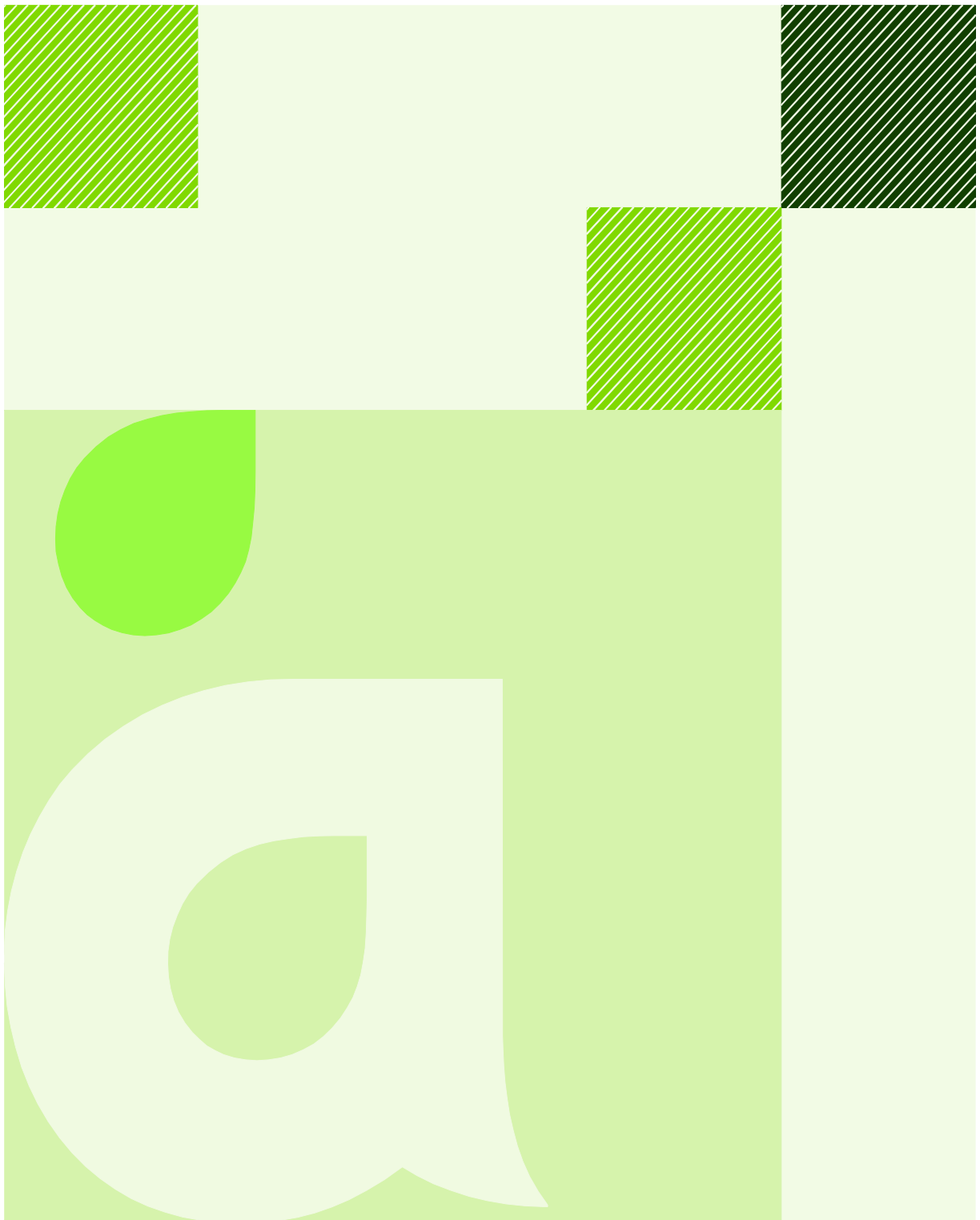
The assessment does not rely on the Claremont Alpha Road, takes into account the issues raised and moves road freight to rail as provided by the upgraded railway.

The proposed development can be supported on a traffic and transportation basis. The traffic impacts associated with the development are acceptable and it will operate satisfactorily to the provisions outlined in the assessment.

Liaison with DTMR and other stakeholders will continue during the design process.

Responses to specific issues are provided in section 10 of the AEIS.

9.12.2 Transport Assessment



South Galilee Coal Project
Transport Assessment

Reference: 224911-1000-
REP-CT-0001

Prepared for: Alpha Coal
Management (ACM)

Revision: 1

9 December 2013

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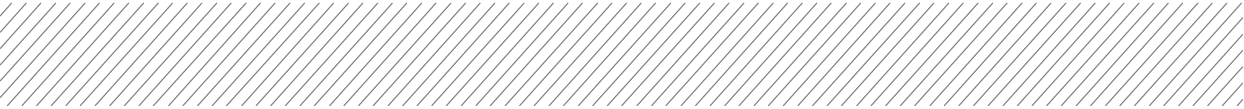
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Glossary of terms

Term	Definition
AADT	Annual average daily traffic
ABCT	Abbot Point Coal Terminal
BRC	Barcaldine Regional Council
AEIS	Additional Information Environmental Impact Statement
CHPP	Coal Handling and Processing Plant
CV	Commercial Vehicle
DTMR	Department of Transport and Main Roads
EIS	Environmental Impact Statement
ESA	Equivalent Standard Axles
ESD	Entering Sight Distance
FIFO	Fly-in Fly-out
GARID	Guidelines for Assessment of Road Impacts of Development
HV	Heavy Vehicle
LOS	Level of Service
MIA	Mining Industrial Area
Mtpa	Million Tonnes Per Annum
OC	Open Cut
OD	Over Dimensional
PFS	Pre-Feasibility Study
RIA	Road Impact Assessment
RUMP	Road Use Management Plan
QR	Queensland Rail
QTRIP	Queensland Transport and Roads Investment Program
SCR	State Controlled Road
SGCP	South Galilee Coal Project ("the project")
SISD	Safe Intersection Sight Distance
UG	Underground
VPD	Vehicles Per Day
VPH	Vehicles Per Hour



9.2.1 Introduction

9.2.1.1 Purpose

This supplementary transport study is an assessment of the proposed development and the mitigation that is considered appropriate for the South Galilee Coal Project developer to provide and manage the impacts of the transportation effects upon the environment, road users, affected property owners and affected communities on the adjacent road controlling authority's networks [Department of Transport and Main Roads (DTMR) state controlled roads and Barcaldine Regional Council (BRC) local roads]. This report focuses on traffic generation during both the construction and operation phases and the resulting impacts upon the local road network.

To make this assessment, Aurecon has utilised the PFS and on-going engineering design to estimate the project generated traffic flows and compare these to existing traffic levels (supplied by DTMR) in accordance with the DTMR's "Guidelines for Assessment of Road Impacts of Development" (GARID) 2006.

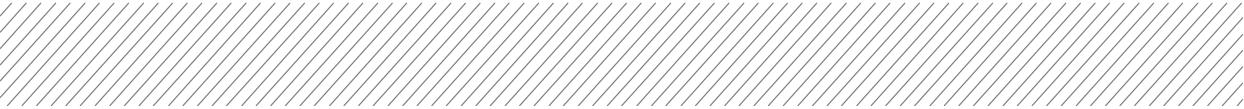
It should be noted that due to changes in the design and staging of the Project, the predicted traffic levels in this assessment are different from those listed in the previous assessment which was submitted in 2012 as part of the EIS. The difference is mostly attributed to changes in the freight philosophy (focus on freight on rail) which are detailed in subsequent sections of this report.

An overview of the scope and structure of this report is presented in Table 1 below.

Table 1 – Scope and structure of this assessment

Scope of report	Road Impact Assessment (RIA) as described in GARID:
■ Overview of the Project and Existing Infrastructure – Project Details – Surrounding Road Network – Existing Traffic Environment ■ Development Profile – Preferred haulage and commuting routes – Predicted construction traffic volumes* – Predicted operational traffic volumes* – Predicted traffic distribution* – Identify which road links are expected to have a significant impact due to Project traffic ■ Pavement Impact Assessment – Calculate current pavement loading – Estimate project pavement loads – Assess pavement impacts against 5% trigger ■ Traffic Operation Assessment – Road link analysis: assess Level of service of affected road links – Intersection analysis: assess impacts of Project traffic on key intersections. ■ Other Considerations – Cumulative Impacts – Over size / over mass vehicles – Transport of Hazardous / Dangerous Goods ■ Mitigation – Proposed site access intersection design – Transport management plan – Traffic management plan – Road use management plan (RUMP) ■ Conclusions and Recommendations	<pre> graph TD Step1[DEVELOPMENT PROFILE] --> Step2{ANY PAVEMENT IMPACTS?} Step2 -- YES --> Step2a[PAVEMENT IMPACT ASSESSMENT] Step2a --> Step3[TRAFFIC OPERATION ASSESSMENT] Step2 -- NO --> Step3 Step3 --> Step4[SAFETY REVIEW] Step4 --> Step5[ENVIRONMENTAL AND OTHER ISSUES] Step5 --> Step6[IMPACT MITIGATION] </pre>

*Note: the estimates of construction quantities are based on the current available data and as such are subject to change should changes be made to the underlying design of the Project as it progresses from pre-feasibility through to construction. However, on the whole it is expected that the estimates presented in this report will be representative of the construction quantities expected for the project and are suitable for the purposes of this investigation.



9.2.2 Project details

9.2.2.1 Location

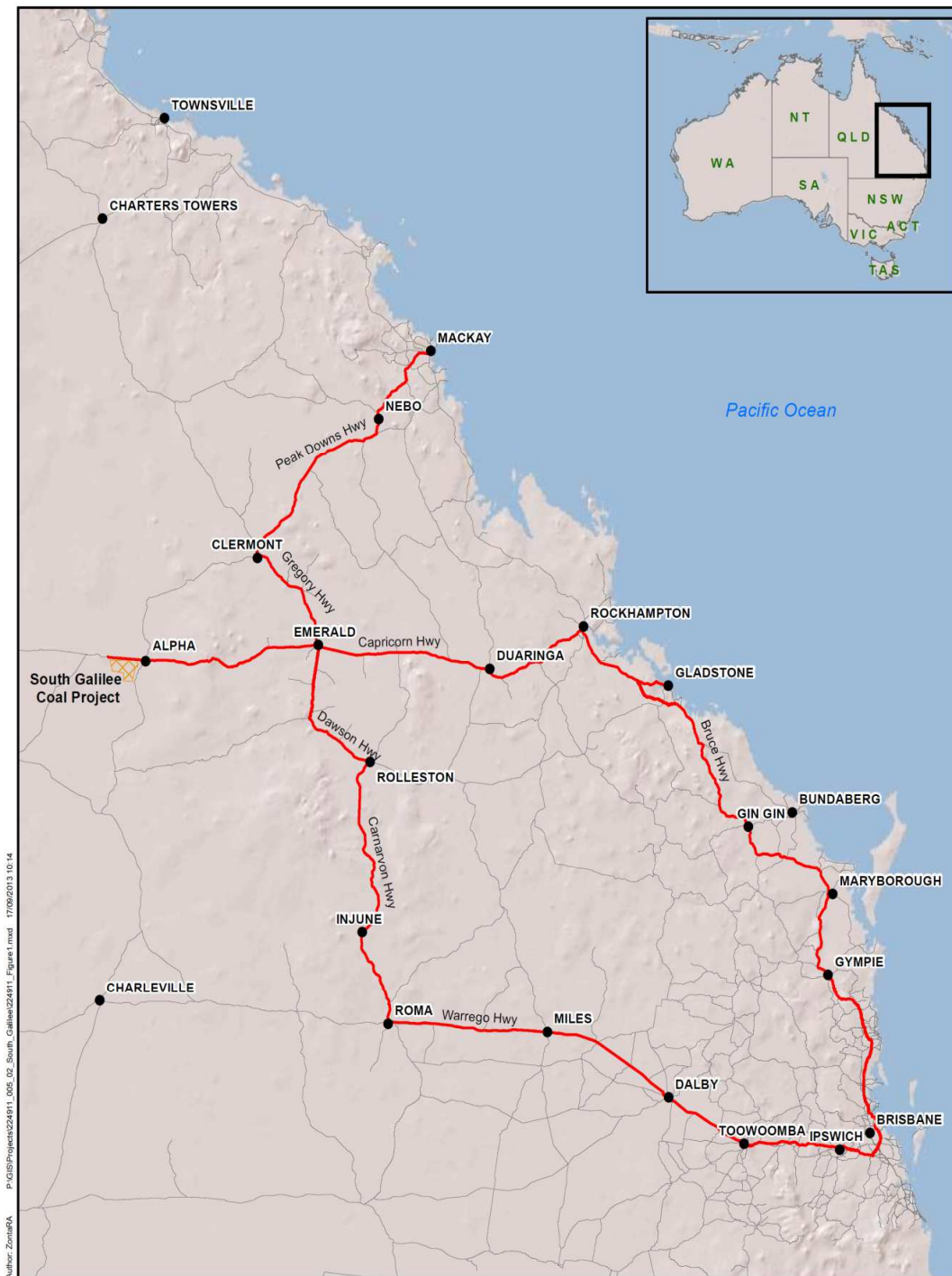
The South Galilee Coal Project is a greenfield open cut and underground mine located in Central Queensland immediately South West of the township of Alpha and approximately 170 km West of Emerald. The Project is located in the Galilee Basin, a largely untouched source of thermal coal, which is to the West of the Bowen Basin (see Figure 1 below).

The region has a number of proposed mining developments however as yet there has not been any significant development of this coal resource and as such the region and the surrounding towns remain largely rural farming communities with little infrastructure suitable for servicing large mining developments.

9.2.2.2 Measures to minimise road impacts

The remoteness of this region creates a number of challenges to which the proponent has been able to find innovative solutions. One of these solutions, which are detailed in the following paragraphs, is the use of the existing Central West railway line to transport both coal and freight. Among other advantages, this approach vastly reduces the impacts on the road network by removing a significant percentage of freight off the road. This innovative use of the existing rail line will be combined with a modular design methodology to maximise the amount of construction materials that can be transported via rail. For the purposes of this assessment a conservative estimate (that is; a lower estimate) of the amount of materials that will be transported via rail has been made.

Another design decision which reduces the traffic on the road network is the decision to include a larger range of maintenance facilities for this mine. This decision was made due to the lack of suitable existing infrastructure in the surrounding communities and the large travel distances to suitable infrastructure hubs. This decision will reduce operational traffic (particularly over size/over mass movements) on the public road network.



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Author: ZondRA

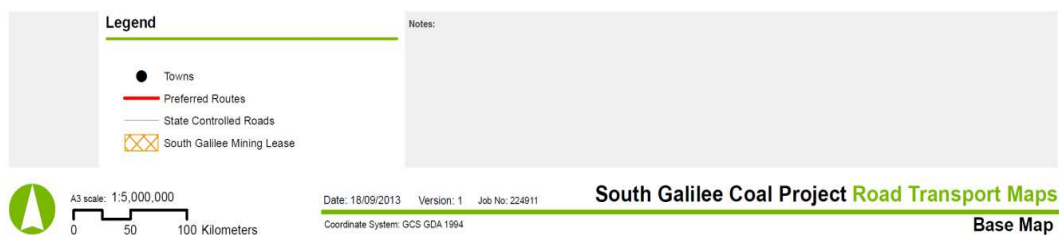
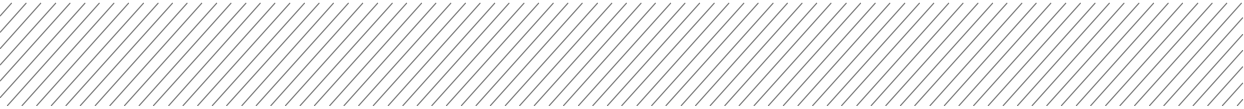


Figure 1 - Location Map



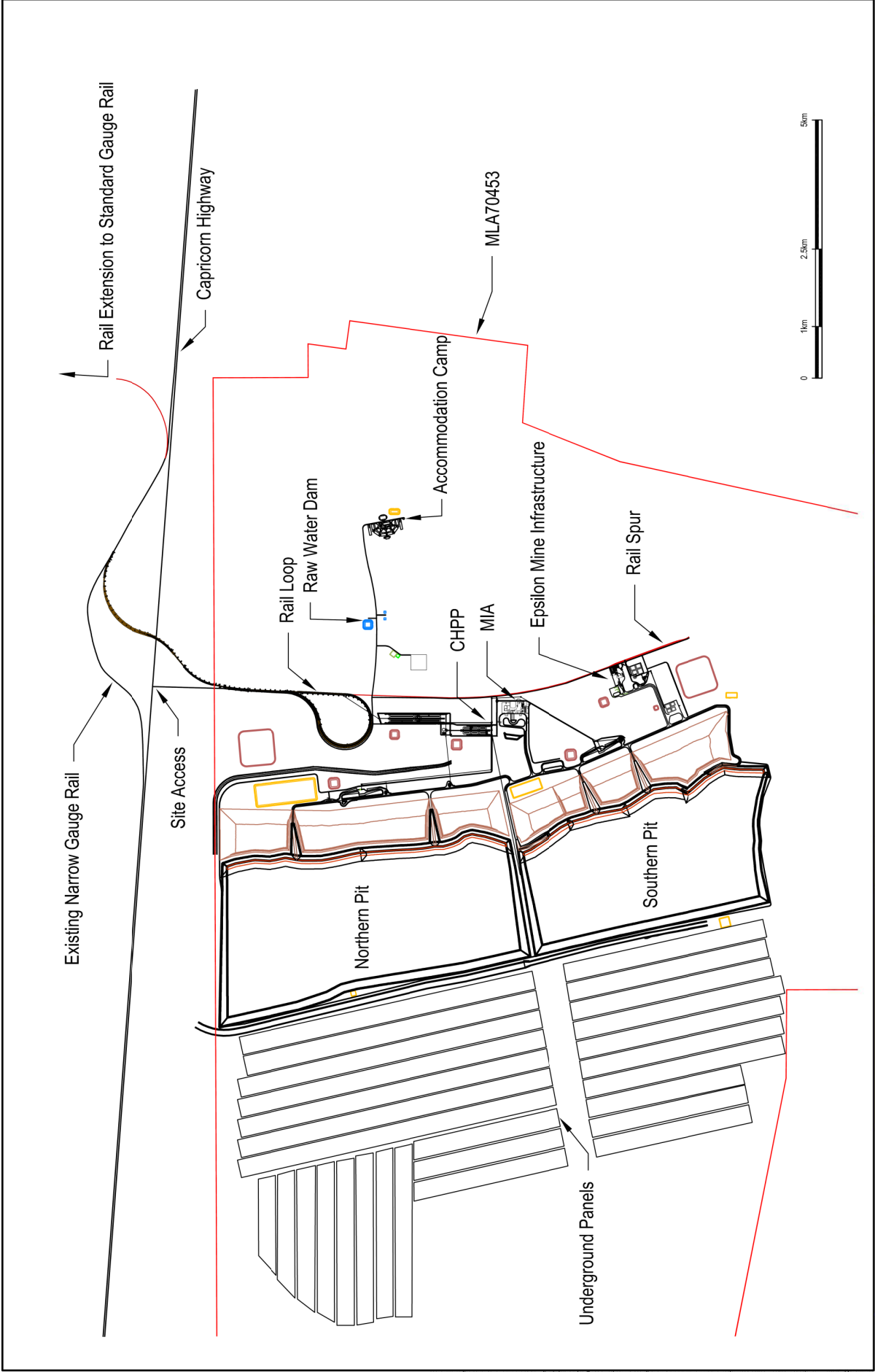
9.2.2.3 Overview of the mine facilities

The SGCP consists of both open cut and underground mining methods to export thermal coal to the international market. At 15 Mtpa of export capacity the SGCP rivals some of the largest existing coal mines in Queensland. As such the SGCP includes a sizable collection of infrastructure that is required to service this mine. This infrastructure includes:

- Materials handling systems (conveyors, sizing stations, stockpile machines)
- Train unloading facility (freight) and train load out facility (coal)
- Dry beneficiation plant, coal processing plant (washplant) and tailings filter plant
- Maintenance facilities for open cut and underground equipment
- Site offices, warehouse, crib rooms, bathhouse, emergency response facility, coal testing laboratory, accommodation village for 1600 persons
- Explosives storage facility, tank farms for fuel, water, lubes and oils
- Control rooms, diesel generator power plant, substations and associated electrical reticulation
- Water and waste water treatment plants and associated water reticulation
- Flood mitigation (diversion drains, bunds), multiple site dams for dirty water, clean water and sedimentation traps
- Network of site roads (both for light vehicle and heavy vehicles)

Due to the remoteness of the SGCP and the lack of suitable infrastructure in the surrounding towns, the mine has been designed with all the necessary facilities to operate effectively without reliance on external facilities in distant regional centres. As mentioned in previous sections, this approach will minimise traffic on the public road network during operational years.

An indicative layout for the site at full production is given in Figure 2 below.



CLIENT		REVISION DETAILS		APPROVED		DRAWN		DESIGNED		PROJECT		PRELIMINARY	
aurecon www.aurecongroup.com		SouthGalilee COAL PROJECT		T. SWANBROUGH		T. SWANBROUGH		T. SWANBROUGH		SOUTH GALILEE COAL PROJECT		NOT FOR CONSTRUCTION	
										TITLE		PROJECT NO.	
										FULL PRODUCTION (15MTPA)		224911	
										PRELIMINARY SITE LAYOUT		SCALE	
										DATE		A1	
												DRAWING No.	
												REV	
												1000-SK-100	
												REV	
												A	

Figure 2 - Site Layout

9.2.2.4 Project staging

9.2.2.4.1 Project timing

At full production the SGCP is a 15 Mtpa open cut and underground coal mine. To reach this target the Project has been split into four distinct stages. A summary of the stages is listed below in Table 2.

Table 2 - Outline of project staging

Project Stage	Export tonnage	Construction Period	Operational Period
Epsilon Mine	~3 Mtpa	2015-16	2017-19
Stage 1, Expanded Open Cut	~5 Mtpa	2018-19	2020-22
Stage 2, First Longwall	~10 Mtpa	2021-22	2023-26
Stage 3, Second Longwall	~15 Mtpa	2025-26	2027-49

In terms of key years for project traffic, the following years are noteworthy and have been assessed in more detail due in the following pages of this report:

- Year 2015 – this is the first construction year for the mine
- Year 2021 – this is the peak predicted project traffic
- Year 2025 – this is the 10 year horizon year
- Year 2035 – this year represents project traffic at full production

9.2.2.4.2 The Epsilon Mine concept

A key addition of this supplementary transport study is the introduction of “Epsilon Mine”. This stage has been developed by the proponent as an innovative solution to the challenge of the remoteness of the site and lack of an existing dedicated coal haulage rail link to the coastal ports.

The ‘Epsilon Mine’ is the only proposed development in the region that doesn’t require extensive development of Rail, Port, Water and Power infrastructure. Instead the existing Central West railway will be upgraded and utilised to export coal via Gladstone for the Epsilon Stage. Subsequent stages will export coal via a proposed new railway from the Galilee Basin to Abbot Point (by others). The upgraded Central West line will also be used for operation freight haulage throughout the life of the mine.

9.2.2.4.3 Transport modes for materials supply

The introduction of the Epsilon concept means that the existing Central West railway line can be used for supply of construction and operational materials throughout the Project. However, there are a number of upgrades (and a new spur line into the Project site) that are required before this line can be utilised. For this reason the supply of construction materials for the Epsilon Mine will be undertaken by truck. Following the construction period of the Epsilon Mine, the upgraded Central West line will be utilised for supply of operation freight as well as construction freight for subsequent expansion stages.

Table 3 lists the transport modes for construction and operational freight as well as the method of transport for product coal for each stage of the SGCP:

Table 3 - Transport mode for each stage

Project Stage	Export tonnage	Construction Freight	Operational Freight	Coal Export
Epsilon Mine	~3 Mtpa	By Road	By Road and Rail	Central West Line to Gladstone
Stage 1, Full production Open Cut	~5 Mtpa	By Road and Rail	By Road and Rail	New railway to Abbot Point
Stage 2, First Longwall	~10 Mtpa	By Road and Rail	By Road and Rail	New railway to Abbot Point
Stage 3, Second Longwall	~15 Mtpa	By Road and Rail	By Road and Rail	New railway to Abbot Point

9.2.2.5 Personnel requirements and transport modes

9.2.2.5.1 Operating personnel requirement

Operational personnel have been split into two categories for the purposes of this report. 'Day shift' staff are those who work a normal 5on/2off roster and reside on site throughout the year, whereas 'even time' staff are those shift workers typically on a 7on/7off roster working 12-12.5 hour shifts. Currently, all stages of the SGCP are planned to be operating continuously throughout the year, 24 hours a day, 7 days a week. A usual day on site will consist of one 'Day shift' and two 12 hour shifts made up of two 'even time' crews.

The majority of staff will be on fly in / fly out (FIFO) arrangements and housed on site in the accommodation camp (more details on accommodation arrangements can be found in section 9.2.2.5.3). Therefore at any one time it is expected that the number of personnel on site in the camp will be equal to the amount of 'day shift' staff plus two 'even time' crews. Similarly the total personnel requirement for the Project is equal to four 'even time' crews (2 on site, 2 on leave) plus the 'day shift' staff. At peak production, with an allowance for visitors/subcontractors, it is predicted that in the order of 765 people will be residing in the accommodation camp at any one time with over 1250 personnel directly employed by the Project.

Table 4 provides a summary of the operational staffing levels for each stage of the Project including an allowance for visitors and subcontractors.

Note: staff rosters will vary depending on roles. For the purposes of this study the above assumptions have been made and align with the current project staffing requirements. While final staffing arrangements may vary from those mentioned above, the current estimates will be representative of the staffing levels for the Project and as such are sufficient for this analysis.

Table 4 - Operational Manning Levels

Project Stage	Total Personnel	Day Shift Staff	No. of people per even time crew
Epsilon Mine	210	30	45
Stage 1, Full production Open Cut	550	90	115
Stage 2, First Longwall	940	140	200
Stage 3, Second Longwall	1285	165	280
Visitor/Subcontractor (Epsilon)	20		
Visitor/Subcontractor (Remaining stages)	40		

9.2.2.5.2 Construction personnel requirement

The Project is split into four stages and as such has four distinct construction periods (for timing of these stages see Table 2). The first construction period is for the smaller Epsilon Mine which is a low capital initial stage and as such doesn't have a high construction personnel requirement.

The second construction period corresponds with the expansion of the open cut operation and the development of the majority of the fixed infrastructure. This period represents the peak number of persons on site at 1450.

The third construction period is a result of the development of the underground mining operation at the SGCP with Longwall mining equipment and additional infrastructure being constructed during this period.

The fourth and final construction period corresponds with the addition of a second longwall for the underground operation. The majority of labour for this period is associated with the assembly of the additional longwall mining equipment.

Table 5 details the personnel requirements for each of the construction periods

Table 5 - Construction Manning Levels

Project Stage	Peak Persons on site	Average Persons on site
Epsilon Mine	160	130
Stage 1, Full production Open Cut	1450	900
Stage 2, First Longwall	1100	700
Stage 3, Second Longwall	150	100

9.2.2.5.3 Total personnel requirement

The total personnel requirement for the Project is shown in the figures below. Figure 3 plots the total number of persons employed by the project over the mine life (note: year 2027 is representative of the full production years 2027-2049). Figure 4 shows the number of personnel expected on site over the mine life.

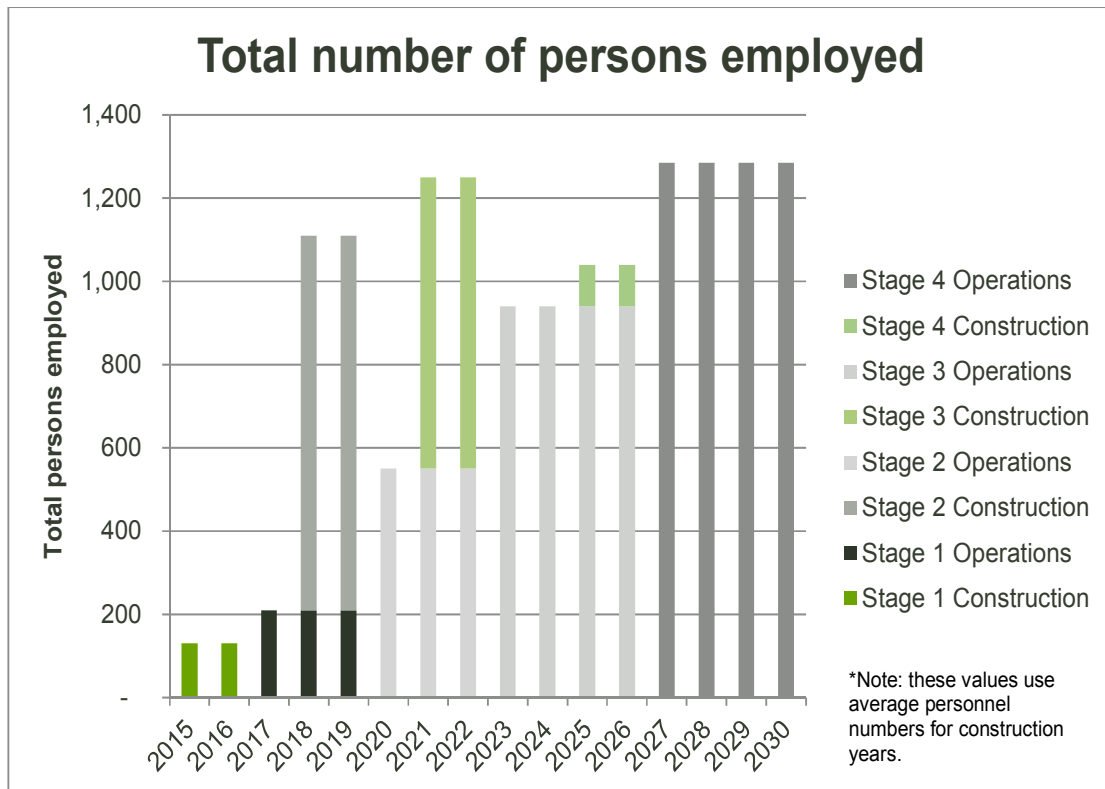


Figure 3 - Total number of persons employed over mine life

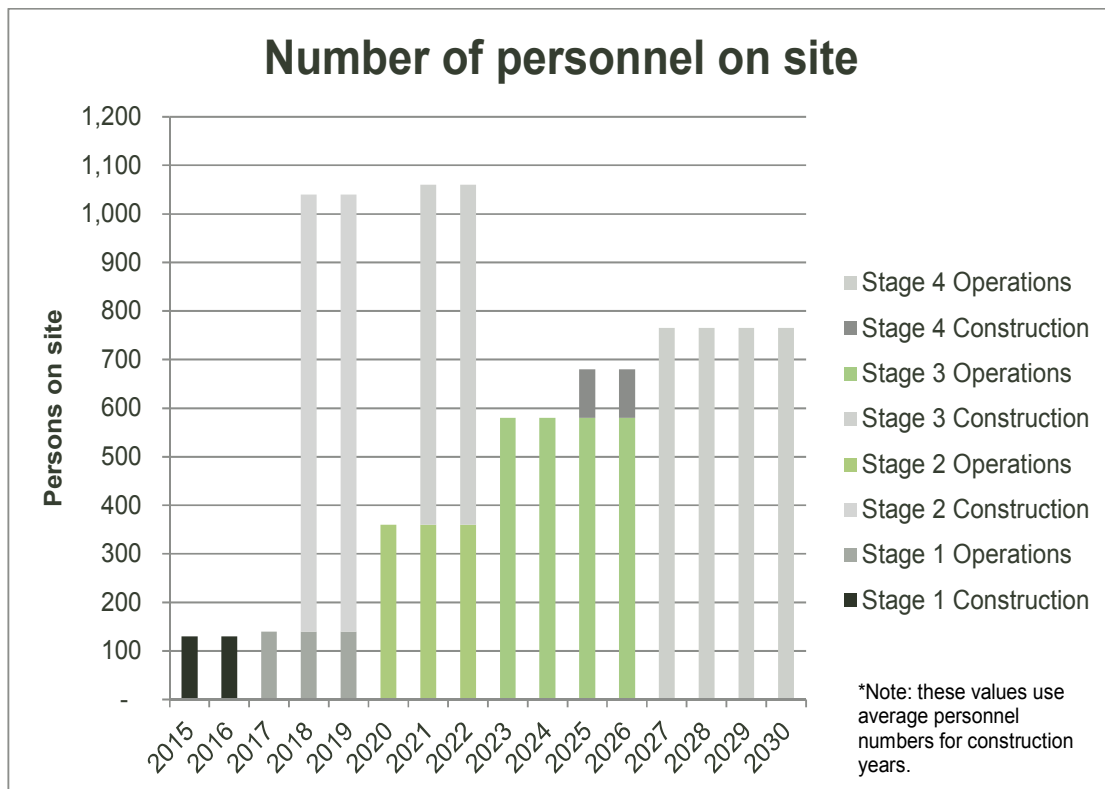
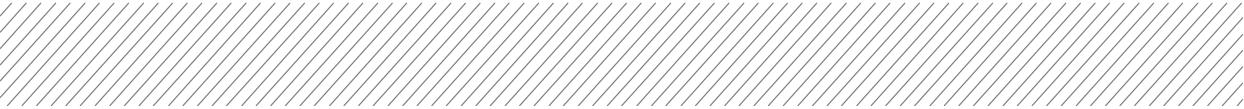


Figure 4 - Personnel on site over life of mine



9.2.2.5.4 Accommodation

The philosophy for this Project is to provide on-site accommodation facilities for 100% of the staffing requirements including an allowance of 20 visitors/subcontracts for Epsilon and 40 for Stages 1 onwards.

While this is the intention of the proponent, it is understood that management staff will be given the opportunity to live in a family environment in the local community. For the purposes of this study an allowance of 8 management staff living off site has been made.

9.2.2.5.5 Transport methods for personnel

The majority of staff for this Project will be on FIFO rosters. During the Epsilon Stage it has been assumed that the Alpha Airport will not be suitable for the Project traffic and that the FIFO workers will utilise the Airport in Emerald from where they will commute via Bus to site. This is a conservative assumption as some allowance of staff during this stage may be able to utilise FIFO services via Alpha Airport.

The intension of the proponent is to maximise the use of buses from Emerald as opposed to individual cars so as to reduce the traffic on the roads. For the transport of construction personnel for Epsilon, it has been conservatively assumed that 50% of the personnel will utilise the bus service with the remaining 50% driving from regional centres such as Emerald and Barcaldine. There also exists an opportunity to reduce road traffic further by using a rail car service to transport personnel, however this option has not been included in this report.

For Stages 1 onwards it is anticipated that the Alpha Airport will have been upgraded to suit the demands of the surrounding developments and that of this project and therefore, from stage 1 onwards, FIFO workers will fly into Alpha Airport and take a short bus trip to site.

Table 6 details the transportation methods for staff during the construction and operational phases of the Project.

Table 6 - Transport (modal split) for site personnel

Project Stage	Personnel on site (average over year)	Day shift staff		Shift staff (7/7 for operational and 21/7 for construction)		
		Permanently in camp	DIDO, Alpha to Site	FIFO via Emerald Airport, Bus to Site	DIDO from Emerald to Site	FIFO via Alpha, Bus to Site
Epsilon Mine Construction (2015-16)	130		8 managers		~50% of personnel	
Epsilon Mine Operation (2017-19)	120	Day shift staff (excluding 8 managers)	8 managers	All FIFO staff		
Stage 1, Full production OC Construction (2018-19)	900					All construction personnel
Stage 1, Full production OC Operation (2020-2022)	320	Day shift staff (excluding 8 managers)	8 managers			All FIFO staff
Stage 2, First Longwall Construction (2021-2022)	700					All construction personnel
Stage 2, First Longwall Operation (2023-26)	540	Day shift staff (excluding 8 managers)	8 managers			All FIFO staff
Stage 3, Second Longwall Construction (2025-26)	100					All construction personnel
Stage 3, Second Longwall Operation (2027-49)	725	Day shift staff (excluding 8 managers)	8 managers			All FIFO staff
Visitor / Sub contractors (Epsilon)	20			10 persons / week	10 persons / week	
Visitor / Subcontractors (Stages 2 onwards)	40				20 persons/ week	20 persons / week

Note: the Epsilon operational staff may be able to commute to site via the upgraded rail. This scenario would further reduce the amount of traffic on the public roads and is being investigated but has not been incorporated in this report.

Also note: it is expected that day shift staff permanently living in the camp will travel via car to regional areas such as Emerald over the course of the year and will also use the nearest Airport for holiday flights. An allowance has been made for both these scenarios.

9.2.3 Existing traffic environment

9.2.3.1 General description of the transport environment

The key roads for this project can be seen in Figure 5 below and are almost exclusively state controlled roads. Of note is the Clermont-Alpha Road which links the townships of Alpha and Clermont. In the previous transport assessment for this project, this road was used for project traffic between Mackay and the site. Since then, this road has been deemed unsuitable for use as a transport route for the Project and will not be utilised throughout the Project life while in its current state.

9.2.3.2 Road hierarchy

The roads (excluding state controlled roads) in the immediate vicinity of the site are mostly farm access roads such as Creek Farm Road and also an access road for Alpha Airport (located immediately east to the proposed mine).

Further from the site is the town of Alpha. All of the project traffic will pass through this township which makes the following roads of particular significance. Brief details of the other roads along the preferred routes can be found in Figure 5 below and current levels of traffic can be found in subsequent sections of this report (see Table 8)

Capricorn Highway (A4): is located in Central Queensland, and is a major vehicular route that links the city of Rockhampton with western Queensland (passing through the township of Alpha). The highway is approximately 560 kms long, and joins the Landsborough Highway at Barcaldine.

This part of Capricorn Highway in the vicinity of the proposed development is essentially an east-west two-lane, two-way sealed rural highway with a 100 km/hour speed limit. This road is frequently used by commercial (CV) and over dimensional (OD) vehicles and has residential traffic generation. An existing QR rail line is located to the north of the site that runs parallel to the Capricorn Highway. Currently there is no formed road access to the proposed mine site.

The road hierarchy as set out in the DTMR signifies A4 within this area as a National Route. This indicates that the route is higher in hierarchy than a primary arterial. This further states that this route forms part of a network of strategic importance (providing a link to Darwin).

Clermont-Alpha Road: is State controlled road located to the east of the proposed development, running in a north/south direction between Clermont and Alpha. It is approximately 7-9 m wide with two way traffic flow. The road hierarchy identifies Clermont-Alpha Road within this area as a State Regional connection and it is anticipated it carries very low vehicular traffic volumes. This road has vulnerable structures and is not proposed to be used by the development traffic.

Shakespeare Street: is a bi-directional two-way road, which is approximately 7 m wide. It is defined as a local road under the TMR road hierarchy. Shakespeare Street is a largely residential street, 800 m in length and links Capricorn Highway to the Alpha east community.

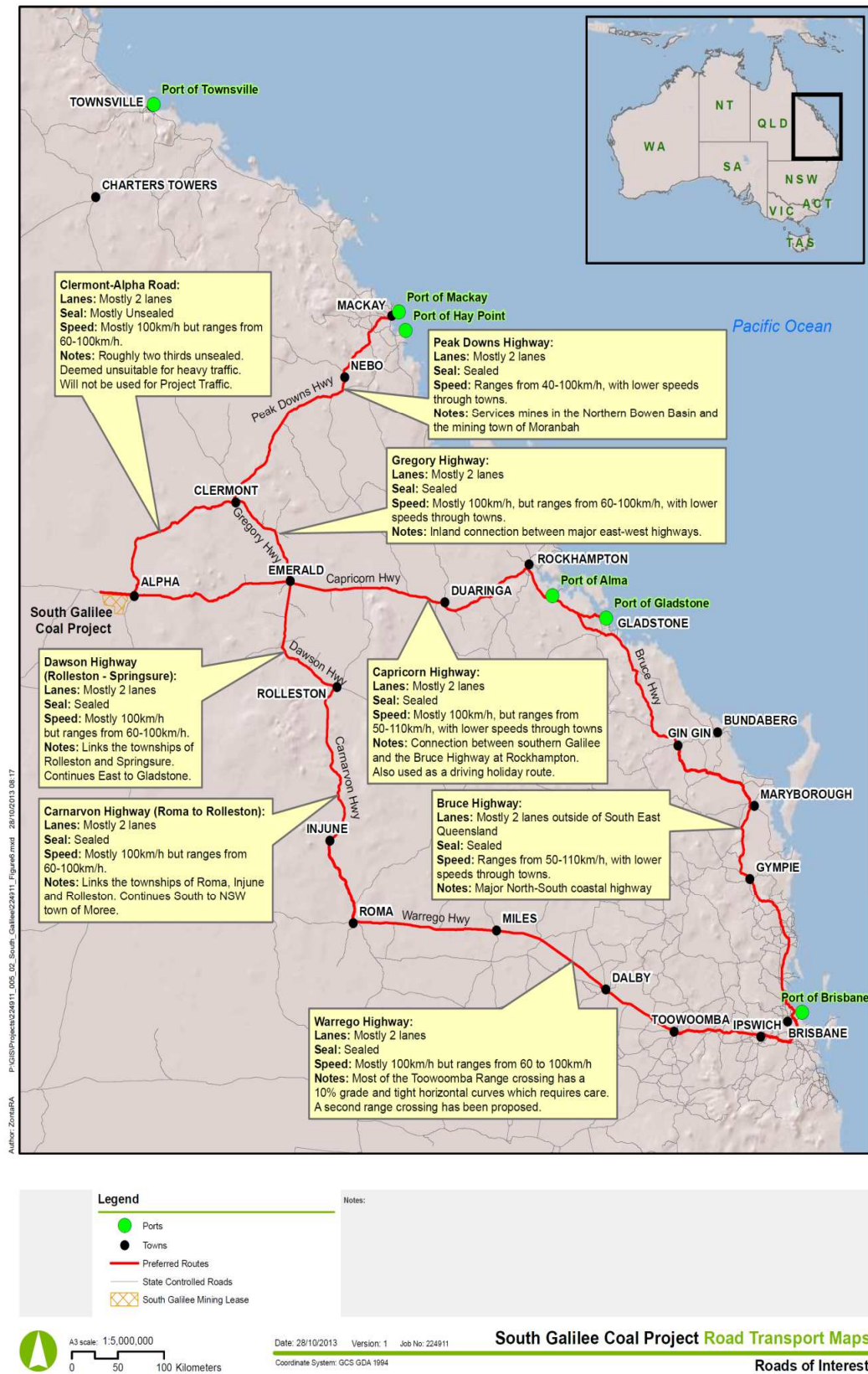


Figure 5 - Roads of Interest

9.2.3.3 Existing traffic infrastructure and use

9.2.3.3.1 Rail

The Queensland Rail's Central West line runs in an east-west direction immediately north of the Project tenement. This line adjoins the Blackwater system at Emerald and runs from Emerald to Hughenden via Longreach and Winton over approximately 780 km. Products carried through the system are primarily grain, livestock and containerised freight. Freight traffic shares the system with the Spirit of the Outback passenger service to Longreach.

It is this line that the proponent is proposing to upgrade and use for both freight to site and coal to port during various stages of the Project.

As the proponent is dealing directly with QR with regards to any track upgrades and project generated rail movements, the impacts on the existing rail network have not been analysed in this report.

9.2.3.3.2 Air

The following text has been reproduced from the original Transport Assessment for the Project undertaken by Halcrow as part of the EIS:

'The Alpha Aerodrome is listed as a registered aerodrome with CASA (Registration Number R076) and is owned and operated by the BRC. The existing runway is currently 1,450 m long and 30 m wide. The Alpha Aerodrome is located approximately 5 km west of the main township of Alpha on the Alpha Aerodrome Access Road, which connects to the Capricorn Highway from the south. The airport is not currently equipped to cater for commercial passenger flights and is currently used irregularly only by small aircrafts.

There are a number of other airfields and aerodromes in the region, including:

- Emerald Airport (located 170 km east of the SGCP and serviced by QANTAS)
- Barcaldine Aerodrome
- Aramac Airfield
- Jericho Airfield, and
- Muttaborra Airfield

Privately-owned property airstrips for agricultural or personal use are not considered in this assessment.

The SGCP will utilise the existing Alpha Aerodrome for the FIFO workforce. The mine site is located approximately 4 km west of the Aerodrome.

No formal car parking or bus layover areas are designated at the aerodrome, however sufficient space is provided to allow for parking and maneuvering of cars and buses.

9.2.3.3.3 Port

Product coal from the Project will be railed to coastal Ports for export to the international market.

During the initial Epsilon Stage, product coal will be transported from site via the existing Queensland Rail and Aurizon railways to Gladstone for export.

For the subsequent expansion stages, product coal will be railed to Abbot Point Coal Terminal (ABCT) via a new Galilee Basin rail line for export via the expanded ABCT.

9.2.3.3.4 Buses, pedestrian and cyclists

There is no local bus service operated within Alpha. However a long distance public transport coach service runs from Longreach to Emerald with a stop in Alpha. This bus transport is not continuous and operates two return services per week.

There are no provisions for walking and cycle opportunities in this location, and it is considered that none is required based on demand. During site visits, no cyclists or pedestrians were observed in this area.

9.2.3.4 Existing site access

Currently, the site is vacant with some agricultural land use and it is noted that there are approximately two low use unformed access tracks leading to farms at the site onto Capricorn Highway. It is considered that these are not DTMR approved access points off Capricorn Highway into this vacant land. These access points are proposed to be redundant under the development. The existing access tracks in some instances are considered below the requirements for sightlines, access management and this will be further improved, by the introduction of designed standard intersection as is discussed in subsequent sections of this report

9.2.3.5 Traffic safety Investigations

The crash data supplied by DTMR from its Road Crash database shows that for the five-year period 2008 to 2013, there has been a total of 12 reported collisions along Capricorn Highway (Link ID 16D) at close proximity to the proposed mine site. Of the 12 crashes, one was a stray animal collision, and 2 crashes involved heavy vehicles. Other reported crashes involved mostly loss of control on a straight or curve. Most of these crashes were recorded during daylight and could be related to high speeds.

The following is a summary of the crashes grouped in terms of severity:

Table 7 - Summary of Crash Data along Road Links

Road	Road Link ID	Fatality	Hospital	Injury	Damage to Property	Treatment	Total
Capricorn Highway							
Rockhampton to Duaringa	16A	6	31	6	25	15	83
Duaringa to Emerald	16B	4	36	4	32	25	101
Emerald to Alpha	16C	3	18	2	10	6	39
Alpha to Site	16D		6		6		12
Peak Downs Highway							
Nebo to Mackay	33B	6	45	13	50	40	154
Clermont to Nebo	33A	2	3	1	5	6	17
Gregory Highway							
Clermont to Belyando Crossing	27C			1		1	2
Emerald to Clermont	27B	1	16	3	17	13	50
Springsure to Emerald	27A		12	1	10	3	26
Dawson Highway							
Rolleston to Springsure	46D		11	1	3		15
Carnarvon Highway							
Injune to Rolleston	24E	1	11	3	8		23
Roma to Injune	24D		12	1	4	4	21
Warrego Highway							
Miles to Roma	18D		1		1		2
Bruce Highway							

Road	Road Link ID	Fatality	Hospital	Injury	Damage to Property	Treatment	Total
Benaraby to Rockhampton	10E	14	91	20	81	47	253

The area in close proximity to the site has a few recorded crashes and is anticipated to have some unreported crashes. Based on the above, and with a view to address any development contributing road safety issues, a Transport Management Plan together with Road Use Management Plan will be developed in consultation with the relevant authorities and agencies such as DTMR and Barcaldine Regional Council. These management plans will be implemented prior to the commencement of the project. In addition, combining the above management plans with the mitigation proposed within this report is anticipated to promote safety and transport efficiency on this section of Capricorn Highway, whilst providing betterment for DTMR, the local road controlling authority, this development and the communities of Alpha.

A crash list detailing the number of crashes is attached in Appendix A.

9.2.3.6 Existing and forecast traffic volumes

Traffic volumes in this area have been assessed using data obtained from traffic surveys taken in this area and data received from the DTMR traffic census. DTMR data indicates an average annual daily traffic (AADT) count undertaken in 2012. The raw data is attached in Appendix A and summarised in Table 8 below.

A future year analysis was also completed on the DTMR link traffic volumes using a compound growth factor (GF) of 3% to estimate the traffic for year 2015, 2021 and 2025 respectively. A 3% GF is considered appropriate and is consistent with previous correspondence with DTMR regarding growth rates for their rural based State Controlled Road network.

The year 2015 is the base construction year with 2021 the year of maximum project generated traffic and year 2025 is the tenth year following the commencement of construction. The estimated DTMR link traffic volumes for these years on which the majority of heavy and light vehicles are expected to travel are tabulated below.

It should be noted the figures below are the lowest measured volumes for each link. This represents a conservative approach when comparing future to existing volumes and determining the level of impact of a development.

Table 8 - Existing and Future Traffic Volume data 'without' development

Existing Data					Future Traffic Data (3% growth)		
Road	Road Link ID	AADT 2012 (both directions)	% HV	Estimated Peak Hour Flow (15% of AADT)	Estimated AADT 2015 (Yr1)	Estimated AADT 2021 (peak project traffic)	Estimated AADT 2025 (design horizon)
Capricorn Highway							
Rockhampton to Duaringa	16A	3,784	21%	568	4,135	4,938	5,557
Duaringa to Emerald	16B	2,595	20%	390	2,836	3,386	3,811
Emerald to Alpha	16C	433	26%	65	474	565	636
Alpha to Site	16D	394	23%	60	431	515	579
Peak Downs Highway							

Existing Data					Future Traffic Data (3% growth)		
Nebo to Mackay	33B	4,907	17%	737	5,363	6,403	7,207
Clermont to Nebo	33A	726	28%	109	794	948	1,067
Gregory Highway					-	-	-
Clermont to Belyando Crossing	27C	2,150	21%	323	2,350	2,806	3,158
Emerald to Clermont	27B	1,193	26%	179	1,304	1,557	1,752
Springsure to Emerald	27A	1,231	27%	185	1,346	1,607	1,808
Dawson Highway					-	-	-
Rolleston to Springsure	46D	715	29%	108	782	933	1,051
Carnarvon Highway					-	-	-
Injune to Rolleston	24E	415	33%	63	454	542	610
Roma to Injune	24D	898	35%	135	982	1,172	1,319
Warrego Highway					-	-	-
Miles to Roma	18D	1,718	34%	258	1,878	2,242	2,523
Dalby to Miles	18C	2,895	28%	435	3,164	3,778	4,252
Toowoomba to Dalby	18B	6,044	26%	907	6,605	7,887	8,876
Ipswich to Toowoomba	18A	14,336	18%	2,151	15,666	18,706	21,053
Bruce Highway					-	-	-
Brisbane to Gympie	10A	14,101	13%	2,116	15,409	18,399	20,708
Gympie to Maryborough	10B	7,923	19%	1,189	8,658	10,338	11,636
Maryborough to Gin Gin	10C	3,446	29%	517	3,766	4,497	5,061
Gin Gin to Benaraby	10D	3,678	25%	552	4,020	4,799	5,402
Benaraby to Rockhampton	10E	3,721	33%	559	4,067	4,856	5,465

The peak hour flow, outlined in the table 1 above, is calculated using 15% of AADT, and is considered appropriate for this area.

DTMR data indicates an average annual daily traffic (AADT) count undertaken in 2012 to be approximately 394 vpd in the vicinity of the site including a 23.1% commercial vehicle (HCV) count. As mentioned previously a traffic growth rate of 3.0% (a compound growth rate) has been assumed for the. Assuming the 3% growth factor (GF) per year equates to an extrapolated 2015 (opening year of development) AADT of 431 vpd.

Local traffic surveys were conducted in this area by AusTraffic during a morning period on Tuesday 2nd August 2011 between 5.30am to 8.30am and the evening peak period of 3.00 pm to 6.00 pm. The raw data is attached in Appendix B.

Based on the survey data, the peak hours were considered to be:

Morning: 6.45 am to 7.45 am; and

Evening: 3.15 pm to 4.15 pm.

The morning and evening survey data was used as the worst case scenario as these measured peaks were above the 15% estimate. It should be noted that no mid-peak survey was undertaken, however,

even if the peak for the middle of the day was twice that measured for the morning/night period, then the road LOS would be unchanged.

The traffic count data is outlined in the figure below:

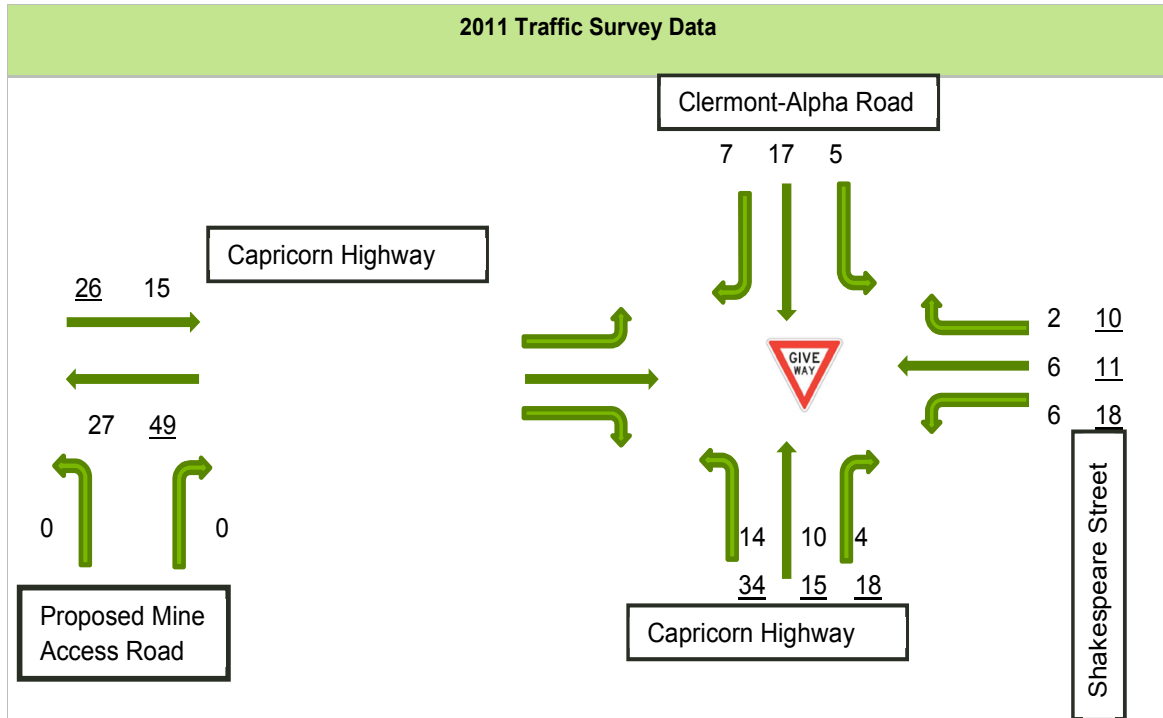


Figure 6 - 2011 Traffic Count Data

Since real traffic data in terms of peak flow is available and provides a more accurate measure of peak volumes, these volumes have been adopted to complete the intersection analysis and are detailed in Section 0. Due to the local conditions and parameters of Capricorn Highway, DTMR supplied data has been used for other road link assessments.

9.2.3.6.1 Summary of existing and planned works

The following table (Table 9) provides a summary of the proposed works for roads along the proposed haulage and commuting routes for Project traffic. This data has been compiled from sections of the Queensland Transport and Roads Investment Program (QTRIP) report. Details on the exact sections of road for which the listed works are planned can be found in the QTRIP report.

It is evident from the QTRIP report that a significant amount of work is planned over the coming years along the chosen routes. In general, the majority of these works are due for completion prior to the first construction period (mid 2015) however a number of works (highlighted in bold in Table 9) will overlap with the Project activities and will need to be considered during the execution stage of the Project when the transport activities will be finalised.

Table 9 - Summary of planned works along chosen routes (according to QTRIP)

Road	Proposed Works(approved and indicative)	Timing
Capricorn Highway		
Rockhampton - Duaringa	Rehabilitation and overlay (>75mm)	2013-14
	Miscellaneous works	2013-15
	Construct overtaking lane(s)	2013-14
	Improve intersection(s)	2013-14
Duaringa - Emerald	Rehabilitate bridge(s) and culvert(s)	2013-14
Emerald - Alpha	Rehabilitate Pavement	2013-14
	Install/replace rest areas, stopping places and pull over areas	2015-17
	Install barrier(s) at Woodbine Creek	2015-17
	Seal shoulder(s)	2013-15
Alpha - Barcaldine	Rehabilitate Pavement	2013-14
Gregory Highway		
Springsure - Emerald	Improve intersection(s)	2013-14
Emerald - Clermont	Improve intersection(s)	2015-17
	Rehabilitate pavement	2013-14
Peak Downs Highway		
Clermont - Nebo	Install, upgrade or replace roadside delineation	2013-14
Nebo - Mackay	Replace bridge(s) and approached	2013-14
	Undertake miscellaneous works	2013-14
	Rehabilitate bridge(s) and culvert(s)	2013-15
	Widen pavement	2013-14
	Upgrade bridge(s)	2013-15
	Minor realignment of traffic lane(s)	2013-15
	Construct deviation – sealed standard	2013-15
Bruce Highway		
Brisbane - Gympie	Construct interchange	2013-14
	Construct additional lane(s)	2013-14
	Install, replace or restore road traffic noise treatments	2013-14
	Grade separation – road works	2013-14
	Construct new alignment and duplicate section to four lanes	2013-17
	Construct to new sealed four lane standard	2013-17
	Improve intersection(s)	2014-17



Road	Proposed Works(approved and indicative)	Timing
Gympie - Maryborough	Widen and seal	2013-14
	Construct overtaking lane(s)	2013-15
	Rehabilitate and widen	2013-14
	Provide heavy vehicle parking	2013-14
	Install/replace rest areas, stopping places and pull over areas	2013-14
	Grade separation – bridge works	2013-14
Maryborough – Gin Gin	Construct bypass – sealed standard	2013-15
	Improve intersection(s)	2013-15
	Rehabilitate and widen	2013-14
	Construct overtaking lane(s)	2013-15
	Reseal – bitumen chip	2013-14
	Rehabilitate pavement	2013-14
	Rehabilitate and overlay (>75mm)	2013-14
	Overlay pavement (>75mm)	2013-14
Gin Gin - Bernaraby	Rehabilitate bridge(s) and culvert(s)	2013-14
	Construct deviation – sealed standard	2013-15
	Install/replace rest areas, stopping places and pull over areas	2013-14
	Rehabilitate pavement	2013-14
	Undertake miscellaneous works	2013-14
	Construction additional lane(s)	2013-14
Bernaraby - Rockhampton	Provide driver fatigue management facilities	2013-14
	Undertake miscellaneous works	2013-14
	Construction additional lane(s)	2013-14
	Rehabilitate and overlay (>75mm)	2013-14
	Construct interchange	2013-17
	Upgrade bridge(s)	2013-15
	Improve intersection(s)	2013-14
Dawson Highway	Seal shoulder(s)	2013-14
Rolleston - Springsure	Rehabilitate and overlay (>75mm)	2013-14
	Rehabilitate bridge(s) and culvert(s)	2013-14
Carnarvon Highway		

Road	Proposed Works(approved and indicative)	Timing
Injune - Rolleston	Rehabilitate Pavement	2013-14
	Rehabilitate and overlay (>75 mm)	2013-14
	Rehabilitate bridge(s) and culvert(s)	2013-14
	Remediate batter slopes	2013-14
	Widen and seal	2013-17
Roma - Injune	Improve intersection(s)	
	Rehabilitate pavement	
	Rehabilitate and overlay (>75 mm)	
Warrego Highway		
Ipswich - Toowoomba	Widen shoulder(s)	2013-14
	Improve intersection(s)	2013-14
	Rehabilitate and overlay (>75 mm)	2013-14
	Rehabilitate bridge(s) and culvert(s)	2013-14
	Install/replace signs	2013-15
	Install, upgrade or replace roadside delineation	2013-15
	Remediate batter slopes	2013-14
Toowoomba - Dalby	Construct overtaking lane(s)	2013-14
	Install/replace signs	2013-14
	Improve intersection(s)	2013-15
	Provide heavy vehicle parking	2013-14
	Rehabilitate pavement	2013-17
Dalby - Miles	Improve drainage	2013-15
	Provide heavy vehicle parking	2013-14

9.2.4 Development profile

9.2.4.1 Site layout and possible future road linkage to the development

Access to the site is via a proposed T-junction intersection on to the Capricorn Highway. The developer will fund the proposed access way along the highway frontage, and all the internal circulating roads will be owned and managed by the mine owner. The access to the mine facilities via this new access road is proposed to be gated to restrict access to the mine when access is not routinely required.

Currently there are no cyclist facilities on this road and it is understood that there are none planned in the future. Therefore, this report has not considered the provision of any such facility as part of this development, as it is considered not required.

Bus transport services to the site will be via chartered mine bus service to transport mine staff to and from the site. It is considered that most of these trips will be to and from the adjacent Alpha Airport.

Due to the site location, there are currently limited alternatives for access to the site using other local roads apart from Capricorn Highway. The site is proposed to provide for a DTMR standard access road and intersection link onto the Capricorn Highway. Based on the site location, there are no logical options to provide possible future alternative routes to the site, therefore no further investigation for alternative routes are assessed in this report.

9.2.4.2 Route selection

9.2.4.2.1 Sources of supply

The execution strategy for the SGCP includes a focus on using pre-fabrication to reduce construction costs. This strategy will result in a large proportion of the construction materials being imported through the major Queensland ports located in Mackay, Gladstone and Brisbane. The remaining construction materials are also expected to originate from these regional cities of Mackay and Gladstone with select materials/parts from Brisbane.

One of the drivers for transport costs is the travel distance and with Mackay and Gladstone being significantly closer than Brisbane it is expected that the majority of the construction materials will originate from Mackay and Gladstone.

It should be noted that the preferred routes from Gladstone and Mackay to the SGCP site (detailed in the next section) have similar travel distances (~550 km) and as such it is expected that construction traffic will be similar between these two cities.

9.2.4.2.2 Preferred routes

Mackay to Site

The preferred route from Mackay to the SGCP site is shown in Figure 7 consisting of the following roads:

Table 10 - Preferred Route - Mackay to Site

Mackay to SGCP	
Road name	Associated Road Links
Nebo Rd	10G
Peak Downs Highway	33A, 33B
Gregory Highway	27B, 27C
Capricorn Highway	16C, 16D

Note: the Clermont-Alpha Rd will not be used as a route for construction or operational traffic due to vulnerable structures and unsuitable road conditions. The proponent will ensure transport contractors for this project adhere to this condition.

Gladstone to Site

The preferred route from Gladstone to the SGCP site is shown in Figure 8; it consists of the following roads:

Table 11 - Preferred Route - Gladstone to Site

Gladstone to SGCP	
Road name	Associated Road Links
Gladstone-Mt Larcom Rd	181
Bruce Highway	10E
Capricorn Highway	16A, 16B, 16C

Brisbane to Site

The preferred route from Brisbane to the SGCP site is shown in Figure 9; they consist of the following roads:

Table 12 - Preferred Route - Brisbane to Site

Brisbane to SGCP	
Road name	Associated Road Links
<u>Route 1:</u>	
Port of Brisbane Motorway	U27
Gateway Motorway	N239, U13C
Bruce Highway	10A, 10B, 10C, 10D, 10E
Capricorn Highway	16A, 16B, 16C
Road name	Associated Road Links
<u>Route 2</u>	
Port of Brisbane Motorway	U27
Gateway Motorway	N239, N332
Logan Motorway	210A, 17A
Warrego Highway	18A, 18B, 18C, 18D
Carnarvon Highway	24D, 24E
Dawson Highway	46D
Gregory Highway	27A
Capricorn Highway	16C, 16D

Note: The routes detailed above are preferred routes, should vulnerable structures or unsuitable conditions be identified along these routes prior to construction an alternative route may be sought out. In the unlikely scenario that this should happen the proponent will liaise with DTMR and the relevant authorities to find a suitable alternative route.

9.2.4.2.3 Over-dimensional Route

It is envisaged that the majority of over dimensional vehicles will originate in Mackay and will follow the preferred route from Mackay (listed above). Should the transport contractor or DTMR find this route unsuitable then an alternative route will be agreed upon with DTMR, the contractor and QLD police via the newly formed Heavy Vehicle Road Operations Program Office.

9.2.4.2.4 Vulnerable Structures

At this time a detailed investigation of vulnerable structures has not been conducted. It is planned that this work will be conducted during the execution phase of the project in conjunction with the relevant authorities and agencies such as DTMR, Barcaldine Regional Council, Heavy Vehicle Road Operations Program Office etc.

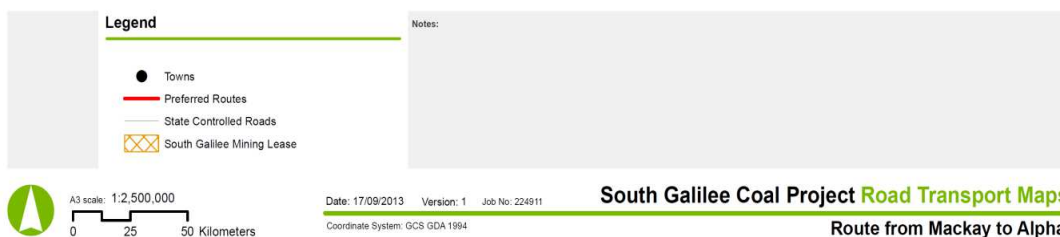
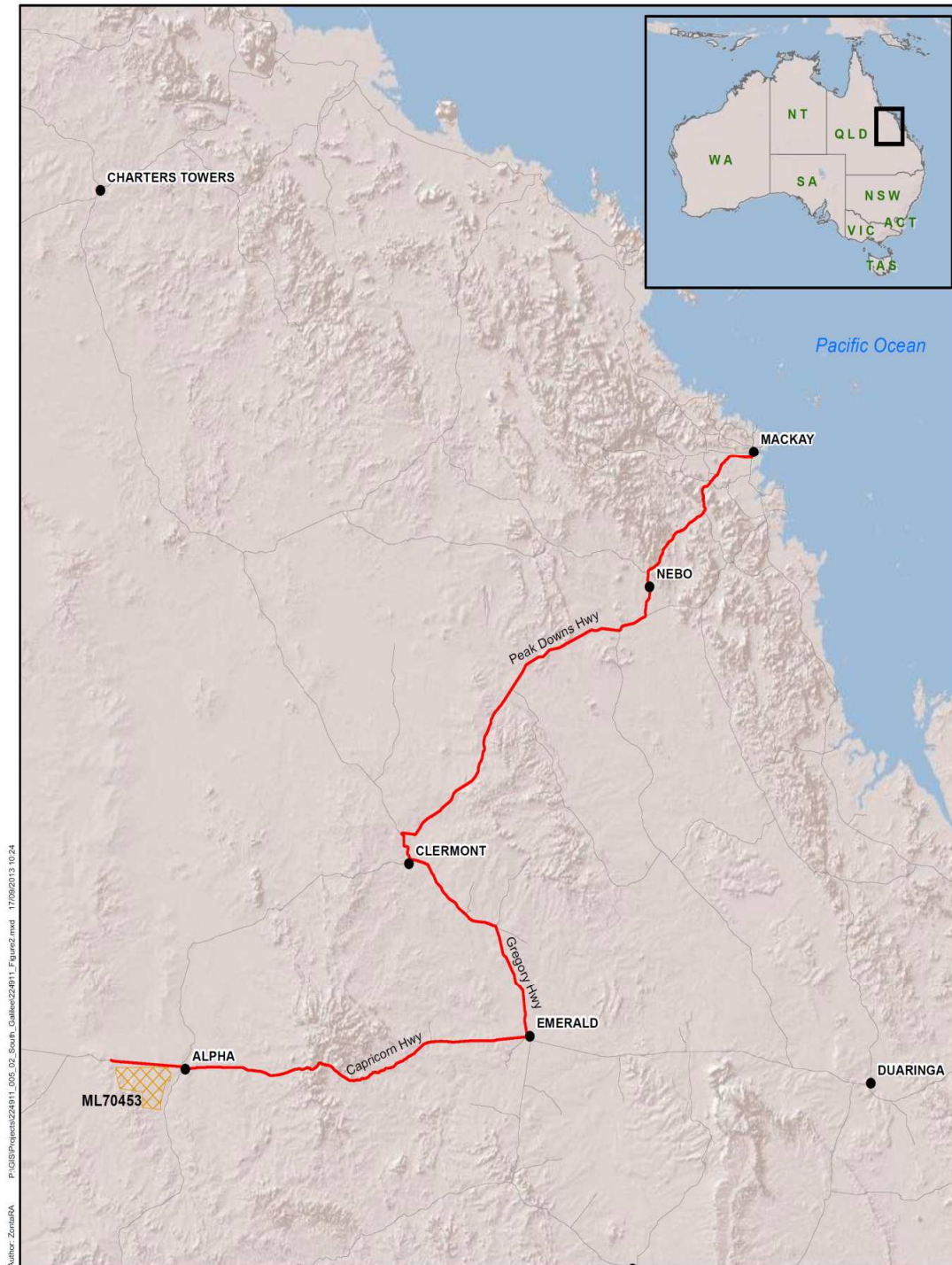


Figure 7 - Preferred Route - Mackay to Site



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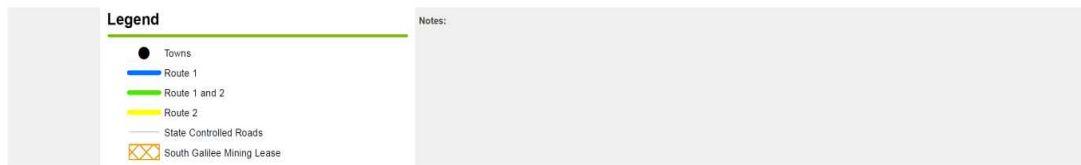
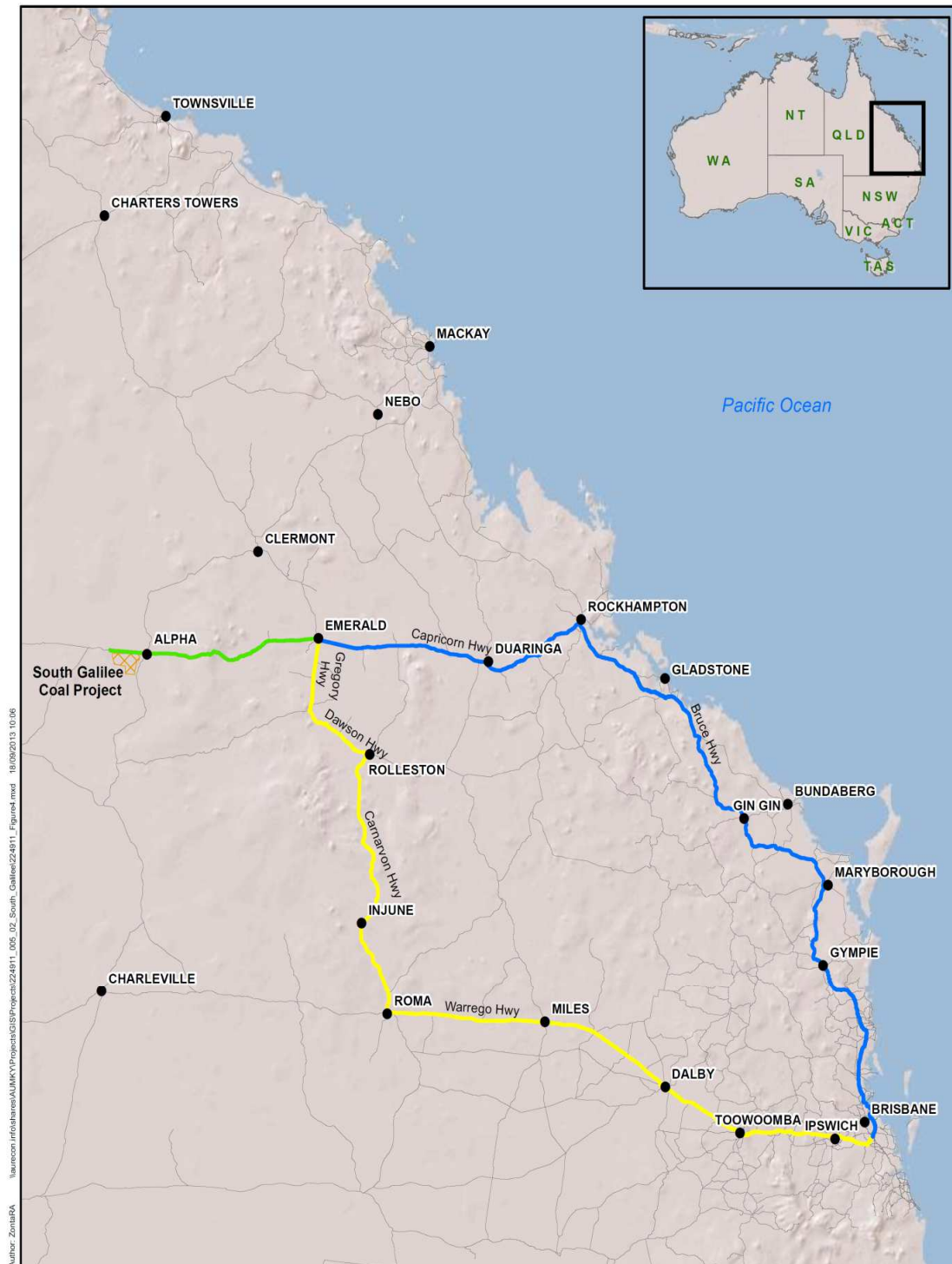


Figure 9 - Preferred Routes - Brisbane to Site

9.2.4.3 Project traffic

The predicted Project traffic data listed below has been based on the most up to date design information for materials and personnel. It should be noted that this base data has a level of uncertainty in accordance with the current stage of the design (Pre-Feasibility). However, for the purposes of this assessment the traffic estimates built off this data are considered representative of the levels of traffic expected for a project of this size.

Where AADT's are listed, 355 days has been adopted as the number of days when works will be carried out, discounting other days as statutory holidays. Note this differs from the 330 days to which mine planning is based on. The difference is attributed to the limitations of mining and materials handling equipment (weather delays, shut downs etc).

9.2.4.3.1 Construction traffic (freight)

The table below provides a summary of the assumed distributions for construction materials. To arrive at these values, different distributions were assigned to groups of construction materials based on the current execution philosophy. An example of these distributions is provided below:

Table 13 - Example of assumed distributions

	Rail/Road	Split for Road Transport			
		Brisbane	Gladstone	Mackay	Emerald
Materials Handling Components	40% / 60%	20%	40%	40%	0%
Yard Machines	0% / 100%	0%	0%	100%	0%
Building Components	75% / 25%	40%	30%	30%	0%
Water and Sewerage Systems	40% / 60%	40%	30%	30%	0%

Note: these assumptions allow for a high distribution of materials from Brisbane. This is a conservative assumption as the Brisbane route modelled in this analysis (via Bruce Highway) uses the same roads as materials originating from Gladstone and therefore, for the purposes of road impacts, is the same as assuming 100% of the Brisbane materials originate in Gladstone. As discussed previously these materials are more likely to be distributed between Gladstone and Mackay due to the similar travel times from these region centres.

Table 14 provides a summary of the overall distributions for each stage. These values are obtained by multiplying the material distributions by the material tonnage for a particular stage.

Table 14 - Distribution of construction materials

Stage	Origin	Brisbane	Gladstone	Mackay	Emerald	Rail
Epsilon		20%	48%	27%	5%	0%
Stage 1		9%	17%	20%	8%	46%
Stage 2		5%	21%	28%	7%	39%
Stage 3		0%	0%	100%	0%	0%
TOTAL		11%	7%	24%	24%	34%

Table 15 through to Table 19 provide more detailed information on the estimated quantities of materials for each stage as well as the class of vehicle and resulting number of trips over that construction period.

Note: the definition of a trip as used in the following tables is one trip is equal to one return journey (origin to site, site to origin).

Table 15 - Generated Construction Traffic - Epsilon Mine (2015-16)

Material Type	Origin	Vehicle Type	Estimated Tonnage (t)	Number of trips over construction period
Mining Equipment				
	Brisbane	B-double & Over Dimensional (Class 10)	-	2
	Gladstone		-	12
	Mackay		-	12
Supply of Rail Materials				
	Brisbane	B- double (Class 10)	622	15
	Gladstone		467	11
	Mackay		467	11
Materials Handling Systems				
	Brisbane	Semi-trailer (Class 9)	518	22
	Gladstone		1,058	44
	Mackay		1,014	42
Maintenance and Administration Facilities				
	Brisbane	Semi-trailer (Class 9)	4,360	182
	Gladstone		3,094	129
	Mackay		3,094	129
Water, Sewerage and Power Systems				
	Brisbane	Semi-trailer (Class 9)	980	41
	Gladstone		742	31
	Mackay		800	33
Diesel, Oils and Lubricants				
	Gladstone	57 kL Tanker (Class 10)	6,661	278
General Consumables				
	Gladstone	20 t capacity	1,825	365
	Mackay	(Class 5)	1,825	365
Waste (from Site to Emerald)				
	Site (to Emerald)	20 t capacity (Class 5)	1,722	86
Miscellaneous Construction Materials				
	Gladstone	20 t capacity	1,825	365
	Mackay	(Class 5)	1,825	365
TOTALS			32,899	2,540
	Brisbane		6,480	262
	Gladstone		15,672	1,235
	Mackay		9,025	957
	Emerald		1,722	86

Table 16 - Generated Construction Traffic - Stage 1 (2018-19)

Material Type	Origin	Vehicle Type	Estimated Tonnage (t)	Number of trips over construction period
Mining Equipment				
	Brisbane	B-double & Over Dimensional (Class 10)	-	7
	Gladstone		-	36
	Mackay		-	36
Supply of Rail Materials				
	Brisbane	B- double (Class 10)	125	3
	Gladstone		94	2
	Mackay		94	2
Materials Handling Systems				
	Brisbane	Semi-trailer (Class 9)	2,920	122
	Gladstone		6,241	260
	Mackay		8,637	360
	Rail	Nominal 6,000 t train	8,937	2
Maintenance and Administration Facilities				
	Brisbane	Semi-trailer (Class 9)	3,071	128
	Gladstone		1,923	80
	Mackay		1,923	80
	Rail	Nominal 6,000 t train	16,860	4
Water, Sewerage and Power Systems				
	Brisbane	Semi-trailer (Class 9)	771	32
	Gladstone		579	24
	Mackay		606	25
	Rail	Nominal 6,000 t train	5,867	2
Diesel, Oils and Lubricants				
	Rail	Nominal 6,000 t train	3,505	1
General Consumables				
	Gladstone	20 t capacity (Class 5)	1,825	365
	Mackay		1,825	365
Waste (from Site to Emerald)				
	Site (to Emerald)	20 t capacity (Class 5)	5865	293
Miscellaneous Construction Materials				
	Gladstone	20 t capacity (Class 5)	1,825	365
	Mackay		1,825	365
TOTALS			75,318	2,959
	Brisbane		6,887	292
	Gladstone		12,487	1,132
	Mackay		14,910	1,233
	Emerald		5,865	293
	Rail		35,169	9

Table 17 - Generated Construction Traffic - Stage 2 (2012-22)

Material Type	Origin	Vehicle Type	Estimated Tonnage (t)	Number of trips over construction period
Mining Equipment				
	Brisbane	B-double & Over Dimensional (Class 10)	-	63
	Gladstone		-	282
	Mackay		-	282
Materials Handling Systems				
	Brisbane	Semi-trailer (Class 9)	1,812	75
	Gladstone		4,389	183
	Mackay		6,914	288
	Rail	Nominal 6,000t train	9,263	2
Maintenance and Administration Facilities				
	Brisbane	Semi-trailer (Class 9)	75	3
	Gladstone		57	2
	Mackay		57	2
	Rail	Nominal 6,000t train	566	1
Diesel, Oils and Lubricants				
	Rail	Nominal 6,000t train	3,505	1
General Consumables				
	Gladstone	20 t capacity	913	183
	Mackay	(Class 5)	913	183
Waste (from Site to Emerald)				
	Site (to Emerald)	20 t capacity (Class 5)	2,313	116
Miscellaneous Construction Materials				
	Gladstone	20 t capacity	1825	365
	Mackay	(Class 5)	1825	365
TOTALS			34,427	2,396
	Brisbane		1,887	141
	Gladstone		7,184	1,015
	Mackay		9,709	1,120
	Emerald		2,313	116
	Rail		13,334	4

Table 18 - Generated Construction Traffic - Stage 3 (2025-26)

Material Type	Origin	Vehicle Type	Estimated Tonnage (t)	Number of trips over construction period
Mining Equipment				
	Brisbane	B-double & Over Dimensional (Class 10)	-	53
	Gladstone		-	237
	Mackay		-	237
General Consumables				
	Mackay	20 t capacity (Class 5)	913	183
TOTALS			913	710
	Brisbane			53
	Gladstone			237
	Mackay		913	420

Table 19 - Generated Construction Traffic - Total across all stages

Stage	Estimated Tonnage (t)	Number of trips	Construction timeframe
Epsilon Mine	32,899	2,540	18 months
Stage 1	75,318	2,959	18 months
Stage 2	34,427	2,396	24 months
Stage 3	913	710	24 months
TOTAL	143,557	8,605	

9.2.4.3.2 Operational traffic (freight)

The operational traffic volumes are based off estimates of the on-going consumables for the mine as well as the on-going mining equipment deliveries that are typical of an open cut and underground mine. The tables below list the operational traffic volumes for each stage.

Note: the data for operational years is listed on a per year basis whereas the data for the construction periods is listed per construction period (which may span a number of years).

Table 20 - Operational Traffic Estimate - Epsilon Mine (2017-2019) - (excluding personnel movements)

Material Type	Origin	Vehicle Type	Estimated Quantity per year	Number of trips per year
Mining Equipment				
	Brisbane	B-double & Over	-	2
	Gladstone	Dimensional	-	8
	Mackay	(Class 10)	-	8
Materials Handling System (replacement parts)				
	Mackay	20 t capacity (Class 5)	25 t	5
Fuel				
	Rail	Nominal 6,000 t train	16,000 kL	4
General Consumables				
	Gladstone	20 t capacity	213 t	43
	Mackay	(Class 5)	213 t	43
Offsite waste/recycling disposal				
	Site (to Emerald)	20 t capacity (Class 5)	2,769 t	277
Oil, Solvents and Water Treatment Chemicals				
	Mackay	20 t capacity (Class 5)	358 kL	18
Explosives				
	Mackay	20 t capacity (Class 5)	268 t	14
	Rail	Nominal 6,000t train	2,683 t	1
Heavy Vehicle Tyres				
	Gladstone	B-double & Over	126 tyres	32
	Mackay	Dimensional (Class 10)	126 tyres	32
			TOTALS	487
			Brisbane	2
			Gladstone	83
			Mackay	120
			Emerald	277
			Rail	5

Table 21 - Operation Traffic Estimate - Stage 1 (2020-22) - (excluding personnel movements)

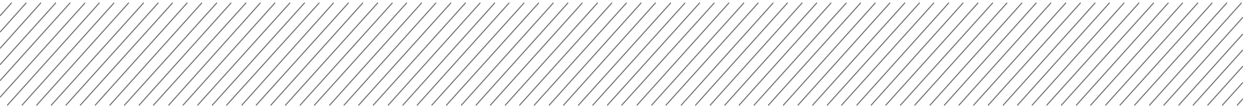
Material Type	Origin	Vehicle Type	Estimated Quantity per year	Number of trips per year
Mining Equipment				
	Brisbane	B-double & Over	-	2
	Gladstone	Dimensional	-	8
	Mackay	(Class 10)	-	8
Materials Handling System (replacement parts)				
	Mackay	20 t capacity (Class 5)	25 t	5
Fuel				
	Rail	Nominal 6,000 t train	17,000 kL	4
General Consumables				
	Gladstone	20 t capacity	425 t	85
	Mackay	(Class 5)	425 t	85
Offsite waste/recycling disposal				
	Site (to Emerald)	20 t capacity (Class 5)	3,955 t	396
Oil, Solvents and Water Treatment Chemicals				
	Rail	Nominal 6,000 t train	537 kL	1
CPP Consumables				
	Mackay	20 t capacity (Class 5)	51 t	3
	Rail	Nominal 6,000 t train	2,375	1
Explosives				
	Mackay	20 t capacity (Class 5)	460 t	23
	Rail	Nominal 6,000 t train	4,600	1
Heavy Vehicle Tyres				
	Gladstone	B-double & Over	180 tyres	45
	Mackay	Dimensional (Class 10)	180 tyres	45
			TRIP TOTALS	712
			Brisbane	2
			Gladstone	138
			Mackay	169
			Emerald	396
			Rail	7

Table 22 - Operation Traffic Estimate - Stage 2 (2023-26) - (excluding personnel movements)

Material Type	Origin	Vehicle Type	Estimated Quantity per year	Number of trips per year
Mining Equipment				
	Brisbane	B-double & Over Dimensional (Class 10)	-	8
	Gladstone		-	35
	Mackay		-	35
Materials Handling System (replacement parts)				
	Mackay	20 t capacity (Class 5)	25 t	5
Fuel				
	Rail	Nominal 6,000 t train	19,000 kL	4
General Consumables				
	Gladstone	20 t capacity	425 t	85
	Mackay	(Class 5)	425 t	85
Underground Mining Consumables				
	Gladstone	20 t capacity	144 t	29
	Mackay	(Class 5)	144 t	29
Offsite waste/recycling disposal				
	Site (to Emerald)	20 t capacity (Class 5)	5,368 t	537
Oil, Solvents and Water Treatment Chemicals				
	Rail	Nominal 6,000 t train	644 kL	1
CPP Consumables				
	Mackay	20 t capacity (Class 5)	101 t	6
	Rail	Nominal 6,000 t train	4,750 t	1
Explosives				
	Mackay	20 t capacity (Class 5)	460 t	23
	Rail	Nominal 6,000 t train	4,600	1
Heavy Vehicle Tyres				
	Gladstone	B-double & Over Dimensional (Class 10)	189 tyres	48
	Mackay		189 tyres	48
			TRIP TOTALS	980
			Brisbane	8
			Gladstone	197
			Mackay	231
			Emerald	537
			Rail	7

Table 23 - Operation Traffic Estimate - Stage 3 (2027-49) - (excluding personnel movements)

Material Type	Origin	Vehicle Type	Estimated Quantity per year	Number of trips per year
Mining Equipment				
	Brisbane	B-double & Over	-	1
	Gladstone	Dimensional	-	2
	Mackay	(Class 10)	-	2
Materials Handling System (replacement parts)				
	Mackay	20 t capacity (Class 5)	25 t	5
Fuel				
	Rail	Nominal 6,000 t train	20,000 kL	4
General Consumables				
	Gladstone	20 t capacity	425 t	85
	Mackay	(Class 5)	425 t	85
Underground Mining Consumables				
	Gladstone	20 t capacity	240 t	48
	Mackay	(Class 5)	240 t	48
Offsite waste/recycling disposal				
	Site (to Emerald)	20 t capacity (Class 5)	5,650 t	565
Oil, Solvents and Water Treatment Chemicals				
	Rail	Nominal 6,000 t train	716 kL	1
CPP Consumables				
	Mackay	20 t capacity (Class 5)	101 t	6
	Rail	Nominal 6,000 t train	4,750 t	1
Explosives				
	Mackay	20 t capacity (Class 5)	460 t	23
	Rail	Nominal 6,000 t train	4,600	1
Heavy Vehicle Tyres				
	Gladstone	B-double & Over	199 tyres	50
	Mackay	Dimensional (Class 10)	199 tyres	50
TRIP TOTALS				977
Brisbane				1
Gladstone				185
Mackay				219
Emerald				565
Rail				7



9.2.4.3.3 Personnel traffic

The personnel requirements, accommodation plans and transport modes for both construction and operational personnel have been detailed previously in Section 9.2.2.5. Table 24 combines the data from Section 9.2.2.5 and presents a summary of the predicted number of personnel trips for each mode across each stage of the Project. The predicted number of trips accounts for the use of buses and shared occupancy of cars (average of 1.2 persons per car).

Table 24 - Summary of Personnel Trips per year

Stage	FIFO (via Emerald) Bus from Emerald to Alpha	DIDO (regional) Emerald to Site	FIFO (via Alpha) Bus to Site	DIDO (local) Alpha to Site	Total Trips (One way)	AADT (both directions)
Epsilon Mine Construction (2015-16)	40	663		2080	2783	16
Epsilon Mine Operation (2017-19)	243	220		2080	2543	14
Stage 1, Full production OC Construction (2018-19)	470				470	3
Stage 1, Full production OC Operation (2020-2022)		820	313	2080	3213	18
Stage 2, First Longwall Construction (2021-2022)			352		352	2
Stage 2, First Longwall Operation (2023-26)		1320	541	2080	3941	22
Stage 3, Second Longwall Construction (2025-26)			79		79	1
Stage 3, Second Longwall Operation (2027-49)		1570	753	2080	4403	25
Visitor / Sub contractors (Epsilon)	52	468			520	3
Visitor / Subcontractors (Stages 2 onwards)		884	52		936	5

9.2.4.3.4 Traffic distribution (combined traffic levels over mine life)

The construction and operational traffic volumes presented in the previous set of tables form the basis of the data presented below. Figure 10 provides a summary of the predicted traffic (two way volumes) over the project life while Table 25 provides a detailed breakdown of the project traffic along the affected road links.

Note: Table 25 presents the figures for four key project years:

- Year 2015 – this is the first construction year for the mine
- Year 2021 – this is the peak predicted project traffic
- Year 2025 – this is the 10yr horizon year
- Year 2035 – this year represents project traffic at full production

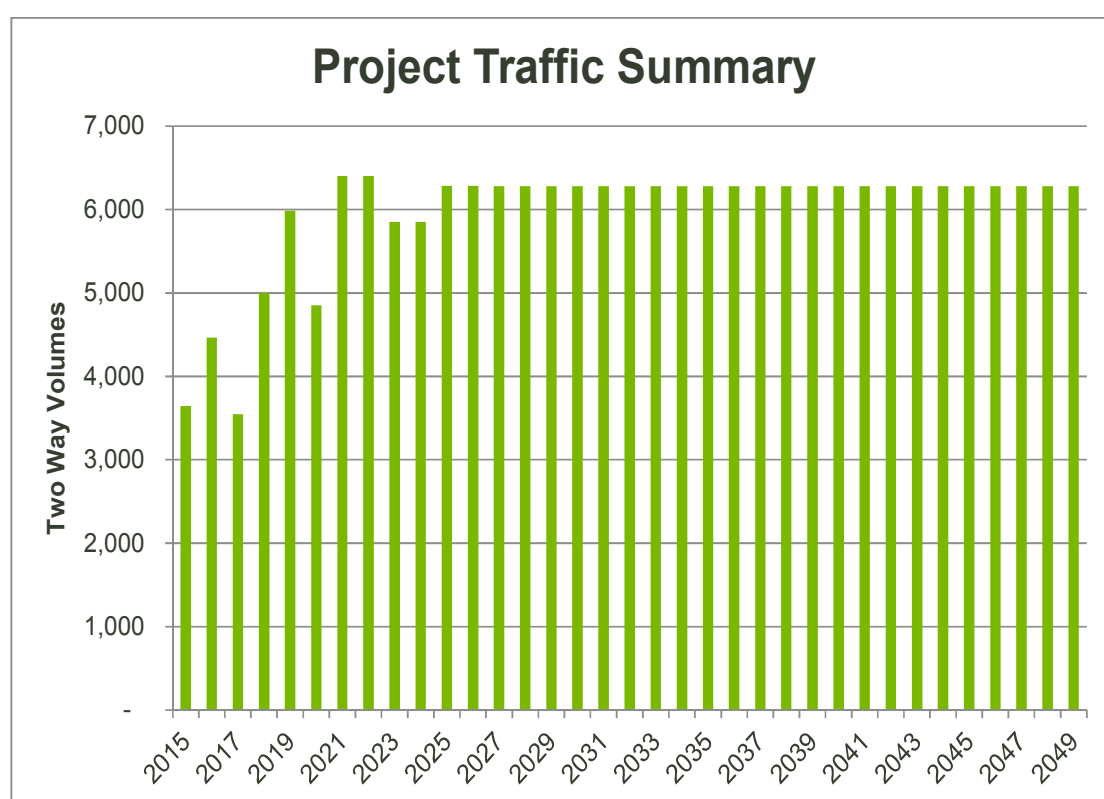


Figure 10 - Predicted Traffic Generation

Table 25 - Project Generated Traffic (Two Way AADT)

Road	Road Link ID	2015 Total Estimated Traffic (Light + Heavy Vehicle)	2021 Total Estimated Traffic (Light + Heavy Vehicle)	2025 Total Estimated Traffic (Light + Heavy Vehicle)	2035 Total Estimated Traffic (Light + Heavy Vehicle)
Capricorn Highway					
Rockhampton to Duarina	16A	2.9	4.2	2.0	1.0
Duarina to Emerald	16B	2.9	4.2	2.0	1.0
Emerald to Alpha	16C	8.9	20.6	20.0	19.1
Alpha to Site	16D	20.7	36.4	35.6	35.4
Peak Downs Highway					
Nebo to Mackay	33B	1.8	4.2	2.5	1.3
Clermont to Nebo	33A	1.8	4.2	2.5	1.3
Gregory Highway					
Clermont to Belyando Crossing	27C	1.8	4.2	2.5	1.3
Emerald to Clermont	27B	1.8	4.2	2.5	1.3
Springsure to Emerald	27A	1.8	0.5	0.2	0.1
Dawson Highway					
Rolleston to Springsure	46D	0.5	0.5	0.2	0.1
Carnarvon Highway					
Injune to Rolleston	24E	0.5	0.5	0.2	0.1
Roma to Injune	24D	0.5	0.5	0.2	0.1
Warrego Highway					
Miles to Roma	18D	0.5	0.5	0.2	0.1
Dalby to Miles	18C	0.5	0.5	0.2	0.1
Toowoomba to Dalby	18B	0.5	0.5	0.2	0.1
Ipswich to Toowoomba	18A	0.5	0.5	0.2	0.1
Bruce Highway					
Brisbane to Gympie	10A	0.5	0.5	0.2	0.1
Gympie to Maryborough	10B	0.5	0.5	0.2	0.1
Maryborough to Gin Gin	10C	0.5	0.5	0.2	0.1
Gin Gin to Benaraby	10D	0.5	0.5	0.2	0.1
Benaraby to Rockhampton	10E	2.9	4.2	2.0	1.2

9.2.4.3.5 Traffic volumes with development

The forecasted traffic without development outlined in Table 8 has been added to the generated traffic illustrated in Table 25 above. This has been completed to understand the development roads impacts on the SCRs. The following table outlines the predicted change in AADT on the existing road network with the development.

Table 26 - Future year traffic volumes including development generated data

Road	Road Link ID	2015 Total Estimated Traffic	2015 % Change	2021 Total Estimated Traffic	2021 % Change	2025 Total Estimated Traffic	2025 % Change
Capricorn Highway							
Rockhampton to Duaringa	16A	4,138	0.1%	4,938	0.1%	5,559	0.1%
Duaringa to Emerald	16B	2,839	0.1%	3,386	0.1%	3,813	0.1%
Emerald to Alpha	16C	483	1.9%	565	3.6%	656	3.1%
Alpha to Site	16D	452	4.8%	515	7.1%	615	6.1%
Peak Downs Highway							
Nebo to Mackay	33B	5,365	0.1%	6,403	0.1%	7,210	0.1%
Clermont to Nebo	33A	796	0.2%	948	0.4%	1,070	0.2%
Gregory Highway							
Clermont to Belyando Crossing	27C	2,352	0.1%	2,806	0.1%	3,161	0.1%
Emerald to Clermont	27B	1,306	0.2%	1,557	0.3%	1,755	0.1%
Springsure to Emerald	27A	1,347	0.1%	1,607	0.1%	1,808	0.1%
Dawson Highway							
Rolleston to Springsure	46D	783	0.1%	933	0.1%	1,051	0.1%
Carnarvon Highway							
Injune to Rolleston	24E	455	0.1%	542	0.1%	610	0.1%
Roma to Injune	24D	983	0.1%	1,172	0.0%	1,319	0.1%
Warrego Highway							
Miles to Roma	18D	1,879	0.1%	2,242	0.1%	2,523	0.1%
Dalby to Miles	18C	3,165	0.1%	3,778	0.1%	4,252	0.1%
Toowoomba to Dalby	18B	6,606	0.1%	7,887	0.1%	8,876	0.1%
Ipswich to Toowoomba	18A	15,667	0.1%	18,706	0.1%	21,053	0.1%
Bruce Highway							
Brisbane to Gympie	10A	15,410	0.1%	18,400	0.1%	20,708	0.1%
Gympie to Maryborough	10B	8,659	0.1%	10,339	0.1%	11,636	0.1%
Maryborough to Gin Gin	10C	3,767	0.1%	4,498	0.1%	5,061	0.1%
Gin Gin to Benaraby	10D	4,021	0.1%	4,800	0.1%	5,402	0.1%
Benaraby to Rockhampton	10E	4,070	0.1%	4,860	0.1%	5,467	0.1%

Figure 11 illustrates the data in Table 26 and is provided to help visualize the traffic flow in the year of peak project generated traffic (yr 2021).

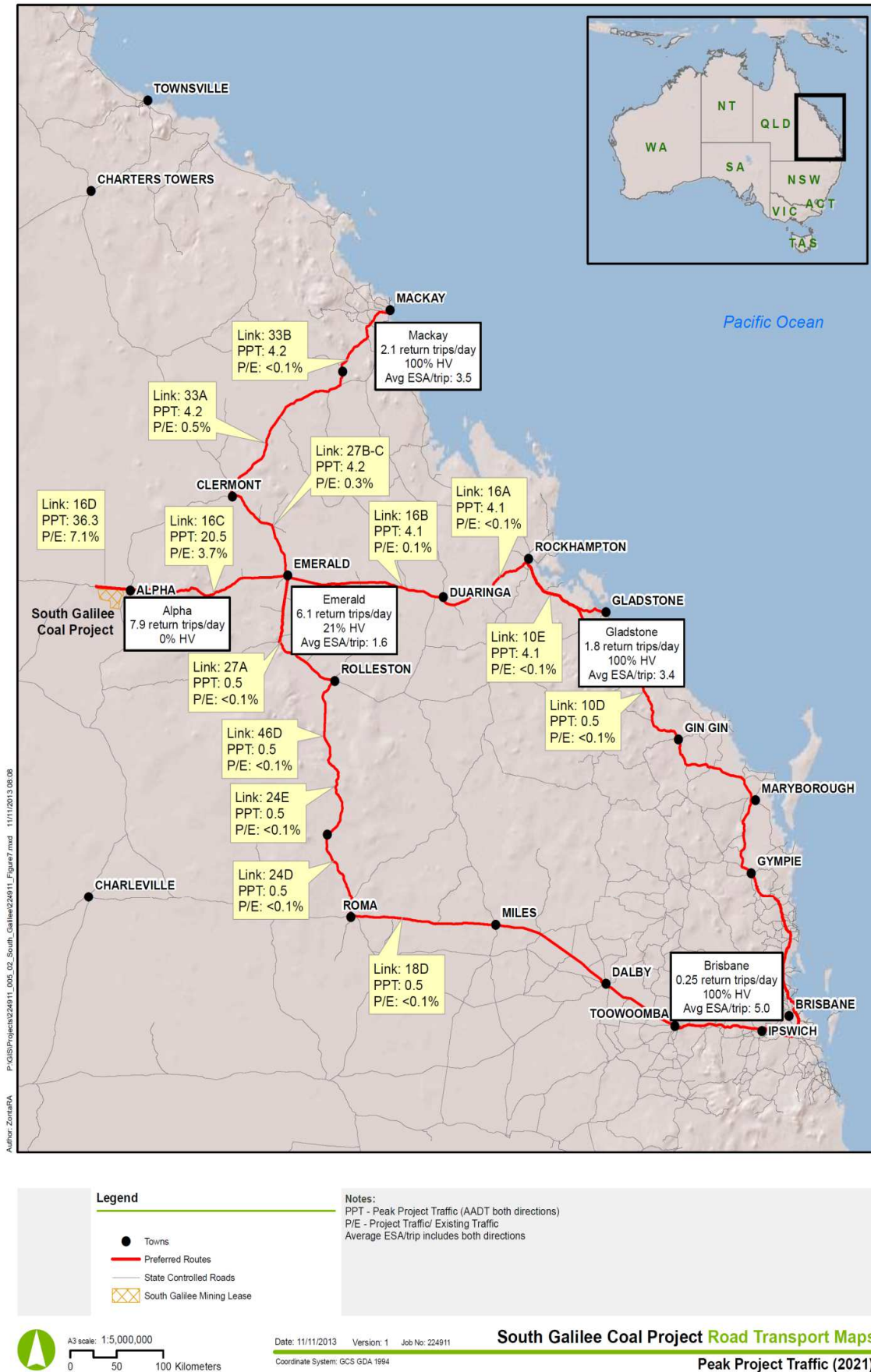


Figure 11 - Peak Project Traffic (yr 2021)

9.2.4.4 Significant impact status

9.2.4.4.1 Performance Criteria

The impacts of the mine generation traffic on the existing road links, intersections and pavements has been further assessed based on GARID. This guideline states that a proposed development's road impacts are considered insignificant if the development generates an increase in traffic on SCR's of no more than 5% of existing levels (measured in AADT or ESA's).

Table 26 indicates that two links are expected to have a significant impact (based on ESA's). These links are both along the Capricorn Highway between Emerald and the site (16C and 16D). Therefore, further analysis as per GARID is completed for these significantly affected links only, as all other links are below the 5% trigger and as such their impacts are considered insignificant.

The current modelling shows that the worst-case traffic change is expected to be in the year 2021.

The assessment of the road links including the existing and proposed intersection is discussed in sections 9.2.5 and 0 below.

9.2.5 Pavement impact assessment

9.2.5.1 Existing pavement loads

The existing pavement load based on the traffic volume data provided by DTMR for State Controlled Roads (SCR) is summarised in Equivalent Standard Axles (ESA's) below in Table 27.

The ESA's/Day are calculated using Details of WIM site data from Guide to Pavement Technology Part 2: Pavement Structural Design 2012 and Appendix C of GARID. ESA/CV ratio is adopted from the WIM data on pages 202 to 205.

Table 27 - Existing Pavement Loads

Road	Road Link ID	ESA/CV ratio	ESA's/Day	ESA's/Year 2012	Design Traffic N(DT) 20 years
Capricorn Highway					
Rockhampton to Duaringa	16A	2.07791	826	301,490	14,633,022
Duaringa to Emerald	16B	2.07791	540	197,100	9,566,382
Emerald to Alpha	16C	1.70819	97	35,405	1,718,406
Alpha to Site	16D	1.70819	78	28,470	1,381,811
Peak Downs Highway					
Nebo to Mackay	33B	1.70819	713	260,245	12,631,168
Clermont to Nebo	33A	1.70819	174	63,510	3,082,501
Gregory Highway					
Clermont to Belyando Crossing	27C	1.70819	386	140,890	6,838,192
Emerald to Clermont	27B	1.70819	265	96,725	4,694,614
Springsure to Emerald	27A	1.70819	284	103,660	5,031,208
Dawson Highway					



Road	Road Link ID	ESA/CV ratio	ESA's/Day	ESA's/Year 2012	Design Traffic N(DT) 20 years
Rolleston to Springsure	46D	1.70819	178	64,970	3,153,363
Carnarvon Highway					
Injune to Rolleston	24E	1.70819	117	42,705	2,072,716
Roma to Injune	24D	1.70819	269	98,185	4,765,476
Warrego Highway					
Miles to Roma	18D	3.19012	932	340,180	16,510,867
Dalby to Miles	18C	3.19012	1,293	471,945	22,906,171
Toowoomba to Dalby	18B	5.9096	4,644	1,695,060	82,270,888
Ipswich to Toowoomba	18A	3.131	4,040	1,474,600	71,570,712
Bruce Highway					
Brisbane to Gympie	10A	2.34587	2,151	785,115	38,106,090
Gympie to Maryborough	10B	2.34587	1,766	644,590	31,285,613
Maryborough to Gin Gin	10C	2.34587	1,173	428,145	20,780,308
Gin Gin to Benaraby	10D	2.34587	1,079	393,835	19,115,049
Benaraby to Rockhampton	10E	2.34587	1,441	525,965	25,528,068

9.2.5.2 Equivalent Standard Axles (ESA's) Generation

The ESA's conversion factors and vehicle class used in this report are outlined in Table 25 below:

Table 28 - ESA Conversion Factors

AUSTROADS Vehicle Classification	Delivery Use	ESA conversion factor	
		Unloaded Vehicle	Loaded Vehicle
Class 5 (20 Tonne Truck)	General Consumables, Waste, Mics Construction Materials.	0.50	4.40
Class 9 (Semi-trailer)	Materials handling System, Maintenance and Admin Facilities, Water, Sewer and Power Systems	0.51	4.93
Class 10 (B-double)	Mining Equipment, Supply Rail Materials	0.53	6.30
Average Loading		0.513	5.210

To calculate the ESA's for project generate traffic the following formula has been used:

Single Way ESA's per year =

$[AADT \text{ (two way)}] / 2 * [\% \text{ Heavy Vehicles}] * [355 \text{ days}] * [\text{Avg ESA's per trip} / 2]$

For example, from Figure 11 we have:

Link: 33B – Nebo to Mackay)

To calculate the ESA's for project generated traffic (listed below) the volumes and class of vehicle, as well as the vehicle payload (% of vehicle capacity) were considered and proportional factors were applied to the ESA conversion factors listed in Table 28 (which are for fully laden vehicles).

The ESA's generated by the project are outlined in Table 26 below. To compute the AADT, 355 days has been adopted as the days when works will be carried out, discounting other days to statutory holidays.

9.2.5.3 Pavement Loads with Development

The following table presents the predicted ESA's due to Project traffic for the four key years.

- Year 2015 – this is the first construction year for the mine
- Year 2021 – this is the peak predicted project traffic
- Year 2025 – this is the 10yr horizon year
- Year 2035 – this year represents project traffic at full production

Table 29 - ESA's Generated by Project

Road	Road Link ID	ESA's/Year 2015	ESA's/Year 2021	ESA's/Year 2025	ESA's/Year 2035
Capricorn Highway					
Rockhampton to Duaringa	16A	838	1,284	888	243
Duaringa to Emerald	16B	838	1,284	888	243
Emerald to Alpha	16C	1,315	2,917	2,536	1,320
Alpha to Site	16D	1,315	3,383	2,973	1,844
Peak Downs Highway					
Nebo to Mackay	33B	364	1,259	923	314
Clermont to Nebo	33A	364	1,259	923	314
Gregory Highway					
Clermont to Belyando Crossing	27C	364	1,259	923	314
Emerald to Clermont	27B	364	1,259	923	314
Springsure to Emerald	27A	158	184	124	5
Dawson Highway					
Rolleston to Springsure	46D	158	184	124	5

Road	Road Link ID	ESA's/Year 2015	ESA's/Year 2021	ESA's/Year 2025	ESA's/Year 2035
Carnarvon Highway					
Injune to Rolleston	24E	158	184	124	5
Roma to Injune	24D	158	184	124	5
Warrego Highway					
Miles to Roma	18D	158	184	124	5
Dalby to Miles	18C	158	184	124	5
Toowoomba to Dalby	18B	158	184	124	5
Ipswich to Toowoomba	18A	158	184	124	5
Bruce Highway					
Brisbane to Gympie	10A	158	1,136	124	5
Gympie to Maryborough	10B	158	1,136	124	5
Maryborough to Gin Gin	10C	158	1,136	124	5
Gin Gin to Benaraby	10D	158	1,136	124	5
Benaraby to Rockhampton	10E	838	3,408	888	243

9.2.5.4 Maintenance contribution

GARID outlines the developer payable maintenance contribution assessment when an increase in ESA's from a development exceeds 5% for any road section at each design year. This is an additional cost incurred on DTMR to existing planned operation maintenance annual costs.

The 5% trigger outlined above should be used with discretion as low volume roads may misleadingly conclude large impacts from small increases in heavy vehicle traffic movements. In these situations, consideration needs to be given to the design standard of the utilised road section, and any maintenance contribution need to be discussed on case by case basis between the developer and DTMR.

The completed impact assessment indicates that an increase in ESA loadings of more than 5% occurs for the road sections outlined in Table 27 below:

Table 30 - ESA Loading Increases

Road	Road Link ID	% increase in ESA's			
		2015	2021	2025	2035
Capricorn Highway					
Emerald to Alpha	16C	3.4%	6.3%	4.9%	1.9%
Alpha to Site	16D	4.2%	9.1%	7.1%	3.3%

No regional council roads are expected to be impacted by the proposed development. The two road sections identified above in Table 30, show an increase in ESA loadings of more than 5% in at least one year.

In the next phase, the proponent will discuss with DTMR, seeking their guidance to understand their contribution requirements to maintain the existing SCR's road user safety, operation and functional requirement.

9.2.6 Traffic operation assessment

9.2.6.1 Highway capacity performance indicators

Highway capacity is based on Level of Service (LOS). The desirable level of service for a two lane rural road is 'C', with a maximum flow of 1,190 vehicles per hour per lane in the peak period in both directions. This is equal to approximately 7,940 vehicles per day (vpd) per lane for a 24-hour period in each direction.

Using the AustRoads "Guide to Traffic Management Part 3: Traffic Studies and Analysis" which provides details of the expected safe traffic flows along different road environments, the practical capacity for any road is based on the road width, posted speed, traffic flow, the road geometry and the vehicle composition using the road. The ideal capacity of any traffic lane is around 1,800 vehicles per hour or in other words 3600 vehicles per hour for a two-lane road. Adjustment factors are then applied to this ideal capacity to determine the practical capacity of a road. In the case of Capricorn Highway, the road geometry with sealed shoulders and its relatively generous lane widths, with provisions of the access directly off the highway is the key element that is anticipated to affect the capacity of the road. The practical capacity of Capricorn Highway has been assessed to be around 1,190 vehicles per hour per lane using the Austroads guideline.

The following describes the LOS criteria used for assessment in this report:

Level of Service Criteria (LOS) - Austroads Description

Link (vehicles per hour) –Intersection

Table 31 - LOS Criteria for Two Lane Rural Highways

LOS	Service Flow Rate (2-way)		Description
	Pcu*/hour	Pcu/day**	
LOS (A)	490	3,270	Free flow in which drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high and the general level of comfort and convenience is excellent.
LOS (B)	780	5,200	Stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is less than LOS A.

LOS	Service Flow Rate (2-way)		Description
LOS (C)	1,190	7,940	Stable flow but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience has declined noticeably.
LOS (D)	1,830	12,200	Approaching unstable flow where all drivers are severely restricted in their freedom to select desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor and small increases in traffic flow will cause operational problems.
LOS (E)	3,200	21,340	Traffic volumes are at or close to capacity and there is virtually no freedom to select desired speed and to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdowns in operation.
LOS (F)	>3,200	>21,340	Forced flow. The amount of traffic approaching a point exceeds that which can pass it. Flow break-downs occur, and queuing and delays occur. In excess of 900-1700 depending on link type, 50 second average delay for each vehicle

Source: Adapted from Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis

*pcu = passenger car units or equivalents

**assumes the peak hour represents 15% of daily traffic as referenced in GARID

As per GARID, in rural areas, a LOS between A to C are desired, and LOS C is considered the minimum standard. However, a LOS of D is still considered an acceptable performance outcome during peak periods on recreational routes.

9.2.7.2 Intersection performance indicators

For T-intersections with relatively low vehicular turning volumes, both 'with' and 'without' development generated traffic, an analysis of the capacity of the intersection is considered unnecessary. Similarly, if an intersection carries through and cross traffic volumes as outlined in Table 32 below, the impact on the intersection is considered insignificant, and relatively high levels of service are expected to be maintained.

Table 32 - Intersection volumes below which capacity analysis is unnecessary

Major Road Types	Major Road Flow (vph)	Minor Road Flow (vph)
Two Lane	400	250
	500	200
	650	100

Major Road Types	Major Road Flow (vph)	Minor Road Flow (vph)
Four Lane	1000	100
	1500	50
	2000	25

Source: Adapted from DTMR Chapter 13 Intersections at Grade Table 13.4

9.2.7.3 Link analysis

9.2.7.3.1 Capricorn Highway - current LOS without the development

As outlined in section 9.2.6.1 above, the road links between Emerald and the Site indicates an increase in daily traffic of more than 5% in at least one assessment year. All the other assessed roads across the assessment years are expected to experience insignificant impact as per GARID. Therefore, only the road sections on the Capricorn Highway between Alpha to the Mine Site and Emerald to Alpha has been further assessed and is detailed below:

Emerald to Alpha

As indicated in Table 8 above, a maximum flow of 65 vehicles per hour per lane (vph/l) in the peak period in two directions was present in 2012. This value of 65 vph has been derived using the recent directional count traffic volumes received from DTMR, assuming 15% of AADT equates to peak hour traffic flow (shown not to be a critical assumption below). This traffic count data has been used to estimate the future peak hour traffic volume, using a 3% compound growth (as determined in previous correspondence with DTMR regarding growth rates for their rural based State Controlled Roads), on Capricorn Highway near the development.

Based on the above assumptions, in year 2021 it is estimated that there will be 85 vph on Capricorn Highway, without the development. This value of 85 vph is well below the accepted LOS C value of 1,190 vehicles as discussed above, indicating that there is spare capacity within the road network to absorb any increase in traffic in this area from the development. It should also be noted that the LOS C value of 1,190 vehicles per hour is well above the daily traffic volumes for this segment. For this reason the assumed value for peak hour flow (of 15% of daily AADT) is not critical in this analysis.

Alpha to the Mine Site

Similarly, a maximum flow of 60 vehicles per hour per lane (vph/l) in the peak period in two directions was present in 2012 for this road link. This value of 60 vph has been derived using the recent directional count traffic volumes received from DTMR, assuming 15% of AADT equates to peak hour traffic flow (shown not to be a critical assumption below). This traffic count data has been used to estimate the future peak hour traffic volume, using a 3% compound growth, on Capricorn Highway near the development.

Based on the above assumptions, in year 2021 it is estimated that there will be 78 vph on Capricorn Highway, without the development. This value of 78 vph is well below the accepted LOS C value of 1,190 vehicles as discussed above, indicating that there is spare capacity within the road network to absorb any increase in traffic in this area from the development. It should also be noted that the LOS C value of 1,190 vehicles per hour is well above the daily traffic volumes for this segment. For this reason the assumed value for peak hour flow (of 15% of daily AADT) is not critical in this analysis.

9.2.7.3.2 Capricorn Highway - LOS with the development

Similarly, future year traffic impact on Capricorn Highway 'with the development' has been completed. Assuming 100% of the total peak hour generated traffic from the development is travelling in same direction as that of the peak hour traffic flow on Capricorn Highway, then this equates to 69 vph per

lane (vph/l) in 2015, 84 vph/l in 2021 and 93 vph/l in 2025 respectively between Alpha to the Mine Site. The peak hour traffic flow with the development for the above two road sections (Alpha to Mine Site and Emerald to Alpha) are outlined in Table 33 below.

Table 33 - Traffic Volumes on Capricorn Highway with and without the development

Road	Road Link ID	Movement Description	Future Year Volumes without Development				Future Year Volumes with Development			
			2015	2021	2025	2035	2015	2021	2025	2035
Capricorn Highway										
Emerald to Alpha	16C	Two Way Daily Volume (AADT)	474	565	636	855	488	591	660	879
Emerald to Alpha	16C	Peak hour Flow	71	85	96	129	74	89	99	132
Alpha to Site	16D	Two Way Daily Volume (AADT)	431	515	579	778	457	557	619	820
Alpha to Site	16D	Peak hour Flow	65	78	87	117	69	84	93	123

As outlined in Table 33 above, these peak hour traffic volumes are lower than the outlined capacity of Capricorn Highway (1,190 vph per lane) under a “worst case” scenario, indicating a LOS of A. Therefore it is considered that the traffic generation from the development is easily contained within the available capacity on Capricorn Highway. Also note the total daily traffic volume for this link is still below the outlined capacity of the Capricorn Highway on an hourly basis (1,190 vph) as so the assumption of 15% of daily traffic equals the hourly peak is not critical.

9.2.7.4 Intersection analysis

9.2.7.4.1 Capricorn Highway / Clermont-Alpha Road/ Shakespeare Street intersection

This existing intersection is located some 13 km to the east of the proposed mine site access road. It is assumed that all traffic generated from the development will access the new mine site via Alpha through this give way controlled intersection. This intersection configuration is outlined in Figure 12 below:

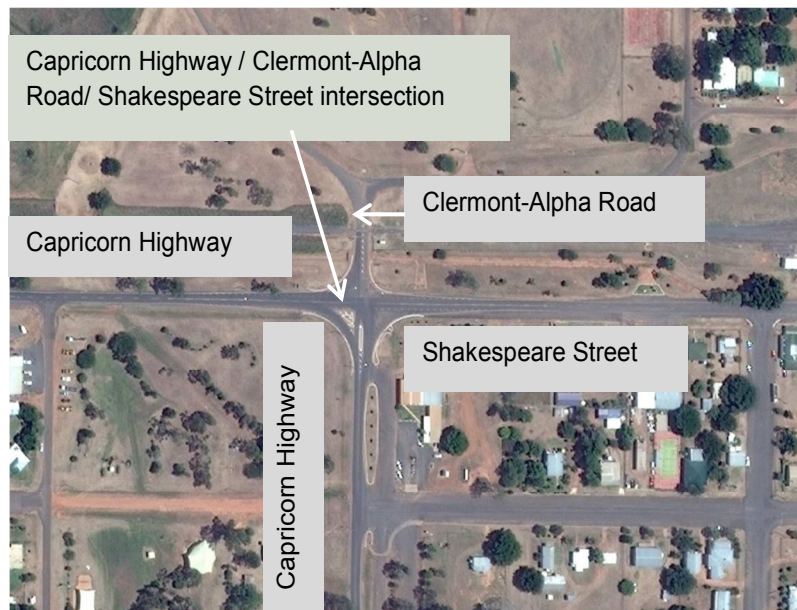


Figure 12 - Intersection Configuration

As indicated in the development is expected to increase traffic for turning movements on the Capricorn Highway leg (south and west approaches) by more than 5%.

It is noted that there is a 5% increase in traffic at the intersection however based on Figure 6 above the existing turning movements at this intersection are very low, and it is expected to have adequate spare capacity to absorb any increase in traffic from the proposed mine, without diminishing the operation and functional requirement of the intersection. Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis details warrants for identifying priority controlled intersections that operate under uninterrupted flow. Based on the warrants provided in Table 32, the Capricorn Highway/Clermont-Alpha Road/Shakespeare Street is considered to operate under uninterrupted flow conditions for all future years, up to and including the ten year design horizon in 2035.

9.2.7.4.2 SIDRA model

A SIDRA analysis has also been completed to demonstrate the high levels of service achieved at the intersection in future years with the proposed mine. The table below outlines the LOS at each leg of the intersection.

Table 34 - LOS at the intersection of Capricorn Highway / Clermont-Alpha Road/ Shakespeare Street

Road	Intersection Leg	Future Year LOS without Development (SIDRA)								Future Year LOS with Development (SIDRA)							
Alpha to Site		2015		2021		2025		2035		2015		2021		2025		2035	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
	Capricorn Hwy south	A	B	A	B	A	B	A	B	B	B	B	B	B	B	B	B
	Shakespeare Street	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	Clermont-Alpha Road	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	Capricorn Hwy west	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

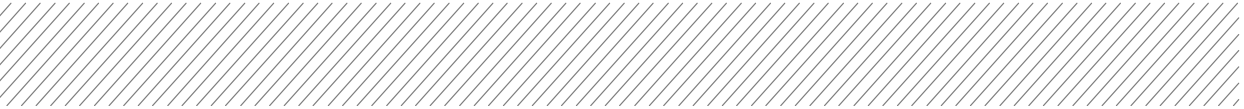
The SIDRA intersection software has been used for the evaluation of this intersection, by providing an estimate of intersection capacity and performance statistics, in isolation. SIDRA intersection software is endorsed by the Austroads Guide to Traffic Engineering Practice.

For the proposed site, a traffic model was developed in SIDRA version 6. The model is constructed based on the layout for the intersections outlined in Figure 12 above. The geometric dimension of the scheme has been assumed for use in SIDRA and is expected to reflect the likely dimensions as per DTMR standards. As noted there are no major intersections within close proximity of the development site.

The traffic count data is as per the SIDRA report attached in Appendix C.

9.2.7.4.3 Proposed intersection - Capricorn Highway / New Site Access Road

The T-intersection is proposed as the primary vehicular access to the mine site and is expected to be installed without turning restrictions. All the existing unformed access-ways to the site are proposed to be redundant as the land considered for development access is to be managed via this new intersection. Standard dimensions of the traffic lanes and the proposed median will be adopted in full compliance with the DTMR standards for the operation of this priority junction.



The intersection will be arranged so as to provide the necessary turning radii for the mine delivery vehicles. In this regard, a minimum turn radius of 15 m in accordance with good road design practice will be developed in consultation with DTMR and will provide for the swept path of the design vehicles turning out of the access road intersection towards the east-west, as well as for any vehicle turning into the development from Capricorn Highway.

It is anticipated that this intersection will not impact on the functional integrity of the Capricorn Highway and will promote the safe and efficient movement of people and goods. The proponent will liaise with DTMR to develop a suitable intersection configuration for site access off the Capricorn Highway. As previously identified, visibility from the development onto the Capricorn Highway is good in all directions from this location. The requirements for sight distances are expected to be as per the defined AUSTROADS standards.

The following traffic patterns are assumed for traffic exiting and entering the site:

- Eastbound traffic to Alpha or beyond (exiting site access road): the road users will be completing a right turn manoeuvre out of the site road to access Capricorn Highway and proceed towards Alpha. The proposed permitted right turn out at this location will be provided with the adequate sight lines and this will aid this manoeuvre to proceed safely and efficiently.
- Westbound traffic to Jericho or beyond: there are not anticipated to be many turning movements, the road users will be completing a left turn manoeuvre to access Capricorn Highway and proceed towards Jericho.
- Westbound traffic to the development is assumed to enter the site at this location generally via a left turn auxiliary lane.

The turning movements at this intersection are anticipated to be low, and it is expected to have adequate spare capacity to absorb any increase in traffic from the proposed mine, without diminishing the operation and functional requirement of the intersection. Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis details warrants for identifying priority controlled intersections that operate under uninterrupted flow. Based on the warrants provided in Table 32, the proposed mine access road intersection with Capricorn Highway is expected to operate under uninterrupted flow conditions for future years, up to and including the design horizon of 2035.

Hence, it is expected that Capricorn Highway in its current design standard and with implementation of a DTMR standard intersection access at this location will be able to meet the capacity requirement without any adverse effects on the surrounding network.

9.2.8 Other considerations

9.2.8.1 Cumulative impacts

The Galilee Basin has the potential to become a significant coal mining, processing and export base with a number of proposed mines (listed below) currently in the planning stages. While each of these projects will add tremendous value to the Queensland economy, they will also increase traffic on select road links which may lead to increased maintenance requirements.

While this report specifically addresses the individual impacts of the South Galilee Coal Project the following table (Table 36) attempts to provide an idea of the cumulative impacts for the region. It should be noted that these figures are indicative only and that DTMR have begun developing an in-house database of planned traffic movements for new developments. It is the intention of the proponent to forward details of the planned Project traffic movements to DTMR during the execution planning phase to aid in the detailed assessment of cumulative impacts for the region.

Table 35 - Current Planned Galilee Basin Projects

Planned Project	Description
South Galilee Coal Project	15 Mtpa Combined Open Cut and Underground Mine
Alpha Coal Project	30 Mtpa Open Cut Coal Mine
Kevin's Corner Mine	30 Mtpa Combined Open Cut and Underground Mine
China First Coal Project	40 Mtpa Combined Open Cut and Underground Mine

Table 36 - Estimated Impact per Project

Project	Export Tonnage	Total Trips during Construction	Total Trips during Operations (per year)
South Galilee Coal Project	15 Mtpa (13%)	8,600 (10%)	5,700 (12%)
Alpha Coal Project	30 Mtpa (26%)	28,500 (34%)	11,200 (23%)
Kevin's Corner Mine	30 Mtpa (26%)	28,500* (34%)	11,200* (23%)
China First Coal Project	40 Mtpa (35%)	18,600 (22%)	20,800 (43%)
TOTAL	115 Mtpa	84,500	48,900

* Figures for Kevin's Corner Mine have been estimated based on Alpha Coal Project figures.

Based on the figures in Table 36 above, it can be seen that the South Galilee Coal Project's impacts are in the order of 10-15% of the total impacts due to the planned developments listed below.

While it was found earlier in this report that only a small portion of the used roads would incur a significant impact it is clear that when considering other projects, a number of additional roads may fall into the category of 'significant' impact.

To analyse and address these impacts, further details (project timelines, more detailed transport figures etc) from each of the proponents are required. It is the intention of the proponent to coordinate with DTMR during the execution phase to further this analysis.

9.2.8.1.1 Airport impacts

As a result of the requirements for FIFO workers of the Project, the numbers of air movements generated each week at the Alpha Aerodrome are shown in Table 37. These air movements are based on an aircraft capacity 75 persons for Epsilon (ATR-72 or similar) and of 115 persons for subsequent stages (Boeing 717 or similar), which would require an upgrade of the Alpha Aerodrome.

The peak number of employees (~1,300) is matched to the capacity of the on-site accommodation village. For details on the number of employees for each stage see Table 4 and Table 5 found in earlier sections of this report.

A list of predicted air movements across the project life is detailed in Table 37 below.

The low volume of air movements generated by the project is not expected to result in adverse impacts at the Alpha Aerodrome. The EIS for both the Alpha Coal Project and Galilee Coal Project did not provide information on the number of air movements expected to be generated by the developments.

Notwithstanding, a summary of the estimated cumulative air movements from the other significant projects in the region are presented in Table 38 below.

Table 37 - Project Generated Air Movements

FIFO Air Movements Generated per Week	Epsilon Construction (2015-16)	Epsilon Operation (2017)	Epsilon Operation + Stage 1 Construction (2018-19)	Stage 1 Operation (2020)	Stage 1 Operation + Stage 2 Construction (2021-22)	Stage 2 Operation (2023-24)	Stage 2 Operation + Stage 3 Construction (2025-26)	Stage 3 Operations (2027-49)
Northern Queensland	1	1	3	1	2	1	2	3
Central Queensland	1	2	3	2	2	2	2	3
South East Queensland	1	2	12	5	10	5	6	7
TOTAL	3	5	18	8	16	8	10	13

Table 38 - Cumulative Air Movement Generation per week of the Significant Projects in the Galilee Basin

FIFO Air Movements Generated per Week	Alpha Coal Project		Galilee Coal Project		Kevin Corner	
	Construction Phase	Operation Phase	Construction Phase	Operation Phase	Construction Phase	Operation Phase
Northern Queensland	5	3	7	5	7	5
Central Queensland	3	3	6	3	6	3
South East Queensland	11	6	14	11	14	11
TOTAL	19	12	27	19	27	19

The cumulative impact of the abovementioned projects would result in air movements between 3 (Epsilon only) to 91 (assuming overlapping construction periods) per week and 63 movements per week during peak operations of each project. This equates to approximately 13 and 9 air movements per day respectively. The upgraded airport is considered adequate to handle this volume of air movements.

9.2.8.2 Over size / over mass vehicles

Current estimate predict that up to 30 escorted trips (over dimensional + over mass) will be required in peak construction years.

It is envisaged that the majority of over dimensional vehicles will be originating in Mackay and will follow the preferred route from Mackay. Should the transport contractor or DTMR find this route unsuitable then an alternative route will be agreed upon with DTMR, the contractor and QLD police via the newly formed Heavy Vehicle Road Operations Program Office.

Similarly routes for over mass vehicles will be planned in consultation with DTMR and the National Heavy Vehicle Regulator (NHVR) and assessed for suitability in accordance with applicable regulations and permits.

9.2.8.3 Accessibility

9.2.8.3.1 Sight distances

Currently, the proposed location of the access way lies within a speed zone of 100 km/h. The 85%ile speed (operating speed) for this area is considered to be 100 kph. The operating speed is defined as the speed at which a driver can safely travel on a section of road under prevailing traffic conditions, and is specified as a speed at which 85% of the drivers travel. Using this speed and Austroads guidelines, this equates to a requirement of 210 m of safe intersection sight distance (SISD) for the existing traffic environment at this location. The SISD requirement stated above is to allow drivers of a vehicle on Capricorn Highway to observe a vehicle on the Mine Access Road, approaching the major road, to decelerate and stop prior to the conflict area.

The location of the proposed T-junction near the development off Capricorn Highway has good visibility and meets the DTMR requirements.

The existing Capricorn Highway geometry is expected to be retained. SISD and entering site distance (ESD) to facilitate vehicular movements as per DTMR and Austroads requirements will be provided in consultation with DTMR.

9.2.8.3.2 Access separation

The access separation from intersections and other access requirements for the development will be as per the DTMR requirements.

9.2.8.3.3 Proposed access

The location of the proposed development is close to the rural fringe of Alpha with limited local road connection, except onto Capricorn Highway. There is also minimal provision for public transport, walking and cycling facilities.

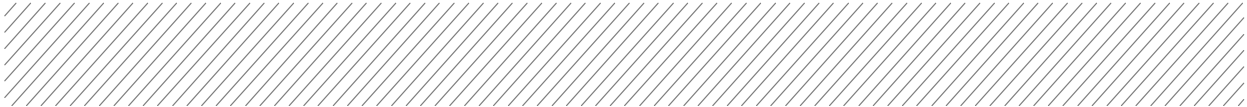
9.2.8.3.4 Vehicle access

There is a single point access (entry and exit) proposed for vehicular usage to the development directly onto Capricorn Highway via a T-intersection. It is proposed that an appropriate intersection configuration will be provided that will meet the DTMR requirements.

The proposed junction design which will afford vehicular access into the site from the east and the west, but which will not preclude direct traffic movements from Alpha to Barcaldine.

9.2.8.3.5 Rail access

The Central West railway track is located immediately North of the project site. It forms a key piece of infrastructure for the development in both the haulage of coal, freight and waste plus the possibility of being used for personnel transport. To ensure this functionality the Central West line will be upgraded and a spur line (approx. 5-10km) will be built to link the existing line to the site.



As it stands the Capricorn Highway runs between the Central West line and the development site and so the spur line must cross the Capricorn highway. The current design for the spur line maintains grade separation by taking the spur line under the existing Capricorn highway without modifying the existing highway alignment. The proponent will liaise with QR, DTMR, BRC and any other relevant agencies and authorities during subsequent stages of the design to ensure a suitable and sustainable design is achieved for this road/rail interface.

9.2.8.3.6 Deliveries and HCV tracking

The specific truck tracking detail at the access way and internal circulation are to be completed within the detail design stage. It is expected that the largest vehicle used for deliveries will typically be a B-Doubles. Loading bays are expected to be provided as per internal mine needs and requirements.

It is recognized that the proposed land use will generate a number of service trips. Delivery trucks maneuvering in the site to load and off-load goods are to be detailed during subsequent design phases. Swept path analysis for all delivery vehicles will be included with these design drawings.

9.2.8.3.7 Street lighting and security

This part of Capricorn Highway is in an essential rural environment. It has no street lighting along the route between Alpha and the site. It is understood that no street lighting improvements programme has been identified by DTMR, currently or into the foreseeable future. The proposed development is early in the phase, however for extended opening hours and security reasons lighting within the site will be confirmed in the detail design phase in consultation with DTMR and Regional Council Standards and requirement.

9.2.8.3.8 Parking (on-site)

Currently there is no on road/street parking available as this is farming land use, therefore no demand is recognised. Parking demand is expected to be sustained within the proposed development area. This development is likely to generate no further on street parking demand as all the anticipated parking requirements is expected to be provided on the site. Further parking reduction can also be realised through the utilisation of the chartered bus services, which will further reduce parking demand into the future.

9.2.8.3.9 Internal traffic circulation

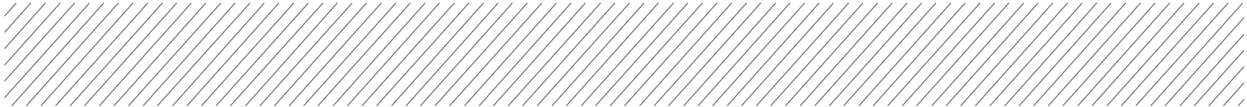
Access and circulation is the process involved when a person arrives at, enters, moves around and exits a venue or area. This definition has been used for the purpose of this project to define integration of vehicular movements at the proposed site.

It is expected that a continuous accessible direct path of travel will be provided that will be most commonly used. Tracking of vehicular movements within the site is discussed in section 9.2.8.3.6 above.

The access way that connects the mine site to the new intersection will have no vehicle parking spaces provided on either side of the road (ie No stopping Day or Night controls). Vehicles are expected to slow down while entering and exiting the site. The proposed development anticipates providing legalised parking spaces away from any direct influence to Capricorn Highway and away from roads leading into the development. This would not only provide more appropriate parking for the land use integration, but will also enhance internal traffic flows and improve the aesthetic values of the available land while also complying with good design principals.

9.2.8.4 Transport of hazardous / dangerous goods

Transportation of hazardous/ dangerous goods will be managed in accordance with the relevant legislation [Transport Operations (Road Use Management) Act 1995 and the Transport Operations (Road Use Management - Dangerous Goods) Regulation 2008]. Due care will be taken to minimise



interaction of these vehicles with peak periods and to avoid vulnerable areas such as school's where practicable.

9.2.9 Mitigation

The mitigation proposed in this section is expected to be funded by the Applicant as part of their fair and reasonable contribution to meet DTMR requirements and built a safe and sustainable transportation network. However, it should be noted that the following mitigation proposal is not a complete mitigation measure and will need further assessment in discussion with DTMR and the Barcaldine Regional Council once a definite development scenario is finalised. This report can be used to compare traffic distribution before and after the development, to predict traffic impact on the surrounding roads so that appropriate mitigation can be designed. Further assessment is dependent on the applicant being successful in achieving a Consent approval. The next phase of the development will include consultation with DTMR and any other key stakeholders.

The following are a list of mitigation factors and there relevance in order to reduce the impacts from this application for the proposed development upon the surrounding road network.

9.2.9.1 Proposed Tee-intersection design (Mine Access Road)

A T-intersection treatment is proposed near the development location. The lane configuration and permissible directional movements are discussed in section 7.5 above. The proponent will liaise with DTMR to develop a suitable intersection configuration for site access off the Capricorn highway and for the interaction of the new railway with the Capricorn highway.

This junction is expected to be used as the primary entrance to the site. Initially, however it is expected that this access will be used during construction by local trip vehicles and it is anticipated that the usage of this intersection will gradually be reduced over time and will eventually become an entrance for delivery and service vehicles.

9.2.9.2 Road signage and line marking

There will be an increase in traffic demand from the development and during the subsequent design phase's appropriate signage and lane marking will be provided for the development and for all users on Capricorn Highway.

Road signage and lane markings will aid the requirements for the proposed Mine Access Road intersection and further enhance guidance for turning maneuvers and the safety of internal circulation as well as at the proposed intersection. The intersection design layout will be provided for within the detail design stage in consultation with DTMR and any other key stakeholders.

9.2.9.3 Redundant driveways

It is proposed to reduce the number of existing unformed track accesses onto Capricorn Highway from the site which will be facilitate via the T-intersection. This will improve access and reduce any future multiple access problems, improving efficiency and traffic flow through this area.

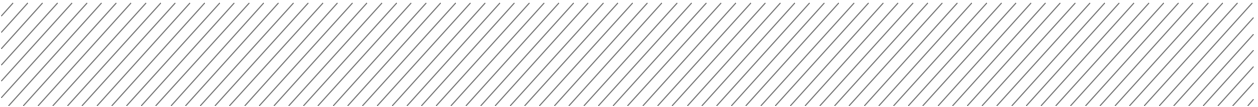
9.2.9.4 Accessway via Intersection control

There is a proposed accessway for the development and this is directly off Capricorn Highway.

The location of the proposed T-junction will be finalised following discussion with DTMR, as previously identified, and visibility on Capricorn Highway is adequate in both directions. The requirements for sight distances defined in AUSTRROADS will be provided.

9.2.9.5 Transport management plan

A Transport Management Plan will be developed and implemented for the Mine Development works prior to commencement of the project and in consultation with DTMR and any other key stakeholders.



The proponent will liaise with DTMR during future design phases to ensure the existing SCR's operation and functional requirements, including road user safety are preserved.

9.2.9.6 Link impact

Apart from the identified pavement impacts and mitigation works on Links 16C and 16D, and those identified in section 9.2.8 above, no further mitigation works is proposed in this report and is deemed not required.

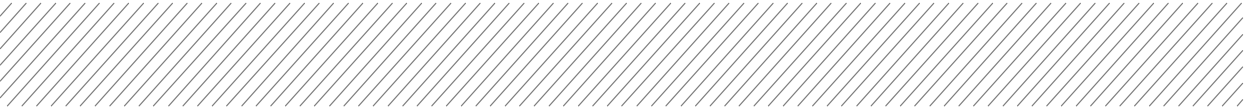
9.2.9.7 Pavement impacts

The proponent will work with DTMR to understand the maintenance and rehabilitation contributions required for those roads sections identified in section 9.2.5 above.

9.2.9.8 Road use management plan

A Road Use Management Plan (RUMP) will be developed in consultation with DTMR and other stakeholders and implemented for the Mine Development works prior to commencement of the project so as to manage or mitigate any potential hazards/impacts to the surrounding community. The Road Use Management Plan will include such items as:

- Safety planning
 - Fatigue Management Plans and Strategies
 - Management of vehicle interactions with public transport
 - Management plans for transportation of hazardous goods
- Route planning
 - Over dimensional and over mass routes and management strategies for these vehicles
 - Strategies to ensure preferred routes are followed
 - Updated traffic figures
- Other strategies and initiatives
 - Provide frameworks for coordinating and integrating road use management policies across the different transport modes
 - Provide details on road use management initiatives
 - Provide details on systems used to monitor project generated traffic



9.2.10 Conclusions

The development of the South Galilee Coal Project is expected to have a manageable impact on the Capricorn Highway from Emerald to Alpha. However, when other proposed developments in the area are considered, the cumulative impacts are likely to cause a number of other road links to fall into the significantly impacted category (as defined in GARID by the 5% increase trigger). It is understood that DTMR are in the process of collecting data from each proponent in the region in order to properly assess these cumulative impacts and it is the intention of the proponent to provide this data to DTMR when available and to continue to liaise with DTMR on transport related issues.

The above sections demonstrate that the project execution strategy (of utilising the existing rail network combined with a modular construction philosophy to remove a large portion of freight off the road) has resulted in relatively minor increases in traffic on public roads (maximum noted increase of slightly above 9%) and it is considered this traffic will have a manageable impact in terms of the performance of the surrounding road network.

The proposed site development is considered an optimal traffic design arrangement for the integration of this site and its proposed land use activities into DTMR's road network.

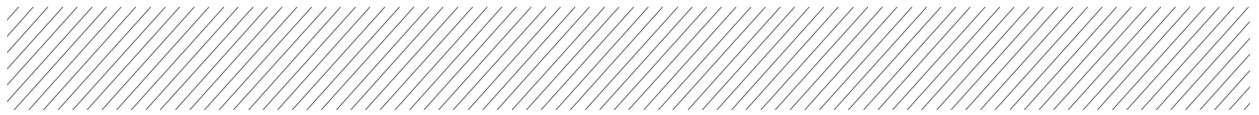
The assessment also finds that the proposed development and the level of added traffic activity would not compromise the function of Capricorn Highway and other SCR's used both during construction and operation. Hence the effects on the road network would be moderate and manageable.

This assessment finds that sufficient on-site parking can be provided within the sites in a manner that both meets expected demands of the development and satisfies the overall intentions and requirements of the DTMR.

In conclusion, the proposed development can be supported on a traffic and transportation basis. The traffic impacts associated with the development are acceptable and the proposed development will operate satisfactorily subject to the provisions outlined in this report and through continued liaison with DTMR during the design process and in relation to maintenance contributions.

Appendices





Appendix A

Crash Data

Crash Types		Crash Dates 17-SEP-2008 - 16-SEP-2013		Alignment: Vertical		
Owner		MR DEPARTMENT OF MAIN ROADS		Horizontal		
DCA Code				Feature		
Group				Traffic Ctrl		
Fatalities =				Speed Limit		
Severity				Contrib Circ.		
Nature				Unit Type		
				Risk Factor		
Area		LGA	SLA	Police Division		

Road Sections	All Road Sections	S	Include Crashes on	Y	Thru road Mid-block	Y	Thru roads at Intersections	Y	Intersecting roads at Intersections	Y	Number of Crashes				Total				
Road Section					Cway	RPC	Start	Dist	End	RPC	Tdist	Start	Dist	End	Fatal	Hosp. Medical	Minor	PDO	
10E BENARABY - ROCKHAMPTON						1	0.000	19	0.000		0.000	121.050			14	93	46	20	80
Intersections																			
All Intersections																			

Road Section

10E Benaraby - Rockhampton

Cway

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Road Section

10E Benaraby - Rockhampton

Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100751932	13-AUG-2010	Fri	16	104	W	Prop	0	11	Utility, Panel	Articulated V	1588	1	1	0.000	0.000	Bruce Hwy	Gladstone - Benarab
20110397969	07-MAY-2011	Sat	00	703	E	Inj	0	99	Articulated V			1	1	0.757	0.757	Bruce Hwy	
20120709819	23-JUL-2012	Mon	17	201	N	Hosp	0	11	Car, Station	Articulated V	621	1	1	1.318	1.318	Bruce Hwy	Hoad Rd
20120795300	15-AUG-2012	Wed	04	805	W	Hosp	0	99	Truck			1	1	3.158	3.158	Bruce Hwy	
20900536066	14-JUL-2009	Tue	06	803	W	Hosp	0	99	Car, Station			1	1	4.417	4.417	Bruce Hwy	
20110089683	01-FEB-2011	Tue	16	201	N	Fatal	1	50	Car, Station	Truck		1	1	5.136	5.136	Bruce Hwy	
20900511826	05-JUL-2009	Sun	10	503	S	Inj	0	20	Car, Station	Utility, Panel		1	1	5.798	5.798	Bruce Hwy	
20900911847	21-NOV-2009	Sat	09	301	N	Treat	0	99	Car, Station	Car, Station		1	1	8.714	8.714	Bruce Hwy	
20100610704	26-JUN-2010	Sat	09	301	E	Prop	0	99	Car, Station	Utility, Panel		1	1	10.868	10.868	Bruce Hwy	
20100974281	28-OCT-2010	Thu	14	101	S	Prop	0	10	Car, Station	Car, Station	40	1	2	0.000	11.580	Bruce Hwy	Dawson Hwy
20800755228	23-NOV-2008	Sun	06	101	N	Prop	0	10	Car, Station	Car, Station	40	1	2	0.000	11.580	Bruce Hwy	Dawson Hwy
20900356507	11-MAY-2009	Mon	08	101	N	Inj	0	10	Car, Station	Car, Station	40	1	2	0.000	11.580	Bruce Hwy	Dawson Hwy
20900593760	03-AUG-2009	Mon	12	101	N	Treat	0	10	Car, Station	Car, Station	40	1	2	0.000	11.580	Bruce Hwy	Dawson Hwy
20900836195	26-OCT-2009	Mon	09	303	N	Inj	0	11	Motor Cycle	Car, Station	40	1	2	0.000	11.580	Bruce Hwy	Talaba Rd
20900896653	16-NOV-2009	Mon	10	101	N	Hosp	0	10	Car, Station	Motor Cycle	40	1	2	0.000	11.580	Bruce Hwy	Dawson Hwy
20900193708	12-MAR-2009	Thu	00	609	S	Prop	0	99	Road Train/B	Animal - Stod		1	2	1.902	13.482	Bruce Hwy	
20101163600	31-DEC-2010	Fri	08	803	S	Treat	0	99	Car, Station			1	2	4.064	15.644	Bruce Hwy	
20130047120	11-JAN-2013	Fri	16	202	S	Hosp	0	11	Car, Station	Utility, Panel	630	1	2	4.114	15.694	Bruce Hwy	Old Bruce Hwy
20800791859	07-DEC-2008	Sun	08	104	N	Prop	0	11	Car, Station	Car, Station	630	1	2	4.114	15.694	Bruce Hwy	Old Bruce Hwy
20900734568	20-SEP-2009	Sun	14	301	N	Prop	0	99	Utility, Panel	Car, Station	630	1	2	4.114	15.694	Bruce Hwy	
20110865901	29-SEP-2011	Thu	15	301	S	Prop	0	97	Articulated V	Utility, Panel		1	2	4.414	15.994	Bruce Hwy	Invalid Street From P
20130099661	23-JAN-2013	Wed	18	201	S	Hosp	0	99	Utility, Panel	Car, Station		1	2	5.201	16.781	Bruce Hwy	
20900691590	05-SEP-2009	Sat	14	301	S	Inj	0	99	Utility, Panel	Car, Station		1	2	5.850	17.430	Bruce Hwy	

Road Crash 2
CRASH LISTING REPORT

Road Section		10E Benaraby - Rockhampton				Cway				Tdist		0.000		- 121.050			
Road Section		Benaraby - Rockhampton															
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20110076153	22-DEC-2010	Wed	07	803	N	Prop	0	99	Car, Station			1	3	0.518	18.388	Bruce Hwy	
20110507322	09-JUN-2011	Thu	22	607	N	Treat	0	99	Car, Station			1	3	0.629	18.499	Bruce Hwy	
20121108885	01-NOV-2012	Thu	20	705	W	Hosp	0	99	Road Train/B			1	3	0.759	18.629	Bruce Hwy	
20100757242	15-AUG-2010	Sun	08	803	N	Hosp	0	99	Car, Station			1	3	1.170	19.040	Bruce Hwy	
20900994617	18-DEC-2009	Fri	16	703	N	Hosp	0	99	Car, Station			1	3	2.181	20.051	Bruce Hwy	
20100816440	04-SEP-2010	Sat	06	800	N	Hosp	0	99	Utility, Panel			1	3	3.446	21.316	Bruce Hwy	
20100475798	10-MAY-2010	Mon	13	301	S	Prop	0	99	Road Train/B	Utility, Panel		1	3	3.447	21.317	Bruce Hwy	
20100491474	14-MAY-2010	Fri	21	800	S	Prop	0	99	Car, Station			1	3	3.447	21.317	Bruce Hwy	
20100612531	27-JUN-2010	Sun	03	201	S	Fatal	2	99	Truck	Car, Station		1	3	4.503	22.373	Bruce Hwy	
20900627184	14-AUG-2009	Fri	10	705	N	Prop	0	99	Car, Station			1	3	6.857	24.727	Bruce Hwy	
20900350316	08-MAY-2009	Fri	12	701	S	Hosp	0	99	Car, Station			1	3	6.930	24.800	Bruce Hwy	
20900653732	23-AUG-2009	Sun	15	700	E	Prop	0	99	Car, Station			1	3	8.587	26.457	Bruce Hwy	
20110618849	16-JUL-2011	Sat	12	501	N	Hosp	0	99	Car, Station	Car, Station		1	3	8.601	26.471	Bruce Hwy	
20900023747	09-JAN-2009	Fri	15	607	N	Inj	0	99	Car, Station			1	4	2.170	29.910	Bruce Hwy	
20101076860	01-DEC-2010	Wed	07	201	N	Fatal	1	99	Articulated V	Motor Cycle		1	4	3.960	31.700	Bruce Hwy	
20900470817	20-JUN-2009	Sat	23	301	N	Hosp	0	99	Utility, Panel	Road Train/B		1	4	4.090	31.830	Bruce Hwy	
20121352117	28-DEC-2012	Fri	14	703	S	Hosp	0	99	Car, Station			1	4	4.833	32.573	Bruce Hwy	
20900838148	27-OCT-2009	Tue	02	700	S	Prop	0	99	Car, Station			1	4	7.004	34.744	Bruce Hwy	
20900647914	21-AUG-2009	Fri	11	700	N	Prop	0	99	Car, Station			1	4	7.680	35.420	Bruce Hwy	
20100193740	01-FEB-2010	Mon	12	803	N	Prop	0	99	Car, Station			1	5	1.050	37.000	Bruce Hwy	
20100795759	23-AUG-2010	Mon	15	802	S	Prop	0	20	Utility, Panel			1	5	1.907	37.857	Bruce Hwy	
20110269011	26-MAR-2011	Sat	14	501	N	Inj	0	99	Car, Station	Car, Station		1	5	2.870	38.820	Bruce Hwy	
20800632924	03-OCT-2008	Fri	16	701	S	Hosp	0	99	Utility, Panel			1	5	4.100	40.050	Bruce Hwy	

Road Section

10E Benaraby - Rockhampton

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Road Section

10E Benaraby - Rockhampton

Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
2010044988	29-APR-2010	Thu	18	805	S	Prop	0	99	Utility, Panel			1	5	4.572	40.522	Bruce Hwy	
20110237528	19-MAR-2011	Sat	01	704	S	Treat	0	99	Utility, Panel			1	5	5.495	41.445	Bruce Hwy	
20130397527	04-APR-2013	Thu	03	700	S	Hosp	0	99	Car, Station			1	5	8.113	44.063	Bruce Hwy	
20120054428	16-JAN-2012	Mon	14	201	N	Hosp	0	99	Car, Station	Utility, Panel		1	5	8.959	44.909	Bruce Hwy	
20900439357	09-JUN-2009	Tue	15	301	W	Prop	0	99	Omnibus	Special Purple	51	1	6	0.000	45.410	Bruce Hwy	
20900319719	27-APR-2009	Mon	08	302	E	Prop	0	11	Utility, Panel	Utility, Panel	640	1	6	0.392	45.802	Bruce Hwy	King George St
20100447554	30-APR-2010	Fri	13	803	S	Hosp	0	99	Car, Station			1	6	0.734	46.144	Bruce Hwy	
20900004350	02-JAN-2009	Fri	10	301	N	Inj	0	99	Car, Station	Car, Station		1	6	1.290	46.700	Bruce Hwy	
20900133889	19-FEB-2009	Thu	11	703	S	Treat	0	99	Car, Station			1	6	1.792	47.202	Bruce Hwy	
20110255747	23-MAR-2011	Wed	12	801	N	Treat	0	99	Car, Station			1	6	2.131	47.541	Bruce Hwy	
20900552165	20-JUL-2009	Mon	01	700	N	Hosp	0	99	Car, Station			1	6	2.392	47.802	Bruce Hwy	
20130387104	01-APR-2013	Mon	20	301	N	Hosp	0	99	Utility, Panel	Motor Cycle		1	6	3.071	48.481	Bruce Hwy	
20100912275	07-OCT-2010	Thu	07	704	N	Treat	0	99	Car, Station			1	6	3.114	48.524	Bruce Hwy	
20120053367	16-JAN-2012	Mon	09	301	N	Fatal	1	99	Road Train/B	Utility, Panel		1	6	3.310	48.720	Bruce Hwy	
20900654941	24-AUG-2009	Mon	00	609	S	Treat	0	99	Omnibus	Animal - Stod		1	6	3.960	49.370	Bruce Hwy	
20100529212	29-MAY-2010	Sat	06	500	S	Treat	0	99	Utility, Panel	Utility, Panel		1	6	3.975	49.385	Bruce Hwy	
20120704420	22-JUL-2012	Sun	08	703	S	Hosp	0	99	Car, Station			1	6	4.466	49.876	Bruce Hwy	
20101157735	29-DEC-2010	Wed	09	607	N	Treat	0	99	Car, Station			1	6	4.693	50.103	Bruce Hwy	
20800790168	05-DEC-2008	Fri	23	700	S	Prop	0	99	Car, Station			1	6	5.253	50.663	Bruce Hwy	
20100845640	13-SEP-2010	Mon	15	201	N	Fatal	1	11	Car, Station	Car, Station	644	1	6	6.667	52.077	Bruce Hwy	Sinclair St
20900648708	21-AUG-2009	Fri	18	202	N	Hosp	0	11	Car, Station	Car, Station	644	1	6	6.667	52.077	Bruce Hwy	Sinclair St
20120731534	29-JUL-2012	Sun	11	201	S	Fatal	1	99	Car, Station	Road Train/B		1	6	6.670	52.080	Bruce Hwy	
20900919113	23-NOV-2009	Mon	15	100	N	Hosp	0	11	Truck	Car, Station	645	1	7	0.000	52.150	Bruce Hwy	Gentle Annie Rd

Road Section		10E Benaraby - Rockhampton				Cway				Tdist		0.000		- 121.050			
Road Section		Benaraby - Rockhampton															
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20800724908	11-NOV-2008	Tue	06	301	N	Treat	0	99	Road Train/B	Road Train/B		1	7	0.020	52.170	Bruce Hwy	
20121331702	23-DEC-2012	Sun	05	703	N	Hosp	0	99	Car, Station			1	7	0.146	52.296	Bruce Hwy	
20100894395	22-SEP-2010	Wed	17	702	N	Inj	0	99	Car, Station			1	7	0.386	52.536	Bruce Hwy	
20130332617	20-MAR-2013	Wed	13	301	W	Hosp	0	99	Car, Station	Truck		1	7	0.463	52.613	Bruce Hwy	
20900520326	07-JUL-2009	Tue	13	301	N	Hosp	0	99	Omnibus	Car, Station		1	7	0.500	52.650	Bruce Hwy	
20100944071	17-OCT-2010	Sun	01	704	S	Treat	0	99	Utility, Panel			1	7	1.387	53.537	Bruce Hwy	
20100800811	30-AUG-2010	Mon	07	700	S	Treat	0	99	Utility, Panel			1	7	3.406	55.556	Bruce Hwy	
20100726124	05-AUG-2010	Thu	03	804	N	Treat	0	99	Articulated Vi			1	7	5.300	57.450	Bruce Hwy	
20120122279	04-FEB-2012	Sat	08	301	S	Hosp	0	20	Car, Station	Car, Station		1	8	0.055	59.285	Bruce Hwy	
20110591128	07-JUL-2011	Thu	05	805	N	Treat	0	99	Road Train/B			1	8	5.978	65.208	Bruce Hwy	
20900378256	19-MAY-2009	Tue	07	301	N	Inj	0	99	Truck	Articulated Vi		1	8	8.260	67.490	Bruce Hwy	
20100152822	18-JAN-2010	Mon	12	400	E	Hosp	0	99	Motor Cycle			1	9A	1.133	68.663	Bruce Hwy	
20110592979	07-JUL-2011	Thu	09	704	W	Hosp	0	99	Car, Station			1	10	1.493	74.023	Bruce Hwy	
20120632516	02-JUL-2012	Mon	14	703	S	Hosp	0	20	Car, Station			1	10	2.570	75.100	Bruce Hwy	
20900739962	22-SEP-2009	Tue	14	502	S	Hosp	0	99	Car, Station		656	1	10	2.939	75.469	Bruce Hwy	
20100811407	02-SEP-2010	Thu	11	802	N	Prop	0	99	Utility, Panel			1	10	3.217	75.747	Bruce Hwy	
20100378194	02-APR-2010	Fri	05	609	N	Prop	0	99	Articulated Vi	Animal - Stoc		1	10	3.382	75.912	Bruce Hwy	
20111130436	16-DEC-2011	Fri	19	408	N	Fatal	1	99	Car, Station	Road Train/B		1	10	3.400	75.930	Bruce Hwy	
20900383163	21-MAY-2009	Thu	05	408	N	Prop	0	99	Car, Station	Articulated Vi		1	10	5.120	77.650	Bruce Hwy	
20800848417	29-DEC-2008	Mon	10	202	N	Hosp	0	99	Car, Station	Car, Station		1	10	5.154	77.684	Bruce Hwy	
20900171233	04-MAR-2009	Wed	13	202	N	Prop	0	99	Utility, Panel	Car, Station		1	10	5.170	77.700	Bruce Hwy	
20800719574	09-NOV-2008	Sun	01	301	S	Prop	0	99	Utility, Panel	Utility, Panel		1	10	6.190	78.720	Bruce Hwy	
20120647273	06-JUL-2012	Fri	08	800	W	Hosp	0	99	Car, Station			1	10	7.697	80.227	Bruce Hwy	

Road Section

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Road Section

10E Benaraby - Rockhampton

Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20110084531	31-JAN-2011	Mon	05	803	N	Hosp	0	20	Car, Station			1	11	2.296	83.846	Bruce Hwy	
20110083901	30-JAN-2011	Sun	22	803	N	Hosp	0	20	Car, Station			1	11	2.318	83.868	Bruce Hwy	
20100377914	06-APR-2010	Tue	02	803	N	Prop	0	99	Car, Station			1	11	3.016	84.566	Bruce Hwy	
20100176450	26-JAN-2010	Tue	18	004	S	Hosp	0	99	Pedestrian	Truck		1	12	0.957	86.277	Bruce Hwy	
20120331809	06-APR-2012	Fri	04	201	N	Hosp	0	99	Car, Station	Car, Station		1	12	1.326	86.646	Bruce Hwy	
20900839942	27-OCT-2009	Tue	17	201	S	Fatal	1	99	Car, Station	Articulated V		1	12	1.640	86.960	Bruce Hwy	
20900248282	31-MAR-2009	Tue	18	609	N	Treat	0	99	Motor Cycle	Animal - Other		1	12	1.780	87.100	Bruce Hwy	
20800674541	22-OCT-2008	Wed	15	701	S	Prop	0	99	Truck			1	12	2.107	87.427	Bruce Hwy	
20900178352	06-MAR-2009	Fri	21	703	S	Prop	0	99	Car, Station			1	12	4.480	89.800	Bruce Hwy	
20120496674	24-MAY-2012	Thu	11	705	N	Hosp	0	99	Utility, Panel			1	12	5.040	90.360	Bruce Hwy	
20110931665	20-OCT-2011	Thu	06	700	S	Hosp	0	99	Articulated V			1	12	5.562	90.882	Bruce Hwy	
20121272879	09-DEC-2012	Sun	21	705	N	Hosp	0	99	Articulated V			1	12	5.593	90.913	Bruce Hwy	
20900044284	17-JAN-2009	Sat	11	703	N	Prop	0	99	Car, Station			1	12	8.480	93.800	Bruce Hwy	
20130400452	04-APR-2013	Thu	15	301	N	Treat	0	99	Utility, Panel	Utility, Panel		1	13	1.004	94.904	Bruce Hwy	
20900971260	10-DEC-2009	Thu	19	609	N	Prop	0	99	Car, Station	Animal - Other		1	13	1.048	94.948	Bruce Hwy	
20110473026	30-MAY-2011	Mon	16	702	N	Treat	0	99	Car, Station			1	13	1.050	94.950	Bruce Hwy	
20100891879	29-SEP-2010	Wed	14	201	S	Fatal	1	99	Road Train/B	Truck		1	13	1.546	95.446	Bruce Hwy	
20900653365	23-AUG-2009	Sun	11	801	N	Hosp	0	99	Car, Station			1	13	1.600	95.500	Bruce Hwy	
20100180075	27-JAN-2010	Wed	18	201	S	Treat	0	99	Articulated V	Articulated V		1	13	1.993	95.893	Bruce Hwy	
20120231267	08-MAR-2012	Thu	11	201	N	Fatal	1	99	Car, Station	Car, Station		1	13	3.650	97.550	Bruce Hwy	
20900546197	17-JUL-2009	Fri	10	201	N	Inj	0	20	Articulated V	Car, Station		1	13	5.720	99.620	Bruce Hwy	
20800719580	09-NOV-2008	Sun	01	607	N	Prop	0	99	Car, Station			1	13	6.290	100.190	Bruce Hwy	
20900090764	03-FEB-2009	Tue	21	201	N	Fatal	1	99	Car, Station	Utility, Panel		1	13	7.910	101.810	Bruce Hwy	

Road Section

10E Benaraby - Rockhampton

Cway

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Road Section

10E Benaraby - Rockhampton

Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20110303674	07-APR-2011	Thu	15	308	S	Hosp	0	11	Car, Station	Utility, Panel		1	13	8.170	102.070	Bruce Hwy	Mogilho Rd
20110609762	13-JUL-2011	Wed	14	804	N	Fatal	1	99	Car, Station			1	14	0.490	104.200	Bruce Hwy	
20110512318	12-JUN-2011	Sun	07	705	N	Hosp	0	99	Utility, Panel			1	14	3.075	106.785	Bruce Hwy	
20101131426	19-DEC-2010	Sun	10	803	N	Hosp	0	99	Car, Station			1	14	3.100	106.810	Bruce Hwy	
20900249345	31-MAR-2009	Tue	13	704	N	Prop	0	99	Car, Station			1	14	3.120	106.830	Bruce Hwy	
20100371866	03-APR-2010	Sat	15	702	N	Treat	0	99	Car, Station			1	14	3.150	106.860	Bruce Hwy	
20100850310	15-SEP-2010	Wed	11	701	N	Hosp	0	99	Utility, Panel			1	14	3.158	106.868	Bruce Hwy	
20900997026	19-DEC-2009	Sat	05	201	N	Fatal	1	99	Car, Station	Road Train/B		1	14	4.740	108.450	Bruce Hwy	
20110172677	27-FEB-2011	Sun	22	703	S	Treat	0	99	Car, Station		72	1	15	0.000	108.950	Bruce Hwy	
20120900010	10-SEP-2012	Mon	11	800	E	Hosp	0	11	Articulated V		72	1	15	0.000	108.950	Bruce Hwy	Gavial - Gracemere F
20121149391	11-NOV-2012	Sun	00	706	N	Hosp	0	11	Car, Station		72	1	15	0.000	108.950	Bruce Hwy	Gavial - Gracemere F
20121099853	31-OCT-2012	Wed	04	609	S	Hosp	0	99	Motor Cycle	Animal - Other		1	15	2.466	111.416	Bruce Hwy	
20800607416	24-SEP-2008	Wed	16	704	N	Prop	0	99	Car, Station			1	15	2.500	111.450	Bruce Hwy	
20100684405	22-JUL-2010	Thu	04	703	N	Prop	0	99	Articulated V			1	15	4.820	113.770	Bruce Hwy	
20100121556	08-JAN-2010	Fri	04	703	N	Prop	0	20	Road Train/B			1	15	4.821	113.771	Bruce Hwy	
20100513374	23-MAY-2010	Sun	20	104	S	Inj	0	10	Car, Station	Car, Station	672	1	15	5.114	114.064	Bruce Hwy	Edith St
20100254486	22-FEB-2010	Mon	06	101	E	Hosp	0	10	Utility, Panel	Car, Station	37	1	16	0.000	114.400	Bruce Hwy	Dawson Hwy
20110753699	26-AUG-2011	Fri	08	703	N	Hosp	0	11	Car, Station		37	1	16	0.000	114.400	Bruce Hwy	Burnett Hwy
20110845014	22-SEP-2011	Thu	23	301	N	Hosp	0	99	Car, Station	Articulated V	37	1	16	0.000	114.400	Bruce Hwy	
20900354612	10-MAY-2009	Sun	11	202	S	Prop	0	11	Car, Station	Car, Station	37	1	16	0.000	114.400	Bruce Hwy	Burnett Hwy
20900652907	23-AUG-2009	Sun	10	801	N	Treat	0	99	Utility, Panel			1	16	0.050	114.450	Bruce Hwy	
20120878355	05-SEP-2012	Wed	08	301	N	Hosp	0	99	Road Train/B	Car, Station		1	16	0.329	114.729	Bruce Hwy	
20110743055	23-AUG-2011	Tue	08	201	N	Hosp	0	20	Utility, Panel	Car, Station		1	16	0.892	115.292	Bruce Hwy	

Road Crash 2
CRASH LISTING REPORT

Road Section

10E Benaraby - Rockhampton

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Road Section

10E Benaraby - Rockhampton

Crash No.

Date

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Key

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Fatal

Feature

Vehicle 1

Vehicle 2

Inter

Cway

RPC

Dist

Tdist

Street 1

Street 2

20900590434	02-AUG-2009	Sun	06	702	N	Prop	0	99	Car, Station			1	16	1.000	115.400	Bruce Hwy	
20110742629	23-AUG-2011	Tue	06	703	N	Treat	0	99	Utility, Panel			1	16	1.327	115.727	Bruce Hwy	
20120887036	07-SEP-2012	Fri	09	705	N	Hosp	0	99	Motor Cycle			1	16	1.331	115.731	Bruce Hwy	
20120654678	08-JUL-2012	Sun	18	607	N	Hosp	0	99	Utility, Panel			1	16	1.760	116.160	Bruce Hwy	
20110210714	11-MAR-2011	Fri	08	301	N	Hosp	0	99	Car, Station	Utility, Panel		1	16	1.928	116.328	Bruce Hwy	
20800698199	31-OCT-2008	Fri	15	610	S	Prop	0	99	Car, Station	Car, Station		1	16	1.960	116.360	Bruce Hwy	
20110083792	30-JAN-2011	Sun	20	703	S	Hosp	0	99	Car, Station			1	16	2.154	116.554	Bruce Hwy	
20100996214	04-NOV-2010	Thu	19	607	S	Prop	0	99	Utility, Panel			1	16	2.396	116.796	Bruce Hwy	
20900109946	10-FEB-2009	Tue	16	703	S	Hosp	0	99	Car, Station			1	16	2.540	116.940	Bruce Hwy	
20100190294	31-JAN-2010	Sun	11	703	S	Prop	0	99	Car, Station		27	1	18	0.000	116.960	Bruce Hwy	
20100292749	06-MAR-2010	Sat	10	301	N	Prop	0	15	Car, Station	Car, Station	27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy
20100702346	26-JUL-2010	Mon	16	301	S	Treat	0	99	Car, Station	Car, Station	27	1	18	0.000	116.960	Bruce Hwy	
20100741163	04-AUG-2010	Wed	18	303	W	Treat	0	15	Car, Station	Car, Station	27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy
20800591296	18-SEP-2008	Thu	07	708	S	Prop	0	15	Articulated V		27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy
20800672236	21-OCT-2008	Tue	12	708	E	Hosp	0	15	Articulated V		27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy
20900289784	16-APR-2009	Thu	10	705	N	Treat	0	15	Articulated V		27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy
20900937995	29-NOV-2009	Sun	15	805	N	Hosp	0	15	Motor Cycle		27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy
20100314369	14-MAR-2010	Sun	15	702	S	Hosp	0	99	Utility, Panel			1	18	0.050	117.010	Capricorn Hwy	
20900504301	02-JUL-2009	Thu	14	302	E	Treat	0	15	Car, Station	Car, Station		1	18	0.106	117.066	Bruce Hwy	Capricorn Hwy
20101075203	30-NOV-2010	Tue	17	301	S	Hosp	0	20	Car, Station	Car, Station		1	18	0.160	117.120	Bruce Hwy	
20800680759	25-OCT-2008	Sat	00	703	S	Prop	0	15	Car, Station			1	18	0.228	117.188	Bruce Hwy	Capricorn Hwy
20110823305	16-SEP-2011	Fri	10	301	S	Hosp	0	99	Car, Station	Utility, Panel		1	18	0.342	117.302	Bruce Hwy	
20900079459	30-JAN-2009	Fri	12	301	S	Inj	0	20	Truck	Special Purp		1	18	0.400	117.360	Bruce Hwy	

Road Crash 2 CRASH LISTING REPORT

Road Section																	
10E Benaraby - Rockhampton																	
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Road Section																	
10E Benaraby - Rockhampton																	
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900257902	04-APR-2009	Sat	07	201	N	Hosp	0	20	Car, Station	Car, Station		1	18	0.420	117.380	Bruce Hwy	
20900466885	19-JUN-2009	Fri	17	301	S	Prop	0	20	Car, Station	Utility, Panel		1	18	0.420	117.380	Bruce Hwy	
20900197970	13-MAR-2009	Fri	17	301	S	Prop	0	20	Car, Station	Car, Station		1	18	0.460	117.420	Bruce Hwy	
20900197837	13-MAR-2009	Fri	18	301	S	Treat	0	99	Utility, Panel	Car, Station		1	18	0.560	117.520	Bruce Hwy	
20900729218	18-SEP-2009	Fri	16	301	S	Prop	0	20	Utility, Panel	Car, Station		1	18	0.612	117.572	Bruce Hwy	
20110994045	08-NOV-2011	Tue	09	305	N	Hosp	0	99	Car, Station	Car, Station		2	18	0.716	117.676	Bruce Hwy	
20101005454	08-NOV-2010	Mon	01	703	S	Hosp	0	99	Car, Station			2	18	0.719	117.679	Bruce Hwy	
20110079659	29-JAN-2011	Sat	10	104	E	Treat	0	10	Car, Station	Car, Station		2	18	0.799	117.759	Bruce Hwy	Upper Dawson Rd
20110429398	16-MAY-2011	Mon	16	102	W	Hosp	0	10	Utility, Panel	Road Train/B		3	18	0.800	117.760	Bruce Hwy	Jellicoe St
20100891915	29-SEP-2010	Wed	19	102	E	Prop	0	10	Car, Station	Utility, Panel	675	3	18	0.802	117.762	Bruce Hwy	Upper Dawson Rd
20101137604	21-DEC-2010	Tue	13	204	E	Prop	0	10	Car, Station	Car, Station	675	3	18	0.802	117.762	Bruce Hwy	Upper Dawson Rd
20900310507	23-APR-2009	Thu	17	102	N	Prop	0	10	Car, Station	Car, Station	675	2	18	0.802	117.762	Bruce Hwy	Jellicoe St
20900782257	07-OCT-2009	Wed	17	102	S	Hosp	0	10	Car, Station	Utility, Panel	675	3	18	0.802	117.762	Bruce Hwy	Upper Dawson Rd
20900837353	27-OCT-2009	Tue	00	808	N	Prop	0	99	Utility, Panel			2	18	0.932	117.892	Bruce Hwy	
20900078970	30-JAN-2009	Fri	05	301	N	Inj	0	99	Car, Station	Utility, Panel		2	18	1.190	118.150	Bruce Hwy	
20130095456	22-JAN-2013	Tue	23	002	N	Hosp	0	99	Pedestrian	Utility, Panel		2	18	1.394	118.354	Bruce Hwy	
20110732071	19-AUG-2011	Fri	16	002	N	Inj	0	99	Pedestrian	Car, Station		2	18	1.549	118.509	Oswald St	
20100324248	16-MAR-2010	Tue	20	406	W	Prop	0	11	Utility, Panel	Truck		3	18	1.563	118.523	Bruce Hwy	Oswald St
20130184437	13-FEB-2013	Wed	17	406	W	Hosp	0	99	Omnibus	Car, Station		3	18	1.567	118.527	Bruce Hwy	
20900584012	30-JUL-2009	Thu	20	805	S	Hosp	0	99	Car, Station			3	18	1.624	118.584	Bruce Hwy	
20121103369	31-OCT-2012	Wed	15	104	S	Hosp	0	11	Car, Station	Motor Cycle	684	3	18	1.795	118.755	Bruce Hwy	Port Curtis Rd
20900272386	09-APR-2009	Thu	14	104	N	Prop	0	11	Utility, Panel	Car, Station	684	2	18	1.795	118.755	Bruce Hwy	Port Curtis Rd
20900518096	07-JUL-2009	Tue	15	104	N	Hosp	0	11	Utility, Panel	Car, Station	684	3	18	1.795	118.755	Bruce Hwy	Port Curtis Rd

Road Crash 2
CRASH LISTING REPORT

Road Section		10E Benaraby - Rockhampton				Cway		Tdist		0.000		121.050					
Road Section		Benaraby - Rockhampton															
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900272350	09-APR-2009	Thu	14	301	S	Prop	0	99	Car, Station	Car, Station		3	18	1.934	118.894	Bruce Hwy	
20900729846	18-SEP-2009	Fri	21	703	S	Treat	0	99	Car, Station	Articulated V		3	18	1.994	118.954	Bruce Hwy	
20100535152	31-MAY-2010	Mon	10	307	N	Prop	0	99	Articulated V	Car, Station		2	18	2.070	119.030	Bruce Hwy	
20900331645	01-MAY-2009	Fri	13	303	S	Prop	0	11	Car, Station	Road Train/B	685	3	18	2.074	119.034	Bruce Hwy	Prospect St
20100410805	17-APR-2010	Sat	13	406	S	Hosp	0	11	Car, Station	Car, Station	686	3	18	2.204	119.164	Bruce Hwy	Prospect St
20900469217	20-JUN-2009	Sat	12	805	N	Hosp	0	11	Motor Cycle		686	2	18	2.204	119.164	Bruce Hwy	Church St
20100656070	12-JUL-2010	Mon	15	804	S	Hosp	0	99	Car, Station			3	18	2.286	119.246	Bruce Hwy	
20110551715	24-JUN-2011	Fri	17	406	W	Treat	0	99	Car, Station	Motor Cycle		3	18	2.297	119.257	Bruce Hwy	
20900634722	17-AUG-2009	Mon	09	301	N	Inj	0	99	Utility, Panel	Car, Station		2	18	2.351	119.311	Bruce Hwy	
20900684402	02-SEP-2009	Wed	08	301	N	Hosp	0	99	Car, Station	Car, Station		2	18	2.470	119.430	Bruce Hwy	
20100540617	02-JUN-2010	Wed	12	604	N	Prop	0	99	Car, Station	Truck		2	18	2.504	119.464	Bruce Hwy	
20900541429	16-JUL-2009	Thu	09	301	N	Prop	0	99	Utility, Panel	Car, Station		2	18	2.514	119.474	Bruce Hwy	
20900058113	22-JAN-2009	Thu	15	301	N	Prop	0	99	Car, Station	Utility, Panel		2	18	2.605	119.565	Bruce Hwy	
20900124560	16-FEB-2009	Mon	09	301	N	Hosp	0	99	Car, Station	Car, Station		2	18	2.607	119.567	Bruce Hwy	
20100916478	08-OCT-2010	Fri	12	301	N	Hosp	0	99	Articulated V	Omnibus		2	18	2.610	119.570	Bruce Hwy	
20101158619	29-DEC-2010	Wed	16	306	N	Prop	0	99	Car, Station	Car, Station		2	18	2.686	119.646	Bruce Hwy	
20900776660	05-OCT-2009	Mon	17	703	S	Prop	0	11	Car, Station			2	18	2.771	119.731	Bruce Hwy	Caroline La
20900706281	10-SEP-2009	Thu	16	301	S	Treat	0	99	Car, Station	Utility, Panel	691	3	18	2.776	119.736	Bruce Hwy	
20800815767	16-DEC-2008	Tue	08	301	N	Prop	0	99	Car, Station	Utility, Panel		2	18	2.791	119.751	Bruce Hwy	
20100759935	16-AUG-2010	Mon	08	301	N	Prop	0	99	Car, Station	Car, Station		2	18	2.805	119.765	Bruce Hwy	
20110664215	30-JUL-2011	Sat	17	001	N	Inj	0	10	Pedestrian	Car, Station		2	18	2.831	119.791	Bruce Hwy	Caroline St
20800769750	28-NOV-2008	Fri	16	202	N	Fatal	1	11	Motor Cycle	Articulated V	692	3	18	2.949	119.909	Bruce Hwy	Stanley St
20900084242	01-FEB-2009	Sun	11	302	W	Prop	0	10	Car, Station	Utility, Panel	692	3	18	2.949	119.909	Bruce Hwy	Stanley St

Road Section		10E Benaraby - Rockhampton				Cway		Tdist		0.000		- 121.050					
Road Section		Benaraby - Rockhampton															
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900403522	28-MAY-2009	Thu	08	301	S	Treat	0	99	Car, Station	Utility, Panel	692	3	18	2.949	119.909	Bruce Hwy	
20900967358	09-DEC-2009	Wed	08	301	S	Inj	0	99	Car, Station	Car, Station		3	18	2.959	119.919	Bruce Hwy	
20100647211	09-JUL-2010	Fri	13	309	S	Treat	0	11	Utility, Panel	Motor Cycle		3	18	3.090	120.050	Bruce Hwy	Stanley St
20101103211	10-DEC-2010	Fri	08	301	N	Prop	0	99	Utility, Panel	Car, Station		2	18	3.139	120.099	Bruce Hwy	
20120511412	29-MAY-2012	Tue	08	301	S	Hosp	0	99	Utility, Panel	Utility, Panel		3	18	3.142	120.102	Bruce Hwy	
20900044167	17-JAN-2009	Sat	09	406	N	Prop	0	99	Utility, Panel	Utility, Panel		2	18	3.179	120.139	Bruce Hwy	
20800684300	26-OCT-2008	Sun	12	301	N	Hosp	0	99	Car, Station	Car, Station		2	18	3.224	120.184	Bruce Hwy	
20100322650	17-MAR-2010	Wed	14	102	S	Treat	0	10	Car, Station	Car, Station	693	3	18	3.239	120.199	Bruce Hwy	Derby St
20100727700	05-AUG-2010	Thu	15	202	N	Treat	0	10	Utility, Panel	Car, Station	693	2	18	3.239	120.199	Bruce Hwy	Derby St
20110648010	25-JUL-2011	Mon	15	202	S	Hosp	0	10	Car, Station	Truck		3	18	3.299	120.259	Bruce Hwy	Derby St
20120525851	02-JUN-2012	Sat	07	202	N	Hosp	0	14	Car, Station	Car, Station		2	18	3.302	120.262	Bruce Hwy	Derby St
20110576846	02-JUL-2011	Sat	23	000	S	Treat	0	99	Car, Station	Pedestrian		3	18	3.324	120.284	Bruce Hwy	
20100314261	14-MAR-2010	Sun	16	101	W	Inj	0	10	Car, Station	Car, Station	694	2	18	3.456	120.416	Bruce Hwy	Murray St
20800734114	14-NOV-2008	Fri	13	104	N	Prop	0	10	Car, Station	Car, Station	694	2	18	3.456	120.416	Fitzroy St	Murray St
20900125978	16-FEB-2009	Mon	15	104	S	Prop	0	10	Car, Station	Utility, Panel	694	3	18	3.456	120.416	Bruce Hwy	Murray St
20900847376	30-OCT-2009	Fri	06	101	W	Prop	0	10	Car, Station	Car, Station	694	2	18	3.456	120.416	Bruce Hwy	Murray St
20900226102	23-MAR-2009	Mon	18	301	S	Prop	0	99	Car, Station	Car, Station	695	2	18	3.576	120.536	Bruce Hwy	
20900573972	27-JUL-2009	Mon	11	001	S	Treat	0	11	Car, Station	Pedestrian	695	3	18	3.576	120.536	Bruce Hwy	William St
20900677674	30-AUG-2009	Sun	23	708	N	Prop	0	99	Car, Station			2	18	3.686	120.646	Bruce Hwy	
20100955020	22-OCT-2010	Fri	00	808	N	Treat	0	99	Car, Station			2	18	3.709	120.669	Bruce Hwy	
20101039434	18-NOV-2010	Thu	10	202	N	Prop	0	10	Car, Station	Car, Station	696	2	18	3.809	120.769	Bruce Hwy	Denham St
20101164244	31-DEC-2010	Fri	13	101	S	Prop	0	10	Utility, Panel	Car, Station	696	3	18	3.809	120.769	Bruce Hwy	Denham St
20110530053	17-JUN-2011	Fri	22	202	S	Treat	0	10	Utility, Panel	Car, Station	696	2	18	3.809	120.769	Bruce Hwy	Denham St

Road Section		10E Benaraby - Rockhampton				Cway		Tdist		0.000		- 121.050					
Road Section		10E Benaraby - Rockhampton															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20800665066	18-OCT-2008	Sat	09	202	N	Inj	0	10	Car, Station	Car, Station	696	2	18	3.809	120.769	Bruce Hwy	Denham St
20900237074	27-MAR-2009	Fri	18	202	S	Prop	0	10	Car, Station	Car, Station	696	3	18	3.809	120.769	Bruce Hwy	Denham St
20900566563	24-JUL-2009	Fri	19	202	E	Prop	0	10	Car, Station	Car, Station	696	3	18	3.809	120.769	Bruce Hwy	Denham St
20110983294	04-NOV-2011	Fri	18	202	N	Hosp	0	10	Car, Station	Car, Station		2	18	3.841	120.801	Bruce Hwy	Denham St
20100458645	04-MAY-2010	Tue	12	308	W	Hosp	0	10	Car, Station	Car, Station		2	18	3.844	120.804	Campbell La	Denham St
20100733052	07-AUG-2010	Sat	09	301	N	Prop	0	10	Car, Station	Car, Station		2	18	3.856	120.816	Bruce Hwy	Denham St
20110688863	23-MAY-2011	Mon	15	303	N	Hosp	0	10	Articulated V	Utility, Panel		2	18	3.856	120.816	Bruce Hwy	Denham St
20100247005	19-FEB-2010	Fri	15	301	S	Prop	0	99	Utility, Panel	Articulated V		3	18	3.970	120.930	Bruce Hwy	
20110385856	03-MAY-2011	Tue	11	101	N	Hosp	0	10	Car, Station	Car, Station		2	18	4.078	121.038	Bruce Hwy	Fitzroy St
20100497786	18-MAY-2010	Tue	12	201	N	Treat	0	10	Articulated V	Car, Station	557	2	19	0.000	121.050	Bruce Hwy	Fitzroy St
20110324118	13-APR-2011	Wed	13	202	E	Treat	0	10	Car, Station	Car, Station	557	2	19	0.000	121.050	Bruce Hwy	Fitzroy St
20110672695	02-AUG-2011	Tue	10	307	W	Hosp	0	11	Utility, Panel	Omnibus	557	3	19	0.000	121.050	Fitzroy St	George La
20121256379	06-DEC-2012	Thu	08	301	N	Hosp	0	99	Car, Station	Utility, Panel		2	19	0.000	121.050	Bruce Hwy	
20900285473	14-APR-2009	Tue	18	703	N	Treat	0	99	Car, Station		557	2	19	0.000	121.050	Rockhampton - Yepp	
20900320469	27-APR-2009	Mon	14	101	W	Prop	0	10	Car, Station	Car, Station	557	2	19	0.000	121.050	Bruce Hwy	Rockhampton - Yepp
Road Section		10F Rockhampton-St Lawrence															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100521819	26-MAY-2010	Wed	17	202	W	Prop	0	10	Car, Station	Car, Station	557	2	1	0.000	0.000	Bruce Hwy	Rockhampton - Yepp
Road Section		16A Rockhampton - Duaringa															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20130303140	13-MAR-2013	Wed	19	302	E	Hosp	0	15	Car, Station	Car, Station	27	1	1	0.000	0.000	Bruce Hwy	Capricorn Hwy
20900338957	04-MAY-2009	Mon	12	302	E	Hosp	0	15	Motor Cycle	Motor Cycle	27	1	1	0.000	0.000	Bruce Hwy	Capricorn Hwy
20900858571	03-NOV-2009	Tue	08	301	E	Treat	0	15	Car, Station	Car, Station	27	1	1	0.000	0.000	Bruce Hwy	Capricorn Hwy



Road Crash 2

Road Section	10E	Benaraby - Rockhampton										Cway		Tdist	0.000	-	121.050		
Road Section	41F	Mt Morgan-Rockhampton																	
Crash No.		Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2	
20900725481		17-SEP-2009	Thu	10	703	E	Prop	0	99	Car, Station		37	1	5	0.000	31.910	Bruce Hwy		
Road Section	46A	Gladstone - Biloela																	
Crash No.		Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2	
20100580169		16-JUN-2010	Wed	10	101	E	Treat	0	10	Car, Station	Car, Station	40	1	5	0.000	19.050	Bruce Hwy	Dawson Hwy	
20100610423		25-JUN-2010	Fri	19	101	N	Hosp	0	10	Car, Station	Road Train/B	40	1	5	0.000	19.050	Bruce Hwy	Dawson Hwy	
20130363687		27-MAR-2013	Wed	12	101	E	Hosp	0	10	Car, Station	Car, Station	40	1	5	0.000	19.050	Bruce Hwy	Dawson Hwy	

Crash Types	
Crash Dates	17-SEP-2008 - 16-SEP-2013
Owner	MR DEPARTMENT OF MAIN ROADS
DCA Code	
Group	
Fatalities	=
Severity	
Nature	
Alignment:	Vertical
	Horizontal
	Feature
	Traffic Ctrl
	Speed Limit
	Contrib Circ.
	Unit Type
	Risk Factor
Area	LGA
	SLA
	Police Division
Road Sections	
All Road Sections	S
	Include Crashes on
	Y
	Thru road Mid-block
	Y
	Thru roads at Intersections
	Y
	Intersecting roads at Intersections
	Y
	Number of Crashes
	Minor
	PDO
	Total
	16A ROCKHAMPTON - DUARINGA
	1
	0.000
	12
	0.000
	0.000
	73.350
	6
	31
	17
	6
	28
	88
Intersections	
All Intersections	N

Road Section																		16A Rockhampton - Duaringa				Cway		Tdist		0.000		- 73.350					
Road Section																		10E Benaraby - Rockhampton															
Crash No.	Date	Day	Hour	Deca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2																
20100190294	31-JAN-2010	Sun	11	703	S	Prop	0	99	Car, Station		27	1	18	0.000	116.960	Bruce Hwy																	
20100292749	06-MAR-2010	Sat	10	301	N	Prop	0	15	Car, Station	Car, Station	27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy																
20100702346	26-JUL-2010	Mon	16	301	S	Treat	0	99	Car, Station	Car, Station	27	1	18	0.000	116.960	Bruce Hwy																	
20100741163	04-AUG-2010	Wed	18	303	W	Treat	0	15	Car, Station	Car, Station	27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy																
20800591296	18-SEP-2008	Thu	07	708	S	Prop	0	15	Articulated Vi		27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy																
20800672236	21-OCT-2008	Tue	12	708	E	Hosp	0	15	Articulated Vi		27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy																
20900289784	16-APR-2009	Thu	10	705	N	Treat	0	15	Articulated Vi		27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy																
20900937995	29-NOV-2009	Sun	15	805	N	Hosp	0	15	Motor Cycle		27	1	18	0.000	116.960	Bruce Hwy	Capricorn Hwy																
Road Section																		16A Rockhampton - Duaringa															
Crash No.	Date	Day	Hour	Deca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2																
20130303140	13-MAR-2013	Wed	19	302	E	Hosp	0	15	Car, Station	Car, Station	27	1	1	0.000	0.000	Bruce Hwy	Capricorn Hwy																
20900338957	04-MAY-2009	Mon	12	302	E	Hosp	0	15	Motor Cycle	Motor Cycle	27	1	1	0.000	0.000	Bruce Hwy	Capricorn Hwy																
20900858571	03-NOV-2009	Tue	08	301	E	Treat	0	15	Car, Station	Car, Station	27	1	1	0.000	0.000	Bruce Hwy	Capricorn Hwy																
20800664406	18-OCT-2008	Sat	09	301	E	Prop	0	99	Car, Station	Car, Station		1	1	0.040	0.040	Capricorn Hwy																	
20120156143	15-FEB-2012	Wed	16	301	E	Hosp	0	99	Utility, Panel	Car, Station		1	1	0.070	0.070	Capricorn Hwy																	
20120767333	07-AUG-2012	Tue	18	305	W	Hosp	0	99	Car, Station	Car, Station		1	1	0.102	0.102	Capricorn Hwy																	
20100140755	14-JAN-2010	Thu	15	301	E	Treat	0	99	Car, Station	Utility, Panel		1	1	0.225	0.225	Capricorn Hwy																	
20900556929	21-JUL-2009	Tue	15	804	E	Hosp	0	99	Car, Station			1	1	0.250	0.250	Capricorn Hwy																	
20800670379	20-OCT-2008	Mon	11	803	S	Prop	0	99	Car, Station			1	1	0.400	0.400	Capricorn Hwy																	
20110276171	30-MAR-2011	Wed	15	301	W	Treat	0	99	Utility, Panel	Utility, Panel		1	1	0.994	0.994	Capricorn Hwy																	
20100270765	26-FEB-2010	Fri	23	609	W	Prop	0	99	Car, Station	Animal - Stoc		1	1	1.080	1.080	Capricorn Hwy																	
20900329749	30-APR-2009	Thu	20	003	E	Fatal	1	99	Pedestrian	Car, Station		1	1	1.275	1.275	Capricorn Hwy																	
20900302041	20-APR-2009	Mon	17	004	W	Hosp	0	99	Special Purpl	Pedestrian		1	1	1.500	1.500	Capricorn Hwy																	

Road Section

16A Rockhampton - Duaringa

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Road Section

16A Rockhampton - Duaringa

Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20800816669	16-DEC-2008	Tue	09	608	W	Treat	0	50	Car, Station	Road Train/B		1	1	1.915	1.915	Capricorn Hwy	
20120159241	16-FEB-2012	Thu	07	201	W	Fatal	1	50	Car, Station	Car, Station		1	1	2.010	2.010	Capricorn Hwy	
20900513323	06-JUL-2009	Mon	02	704	N	Hosp	0	99	Utility, Panel			1	1	2.223	2.223	Capricorn Hwy	
20900108286	10-FEB-2009	Tue	08	301	E	Prop	0	99	Car, Station	Car, Station		1	1	2.515	2.515	Capricorn Hwy	
20900644524	20-AUG-2009	Thu	09	301	E	Prop	0	99	Car, Station	Car, Station		1	1	2.700	2.700	Capricorn Hwy	
20100514883	24-MAY-2010	Mon	10	103	E	Hosp	0	10	Utility, Panel	Utility, Panel	697	1	1	2.815	2.815	Capricorn Hwy	Old Capricorn Hwy
20100994962	04-NOV-2010	Thu	08	301	E	Prop	0	99	Utility, Panel	Car, Station	697	1	1	2.815	2.815	Capricorn Hwy	
20900525555	10-JUL-2009	Fri	07	101	S	Inj	0	10	Truck	Utility, Panel	697	1	1	2.815	2.815	Capricorn Hwy	Old Capricorn Hwy
20100454649	02-MAY-2010	Sun	22	609	W	Prop	0	99	Car, Station	Animal - Stod		1	1	2.950	2.950	Capricorn Hwy	
20110729177	18-AUG-2011	Thu	18	609	S	Hosp	0	99	Car, Station	Animal - Stod		1	1	3.005	3.005	Capricorn Hwy	
20130101948	24-JAN-2013	Thu	09	301	E	Hosp	0	99	Car, Station	Utility, Panel		1	1	3.161	3.161	Capricorn Hwy	
20110732966	18-AUG-2011	Thu	18	301	E	Inj	0	99	Car, Station	Utility, Panel		1	1	3.208	3.208	Capricorn Hwy	
20100441796	28-APR-2010	Wed	19	609	E	Prop	0	99	Car, Station	Animal - Stod		1	1	3.215	3.215	Capricorn Hwy	
20100445048	29-APR-2010	Thu	18	609	W	Prop	0	99	Car, Station	Animal - Stod		1	1	3.250	3.250	Capricorn Hwy	
20800660852	17-OCT-2008	Fri	00	703	S	Inj	0	99	Car, Station			1	1	3.508	3.508	Capricorn Hwy	
20100137493	13-JAN-2010	Wed	14	104	N	Prop	0	10	Car, Station	Car, Station	699	1	1	3.538	3.538	Capricorn Hwy	Old Capricorn Hwy
20100273879	28-FEB-2010	Sun	17	101	W	Hosp	0	10	Utility, Panel	Car, Station	699	1	1	3.538	3.538	Capricorn Hwy	Fairy Bower Rd
20900106960	09-FEB-2009	Mon	08	104	E	Hosp	0	10	Utility, Panel	Car, Station	699	1	1	3.538	3.538	Capricorn Hwy	Old Capricorn Hwy
20900197791	13-MAR-2009	Fri	17	104	W	Treat	0	10	Car, Station	Utility, Panel	699	1	1	3.538	3.538	Capricorn Hwy	Old Capricorn Hwy
20900385111	21-MAY-2009	Thu	17	303	W	Treat	0	10	Car, Station	Car, Station	699	1	1	3.538	3.538	Capricorn Hwy	Fairy Bower Rd
20900560174	22-JUL-2009	Wed	15	104	W	Prop	0	10	Car, Station	Car, Station	699	1	1	3.538	3.538	Capricorn Hwy	Old Capricorn Hwy
20900961520	07-DEC-2009	Mon	15	104	W	Prop	0	10	Car, Station	Car, Station	699	1	1	3.538	3.538	Capricorn Hwy	Old Capricorn Hwy
20900644129	20-AUG-2009	Thu	07	201	W	Hosp	0	99	Utility, Panel	Car, Station		1	2	0.266	4.406	Capricorn Hwy	

Road Section

16A Rockhampton - Duaringa

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Road Section

16A Rockhampton - Duaringa

Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100324128	17-MAR-2010	Wed	15	301	S	Prop	0	99	Car, Station	Car, Station		1	2	1.341	5.481	Capricorn Hwy	
20900826907	23-OCT-2009	Fri	06	804	E	Hosp	0	99	Car, Station			1	2	1.480	5.620	Capricorn Hwy	
20100781583	23-AUG-2010	Mon	12	202	E	Prop	0	11	Car, Station	Car, Station	820	1	3	0.000	5.690	Capricorn Hwy	Gavial - Gracemere F
20100813954	03-SEP-2010	Fri	10	104	S	Hosp	0	11	Utility, Panel	Utility, Panel	820	1	3	0.000	5.690	Capricorn Hwy	Gavial - Gracemere F
20110695358	09-AUG-2011	Tue	05	104	S	Treat	0	11	Car, Station	Car, Station	820	1	3	0.000	5.690	Capricorn Hwy	Gavial - Gracemere F
20120074009	22-JAN-2012	Sun	13	301	W	Hosp	0	11	Car, Station	Car, Station	820	1	3	0.000	5.690	Capricorn Hwy	Mclaughlin St
20901018117	27-DEC-2009	Sun	09	303	E	Prop	0	11	Car, Station	Car, Station	704	1	3	1.066	6.756	Capricorn Hwy	O'Shanesy St
20120958998	25-SEP-2012	Tue	19	705	W	Hosp	0	99	Car, Station			1	3	2.349	8.039	Capricorn Hwy	
20100382403	07-APR-2010	Wed	14	301	W	Prop	0	99	Utility, Panel	Utility, Panel		1	3	2.375	8.065	Capricorn Hwy	
20100639397	06-JUL-2010	Tue	15	104	W	Treat	0	11	Utility, Panel	Car, Station	707	1	3	2.888	8.578	Capricorn Hwy	Somerset Rd
20100240743	17-FEB-2010	Wed	15	201	N	Inj	0	99	Car, Station	Utility, Panel		1	3	3.956	9.646	Capricorn Hwy	
20120851439	07-JUL-2012	Sat	19	301	E	Hosp	0	99	Utility, Panel	Car, Station		1	3	5.579	11.269	Capricorn Hwy	
20120330930	06-APR-2012	Fri	07	703	N	Hosp	0	99	Car, Station			1	3	5.723	11.413	Capricorn Hwy	
20100924095	11-OCT-2010	Mon	10	303	W	Inj	0	11	Car, Station	Car, Station		1	3	6.100	11.790	Capricorn Hwy	Kabra - Scrubby Cree
20100653121	11-JUL-2010	Sun	15	303	W	Prop	0	99	Car, Station	Car, Station		1	3	7.030	12.720	Capricorn Hwy	
20100472323	09-MAY-2010	Sun	08	201	E	Treat	0	99	Car, Station	Car, Station		1	4	1.925	14.805	Capricorn Hwy	
20900574958	27-JUL-2009	Mon	19	703	W	Prop	0	99	Car, Station			1	4	3.810	16.690	Capricorn Hwy	
20900258737	04-APR-2009	Sat	14	506	E	Fatal	1	99	Motor Cycle	Utility, Panel		1	4	5.913	18.793	Capricorn Hwy	
20900793557	11-OCT-2009	Sun	17	703	E	Prop	0	20	Car, Station			1	4	5.943	18.823	Capricorn Hwy	
20900706850	10-SEP-2009	Thu	21	506	W	Prop	0	11	Car, Station	Car, Station		1	4	7.680	20.560	Capricorn Hwy	Power Station Rd
20121086800	27-OCT-2012	Sat	20	301	E	Hosp	0	11	Utility, Panel	Motor Cycle		1	4	8.297	21.177	Dawson Hwy	Muirhead St
20120077832	23-JAN-2012	Mon	12	607	N	Hosp	0	99	Truck			1	4	9.549	22.429	Capricorn Hwy	
20110588677	06-JUL-2011	Wed	18	201	W	Fatal	1	99	Car, Station	Car, Station		1	5	3.680	33.150	Capricorn Hwy	

Road Section		16A Rockhampton - Duaringa										Cway		Tdist		0.000		- 73.350	
Road Section		16A Rockhampton - Duaringa																	
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2		
20101110191	12-DEC-2010	Sun	14	607	W	Prop	0	99	Car, Station			1	5	5.660	35.130	Capricorn Hwy			
201110434682	18-MAY-2011	Wed	11	301	S	Treat	0	99	Utility, Panel	Car, Station		1	6	1.626	38.286	Capricorn Hwy			
20900789315	10-OCT-2009	Sat	01	800	W	Hosp	0	99	Utility, Panel			1	6	2.240	38.900	Capricorn Hwy			
20900120842	14-FEB-2009	Sat	16	607	W	Inj	0	99	Utility, Panel			1	6	3.274	39.934	Capricorn Hwy			
20100313369	13-MAR-2010	Sat	21	609	W	Prop	0	99	Car, Station	Animal - Stoc		1	6	8.637	45.297	Capricorn Hwy			
20110304995	07-APR-2011	Thu	19	802	S	Treat	0	99	Car, Station			1	7	1.846	47.756	Capricorn Hwy			
20130438410	13-APR-2013	Sat	11	700	W	Hosp	0	99	Car, Station			1	8	0.852	49.632	Capricorn Hwy			
20900824091	22-OCT-2009	Thu	03	609	E	Hosp	0	99	Utility, Panel	Animal - Othe		1	8	1.440	50.220	Capricorn Hwy			
20800734050	14-NOV-2008	Fri	11	800	W	Prop	0	99	Utility, Panel			1	9	1.000	52.620	Capricorn Hwy			
20120624364	30-JUN-2012	Sat	06	609	E	Hosp	0	99	Truck	Animal - Othe		1	9	2.000	53.620	Capricorn Hwy			
20120674383	13-JUL-2012	Fri	18	609	E	Hosp	0	99	Utility, Panel	Animal - Stoc		1	11	1.456	61.646	Capricorn Hwy			
20100289683	05-MAR-2010	Fri	22	501	E	Fatal	1	99	Utility, Panel	Motor Cycle		1	11	2.930	63.120	Capricorn Hwy			
20900555247	11-JUL-2009	Sat	05	704	E	Treat	0	99	Car, Station			1	11	3.040	63.230	Capricorn Hwy			
20111072026	29-NOV-2011	Tue	22	804	E	Hosp	0	99	Motor Cycle			1	11	6.002	66.192	Capricorn Hwy			
20800741024	17-NOV-2008	Mon	09	502	E	Treat	0	99	Utility, Panel			1	11	6.941	67.131	Capricorn Hwy			
20900305894	22-APR-2009	Wed	04	803	W	Hosp	0	99	Utility, Panel			1	11	10.410	70.600	Capricorn Hwy			
20900181922	07-MAR-2009	Sat	22	805	W	Treat	0	99	Car, Station			1	11	10.834	71.024	Capricorn Hwy			
20121098903	29-OCT-2012	Mon	23	804	W	Hosp	0	99	Car, Station			1	11	11.733	71.923	Capricorn Hwy			
20120835886	25-AUG-2012	Sat	11	201	W	Fatal	1	99	Motor Cycle	Car, Station		1	11	11.790	71.980	Capricorn Hwy			
20100997258	04-NOV-2010	Thu	19	800	E	Prop	0	99	Utility, Panel			1	11	11.900	72.090	Capricorn Hwy			
20100577895	15-JUN-2010	Tue	04	609	E	Prop	0	99	Utility, Panel	Animal - Othe		1	11	12.104	72.294	Capricorn Hwy			

Crash Types	
Crash Dates	17-SEP-2008 - 16-SEP-2013
Owner	MR DEPARTMENT OF MAIN ROADS
DCA Code	
Group	
Fatalities	=
Severity	
Nature	
Alignment: Vertical	
Horizontal	
Feature	
Traffic Ctrl	
Speed Limit	
Contrib Circ.	
Unit Type	
Risk Factor	
Area	LGA
SLA	Police Division
Road Sections	
All Road Sections	S
Road Section	16B DUARINGA - EMERALD
Include Crashes on	Y
Thru road Mid-block	Y
Cway	
RPC	1
Dist	0.000
RPC	19
Dist	0.000
End	
RPC	
Dist	0.000
Start	0.000
End	159.550
Tdist	
Start	
End	
Fatal	4
Hosp. Medical	35
Minor	25
PDO	4
Total	31
99	
Intersections	
All Intersections	N

Road Section

16B Duaringa - Emerald

Cway

Tdist

0.000

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159.550

Road Section

16B Duaringa - Emerald

Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900803286	14-OCT-2009	Wed	19	202	W	Treat	0	11	Utility, Panel	Car, Station	59	1	1	0.000	0.000	Capricorn Hwy	Duaringa Connection
20900133968	19-FEB-2009	Thu	11	400	W	Prop	0	99	Articulated V			1	1	0.050	0.050	Capricorn Hwy	
20100675868	19-JUL-2010	Mon	11	303	W	Prop	0	99	Car, Station	Utility, Panel		1	1	0.502	0.502	Capricorn Hwy	
20100339480	21-MAR-2010	Sun	19	607	W	Prop	0	99	Car, Station			1	1	1.000	1.000	Capricorn Hwy	
20900655204	24-AUG-2009	Mon	07	800	E	Hosp	0	99	Car, Station			1	1	1.000	1.000	Capricorn Hwy	
20100820320	05-SEP-2010	Sun	15	704	W	Inj	0	99	Car, Station			1	1	1.783	1.783	Capricorn Hwy	
20800847367	28-DEC-2008	Sun	18	705	E	Treat	0	99	Utility, Panel			1	1	2.000	2.000	Capricorn Hwy	
20800829886	21-DEC-2008	Sun	02	803	W	Treat	0	99	Car, Station			1	1	3.990	3.990	Capricorn Hwy	
20130046849	11-JAN-2013	Fri	15	301	E	Hosp	0	99	Car, Station	Utility, Panel		1	1	5.818	5.818	Capricorn Hwy	
20120665536	11-JUL-2012	Wed	17	703	W	Fatal	1	99	Car, Station			1	2	1.540	8.370	Capricorn Hwy	
20900558331	21-JUL-2009	Tue	14	800	E	Hosp	0	99	Car, Station			1	2	1.846	8.676	Capricorn Hwy	
20900345107	06-MAY-2009	Wed	16	704	W	Treat	0	99	Utility, Panel			1	2	11.248	18.078	Capricorn Hwy	
20110345347	19-APR-2011	Tue	17	704	W	Hosp	0	99	Car, Station			1	3	0.315	18.445	Capricorn Hwy	
20900230342	25-MAR-2009	Wed	05	201	E	Hosp	0	99	Utility, Panel	Articulated V		1	3	7.415	25.545	Capricorn Hwy	
20101076129	30-NOV-2010	Tue	15	805	E	Treat	0	99	Motor Cycle			1	4	0.000	27.830	Capricorn Hwy	
20900045	18-JUN-2009	Thu	18	607	E	Prop	0	99	Utility, Panel			1	4	1.210	29.040	Capricorn Hwy	
20110944195	24-OCT-2011	Mon	01	703	W	Fatal	1	99	Utility, Panel			1	4	3.170	31.000	Capricorn Hwy	
20100264600	24-FEB-2010	Wed	19	201	E	Treat	0	99	Articulated V	Car, Station		1	4	5.207	33.037	Capricorn Hwy	
20900789945	10-OCT-2009	Sat	07	702	E	Prop	0	99	Utility, Panel			1	5	1.193	37.233	Capricorn Hwy	
20110834684	19-SEP-2011	Mon	16	301	E	Hosp	0	99	Car, Station	Car, Station		1	5	1.973	38.013	Capricorn Hwy	
20110593096	22-JUN-2011	Wed	14	301	W	Treat	0	99	Road Train/B	Car, Station		1	5	4.986	41.026	Capricorn Hwy	
20100753427	13-AUG-2010	Fri	22	609	E	Hosp	0	99	Car, Station	Animal - Stoc		1	5	5.837	41.877	Capricorn Hwy	
20100572318	12-JUN-2010	Sat	21	609	W	Prop	0	99	Utility, Panel	Animal - Stoc		1	5	6.572	42.612	Capricorn Hwy	

Road Crash 2
CRASH LISTING REPORT

Road Section		16B Duaringa - Emerald				Cway		Tdist		0.000		- 159.550					
Road Section		Duaringa - Emerald															
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900692212	05-SEP-2009	Sat	19	609	W	Treat	0	99	Car, Station	Animal - Stoc		1	6	0.323	42.963	Capricorn Hwy	
20900465416	18-JUN-2009	Thu	18	609	E	Hosp	0	99	Car, Station	Animal - Stoc		1	6	0.400	43.040	Capricorn Hwy	
20101045802	20-NOV-2010	Sat	18	607	W	Prop	0	99	Utility, Panel			1	6	1.434	44.074	Capricorn Hwy	
20900230724	25-MAR-2009	Wed	12	408	W	Treat	0	99	Car, Station	Car, Station		1	6	5.190	47.830	Capricorn Hwy	
20900972158	11-DEC-2009	Fri	10	705	W	Prop	0	99	Car, Station			1	6	5.330	47.970	Capricorn Hwy	
20120734929	30-JUL-2012	Mon	11	803	E	Hosp	0	99	Car, Station			1	6	5.455	48.095	Capricorn Hwy	
20800662261	17-OCT-2008	Fri	12	704	W	Prop	0	99	Car, Station			1	6	6.640	49.280	Capricorn Hwy	
20900126476	16-FEB-2009	Mon	15	803	W	Hosp	0	99	Car, Station			1	6	14.104	56.744	Capricorn Hwy	
20110695390	08-AUG-2011	Mon	02	702	E	Treat	0	99	Car, Station			1	6	14.516	57.156	Capricorn Hwy	Invalid Street From P
20100550234	05-JUN-2010	Sat	17	703	W	Hosp	0	99	Car, Station			1	6	15.230	57.870	Capricorn Hwy	
20120943855	21-SEP-2012	Fri	16	303	W	Fatal	1	11	Car, Station	Utility, Panel	440	1	7	2.910	61.120	Capricorn Hwy	Rockview Rd
20900575535	27-JUL-2009	Mon	18	802	W	Treat	0	99	Car, Station			1	7	2.915	61.125	Capricorn Hwy	
20100187931	30-JAN-2010	Sat	14	400	W	Treat	0	99	Motor Cycle			1	7	6.455	64.665	Capricorn Hwy	
20120976299	30-SEP-2012	Sun	01	805	E	Hosp	0	99	Car, Station		221	1	7	6.838	65.048	Capricorn Hwy	
20121025417	12-OCT-2012	Fri	19	803	W	Hosp	0	99	Car, Station		221	1	7	6.838	65.048	Capricorn Hwy	
20800608010	25-SEP-2008	Thu	02	803	W	Hosp	0	99	Articulated V			1	7	6.908	65.118	Capricorn Hwy	
20900340065	05-MAY-2009	Tue	01	703	W	Prop	0	99	Car, Station			1	7	9.110	67.320	Capricorn Hwy	
20800718302	08-NOV-2008	Sat	13	803	W	Treat	0	99	Utility, Panel			1	8	0.050	68.730	Capricorn Hwy	
20130739159	24-JUN-2013	Mon	07	303	W	Fatal	1	11	Car, Station	Utility, Panel	80	1	8	5.820	74.500	Capricorn Hwy	Yarrabee Mine Acces
20900743046	23-SEP-2009	Wed	17	610	W	Hosp	0	99	Utility, Panel	Car, Station		1	8	10.022	78.702	Capricorn Hwy	
20100131195	11-JAN-2010	Mon	08	502	E	Treat	0	99	Car, Station			1	8	10.023	78.703	Capricorn Hwy	
20900873686	08-NOV-2009	Sun	14	704	E	Inj	0	99	Utility, Panel			1	8	10.023	78.703	Capricorn Hwy	
20100934038	14-OCT-2010	Thu	17	502	E	Hosp	0	99	Utility, Panel			1	8	10.130	78.810	Capricorn Hwy	

Road Section		16B Duaringa - Emerald				Cway				Tdist		0.000		- 159.550			
Road Section		Duaringa - Emerald															
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20101072632	29-NOV-2010	Mon	18	500	W	Prop	0	99	Utility, Panel	Truck		1	8	10.141	78.821	Capricorn Hwy	
20110779810	03-SEP-2011	Sat	04	400	W	Hosp	0	99	Utility, Panel			1	9	0.368	81.868	Capricorn Hwy	
20100393799	11-APR-2010	Sun	16	703	W	Treat	0	11	Motor Cycle		125	1	9	1.873	83.373	Arthur St	Capricorn Hwy
20100700754	27-JUL-2010	Tue	16	703	W	Prop	0	99	Utility, Panel		125	1	9	1.873	83.373	Capricorn Hwy	
20900312934	24-APR-2009	Fri	17	104	S	Prop	0	11	Car, Station	Utility, Panel	125	1	9	1.873	83.373	Arthur St	Capricorn Hwy
20100267477	26-FEB-2010	Fri	10	703	E	Prop	0	11	Car, Station		135	1	9	2.500	84.000	Capricorn Hwy	Mackenzie St
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1	10	0.000	84.090	Blackwater - Rolleston	Capricorn Hwy
20900173456	05-MAR-2009	Thu	09	301	E	Inj	0	99	Utility, Panel	Utility, Panel		1	11	0.200	86.350	Capricorn Hwy	
20900744159	22-SEP-2009	Tue	20	607	E	Prop	0	99	Car, Station			1	11	6.282	92.432	Capricorn Hwy	
20110629000	19-JUL-2011	Tue	19	301	E	Hosp	0	99	Car, Station	Utility, Panel		1	11	6.370	92.520	Capricorn Hwy	
20130392021	02-APR-2013	Tue	19	501	E	Hosp	0	99	Car, Station	Car, Station		1	12	8.184	102.764	Capricorn Hwy	
20110845570	23-SEP-2011	Fri	07	800	W	Treat	0	99	Car, Station			1	12	8.191	102.771	Capricorn Hwy	
20110171242	27-FEB-2011	Sun	11	301	W	Hosp	0	99	Car, Station	Special Purp		1	12	9.664	104.244	Capricorn Hwy	
20900976221	12-DEC-2009	Sat	11	701	E	Inj	0	99	Special Purp			1	12	16.820	111.400	Capricorn Hwy	
20111028159	17-NOV-2011	Thu	14	701	E	Hosp	0	99	Utility, Panel			1	12	18.745	113.325	Capricorn Hwy	
20900660376	26-AUG-2009	Wed	02	201	W	Hosp	0	99	Utility, Panel	Truck		1	14	3.200	119.000	Capricorn Hwy	
20110554124	25-JUN-2011	Sat	15	804	W	Treat	0	20	Car, Station			1	14	4.791	120.591	Capricorn Hwy	
20900763422	30-SEP-2009	Wed	23	803	W	Hosp	0	99	Car, Station			1	14	5.367	121.167	Capricorn Hwy	
20900996041	18-DEC-2009	Fri	23	701	W	Prop	0	99	Utility, Panel			1	14	5.500	121.300	Capricorn Hwy	
20900746355	24-SEP-2009	Thu	19	800	W	Prop	0	99	Car, Station			1	15	0.760	125.400	Capricorn Hwy	
20100184766	29-JAN-2010	Fri	11	702	E	Prop	0	99	Car, Station		83	1	15	3.310	127.950	Capricorn Hwy	
20100998465	05-NOV-2010	Fri	13	502	E	Hosp	0	99	Car, Station			1	15	3.734	128.374	Capricorn Hwy	
20100772387	20-AUG-2010	Fri	11	301	W	Prop	0	99	Utility, Panel	Car, Station		1	15	7.361	132.001	Capricorn Hwy	

Road Crash 2
CRASH LISTING REPORT

Road Section		16B Duaringa - Emerald								Cway		Tdist		0.000		- 159.550	
Road Section		Duaringa - Emerald															
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20101098882	08-DEC-2010	Wed	17	704	W	Treat	0	99	Car, Station			1	15	7.361	132.001	Capricorn Hwy	
20100769845	19-AUG-2010	Thu	14	504	E	Hosp	0	99	Car, Station	Car, Station		1	15	7.363	132.003	Capricorn Hwy	
20900666875	28-AUG-2009	Fri	07	406	S	Hosp	0	99	Car, Station	Truck		1	16	0.061	136.211	Capricorn Hwy	
20800599756	19-SEP-2008	Fri	18	703	E	Prop	0	99	Car, Station			1	16	2.190	138.340	Capricorn Hwy	
20120542097	07-JUN-2012	Thu	05	705	E	Hosp	0	99	Car, Station			1	16	3.457	139.607	Capricorn Hwy	
20130387842	02-APR-2013	Tue	01	704	E	Hosp	0	99	Car, Station			1	16	5.826	141.976	Capricorn Hwy	
20800589444	17-SEP-2008	Wed	07	500	W	Prop	0	99	Car, Station	Truck		1	16	8.980	145.130	Capricorn Hwy	
20100307821	11-MAR-2010	Thu	12	703	W	Treat	0	99	Car, Station			1	16	10.276	146.426	Capricorn Hwy	
20900048864	19-JAN-2009	Mon	08	700	W	Prop	0	99	Utility, Panel			1	16	10.780	146.930	Capricorn Hwy	
20110861326	28-SEP-2011	Wed	07	406	E	Hosp	0	99	Car, Station	Utility, Panel		1	16	10.978	147.128	Capricorn Hwy	
20900156069	26-FEB-2009	Thu	11	301	E	Prop	0	99	Articulated V	Articulated V		1	17	0.100	149.210	Capricorn Hwy	
20900418694	02-JUN-2009	Tue	17	609	W	Prop	0	99	Utility, Panel	Animal - Stoc		1	17	0.478	149.588	Capricorn Hwy	
20900619260	07-AUG-2009	Fri	12	704	W	Treat	0	99	Car, Station		131	1	17	1.447	150.557	Capricorn Hwy	
20100737777	09-AUG-2010	Mon	07	704	E	Hosp	0	99	Utility, Panel			1	17	2.440	151.550	Capricorn Hwy	
20100664446	02-JUL-2010	Fri	04	609	W	Prop	0	99	Articulated V	Animal - Stoc		1	17	4.687	153.797	Capricorn Hwy	
20120232842	09-MAR-2012	Fri	01	705	E	Hosp	0	99	Utility, Panel			1	17	4.708	153.818	Capricorn Hwy	
20900840234	27-OCT-2009	Tue	23	708	E	Prop	0	11	Car, Station		85	3	18	0.100	157.660	Capricorn Hwy	Codenwarra Rd
20110637376	22-JUL-2011	Fri	06	705	W	Treat	0	99	Motor Cycle			1	18	0.600	158.160	Capricorn Hwy	
20800816992	16-DEC-2008	Tue	14	201	W	Prop	0	20	Utility, Panel	Car, Station		1	18	0.600	158.160	Capricorn Hwy	
20900218457	20-MAR-2009	Fri	15	202	W	Treat	0	10	Car, Station	Car, Station	86	1	18	1.390	158.950	Capricorn Hwy	Opal St
20900417321	02-JUN-2009	Tue	08	003	E	Treat	0	99	Pedestrian	Car, Station	86	1	18	1.390	158.950	Capricorn Hwy	
20900938490	30-NOV-2009	Mon	06	303	W	Hosp	0	99	Utility, Panel	Car, Station		1	18	1.486	159.046	Capricorn Hwy	
20900130550	18-FEB-2009	Wed	09	408	E	Prop	0	99	Car, Station	Car, Station		1	18	1.520	159.080	Capricorn Hwy	

Road Section		16B Duaringa - Emerald			Cway		Tdist		0.000		-		159.550				
Road Section		Duaringa - Emerald															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900768533	02-OCT-2009	Fri	15	900	N	Hosp	0	99	Car, Station \			1	18	1.580	159.140	Capricorn Hwy	
20800621508	29-SEP-2008	Mon	15	401	E	Prop	0	99	Car, Station \	Car, Station \		1	18	1.720	159.280	Capricorn Hwy	
20121115735	03-NOV-2012	Sat	12	402	E	Hosp	0	99	Utility, Panel	Car, Station \		1	18	1.729	159.289	Capricorn Hwy	
20100725768	05-AUG-2010	Thu	08	303	W	Prop	0	99	Utility, Panel	Car, Station \		1	18	1.758	159.318	Capricorn Hwy	
20100728784	05-AUG-2010	Thu	22	303	E	Treat	0	99	Car, Station \	Car, Station \		1	18	1.759	159.319	Capricorn Hwy	
20110611577	14-JUL-2011	Thu	13	408	W	Treat	0	11	Car, Station \	Car, Station \	88	1	18	1.810	159.370	Anakie St	Capricorn Hwy
20100636182	05-JUL-2010	Mon	17	104	W	Prop	0	11	Car, Station \	Utility, Panel	37	1	19	0.000	159.550	Capricorn Hwy	Gregory Hwy

Crash Types	
Crash Dates	17-SEP-2008 - 16-SEP-2013
Owner	MR DEPARTMENT OF MAIN ROADS
DCA Code	
Group	
Fatalities	=
Severity	
Nature	
Alignment: Vertical	
Horizontal	
Feature	
Traffic Ctrl	
Speed Limit	
Contrib Circ.	
Unit Type	
Risk Factor	
Area	LGA
SLA	Police Division
Road Sections	
All Road Sections	S
Road Section	16C EMERALD - ALPHA
Include Crashes on	
Y	Thru road Mid-block
Y	Thru roads at Intersections
Y	Intersecting roads at Intersections
Cway	RPC
1	0.000
16	0.000
Dist	0.000
End	0.000
Start	0.000
RPC	167.940
Dist	167.940
End	167.940
Fatal	3
Hosp. Medical	18
Minor	6
PDO	2
Total	11
Total	40
Intersections	
All Intersections	N

Road Crash 2
CRASH LISTING REPORT

Road Section		16C Emerald - Alpha		Cway		Tdist		0.000		- 167.940	
Road Section		16B Duaringa - Emerald									
Crash No.	Date	Day	Hour	Deca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Street 2
20100636182	05-JUL-2010	Mon	17	104	W	Prop	0	11	Car, Station	Utility, Panel	Capricorn Hwy
									37	19	Gregory Hwy
Road Section		16C Emerald - Alpha									
Crash No.	Date	Day	Hour	Deca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Street 2
20120372848	18-APR-2012	Wed	17	201	W	Hosp	0	99	Utility, Panel	Utility, Panel	Capricorn Hwy
20100450134	30-APR-2010	Fri	13	104	E	Inj	0	11	Utility, Panel	Utility, Panel	Baker St
20110580047	04-JUL-2011	Mon	07	202	W	Hosp	0	11	Car, Station	Car, Station	Capricorn Hwy
20130400619	04-APR-2013	Thu	16	202	N	Hosp	0	11	Bicycle	Car, Station	Daniels St
20900668375	28-AUG-2009	Fri	14	106	W	Hosp	0	11	Utility, Panel	Truck	Selma Rd
20100916252	08-OCT-2010	Fri	12	103	E	Prop	0	11	Car, Station	Articulated Vi	Selma Rd
20110456288	24-MAY-2011	Tue	18	706	S	Treat	0	11	Articulated Vi		Capricorn Hwy
20121327098	22-DEC-2012	Sat	05	702	E	Hosp	0	99	Omnibus		Tyson Rd
20101132916	19-DEC-2010	Sun	23	607	W	Prop	0	20	Car, Station		Capricorn Hwy
20100403689	15-APR-2010	Thu	07	301	W	Treat	0	99	Utility, Panel	Car, Station	Capricorn Hwy
20100695476	23-JUL-2010	Fri	03	704	W	Hosp	0	99	Truck		Capricorn Hwy
20100653412	11-JUL-2010	Sun	15	700	W	Treat	0	99	Car, Station		Capricorn Hwy
20101104090	10-DEC-2010	Fri	14	704	E	Prop	0	99	Utility, Panel		Capricorn Hwy
20121052952	19-OCT-2012	Fri	13	201	W	Fatal	3	99	Car, Station	Road Train/B	Capricorn Hwy
20900026679	10-JAN-2009	Sat	15	703	W	Inj	0	20	Car, Station		Capricorn Hwy
20110328684	14-APR-2011	Thu	18	201	W	Fatal	1	99	Road Train/B	Articulated Vi	Capricorn Hwy
20100899379	02-OCT-2010	Sat	09	801	W	Hosp	0	99	Car, Station		Capricorn Hwy
20900338148	04-MAY-2009	Mon	03	803	W	Treat	0	99	Car, Station		Capricorn Hwy
20800807075	11-DEC-2008	Thu	09	704	E	Prop	0	99	Utility, Panel		Capricorn Hwy
20110188548	04-MAR-2011	Fri	04	702	E	Treat	0	99	Utility, Panel		Capricorn Hwy

Road Crash 2
CRASH LISTING REPORT

Road Section		16C Emerald - Alpha		Cway		Tdist		0.000		- 167.940							
Road Section		Emerald - Alpha															
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100435701	26-APR-2010	Mon	15	705	E	Hosp	0	99	Motor Cycle			1	4	6.680	41.300	Capricorn Hwy	
20900477807	23-JUN-2009	Tue	13	101	S	Prop	0	10	Car, Station	Car, Station	75	1	5	0.000	43.300	Anakie - Sapphire Rd	Capricorn Hwy
20100817851	04-SEP-2010	Sat	04	705	W	Hosp	0	11	Utility, Panel		514	1	5	3.721	47.021	Capricorn Hwy	Withersfield Willows Rd
20900199207	13-MAR-2009	Fri	16	505	E	Hosp	0	99	Utility, Panel	Utility, Panel		1	5	8.060	51.360	Capricorn Hwy	
20120373989	19-APR-2012	Thu	06	609	E	Hosp	0	99	Utility, Panel	Animal - Other		1	6	0.965	52.415	Capricorn Hwy	
20130587433	18-MAY-2013	Sat	11	704	E	Fatal	1	99	Utility, Panel			1	6	1.765	53.215	Capricorn Hwy	
20900005	27-JAN-2009	Tue	21	608	W	Prop	0	99	Car, Station	Road Train/B		1	6	7.210	58.660	Capricorn Hwy	
20900072701	27-JAN-2009	Tue	21	703	E	Prop	0	99	Car, Station			1	6	7.210	58.660	Capricorn Hwy	
20110318144	11-APR-2011	Mon	19	802	E	Hosp	0	99	Road Train/B			1	7	7.929	79.759	Capricorn Hwy	
20110235810	18-MAR-2011	Fri	07	803	E	Treat	0	99	Car, Station			1	9	4.160	98.900	Capricorn Hwy	
20120778949	10-AUG-2012	Fri	15	704	W	Hosp	0	99	Car, Station			1	11	8.205	124.955	Capricorn Hwy	
20111162295	26-DEC-2011	Mon	16	804	W	Hosp	0	99	Utility, Panel			1	11	13.487	130.237	Capricorn Hwy	
20900274843	10-APR-2009	Fri	10	701	W	Prop	0	99	Car, Station			1	11	16.190	132.940	Capricorn Hwy	
20800698274	31-OCT-2008	Fri	14	803	W	Prop	0	99	Utility, Panel			1	12	4.750	138.450	Capricorn Hwy	
20110757243	26-AUG-2011	Fri	22	701	E	Hosp	0	99	Utility, Panel			1	13	3.348	150.018	Capricorn Hwy	
20100829600	08-SEP-2010	Wed	15	700	W	Hosp	0	99	Car, Station			1	13	4.076	150.746	Capricorn Hwy	
20120642036	05-JUL-2012	Thu	09	701	E	Hosp	0	99	Car, Station			1	13	12.058	158.728	Capricorn Hwy	
20900467270	14-JUN-2009	Sun	14	803	E	Hosp	0	99	Utility, Panel			1	14	2.694	162.824	Capricorn Hwy	
20120083601	25-JAN-2012	Wed	14	803	W	Prop	0	99	Utility, Panel			1	14	5.808	165.938	Capricorn Hwy	



Road Crash 2

Crash Types													
Crash Dates		17-SEP-2008		-		16-SEP-2013		Alignment: Vertical					
Owner		MR DEPARTMENT OF MAIN ROADS											
DCA Code													
Group													
Speed Limit													
Contrib Circ.													
Unit Type													
Risk Factor													
Area		LGA		SLA		Police Division							
Road Sections													
All Road Sections		S		Include Crashes on		Y		Thru roads at Intersections		Y		Intersecting roads at Intersections	
Road Section		Cway		RPC		Start		Dist		End		Tdist	
16D ALPHA - BARCALDINE				1		0.000		6		0.000		80.650	
								0.000				0	
												6	
												0	
												0	
												6	
												12	
Intersections													
All Intersections		N											

Road Section																	
16D Alpha - Barcaldine																	
Cway																	
Tdist																	
0.000																	
-																	
80.650																	
Road Section																	
Alpha - Barcaldine																	
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20120730044	28-JUL-2012	Sat	15	703	E	Hosp	0	99	Utility, Panel			1	1	0.567	0.567	Capricorn Hwy	
20101073038	22-NOV-2010	Mon	06	703	E	Prop	0	99	Articulated Vi			1	1	6.548	6.548	Capricorn Hwy	
20800603812	23-SEP-2008	Tue	08	704	E	Prop	0	99	Car, Station			1	2	4.000	20.800	Capricorn Hwy	
20120241352	11-MAR-2012	Sun	10	802	W	Hosp	0	99	Utility, Panel			1	3	4.600	34.270	Capricorn Hwy	
20900824732	22-OCT-2009	Thu	12	701	W	Prop	0	99	Car, Station			1	3	14.160	43.830	Capricorn Hwy	
20120525673	01-JUN-2012	Fri	23	803	E	Hosp	0	99	Car, Station			1	5	0.146	54.416	Capricorn Hwy	
20900807987	15-OCT-2009	Thu	15	704	E	Prop	0	99	Car, Station			1	5	1.560	55.830	Capricorn Hwy	
20100544378	03-JUN-2010	Thu	13	807	W	Prop	0	99	Articulated Vi			1	5	3.613	57.883	Capricorn Hwy	
20100718387	02-AUG-2010	Mon	16	701	E	Hosp	0	99	Utility, Panel			1	5	3.700	57.970	Capricorn Hwy	
20110282360	01-APR-2011	Fri	10	609	E	Hosp	0	99	Motor Cycle	Animal - Other		1	5	19.507	73.777	Capricorn Hwy	
20111102584	08-DEC-2011	Thu	16	705	E	Hosp	0	99	Utility, Panel			1	5	23.430	77.700	Capricorn Hwy	
20100261553	24-FEB-2010	Wed	07	703	E	Prop	0	99	Car, Station			1	5	25.090	79.360	Capricorn Hwy	



Road Crash 2

Crash Types																											
Crash Dates		17-SEP-2008		-		16-SEP-2013		Alignment: Vertical																			
Owner		MR DEPARTMENT OF MAIN ROADS																									
DCA Code																											
Group																											
Speed Limit																											
Contrib Circ.																											
Unit Type																											
Risk Factor																											
Area		LGA		SLA		Police Division																					
Road Sections																											
All Road Sections		S		Include Crashes on		Y		Thru roads at Intersections		Y		Intersecting roads at Intersections															
Road Section		24D ROMA - INJUNE		Cway		RPC		Start		Dist		End		Tdist		Fatal		Hosp. Medical		Minor		PDO		Total			
				1		0.000		7		0.000		0.000		90.350		0		13		4		2		7		26	
Intersections																											
All Intersections		N																									

Road Crash 2 CRASH LISTING REPORT

Road Section	24D Roma - Injune		Cway		Tdist	0.000	-	90.350									
Road Section	18D	Miles - Roma															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100395127	12-APR-2010	Mon	09	104	S	Prop	0	10	Car, Station	Utility, Panel	59	3	14	0.000	141.267	Camarvon Hwy	Warrego Hwy
20130460265	18-APR-2013	Thu	10	104	S	Hosp	0	11	Car, Station	Utility, Panel	59	3	14	0.000	141.267	Camarvon Hwy	Warrego Hwy
Road Section	18E	Roma - Mitchell															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100643863	08-JUL-2010	Thu	12	101	E	Prop	0	10	Car, Station	Utility, Panel	59	3	1	0.000	0.000	Bowen St	Warrego Hwy
20900120154	14-FEB-2009	Sat	14	101	N	Inj	0	10	Utility, Panel	Car, Station	59	2	1	0.000	0.000	Bowen St	Warrego Hwy
20900247689	31-MAR-2009	Tue	15	102	N	Prop	0	10	Utility, Panel	Utility, Panel	59	2	1	0.000	0.000	Bowen St	Warrego Hwy
Road Section	24D	Roma - Injune															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100328413	19-MAR-2010	Fri	13	301	S	Prop	0	99	Car, Station	Utility, Panel		1	1	0.526	0.526	Camarvon Hwy	
20110494536	06-JUN-2011	Mon	15	303	N	Inj	0	10	Utility, Panel	Utility, Panel		1	1	0.526	0.526	Bungil St	Camarvon Hwy
20100973430	27-OCT-2010	Wed	19	101	W	Treat	0	10	Car, Station	Motor Cycle		1	1	0.908	0.908	Camarvon Hwy	Lovell St
20110136020	16-FEB-2011	Wed	21	101	N	Treat	0	10	Car, Station	Car, Station		1	1	0.949	0.949	Camarvon Hwy	Lovell St
20110179492	01-MAR-2011	Tue	22	104	N	Hosp	0	11	Car, Station	Bicycle		1	1	1.558	1.558	Camarvon Hwy	Taylor St
20110499662	08-JUN-2011	Wed	10	702	S	Hosp	0	99	Utility, Panel			1	2	1.890	6.610	Camarvon Hwy	
20900908475	20-NOV-2009	Fri	06	705	S	Prop	0	99	Road Train/B			1	2	2.963	7.683	Camarvon Hwy	
20110478412	01-JUN-2011	Wed	10	705	N	Treat	0	99	Utility, Panel			1	2	4.820	9.540	Camarvon Hwy	
20100234859	15-FEB-2010	Mon	14	703	N	Hosp	0	99	Car, Station			1	2	6.286	11.006	Camarvon Hwy	
20900678011	01-SEP-2009	Tue	06	609	S	Prop	0	99	Utility, Panel	Animal - Other		1	3	0.879	18.439	Camarvon Hwy	
20100475105	10-MAY-2010	Mon	09	805	N	Hosp	0	99	Car, Station			1	3	12.440	30.000	Camarvon Hwy	
20110338902	17-APR-2011	Sun	18	609	S	Hosp	0	99	Motor Cycle	Animal - Stoc		1	3	20.830	38.390	Camarvon Hwy	
20110623206	18-JUL-2011	Mon	03	704	N	Hosp	0	99	Car, Station			1	3	21.854	39.414	Camarvon Hwy	
20901029733	29-DEC-2009	Tue	14	702	N	Treat	0	99	Car, Station			1	4	2.864	46.014	Camarvon Hwy	

Road Section	24D Roma - Injune		Cway		Tdlist		0.000		-		90.350						
Road Section	Roma - Injune																
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900103324	08-FEB-2009	Sun	07	700	N	Prop	0	20	Car, Station			1	5	0.900	57.350	Camarvon Hwy	
20120313573	30-MAR-2012	Fri	17	302	S	Hosp	0	10	Truck	Utility, Panel		1	5	7.757	64.207	Bymount East Rd	Camarvon Hwy
20120469807	16-MAY-2012	Wed	07	703	N	Hosp	0	99	Road Train/B			1	5	19.166	75.616	Camarvon Hwy	
20900783627	07-OCT-2009	Wed	12	703	N	Hosp	0	99	Car, Station			1	6	1.650	80.350	Camarvon Hwy	
20110365788	20-APR-2011	Wed	12	804	N	Hosp	0	99	Car, Station			1	6	5.163	83.863	Camarvon Hwy	
20121031833	14-OCT-2012	Sun	12	703	N	Hosp	0	99	Car, Station			1	6	8.776	87.476	Camarvon Hwy	
20121002445	06-OCT-2012	Sat	22	804	S	Hosp	0	99	Car, Station			1	6	9.912	88.612	Camarvon Hwy	

Road Crash 2 CRASH LISTING REPORT

Crash Types	
Crash Dates	17-SEP-2008 - 16-SEP-2013
Owner	MR DEPARTMENT OF MAIN ROADS
DCA Code	
Group	
Fatalities	=
Severity	
Nature	
Alignment:	Vertical
	Horizontal
	Feature
	Traffic Ctrl
	Speed Limit
	Contrib Circ.
	Unit Type
	Risk Factor
Area	LGA
	SLA
	Police Division
Road Sections	
All Road Sections	☒ S
Road Section	24E INJUNE - ROLLESTON
Include Crashes on	☒ Y
Thru road Mid-block	☒ Y
Thru road RPC	5
Dist	0.000
Start	12
End	12
RPC	0.000
Dist	0.000
Start	68.510
End	172.310
Tdist	172.310
Intersecting roads at Intersections	☒ Y
Fatal	1
Hosp. Medical	11
Minor	0
PDO	3
Total	23
Intersections	
All Intersections	☒ N

Road Section		24E Injune - Rolleston		Cway		Tdist		68.510		- 172.310								
Road Section		24E Injune - Rolleston																
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2	
20110046155	17-JAN-2011	Mon	21	609	N	Hosp	0	99	Car, Station	Animal - Stoc		1	5	1.542	70.052	Camarvon Hwy		
20110523325	15-JUN-2011	Wed	13	800	N	Hosp	0	99	Road Train/B			1	5	10.259	78.769	Camarvon Hwy		
20100330471	19-MAR-2010	Fri	22	701	N	Hosp	0	99	Utility, Panel			1	6	0.880	81.320	Camarvon Hwy		
20100475633	07-MAY-2010	Fri	14	805	N	Prop	0	99	Towed Devic			1	6	1.120	81.560	Camarvon Hwy		
20900542399	16-JUL-2009	Thu	05	702	S	Prop	0	99	Utility, Panel			1	6	2.280	82.720	Camarvon Hwy		
20101122768	16-DEC-2010	Thu	12	801	S	Inj	0	99	Car, Station			1	6	5.006	85.446	Camarvon Hwy		
20111074324	30-NOV-2011	Wed	09	701	S	Hosp	0	99	Truck			1	7	5.218	106.258	Camarvon Hwy		
20110340952	18-APR-2011	Mon	14	701	S	Hosp	0	11	Motor Cycle		116	1	7	10.170	111.210	Camarvon Hwy	Wyseby Rd	
20100257757	28-JAN-2010	Thu	19	607	N	Prop	0	99	Car, Station			1	8	0.730	112.310	Camarvon Hwy		
20900354135	09-MAY-2009	Sat	00	705	N	Inj	0	99	Articulated Vi			1	8	3.620	115.200	Camarvon Hwy		
20900616889	10-AUG-2009	Mon	14	702	S	Prop	0	99	Car, Station			1	8	10.730	122.310	Camarvon Hwy		
20900536017	14-JUL-2009	Tue	02	609	S	Prop	0	99	Car, Station	Animal - Othe		1	8	12.400	123.980	Camarvon Hwy		
20110054468	19-JAN-2011	Wed	15	703	N	Hosp	0	99	Utility, Panel			1	8	15.883	127.463	Camarvon Hwy		
20111146734	20-DEC-2011	Tue	14	700	S	Hosp	0	99	Utility, Panel			1	8	16.054	127.634	Camarvon Hwy		
20800837713	05-DEC-2008	Fri	06	703	S	Prop	0	99	Utility, Panel			1	9	0.300	130.940	Camarvon Hwy		
20900007617	03-JAN-2009	Sat	15	701	S	Prop	0	99	Car, Station			1	9	6.670	137.310	Camarvon Hwy		
20900542277	15-JUL-2009	Wed	13	702	S	Hosp	0	99	Articulated Vi			1	9	10.500	141.140	Camarvon Hwy		
20900717844	14-SEP-2009	Mon	15	500	S	Fatal	1	99	Road Train/B	Car, Station		1	10	3.530	148.610	Camarvon Hwy		
20110207476	09-MAR-2011	Wed	12	803	N	Hosp	0	99	Utility, Panel			1	10	4.320	149.400	Camarvon Hwy		
20120388461	14-APR-2012	Sat	00	805	N	Hosp	0	99	Utility, Panel			1	10	7.225	152.305	Camarvon Hwy		
20900097455	06-FEB-2009	Fri	03	004	S	Hosp	0	99	Pedestrian	Utility, Panel		1	11	9.910	163.310	Camarvon Hwy		
20101062139	25-NOV-2010	Thu	19	609	S	Prop	0	99	Utility, Panel	Animal - Stoc		1	11	12.644	166.044	Camarvon Hwy		
Road Section		46D		Rolleston - Springsure														

Road Section	24E Injune - Rolleston		Cway		Tdist	68.510	-	172.310
Road Section	46D Rolleston - Springsure							
Crash No.	20100687855	Date	23-JUL-2010	Day	Fri	Hour	05	700
				Key Seve	Inj	Fatal	0	11
				Feature	Utility, Panel	Vehicle 1		
				Vehicle 2		Inter	45	1
				Way	2	RPC		
				Dist	0.000	Tdist	0.660	
				Street 1	Camarvon Hwy	Street 2	Dawson Hwy	

Road Crash 2 CRASH LISTING REPORT

Crash Types																																																													
Crash Dates	17-SEP-2008 - 16-SEP-2013																																																												
Owner	MR DEPARTMENT OF MAIN ROADS																																																												
DCA Code																																																													
Group																																																													
Fatalities	=																																																												
Severity																																																													
Nature																																																													
Alignment:	Vertical																																																												
	Horizontal																																																												
Feature																																																													
Traffic Ctrl																																																													
Speed Limit																																																													
Contrib Circ.																																																													
Unit Type																																																													
Risk Factor																																																													
Area	LGA																																																												
SLA																																																													
Police Division																																																													
Road Sections																																																													
All Road Sections	☒ Include Crashes on ☒ Thru road Mid-block ☒ Thru roads at Intersections ☒ Intersecting roads at Intersections																																																												
Road Section	27A SPRINGSURE - EMERALD																																																												
	<table border="1"> <thead> <tr> <th colspan="2">Start</th> <th colspan="2">Dist</th> <th colspan="2">RPC</th> <th colspan="2">End</th> <th colspan="2">Tdist</th> <th colspan="2">Fatal</th> <th colspan="2">Hosp. Medical</th> <th colspan="2">Minor</th> <th colspan="2">PDO</th> <th colspan="2">Total</th> </tr> <tr> <th>Cway</th> <th>RPC</th> <th>Start</th> <th>Dist</th> <th>RPC</th> <th>Start</th> <th>Dist</th> <th>End</th> <th>Start</th> <th>End</th> <th>Start</th> <th>End</th> <th>Start</th> <th>End</th> <th>Start</th> <th>End</th> <th>Start</th> <th>End</th> <th>Start</th> <th>End</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.000</td> <td>9</td> <td>0.000</td> <td>0.000</td> <td>0.000</td> <td>0.000</td> <td>65.711</td> <td>0.000</td> <td>65.711</td> <td>0</td> <td>11</td> <td>3</td> <td>1</td> <td>10</td> <td>25</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Start		Dist		RPC		End		Tdist		Fatal		Hosp. Medical		Minor		PDO		Total		Cway	RPC	Start	Dist	RPC	Start	Dist	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	1	0.000	9	0.000	0.000	0.000	0.000	65.711	0.000	65.711	0	11	3	1	10	25				
Start		Dist		RPC		End		Tdist		Fatal		Hosp. Medical		Minor		PDO		Total																																											
Cway	RPC	Start	Dist	RPC	Start	Dist	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End																																										
1	0.000	9	0.000	0.000	0.000	0.000	65.711	0.000	65.711	0	11	3	1	10	25																																														
Intersections																																																													
All Intersections	☒																																																												

Road Section		27A Springsure - Emerald										Cway		Tdist		0.000		- 65.711	
Road Section		27A Springsure - Emerald																	
Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2		
20800701200	01-NOV-2008	Sat	19	003	S	Hosp	0	10	Utility, Panel	Pedestrian	47	1	1	0.000	0.000	Dawson Development	Gregory Hwy		
20900751118	26-SEP-2009	Sat	11	104	E	Treat	0	10	Utility, Panel	Car, Station	271	1	1	0.180	0.180	Gregory Hwy	Porphyry St		
20101030265	16-NOV-2010	Tue	07	704	S	Inj	0	99	Utility, Panel			1	1	3.717	3.717	Gregory Hwy			
20101143699	23-DEC-2010	Thu	07	804	N	Prop	0	99	Utility, Panel			1	1	3.717	3.717	Gregory Hwy			
20110692227	08-AUG-2011	Mon	09	803	S	Treat	0	99	Utility, Panel			1	1	3.720	3.720	Gregory Hwy			
20901005938	22-DEC-2009	Tue	11	704	S	Hosp	0	99	Car, Station		70	1	2	0.000	4.740	Gregory Hwy			
20110958862	28-OCT-2011	Fri	10	803	N	Hosp	0	99	Utility, Panel			1	3	8.724	16.224	Gregory Hwy			
20100460396	05-MAY-2010	Wed	07	701	N	Prop	0	99	Road Train/B			1	3	9.310	16.810	Gregory Hwy			
20900678045	31-AUG-2009	Mon	18	607	N	Prop	0	99	Utility, Panel		257	1	5	5.610	28.761	Gregory Hwy			
20800796419	08-DEC-2008	Mon	16	803	S	Prop	0	99	Car, Station			1	6	4.649	34.200	Gregory Hwy			
201101070	24-JUN-2011	Fri	20	607	S	Hosp	0	99	Car, Station			1	8	7.293	57.095	Gregory Hwy			
20110551723	24-JUN-2011	Fri	20	607	S	Prop	0	99	Car, Station			1	8	7.296	57.098	Gregory Hwy			
20100925285	11-OCT-2010	Mon	22	701	S	Treat	0	99	Car, Station		377	1	8	8.502	58.304	Gregory Hwy			
20111053326	24-NOV-2011	Thu	16	102	W	Hosp	0	11	Car, Station	Car, Station		1	8	11.507	61.309	Gregory Hwy	Talafa Rd		
20101072863	29-NOV-2010	Mon	22	700	W	Prop	0	11	Car, Station		243	1	8	11.508	61.310	Gregory Hwy	Talafa Rd		
20800632871	03-OCT-2008	Fri	17	207	S	Hosp	0	99	Utility, Panel	Car, Station		1	8	12.108	61.910	Gregory Hwy			
20100593318	20-JUN-2010	Sun	18	303	S	Prop	0	11	Car, Station	Utility, Panel	240	1	8	14.229	64.031	Cunningham Dr	Gregory Hwy		
20120719870	26-JUL-2012	Thu	10	607	S	Hosp	0	99	Motor Cycle			1	8	14.548	64.350	Gregory Hwy			
20101082875	03-DEC-2010	Fri	07	303	S	Prop	0	11	Utility, Panel	Car, Station	99	1	8	14.869	64.671	Andrews Rd	Gregory Hwy		
20120949946	23-SEP-2012	Sun	12	303	S	Hosp	0	11	Car, Station	Car, Station	99	1	8	14.869	64.671	Andrews Rd	Gregory Hwy		
20111061711	26-NOV-2011	Sat	22	700	E	Hosp	0	11	Car, Station			1	8	14.873	64.675	Andrews Rd	Gregory Hwy		
20900401750	27-MAY-2009	Wed	14	303	S	Prop	0	99	Utility, Panel	Car, Station		1	8	15.136	64.938	Gregory Hwy			
20110869471	30-SEP-2011	Fri	15	003	N	Hosp	0	99	Pedestrian	Utility, Panel		1	8	15.248	65.050	Gregory Hwy			



Road Crash 2

Road Section	27A Springsure - Emerald	Cway	Tdist	0.000	-	65.711											
Road Section	27A Springsure - Emerald																
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20901003828	21-DEC-2009	Mon	14	303	S	Hosp	0	99	Utility, Panel	Utility, Panel		1	8	15.468	65.270	Gregory Hwy	
20101075565	30-NOV-2010	Tue	21	904	N	Prop	0	30	Car, Station			1	8	15.848	65.650	Gregory Hwy	



Road Crash 2

Crash Types									
Crash Dates		17-SEP-2008		-		16-SEP-2013			
Owner		MR DEPARTMENT OF MAIN ROADS							
DCA Code									
Group									
Alignment:		Vertical							
		Horizontal							
		Feature							
		Traffic Ctrl							
		Speed Limit							
Fatalities =									
Severity									
Nature									
Contrib Circ.									
Unit Type									
Risk Factor									
Area		LGA				SLA			
						Police Division			
Road Sections									
All Road Sections		S		Include Crashes on		Y		Thru roads at Intersections	
								Y	
Road Section				Cway		RPC		Dist	
27B EMERALD - CLERMONT				1		0.000		10	
								0.000	
								105.880	
								End	
								Tdist	
								Start	
								Dist	
								Fatal	
								Hosp. Medical	
								Minor	
								PDO	
								Total	
								50	
Intersections									
All Intersections		N							

Road Crash 2 CRASH LISTING REPORT

Road Section

27B Emerald - Clermont

Cway

Tdist

0.000

-

105.880

Road Section

27B Emerald - Clermont

Crash No.	Date	Day	Hour	Dea	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100174605	26-JAN-2010	Tue	00	004	W	Treat	0	99	Pedestrian	Utility, Panel	100	2	1	0.160	0.160	Esmond St	
20800771423	29-NOV-2008	Sat	08	104	W	Prop	0	10	Car, Station	Utility, Panel	100	2	1	0.160	0.160	Egerton St	Gregory Hwy
20900157104	27-FEB-2009	Fri	13	107	W	Prop	0	11	Car, Station	Car, Station	100	2	1	0.160	0.160	Egerton St	Gregory Hwy
20900469430	20-JUN-2009	Sat	16	104	N	Inj	0	11	Special Purp	Car, Station	100	2	1	0.160	0.160	Egerton St	Gregory Hwy
20900569005	25-JUL-2009	Sat	18	104	W	Prop	0	11	Utility, Panel	Car, Station	100	2	1	0.160	0.160	Egerton St	Gregory Hwy
20110052726	20-JAN-2011	Thu	16	703	N	Hosp	0	99	Car, Station	Car, Station		2	1	0.273	0.273	Gregory Hwy	
20100857432	17-SEP-2010	Fri	18	202	N	Prop	0	10	Utility, Panel	Car, Station	101	2	1	0.510	0.510	Gregory Hwy	Yamala St
20120897333	09-SEP-2012	Sun	22	704	S	Hosp	0	10	Car, Station		101	3	1	0.510	0.510	Gregory Hwy	Yamala St
20100594450	21-JUN-2010	Mon	09	104	N	Treat	0	11	Utility, Panel	Car, Station	127	2	1	0.860	0.860	Gregory Hwy	Scant St
20900488929	22-JUN-2009	Mon	12	104	E	Prop	0	11	Car, Station	Car, Station	127	2	1	0.860	0.860	Gregory Hwy	Scant St
20100810036	02-SEP-2010	Thu	10	104	N	Prop	0	11	Utility, Panel	Utility, Panel	103	2	1	0.970	0.970	Curt St	Gregory Hwy
20800827047	20-DEC-2008	Sat	02	003	N	Fatal	1	10	Motor Cycle	Pedestrian		2	1	1.340	1.340	Gregory Hwy	Harris St
20100703819	28-JUL-2010	Wed	18	101	N	Prop	0	10	Car, Station	Car, Station	105	2	1	1.370	1.370	Gregory Hwy	Harris St
20100845240	07-SEP-2010	Tue	19	101	S	Treat	0	10	Car, Station	Bicycle	105	3	1	1.370	1.370	Gregory Hwy	Harris St
20111151577	22-DEC-2011	Thu	17	202	S	Hosp	0	10	Car, Station	Car, Station	105	3	1	1.370	1.370	Egan St	Gregory Hwy
20120156949	15-FEB-2012	Wed	23	202	N	Hosp	0	10	Car, Station	Utility, Panel	105	2	1	1.370	1.370	Gregory Hwy	Harris St
20121296552	15-DEC-2012	Sat	11	001	E	Hosp	0	10	Pedestrian	Car, Station	105	2	1	1.370	1.370	Egan St	Gregory Hwy
20900380107	19-MAY-2009	Tue	19	202	E	Inj	0	10	Car, Station	Utility, Panel	105	2	1	1.370	1.370	Gregory Hwy	Harris St
20900481525	24-JUN-2009	Wed	14	104	N	Prop	0	10	Car, Station	Car, Station	105	2	1	1.370	1.370	Egan St	Gregory Hwy
20100879190	25-SEP-2010	Sat	09	607	N	Prop	0	99	Car, Station			1	1	2.099	2.099	Gregory Hwy	
20100867297	21-SEP-2010	Tue	08	303	N	Prop	0	11	Car, Station	Utility, Panel	279	1	1	2.799	2.799	Braeside Rd	Gregory Hwy
20100874607	23-SEP-2010	Thu	14	303	N	Treat	0	11	Utility, Panel	Car, Station	279	1	1	2.799	2.799	Braeside Rd	Gregory Hwy
20900680211	01-SEP-2009	Tue	19	104	W	Prop	0	11	Car, Station	Utility, Panel	279	1	1	2.799	2.799	Braeside Rd	Gregory Hwy

Road Crash 2 CRASH LISTING REPORT

Road Section

27B Emerald - Clermont

27B Emerald - Clermont

27B Emerald - Clermont

Crash No.

Date

Day

Hour

Dea

Key

Seve

Fatal

Feature

Vehicle 1

Vehicle 2

Inter

Cway

RPC

Dist

Tdist

Street 1

Street 2

20100816432	04-SEP-2010	Sat	06	705	N	Treat	0	11	Utility, Panel		278	1	1	4.100	4.100	Gregory Hwy	Wills Rd
20110388361	04-MAY-2011	Wed	10	104	E	Hosp	0	11	Articulated V	Car, Station	278	1	1	4.100	4.100	Gregory Hwy	Wills Rd
20900417022	01-JUN-2009	Mon	18	609	S	Hosp	0	99	Utility, Panel	Animal - Stoc		1	1	5.000	5.000	Gregory Hwy	
20900682646	31-AUG-2009	Mon	15	700	S	Prop	0	99	Car, Station			1	1	5.000	5.000	Gregory Hwy	
20110789617	23-AUG-2011	Tue	11	503	N	Hosp	0	20	Utility, Panel	Car, Station		1	2	0.005	10.835	Gregory Hwy	
20800555412	03-SEP-2009	Thu	01	704	S	Hosp	0	99	Road Train/B			1	2	0.010	10.840	Gregory Hwy	
20120768225	08-AUG-2012	Wed	07	703	N	Hosp	0	99	Utility, Panel			1	2	1.716	12.546	Gregory Hwy	
20900705989	10-SEP-2009	Thu	14	700	N	Treat	0	11	Utility, Panel			1	3	0.000	16.150	Gregory Hwy	Lilyvale Rd
20100948694	20-OCT-2010	Wed	04	805	N	Inj	0	99	Car, Station			1	3	6.473	22.623	Gregory Hwy	
20800831494	21-DEC-2008	Sun	22	607	S	Hosp	0	20	Car, Station			1	4A	0.000	30.390	Gregory Hwy	
20120450864	10-MAY-2012	Thu	20	700	N	Hosp	0	99	Utility, Panel			1	4A	9.650	40.040	Gregory Hwy	
20900041252	16-JAN-2009	Fri	08	705	N	Treat	0	99	Car, Station			1	4A	11.610	42.000	Gregory Hwy	
20100972874	27-OCT-2010	Wed	10	702	S	Treat	0	99	Car, Station			1	4A	11.792	42.182	Gregory Hwy	
20900676957	31-AUG-2009	Mon	14	705	S	Prop	0	99	Road Train/B			1	4A	15.475	45.865	Gregory Hwy	
20900970211	10-DEC-2009	Thu	13	402	S	Prop	0	99	Car, Station	Utility, Panel		1	5	0.050	52.090	Capella St	
20100120480	07-JAN-2010	Thu	03	701	S	Treat	0	99	Car, Station			1	5	0.071	52.111	Gregory Hwy	
20900880320	10-NOV-2009	Tue	17	201	N	Hosp	0	99	Truck	Car, Station		1	6	8.480	62.170	Gregory Hwy	
20110518796	12-JUN-2011	Sun	15	705	S	Treat	0	99	Motor Cycle			1	6	11.406	65.096	Gregory Hwy	
20100518336	25-MAY-2010	Tue	13	702	S	Hosp	0	99	Truck			1	6	12.470	66.160	Gregory Hwy	
20100857802	17-SEP-2010	Fri	21	703	N	Prop	0	99	Utility, Panel			1	7	4.904	74.234	Gregory Hwy	
20900561942	23-JUL-2009	Thu	08	704	N	Treat	0	99	Utility, Panel			1	8	0.000	75.250	Gregory Hwy	
20120731734	29-JUL-2012	Sun	15	705	S	Hosp	0	99	Utility, Panel			1	8	1.173	76.423	Gregory Hwy	
20800770264	28-NOV-2008	Fri	20	704	N	Hosp	0	99	Car, Station			1	8	4.250	79.500	Gregory Hwy	



Road Crash 2

Road Section	27B	Emerald - Clermont		Cway		Tdist	0.000	-	105.880								
Road Section	27B	Emerald - Clermont															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100796266	28-AUG-2010	Sat	12	801	N	Prop	0	99	Car, Station \			1	8		88.626	Gregory Hwy	
20110063900	04-DEC-2010	Sat	06	805	N	Prop	0	30	Car, Station \			1	8		88.980	Gregory Hwy	
20110111162	09-FEB-2011	Wed	03	705	W	Treat	0	99	Road Train/B			1	9		103.319	Gregory Hwy	
20900544448	17-JUL-2009	Fri	08	705	S	Treat	0	15	Articulated V\		61	1	10		105.880	Gregory Hwy	Industrial Rd

Road Crash 2
CRASH LISTING REPORT

Crash Types	
Crash Dates	17-SEP-2008 - 16-SEP-2013
Owner	MR DEPARTMENT OF MAIN ROADS
DCA Code	
Group	
Fatalities	=
Severity	
Nature	
Alignment:	Vertical
	Horizontal
	Feature
	Traffic Ctrl
	Speed Limit
	Contrib Circ.
	Unit Type
	Risk Factor
Area	LGA
	SLA
	Police Division
Road Sections	
All Road Sections	S
Road Section	33A CLERMONT - NEBO
Include Crashes on	Y
Thru road Mid-block	Y
Thru road RPC	1A
Cway	
Dist	0.000
RPC	13
Start	0.000
End	0.000
Dist	0.000
Tdist	101.770
Start	0.000
End	101.770
Fatal	2
Hosp. Medical	3
Minor	6
PDO	1
Total	17
Intersections	
All Intersections	N

Road Crash 2
CRASH LISTING REPORT

Road Section		33A Clermont - Nebo		Cway		Tdist		0.000		- 101.770							
Road Section		33A Clermont - Nebo															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20101145252	22-DEC-2010	Wed	11	703	S	Prop	0	20	Articulated V\			1	2	4.029	13.159	Peak Downs Hwy	
20900434568	08-JUN-2009	Mon	14	704	N	Treat	0	99	Car, Station\			1	3	2.506	18.046	Peak Downs Hwy	
20800667905	19-OCT-2008	Sun	17	801	W	Prop	0	99	Car, Station\			1	4	5.490	28.080	Peak Downs Hwy	
20110321741	12-APR-2011	Tue	19	609	E	Fatal	1	99	Motor Cycle	Animal - Stoc		1	5	6.587	42.317	Peak Downs Hwy	
20110276311	30-MAR-2011	Wed	16	506	E	Hosp	0	99	Road Train/B	Utility, Panel		1	6	2.413	45.003	Peak Downs Hwy	
20100522799	25-MAY-2010	Tue	23	704	W	Prop	0	99	Car, Station\			1	8	4.877	69.887	Peak Downs Hwy	
20110721336	16-AUG-2011	Tue	15	703	N	Fatal	1	99	Car, Station\			1	9	4.610	79.870	Peak Downs Hwy	
20101006150	08-NOV-2010	Mon	08	704	W	Treat	0	99	Utility, Panel			1	10	4.359	85.659	Peak Downs Hwy	
20120699193	20-JUL-2012	Fri	22	700	W	Hosp	0	11	Car, Station\		110	1	10	7.750	89.050	Gregory Development	Peak Downs Hwy
20900104066	08-FEB-2009	Sun	14	802	S	Prop	0	99	Car, Station\		111	1	11	0.000	90.370	Moranbah Access Rd	
20900283571	09-APR-2009	Thu	03	702	S	Prop	0	99	Car, Station\		111	1	11	0.000	90.370	Moranbah Access Rd	
20900113920	12-FEB-2009	Thu	05	801	S	Treat	0	99	Car, Station\			1	11	4.600	94.970	Peak Downs Hwy	
20110395894	06-MAY-2011	Fri	06	703	S	Hosp	0	99	Articulated V\			1	11	4.605	94.975	Peak Downs Hwy	
20900807034	16-OCT-2009	Fri	03	905	W	Treat	0	99	Utility, Panel	Animal - Othe		1	11	4.612	94.982	Peak Downs Hwy	
20900349193	08-MAY-2009	Fri	05	609	E	Treat	0	99	Utility, Panel	Animal - Stoc		1	11	4.809	95.179	Peak Downs Hwy	
20900751384	26-SEP-2009	Sat	16	702	W	Inj	0	99	Car, Station\			1	11	5.467	95.837	Peak Downs Hwy	
20900029697	12-JAN-2009	Mon	05	609	N	Treat	0	99	Utility, Panel	Animal - Othe		1	12	0.500	97.500	Peak Downs Hwy	

Road Crash 2
CRASH LISTING REPORT

Crash Types		Crash Dates 17-SEP-2008 - 16-SEP-2013		Alignment: Vertical	
Owner MR DEPARTMENT OF MAIN ROADS				Horizontal	
DCA Code				Feature	
Group				Traffic Ctrl	
				Speed Limit	
Fatalities =				Contrib Circ.	
Severity				Unit Type	
Nature				Risk Factor	
Area LGA		SLA		Police Division	

Road Sections		Include Crashes on S		Thru road Mid-block Y		Thru roads at Intersections Y		Intersecting roads at Intersections Y		Number of Crashes		Total	
		Cway	RPC	Start	Dist	End	RPC	Start	Dist	End	Fatal	Hosp. Medical	PDO
Road Section													
33B NEBO - MACKAY		1	0.000	17	0.000	87.762	0.000	6	47	44	13	58	168

Intersections	
All Intersections N	

Road Crash 2
CRASH LISTING REPORT

Road Section		33B Nebo - Mackay			Cway		Tdist		0.000		- 87.762						
Road Section		10G St. Lawrence - Mackay															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900655949	24-AUG-2009	Mon	08	301	N	Prop	0	99	Articulated V	Articulated V	39	2	24	7.814	152.520	Bruce Hwy	
20100250358	20-FEB-2010	Sat	18	202	N	Prop	0	10	Car, Station	Car, Station	39	2	27	0.000	152.586	Archibald St	Bruce Hwy
20100365522	01-APR-2010	Thu	08	301	S	Prop	0	10	Utility, Panel	Car, Station	39	3	27	0.000	152.586	Archibald St	Bruce Hwy
20100600481	23-JUN-2010	Wed	10	301	N	Treat	0	10	Omibus	Car, Station	39	2	27	0.000	152.586	Bruce Hwy	Peak Downs Hwy
20130454545	17-APR-2013	Wed	05	202	S	Hosp	0	10	Car, Station	Car, Station	39	3	27	0.000	152.586	Archibald St	Bruce Hwy
20900258844	04-APR-2009	Sat	18	202	S	Prop	0	10	Utility, Panel	Car, Station	39	3	27	0.000	152.586	Archibald St	Bruce Hwy
20900329091	30-APR-2009	Thu	16	301	N	Treat	0	99	Car, Station	Utility, Panel	39	2	27	0.000	152.586	Bruce Hwy	
20900384212	20-MAY-2009	Wed	10	303	S	Treat	0	99	Car, Station	Car, Station	39	3	27	0.000	152.586	Bruce Hwy	
20900461641	18-JUN-2009	Thu	05	800	S	Prop	0	10	Car, Station		39	3	27	0.000	152.586	Archibald St	Bruce Hwy
20900506497	03-JUL-2009	Fri	09	202	E	Prop	0	11	Utility, Panel	Articulated V	39	3	27	0.000	152.586	Bruce Hwy	Peak Downs Hwy
20900825343	22-OCT-2009	Thu	17	301	N	Prop	0	10	Truck	Car, Station	39	2	27	0.000	152.586	Bruce Hwy	Peak Downs Hwy
20900918533	23-NOV-2009	Mon	07	301	N	Treat	0	99	Utility, Panel	Utility, Panel	39	2	27	0.000	152.586	Bruce Hwy	
Road Section		33B Nebo - Mackay															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20110544554	22-JUN-2011	Wed	14	301	E	Treat	0	99	Car, Station	Car, Station		1	1	0.167	0.167	Peak Downs Hwy	
20900375764	07-MAR-2009	Sat	12	301	S	Treat	0	99	Utility, Panel	Car, Station		1	1	0.500	0.500	Peak Downs Hwy	
20900078532	29-JAN-2009	Thu	15	703	N	Prop	0	99	Utility, Panel			1	1	1.823	1.823	Peak Downs Hwy	
20110278482	29-MAR-2011	Tue	06	700	S	Hosp	0	99	Car, Station			1	1	2.224	2.224	Peak Downs Hwy	
20900067434	26-JAN-2009	Mon	10	803	S	Treat	0	99	Utility, Panel			1	1	2.263	2.263	Peak Downs Hwy	
20900605904	07-AUG-2009	Fri	08	701	N	Treat	0	99	Car, Station			1	1	2.323	2.323	Peak Downs Hwy	
20110762686	29-AUG-2011	Mon	06	700	N	Treat	0	99	Car, Station			1	1	2.865	2.865	Peak Downs Hwy	
20100503751	18-MAY-2010	Tue	19	308	S	Treat	0	99	Omibus	Motor Cycle		1	1	5.755	5.755	Peak Downs Hwy	
20100970446	27-OCT-2010	Wed	07	703	S	Prop	0	11	Car, Station		40	1	2	0.000	5.965	Peak Downs Hwy	Sutor Developmenta

Road Crash 2
CRASH LISTING REPORT

Road Section																	
33B Nebo - Mackay																	
33B Nebo - Mackay																	
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20800666645	18-OCT-2008	Sat	22	700	E	Treat	0	11	Car, Station \		40	1	2	0.000	5.965	Peak Downs Hwy	Sutor Developmenta
20100551888	02-JUN-2010	Wed	11	801	N	Prop	0	99	Utility, Panel			1	2	0.260	6.225	Peak Downs Hwy	
20100723300	02-AUG-2010	Mon	15	704	W	Prop	0	99	Car, Station \			1	2	1.282	7.247	Peak Downs Hwy	
20900120744	27-JAN-2009	Tue	09	804	E	Inj	0	99	Car, Station \			1	2	1.585	7.550	Peak Downs Hwy	
20100256371	22-FEB-2010	Mon	14	804	E	Prop	0	99	Car, Station \			1	2	3.950	9.915	Peak Downs Hwy	
20900111930	11-FEB-2009	Wed	06	201	N	Fatal	1	20	Car, Station \	Road Train/B		1	2	3.995	9.960	Peak Downs Hwy	
20110218599	13-MAR-2011	Sun	16	607	W	Inj	0	20	Utility, Panel			1	2	4.036	10.001	Peak Downs Hwy	
20110143018	18-FEB-2011	Fri	17	201	E	Treat	0	99	Utility, Panel	Car, Station \		1	2	4.093	10.058	Peak Downs Hwy	
20110144262	19-FEB-2011	Sat	05	301	E	Treat	0	99	Utility, Panel	Articulated V		1	2	4.670	10.635	Peak Downs Hwy	
20120670874	13-JUL-2012	Fri	03	800	N	Fatal	1	99	Articulated V			1	2	6.692	12.657	Peak Downs Hwy	
20110241505	18-MAR-2011	Fri	15	804	N	Treat	0	20	Utility, Panel			1	2	7.435	13.400	Peak Downs Hwy	
20800591837	18-SEP-2008	Thu	09	804	E	Prop	0	20	Car, Station \			1	2	7.435	13.400	Peak Downs Hwy	
20100308437	12-MAR-2010	Fri	13	301	S	Prop	0	99	Utility, Panel	Utility, Panel		1	2	9.140	15.105	Peak Downs Hwy	
20101161542	30-DEC-2010	Thu	16	607	N	Treat	0	20	Utility, Panel			1	2	10.680	16.645	Peak Downs Hwy	
20900445504	10-JUN-2009	Wed	15	703	W	Prop	0	20	Special Purp			1	2	10.680	16.645	Peak Downs Hwy	
20120700455	21-JUL-2012	Sat	08	600	N	Hosp	0	20	Car, Station \			1	3	0.001	16.681	Peak Downs Hwy	
20100991639	01-NOV-2010	Mon	23	201	W	Prop	0	20	Car, Station \	Utility, Panel		1	3	0.029	16.709	Peak Downs Hwy	
20120590578	20-JUN-2012	Wed	17	803	S	Hosp	0	99	Utility, Panel			1	3	8.962	25.642	Peak Downs Hwy	
20100362960	29-MAR-2010	Mon	21	704	E	Inj	0	99	Truck			1	3	9.431	26.111	Peak Downs Hwy	
20120453731	12-MAY-2012	Sat	04	704	N	Hosp	0	99	Car, Station \			1	3	9.548	26.228	Peak Downs Hwy	
20100238690	16-FEB-2010	Tue	12	607	N	Prop	0	99	Articulated V			1	4	1.500	29.630	Peak Downs Hwy	
20900899260	17-NOV-2009	Tue	04	201	E	Inj	0	99	Car, Station \	Omnibus		1	4	5.360	33.490	Peak Downs Hwy	
20100344449	23-MAR-2010	Tue	10	703	E	Treat	0	99	Car, Station \			1	4	7.694	35.824	Peak Downs Hwy	

Road Crash 2
CRASH LISTING REPORT

Road Section																	
33B Nebo - Mackay																	
33B Nebo - Mackay																	
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900750002	26-SEP-2009	Sat	00	703	N	Treat	0	99	Utility, Panel			1	4	10.351	38.481	Peak Downs Hwy	
20800821365	18-DEC-2008	Thu	07	703	E	Inj	0	99	Utility, Panel			1	5	4.528	43.393	Peak Downs Hwy	
20800800149	09-DEC-2008	Tue	17	703	E	Prop	0	99	Utility, Panel			1	5	4.959	43.824	Peak Downs Hwy	
20100902153	03-OCT-2010	Sun	10	704	E	Hosp	0	99	Car, Station \			1	5	5.210	44.075	Peak Downs Hwy	
20120424277	03-MAY-2012	Thu	22	802	E	Hosp	0	99	Articulated Vi			1	6	0.700	45.590	Peak Downs Hwy	
20900772682	03-OCT-2009	Sat	04	805	S	Prop	0	99	Truck			1	7	0.047	46.417	Peak Downs Hwy	
209000428535	29-MAY-2009	Fri	02	802	W	Prop	0	99	Car, Station \			1	7	0.659	47.029	Peak Downs Hwy	
20100228329	13-FEB-2010	Sat	02	804	S	Prop	0	99	Utility, Panel			1	7	1.572	47.942	Peak Downs Hwy	
20900397374	22-MAY-2009	Fri	20	803	N	Prop	0	99	Utility, Panel			1	7	1.659	48.029	Peak Downs Hwy	
20120975423	29-SEP-2012	Sat	22	805	N	Hosp	0	99	Car, Station \			1	7E	0.195	50.342	Peak Downs Hwy	
20900062692	23-JAN-2009	Fri	19	609	N	Inj	0	99	Car, Station \	Animal - Stoc		1	7E	0.283	50.430	Peak Downs Hwy	
20800847800	28-DEC-2008	Sun	16	804	S	Prop	0	99	Car, Station \			1	7E	0.382	50.529	Peak Downs Hwy	
20100574129	11-JUN-2010	Fri	17	301	N	Prop	0	99	Utility, Panel	Utility, Panel		1	7E	0.395	50.542	Peak Downs Hwy	
20110867483	29-SEP-2011	Thu	19	301	N	Treat	0	99	Utility, Panel	Car, Station \		1	7E	0.418	50.565	Peak Downs Hwy	
20110838834	18-SEP-2011	Sun	17	805	N	Treat	0	99	Truck			1	7E	0.880	51.027	Peak Downs Hwy	
20100491963	10-MAY-2010	Mon	18	201	E	Inj	0	99	Utility, Panel	Car, Station \		1	7E	1.790	51.937	Peak Downs Hwy	
20800626277	02-OCT-2008	Thu	19	201	S	Prop	0	99	Car, Station \	Utility, Panel		1	7E	2.120	52.267	Peak Downs Hwy	
20101003979	07-NOV-2010	Sun	11	201	S	Hosp	0	99	Motor Cycle	Car, Station \		1	7E	2.320	52.467	Peak Downs Hwy	
20900080285	30-JAN-2009	Fri	14	805	N	Hosp	0	99	Articulated Vi			1	7E	2.853	53.000	Peak Downs Hwy	
20900324321	26-APR-2009	Sun	11	805	N	Hosp	0	99	Articulated Vi			1	7E	3.114	53.261	Peak Downs Hwy	
20900689018	29-AUG-2009	Sat	12	705	E	Treat	0	99	Utility, Panel			1	7E	3.597	53.744	Peak Downs Hwy	
20101153189	27-DEC-2010	Mon	07	703	N	Hosp	0	99	Car, Station \			1	7H	0.138	53.900	Peak Downs Hwy	
20900622855	07-AUG-2009	Fri	07	301	S	Prop	0	99	Car, Station \	Omnibus		1	8	2.018	56.255	Peak Downs Hwy	

Road Crash 2
CRASH LISTING REPORT

Road Section		33B		Nebo - Mackay		Cway		Tdist		0.000		87.762					
Road Section		33B		Nebo - Mackay													
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
2010075	10-NOV-2010	Wed	13	804	S	Treat	0	99	Car, Station			1	8	3.743	57.980	Peak Downs Hwy	
20101030559	10-NOV-2010	Wed	13	803	E	Inj	0	99	Articulated V			1	8	3.743	57.980	Peak Downs Hwy	
20100803142	30-AUG-2010	Mon	09	301	S	Prop	0	99	Car, Station	Car, Station		1	9	2.143	61.510	Peak Downs Hwy	
20800745340	18-NOV-2008	Tue	20	303	N	Inj	0	99	Road Train/B	Utility, Panel		1	9	2.283	61.650	Peak Downs Hwy	
20101121714	10-DEC-2010	Fri	18	703	N	Treat	0	11	Utility, Panel			1	9	2.585	61.952	Eton - Homebush Rd	Peak Downs Hwy
20100646289	09-JUL-2010	Fri	07	705	W	Inj	0	11	Articulated V		51	1	10	0.000	62.052	Eton - Homebush Rd	Peak Downs Hwy
20100597255	21-JUN-2010	Mon	19	301	N	Inj	0	99	Articulated V	Articulated V		1	10	0.470	62.522	Peak Downs Hwy	
20130318861	17-MAR-2013	Sun	09	303	W	Hosp	0	10	Utility, Panel	Car, Station	986	1	11	0.260	62.982	Hill St	Peak Downs Hwy
20800797690	08-DEC-2008	Mon	07	607	W	Prop	0	11	Car, Station		672	1	11	1.220	63.942	Hannans Rd	Marian - Eton Rd
20100354805	28-MAR-2010	Sun	00	609	E	Treat	0	99	Truck	Animal - Stoc		1	11	2.071	64.793	Peak Downs Hwy	
20100193018	31-JAN-2010	Sun	20	607	W	Prop	0	99	Car, Station			1	11	2.970	65.692	Peak Downs Hwy	
20900737642	21-SEP-2009	Mon	18	805	E	Hosp	0	99	Utility, Panel			1	11	3.014	65.736	Peak Downs Hwy	
20110246154	21-MAR-2011	Mon	16	201	E	Fatal	1	99	Road Train/B	Utility, Panel		1	11	3.218	65.940	Peak Downs Hwy	
20800806426	12-DEC-2008	Fri	13	303	W	Treat	0	10	Car, Station	Car, Station	106	1	12	0.000	66.292	North Eton Rd	Peak Downs Hwy
20800709416	04-NOV-2008	Tue	11	201	W	Inj	0	99	Articulated V	Car, Station		1	12	0.023	66.315	Peak Downs Hwy	
20800819249	17-DEC-2008	Wed	06	803	W	Prop	0	20	Truck			1	12	0.313	66.605	Peak Downs Hwy	
20900030794	12-JAN-2009	Mon	09	803	W	Prop	0	99	Truck			1	12	0.501	66.793	Peak Downs Hwy	
20101153239	27-DEC-2010	Mon	09	607	W	Treat	0	99	Utility, Panel		106	1	12	0.910	67.202	Peak Downs Hwy	
20100361677	30-MAR-2010	Tue	04	609	W	Treat	0	99	Car, Station	Animal - Othe		1	12	2.501	68.793	Peak Downs Hwy	
20130408703	06-APR-2013	Sat	12	301	N	Hosp	0	99	Ornibus	Car, Station		1	12	3.850	70.142	Peak Downs Hwy	
20100232447	14-FEB-2010	Sun	17	301	W	Treat	0	99	Utility, Panel	Car, Station		1	12	5.656	71.948	Peak Downs Hwy	
20100985927	26-OCT-2010	Tue	08	705	W	Prop	0	99	Utility, Panel		482	1	13	0.000	72.632	Peak Downs Hwy	
20110801071	09-SEP-2011	Fri	04	303	S	Hosp	0	10	Utility, Panel	Car, Station	482	1	13	0.000	72.632	Peak Downs Hwy	Rocky Waterhole - W

Road Crash 2
CRASH LISTING REPORT

Road Section																	
33B Nebo - Mackay																	
33B Nebo - Mackay																	
33B Nebo - Mackay																	
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20120325525	04-APR-2012	Wed	18	303	S	Hosp	0	10	Special Purp	Car, Station	482	1	13	0.000	72.632	Peak Downs Hwy	Rocky Waterhole - W
20900044575	17-JAN-2009	Sat	12	303	W	Fatal	1	10	Motor Cycle	Car, Station	482	1	13	0.000	72.632	Peak Downs Hwy	Rocky Waterhole - W
20100596265	21-JUN-2010	Mon	20	609	S	Prop	0	99	Utility, Panel	Animal - Stoc		1	13	0.329	72.961	Peak Downs Hwy	
20110852310	25-SEP-2011	Sun	11	506	N	Fatal	2	99	Utility, Panel	Car, Station		1	13	0.438	73.070	Peak Downs Hwy	
20900951979	04-DEC-2009	Fri	12	502	W	Treat	0	99	Car, Station			1	13	0.709	73.341	Peak Downs Hwy	
20900880970	10-NOV-2009	Tue	05	701	W	Prop	0	99	Articulated Vi			1	13	0.768	73.400	Peak Downs Hwy	
20900682057	02-SEP-2009	Wed	11	705	E	Treat	0	99	Car, Station			1	13	0.910	73.542	Peak Downs Hwy	
20110491481	05-JUN-2011	Sun	18	609	N	Hosp	0	99	Car, Station	Animal - Stoc		1	13	1.388	74.020	Peak Downs Hwy	
20900615724	10-AUG-2009	Mon	17	805	N	Hosp	0	99	Car, Station			1	13	2.108	74.740	Peak Downs Hwy	
20900507623	03-JUL-2009	Fri	18	303	S	Prop	0	99	Car, Station	Car, Station		1	13	2.988	75.620	Peak Downs Hwy	
20800727347	10-NOV-2008	Mon	12	609	E	Prop	0	99	Car, Station	Animal - Stoc		1	13	3.623	76.255	Peak Downs Hwy	
20900586799	31-JUL-2009	Fri	18	303	W	Prop	0	11	Car, Station	Car, Station	484	1	13	4.160	76.792	Cameron Rd	Peak Downs Hwy
20100585150	17-JUN-2010	Thu	14	704	S	Inj	0	99	Utility, Panel			1	13	4.200	76.832	Peak Downs Hwy	
20110126451	14-FEB-2011	Mon	02	501	W	Hosp	0	99	Utility, Panel	Utility, Panel		1	13	4.770	77.402	Peak Downs Hwy	
20900474719	22-JUN-2009	Mon	13	804	W	Hosp	0	11	Car, Station		190	1	13	5.420	78.052	Peak Downs Hwy	Pugsley St
20100684552	22-JUL-2010	Thu	08	202	E	Hosp	0	11	Truck	Car, Station	487	1	13	5.660	78.292	Branscombe Rd	Peak Downs Hwy
20100530019	28-MAY-2010	Fri	12	301	W	Prop	0	99	Utility, Panel	Utility, Panel		1	13	5.730	78.362	Peak Downs Hwy	
20100554241	06-JUN-2010	Sun	00	703	N	Prop	0	99	Car, Station		490	1	13	6.150	78.782	Anne St	
20900086155	30-JAN-2009	Fri	14	408	W	Prop	0	99	Car, Station	Car, Station		1	13	6.218	78.850	Peak Downs Hwy	
20100293901	07-MAR-2010	Sun	16	803	W	Treat	0	99	Utility, Panel	Car, Station		1	13	6.328	78.960	Peak Downs Hwy	
20100447582	30-APR-2010	Fri	12	201	E	Prop	0	11	Car, Station	Car, Station		1	13	6.334	78.966	Dane St	Peak Downs Hwy
20900334606	02-MAY-2009	Sat	18	303	W	Hosp	0	11	Car, Station	Utility, Panel	495	1	13	7.290	79.922	Palms Rd	Peak Downs Hwy
20100316010	15-MAR-2010	Mon	10	207	E	Treat	0	99	Utility, Panel	Car, Station		1	13	7.851	80.483	Peak Downs Hwy	

Road Crash 2 CRASH LISTING REPORT

Road Section		33B Nebo - Mackay		Cway		Tdist		0.000		-		87.762					
Road Section		33B Nebo - Mackay															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20110374952	29-APR-2011	Fri	15	303	E	Treat	0	11	Car, Station	Utility, Panel	496	1	14	0.000	80.792	Peak Downs Hwy	Walkerston - Homebu
20120943745	21-SEP-2012	Fri	16	301	E	Hosp	0	11	Car, Station	Car, Station	496	1	14	0.000	80.792	Peak Downs Hwy	Walkerston - Homebu
20800822387	18-DEC-2008	Thu	15	301	E	Hosp	0	99	Car, Station	Omnibus		1	14	0.408	81.200	Peak Downs Hwy	
20100679980	20-JUL-2010	Tue	14	202	W	Prop	0	11	Omnibus	Utility, Panel	58	1	15	0.000	81.292	Mackay - Eungella R	Peak Downs Hwy
20101067983	28-NOV-2010	Sun	11	703	S	Treat	0	11	Car, Station		58	1	15	0.000	81.292	Mackay - Eungella R	Peak Downs Hwy
20100585927	18-JUN-2010	Fri	07	301	E	Prop	0	99	Car, Station	Car, Station		1	15	0.330	81.622	Peak Downs Hwy	
20900177280	06-MAR-2009	Fri	13	400	E	Prop	0	99	Utility, Panel			1	15	0.510	81.802	Peak Downs Hwy	
20800780850	01-DEC-2008	Mon	08	104	N	Treat	0	11	Car, Station	Car, Station	498	1	15	0.920	82.212	Alexandria Rd	Peak Downs Hwy
20900086209	01-FEB-2009	Sun	12	104	N	Treat	0	11	Car, Station	Car, Station		1	15	0.970	82.262	Alexandria Rd	Peak Downs Hwy
20100782610	23-AUG-2010	Mon	23	609	W	Hosp	0	99	Utility, Panel	Animal - Stoc		1	15	1.540	82.832	Peak Downs Hwy	
20110604615	12-JUL-2011	Tue	08	101	N	Fatal	1	10	Car, Station	Truck	292	1	15	2.120	83.412	Hansens Rd	Peak Downs Hwy
20110953765	27-OCT-2011	Thu	05	101	N	Hosp	0	10	Car, Station	Car, Station	292	1	15	2.120	83.412	Hansens Rd	Peak Downs Hwy
20120801779	16-AUG-2012	Thu	15	308	E	Hosp	0	10	Truck	Special Purp	292	1	15	2.120	83.412	Hills Rd	Peak Downs Hwy
20121126830	06-NOV-2012	Tue	07	303	E	Hosp	0	10	Utility, Panel	Utility, Panel	292	1	15	2.120	83.412	Hansens Rd	Peak Downs Hwy
20100740790	10-AUG-2010	Tue	05	408	E	Hosp	0	99	Car, Station	Car, Station		1	15	2.970	84.262	Peak Downs Hwy	
2010022	10-AUG-2010	Tue	05	301	E	Prop	0	99	Utility, Panel	Car, Station		1	15	2.976	84.268	Peak Downs Hwy	
20120356608	13-APR-2012	Fri	19	301	E	Hosp	0	99	Car, Station	Car, Station		1	15	3.160	84.452	Peak Downs Hwy	
20800719375	08-NOV-2008	Sat	23	004	N	Hosp	0	99	Pedestrian	Car, Station		1	15	3.538	84.830	Peak Downs Hwy	
20900595328	04-AUG-2009	Tue	00	802	E	Prop	0	99	Utility, Panel			1	15	3.920	85.212	Peak Downs Hwy	
20100703774	28-JUL-2010	Wed	17	406	N	Prop	0	99	Utility, Panel	Car, Station		1	15	4.120	85.412	Peak Downs Hwy	
20110494690	06-JUN-2011	Mon	18	301	W	Hosp	0	30	Car, Station	Car, Station		1	15	4.163	85.455	Peak Downs Hwy	
20110030231	12-JAN-2011	Wed	06	406	N	Hosp	0	99	Car, Station	Car, Station		1	15	4.261	85.553	Peak Downs Hwy	
20900555133	20-JUL-2009	Mon	18	000	E	Treat	0	99	Car, Station	Pedestrian		1	15	4.286	85.578	Peak Downs Hwy	

Road Crash 2
CRASH LISTING REPORT

33B Nebo - Mackay																	
Tdist 0.000 - 87.762																	
Cway																	
33B Nebo - Mackay																	
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100156360	20-JAN-2010	Wed	06	104	S	Hosp	0	11	Utility, Panel	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20100270028	27-FEB-2010	Sat	10	104	S	Treat	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20100379863	06-APR-2010	Tue	16	104	S	Prop	0	11	Motor Cycle	Utility, Panel	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20100715164	01-AUG-2010	Sun	16	104	S	Prop	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20100720925	03-AUG-2010	Tue	13	104	S	Prop	0	11	Car, Station	Utility, Panel	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20100996285	04-NOV-2010	Thu	17	104	S	Hosp	0	11	Utility, Panel	Utility, Panel	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20101075191	30-NOV-2010	Tue	15	104	S	Prop	0	11	Car, Station	Utility, Panel	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20101145587	23-DEC-2010	Thu	19	104	S	Treat	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20101147498	24-DEC-2010	Fri	11	104	S	Treat	0	11	Utility, Panel	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20110262745	26-MAR-2011	Sat	13	104	S	Treat	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20110507170	10-JUN-2011	Fri	16	104	S	Hosp	0	11	Utility, Panel	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20110682692	05-AUG-2011	Fri	10	104	N	Hosp	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Landsdowne Rd
20900237272	27-MAR-2009	Fri	16	104	W	Hosp	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20900546179	17-JUL-2009	Fri	16	104	S	Hosp	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20900661549	26-AUG-2009	Wed	07	104	W	Hosp	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20900726541	17-SEP-2009	Thu	18	104	S	Treat	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20900780966	07-OCT-2009	Wed	08	104	S	Hosp	0	11	Car, Station	Car, Station	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20900847600	30-OCT-2009	Fri	08	104	E	Prop	0	11	Utility, Panel	Utility, Panel	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20900949504	03-DEC-2009	Thu	15	104	N	Hosp	0	11	Utility, Panel	Utility, Panel	244	1	15	4.660	85.952	Horse And Jockey Rd	Peak Downs Hwy
20100864272	20-SEP-2010	Mon	07	301	E	Treat	0	99	Car, Station	Omnibus		1	15	4.761	86.053	Peak Downs Hwy	
20120855540	27-MAR-2012	Tue	07	301	E	Hosp	0	99	Car, Station	Utility, Panel		1	15	4.770	86.062	Peak Downs Hwy	
20110751840	25-AUG-2011	Thu	19	202	E	Treat	0	11	Car, Station	Utility, Panel	503	1	15	4.810	86.102	Cowleys Rd	Peak Downs Hwy
20121224145	28-NOV-2012	Wed	17	301	W	Hosp	0	99	Utility, Panel	Utility, Panel		1	15	5.261	86.553	Peak Downs Hwy	



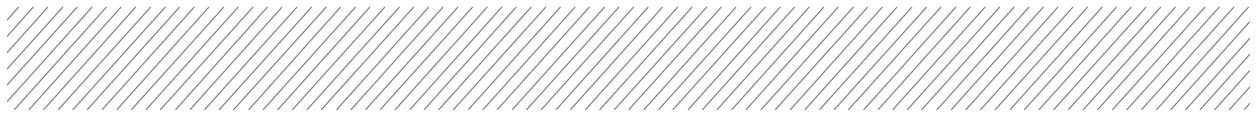
Road Section		33B Nebo - Mackay			Cway		Tdist		0.000		- 87.762						
Road Section		33B Nebo - Mackay															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20110849577	24-SEP-2011	Sat	10	102	N	Treat	0	11	Car, Station	Car, Station	504	1	15	5.640	86.932	Bernborough Ave	Peak Downs Hwy
20900535487	14-JUL-2009	Tue	07	104	E	Prop	0	11	Car, Station	Car, Station	504	1	15	5.640	86.932	Bernborough Ave	Peak Downs Hwy
20100552523	06-JUN-2010	Sun	12	703	E	Prop	0	99	Utility, Panel			1	15	5.730	87.022	Peak Downs Hwy	
20101053043	23-NOV-2010	Tue	07	700	E	Prop	0	99	Car, Station			1	15	5.740	87.032	Peak Downs Hwy	
20900841006	28-OCT-2009	Wed	08	301	E	Prop	0	99	Utility, Panel	Car, Station	683	1	15	5.930	87.222	Peak Downs Hwy	
20111068048	28-NOV-2011	Mon	18	301	W	Hosp	0	99	Car, Station	Car, Station		1	15	6.040	87.332	Peak Downs Hwy	
20100800128	30-AUG-2010	Mon	06	301	E	Prop	0	99	Car, Station	Utility, Panel		1	15	6.438	87.730	Peak Downs Hwy	
Road Section		532 Mackay - Eungella Road															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20900897483	13-NOV-2009	Fri	16	703	W	Prop	0	11	Car, Station		58	1	1	0.000	0.000	Mackay - Eungella R	Peak Downs Hwy
Road Section		82A Nebo - Mt. Coolon															
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway	RPC	Dist	Tdist	Street 1	Street 2
20100300500	09-MAR-2010	Tue	22	700	E	Hosp	0	11	Car, Station		40	1	1	0.000	0.000	Peak Downs Hwy	Sutor Developmenta

Crash Types	
Crash Dates	17-SEP-2008 - 16-SEP-2013
Owner	MR DEPARTMENT OF MAIN ROADS
DCA Code	
Group	
Fatalities	=
Severity	
Nature	
Alignment: Vertical	
Horizontal	
Feature	
Traffic Ctrl	
Speed Limit	
Contrib Circ.	
Unit Type	
Risk Factor	
Area	LGA
SLA	Police Division
Road Sections	
All Road Sections	S
Road Section	469 BLACKWATER - ROLLESTON ROAD
Include Crashes on	Y
Thru road Mid-block	Y
Cway	
RPC	1
Dist	0.000
RPC	10
Dist	0.000
End	
RPC	
Dist	0.000
Start	0.000
End	119.930
Tdist	
Start	
End	
Fatal	0
Hosp.	4
Medical	2
Minor	1
PDO	2
Total	9
Intersections	
All Intersections	N



Road Crash 2

Road Section												
469 Blackwater - Rolleston Road												
Cway												
Tdlist												
- 119.930												
Road Section												
16B Duaringa - Emerald												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20100364653	01-APR-2010	Thu	05	303	E	Hosp	0	11	Utility, Panel	Car, Station	56	1
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1	Vehicle 2	Inter	Cway
20900771149	03-OCT-2009	Sat	15	101	E	Treat	0	10	Utility, Panel	Car, Station	1	1
20110542774	22-JUN-2011	Wed	05	201	N	Treat	0	99	Car, Station	Utility, Panel	469	1
20100232485	14-FEB-2010	Sun	17	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	1
20900402317	28-MAY-2009	Thu	00	803	N	Hosp	0	99	Utility, Panel	Utility, Panel	1	3A
20900230223	23-MAR-2009	Mon	13	705	N	Hosp	0	99	Motor Cycle	Motor Cycle	1	3A
20900474193	21-JUN-2009	Sun	14	705	N	Prop	0	99	Utility, Panel	Utility, Panel	1	6A
20800640440	08-OCT-2008	Wed	18	607	N	Inj	0	99	Utility, Panel	Utility, Panel	1	7
20100744667	11-AUG-2010	Wed	06	607	S	Hosp	0	99	Car, Station	Car, Station	1	8C
Road Section												
469 Blackwater - Rolleston Road												
Crash No.	Date	Day	Hour	Dca	Key	Seve	Fatal	Feature	Vehicle 1			



Appendix B

AusTraffic Survey Data

AUSTRAFFIC MANUAL INTERSECTION COUNT

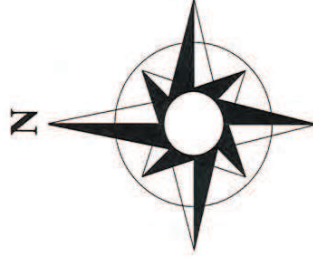
Site No.: 1

Location: Clermont-Alpha Road/Capricorn Highway, Alpha

Day/Date: Tuesday 2 August 2011

Summary: AM Peak : Hour ending 7:45 AM

PM Peak : Hour ending 4:15 PM



Clermont-Alpha Road (north)

A	AM Peak	0
	PM Peak	0

Total	AM PEAK	PM PEAK
18	17%	32
	9%	

Total	AM PEAK	PM PEAK
29	17%	25
	16%	

Movements	AM PEAK	PM PEAK
vol		
% CV		

Movements	AM PEAK	PM PEAK
vol		
% CV		

Total	AM PEAK	PM PEAK
15	13%	26
	15%	

Total	AM PEAK	PM PEAK
12	0%	34
	9%	

Movements	AM PEAK	PM PEAK
vol		
% CV		

Shakespeare Street (east)

D	AM Peak	0
	PM Peak	0

B	AM Peak	0
	PM Peak	0

Total	AM PEAK	PM PEAK
14	7%	39
	3%	

Total	AM PEAK	PM PEAK
29	24%	42
	14%	

Movements	AM PEAK	PM PEAK
vol		
% CV		

Movements	AM PEAK	PM PEAK
vol		
% CV		

Capricorn Highway (west)

Total	AM PEAK	PM PEAK
27	11%	49
	35%	

Total	AM PEAK	PM PEAK
28	18%	67
	30%	

Movements	AM PEAK	PM PEAK
vol		
% CV		

Movements	AM PEAK	PM PEAK
vol		
% CV		

Legend

vol = total vehicle volume

% CV = percentage of commercial vehicles (trucks and buses)

Capricorn Highway (south)

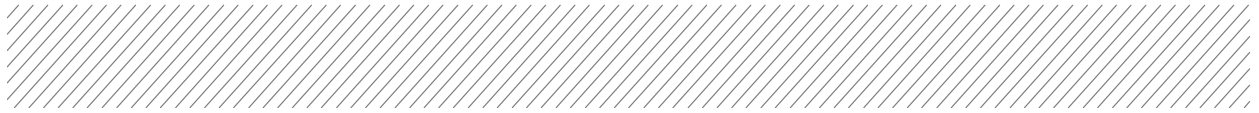
C	AM Peak	0
	PM Peak	9

Total	AM PEAK	PM PEAK
14	7%	39
	3%	

Total	AM PEAK	PM PEAK
29	24%	42
	14%	

Movements	AM PEAK	PM PEAK
vol		
% CV		

Movements	AM PEAK	PM PEAK
vol		
% CV		



Appendix C

SIDRA Report

MOVEMENT SUMMARY

Site: 2011 AM Without Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	15	18.0	0.023	8.2	LOS A	0.1	0.7	0.07	0.67	51.5
2	T1	11	20.0	0.023	8.2	LOS A	0.1	0.7	0.07	0.67	51.5
3	R2	4	0.0	0.023	8.2	LOS A	0.1	0.7	0.07	0.67	51.5
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		29	16.1	0.023	8.2	LOS A	0.1	0.7	0.07	0.67	51.5
East: Shakespeare Street											
4	L2	6	17.0	0.008	7.5	LOS A	0.0	0.3	0.05	0.54	52.5
5	T1	6	0.0	0.008	7.5	LOS A	0.0	0.3	0.05	0.54	52.5
6	R2	2	0.0	0.008	7.5	LOS A	0.0	0.3	0.05	0.54	52.5
Approach		15	7.3	0.008	7.5	NA	0.0	0.3	0.05	0.54	52.5
North: Clermont-Alpha Road											
7	L2	5	0.0	0.026	4.5	LOS A	0.1	0.7	0.05	0.63	53.1
8	T1	18	29.0	0.026	4.5	LOS A	0.1	0.7	0.05	0.63	53.1
9	R2	7	6.0	0.026	4.5	LOS A	0.1	0.7	0.05	0.63	53.1
Approach		31	18.4	0.026	4.5	LOS A	0.1	0.7	0.05	0.63	53.1
West: Capricorn Highway (west)											
10	L2	6	17.0	0.009	11.0	LOS B	0.0	0.3	0.06	0.64	50.8
11	T1	4	0.0	0.009	11.0	LOS B	0.0	0.3	0.06	0.64	50.8
12	R2	5	20.0	0.009	11.0	LOS B	0.0	0.3	0.06	0.64	50.8
Approach		16	13.5	0.009	11.0	NA	0.0	0.3	0.06	0.64	50.8
All Vehicles		91	15.0	0.026	8.7	NA	0.1	0.7	0.06	0.63	52.1

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2011 PM Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Capricorn Highway (south)											
1	L2	36	44.0	0.060	14.2	LOS B	0.2	2.0	0.08	0.74	50.6
2	T1	16	13.0	0.060	14.2	LOS B	0.2	2.0	0.08	0.74	50.6
3	R2	19	12.0	0.060	14.2	LOS B	0.2	2.0	0.08	0.74	50.6
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		71	28.5	0.060	14.2	LOS B	0.2	2.0	0.08	0.74	50.6
East: Shakespeare Street											
4	L2	19	0.0	0.022	6.7	LOS A	0.1	0.8	0.07	0.54	50.3
5	T1	12	9.0	0.022	6.7	LOS A	0.1	0.8	0.07	0.54	50.3
6	R2	11	0.0	0.022	6.7	LOS A	0.1	0.8	0.07	0.54	50.3
Approach		41	2.5	0.022	6.7	NA	0.1	0.8	0.07	0.54	50.3
North: Clermont-Alpha Road											
7	L2	7	25.0	0.022	7.1	LOS A	0.1	0.6	0.07	0.99	53.7
8	T1	15	14.0	0.022	7.1	LOS A	0.1	0.6	0.07	0.99	53.7
9	R2	4	14.0	0.022	7.1	LOS A	0.1	0.6	0.07	0.99	53.7
Approach		26	17.1	0.022	7.1	LOS A	0.1	0.6	0.07	0.99	53.7
West: Capricorn Highway (west)											
10	L2	7	14.0	0.017	10.6	LOS B	0.1	0.7	0.11	0.60	51.7
11	T1	11	0.0	0.017	10.6	LOS B	0.1	0.7	0.11	0.60	51.7
12	R2	9	33.0	0.017	10.6	LOS B	0.1	0.7	0.11	0.60	51.7
Approach		27	15.2	0.017	10.6	NA	0.1	0.7	0.11	0.60	51.7
All Vehicles		165	18.0	0.060	11.4	NA	0.2	2.0	0.08	0.71	51.2

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2015 AM With Development - Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m		per veh	km/h
South: Capricorn Highway (south)											
1	L2	21	30.0	0.031	10.5	LOS B	0.1	1.0	0.07	0.71	51.4
2	T1	13	20.0	0.031	10.5	LOS B	0.1	1.0	0.07	0.71	51.4
3	R2	5	0.0	0.031	10.5	LOS B	0.1	1.0	0.07	0.71	51.4
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		39	22.7	0.031	10.5	LOS B	0.1	1.0	0.07	0.71	51.4
East: Shakespeare Street											
4	L2	7	17.0	0.010	7.5	LOS A	0.0	0.3	0.06	0.54	52.2
5	T1	7	0.0	0.010	7.5	LOS A	0.0	0.3	0.06	0.54	52.2
6	R2	3	0.0	0.010	7.5	LOS A	0.0	0.3	0.06	0.54	52.2
Approach		18	7.0	0.010	7.5	NA	0.0	0.3	0.06	0.54	52.2
North: Clermont-Alpha Road											
7	L2	6	0.0	0.031	4.0	LOS A	0.1	0.9	0.06	0.53	53.0
8	T1	21	29.0	0.031	4.0	LOS A	0.1	0.9	0.06	0.53	53.0
9	R2	8	0.0	0.031	4.0	LOS A	0.1	0.9	0.06	0.53	53.0
Approach		36	17.1	0.031	4.0	LOS A	0.1	0.9	0.06	0.53	53.0
West: Capricorn Highway (west)											
10	L2	7	17.0	0.015	14.6	LOS B	0.1	0.6	0.07	0.69	50.6
11	T1	5	0.0	0.015	14.6	LOS B	0.1	0.6	0.07	0.69	50.6
12	R2	11	40.0	0.015	14.6	LOS B	0.1	0.6	0.07	0.69	50.6
Approach		23	23.6	0.015	14.6	NA	0.1	0.6	0.07	0.69	50.6
All Vehicles		116	18.7	0.031	11.2	NA	0.1	1.0	0.07	0.63	51.8

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Clermont-Alpha Rd Shakespeare Street.sip6

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

Site: 2015 AM without Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	17	21.0	0.027	8.5	LOS A	0.1	0.8	0.07	0.68	51.6
2	T1	13	20.0	0.027	8.5	LOS A	0.1	0.8	0.07	0.68	51.6
3	R2	5	0.0	0.027	8.5	LOS A	0.1	0.8	0.07	0.68	51.6
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		35	17.5	0.027	8.5	LOS A	0.1	0.8	0.07	0.68	51.6
East: Shakespeare Street											
4	L2	7	17.0	0.010	7.5	LOS A	0.0	0.3	0.06	0.54	52.2
5	T1	7	0.0	0.010	7.5	LOS A	0.0	0.3	0.06	0.54	52.2
6	R2	3	0.0	0.010	7.5	LOS A	0.0	0.3	0.06	0.54	52.2
Approach		18	7.0	0.010	7.5	NA	0.0	0.3	0.06	0.54	52.2
North: Clermont-Alpha Road											
7	L2	6	29.0	0.029	5.5	LOS A	0.1	0.7	0.05	0.83	54.3
8	T1	21	0.0	0.029	5.5	LOS A	0.1	0.7	0.05	0.83	54.3
9	R2	8	0.0	0.029	5.5	LOS A	0.1	0.7	0.05	0.83	54.3
Approach		36	5.1	0.029	5.5	LOS A	0.1	0.7	0.05	0.83	54.3
West: Capricorn Highway (west)											
10	L2	7	17.0	0.011	10.8	LOS B	0.1	0.4	0.07	0.64	50.8
11	T1	5	0.0	0.011	10.8	LOS B	0.1	0.4	0.07	0.64	50.8
12	R2	6	20.0	0.011	10.8	LOS B	0.1	0.4	0.07	0.64	50.8
Approach		19	13.3	0.011	10.8	NA	0.1	0.4	0.07	0.64	50.8
All Vehicles		107	10.9	0.029	9.8	NA	0.1	0.8	0.06	0.70	52.4

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

Site: 2015 PM With Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Capricorn Highway (south)											
1	L2	45	46.0	0.073	14.9	LOS B	0.3	2.5	0.09	0.74	50.4
2	T1	18	13.0	0.073	14.9	LOS B	0.3	2.5	0.09	0.74	50.4
3	R2	22	12.0	0.073	14.9	LOS B	0.3	2.5	0.09	0.74	50.4
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		85	30.3	0.073	14.9	LOS B	0.3	2.5	0.09	0.74	50.4
East: Shakespeare Street											
4	L2	22	0.0	0.026	6.7	LOS A	0.1	0.9	0.08	0.54	50.3
5	T1	14	9.0	0.026	6.7	LOS A	0.1	0.9	0.08	0.54	50.3
6	R2	13	0.0	0.026	6.7	LOS A	0.1	0.9	0.08	0.54	50.3
Approach		48	2.5	0.026	6.7	NA	0.1	0.9	0.08	0.54	50.3
North: Clermont-Alpha Road											
7	L2	8	14.0	0.026	6.9	LOS A	0.1	0.7	0.08	0.96	53.4
8	T1	17	14.0	0.026	6.9	LOS A	0.1	0.7	0.08	0.96	53.4
9	R2	5	25.0	0.026	6.9	LOS A	0.1	0.7	0.08	0.96	53.4
Approach		31	15.9	0.026	6.9	LOS A	0.1	0.7	0.08	0.96	53.4
West: Capricorn Highway (west)											
10	L2	8	14.0	0.024	12.7	LOS B	0.1	1.0	0.12	0.63	51.3
11	T1	13	0.0	0.024	12.7	LOS B	0.1	1.0	0.12	0.63	51.3
12	R2	16	40.0	0.024	12.7	LOS B	0.1	1.0	0.12	0.63	51.3
Approach		37	20.3	0.024	12.7	NA	0.1	1.0	0.12	0.63	51.3
All Vehicles		201	19.6	0.073	12.6	NA	0.3	2.5	0.09	0.70	51.0

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2015 PM Without Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Capricorn Highway (south)											
1	L2	41	44.0	0.069	14.3	LOS B	0.3	2.3	0.09	0.74	50.5
2	T1	18	13.0	0.069	14.3	LOS B	0.3	2.3	0.09	0.74	50.5
3	R2	22	12.0	0.069	14.3	LOS B	0.3	2.3	0.09	0.74	50.5
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		81	28.4	0.069	14.3	LOS B	0.3	2.3	0.09	0.74	50.5
East: Shakespeare Street											
4	L2	22	0.0	0.026	6.7	LOS A	0.1	0.9	0.08	0.54	50.3
5	T1	14	9.0	0.026	6.7	LOS A	0.1	0.9	0.08	0.54	50.3
6	R2	13	0.0	0.026	6.7	LOS A	0.1	0.9	0.08	0.54	50.3
Approach		48	2.5	0.026	6.7	NA	0.1	0.9	0.08	0.54	50.3
North: Clermont-Alpha Road											
7	L2	8	14.0	0.026	6.9	LOS A	0.1	0.7	0.08	0.96	53.4
8	T1	17	14.0	0.026	6.9	LOS A	0.1	0.7	0.08	0.96	53.4
9	R2	5	25.0	0.026	6.9	LOS A	0.1	0.7	0.08	0.96	53.4
Approach		31	15.9	0.026	6.9	LOS A	0.1	0.7	0.08	0.96	53.4
West: Capricorn Highway (west)											
10	L2	8	14.0	0.020	10.6	LOS B	0.1	0.8	0.12	0.60	51.6
11	T1	13	0.0	0.020	10.6	LOS B	0.1	0.8	0.12	0.60	51.6
12	R2	12	33.0	0.020	10.6	LOS B	0.1	0.8	0.12	0.60	51.6
Approach		33	15.3	0.020	10.6	NA	0.1	0.8	0.12	0.60	51.6
All Vehicles		193	17.7	0.069	11.4	NA	0.3	2.3	0.09	0.70	51.1

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2021 AM With Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	26	28.0	0.037	10.4	LOS B	0.1	1.2	0.08	0.70	51.2
2	T1	15	20.0	0.037	10.4	LOS B	0.1	1.2	0.08	0.70	51.2
3	R2	6	0.0	0.037	10.4	LOS B	0.1	1.2	0.08	0.70	51.2
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		47	21.8	0.037	10.4	LOS B	0.1	1.2	0.08	0.70	51.2
East: Shakespeare Street											
4	L2	9	17.0	0.012	7.5	LOS A	0.1	0.4	0.07	0.53	52.3
5	T1	9	0.0	0.012	7.5	LOS A	0.1	0.4	0.07	0.53	52.3
6	R2	3	0.0	0.012	7.5	LOS A	0.1	0.4	0.07	0.53	52.3
Approach		22	7.3	0.012	7.5	NA	0.1	0.4	0.07	0.53	52.3
North: Clermont-Alpha Road											
7	L2	7	0.0	0.036	4.2	LOS A	0.1	1.0	0.06	0.54	52.8
8	T1	24	29.0	0.036	4.2	LOS A	0.1	1.0	0.06	0.54	52.8
9	R2	11	0.0	0.036	4.2	LOS A	0.1	1.0	0.06	0.54	52.8
Approach		42	16.7	0.036	4.2	LOS A	0.1	1.0	0.06	0.54	52.8
West: Capricorn Highway (west)											
10	L2	9	17.0	0.019	14.7	LOS B	0.1	0.8	0.08	0.68	50.3
11	T1	6	0.0	0.019	14.7	LOS B	0.1	0.8	0.08	0.68	50.3
12	R2	14	39.0	0.019	14.7	LOS B	0.1	0.8	0.08	0.68	50.3
Approach		29	23.6	0.019	14.7	NA	0.1	0.8	0.08	0.68	50.3
All Vehicles		141	18.4	0.037	11.4	NA	0.1	1.2	0.08	0.62	51.6

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2021 AM Without Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	20	21.0	0.032	8.6	LOS A	0.1	1.0	0.09	0.67	51.4
2	T1	15	20.0	0.032	8.6	LOS A	0.1	1.0	0.09	0.67	51.4
3	R2	6	0.0	0.032	8.6	LOS A	0.1	1.0	0.09	0.67	51.4
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		41	17.4	0.032	8.6	LOS A	0.1	1.0	0.09	0.67	51.4
East: Shakespeare Street											
4	L2	9	17.0	0.012	7.5	LOS A	0.1	0.4	0.07	0.53	52.3
5	T1	9	0.0	0.012	7.5	LOS A	0.1	0.4	0.07	0.53	52.3
6	R2	3	0.0	0.012	7.5	LOS A	0.1	0.4	0.07	0.53	52.3
Approach		22	7.3	0.012	7.5	NA	0.1	0.4	0.07	0.53	52.3
North: Clermont-Alpha Road											
7	L2	7	0.0	0.036	4.2	LOS A	0.1	1.0	0.06	0.54	52.8
8	T1	24	29.0	0.036	4.2	LOS A	0.1	1.0	0.06	0.54	52.8
9	R2	11	0.0	0.036	4.2	LOS A	0.1	1.0	0.06	0.54	52.8
Approach		42	16.7	0.036	4.2	LOS A	0.1	1.0	0.06	0.54	52.8
West: Capricorn Highway (west)											
10	L2	9	17.0	0.014	10.9	LOS B	0.1	0.5	0.08	0.63	50.7
11	T1	6	0.0	0.014	10.9	LOS B	0.1	0.5	0.08	0.63	50.7
12	R2	7	20.0	0.014	10.9	LOS B	0.1	0.5	0.08	0.63	50.7
Approach		23	13.3	0.014	10.9	NA	0.1	0.5	0.08	0.63	50.7
All Vehicles		128	14.7	0.036	8.8	NA	0.1	1.0	0.07	0.60	51.9

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

Site: 2021 PM With Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Capricorn Highway (south)											
1	L2	56	45.0	0.090	14.8	LOS B	0.4	3.1	0.10	0.74	50.4
2	T1	22	13.0	0.090	14.8	LOS B	0.4	3.1	0.10	0.74	50.4
3	R2	26	12.0	0.090	14.8	LOS B	0.4	3.1	0.10	0.74	50.4
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		104	29.9	0.090	14.8	LOS B	0.4	3.1	0.10	0.74	50.4
East: Shakespeare Street											
4	L2	26	0.0	0.031	6.8	LOS A	0.1	1.1	0.09	0.53	50.2
5	T1	16	9.0	0.031	6.8	LOS A	0.1	1.1	0.09	0.53	50.2
6	R2	15	0.0	0.031	6.8	LOS A	0.1	1.1	0.09	0.53	50.2
Approach		57	2.5	0.031	6.8	NA	0.1	1.1	0.09	0.53	50.2
North: Clermont-Alpha Road											
7	L2	11	14.0	0.032	7.1	LOS A	0.1	0.9	0.09	0.94	53.3
8	T1	20	14.0	0.032	7.1	LOS A	0.1	0.9	0.09	0.94	53.3
9	R2	6	25.0	0.032	7.1	LOS A	0.1	0.9	0.09	0.94	53.3
Approach		37	15.9	0.032	7.1	LOS A	0.1	0.9	0.09	0.94	53.3
West: Capricorn Highway (west)											
10	L2	11	14.0	0.030	13.2	LOS B	0.1	1.2	0.14	0.63	50.9
11	T1	15	0.0	0.030	13.2	LOS B	0.1	1.2	0.14	0.63	50.9
12	R2	21	40.0	0.030	13.2	LOS B	0.1	1.2	0.14	0.63	50.9
Approach		46	21.4	0.030	13.2	NA	0.1	1.2	0.14	0.63	50.9
All Vehicles		244	19.8	0.090	12.9	NA	0.4	3.1	0.10	0.70	50.8

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2021 PM Without Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	48	44.0	0.084	14.2	LOS B	0.3	2.8	0.10	0.74	50.5
2	T1	22	13.0	0.084	14.2	LOS B	0.3	2.8	0.10	0.74	50.5
3	R2	26	12.0	0.084	14.2	LOS B	0.3	2.8	0.10	0.74	50.5
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		97	28.2	0.084	14.2	LOS B	0.3	2.8	0.10	0.74	50.5
East: Shakespeare Street											
4	L2	26	0.0	0.031	6.8	LOS A	0.1	1.1	0.09	0.53	50.2
5	T1	16	9.0	0.031	6.8	LOS A	0.1	1.1	0.09	0.53	50.2
6	R2	15	0.0	0.031	6.8	LOS A	0.1	1.1	0.09	0.53	50.2
Approach		57	2.5	0.031	6.8	NA	0.1	1.1	0.09	0.53	50.2
North: Clermont-Alpha Road											
7	L2	11	25.0	0.032	7.4	LOS A	0.1	0.9	0.09	0.94	53.3
8	T1	20	14.0	0.032	7.4	LOS A	0.1	0.9	0.09	0.94	53.3
9	R2	6	14.0	0.032	7.4	LOS A	0.1	0.9	0.09	0.94	53.3
Approach		37	17.1	0.032	7.4	LOS A	0.1	0.9	0.09	0.94	53.3
West: Capricorn Highway (west)											
10	L2	11	14.0	0.026	11.2	LOS B	0.1	1.0	0.13	0.60	51.2
11	T1	15	0.0	0.026	11.2	LOS B	0.1	1.0	0.13	0.60	51.2
12	R2	16	33.0	0.026	11.2	LOS B	0.1	1.0	0.13	0.60	51.2
Approach		41	16.3	0.026	11.2	NA	0.1	1.0	0.13	0.60	51.2
All Vehicles		232	18.0	0.084	11.7	NA	0.3	2.8	0.10	0.70	51.0

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA INTERSECTION 6.0.1.3703

Project: C:\Users\samial\Desktop\SIDRA\2021 PM - Capricorn Highway Clermont-Alpha Rd Shakespeare

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

Site: 2025 AM With Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	28	30.0	0.042	10.6	LOS B	0.2	1.3	0.09	0.70	51.2
2	T1	17	20.0	0.042	10.6	LOS B	0.2	1.3	0.09	0.70	51.2
3	R2	7	0.0	0.042	10.6	LOS B	0.2	1.3	0.09	0.70	51.2
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		53	22.6	0.042	10.6	LOS B	0.2	1.3	0.09	0.70	51.2
East: Shakespeare Street											
4	L2	11	17.0	0.014	7.5	LOS A	0.1	0.5	0.07	0.53	52.1
5	T1	11	0.0	0.014	7.5	LOS A	0.1	0.5	0.07	0.53	52.1
6	R2	4	0.0	0.014	7.5	LOS A	0.1	0.5	0.07	0.53	52.1
Approach		25	7.1	0.014	7.5	NA	0.1	0.5	0.07	0.53	52.1
North: Clermont-Alpha Road											
7	L2	8	0.0	0.041	4.2	LOS A	0.1	1.2	0.07	0.54	52.8
8	T1	27	29.0	0.041	4.2	LOS A	0.1	1.2	0.07	0.54	52.8
9	R2	12	0.0	0.041	4.2	LOS A	0.1	1.2	0.07	0.54	52.8
Approach		47	16.8	0.041	4.2	LOS A	0.1	1.2	0.07	0.54	52.8
West: Capricorn Highway (west)											
10	L2	11	17.0	0.020	14.3	LOS B	0.1	0.8	0.09	0.67	50.4
11	T1	7	0.0	0.020	14.3	LOS B	0.1	0.8	0.09	0.67	50.4
12	R2	14	39.0	0.020	14.3	LOS B	0.1	0.8	0.09	0.67	50.4
Approach		32	22.6	0.020	14.3	NA	0.1	0.8	0.09	0.67	50.4
All Vehicles		157	18.3	0.042	11.2	NA	0.2	1.3	0.08	0.62	51.7

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2025 AM Without Development - Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	23	21.0	0.038	8.7	LOS A	0.1	1.1	0.09	0.67	51.4
2	T1	17	20.0	0.038	8.7	LOS A	0.1	1.1	0.09	0.67	51.4
3	R2	7	0.0	0.038	8.7	LOS A	0.1	1.1	0.09	0.67	51.4
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		47	17.4	0.038	8.7	LOS A	0.1	1.1	0.09	0.67	51.4
East: Shakespeare Street											
4	L2	11	17.0	0.014	7.5	LOS A	0.1	0.5	0.07	0.53	52.1
5	T1	11	0.0	0.014	7.5	LOS A	0.1	0.5	0.07	0.53	52.1
6	R2	4	0.0	0.014	7.5	LOS A	0.1	0.5	0.07	0.53	52.1
Approach		25	7.1	0.014	7.5	NA	0.1	0.5	0.07	0.53	52.1
North: Clermont-Alpha Road											
7	L2	8	0.0	0.041	4.2	LOS A	0.1	1.2	0.07	0.54	52.8
8	T1	27	29.0	0.041	4.2	LOS A	0.1	1.2	0.07	0.54	52.8
9	R2	12	0.0	0.041	4.2	LOS A	0.1	1.2	0.07	0.54	52.8
Approach		47	16.8	0.041	4.2	LOS A	0.1	1.2	0.07	0.54	52.8
West: Capricorn Highway (west)											
10	L2	11	17.0	0.016	10.8	LOS B	0.1	0.6	0.09	0.63	50.7
11	T1	7	0.0	0.016	10.8	LOS B	0.1	0.6	0.09	0.63	50.7
12	R2	8	20.0	0.016	10.8	LOS B	0.1	0.6	0.09	0.63	50.7
Approach		26	13.2	0.016	10.8	NA	0.1	0.6	0.09	0.63	50.7
All Vehicles		146	14.6	0.041	8.8	NA	0.1	1.2	0.08	0.60	51.8

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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**SIDRA
INTERSECTION 6**

MOVEMENT SUMMARY

Site: 2025 PM With Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	61	45.0	0.100	14.8	LOS B	0.4	3.4	0.11	0.74	50.3
2	T1	24	13.0	0.100	14.8	LOS B	0.4	3.4	0.11	0.74	50.3
3	R2	29	12.0	0.100	14.8	LOS B	0.4	3.4	0.11	0.74	50.3
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		115	29.8	0.100	14.8	LOS B	0.4	3.4	0.11	0.74	50.3
East: Shakespeare Street											
4	L2	29	0.0	0.035	6.8	LOS A	0.2	1.2	0.10	0.53	50.1
5	T1	18	9.0	0.035	6.8	LOS A	0.2	1.2	0.10	0.53	50.1
6	R2	17	0.0	0.035	6.8	LOS A	0.2	1.2	0.10	0.53	50.1
Approach		64	2.5	0.035	6.8	NA	0.2	1.2	0.10	0.53	50.1
North: Clermont-Alpha Road											
7	L2	12	14.0	0.037	7.1	LOS A	0.1	1.1	0.10	0.95	53.2
8	T1	23	14.0	0.037	7.1	LOS A	0.1	1.1	0.10	0.95	53.2
9	R2	7	25.0	0.037	7.1	LOS A	0.1	1.1	0.10	0.95	53.2
Approach		42	15.9	0.037	7.1	LOS A	0.1	1.1	0.10	0.95	53.2
West: Capricorn Highway (west)											
10	L2	12	14.0	0.032	12.7	LOS B	0.2	1.3	0.15	0.62	51.0
11	T1	17	0.0	0.032	12.7	LOS B	0.2	1.3	0.15	0.62	51.0
12	R2	21	40.0	0.032	12.7	LOS B	0.2	1.3	0.15	0.62	51.0
Approach		49	20.3	0.032	12.7	NA	0.2	1.3	0.15	0.62	51.0
All Vehicles		271	19.4	0.100	12.6	NA	0.4	3.4	0.11	0.70	50.8

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

Site: 2025 PM Without Development - Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	55	44.0	0.095	14.3	LOS B	0.4	3.2	0.11	0.74	50.4
2	T1	24	13.0	0.095	14.3	LOS B	0.4	3.2	0.11	0.74	50.4
3	R2	29	12.0	0.095	14.3	LOS B	0.4	3.2	0.11	0.74	50.4
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		108	28.4	0.095	14.3	LOS B	0.4	3.2	0.11	0.74	50.4
East: Shakespeare Street											
4	L2	29	0.0	0.035	6.8	LOS A	0.2	1.2	0.10	0.53	50.1
5	T1	18	9.0	0.035	6.8	LOS A	0.2	1.2	0.10	0.53	50.1
6	R2	17	0.0	0.035	6.8	LOS A	0.2	1.2	0.10	0.53	50.1
Approach		64	2.5	0.035	6.8	NA	0.2	1.2	0.10	0.53	50.1
North: Clermont-Alpha Road											
7	L2	12	25.0	0.036	7.3	LOS A	0.1	1.1	0.10	0.95	53.3
8	T1	23	14.0	0.036	7.3	LOS A	0.1	1.1	0.10	0.95	53.3
9	R2	7	14.0	0.036	7.3	LOS A	0.1	1.1	0.10	0.95	53.3
Approach		42	17.0	0.036	7.3	LOS A	0.1	1.1	0.10	0.95	53.3
West: Capricorn Highway (west)											
10	L2	12	14.0	0.027	10.5	LOS B	0.1	1.1	0.14	0.58	51.4
11	T1	17	0.0	0.027	10.5	LOS B	0.1	1.1	0.14	0.58	51.4
12	R2	15	33.0	0.027	10.5	LOS B	0.1	1.1	0.14	0.58	51.4
Approach		43	15.0	0.027	10.5	NA	0.1	1.1	0.14	0.58	51.4
All Vehicles		258	17.8	0.095	11.4	NA	0.4	3.2	0.11	0.69	50.9

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Friday, 27 September 2013 9:54:26 AM

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY

Site: 2035 AM With Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	37	29.0	0.055	10.4	LOS B	0.2	1.8	0.11	0.70	51.1
2	T1	22	20.0	0.055	10.4	LOS B	0.2	1.8	0.11	0.70	51.1
3	R2	9	0.0	0.055	10.4	LOS B	0.2	1.8	0.11	0.70	51.1
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		68	22.1	0.055	10.4	LOS B	0.2	1.8	0.11	0.70	51.1
East: Shakespeare Street											
4	L2	14	17.0	0.018	7.5	LOS A	0.1	0.6	0.09	0.53	52.0
5	T1	14	0.0	0.018	7.5	LOS A	0.1	0.6	0.09	0.53	52.0
6	R2	5	0.0	0.018	7.5	LOS A	0.1	0.6	0.09	0.53	52.0
Approach		33	7.1	0.018	7.5	NA	0.1	0.6	0.09	0.53	52.0
North: Clermont-Alpha Road											
7	L2	12	0.0	0.056	4.3	LOS A	0.2	1.6	0.08	0.54	52.6
8	T1	37	29.0	0.056	4.3	LOS A	0.2	1.6	0.08	0.54	52.6
9	R2	16	0.0	0.056	4.3	LOS A	0.2	1.6	0.08	0.54	52.6
Approach		64	16.6	0.056	4.3	LOS A	0.2	1.6	0.08	0.54	52.6
West: Capricorn Highway (west)											
10	L2	14	17.0	0.026	13.9	LOS B	0.1	1.0	0.11	0.66	50.2
11	T1	9	0.0	0.026	13.9	LOS B	0.1	1.0	0.11	0.66	50.2
12	R2	18	36.0	0.026	13.9	LOS B	0.1	1.0	0.11	0.66	50.2
Approach		41	21.4	0.026	13.9	NA	0.1	1.0	0.11	0.66	50.2
All Vehicles		206	17.9	0.056	10.9	NA	0.2	1.8	0.10	0.61	51.5

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 AM Without Development - Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	31	21.0	0.050	8.7	LOS A	0.2	1.5	0.11	0.67	51.2
2	T1	22	20.0	0.050	8.7	LOS A	0.2	1.5	0.11	0.67	51.2
3	R2	9	0.0	0.050	8.7	LOS A	0.2	1.5	0.11	0.67	51.2
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		62	17.4	0.050	8.7	LOS A	0.2	1.5	0.11	0.67	51.2
East: Shakespeare Street											
4	L2	14	17.0	0.018	7.5	LOS A	0.1	0.6	0.09	0.53	52.0
5	T1	14	0.0	0.018	7.5	LOS A	0.1	0.6	0.09	0.53	52.0
6	R2	5	0.0	0.018	7.5	LOS A	0.1	0.6	0.09	0.53	52.0
Approach		33	7.1	0.018	7.5	NA	0.1	0.6	0.09	0.53	52.0
North: Clermont-Alpha Road											
7	L2	12	0.0	0.056	4.3	LOS A	0.2	1.6	0.08	0.54	52.7
8	T1	37	29.0	0.056	4.3	LOS A	0.2	1.6	0.08	0.54	52.7
9	R2	16	0.0	0.056	4.3	LOS A	0.2	1.6	0.08	0.54	52.7
Approach		64	16.6	0.056	4.3	LOS A	0.2	1.6	0.08	0.54	52.7
West: Capricorn Highway (west)											
10	L2	14	17.0	0.021	10.9	LOS B	0.1	0.8	0.10	0.62	50.5
11	T1	9	0.0	0.021	10.9	LOS B	0.1	0.8	0.10	0.62	50.5
12	R2	12	20.0	0.021	10.9	LOS B	0.1	0.8	0.10	0.62	50.5
Approach		35	13.4	0.021	10.9	NA	0.1	0.8	0.10	0.62	50.5
All Vehicles		194	14.7	0.056	8.9	NA	0.2	1.6	0.09	0.59	51.7

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 2035 PM With Development -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	81	46.0	0.135	14.1	LOS B	0.5	4.8	0.13	0.70	49.9
2	T1	33	20.0	0.135	14.1	LOS B	0.5	4.8	0.13	0.70	49.9
3	R2	39	0.0	0.135	14.1	LOS B	0.5	4.8	0.13	0.70	49.9
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		153	28.7	0.135	14.1	LOS B	0.5	4.8	0.13	0.70	49.9
East: Shakespeare Street											
4	L2	39	0.0	0.047	6.8	LOS A	0.2	1.6	0.12	0.52	50.0
5	T1	24	9.0	0.047	6.8	LOS A	0.2	1.6	0.12	0.52	50.0
6	R2	22	0.0	0.047	6.8	LOS A	0.2	1.6	0.12	0.52	50.0
Approach		85	2.6	0.047	6.8	NA	0.2	1.6	0.12	0.52	50.0
North: Clermont-Alpha Road											
7	L2	16	14.0	0.050	7.2	LOS A	0.2	1.5	0.11	0.94	53.0
8	T1	31	14.0	0.050	7.2	LOS A	0.2	1.5	0.11	0.94	53.0
9	R2	9	25.0	0.050	7.2	LOS A	0.2	1.5	0.11	0.94	53.0
Approach		56	15.9	0.050	7.2	LOS A	0.2	1.5	0.11	0.94	53.0
West: Capricorn Highway (west)											
10	L2	16	14.0	0.042	12.6	LOS B	0.2	1.7	0.17	0.60	50.7
11	T1	22	0.0	0.042	12.6	LOS B	0.2	1.7	0.17	0.60	50.7
12	R2	27	39.0	0.042	12.6	LOS B	0.2	1.7	0.17	0.60	50.7
Approach		65	19.7	0.042	12.6	NA	0.2	1.7	0.17	0.60	50.7
All Vehicles		359	18.9	0.135	12.2	NA	0.5	4.8	0.13	0.68	50.5

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2035 PM Without Development - Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street

Intersection -Capricorn Highway/Clermont-Alpha Rd/Shakespeare Street
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m	per veh	km/h	
South: Capricorn Highway (south)											
1	L2	74	44.0	0.130	14.5	LOS B	0.5	4.5	0.13	0.74	50.2
2	T1	33	13.0	0.130	14.5	LOS B	0.5	4.5	0.13	0.74	50.2
3	R2	39	12.0	0.130	14.5	LOS B	0.5	4.5	0.13	0.74	50.2
3u	U	0	0.0	0.000	0.0	NA	0.0	0.0	0.00	0.00	0.0
Approach		145	28.5	0.130	14.5	LOS B	0.5	4.5	0.13	0.74	50.2
East: Shakespeare Street											
4	L2	39	0.0	0.047	6.8	LOS A	0.2	1.6	0.12	0.52	50.0
5	T1	24	9.0	0.047	6.8	LOS A	0.2	1.6	0.12	0.52	50.0
6	R2	22	0.0	0.047	6.8	LOS A	0.2	1.6	0.12	0.52	50.0
Approach		85	2.6	0.047	6.8	NA	0.2	1.6	0.12	0.52	50.0
North: Clermont-Alpha Road											
7	L2	16	14.0	0.050	7.2	LOS A	0.2	1.4	0.11	0.94	53.0
8	T1	31	14.0	0.050	7.2	LOS A	0.2	1.4	0.11	0.94	53.0
9	R2	9	25.0	0.050	7.2	LOS A	0.2	1.4	0.11	0.94	53.0
Approach		56	15.9	0.050	7.2	LOS A	0.2	1.4	0.11	0.94	53.0
West: Capricorn Highway (west)											
10	L2	16	14.0	0.039	11.4	LOS B	0.2	1.6	0.17	0.59	50.8
11	T1	22	0.0	0.039	11.4	LOS B	0.2	1.6	0.17	0.59	50.8
12	R2	24	33.0	0.039	11.4	LOS B	0.2	1.6	0.17	0.59	50.8
Approach		62	16.4	0.039	11.4	NA	0.2	1.6	0.17	0.59	50.8
All Vehicles		348	18.0	0.130	11.8	NA	0.5	4.5	0.13	0.69	50.7

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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9.13 Matters of National Environmental Significance

9.13 Matters of National Environmental Significance

9.13.1 Biodiversity Offset

9.13.1.1 Biodiversity Offset Summary

Because the SGCP has residual impacts on state and federal environmental values of significance, governmental approval of this project is contingent on the development of an appropriate offsets plan to ensure no net loss of these values. A brief description of the South Galilee Biodiversity Offsets Plan was provided in the draft EIS. During the review process, stakeholders raised the need for more detailed information about this plan.

In response to stakeholder comments, this chapter presents a revised and detailed South Galilee Biodiversity Offsets Plan. This plan aims to develop and justify a strategy for delivering a net gain to all environmental values, based on the best available scientific data, and complying with Queensland and Commonwealth offsetting policies. This plan also addresses a number of key changes to the SGCP since the draft EIS: namely, revised policy requirements, revised mine plans and impacts, revised offset areas, and a revised offset delivery schedule.

This chapter presents the results of BioCondition surveys of offset and impact areas, and uses these data to show that the proposed offsets will deliver a net gain to all matters of state and national environmental significance impacted by the SGCP.

9.13.1.2 Biodiversity Offset Assessment

South Galilee Biodiversity Offsets Plan

for

South Galilee Coal Project

February 2014

This report has been prepared solely for the benefit of AMCI and Bandana Coal Pty Limited. MET Serve Pty Ltd accepts no liability for the use or interpretation of any information contained in this report for any other purpose other than intended, or for its use by any party other than the above named Client.

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1 INTRODUCTION

1.1 THE SOUTH GALILEE COAL PROJECT

Minimisation of impacts to matters of environmental significance was a major consideration during the planning of the South Galilee Coal Project (SGCP). Nevertheless, residual impacts on certain values are anticipated. Because the SGCP has residual impacts on state and federal environmental values of significance, government approval of this project is contingent on the development of an appropriate offsets plan to ensure no net loss of these values.

The environmental impacts of the SGCP have been assessed in a draft Environmental Impact Statement (EIS), prepared and released for public and government review on the 20th October 2012. Following this consultation process, additional fauna surveys were undertaken to provide further information about certain parts of the mining lease. The EIS also contained a brief description of a proposed offset plan. Several comments arising from this consultation process regarded the need for greater detail about the proposed offsets plan. Furthermore, since this EIS there have been changes to both the mine plan and proposed offsets.

The current South Galilee Biodiversity Offsets Plan aims to develop and justify a strategy for delivering a net gain to all environmental values, based on the best available scientific data, and complying with Queensland and Commonwealth policies. An attempt to avoid unnecessarily detailed repetition of the impacts of the SGCP on environmental values has been made, and for this reason the South Galilee Biodiversity Offset Plan is best read in conjunction with the EIS and the AEIS chapter detailing additional ecological surveys.

1.2 PURPOSE

This Biodiversity Offsets Plan is provided as part of the AEIS for the SGCP. It presents a revised and more detailed strategy to that provided in the SGCP EIS. The plan is presented to address the following key changes:

- Revised policy requirements;
- Revised mine plans and impacts;
- Revised offset areas; and
- Revised offset delivery schedule.

It also addresses offsets-related stakeholder comments provided during the SGCP EIS Public Consultation Program.

1.3 IMPACT AREA

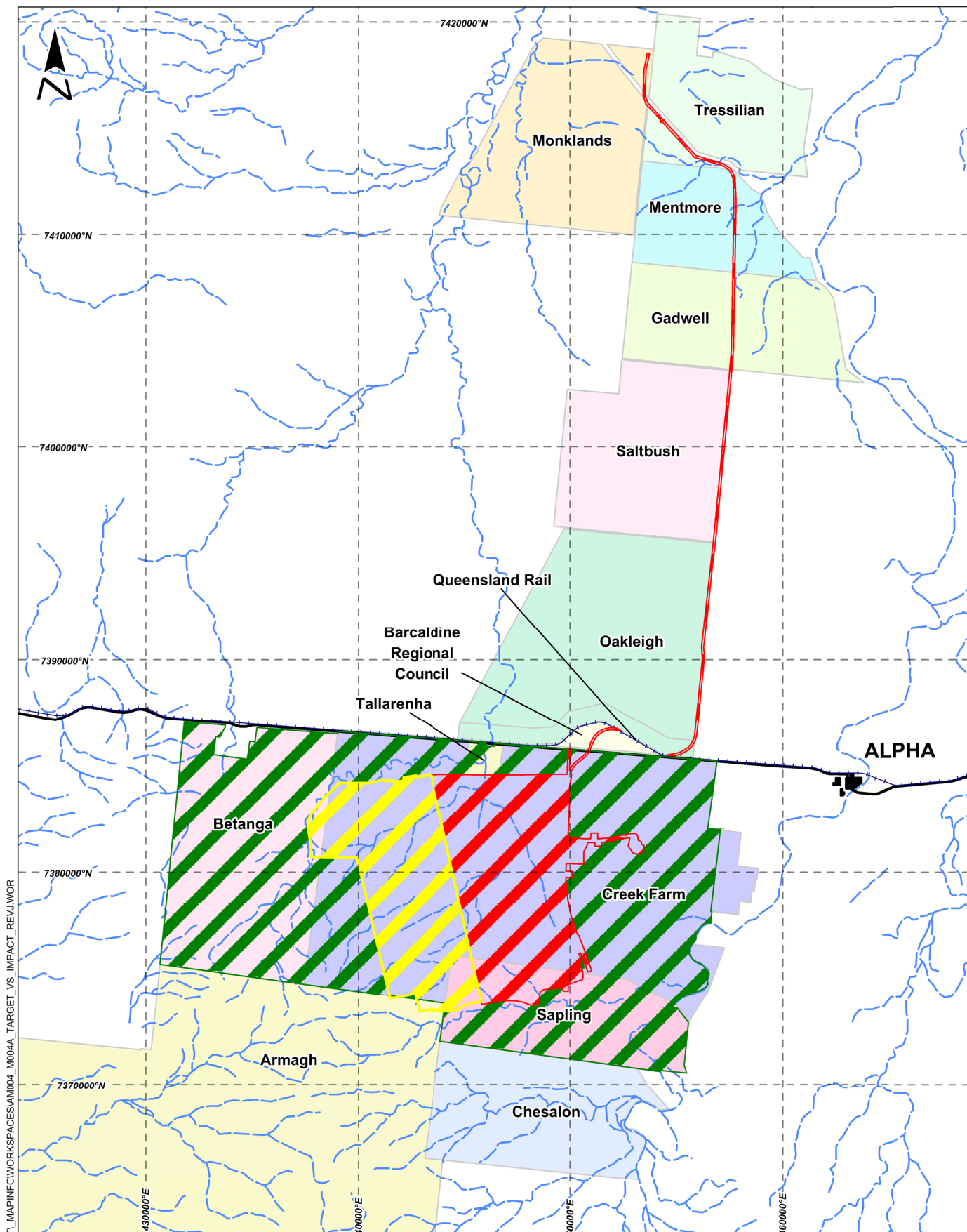
The 'impact area' refers to the footprint of the mine and its associated infrastructure, including a rail corridor linking the SGCP with proposed rail links in the northern Galilee Basin (**Figure 1**). The total impact area is estimated to be 11,519.77 ha. Of this, 6,369.66 ha will be cleared to accommodate the SGCP. The remainder (5,150.11 ha) will overlie underground longwall mining panels, and may be subject to subsidence and cracking. Based on subsidence models and a review of available literature on vegetation communities susceptible to underground mining (see draft EIS), impacts to vegetation communities above longwall panels are expected to be negligible. Nevertheless, for the purposes of the offsets plan, areas above longwall panels are conservatively included within impact areas to serve as an extreme upper limit to the environmental impacts of the SGCP.

The current land use within the impact area is cattle grazing, and the vast majority of the impact area consists of cleared, treeless pastures that have low environmental value. The impact area does not contain any National Parks, Nature Refuges, State Forests or other conservation estates. The impact area also does not contain any areas designated as offsets for other development projects.

The impact area contains 1880.92 ha of remnant vegetation, 800.73 ha of which will be cleared, and the remainder is subject to potential subsidence impacts (**Appendix A**). None of this remnant vegetation is mapped as essential habitat for threatened flora or fauna. Most of the vegetation communities present are dominated by *Eucalyptus populnea* or *Eucalyptus melanophloia*. Other

Eucalyptus and *Corymbia* species dominate some regional ecosystems, while *Acacia harpophylla* and *Acacia shirleyi* dominate in small areas.

The entire impact area is of low topographical relief, and consists primarily of alluvial flats (land zone 3) and Tertiary-early Quaternary old sandy plains (land zone 5). Low rises in the west of the impact area contain low sandstone ridges (land zone 10) and ironstone jump-ups (land zone 7). Alpha Creek, one of the few permanent waterways in the region and an important wildlife corridor, is approximately 5 km east of the impact area.



-  Surface Impact Area
-  Subsidence Impact Area
-  Offset Area
-  Rail
-  Road (Principal)
-  Hydrology

Data Source: Tenement - DEEDI, Topography (250k) - Geoscience Australia

Alpha Coal Pty Ltd

South Galilee Coal Project

Impact and Offset Areas

2 0 2 4 6



Kilometres

Scale: 1:250,000 (A4)

17/03/2014

Proj. : MGA Z55
Datum: GDA 1994

FIGURE 1

1.4 LEGISLATIVE FRAMEWORK

1.4.1 Galilee Basin Offset Strategy

The *Galilee Basin Offset Strategy* was published in August 2013 by the Queensland Government as a guide to proponents of level one mining, petroleum and gas activities who need to locate an offset site as part of the conditions of an environmental authority under the *Environmental Protection Act 1994*. The strategy identifies key wildlife corridors and conservation hubs within the Galilee Coal Basin. The strategy supports the implementation of the *Queensland Biodiversity Offset Policy (Section 1.4.2)* through the provision of spatial resources for prioritising land-based offsets.

1.4.2 Queensland Biodiversity Offset Policy

Version 1 of the *Queensland Biodiversity Offset Policy* came into effect in October 2011, and specifies offsetting requirements when developments have residual impacts on State-significant biodiversity values. Such values include:

- 1) remnant Endangered regional ecosystems*
- 2) remnant Of Concern regional ecosystems*
- 3) high-value regrowth containing Endangered regional ecosystems
- 4) high-value regrowth containing Of Concern regional ecosystems
- 5) threshold regional ecosystems
- 6) critically limited regional ecosystems
- 7) essential habitat for protected wildlife
- 8) essential regrowth habitat for protected wildlife
- 9) wetlands
- 10) watercourses*
- 11) connectivity important for state-significant biodiversity values*
- 12) Endangered, Vulnerable, Near Threatened and special Least Concern plants and animals*
- 13) legally secured offset areas under Queensland legislation.

Those marked with an asterisk are relevant to the SGCP.

There are seven principles of the *Queensland Biodiversity Offset Policy*.

1. Offsets will not replace or undermine existing environmental standards or regulatory requirements, or be used to allow development in areas otherwise prohibited through legislation or policy.
2. Environmental impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact.
3. Offsets must achieve an equivalent or better environmental outcome.
4. Offsets must provide environmental values as similar as possible to those being lost.
5. Offset provision must minimise the time-lag between the impact and delivery of the offset.
6. Offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values.
7. Offsets must be legally secured for the duration of the offset requirement.

Where the Commonwealth Government requires an offset for an activity that is considered a 'controlled action' under the *Environment Protection and Biodiversity Conservation Act 1999*, an additional offset for the purposes of the Queensland Biodiversity Offset Policy is not required where the same State-significant biodiversity values are impacted. The offset provided must achieve the same, or greater, outcomes for the values impacted as would be required under the Queensland policy.

The *Queensland Biodiversity Offset Policy* is to be replaced by a new offset policy in 2014. Draft versions of this new policy do not impose any additional requirements on offsetting, and in fact remove offsetting requirements for certain environmental values considered under the current policy (e.g., Near Threatened species, some regrowth vegetation). The key principles of the new policy

remain similar to the current policy, and by complying with the latter by a wide margin, the SGCP is likely to comply with any new policies released during the assessment process.

1.4.3 EPBC Act 1999 Environmental Offsets Policy

The *EPBC Act Environmental Offsets Policy* came into effect in October 2012, and specifies offsetting requirements when developments have residual impacts on Matters of National Environmental Significance protected under the *Environment Protection and Biodiversity Conservation Act 1999*. Such matters include:

- 1) world heritage properties
- 2) national heritage places
- 3) wetlands of international importance
- 4) listed threatened species and ecological communities*
- 5) migratory species protected under international agreements*
- 6) Commonwealth marine areas
- 7) the Great Barrier Reef Marine Park
- 8) the environment, where nuclear actions are involved
- 9) the environment, where actions are on Commonwealth land
- 10) the environment, where Commonwealth agencies are undertaking the action.

Those marked with an asterisk are relevant to the SGCP.

The *EPBC Act Environmental Offsets Policy* has ten principles:

1. Offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter impacted.
2. Direct offsets must form the basis of an offsets package.
3. Offsets are to be in proportion to the level of statutory protection afforded to the protected matter.
4. Offsets must be of a size and scale proportionate to the residual impacts on the protected matter.
5. Offsets must account for and manage the risks of the offset not succeeding.
6. Offsets must be in addition to requirements under other law or planning regulations.
7. Offsets are to be efficient, effective, timely, transparent, scientifically robust and reasonable.
8. Offsets are to have transparent governance, including being able to be readily measured, monitored, audited and enforced.
9. Government decision-making will be informed by scientifically robust information and exercise the precautionary principle.
10. Government decision-making will be conducted in a consistent and transparent manner.

To achieve these principles, The Commonwealth Government has developed the *Offsets Assessment Guide*, which is a balance sheet to be used for calculating compliance of a proposed offsets package with the *EPBC Act Environmental Offsets Policy*.

Biodiversity offsets under Queensland legislation count towards an offset under the EPBC Act to the extent that they compensate for the residual impact to the matter protected under the EPBC Act.

1.5 MATTERS TO BE OFFSET

Extensive ecological surveys of the SGCP area have been undertaken as part of the EIS. These encompassed various seasons over three years. An additional fauna survey was undertaken as part of the AEIS, in response to concerns that parts of the SGCP were inadequately surveyed. Combined, these surveys detected a number of species and ecological communities that are listed as threatened under State or Commonwealth legislation. Several protected matters require offsets under both the *EPBC Act Environmental Offsets Policy* and *Queensland Biodiversity Offset Policy*. In such cases, the obligations under both policies often slightly differ (**Table 1**). **Section 4** and **Section 5** explain how the South Galilee Biodiversity Offsets Plan fulfils the obligations under both policies.

Table 1 Offset obligations under Queensland and Commonwealth offset policies

Protected Matter	Offset obligations under QLD policy	Offset obligations under Commonwealth policy
Connectivity	Where a State-significant wildlife corridor is being impacted, the offset must be: a) located within the same bioregion b) identified on a map within one of the following: i. a strategic area or strategic rehabilitation area identified by the Department of Environment and Heritage Protection (DEHP) ii. an ecological corridor identified by the Commonwealth, State or local government either on its website or in an approved and publicly available document iii. a DEHP-approved, strategic corridor identified by a recognised organisation or group.	N/A
Endangered ecosystems	Where a remnant or high value regrowth Endangered regional ecosystem is impacted, the offset must be: a) an Endangered regional ecosystem in the same regional-scale broad vegetation group (1:1 000 000) b) located within the same bioregion.	Where a federally threatened ecological community is being impacted: a) offsets must pertain to the community being impacted b) offsets must deliver an outcome that improves or maintains the viability of the threatened community c) at least 90% of the total offset must be direct offsets d) offsets should be proportional to the level of statutory protection of the ecological community e) offsets must take into account time until ecological benefit f) offsets must consider risk of failure g) offsets must be additional to what is already required by law or planning regulations, or agreed to under other schemes or programs.
Of Concern regional ecosystems	Where a remnant or high value regrowth Of Concern regional ecosystem is impacted, the offset must be: a) an Of Concern regional ecosystem or an Endangered regional ecosystem in the same regional-scale broad vegetation group (1:1 000 000) b) located within the same bioregion c) the same or higher conservation status as the area proposed to be impacted on.	N/A

Protected animals	Where a protected animal is being impacted, the offset must: a) be known habitat for the species being impacted which contains the elements necessary for the survival of the species being offset b) be an area utilised by the species at any stage of its life cycle for which there is recent evidence c) demonstrate that the direct impacts on the species are mitigated by the offset area and surrounding environment. d) be consistent with the requirements of an approved recovery plan (where it exists) for the species or relevant community. Where a specific plan for the species does not exist, advice from a suitably qualified and experienced person should be sought and provided about the conditions and requirements for the survival of the species. In the absence of scientific information about the habitat of the species being impacted, the offset area must contain the same regional ecosystem containing the protected animal as being impacted.	Where a federally listed protected animal is being impacted: a) offsets must pertain to the actual species being impacted b) offsets must deliver an outcome that improves or maintains the viability of the protected animal c) at least 90% of the total offset must be direct offsets d) offsets should be proportional to the level of the species' statutory protection e) offsets must take into account time until ecological benefit f) offsets must consider risk of failure g) offsets must be additional to what is already required by law or planning regulations, or agreed to under other schemes or programs.
Essential habitat	Where essential habitat or essential regrowth habitat is being impacted, the offset must: a) be located within the same bioregion b) include at least three essential habitat factors for the protected wildlife and must include any essential habitat factors or essential regrowth habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database or the essential regrowth habitat database; or be an area utilised by the protected wildlife at any stage of its life cycle for which there is recent evidence c) demonstrate that the direct impacts on the protected wildlife are mitigated by the offset area and surrounding environment.	N/A

Protected plants	Where protected plants will be impacted, suitable offsets: a) may be located on land owned by the applicant or by a third party b) must be in an area where the protected plant species has the conditions and requirements necessary to survive. The offset must: c) be within the known or historical distribution of the species being offset d) be in an area that contains the conditions necessary for the survival of the species being offset, such as sunlight, water availability, soil type or position in the landscape e) demonstrate like for like for the species being cleared, by replacing the species being impacted on in the impact area with the same species in the offset area f) achieve a net conservation gain for the species affected, using the following offset ratios: i. at least 1:5 for endangered species (i.e. 5 plants must be re-planted to replace 1 plant cleared) ii. at least 1:3.5 for vulnerable species iii. at least 1:3 for near threatened species. e) be replaced in an area likely to be viable and display the inter-relationships the species needs to survive f) have a management plan that clearly identifies how the offset area will be managed to ensure a self-sustaining wild plant population is created g) for endangered plants, be consistent with the requirements of an approved recovery plan (where it exists) and the Nature Conservation (Protected Plants) Conservation Plan 2000. Where a specific plan for the species does not exist, advice from the Queensland Herbarium (or from a suitably qualified and experienced person) should be sought and provided about the conditions and requirements for the survival of the species.	N/A
Watercourses	Where a watercourse is being impacted, an offset must be: a) located in the same bioregion b) the same or higher stream order as the watercourse being impacted c) a regional ecosystem associated with a watercourse.	N/A

2 PROPOSED OFFSETS PLAN

2.1 OVERVIEW

Both the Queensland and Commonwealth offsets policies prioritise direct (usually land-based) offsets as the basis of any offsets plan. In accordance with these policies, the South Galilee Biodiversity Offsets Plan utilises entirely direct offsets.

These offsets include:

- 1) protection of land currently subject to ongoing clearing for grazing
- 2) exclusion of livestock to protect watercourses, and improve the ecological values of existing remnant vegetation
- 3) revegetation of non-remnant pastures
- 4) linking of existing vegetation remnants and improved connectivity of regionally significant wildlife corridors.

2.2 OFFSET AREA

The SGCP offset area is adjacent to the proposed mine. This close proximity to the impact area is a recommendation of the *EPBC Act 1999 Environmental Offsets Policy*. The offset area covers the properties Creek Farm (Real Property Description 4315PH720), Sapling (Real Property Description 3BF53) and Betanga (Real Property Description 31BF11), outside the footprint of the SGCP.

The offset area includes an extensive riparian corridor along Alpha Creek. Such narrow ribbons of riparian vegetation serve as important corridors for the movement of birds, and it is frequently recommended that they form the basis of revegetation initiatives within a landscape (Fisher and Goldney 1997).

The offset area also includes large blocks of remnant vegetation in the southwest, which is contiguous with the central Queensland sandstone rises, containing large and nationally important protected areas, such as Carnarvon National Park. The *Galilee Basin Offset Strategy* identifies this western part of the SGCP offset area as a Conservation Priority 2, a key north-south and east-west linkage corridor.

The offset area contains a mixture of remnant vegetation and non-remnant (cleared) pastures. Much of the remnant vegetation is in good condition, but occurs in isolated fragments, which reduces its value as habitat for wildlife. Through the revegetation of pastures, existing vegetation remnants will be reconnected, and important corridors along Alpha Creek and the western rises will be joined. This will enlarge and enhance key corridors identified in the *Galilee Basin Offset Strategy*.

A total of 21,853.71 ha are contained within the SGCP offset area. Of these, 8,016.41 ha consist of remnant vegetation, and the remainder contain non-remnant pastures.

The offset area contains the majority of regional ecosystems present within the impact area (**Table 2**). Furthermore, all impacted land zones are present within the offset area. Because impact and offset areas occur on the same pastoral properties, they have been subject to similar management histories. Consequently, the condition of vegetation present in offset and impact areas is similar (assessed in detail in **Sections 4.4, 4.5 and 4.6**).

Table 2 Regional ecosystems contained within the impact and offset areas

Regional Ecosystem	Description	Impact Area		
		Surface Impacts (ha)	Potential Subsidence Impacts (ha)*	Offsets Area (ha)
10.3.3b	<i>Acacia harpophylla</i> and/or <i>Eucalyptus cambageana</i> woodland in frequently inundated areas.	16.73	0	16.21
10.3.10	<i>Corymbia dallachiana</i> and <i>Corymbia terminalis</i> on old alluvial plains	0.10	0	0
10.3.12a	<i>Corymbia plena</i> and <i>Corymbia dallachiana</i> open woodland on sandy alluvial terraces.	0	0	10.83
10.3.14d	<i>Eucalyptus camaldulensis</i> woodland fringing watercourses.	0	0	5.67
10.3.27a	<i>Eucalyptus populnea</i> woodland on alluvial plains.	128.72	238.80	359.92
10.3.28a	<i>Eucalyptus melanophloia</i> woodland on alluvial fans.	227.28	96.37	236.35
10.5.1b	<i>Corymbia brachycarpa</i> , <i>Corymbia similis</i> and <i>Corymbia dallachiana</i> open woodland on sand plains.	47.58	131.03	639.29
10.5.5a	<i>Eucalyptus melanophloia</i> open woodland on sand plains.	295.90	417.79	1,437.32
10.5.10	<i>Corymbia leichhardtii</i> open woodland on sand plains.	0	78.80	376.59
10.5.12	<i>Eucalyptus populnea</i> open woodland on sand plains.	37.18	22.48	135.73
10.7.3	<i>Acacia shirleyi</i> woodland at margins of plateaus.	5.23	9.20	191.68
10.7.5	<i>Eucalyptus thozetiana</i> open woodland on scarps.	0	0	7.02
10.7.7b	<i>Melaleuca tamariscina</i> open shrubland on ferricrete.	16.56	25.05	91.88
11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains.	0.49	1.92	143.09
11.3.19	<i>Callitris glaucophylla</i> , <i>Corymbia</i> spp. and <i>Eucalyptus melanophloia</i> on alluvial plains.	0	0	208.16
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains.	0.16	0	226.93
11.3.6	<i>Eucalyptus melanophloia</i> woodland on alluvial plains.	0	0	119.81
11.3.7	<i>Corymbia</i> spp. woodland on alluvial plains.	0	0	56.62
11.3.25	<i>Eucalyptus camaldulensis</i> woodland fringing watercourses.	1.08	0.26	103.54
11.4.8	<i>Acacia harpophylla</i> and <i>Eucalyptus cambageana</i> woodland on clay plains.	8.32	0	27.99

South Galilee Biodiversity Offsets Plan South Galilee Coal Project

Regional Ecosystem	Description	Impact Area		Offsets Area (ha)
		Surface Impacts (ha)	Potential Subsidence Impacts (ha)*	
11.5.3	<i>Eucalyptus populnea</i> and/or <i>Eucalyptus melanophloia</i> on sand plains.	11.93	5.00	124.55
11.5.5	<i>Eucalyptus melanophloia</i> and <i>Callitris glaucophylla</i> on sand plains.	2.53	0	223.12
11.5.12	<i>Corymbia clarksoniana</i> woodland on sand plains.	0.94	0	6.93
11.7.1	<i>Acacia harpophylla</i> and <i>Eucalyptus thozetiana</i> on lower scarp slopes.	0	0	114.25
11.7.2	<i>Acacia shirleyi</i> forest/woodland on lateritic duricrust.	0	6.99	541.17
11.10.3	<i>Acacia catenulata</i> or <i>A. shirleyi</i> open forest on sandstone crests and scarps.	0	0	8.23
11.10.4	<i>Eucalyptus decorticans</i> , <i>Lysicarpus angustifolius</i> woodland on sandstone.	0	13.95	1,288.93
11.10.7	<i>Eucalyptus crebra</i> woodland on sandstone.	0	13.95	642.44
11.10.13b	<i>Corymbia leichhardtii</i> woodland on sandstone.	0	18.60	672.16
Non-remnant pastures		5,568.94	4,069.90	13,837.32
Total		6,369.66	5,150.11	21,853.71

The SGCP is located at the edge of the Galilee Coal Basin. Coal reserves cease at the eastern edge of the SGCP, and are located at great depths below the Great Dividing Range to the west of the SGCP. As a result, the SGCP offset area is unlikely to be under further development pressure from future mining operations, an important consideration for the long-term preservation of biodiversity values on-site.

2.3 DELIVERY OF OFFSET

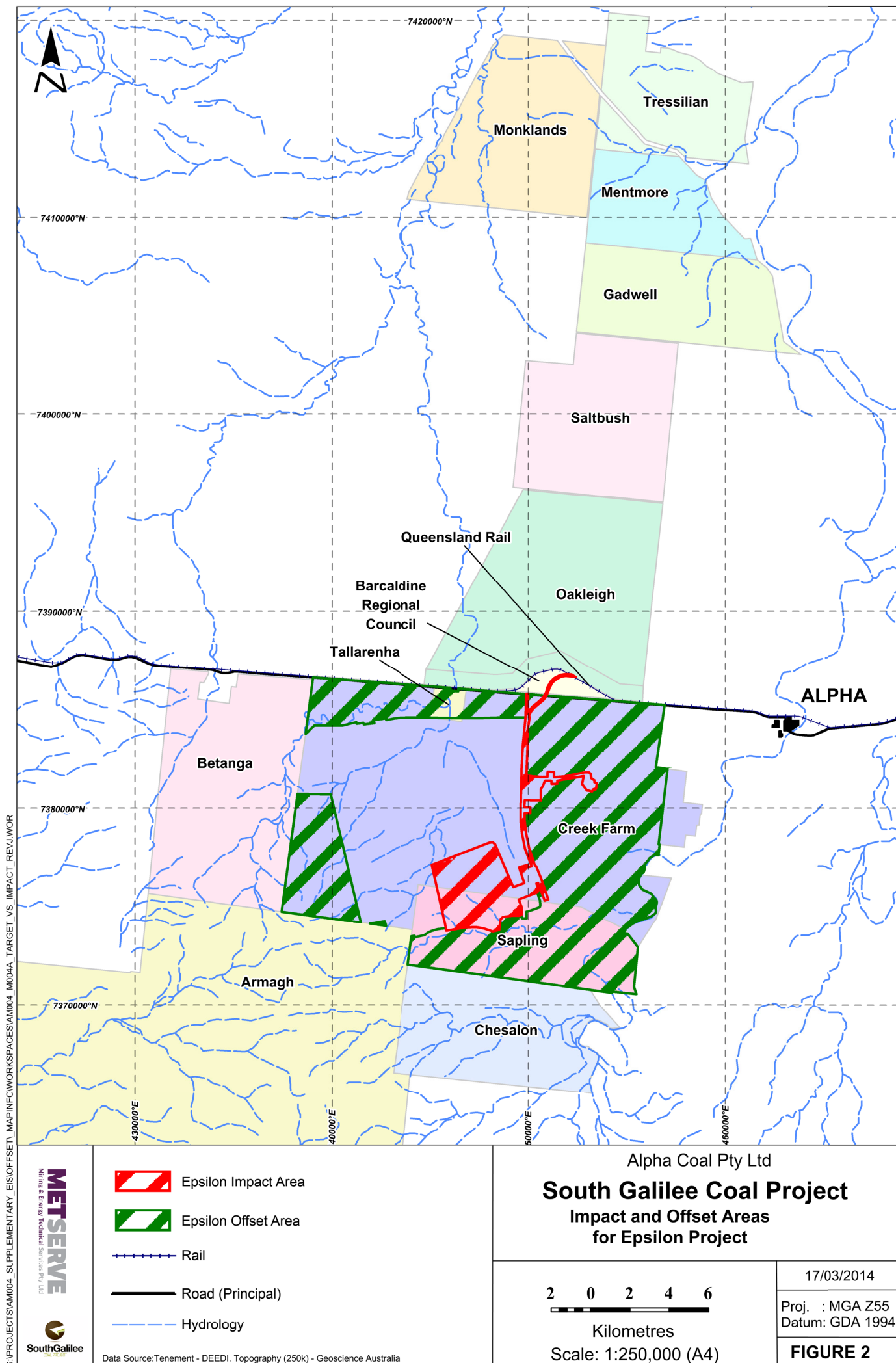
The offsets will be delivered in two phases, corresponding to the stages of mine development (**Figure 2**).

Prior to impacts of the Epsilon Project (see Chapter 2 of the AEIS), offsets contained within the rural properties Creek Farm and Sapling will be procured. Offsets contained within the property Betanga will be added prior to any mine expansion of the SGCP following the Epsilon Project. The total areas contained within offsets to be delivered in the two phases are listed in **Table 3**.

All offsets will be managed similarly, regardless of property. This South Galilee Biodiversity Offsets Plan focuses on the total offsets package to be delivered as part of the SGCP; however, the subset of offsets to be delivered as part of the Epsilon Project is assessed independently in **Section 6** of this plan.

Table 3 Area of vegetation impacted by each mine phase and the offsets proposed for each

Mine Phase	Area to be impacted by mine (hectares)			Area contained within offsets (hectares)		
	Remnant vegetation	Cleared pasture	Total	Remnant vegetation	Cleared pasture	Total
Epsilon Project	127.59	1,879.18	2,006.74	4,320.87	9,7121.92	14,042.79
Entire SGCP	1,864.20	9,638.84	11,503.04	8,016.41	13,837.32	21,853.71
% during the Epsilon Project	6.8%	19.5%	17.4%	53.9%	70.3%	64.3%



2.4 MANAGEMENT OF OFFSET

Management of the offset will commence with the acquisition of the land, and will continue throughout the life of the SGCP. The following subsections detail the key management actions to be implemented.

2.4.1 Exclusion of Cattle

The entire offset area is currently and has historically been used for grazing cattle. Grazing by livestock has a number of impacts on ecosystem health. Heavy browsing and grazing can lead to mortality of native shrubs and regrowth (Read 2004; McIvor 2006), a reduction in the density and diversity of understorey vegetation (Henderson and Keith 2002; Briggs *et al.* 2008), a reduction in the density of native mammals (Read and Cunningham 2010; Legge *et al.* 2011; Kutt and Gordon 2012), reduced abundance and diversity of birds (Martin *et al.* 2005; Martin and McIntyre 2007; Bowen 2009), increased densities of hyper-aggressive species (Eyre *et al.* 2009), and concentrated soil nutrients causing weed invasion (Close *et al.* 2008). Grazing in remnant vegetation also reduces the frequency of fires, leading to 'woodland thickening', the artificial increase in density of the shrubs and small trees, at the expense of understorey diversity (Burrows *et al.* 2002).

Not all native species are affected equally by grazing. Some species increase in abundance with grazing (Martin and McIntyre 2007), although these species tend to be increasing in abundance nationally, and are therefore of low conservation significance. In contrast, native species utilising the lower vegetation strata are most vulnerable to negative impacts of grazing (Martin and Possingham 2005).

The impacts of grazing vary spatially, with riparian forests most susceptible (Martin and McIntyre 2007).

Studies have demonstrated that these impacts can usually be reversed (at least partially) by destocking (Cheal 2009; Price 2010; Legge *et al.* 2011; Kutt *et al.* 2012). This recovery generally takes 2-20 years, depending on weather, fire patterns, the level of degradation, and native and feral herbivore densities (Page and Beeton 2000; Legge *et al.* 2011; Lunt *et al.* 2007; Price 2010; Kutt *et al.* 2012).

As part of the South Galilee Biodiversity Offsets Plan, all offset areas will be destocked, and perimeter fences maintained to maximise exclusion of domestic livestock from neighbouring properties.

2.4.2 Natural Regeneration

There has been considerable recent discussion over the benefits of planting versus natural (passive) regeneration for the restoration of natural ecosystems. Passive regeneration is generally considered preferable due to the lower costs, and greater environmental and scientific benefits (Mcloughlin 1997). Passive regeneration is often successful in Australian woodland and shrubland communities subject to past agricultural use (Arnold *et al.* 1999; Dorrough and Moxham 2005), provided this has not been too intense. In contrast, planting and sowing of native species is often required at heavily weed-infested sites, at sites where conditions have changed such that natural regeneration is precluded, and/or in isolated sites far from seed sources (Mcloughlin 1997; De Jong 2000). The relative benefits of planting are site-specific (Vesk and Dorrough 2007).

There is good reason to expect passive regeneration to be highly successful in the South Galilee Offset area. First, saplings of canopy species were observed in all non-remnant pastures sampled during BioCondition surveys (**Section 4.4**). Second, understorey plant diversity was high in non-remnant pastures (96% of the mean diversity recorded in remnant vegetation). This implies that natural recruitment is high across non-remnant vegetation within the South Galilee Offsets area. Third, pastures across the region require regular re-clearing to maintain openness for grazing (Back *et al.* 2009a, 2009b). Taken together, this suggests that passive regeneration of native vegetation is high (**Plate 1**).



Plate 1 **Non-remnant pastures within the South Galilee Offsets area, showing the natural recruitment of dominant canopy species (*Eucalyptus melanophloia* and *Eucalyptus populnea*).**

All remnant and non-remnant vegetation will be allowed to passively regenerate across the entire South Galilee offsets area. Within 15 years, by definition, non-remnant vegetation within the area will comprise high-value regrowth, under Queensland's vegetation management framework. This regrowth will serve important ecosystem functions in linking currently fragmented vegetation remnants. It will also provide important habitat values in its own right. For many species, such regrowth provides habitat comparable or superior to that of remnant vegetation (Lindenmayer *et al.* 2012). The offset management procedures will contain mandates that prevent the clearing of regrowth within the South Galilee Offsets area throughout the duration of offsets management.

2.4.3 Weed Control

Twenty-eight weed species have been recorded in the SGCP area (see draft EIS), although most of these are low-density herbs that have minor environmental impacts. Of these, the Harrisia Cactus (*Harrisia martinii*), Prickly Pear (*Opuntia stricta*) and Velvety Tree Pear (*Opuntia tomentosa*) are Class 2 weeds under the *Land Protection (Pest and Stock Route Management) Act 2002*. All of these were present in low densities within the SGCP.

Among non-declared weeds, exotic grasses have the greatest impact on biodiversity. They make up greater than 95% of the total weed cover within the SGCP area. The following four species have been recorded in the SGCP area: Buffel Grass (*Cenchrus ciliaris*), Purple-top Rhodes Grass (*Chloris inflata*), Feather-top Rhodes Grass (*Chloris virgata*) and Natal Grass (*Melinis repens*). These frequently form dense thickets, reducing biodiversity of understorey flora (McIvor 1998; Fairfax and Fensham 2000; Franks 2002; Jackson 2005) and altering fire regimes (Jackson 2004; Smyth *et al.* 2009). The impact

of exotic pasture grasses on native flora is often greater than that of clearing woody vegetation (McIvor 1998; Fairfax and Fensham 2000). Unlike native grasses, which are an important food-source for a range of granivorous birds, rodents and insects, exotic grasses such as *C. ciliaris* and *M. repens* lack nutritious seeds (Smyth *et al.* 2009). By restricting the amount of open ground for foraging and reducing native seed supplies, *C. ciliaris* is a potential threat to native granivorous birds and mammals.

Across the SGCP, the density of exotic grasses varies widely. The percentage of ground covered by weeds varied from 0-62% across all sites surveyed for BioCondition (**Sections 4.4, 4.5 and 4.6**). The percentage of the ground vegetation that comprised weeds varied between land zones, with land zone 3 (alluvial flats) having greater relative weed densities than other land zones (**Figure 3**). Non-remnant vegetation also tended to contain a greater relative cover of weeds than remnant vegetation. When remnant status and land zone were taken into account, there was no difference between the weed cover in offset and impact areas (**Table 4**).

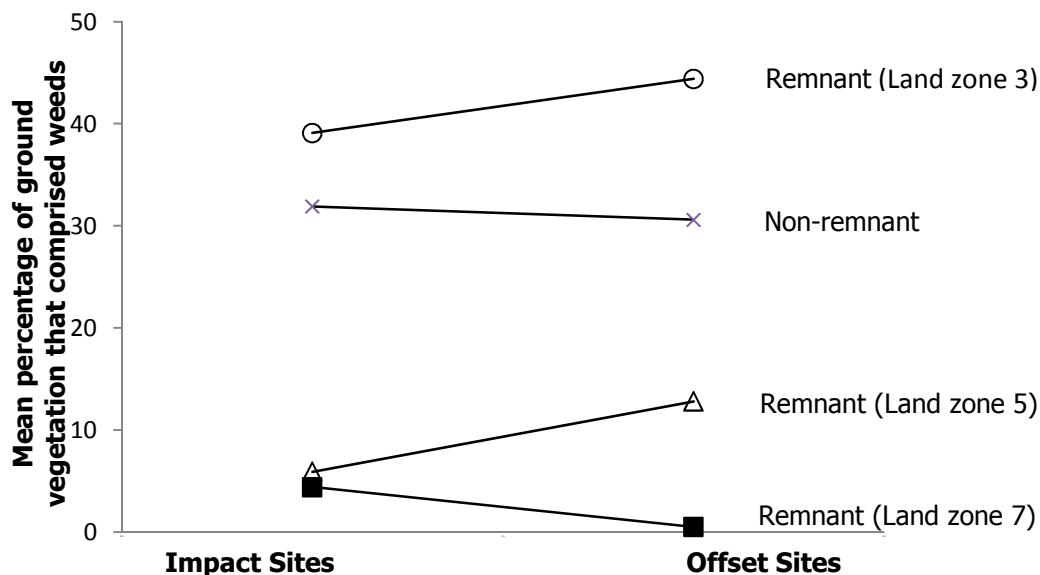


Figure 3 Relative weed densities across land zones in impact and offset sites.

Table 4 Results of a 3-way analysis of variance, showing the effect of remnant status, land zone and site type (impact vs offset) on the percentage of ground vegetation that comprised weeds.

Explanatory variable	DF	F	p
Site type (offset versus impact)	1, 39	0.031	0.86
Land zone	2, 39	9.47	0.0004
Remnant status	1, 39	3.02	0.09

The invasion of Buffel Grass can be suppressed through the removal of grazing livestock. In unburnt pastures, Buffel Grass spreads up to ten times faster in the presence of cattle than in the absence of cattle (Fensham *et al.* 2013). In cattle-free areas, this rate of spread is close to zero (Fensham *et al.* 2013). This benefit is lost, or greatly reduced, in burnt pastures (Fensham *et al.* 2013), indicating that the careful management of fire and livestock can halt the spread of this exotic grass. As discussed in **Section 2.4.1**, cattle will be excluded from all offset areas. Fire will be managed to promote natural regeneration and weed control.

2.4.4 Thinning

It is well documented that regrowth that develops following the clearing of Australian forests and woodlands is characterised by far higher stem densities than the original uncleared vegetation (McIvor 2006; Dwyer *et al.* 2010a; Ngugi *et al.* 2011). The competition introduced by these high densities impairs the development of the vegetation community towards a natural state (Vesk *et al.* 2008; Dwyer *et al.* 2010b).

Selective thinning of dense regrowth improves the growth rates of remaining trees (Back *et al.* 2009a), and reduces the time taken until the regrowth develops structural characteristics of remnant woodlands (Dwyer *et al.* 2010b).

Surveys will be undertaken after regrowth has experienced ten years of growth, to determine if, and where, stem densities necessitate selective thinning to expedite the development of vegetation communities towards natural structural and vegetative features.

2.5 LEGALLY BINDING MECHANISMS

Land-based offsets are to be legally secured following financial close of the Project (i.e., internal financial approval). Offsets will be secured prior to the commencement of on-ground disturbance.

The offset area will be protected through a nature refuge agreement with the Queensland Government. A nature refuge is a class of protected area under the *Nature Conservation Act 1992*. The agreement is registrable on title, binding future owners or lessees of the land, and ensures that gains achieved through the offsets process are maintained in perpetuity.

A nature refuge agreement conforms to requirements of the *EPBC Act Environmental Offsets Policy*, which specifies that offsets should be “protected in an enduring way and...the tenure of the offset should be secured for at least the same duration as the impact on the protected matter”.

Because some of the offset area is contained within a mining lease, there is the possibility that it may not be eligible for protection as a nature refuge. However, if or when the proposed Environmental Offsets Act (currently before Parliament as the *Environmental Offsets Bill 2014*) commences, the offset area will be protected through this act as an ‘Environmental Protection Offset Area’, and this provision is likely to be in place by the time offsets are to be delivered.

2.6 REPORTING

The progress of legally securing the offset area will be communicated through quarterly written reports to the Queensland Department of Environment and Heritage Protection, as specified in the *Queensland Biodiversity Offset Policy*. These reports will:

- 5) report progress of offsetting requirements as specified in the agreement
- 6) demonstrate whether or not offset requirements are being met
- 7) identify changes to offset delivery during the reporting period
- 8) be available for auditing by a third party to identify where investigation and/or compliance action is required by the Queensland Government.

3 COMPLIANCE WITH THE *GALILEE BASIN OFFSET STRATEGY*

The *Galilee Basin Offset Strategy* identifies a 'strategic footprint' within the Brigalow Belt and Desert Uplands bioregions. This footprint contains areas with a substantial amount of remnant vegetation that represent important hubs for conservation. The footprint is prioritised into:

- a) areas of high conservation value (priority one)
- b) key north-south and east-west linkage corridors (priority two)
- c) areas of non-remnant vegetation linking a) and/or b) that are priorities for rehabilitation.

This footprint can be used either voluntarily by proponents in the Galilee Basin, or by delegated decision-makers to ensure offsets are located in areas that achieve the best possible biodiversity benefits. The *Galilee Basin Offset Strategy* was taken into consideration during the planning of offsets for the SGCP (**Table 5**).

Table 5 Compliance of the South Galilee Biodiversity Offsets Plan with the *Galilee Basin Offset Strategy*

	Recommendation	Compliance
1	Identified conservation hubs within the strategic footprint should be protected from mining.	No conservation hubs, or other areas within the strategic footprint, will be impacted by the SGCP.
2	Properties within the strategic footprint should be prioritised for land-based offsetting.	The south-western part of the South Galilee offset area is a recognised key north-south linkage corridor (conservation priority two). By expanding the total area of this corridor, and linking it to vegetation along Alpha Creek, the value of this high-priority corridor will be enhanced.
3	Values to be lost should be secured in offset areas.	The close proximity of the South Galilee offset area to areas being impacted ensures that similar values are present within the offset area as those lost. This was confirmed through field surveys (Section 4.6).

4 COMPLIANCE WITH THE *QUEENSLAND BIODIVERSITY OFFSET POLICY*

4.1 AVOIDANCE AND MINIMISATION OF IMPACTS

The avoidance of impacts to State-significant biodiversity values were a major consideration during the planning phases of the SGCP. The mine footprint was positioned to minimise disturbance to remnant vegetation, especially that containing State-significant biodiversity values. Vegetation units where threatened species were recorded were also largely avoided by the SGCP. A number of management measures have been proposed to further mitigate biodiversity impacts of the planned project. These were described in detail within Chapters 8 and 20 of the draft EIS.

Since submission of the EIS, the SGCP has been altered to further minimise environmental impacts; underground mining panels no longer pass beneath Tallarenha Creek, and the mine pit does not extend south of Sapling Creek, removing the need to divert this ephemeral waterway.

The Epsilon Project is located in areas of least environmental significance.

4.2 SIMILARITY OF BIODIVERSITY VALUES IMPACTED AND OFFSET

Despite avoidance and mitigation measures in place to protect the environment, there will be residual impacts of the SGCP on a number of State-significant environmental values. These impacts and their proposed offsets are summarised in **Table 6** and detailed in **Sections 4.2.1 to 4.2.8**.

Table 6 Summary of impacts on and offsets for State-significant environmental values of the South Galilee Coal Project.

State-significant value	Proposed impact	Proposed offset
Remnant endangered regional ecosystems*	Removal of 8.81 ha of regional ecosystems 11.3.1 and 11.4.8. Possible impacts of subsidence on a further 1.92 ha.	Protection and removal of livestock from 171 ha of remnant 11.3.1 and 11.4.8. A total of 870.74 ha of 11.3.1 and 11.4.8 will be restored to high-value regrowth from cleared pastures. 97.5 ha of this regrowth already supports vegetation with >6% foliage projective cover.
Remnant Of Concern regional ecosystems*	Removal of 0.16 ha of regional ecosystem 11.3.2.	Protection and removal of livestock from 226.93 ha of remnant 11.3.2. A total of 1,639.75 ha of 11.3.2 will be restored to high-value regrowth from cleared pastures. 98.8 ha of this regrowth already supports vegetation with >6% foliage projective cover.
Essential habitat for protected wildlife	None.	N/A
Watercourses	Loss of 56.01 km of 1st- to 3rd - order streams (ephemeral drainage channels, primarily tributaries of Tallarenha Creek).	Exclusion of cattle from 89.05 km of first- to third-order creeks, and 6.81 km of Alpha Creek (sixth-order). Restoration of 42.42 km of non-remnant pastures along creeks to high-value regrowth.
Habitat connectivity	Slight reductions in the width of State-significant corridors. No loss of connectivity is proposed.	Significant enhancements of the size and connectivity of State-significant habitat corridors.
Endangered plants and animals	None.	N/A
Vulnerable plants and animals	Loss of habitat for the Brigalow Scaly-foot.	Protection and restoration of important habitat corridors. There will be a net increase in the total amount of habitat available.

Near Threatened plants and animals†	Loss of habitat for <i>Micromyrtus rotundifolia</i> , <i>Desmodium macrocarpum</i> , the Little Pied Bat and the Square-tailed Kite.	Protection of known and potential habitat for all species. Pastures will be revegetated to vastly increase the amount, condition and connectivity of habitat.
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*For the purposes of the *Queensland Biodiversity Offset Policy*, a regional ecosystem's conservation status is that identified by the Regional Ecosystem Database Description under 'Vegetation Management Act Class'.

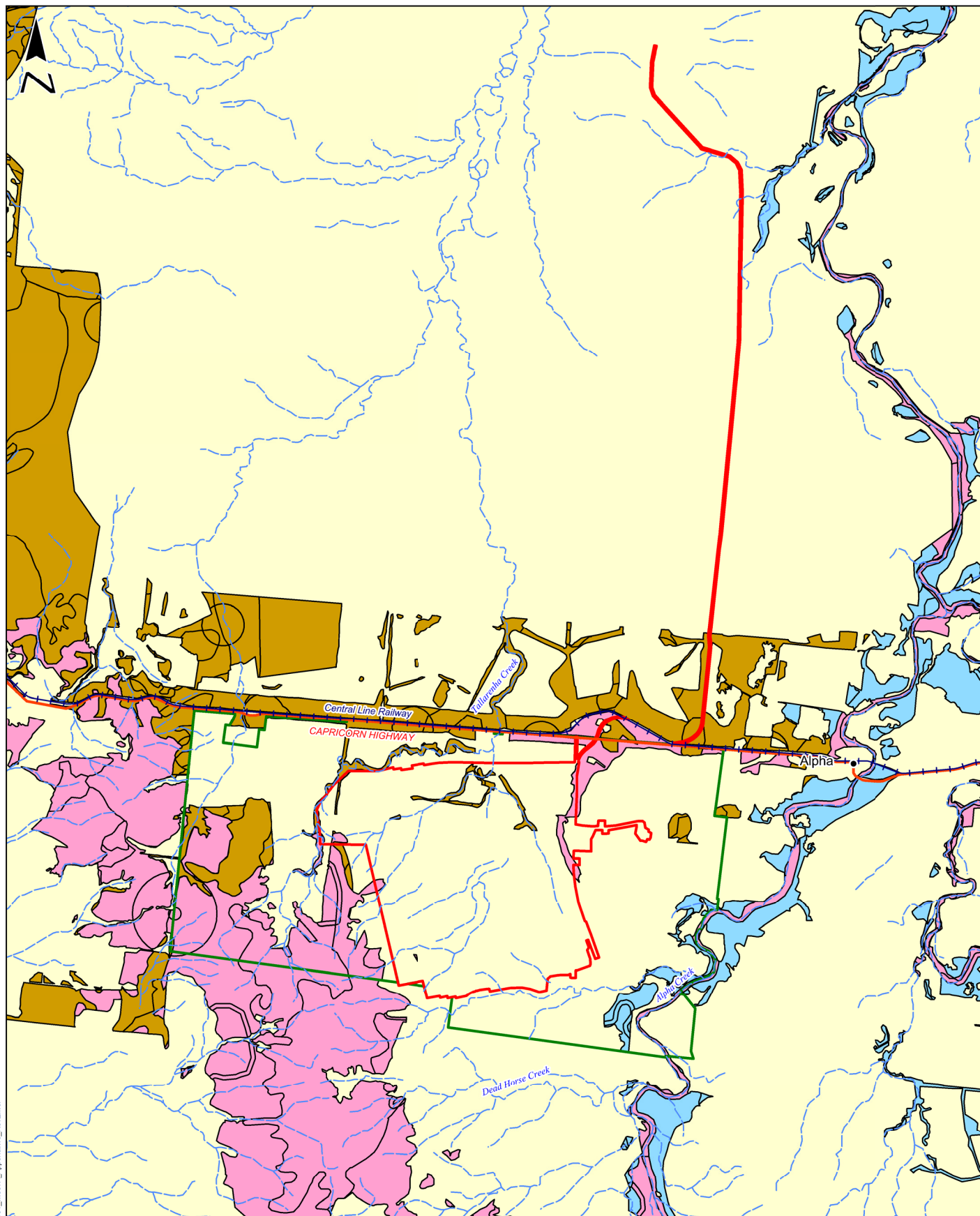
†Under the new Queensland offset policy (currently before Parliament under the *Environmental Offsets Bill 2014*), Near Threatened taxa are not considered a matter of State environmental significance. Consequently, impacts to these species do not require offsetting. However, these species are included in assessments of the SGCP offsets plan as a conservative measure, and because they must be offset under the current *Queensland Biodiversity Offset Policy 2011*.

4.2.1 Habitat Connectivity

The SGCP was positioned to avoid important wildlife corridors along Alpha Creek and the western rises (**Figure 4**). However, 521.0 ha of vegetation mapped according to Criteria J of Biodiversity Assessment Mapping Methodology as State-significant corridors will be cleared or subject to potential subsidence as a result of the SGCP. While these impacts will not result in reduced connectivity of these corridors, they will reduce the total width of the corridors and therefore their value.

The offset area currently contains 6,041.9 ha of vegetation in State-significant corridors, and 622.5 ha in regionally significant corridors. This vegetation will be afforded additional protection through the South Galilee Biodiversity Offsets Plan.

In addition to the protection of extensive corridors along Alpha Creek and the Capricorn Highway, restoration of 13,837.32 ha of adjacent non-remnant pastures will further increase the size and connectivity of these corridors. Within 15 years (time until development of high-value regrowth), a large, almost continuous corridor of remnant and regrowth vegetation will be formed that links Alpha Creek with woodlands on rises to the west of the SGCP, and ultimately with the extensive sandstone rises of the Carnarvon Ranges to the southeast. 2,074.8 ha of this regrowth already supports vegetation with at least 6% foliage projective cover, and therefore already acts as a functional ecosystem. This State-significant corridor will allow movement of wildlife in all cardinal directions around the proposed mine, and will greatly enhance habitat connectivity at the landscape level.



LEGEND

- ▬ Impact Area
- ▬ Offset Area
- ▬ Principal road
- ▬ Railway
- ▬ Watercourse

Brigalow Belt Bioregion

- ▬ Regional Significance
- ▬ State Significance

Desert Uplands Bioregion

- ▬ State Significance

Alpha Coal Pty Ltd South Galilee Coal Project Location of Biodiversity Corridors BAMM - Criteria J

0 5 10

Kilometres

Scale: 1:250,000 (A4)

26/02/2014

Proj. : MGA Z55
Datum: GDA 1994

FIGURE 4

4.2.2 Endangered Regional Ecosystems

A total of 8.32 ha of RE 11.4.8 and 0.49 ha of RE 11.3.1 will be cleared to accommodate the SGCP. Both of these are Brigalow communities within the same regional-scale broad vegetation group (i.e., group 25a: open-forests to woodlands dominated by *Acacia harpophylla* sometimes with *Casuarina cristata* on heavy clay soils). Because, under the *Queensland Biodiversity Offset Policy*, Endangered regional ecosystems can be offset with other regional ecosystems in the same regional-scale broad vegetation group, these two ecosystems are best treated as a single unit (i.e., 8.81 ha of vegetation group 25a).

A total of 171 ha of vegetation group 25a is contained within the offset area. This consists of 143.09 ha of regional ecosystem 11.3.1 and 27.99 ha of regional ecosystem 11.4.8. The BioCondition of vegetation group 25a was greater in the offset area than in the impact area (**Section 4.6.2**).

Grazing can strongly affect recruitment of shrubs and trees in Brigalow-dominated ecosystems, as many of the common constituent species are readily eaten by domestic livestock (Butler 2007). Grazing also has deleterious effects on the diversity of wildlife within Brigalow-dominated ecosystems (Bowen 2009). The exclusion of livestock from the offset area will improve the condition of existing remnants.

The South Galilee Biodiversity Offsets Plan will return 13,837.32 ha of non-remnant pastures to high-value regrowth and remnant vegetation. Based on the pre-European extent and distribution of vegetation communities (data from the Queensland Department of Environment and Heritage Protection, version 8 of the certified Regional Ecosystem map), it is estimated that approximately 870.75 ha of broad vegetation group 25a will regenerate in these pastures. Of this regrowth, 97.5 ha already possess a foliage projective cover greater than 6%, which is a benchmark used in the *Galilee Basin Offset Strategy* as representing functioning regional ecosystems when rehabilitated.

Regrowth of other regional ecosystems will serve to improve connectivity between fragments of Brigalow, as well as acting as buffer zones around these. For a quantification of the net benefit to regional ecosystems 11.3.1 and 11.4.8, see **Section 5.1**.

4.2.3 Of Concern Regional Ecosystems

The SGCP will have residual impacts on one regional ecosystem with the conservation status (under the *Vegetation Management Act*) Of Concern. Approximately 0.16 ha of remnant regional ecosystem 11.3.2 (*Eucalyptus populnea* woodland on alluvial plains) will be cleared to accommodate the mine and associated infrastructure.

The offset area contains 226.93 ha of remnant regional ecosystem 11.3.2. The land zone containing this regional ecosystem (land zone 3) currently has the lowest BioCondition scores of all land zones assessed (**Section 4.6.1**). This is due in part to high grazing pressure in alluvial areas near water. This suggests that regional ecosystem 11.3.2, like others in its land zone, stand to receive the greatest benefits from the exclusion of cattle as part of the South Galilee Biodiversity Offsets Plan.

In addition to improving the condition of existing Of Concern regional ecosystems within the offsets area, the South Galilee Biodiversity Offsets Plan will return 13,837.32 ha of non-remnant pastures to high-value regrowth and remnant vegetation. Based on pre-European extent and distribution of vegetation communities, it is estimated that approximately 1,639.75 ha of regional ecosystem 11.3.2 will regenerate in these pastures. Of this regrowth, 98.8 ha already possess a foliage projective cover greater than 6%, which is a benchmark used in the *Galilee Basin Offset Strategy* as representing functioning regional ecosystems when rehabilitated.

The remaining regrowth (of other regional ecosystems) will serve to improve connectivity between fragments of 11.3.2, as well as acting as buffer zones around these.

4.2.4 Habitat for the Brigalow Scaly-foot

The Brigalow Scaly-foot (*Paradelma orientalis*) is a nocturnal legless lizard that is listed as Vulnerable under the *Nature Conservation Act 1992*. It was recorded in *Callitris glaucophylla* woodland during

surveys of the SGCP area (MET Serve 2011), but elsewhere it is known to utilise a wide range of regional ecosystems, including all land zones to be impacted by the SGCP (Department of the Environment 2013b).

The Brigalow Scaly-foot prefers extensive tracts of remnant woodlands and shrublands, but can persist in disturbed environments, such as those invaded by Buffel Grass and other weeds (Department of the Environment 2013b). Clearing and fragmentation of remnant habitats is the greatest threat to the species, and landscape corridors linking large patches of suitable habitat are important for maintaining dispersal of the species and its genetic diversity (Department of the Environment 2013b).

During the day, the species shelters beneath rocks, logs, loose bark, dense leaf litter and grass tussocks (Department of the Environment 2013b). Any factors that reduce ground cover (e.g., grazing by livestock, excessive fires) are detrimental to Brigalow Scaly-foots.

A total of 800.73 ha of remnant vegetation providing potential habitat for the species will be removed for the SGCP. Non-remnant pastures may also be utilised rarely and transiently by the species; 5,568.94 ha of this marginal habitat will also be removed for the SGCP. Subsidence resulting from underground mining is not expected to impact most vegetation communities utilised by the Brigalow Scaly-foot. However, these potential impacts are incorporated into the quantification of offsets for the species under Commonwealth policy (**Section 5.2**).

Large blocks of remnant vegetation within the western and south-eastern parts of SGCP area are contiguous with the sandstone rises of the Carnarvon Ranges, and serve as important movement corridors. The SGCP will not compromise connectivity within these large blocks.

A total of 8,016.38 ha of remnant vegetation and 13,837.32 ha of non-remnant vegetation is contained within the offset area. The former is high-value habitat for Brigalow Scaly-foot, while the latter is low-value habitat. Of the latter, 2,074.8 ha already possess a foliage projective cover greater than 6%, which is a benchmark used in the *Galilee Basin Offset Strategy* as representing functioning regional ecosystems when rehabilitated. The habitat value of remnant and non-remnant vegetation within the SGCP area will be enhanced by removing grazing pressure, improving the connectivity of remnant vegetation, and restoring pastures to high-value regrowth, which is highly valuable as habitat for reptiles in central Queensland (Bruton *et al.* 2013).

4.2.5 Habitat for *Micromyrtus rotundifolia*

Micromyrtus rotundifolia is a Near Threatened shrub that grows on or at the edge of low, stony hills supporting *Acacia* communities (Queensland Herbarium records). It is endemic to central Queensland. Within the SGCP area, the species was recorded in RE 10.7.7.

The only known population of *M. rotundifolia* within the SGCP area lies outside the mine footprint. However, 81.63 ha of potential habitat (REs 10.7.3, 10.7.7, 11.7.2 and 11.10.13) will be impacted by the project, consisting of 21.79 ha to be cleared and 59.84 ha to be potentially impacted by subsidence.

The known population of *M. rotundifolia* will be protected within the offset area. An additional small population was discovered during BioCondition surveys of offset areas 1 km south of the known population. This population, too, will be protected within the offset area. In total, the offset area contains 1,496.89 ha of potential habitat for *M. rotundifolia*. The value of this habitat will be improved through the exclusion of grazing livestock, and its increased size and connectivity resulting from restoration of adjoining non-remnant pastures.

4.2.6 Habitat for *Desmodium macrocarpum*

The Near Threatened herb *Desmodium macrocarpum* grows in a wide range of open, grassy woodlands across semi-arid Queensland. Most records are from sandy substrates (land zones 3 and 5), including areas disturbed by grazing and mining (Queensland Herbarium records). It was recorded in low densities across the SGCP area, including in non-remnant pastures (see draft EIS).

Most records were from remnant habitats, and these are considered to be most important for the species.

The SGCP will remove 753.79 ha of high-quality habitat (remnant vegetation in land zones 3 and 5) and 5,589.96 ha of low-quality habitat (non-remnant pastures in land zones 3 and 5, and remnant vegetation in other land zones) for the species.

The offset area currently contains 4,430.66 ha of high-quality habitat for the species, and 16,599.32 ha of low-quality habitat. 13,013.57 ha of this low-quality habitat consists of non-remnant pastures on land zones 3 and 5, which will be restored to high-quality habitat as part of the South Galilee Biodiversity Offsets Plan. Of these non-remnant pastures, 1,935.5 ha already possess a foliage projective cover greater than 6%, which is a benchmark used in the *Galilee Basin Offset Strategy* as representing functioning regional ecosystems when rehabilitated.

Desmodium macrocarpum was recorded at five of the 44 BioCondition sites assessed as part of the development of the South Galilee Biodiversity Offsets Plan (**Section 4.4**). This herb was recorded at 18% of offset sites, and 5% of impact sites. This suggests that offset areas currently contain equally or more favourable habitat for the species than impact areas. It also suggests that the offset areas contain a sizeable source population from which colonisation of restored habitats can occur.

4.2.7 Habitat for the Square-tailed Kite

The Square-tailed Kite (*Lophoictinia isura*) is a medium-sized raptor that inhabits woodlands and forests across coastal and sub-coastal Australia. In inland areas, it is dependent on riparian woodlands, where it typically breeds (Marchant and Higgins 1993). It preys primarily on birds, and wooded habitats (including regrowth) that support large and diverse bird populations provide the best habitat (NSW Scientific Committee 2009). Square-tailed Kites require extensive forested areas for breeding. They are highly dispersive and not especially vulnerable to habitat fragmentation (NSW Scientific Committee 2009).

Two sightings of Square-tailed Kites were recorded within the SGCP area. This may have represented a dispersing individual, considering that the species was not recorded in four out of five surveys. A total of 800.73 ha of remnant vegetation will be cleared for the SGCP. These are mostly small fragments that are unsuitable as breeding habitat, but may be used by the species for foraging. An additional 1080.19 ha of remnant vegetation may potentially be affected by subsidence, although these impacts are expected to be minimal.

The South Galilee Biodiversity Offsets Plan will protect large tracts of riparian forests along Alpha Creek, which provide potential breeding and foraging habitat for Square-tailed Kites. Restoration of native woodlands from open pastures will create 13,837.32 ha of new foraging habitat within 15 years, and link currently isolated fragments. Of this new regrowth, 2,074.8 ha already possess a foliage projective cover greater than 6%, which is a benchmark used in the *Galilee Basin Offset Strategy* as representing functioning regional ecosystems when rehabilitated.

Existing remnant forests will also develop a denser midstorey and understorey following the removal of grazing pressure, which will increase the density of prey (birds) (Weeldenburg 1998; Seddon *et al.* 2003). Due to the close proximity of this new foraging habitat to potential breeding habitat, the overall value of the region for Square-tailed Kites will be enhanced as a result of the SGCP.

4.2.8 Habitat for the Little Pied Bat

Little Pied Bats (*Chalinolobus picatus*) inhabit dry woodland communities across sub-coastal and inland eastern Australia. They may be locally common near permanent or semi-permanent water sources (Environment Australia 1999), and were recorded at numerous locations across the SGCP area (see draft EIS). Little is known about their favoured roosting sites, although these may include caves, hollow trees and disused buildings (Environment Australia 1999; Pennay and Freeman 2005). The species persists in corridors and well-connected small remnants of native vegetation (Hourigan 2012), and is known to travel 17 km between roosting and foraging sites (Churchill 2008). It is unknown to what extent the species utilises cleared pastures for foraging, although other open-country species of

bats widely utilise non-remnant pastures, provided hollow trees are available nearby for roosting (Lentini *et al.* 2012).

While Little Pied Bats are likely to continue to utilise the airspace above the proposed SGCP mine for foraging, it is also likely that insect populations will be reduced through the removal of pasture, and therefore foraging habitat for the species will be decreased. Potential roost sites in 778.45 ha of eucalypt-dominated remnant vegetation will also be removed. It is unknown whether roost hollows are a limiting resource for bats in Australian landscapes, or whether other factors such as seasonal shortages of food (insects) or water limit population size (Law 1996). The preference of Little Pied Bats for habitats near permanent or semi-permanent water sources (Environment Australia 1999) suggests that water availability may instead limit populations. Overall, a lack of understanding of the habitat features limiting the populations of Little Pied Bats makes it difficult to predict the impacts of the SGCP on the species. Likewise, the most appropriate offsets for these impacts are equally difficult to determine.

Based on what is known about the species, habitats for Little Pied Bats within the proposed offset area are similar or superior to those to be impacted by the SGCP. A greater proportion of the offset area consists of remnant vegetation (36.7%), compared with the impact areas (16.3%). Furthermore, within remnant vegetation in the offset area there is a higher density of 'large trees' (as defined under the BioCondition framework: **Section 4.4**) than within the impact area (16.9 large trees per ha versus 5.6 per ha: T-test, $T_{35} = 3.18$, $p = 0.003$). Given the strong relationship between tree trunk diameter and presence of hollows (e.g., Gibbons *et al.* 2000; Eyre 2005), this implies a greater density of hollows in offset areas than in impact areas. The riparian forests within the offset area along Alpha Creek, a permanent source of water, are likely to be particularly important to Little Pied Bats. It was in this area that the majority of records were obtained (see draft EIS). In contrast, creeks within the impact area are highly ephemeral and less likely to represent important water sources for the species.

Little Pied Bats will benefit from the restoration of open pastures within the offset area to native woodlands, although the greatest benefits (increased density of roost sites) are unlikely to be realised for some time. There are little data regarding the ontogeny of tree hollows in semi-arid Queensland, although studies elsewhere in Australia suggest that hollows do not form until trees are 40-100 years old, and large hollow development may take 140-450 years (Mawson and Long 1994; Gibbons *et al.* 2000; Wormington *et al.* 2003; Koch *et al.* 2008; Haslem *et al.* 2012). While bats are able to utilise small hollows (in relatively young trees) (Law 1996), it is unlikely that regrowth developing within the offset area will provide important roosting sites for Little Pied Bats within 20 years.

The second benefit of the South Galilee Biodiversity Offsets Plan for Little Pied Bats (improvement of foraging habitat) is likely to be more immediate. The removal of cattle and passive regeneration of woody vegetation will result in a larger amount of vegetation available to insect herbivores, a food source of Little Pied Bats. The little data available do not support the notion that bats, in general, preferentially forage in regrowth over open paddocks (Law and Chidel 2006; Law *et al.* 2011). However, these studies were biased towards loud (typically high-foraging) species. In contrast, the Little Pied Bat is known to forage close to vegetation and glean insects from the canopy (Churchill 2008), suggesting that it is likely to benefit from the greater surface areas of woody vegetation that would be created by extensive areas of regrowth within the offset area.

Overall, the SGCP offset area currently contains superior habitat for Little Pied Bats, compared to those areas being impacted. The proposed management of those offset areas will improve foraging habitat for the species in the short-term, and increase the number of potential roost sites in the distant long-term.

4.3 ADDITIONAL PROTECTION AFFORDED

Vegetation cannot be used as an offset under the *Queensland Biodiversity Offset Policy* if it is already protected from clearing through other legislation. Consequently, a proposed biodiversity offset cannot be:

- d) remnant vegetation on certified regional ecosystem mapping

- e) an area required to be retained by an approval issued under any Act administered by the Commonwealth, State or local government
- f) on land already used as an offset for another activity
- g) a category A or B area on a Property Map of Assessable Vegetation
- h) land protected by an instrument of State government
- i) high-value regrowth that is
 - an Endangered regional ecosystem on freehold land
 - an Endangered or Of Concern regional ecosystem on leasehold land
 - essential regrowth habitat
 - a stream protection zone
 - within a wetland protection area.

This above requirement, that a proposed offset cannot be remnant vegetation or high-value regrowth, conflicts with other biodiversity offset mandates for ecological equivalence and special values (**Section 4.4**), which are primarily characteristics of remnant vegetation. The SGCP proposes to overcome this paradox by offsetting with a combination of remnant and non-remnant vegetation. The eventual maturity of this non-remnant vegetation into high-value regrowth and, later, remnant vegetation will create 13,837.32 ha of woody vegetation that does not currently exist, and currently lacks any legal protection from continued clearing. Of this regrowth, 2,074.8 ha already possess a foliage projective cover greater than 6%, which is a benchmark used in the *Galilee Basin Offset Strategy* as representing functioning regional ecosystems when rehabilitated. Furthermore, by linking currently fragmented remnant vegetation within the offset area, biodiversity values of existing remnant vegetation will be enhanced.

4.4 BIOCONDITION ASSESSMENTS OF IMPACT AND OFFSET AREAS

All land-based offsets under the *Queensland Biodiversity Offset Policy* must demonstrate ecological equivalence. This requires an assessment of both the proposed impact area and the offset area. Ecological equivalence is comprised of two components, BioCondition and special features. Ecological equivalence is demonstrated when the proposed offset area achieves BioCondition scores and levels of special features the same as or higher than the impact area.

The BioCondition assessment framework is defined and explained in the *BioCondition Assessment Manual* (Eyre *et al.* 2011a). The application of this framework to the SGCP is detailed below.

4.4.1 Selection of Sites

Where practicable, site selection followed specifications outlined in the *BioCondition Assessment Manual* (Eyre *et al.* 2011a). Specifically:

- Sites were located 50m away from major disturbances such as roads or dams. In some instances (e.g., where the entire vegetation unit was a narrow corridor running alongside a road), this was not achievable.
- Sites within the same regional ecosystem were located at least 1km apart.
- Sites were representative of the regional ecosystem being assessed.

To ensure the latter was true, site locations were selected based on field-verified regional ecosystem mapping by a person without prior experience with the SGCP area, to prevent bias in their placement. Sites were chosen roughly randomly, while taking into account the requirements listed above, as well as access limitations. These pre-selected co-ordinates were located in the field using GPS.

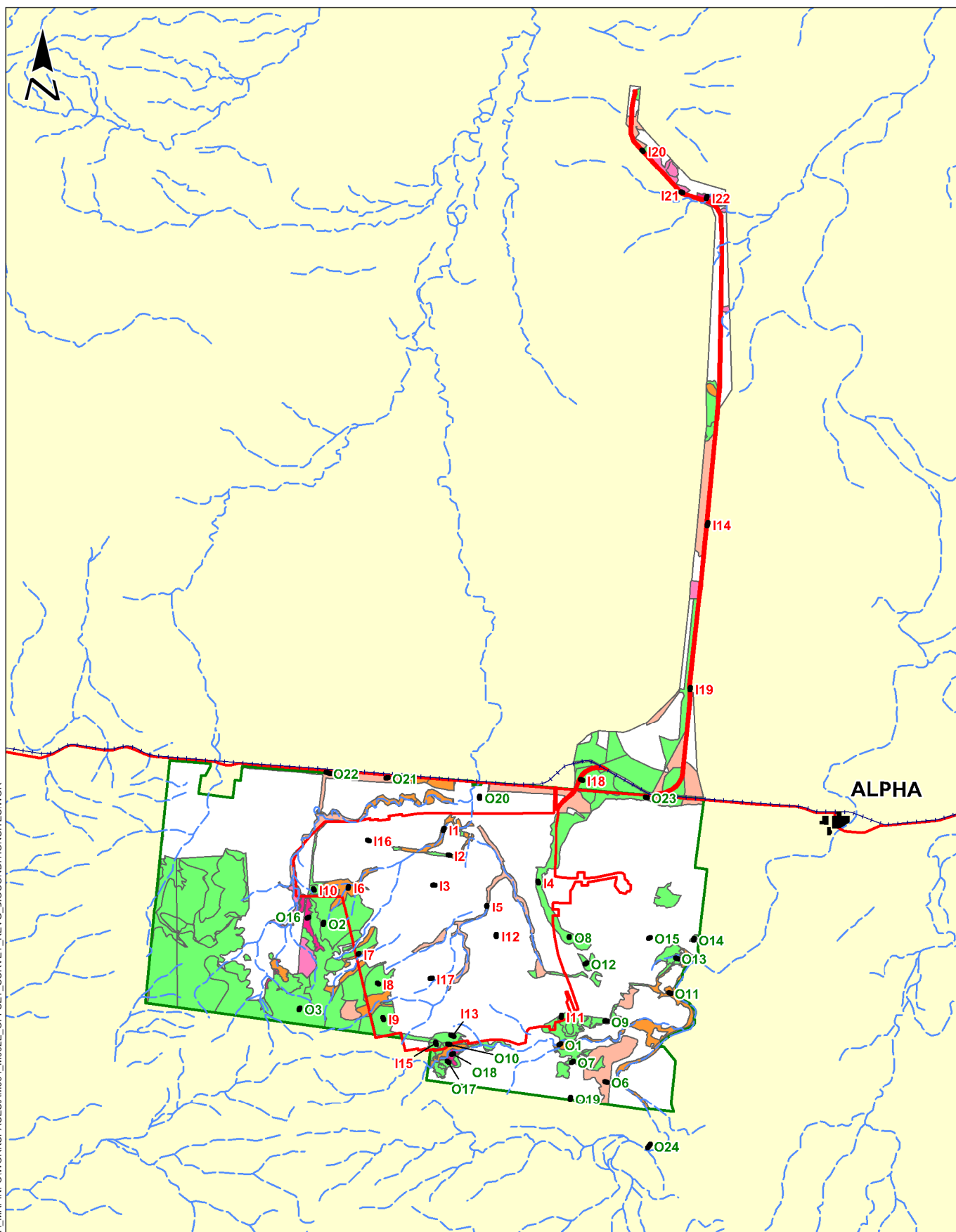
In total, 44 BioCondition sites were surveyed (22 in offset areas and 22 in impact areas). Seven of these were positioned in non-remnant pastures, as these constituted a substantial proportion of the total impact and offset areas. The remaining 37 BioCondition sites were located in remnant vegetation. Sixteen different regional ecosystems were assessed. Most regional ecosystems assessed within impact areas were also assessed within offset areas (**Table 7**), with the exception of some, generally small-scale and highly localised, regional ecosystems (10.3.28a, 10.5.10, 10.7.7b, 11.5.5). The locations of survey sites are shown in **Figure 5**.

One survey site (O24) was situated outside the offset area, due to fact the boundary of this offset area was altered after the survey. Data from this site was included in the analyses as the vegetation unit sampled (riparian vegetation along Alpha Creek) extended to within the offset area.

Table 7 Regional ecosystems surveyed for BioCondition in areas to be impacted by the SGCP, and the proposed offset areas.

Regional Ecosystem	Impact Sites Assessed		Offset Sites Assessed	
	No. of BioCondition Sites	Sites	No. of BioCondition Sites	Sites
10.3.27a	1	I1	1	O21
10.3.28a	1	I5	0	-
10.5.1b	3	I18, I9, I20	2	O8, O12
10.5.4c	0	-	1	O2
10.5.5a	4	I2, I4, I13, I19	4	O7, O9, O22, O23
10.5.10	1	I8	0	-
10.5.12	2	I7, I14	1	O14
10.7.3	2	I6, I10	2	O13, O10
10.7.7b	2	I11, I15	0	-
11.3.1	0	-	1	O16
11.3.25	0	-	2	O24, O1
11.3.6	0	-	1	O11
11.3.19	0	-	1	O6
11.4.8	1	I21	1	O18
11.5.5	1	I22	0	-
11.7.2	0	-	2	O3, O17
Non-remnant	4	I3, I12, I16, I17	3	O15, O19, O20
Total	22		22	

S:\PROJECTS\AM004_SUPPLEMENTARY_EIS\OFFSET_MAP\INFO\WORKSPACES\AM004_M002E_OFFSET_SURVEY_REV_3\BIOCONDITION\SITES.WOR



LEGEND

- Offset Area
- Impact Area
- Principal road
- Railway
- Stream

Remnant Vegetation Biodiversity Status

- Endangered (dominant)
- Endangered (sub-dominant)
- Of Concern (dominant)
- Of Concern (sub-dominant)
- Not of Concern
- Non-remnant

Biocondition site locations :
RED = impact area (prefix I)
GREEN = offset area (prefix O)

Alpha Coal Pty Ltd

South Galilee Coal Project BioCondition Site Locations

2 0 2 4 6

Kilometres

Scale: 1:250,000 (A4)

27/02/2014

Proj. : MGA Z55
Datum: GDA 1994

FIGURE 5

Data Source: Tenement - DEEDI. Topography (250k) - Geoscience Australia

METSERVE
Mining & Energy Technical Services Pty Ltd



4.4.2 Timing of Surveys

Because certain attributes of BioCondition (e.g., species richness, tree canopy cover and perennial grass cover) vary seasonally (Eyre *et al.* 2011a), it is important that sites in both impact and offset areas were surveyed at the same time, so that valid comparisons between their BioCondition scores can be made. All impact and offset BioCondition sites were surveyed over a single period between 4 and 12 September 2012. Within this period, the order in which impact and offset sites were assessed was randomised. While no rain fell over the preceding month (as is typical for the time of year), the year to date was characterised by rainfall well above average (197% of the long-term mean: data from the Bureau of Meteorology, Alpha Post Office weather station). As a result, species richness remained high (mean of 11.7 grass species and 20.4 forb species per site), despite the dry season timing of the survey.

4.4.3 Methodology

At each survey site, BioCondition was assessed following methodology specified in the *BioCondition Assessment Manual (Version 2.1)* (Eyre *et al.* 2011a). This involved surveying a suite of vegetation condition attributes that act as surrogates or indicators of biodiversity values. These are summarised briefly below.

1. A 100 x 50m area was assessed for large trees, recruitment of canopy species, tree canopy height and native tree species richness. Due to the narrow, linear nature of the riparian regional ecosystem 11.3.25, a 200 x 25m area was surveyed for this regional ecosystem, following Eyre *et al.* (2011a).
2. Tree and shrub cover were assessed along a 100m transect.
3. Within a 50 x 10m subplot, non-native plant cover and species richness of native shrubs, grasses and non-grasses were assessed.
4. A 50 x 20m subplot was assessed for amount of coarse woody debris.
5. Five 1 x 1m quadrats were assessed for native grass cover and organic litter.

The layout of BioCondition sites is depicted in **Figure 6**.

Surveys of BioCondition sites in offset and impact areas were undertaken by the same teams of ecologists, to avoid biases in scores caused by observer.

In addition to the site-based attributes assessed at the field sites described above, landscape attributes were assessed for each BioCondition site following Eyre *et al.* (2011a). Because the SGCP is located in a 'fragmented landscape', as defined by Eyre *et al.* (2011a), the following three attributes were assessed using field-verified regional ecosystem mapping (see draft EIS), and certified regional ecosystem mapping version 8 (where remnant patches extend beyond the boundaries of the SGCP area):

- Size of the patch of remnant vegetation containing the BioCondition survey site.
- The connectivity of the vegetation unit containing the BioCondition survey site to neighbouring remnant vegetation or high-value regrowth.
- Amount of remnant vegetation or high-value regrowth within a 1km radius of each BioCondition survey site.

These calculations were carried out with geographic information systems, applied using the software, MapInfo Professional.

Each assessable attribute was awarded a score following Eyre *et al.* (2011a). Scores are weighted within the BioCondition assessment framework according to the degree to which the attribute:

- has a potential impact upon long-term condition
- is difficult or takes a long time to replace in a system if lost
- has habitat value based on empirical research.

The weighting of attributes is shown in **Table 8**. Scores for each attribute are summed to generate an overall BioCondition score (out of 100).

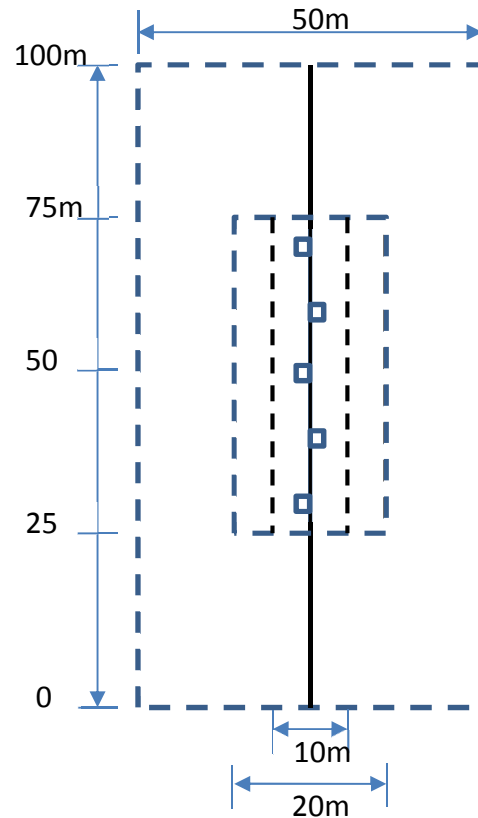


Figure 6 **Layout of BioCondition field sites** (from Eyre *et al.* 2011a). The solid middle line shows the 100m transect, and the dotted lines show positions of the 100 x 50m, 50 x 20m and the 50 x 10m survey areas used for assessing the vegetation condition attributes. The 1 x 1m quadrats for native grass cover and organic litter assessment were positioned along the 100m transect.

Table 8 The assessable attributes of BioCondition and their weightings

Attribute	Weighting (%)
Recruitment of dominant canopy species	5
Native plant species richness	
- Trees	5
- Shrubs	5
- Grasses	5
- Other	5
Tree canopy cover (%)	5
Tree canopy height	5
Shrub layer cover (%)	5
Native perennial grass cover (%)	5
Large trees	15
Coarse woody debris	5
Non-native plant cover	10
Litter	5
Total site score	80
Size of patch	10
Connectivity	5
Context (amount of vegetation within 1km)	5
Total landscape score	20
TOTAL BIOCONDITION SCORE	100

4.5 REFERENCE SITES

The calculation of BioCondition scores requires a set of benchmark values for each of the constituent attributes. These benchmark values are derived from reference sites surveyed in equivalent regional ecosystems that are in as close to 'pristine' (i.e., pre-European) state as possible. Benchmarks have been calculated by the Queensland Herbarium for many of the state's bioregions, and these are publicly available for use in calculating BioCondition scores. Unfortunately, at the time of survey such benchmarks were unavailable for the specific regional ecosystems located within the SGCP area.

To generate the necessary benchmarks, reference sites were established and surveyed following guidelines specified in the *Method for the Establishment and Survey of Reference Sites for BioCondition, Version 2* (Eyre *et al.* 2011b).

4.5.1 Selection of Sites

The selection of appropriate reference sites is fundamental to generating relevant benchmarks. Reference sites should (Eyre *et al.* 2011b):

- be close to the area being assessed for BioCondition
- have similar environmental conditions
- have similar natural disturbance (e.g., fire history)
- lack past chemical or mechanical disturbance
- represent an undisturbed, mature example of the regional ecosystem being assessed
- be located in a large intact patch of remnant vegetation
- be located at least 50m from a roadside or other disturbance
- be remote from artificial water sources
- not have been subject to recent management change.

Surrounding the SGCP area is a mosaic of pastoral properties. All vegetation within these properties is exposed to significant grazing pressure, and contains varying (but usually extensive) infestations of introduced pasture grasses and other non-native plants, as well as numerous artificial water sources. Access to these private properties was also limited. This placed substantial constraints on the availability of suitable reference sites.

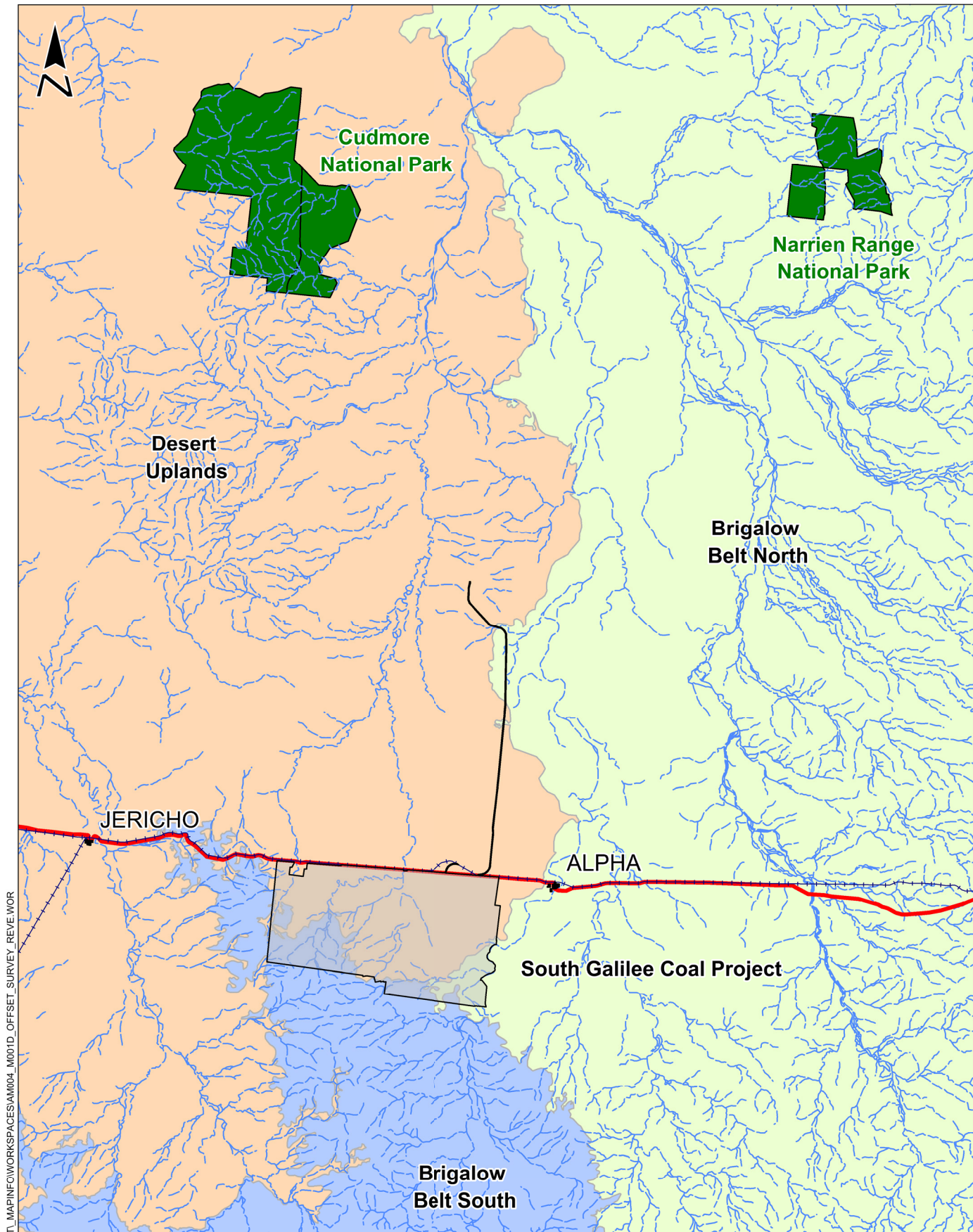
Fortunately, Cudmore National Park, an extensive reserve free from the impacts of grazing, contained the majority of regional ecosystems for which BioCondition benchmarks were required. Cudmore National Park is located 46km NW of the northern end of the SGCP area (**Figure 7**). It is located entirely within the Desert Uplands bioregion. Apart from localised infestations of the non-native Buffel Grass (*Cenchrus ciliaris*) (mostly impacting ecosystems in land zone 3), remnant vegetation contained within Cudmore National Park is in a relatively natural state. No artificial water sources are present within the national park.

Unlike BioCondition sites, which were randomly selected to be representative examples of the vegetation unit being assessed, reference sites were selected to be best-on-offer. Within Cudmore National Park, reference sites were positioned within examples of the regional ecosystem being assessed that were deemed by qualified persons to be of the highest condition (usually with the largest trees and highest densities of trees). Because of the well-known impacts of Buffel Grass on native plant diversity (Franks 2002; Jackson 2005), sites were only surveyed where Buffel Grass or other non-native species constituted less than 10% of the groundcover. Two reference sites were assessed per regional ecosystem, and these were located at least 3 km apart, following Eyre *et al.* (2009) (**Figure 8**).

While the majority of the SGCP lies within the Desert Uplands bioregion, parts in the south and east are located in the far west of the Brigalow Belt bioregion (**Figure 7**). Due to this somewhat arbitrary assignment of bioregion boundaries, one vegetation unit may be assigned to different regional ecosystems, depending on the section of the SGCP area in which it is located. Rather than separately assessing reference sites for both regional ecosystems, benchmarks for one ecosystem were applied to the 'sister' ecosystem in the neighbouring bioregion. 'Sister' pairs of regional ecosystems, for which a single set of benchmarks were applied, are listed in **Table 9**.

Table 9 Sister pairs of regional ecosystems for which the same set of benchmarks were applied.

Brief description of vegetation unit	Regional Ecosystem within the Desert Uplands	Regional Ecosystem within the Brigalow Belt
<i>Eucalyptus populnea</i> on sand plain	10.5.12	11.5.3
<i>Acacia shirleyi</i> woodland at margins of plateau	10.7.3b	11.7.2
<i>Eucalyptus camaldulensis</i> riparian forest	10.3.14	11.3.25
<i>Eucalyptus melanophloia</i> on alluvial plain	10.3.28a	11.3.6

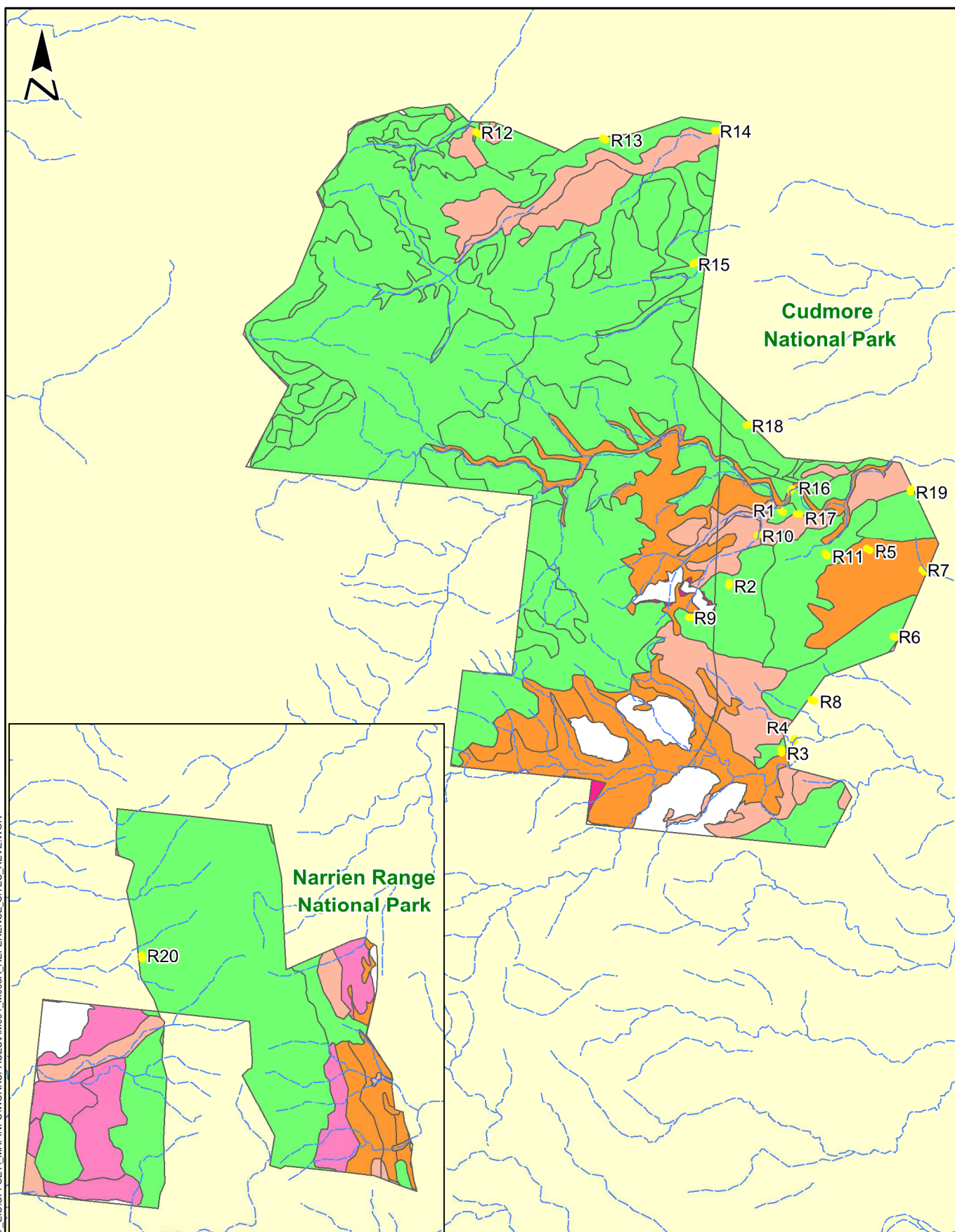


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LEGEND	
	SGCP Survey Area
	Principal road
	Railway
	Water Course
Bioregional Boundaries	
	Desert Uplands (Jericho Subregion)
	Brigalow Belt North (Upper Belyando Floodout Subregion)
	Brigalow Belt South (Claude River Downs Subregion)

Data Source: Tenement - DEEDI, Topography (250k) - Geoscience Australia

Alpha Coal Pty Ltd	
South Galilee Coal Project	
Location of National Parks used as Reference Sites for BioCondition Assessment	
 Kilometres Scale: 1:600,000 (A4)	25/02/2014 Proj. : MGA Z55 Datum: GDA 1994
FIGURE 7	



Remnant Vegetation Biodiversity Status

- Endangered (dominant)
- Endangered (sub-dominant)
- Of Concern (dominant)
- Of Concern (sub-dominant)
- Not Of Concern
- Non-Remnant

Data Source: Tenement - DEEDI. Topography (250k) - Geoscience Australia

Alpha Coal Pty Ltd South Galilee Coal Project Reference Sites for BioCondition Assessment

0 2 4 6

Kilometres

Scale: 1:160,000 (A4)

27/02/2014

Proj. : MGA Z55
Datum: GDA 1994

FIGURE 8

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Some regional ecosystems contained within the SGCP area were not found in Cudmore National Park (especially those confined to the Brigalow Belt bioregion). Narrien Range National Park, located 60 km northeast of the SGCP area was investigated as a potential source of reference sites for these regional ecosystems (**Figure 7**). Narrien Range National Park is located within the Brigalow Belt bioregion. The inaccessibility of this park, combined with a lack of good examples of the desired regional ecosystems (these were mostly small patches, or were minor components of larger mosaics) meant that only a single reference site (for RE 11.5.3) was assessed in this reserve.

4.5.2 Timing of Reference Site Surveys

Reference sites were assessed over a single survey period between 29 October and 7 November 2012. This was a similar time of the year to the BioCondition surveys (1.5 months later), and the vegetation was in a comparable state. Due to the dry season timing of these surveys, it is likely that the benchmarks obtained may slightly underestimate certain seasonally variable attributes (e.g., species richness and grass cover). For this reason, while these benchmarks are relevant to our BioCondition surveys undertaken during similar seasons, their use for other projects, where BioCondition is assessed at a different time of year, is not recommended.

One limitation of the timing of the reference site surveys is that Cudmore National Park had experienced widespread fires approximately one year prior to the survey. While the vegetation had mostly recovered from this event, a number of attributes were likely lower than usual, notably tree diversity (due to the 2-5m tall midstorey being removed by fire) and coarse woody debris. Unrepresentatively low benchmarks can have the effect of penalising high-quality BioCondition sites, as these may deviate from (exceed) the benchmark values. However, this is unlikely to have been a major constraint of the current surveys, as BioCondition sites are not penalised for above-benchmark tree diversity, and coarse woody debris has a relatively low overall weighting (5%).

4.5.3 Methodology

The methodology used for assessing reference sites followed that specified in the *Method for the Establishment and Survey of Reference Sites for BioCondition, Version 2* (Eyre *et al.* 2011b). The layout of reference sites was identical to that of BioCondition sites (see **Figure 6**), and the attributes assessed were mostly identical. Benchmarks for each attribute were derived by taking the mean values across the reference sites within each regional ecosystem.

The only benchmark that deviated from those defined in the methods proposed by Eyre *et al.* (2011b) was the definition of 'large trees'. Eyre *et al.* (2011b) define a large tree as one that possesses a diameter exceeding the average of all trees above 30cm (for *Eucalyptus* spp.) and above 20cm (for non-eucalypts). In order that large trees are counted in a BioCondition site, the threshold diameter for a 'large tree' must be known *a priori*. Because BioCondition sites were surveyed prior to the reference sites, these thresholds were estimated based on published values in similar woodland types elsewhere. For *Eucalyptus* and *Corymbia* species, a threshold of 40cm was used, with the exception of *E. camaldulensis*, which was assigned a threshold of 50cm. *Acacia* spp. and most other non-eucalypts were assigned a threshold of 30cm. *Melaleuca tamariscina* was assigned a threshold of 20cm. These estimated thresholds were generally close to the values ultimately calculated using reference sites (18.5cm for *M. tamariscina*, 27.1cm for non-eucalypts, 44.1cm for eucalypts and 48.4cm for *E. camaldulensis*), indicating that the BioCondition scores are unlikely to be compromised through the use of these estimates.

A list of the BioCondition benchmarks calculated from reference sites is provided in **Appendix B**.

4.6 ECOLOGICAL EQUIVALENCE OF IMPACT AND OFFSET AREAS

BioCondition scores calculated for each BioCondition survey site are shown in **Appendix C**. The raw data used in these calculations are presented in **Appendix D**. Site photos are contained in **Appendix E**.

4.6.1 Comparisons of BioCondition Scores

There was a significant difference between the BioCondition scores of sites in different land zones (ANOVA, $F_{3,34} = 36.59$, $p < 0.0001$). Sites in land zone 3 had significantly lower BioCondition scores than sites in land zones 5 or 7 (**Figure 9**). This can be attributed to higher grazing pressure and weed invasion along waterways. Non-remnant vegetation had BioCondition scores approximately half that of remnant vegetation.

There was no significant difference between the BioCondition scores of offset and impact areas (two-way ANOVA with land zone included as a covariate, $F_{1,34} = 0.63$, $p = 0.43$). On average, the BioCondition scores of offset areas were 2.6 points higher than those for impact areas, which is a negligible difference. These data indicate that offset areas were of equivalent condition to impact areas. This ecological equivalence reflects the close proximity of offset and impact areas, and their similar management histories.

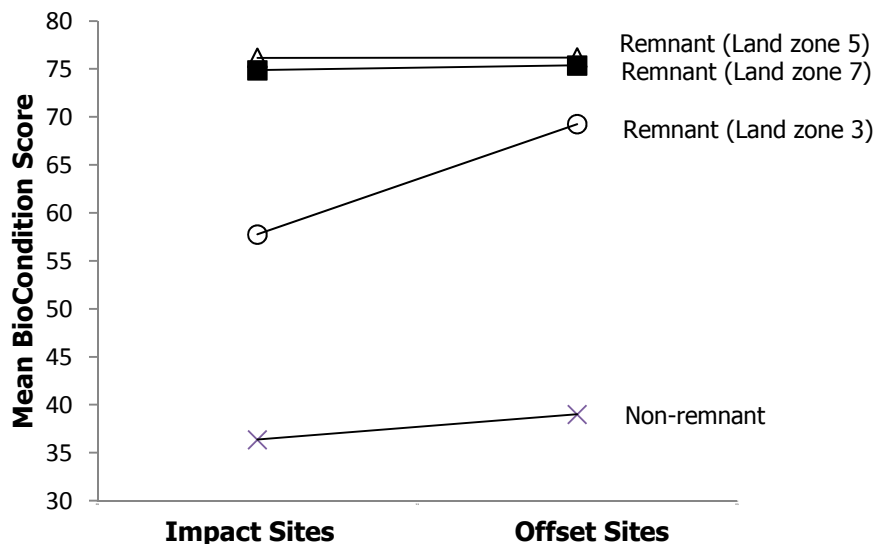


Figure 9 Mean BioCondition scores in offset and impact areas for remnant vegetation in each land zone, and non-remnant vegetation.

4.6.2 Regional Ecosystems Lacking BioCondition Benchmarks

Suitable reference sites for several regional ecosystems contained within the SGCP area were lacking from Cudmore National Park and Narrien Range National Park. These were either present in too small patches, were heavily infested with non-native grasses, or were absent altogether. A lack of benchmarks for these regional ecosystems precludes conventional calculations of BioCondition for five sites surveyed within the South Galilee impact or offset areas.

Despite a lack of reference sites, the raw data collected allows a comparison between sites within the same regional ecosystem. For these comparisons, it must be assumed that high-condition sites have:

- more large trees
- a taller canopy
- a greater cover of trees and shrubs
- a higher rate of recruitment of canopy species
- a greater diversity of trees, shrubs, grasses and forbs
- a higher density of woody debris
- a higher groundcover of native grass and litter
- a lower cover of weeds
- a higher landscape score (calculated from size of patch, connectivity and context using BioCondition methodology).

BioCondition methodology places different weightings on the above variables, depending on their importance as an indicator of ecosystem health (see **Section 4.4.3**). For each variable, offset sites were compared to impact sites of the same or similar regional ecosystem. The number of variables (multiplied by the weighting of each variable) for which the offset area was of better condition than the impact area was tallied. This generates a percentage of the BioCondition variables for which the offset site was superior to the impact site(s). Scores close to 50% suggest that the offset and impact sites were in similar condition. Scores greater than 50% reflect offset sites in superior overall condition, while scores lower than 50% suggest offset sites in inferior condition. These scores are presented in **Table 10**.

Table 10 Comparison of condition of sites lacking BioCondition benchmarks

Site	Offset/ Impact (O/I)	Regional ecosystem	Large trees (per ha)	Canopy height (m)	Tree cover (%)	Shrub cover (%)	Recruitment (%)	Tree spp.	Shrub spp.	Grass spp.	Forb spp.	Woody debris (m/ha)	Weed cover (%)	Native grass cover (%)	Litter cover (%)	Landscape score	Offset condition score*
WEIGHTING (%)			15	5	5	5	5	5	5	5	5	5	10	5	5	20	
<i>Acacia harpophylla</i> woodland on clay soils																	
O16	O	11.3.1	20	13.7	53.6	17.6	100	15	4	8	17	79	11.3	6.8	61.2	20	70
O18	O	11.4.8	18	13.6	43.2	18.3	50	10	11	15	29	639	9	20.8	38	19	80
I21	I	11.4.8	0	10.1	2	14.4	100	5	6	13	13	84	2.6	23.6	28.2	18	
<i>Callitris glaucophylla</i> woodland with emergent <i>Corymbia</i> spp. and <i>Eucalyptus melanophloia</i>																	
O6	O	11.3.19	16	16.3	62.4	11.4	100	6	6	13	28	58	0.06	9.4	77.2	16	80
I22	I	11.5.5	8	17	51.4	9.6	100	7	7	10	18	288	62.5	2.2	55.8	13	

*The offset condition score is the percentage of the BioCondition variables for which the offset area was in better condition than the impact area within the similar regional ecosystem. Variables for which the offset sites were equal or superior to impact sites are in green, and those where the offset sites were inferior are in red.

Based on the above scores, both *Acacia harpophylla* woodlands and *Callitris glaucophylla* woodlands were in substantially higher condition within offset areas than in impact areas. To convert the scores in **Table 10** to ones comparable to BioCondition scores, the following formula was used: BioCondition Score = $(O/50) \times I$, where O is the offset condition score in **Table 10**, and I is the BioCondition score of the impact site(s), estimated using the mean BioCondition score across other impact sites in the same land zone (see **Appendix C**). For REs 11.3.1 and 11.4.8 within the offset area, the BioCondition scores are estimated to be 80.9 and 92.5, respectively. For RE 11.3.19 within the offset area, the BioCondition score is estimated to be 92.5.

There are a number of limitations of the above assessments. Firstly, these do not take into account degree of difference between offset and impact areas in each variable. This is due to the fact that variables differ in units, and differences between impact and offset areas cannot be meaningfully combined across variables. This limitation does not bias the assessment in any one direction (i.e., for or against offset sites relative to impact sites).

Secondly, in some regional ecosystems some of the assumptions regarding the structure of high-quality sites may not be valid. For example, in high-quality remnants of *Acacia harpophylla* woodland, the large size and high density of canopy trees may shade out the understorey, resulting in fewer species and lower cover of grasses, shrubs and forbs, compared with mid-quality sites. Conversely, highly degraded sites experiencing substantial canopy die-off can have elevated amounts of woody

debris. In light of this, the relative quality of offset vegetation may be underestimated by the above calculations.

Despite the limitations of assessing vegetation condition in the absence of benchmarks, data presented here indicate that the two vegetation types lacking benchmarks were of better quality in offset areas than in impact areas. This is consistent with analyses of the other 39 BioCondition sites, which indicate that offset areas are ecologically equivalent to impact sites.

4.6.3 Special Features

The *Queensland Biodiversity Offset Policy* lists a set of special ecological features that, if present within an area to be impacted, must also be present within the offset area. These are summarised and their relevance to the SGCP is discussed in **Table 11**.

Table 11 Special features under the *Queensland Biodiversity Offset Policy*

Special Feature	Proposed impacts	Offsets
Centres of endemism	None identified.	None required.
Wildlife refugia	None identified.	None required.
Concentrations of disjunct populations	None identified.	None required.
Concentrations of taxa at the limits of their geographic ranges	While the SGCP area supports several species near their distributional limits, the concentration of such species is no higher than for elsewhere across the Brigalow Belt or Desert Uplands.	None required.
Areas with high species richness	None identified.	None required.
Concentrations of relictual populations	None identified.	None required.
Regional ecosystems with distinct variation in species composition	None identified.	None required.
Artificial water bodies of ecological significance	All artificial water bodies to be impacted were small dams for watering livestock. None supported important aquatic communities.	None required.
Areas with high densities of hollow-bearing trees	Hollow-bearing trees were frequent across remnant woodlands.	Offset areas contained a greater amount of remnant vegetation, with a greater density of large trees than impact areas (see Section 4.2.8).
Breeding or roosting sites used by a significant number of individuals	None identified.	None required.
State, bioregional or sub-regional corridors	According to Criterion J of Biodiversity Assessment and Mapping Methodology (BAMM), small areas of state or regionally significant corridors will be impacted by the proposed project (see Section 4.2.1).	The offsets area contains large state and regionally significant corridors (see Section 4.2.1). These will be further widened and connected through the rehabilitation of adjoining nonremnant habitats. The offset will deliver an overall environmental gain to state and regional corridors.

Priority species within the bioregion	The Yellow-spotted Monitor (<i>Varanus panoptes</i>), Black Falcon (<i>Falco subniger</i>), Australian Bustard (<i>Ardeotis australis</i>), Bush Stone-curlew (<i>Burhinus grallarius</i>), Barking Owl (<i>Ninox connivens</i>), Brown Treecreeper (<i>Climacteris picumnus</i>), White-eared Honeyeater (<i>Lichenostomus leucotis</i>), Hooded Robin (<i>Melanodryas cucullata</i>), Grey-crowned Babbler (<i>Pomatostomus temporalis</i>), Narrow-nosed Planigale (<i>Planigale tenuirostris</i>), Common Dunnart (<i>Sminthopsis murina</i>), Koala (<i>Phascolarctos cinereus</i>), Common Brushtail Possum (<i>Trichosurus vulpecula</i>), Rufous Bettong (<i>Aepyprymnus rufescens</i>), Spectacled Hare-wallaby (<i>Lagorchestes conspicillatus</i>), Black-striped Wallaby (<i>Macropus dorsalis</i>), Swamp Wallaby (<i>Wallabia bicolor</i>), Inland Forest Bat (<i>Vespadelus baverstocki</i>) and Desert Mouse (<i>Pseudomys desertor</i>) will lose habitat as a result of the SGCP.	All of these species will benefit from the increased connectivity and total amount of regrowth and remnant habitats created via the offsets.
Significance of patch within a one kilometre buffer	This feature is incorporated into BioCondition scores (see Section 4.4.3). Appendix D lists the percentage of the area surrounding (1km radius) each BioCondition site that contains remnant vegetation ('context'). The mean of impact sites is 46%.	BioCondition sites in offset areas had a mean of 47% of remnant vegetation within a 1km radius, which was not significantly different from impact sites (T-test, $t_{42} = 0.13$, $p = 0.90$).
Areas adjacent to a protected area estate under the <i>Nature Conservation Act 1992</i> .	None identified.	None required.

4.7 SUMMARY

The South Galilee Biodiversity Offsets Plan meets the requirements of the *Queensland Biodiversity Offset Policy*. **Table 12** summarises how this is achieved with respect to each of the seven principals of the *Queensland Biodiversity Offset Policy*.

Table 12 How the South Galilee Biodiversity Offsets Plan meets the requirements of the *Queensland Biodiversity Offset Policy*

1	"Offsets will not replace or undermine existing environmental standards or regulatory requirements, or be used to allow development in areas otherwise prohibited through legislation or policy." The proposed impacts will adhere to State and federal regulatory requirements, and will be carried out with government approval. Offsets are not used to justify illegal environmental impacts.
2	"Environmental impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact." The avoidance of impacts to State-significant biodiversity values was a major consideration during the planning phases of the SGCP. The mine footprint was positioned to minimise disturbance to remnant vegetation, especially that containing State-significant biodiversity values. Vegetation units where threatened species were recorded were also largely avoided by the SGCP. A number of management measures have been proposed to further mitigate biodiversity impacts of the planned project (detailed within the draft EIS). Since the draft EIS, the mine footprint has been altered to minimise impacts to Tallarenha Creek and Sapling Creek.
3	"Offsets must achieve an equivalent or better environmental outcome." To offset 8.81 ha of an Endangered regional ecosystem to be cleared, 171.08 ha of remnant Endangered regional ecosystem will be protected within the offset area, and 870.75 ha of new Endangered regional ecosystems (97.5 ha of which currently have >6% foliage projective cover) will be created from non-remnant pastures and protected. The latter is not currently protected under any legislation. To offset 0.16 ha of an Of Concern regional ecosystem to be cleared, 226.93 ha of remnant Of Concern regional ecosystem will be protected within the offset area, and 1,639.75 ha of new Of Concern regional ecosystem (98.8 ha of which currently have >6% foliage projective cover) will be created from non-remnant pasture. To offset 521 ha of a State-significant wildlife corridor potentially impacted by the SGCP, 6,664.4 ha of the same corridor will be protected within the offset area, and a further 13,837.32 ha (2,074.8 ha of which currently have >6% foliage projective cover) will be added to this corridor. To offset the clearing of 21.79 ha of potential habitat for the Near Threatened shrub <i>Micromyrtus rotundifolia</i>, 1,496.89 ha of potential habitat will be protected within the offset area, which includes all known locations of the species within the Mining Lease Application area. To offset the clearing of 753.79 ha of high-quality habitat for the Near Threatened herb <i>Desmodium macrocarpum</i>, 4,430.66 ha of high-quality habitat (containing a high density of the species) will be protected within the offset area, and a further 13,013.57 ha of high-quality habitat (1,935.5 ha of which currently have >6% foliage projective cover) will be created from non-remnant pasture. To offset the loss of 800.73 ha of potential habitat for the Near Threatened Square-tailed Kite, 8,016.39 ha of higher quality habitat will be protected within the offset area, and a further 13,837.32 ha of foraging habitat will be created through the restoration of non-remnant pastures to high-value regrowth and remnant vegetation. To offset the loss of 778.45 ha of potential habitat for the Near Threatened Little Pied Bat, 7,040.36 ha of higher quality habitat will be protected within the offset area, and a further 13,837.32 ha of foraging habitat (2,074 98.8 ha of which currently have >6% foliage projective cover) will be created through the restoration of non-remnant pastures to high-value regrowth and remnant vegetation. To offset the potential loss of 800.73 ha of high-quality habitat for the Vulnerable Brigalow Scaly-foot, 8,016.39 ha of high-quality habitat will be protected within the offset area, and 13,837.32 ha of additional high-quality habitat (2,074.8 98.8 ha of which currently have >6% foliage projective cove r) will be created through the restoration of cleared pastures to high-value regrowth. The above suggest a net environmental gain as a result of the offsets.
4	"Offsets must provide environmental values as similar as possible to those being lost."

	All environmental values impacted by the SGCP (remnant endangered regional ecosystems, remnant Of Concern regional ecosystems, habitat for Endangered, Vulnerable and Near Threatened species of plants and animals, and State-significant habitat connectivity) are enhanced through the South Galilee Biodiversity Offsets Plan. All land-based offsets under the <i>Queensland Biodiversity Offset Policy</i> must demonstrate ecological equivalence, with respect to the BioCondition of the vegetation contained within them and the special features of each. Extensive BioCondition surveys across the offset and impact areas demonstrate that remnant vegetation within these has equivalent BioCondition scores. Furthermore, the amount of remnant vegetation was far greater in the offset area than the impact area, and the offset area contains a greater amount of State-significant wildlife corridors. All special features contained within the impact area are present in the offset area. The current environmental value of the offset area thus exceeds that of the impact area.
5	"Offset provision must minimise the time-lag between the impact and delivery of the offset." Offsets will be legally secured following financial close of the Project. Some gains will be achieved within the first year (e.g., increased understorey cover) through the removal of cattle. The overall ecological value of the offset area will increase throughout the duration of the SGCP through the regrowth of woody vegetation. Environmental impacts of the SGCP will not occur immediately at the commencement of the project. Instead, the total environmental impacts of the SGCP will accrue over a 33-year period of operation (see draft EIS and AEIS for a full description of the proposed mine operation plan). The first phase of operations, the Epsilon Project, is responsible for only 17.4% of the total impacts of the entire SGCP. In contrast, the majority of offsets (64.3%) will be established at the onset of the SGCP. This means that the largest offset gains (conversion of non-remnant pasture to 15-year-old high-value regrowth) will be realised prior to most impacts taking place. The remainder of the offsets will be acquired prior to expansion of the SGCP beyond the Epsilon Project.
6	"Offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values." Non-remnant vegetation that is less than 15 years old is not protected under any legislation or policy. The South Galilee Biodiversity Offsets Plan will protect 13,837.32 ha of non-remnant vegetation, and allow its development into high-value regrowth and, later, remnant vegetation. 2,074 98.8 ha of this regrowth already have >6% foliage projective cover. Furthermore, by linking currently fragmented remnant vegetation within the offset area, biodiversity values of existing remnant vegetation will be greatly enhanced. The exclusion of livestock from offset areas will deliver additional benefits to remnant and non-remnant habitats.
7	"Offsets must be legally secured for the duration of the offset requirement." The offset area will be protected through either a nature refuge agreement with the Queensland Government, or as an 'Environmental Protection Offset Area' if and when the proposed Environmental Offsets Act (currently before Parliament) commences. The agreement is registrable on title, binding future owners or lessees of the land, and ensures that gains achieved through the offsets process are maintained in perpetuity.

5 COMPLIANCE WITH THE *EPBC ACT 1999 ENVIRONMENTAL OFFSETS POLICY*

Because the *EPBC Act Environmental Offsets Policy* specifies that offsets must target the specific protected matters that are being impacted, the compliance of the South Galilee Biodiversity Offsets Plan with this policy is discussed below, with reference to each federally protected matter. Note that all impact and offset values are based on the current mine plan, as presented in the AEIS, and these may differ slightly from the original impacts predicted in the draft EIS.

5.1 BRIGALOW THREATENED ECOLOGICAL COMMUNITY

5.1.1 Description

The ecological community 'Brigalow (*Acacia harpophylla* dominant and co-dominant)' is listed as endangered under the EPBC Act. It occurs patchily across large areas of Queensland and New South Wales. In Queensland, the Brigalow ecological community listed under the EPBC Act is defined by reference to 16 regional ecosystems, two of which occur within the SGCP impact and/or offset areas (RE 11.3.1 and RE 11.4.8). Both regrowth (more than 15 years old) and remnant forms of this community are protected under the EPBC Act, although only remnant forms are present on-site.

The Brigalow ecological community consists of dense shrublands or woodlands of *A. harpophylla*, usually with a diverse midstorey of softwood species, and occasionally with emergent eucalypts. There is generally an abundance of fallen timber and litter, which provides habitat for a range of threatened fauna. Hollow trees are generally scarce.

Brigalow ecological communities grow mostly on fertile clay soils, which have been highly favoured in the past for grazing and cropping land. Consequently, a large proportion of this ecological community has been cleared for agriculture.

A. harpophylla has a significant capacity for self-regeneration after clearing (Dwyer *et al.* 2009, 2010a). Due to widespread suckering of pulled trees, *A. harpophylla* is often viewed as a woody weed by pastoralists (Scanlan 1984, 1991). Understorey plant community richness is generally maintained in pastures where Brigalow has been cleared, provided exotic grasses are not widely introduced (Fairfax and Fensham 2000). This implies that Brigalow ecological communities have the potential to be restored through the cessation of recurrent clearing of working pastures (Dwyer *et al.* 2009).

Brigalow regrowth provides an important contribution to landscape restoration in modified agricultural landscapes (Bowen 2009; Bowen *et al.* 2009). Based on bird communities as an indicator of ecosystem health, benefits are greatest in regrowth that is older than 30 years (Bowen *et al.* 2009). Brigalow regrowth tends to display much higher stem densities than remnant Brigalow (Dwyer *et al.* 2010a; Ngugi *et al.* 2011), which can shade out understorey vegetation and slow biomass accumulation. It takes between 30 and 95 years for regrowth to naturally thin down to similar densities observed in remnant Brigalow (Johnson 1997; Ngugi *et al.* 2011). Actively thinning regrowth to 6000 stems ha⁻¹ facilitates development of Brigalow regrowth towards the structure of remnant Brigalow (Dwyer *et al.* 2010b). If not thinned, Brigalow regrowth can take >100 years to recover 90% of the structural and floristic compositional attributes of mature forest (Bradley 2007).

Fires are thought to have been naturally infrequent in Brigalow woodlands, although most of the dominant species in this community are tolerant of mild to moderate-intensity fires (Butler 2007).

Grazing can strongly affect recruitment of shrubs and trees in Brigalow ecological communities, as many of the common constituent species are readily eaten by domestic livestock (Butler 2007). Grazing in Brigalow ecological communities also reduces the abundance and diversity of birds utilising it (Bowen 2009).

5.1.2 Residual Impacts of the South Galilee Coal Project

The position of the SGCP was altered to largely avoid impacts to the Brigalow ecological community. Nevertheless, 8.81 ha of remnant Brigalow may be cleared, and an additional 1.92 ha lie above proposed longwall panels. The impacts of subsidence on the latter are anticipated to be negligible (see draft EIS).

The condition of remnant Brigalow in the impact area was generally poor (see **Table 10** and **Appendix E**). Because reference sites were lacking for BioCondition assessments of the constituent regional ecosystems (see **Section 4.6.2**), it was assumed that the condition of Brigalow in impact areas was equal to the mean BioCondition score for other regional ecosystems in the same land zone (i.e., 57.8/100).

5.1.3 Proposed Offsets

Contained within the proposed offset area are 171.08 ha of remnant Brigalow (based on field-verified mapping) and 870.74 ha of non-remnant pasture that once supported Brigalow prior to clearing (based on certified Queensland mapping). The latter will be allowed to passively regenerate towards high-value regrowth and, ultimately, remnant vegetation.

BioCondition assessments indicated that the current condition of Brigalow within the offset area exceeded that found within the impact area (see **Section 4.6.2**), and this was calculated to have a score of 92/100.

All Brigalow within the offset area will be afforded additional protection through a nature refuge agreement. Cattle will be excluded from all Brigalow, leading to improved condition of existing remnants. Extensive rehabilitation of non-remnant pastures will lead to improved connectivity, patch size and patch context (under the Queensland BioCondition framework) of existing remnants. While edge effects on Brigalow vegetation communities are relatively minimal (Collard *et al.* 2011), this improved connectivity will benefit the dispersal of fauna, and improve stability of the overall community. Landscape score contributes 20% of the total BioCondition score, which is a good reflection of overall community health (see **Table 8**).

Monitoring of offset sites throughout the duration of the SGCP will determine whether other management inputs, such as thinning of *A. harpophylla* regrowth, reduction of Buffel Grass, and fire suppression, may be required (see **Section 2.4**).

5.1.4 Risk of clearing without offsets

Despite legislation in place to protect remnant and regrowth vegetation in Queensland, a certain amount is cleared, both legally and illegally, on an annual basis. The most recent land-clearing data for Queensland (from 2009) show that 0.062% of remnant vegetation within the Brigalow Belt bioregion and 0.007% of remnant vegetation within the Desert Uplands bioregion is cleared annually (Accad *et al.* 2012). Of the total clearing within the Brigalow Belt and Desert Uplands bioregions in 2007-2009, 14.2% is 'unexplained' (DERM 2010), and is likely to be illegal.

These data suggest that vegetation protected under the *Environment Protection and Biodiversity Conservation Act* and the *Vegetation Management Act*, such as the Brigalow threatened ecological community, is subject to a certain amount of annual loss unless other protection measures are in place.

Between 2007 and 2009, remnant vegetation of the regional ecosystems 11.3.1 and 11.4.8, constituent members of the Brigalow threatened ecological community, were cleared at an annual rate of 0.13% on Freehold and Leasehold land, but 0% in National Parks and Conservation Parks (Accad *et al.* 2012). These figures do not include regrowth, which is considered as belonging to threatened ecological communities under the EPBC Act. Data on the specific amount of Brigalow regrowth that is cleared annually is not available. However, across Queensland, regrowth is cleared at a rate 8.5 times higher than remnant vegetation (Accad *et al.* 2012).

Based on the above data, over the 20-year timeframe for which the offset calculator is applied, it is predicted that remnant vegetation belonging to the Brigalow threatened ecological community has a 2.6% chance of being removed unless additional protection is afforded to it. This estimate assumes that current levels of protection afforded to vegetation remain constant over the 20-year period.

In May 2013, the Queensland Government introduced the *Vegetation Management Framework Amendment Act 2013*, which reduced protection afforded to regrowth, allowed clearing of previously protected remnant vegetation in areas of agricultural significance, and changed the enforcement and

offense provisions, making it more difficult to prosecute illegal clearing. It is too early to assess the impact this Act has on overall clearing rates in Queensland, and specifically on clearing of the Brigalow ecological community. However, it is anticipated that the 2.6% risk of clearing, based on 2007-2009 data, constitutes a substantial underestimate of the true future risk.

From 2000 to 2005, the five years prior to the implementation of the *Vegetation Management and Other Legislation Amendment Bill 2004 (Qld)*, regional ecosystems 11.3.1 and 11.4.8, constituent members of the Brigalow threatened ecological community, experienced annual clearing rates of 0.77%. In the extreme situation that Queensland's new clearing laws return clearing rates to these previous levels, there is a 15.4% risk that Brigalow within the SGCP area would be cleared within 20 years. The true risk of clearing over the next 20 years is likely to be somewhere between the 2.6% risk based on 2009 data and the 15.4% based on relaxed clearing laws prior to 2005. Because the offset gains are higher if the estimated risk of clearing in non-protected areas is high, it is important to be conservative when estimating these risks. For this reason, a risk at the lower end of this range, but twice the 2009 clearing levels (i.e., 5.2%), was chosen for use in the offset calculator.

The rate of clearing of non-remnant vegetation is expected to be much higher than the 5.2% estimate for remnant Brigalow communities. High-value regrowth (>15 years old) is largely absent from the SGCP area, with almost all vegetation being of one of two extremes in age (non-remnant pasture or remnant). This implies that re-clearing of young regrowth, to maintain the openness of pastures, has occurred regularly. This is a common practice in central Queensland (Back *et al.* 2009a, 2009b; McIvor 2006), and no laws protect vegetation younger than 15 years from being cleared. Taken together, this suggests that areas of non-remnant pasture that support regrowing Brigalow communities have a very high probability of being re-cleared in the next 20 years. A risk of clearing of 95% was used for non-remnant Brigalow in the offset calculator.

5.1.5 Time until Environmental Gains are Realised

The return of ecological values to developing regrowth is a gradual process, and different values are likely to recover at different rates. Some vegetation attributes, such as canopy cover, recover quickly (Bowen 2009). Others, such as the development of mistletoes important as a food source for wildlife (Oliver *et al.* 2003), take longer. Based on studies into avian communities utilising Brigalow, maximum gains are obtained after brigalow is 30-50 years old (Bowen *et al.* 2009). Basal area and biomass within Brigalow communities also reach maximum levels in regrowth of around 40 years of age (Ngugi *et al.* 2011). However, some environmental gains are likely prior to this time.

Under the *Environment Protection and Biodiversity Conservation Act*, regrowth that is 15 years old is included within the Brigalow threatened ecological community, because it generally possesses a structure and species composition similar to remnant Brigalow (Environment Australia 2003). Conservatively estimating that non-remnant pastures within the SGCP area were most recently cleared approximately five years ago, the estimated time until environmental gain is 10 years.

The magnitude of this environmental gain was estimated based on the BioCondition scores of non-remnant pastures and remnant Brigalow within the offset areas. The former had a mean score of 39/100, while the latter had a score of 92.5/100. Assuming that it takes regrowth 50 years to attain a remnant BioCondition score (a conservative estimate, based on studies by Bowen 2009 and Ngugi *et al.* 2011), and assuming a linear increase in BioCondition over this time, 15-year-old regrowth is predicted to have a BioCondition score of 50.9/100, an 11.9-point increase from current conditions.

5.1.6 Confidence in Result

The ability of Brigalow to naturally recover after clearing is well-documented (Dwyer *et al.* 2009, 2010a). Furthermore, all values used in the offset calculator (i.e., size of community, starting qualities, risk of loss with and without offsets, future quality and time until ecological benefit) are well supported by scientific data. Each estimate, however, is associated with an unknown error. For this reason, each value was selected to be at the conservative end of possible values, with respect to minimising the calculated gains of the offsets plan. This ensures that, while the true gains of the offsets plan may be much higher than those predicted here, it is highly unlikely that these gains will

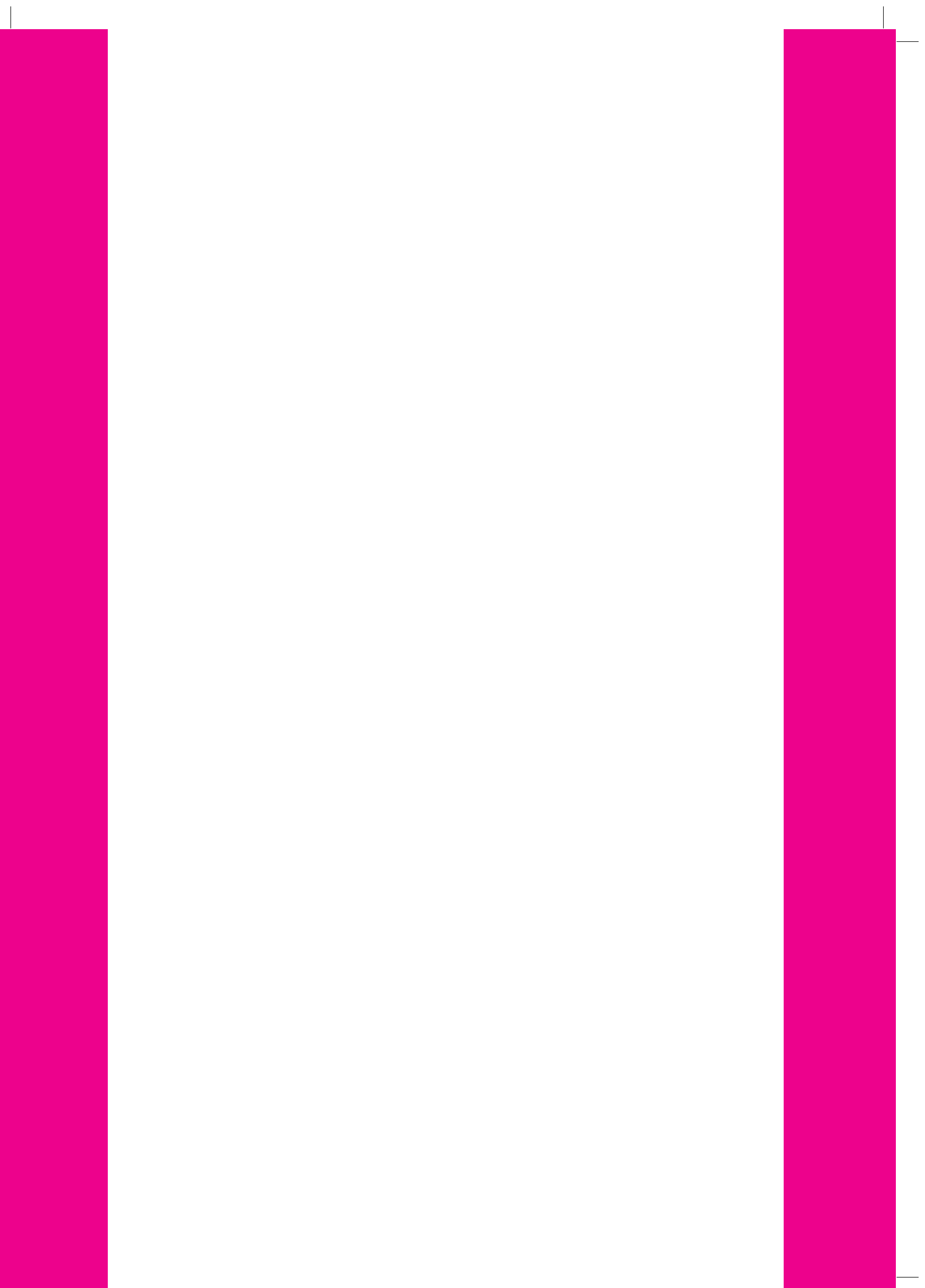
be lower. Therefore, confidence in the result was estimated to be 90% when using the offset calculator.

5.1.7 Offset Assessment

The *Offset Assessment Guide* has been developed by the federal government to estimate impacts and offsets for threatened species and ecological communities using a balance sheet approach. The South Galilee Biodiversity Offsets Plan has two major benefits for the Brigalow ecological community:

- The exclusion of cattle, control of weeds and fire, and improved connectivity between woodland fragments will improve the quality of existing remnants.
- Land formerly cleared of Brigalow and now being maintained as open pasture through recurrent clearing will be protected from future clearing and allowed to return to a Brigalow ecological community.

These two benefits are assessed separately using the *Offset Assessment Guide*, and their total offset gains are summed to generate an assessment of the overall benefits of the South Galilee Biodiversity Offsets Plan on the Brigalow ecological community (**Table 13**). The benefit to the Brigalow ecological community of the South Galilee Biodiversity Offsets Plan is estimated to be 4,783.8% of the total impact of the SGCP.



5.2 BRIGALOW SCALY-FOOT

5.2.1 Description

The Brigalow Scaly-foot (*Paradelma orientalis*) is a nocturnal legless lizard that occurs in a wide variety of wooded habitats across coastal and inland south-east Queensland. It was recorded in *Callitris glaucophylla* woodland during surveys of the SGCP area (MET Serve 2011), but elsewhere it is known to utilise a wide range of ecological communities and land zones, including all land zones to be impacted by the SGCP (Department of the Environment 2013b).

While displaying a preference for extensive tracts of remnant woodlands and shrublands, the Brigalow Scaly-foot is known to persist in disturbed environments, such as those invaded by Buffel Grass and other weeds (Department of the Environment 2013b). The Central Queensland sandstone rises, located to the south and east of the SGCP, represent important tracts of habitat for the species (Department of the Environment 2013b). Clearing and fragmentation of remnant habitats is the greatest threat to the species, and landscape corridors linking large patches of suitable habitat are important for maintaining dispersal of the species and its genetic diversity (Department of the Environment 2013b).

During the day, the species shelters beneath rocks, logs, loose bark, dense leaf litter and grass tussocks (Department of the Environment 2013b), and a dense and complex ground cover is likely to be important for Brigalow Scaly-foots. Any factors that reduce ground cover (e.g., grazing by livestock, excessive fires) are detrimental to Brigalow Scaly-foots.

The Brigalow Scaly-foot was listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act* at the time of submission of the draft EIS. On 15 May 2013, this species was deleted from this category, on the basis of insufficient data. Because the species was a consideration during the planning of the SGCP and offsets, and because it remains listed as Vulnerable under the *Nature Conservation Act*, offsets for the species are assessed here in the same level of detail as afforded to other federally listed species.

5.2.2 Residual Impacts of the South Galilee Coal Project

The primary impact of the SGCP on the Brigalow Scaly-foot is the removal of potential habitat. The species was detected in the east of the MLA, in a unit of remnant vegetation that is outside the proposed mine footprint. Nevertheless, 800.72 ha of remnant vegetation providing potential habitat for the species will be removed for the SGCP, which may reduce the area of occupancy of the species and its local population size. Non-remnant pastures may also be utilised rarely and transiently by the species, and 5,568.94 ha of this marginal habitat will be removed to accommodate the SGCP.

In addition to the proposed clearing, additional habitat may be affected by subsidence associated with longwall mining. Most vegetation communities present on-site are unlikely to be negatively affected by subsidence, due to their lack of dependence on perched aquifers supported by confining layers vulnerable to cracking (see draft EIS for a more detailed assessment). Nevertheless, an assumption that all vegetation overlying longwall panels will be 'removed' provides a highly conservative estimate of the total impacts of the SGCP on habitat for the Brigalow Scaly-foot. In total, 1,080.2 ha of remnant vegetation and 4,069.9 ha of non-remnant pastures overlie long-wall panels and are potentially affected by subsidence.

Large blocks of remnant vegetation within the western and south-eastern parts of SGCP area are contiguous with the sandstone rises of the Carnarvon Ranges, and serve as important movement corridors. The SGCP will not compromise connectivity within these large blocks.

The habitat value of remnant and non-remnant vegetation within the SGCP area was assessed by re-calculating BioCondition scores for each regional ecosystem, using only those variables that are relevant to the Brigalow Scaly-foot (tree and shrub canopy cover, coarse woody debris, native perennial grass cover, litter cover, size of patch, connectivity and context). Based on these calculations, remnant vegetation within the SGCP impact area had a mean habitat value of 77.4/100, while non-remnant habitats had a habitat value of 40.9/100.

5.2.3 Proposed Offsets

A total of 8,016.38 ha of remnant vegetation and 13,837.32 ha of non-remnant vegetation is contained within the offset area. The former is high-value habitat for Brigalow Scaly-foot, while the latter is low-value habitat. The habitat value of remnant and non-remnant vegetation within the SGCP area was assessed by re-calculating BioCondition scores for each regional ecosystem, using only those variables that are relevant to the Brigalow Scaly-foot (tree and shrub canopy cover, coarse woody debris, native perennial grass cover, litter cover, size of patch, connectivity and context). Based on these calculations, remnant vegetation within the offset area had a mean habitat value of 73.9/100, while non-remnant habitats had a habitat value of 38.8/100.

The quality of remnant habitats for Brigalow Scaly-foots will be improved through the exclusion of cattle and enhancement of connectivity. The quality of non-remnant habitats will be improved by protecting it from future clearing, and allowing the passive regeneration of high-value regrowth and, ultimately, remnant vegetation.

5.2.4 Risk of Loss without Offsets

To assess the future risk of loss of habitat within the SGCP offset area in the absence of additional protection, current land-clearing rates were calculated for each land zone across the Brigalow Belt and Desert Uplands bioregions (data from Accad *et al.* 2012). The risk of clearing to remnant vegetation within the SGCP offset area was estimated by calculating the mean clearing rate across all land zones contained within the offset area, weighted by the relative amount of each land zone (**Table 14**). Based on the most recent (2009) rates of clearing, the annual risk that remnant vegetation within the offset area will be lost is 0.046%. This gives a risk of loss over 20 years of 0.92%. Based on 2009 data, risk of loss within National Parks and Conservation Reserves (a similar protection level to the proposed offset area) is 0%.

Table 14 Clearing rates within the Brigalow Belt and Desert Uplands bioregions for each land zone relevant to the SGCP offset area. Data is extracted from Accad *et al.* 2012.

Land zone	Area within SGCP offset (ha)	Annual Clearing Rate (% of the remaining vegetation)			
		National Parks/Conservation Reserves		Leasehold/Freehold	
		2007-2009	2000-2005	2007-2009	2000-2005
3	1,487.12	0.000	0.002	0.063	0.754
4	27.99	0.000	0.002	0.111	1.024
5	2,943.52	0.000	0.001	0.052	1.036
7	945.99	0.000	0.001	0.065	0.433
10	2,611.76	0.000	0.002	0.021	0.440

The above calculations assume that current clearing rates are indicative of those over the next 20 years, which assumes that the level of vegetation protection will remain constant over this time. Due to the recent relaxation in land-clearing laws in Queensland (as of May 2013), risk of loss calculated based on 2009 data is likely to underestimate the true risk. The return of future clearing rates to the levels experienced prior to the introduction of the *Vegetation Management and Other Legislation Amendment Bill 2004 (Qld)* is unlikely, but can be considered as an upper limit of risk of loss. Based on clearing rates between 2000 and 2005 (Accad *et al.* 2012), the risk that remnant vegetation within the SGCP offset area will be lost over 20 years is 14.4%. For the purposes of the offset calculator, a conservative risk at the lower end of the range between 2009 and 2005 values, but twice the 2009 clearing levels (i.e., 1.8%), was chosen.

Young regrowth is not protected under any law. Non-remnant vegetation within the SGCP area is regularly re-cleared to maintain pastures, and a lack of regrowth older than 15 years implies that this

re-clearing is frequent. This also implies that non-remnant areas within the SGCP offset area would almost certainly be re-cleared within the next 20 years. A risk of loss to non-remnant (marginal) habitats without intervention is estimated to be 95% in the offset calculator.

5.2.5 Time until Environmental Gains are Realised

Grazing by cattle is known to have major impacts on reptile populations in the Desert Uplands through alterations to the structure and composition of understorey vegetation (Kutt and Woinarski 2007). Exclusion of livestock leads to greater tree recruitment and native plant cover (Prober *et al.* 2011). The removal of cattle from remnant habitats will deliver rapid gains (within one year) for the Brigalow Scaly-foot, due to an increased cover of grasses and herbs.

In contrast, maximal gains are not anticipated until non-remnant pastures develop into mature ecological communities. Some habitat values, such as leaf litter and canopy cover, are expected to regenerate within 5-15 years (Vesk *et al.* 2008; Brady and Noske 2009). However, other values important to the Brigalow Scaly-foot, such as the development of heavy loads of fallen timber, may require 100 years to develop (Vesk *et al.* 2008).

Most gains are anticipated within the first 10-23 years after non-remnant pastures are left to regrow (Bruton *et al.* 2013). Because high-value regrowth (15 years old) possesses levels of structural complexity intermediate between non-remnant pastures (habitat score of 38.8/100) and remnant vegetation (habitat score of 73.9/100), these are expected to have an intermediate habitat value (~56.4/100) to the Brigalow Scaly-foot. This is a conservative estimate of habitat value, as studies have shown that regrowth eucalypt and acacia communities in central Queensland support a similar reptile community to remnant woodlands (Bruton *et al.* 2013).

5.2.6 Confidence in Result

There is substantial error associated with all estimates used in the *Offset Assessment Guide*, and it is important to consider this when assessing the risks of an offsets plan not having the predicted outcomes. Because high risks of failure reduce the value of an offset, it is important to minimise these risks when deciding on values to use in the offset calculator. This can be achieved by basing estimates on robust science, and/or by using highly conservative estimates that are unlikely to exceed realistic values. Both approaches have been used in this plan. By taking a conservative approach for each estimate, the probability of the overall gains being overestimated is likely to be extremely low.

5.2.7 Offset Assessment

The *Offset Assessment Guide* has been developed by the federal government to estimate impacts and offsets for threatened species and ecological communities using a balance sheet approach. The South Galilee Biodiversity Offsets Plan has three major benefits for the Brigalow Scaly-foot:

- increased density and complexity of the understorey in remnant vegetation through the exclusion of cattle (time frame: one year)
- increased habitat value of remnant vegetation through improved connectivity as a result of regeneration within cleared areas (time frame: 15 years)
- conversion of non-remnant pastures to high-value native regrowth (time frame: 15 years).

Each of the above gains is assessed separately using the *Offset Assessment Guide*, and summed to calculate an overall gain of the South Galilee Biodiversity Offsets Plan to the Brigalow Scaly-foot (**Table 15**).

If, as anticipated in the draft EIS, vegetation overlying longwall panels is unaffected by mining, the benefit to the Brigalow Scaly-foot of the South Galilee Biodiversity Offsets Plan is estimated to be 286% of the total impact of the SGCP. In a worst-case scenario, where all vegetation above longwall panels is impacted, the benefit to the Brigalow Scaly-foot of the South Galilee Biodiversity Offsets Plan is estimated to be 153% of the total impact of the SGCP. In either case, the offset plan will deliver a net benefit to the Brigalow Scaly-foot.

Table 15 **Offset assessment guide for the Brigalow Scaly-foot.** Values in black text show estimations based on a worst-case scenario where all vegetation above longwall panels are impacted. Values in blue indicate the more likely scenario that no vegetation above longwall panels will be affected.

Impact Calculator			Offset Calculator										Raw Gain	Confidence in Result	Adjusted Gain	Net Present Value (adjusted ha)	% OF IMPACT OFFSET	
Area of high-value habitat (remnant vegetation)	Area (ha)	1,880.92 (800.72)	Benefit 1: Improvement of understorey in existing high-value habitat & added protection	20	Time over which loss is averted	Start area (ha)	8,016.38	2	Risk of loss (%) without offset	1	Risk of loss (%) with offset	Future quality of offset (adjusted ha)	80.16	90	72.15	761.09	14.20% (26.54%)	
	Quality (score 0-10)	8		1	Future area without offset (adjusted ha)	7,936.2	Future area with offset (adjusted ha)											
	Total impact (adjusted ha)	1,504.74 (640.58)		7	Future quality without offset (score 0-10)	7	Future quality of offset (score 0-10)	8	0.9									
Area of low-value habitat (non-remnant pastures)	Area (ha)	9,638.84 (5,568.94)	Benefit 2: Improvement of connectivity between existing high-value habitat	20	Time over which loss is averted	Start area (ha)	8,016.38	2	Risk of loss (%) without offset	2	Risk of loss (%) with offset	Future quality of offset (adjusted ha)	0	90	0	686.17	12.80% (23.92%)	
	Quality (score 0-10)	4		7	Future area without offset (adjusted ha)	7,856.1	Future area with offset (adjusted ha)	8	0.9									
	Total impact (adjusted ha)	3,855.54 (2,227.58)		7	Future quality without offset (score 0-10)	7	Future quality of offset (score 0-10)	8	0.9									
			Benefit 3: Restoration of non-remnant pastures to regrowth	20	Time over which loss is averted	Start area (ha)	13,837.32	95	Risk of loss (%) without offset	1	Risk of loss (%) with offset	Future area with offset (adjusted ha)	13,007.08	90	11,706.37	6,748.69	125.90% (235.30%)	
				15	Future area without offset (adjusted ha)	691.9	Future area with offset (adjusted ha)	5	Future quality of offset (score 0-10)	5	0							
				15	Future quality without offset (score 0-10)	5	Future quality of offset (score 0-10)	5	Future quality of offset (score 0-10)	5	0							
Total																		152.90% (285.76%)

5.3 KOALA

5.3.1 Description

Koalas (*Phascolarctos cinereus*) inhabit a range of eucalypt forests and woodlands across eastern Australia. In Queensland, their stronghold is within the southeast corner, where populations are under increasing pressure from urbanisation (Dique *et al.* 2004). In drier parts of the state, populations have suffered marked declines in recent decades due to drought (TSSC 2012). This may constitute a temporary and natural fluctuation in wild populations (Gordon and Hrdina 2005), but one that may be exacerbated by climate change. These declines have prompted the recent elevation of their conservation status under the *Environment Protection and Biodiversity Conservation Act* to Vulnerable.

Riparian forests are important habitats for Koalas in semi-arid Queensland (Gordon *et al.* 1988; Munks *et al.* 1996; Sullivan *et al.* 2004). *Eucalyptus camaldulensis* is the preferred food tree in these environments (Smith *et al.* 2013), and riparian woodlands of *E. camaldulensis* are likely to be the most important habitat for Koalas in the SGCP area. This occurs primarily along Alpha Creek and its tributaries. Studies of Koalas across semi-arid Queensland suggest that *Eucalyptus populnea*, the dominant tree of regional ecosystems 11.5.3, 11.3.2, 10.3.27 and 10.5.12 within the SGCP area, also forms a dominant component of their diet (Ellis *et al.* 2002; Smith *et al.* 2013), although it is far less favoured than *E. camaldulensis* (Smith *et al.* 2013). *Eucalyptus melanophloia*, the other common eucalypt across the SGCP area, is unimportant for Koalas (Smith *et al.* 2013).

5.3.2 Residual Impacts of the South Galilee Coal Project

The primary impact of the SGCP on Koalas is through the removal of habitat to accommodate the mine and associated infrastructure. Because additional riparian woodlands may be impacted by subsidence caused by underground mining, Koala habitat overlying longwall panels was conservatively included as being removed by the SGCP. Habitats being removed were categorised into three classes, according to their value to Koalas. The area of each habitat class to be cleared, and the value of these to Koalas (calculated on a scale from 0 to 100, based on BioCondition attributes that contribute to Koala habitat) are shown in **Table 16**.

Table 16 Koala habitat to be impacted by the SGCP

Koala value	Habitat	REs	Area impacted (ha)	Habitat condition score*	Mean score of impact areas**
High	<i>Eucalyptus camaldulensis</i> dominated riparian woodlands	11.3.25/10.3.14	1.34	85†	85
Medium	<i>Eucalyptus populnea</i> dominated woodlands	11.3.2/10.3.27	367.68	48.3	52
		11.5.3/10.5.12	76.59	70.0	
Low	Non-remnant pastures containing food trees	NR	3582.6	9.6	9.6

*Habitat condition score was estimated by re-calculating BioCondition scores using only those attributes that directly contribute to Koala habitat (i.e., large trees, tree canopy height, recruitment of canopy species, tree canopy cover, size of patch, connectivity and context). One additional variable (dominance of *Eucalyptus camaldulensis*) was added to these calculations and this was arbitrarily awarded a weighting of 10 points due to the importance of the species as a food tree for Koalas in semi-arid regions. Sister ecosystems (those occurring in both bioregions) are combined.

Overall scores awarded to the three habitat types were derived by taking the mean habitat condition scores of the constituent REs, weighted by the relative amount of each RE being impacted. These scores were used as 'habitat quality score' in the Offset Assessment Guide (Table 18**).

†The fragments of high-quality habitat that will be impacted were too small for BioCondition assessment. The condition scores of offset areas were applied in this case, which is likely to be a very conservative approach, given that the best-quality habitats were along Alpha Creek, which is outside the impact area.

5.3.3 Proposed Offsets

The offset area contains high-, medium- and low-quality Koala habitats, as defined in **Table 16**. The current habitat values of these categories are higher than or similar to the same habitat types within the impact area (compare **Table 17** with **Table 16**).

Environmental gains are primarily the regeneration of suckers and saplings of food trees (*Eucalyptus populneus* and *Eucalyptus camaldulensis*) through the exclusion of browsing livestock and the cessation of recurrent clearing of pastures. Koalas readily utilise regrowth (Gall 1980; Kavanagh *et al.* 1995; Jurskis and Potter 1997), and sometimes favour this over remnant forests (Gordon *et al.* 1990). Koalas are known to readily return to mine rehabilitation sites, as long as canopy cover and diversity of food trees is sufficient (Cristescu *et al.* 2013).

Allowing the development of regrowth across the offset area will not only increase the total amount of habitat for Koalas, but will also increase the value of current habitat, through improving connectivity (McAlpine *et al.* 2006).

Table 17 Koala habitat contained within the SGCP offset area

Koala value	Habitat	Regional Ecosystems	Area in offset (ha)	Habitat condition score*	Mean score of offset areas**
High	<i>Eucalyptus camaldulensis</i> dominated riparian woodlands	11.3.25/10.3.14	109.21	85	85
Medium	<i>Eucalyptus populnea</i> dominated woodlands	11.3.2/10.3.27	586.85	53.3	53.9
		11.5.3/10.5.12	260.28	56.7	
Low	Non-remnant pastures containing food trees	Non-remnant	5,095.71	11.1	11.1

*Habitat condition score was estimated by re-calculating BioCondition scores using only those attributes that directly contribute to Koala habitat (i.e., large trees, tree canopy height, recruitment of canopy species, tree canopy cover, size of patch, connectivity and context). One additional variable (dominance of *Eucalyptus camaldulensis*) was added to these calculations and this was arbitrarily awarded a weighting of 10 points due to the importance of the species as a food tree for Koalas in semi-arid regions.

Overall scores awarded to the two habitat types were derived by taking the mean habitat condition scores of the constituent regional ecosystems, weighted by the relative amount of each ecosystem being impacted. These scores were used as 'habitat quality score' in the Offset Assessment Guide (Table 18**).

5.3.4 Risk of Loss without Offsets

Between 2007 and 2009, remnant vegetation of the high-quality Koala habitats 11.3.25 and 10.3.14 were cleared at an annual rate of 0.038% on Freehold and Leasehold land across the Brigalow Belt and Desert Uplands bioregions, but 0% in National Parks and Conservation Parks (Accad *et al.* 2012). The medium-quality Koala habitats (regional ecosystems 11.3.2, 10.3.27, 11.5.3 and 10.5.12) were cleared at an annual rate of 0.151% on Freehold and Leasehold land, but 0% in National Parks and Conservation Reserves (Accad *et al.* 2012).

Based on the above data, over the 20-year timeframe for which the offset calculator is applied, it is predicted that high-quality Koala habitat has a 0.8% chance of being removed unless additional protection is afforded to it. Medium-quality habitat has a 3.0% risk of loss over the 20 years. These estimates assume that current levels of protection afforded to vegetation remain constant over the 20-year period.

Due to the recent relaxation in land-clearing laws in Queensland, risk of loss calculated based on 2009 data is likely to underestimate the true risk. The return of future clearing rates to the levels experienced prior to the introduction of the *Vegetation Management and Other Legislation Amendment Bill 2004 (Qld)* is unlikely, but can be considered as an upper limit of risk of loss. Based on clearing rates between 2000 and 2005 (Accad *et al.* 2012), high-value Koala habitat has a 5.02%

risk of loss over 20 years, while medium-value habitat has a 41.6% risk of loss. For the purposes of the offset calculator, risks at the lower end of the range between 2009 and 2005 values, but twice the 2009 clearing levels (i.e., 1.6% and 6.0% for high- and medium-quality habitats, respectively), were chosen.

Young regrowth is not protected under any law. Non-remnant vegetation within the SGCP area is regularly re-cleared to maintain pastures, and a lack of regrowth older than 15 years implies that this re-clearing is frequent. This also implies that non-remnant areas within the SGCP offset area would almost certainly be re-cleared within the next 20 years. A risk of loss to non-remnant (i.e., poor) habitats without intervention is estimated to be 95% in the offset calculator.

5.3.5 Time until Environmental Gains are Realised

The rate at which regrowth develops depends on rainfall, the methods used for clearing, and the frequency of clearing (Back *et al.* 2009b). Based on studies elsewhere in central Queensland, when 35-year-old *E. populnea* regrowth (possessing many attributes of remnant woodlands) is cleared using bulldozers, the regrowth after seven years possesses 70% of the stem density and 24% of the biomass of the vegetation present pre-clearing (Back *et al.* 2009b).

A number of other studies of eucalypt regrowth across Australia reveal similar trends. Eucalypt woodlands on Cape York reach maximum height after 15 years (Gould 2012). Eucalypt woodlands in the Northern Territory reach natural canopy cover after 20 years (Brady and Noske 2009). Natural canopy cover is obtained after about 17 years in sandy coastal woodland in New South Wales (Fox *et al.* 1996). Canopy cover is obtained within 10 years in central Victoria (Vesk *et al.* 2008). As canopy cover and height are probably the two main vegetation characteristics relevant to Koalas, it is conservatively anticipated that Koala habitat values will be returned to that of remnant vegetation (a score of 54 out of 100, for *E. populnea* communities: see **Table 17**) after 30 years of regrowth. Assuming that regrowth is currently five years old, this is expected to occur within 25 years. At that time, habitat scores are even likely to exceed that of current remnant vegetation, due to the far greater connectivity of habitat that will eventuate from the restoration of woodlands from pastures. Given that landscape attributes, such as patch size and connectivity, contribute 20 points out of 100 to the BioCondition score of vegetation, it is conservative to estimate the habitat value of regrowth after 25 years as having a score of approximately 60/100.

While maximum gains are anticipated within 25 years, initial gains will occur much sooner. For the purposes of the offset calculator, a score of 4/10 is expected within 15 years, based on:

- the above scientific data suggesting a score of 6/10 after 25 years
- the starting state of the vegetation being 1/10, based on BioCondition data collected on-site
- the assumption that habitat scores increase linearly over time (i.e., increasing by one every five years).

This habitat score after 15 years is considered conservative, as the final assumption above is likely to be cautious. This is because the rate at which vegetation develops towards a remnant state is expected to decline with age of the vegetation.

5.3.6 Confidence in Result

Due to the heavy reliance on scientific data when generating the estimates used in the offset calculator, along with the conservative approach used when selecting all estimates from within their ranges of possible values, it is highly unlikely that the raw gains calculated overestimate the real gains for Koalas that will arise through the South Galilee Biodiversity Offsets Plan. For this reason, confidence in the result is estimated to be at least 90% in the offset calculator.

5.3.7 Offset Assessment

The *Offset Assessment Guide* has been developed by the federal government to estimate impacts and offsets for threatened species and ecological communities using a balance sheet approach. The South Galilee Biodiversity Offsets Plan has three major benefits for the Koala:

- increased protection for existing high- and medium-value habitats
- improvement of existing medium-value habitat through improved connectivity as a result of regeneration within cleared areas (time frame: 15 years)
- conversion of non-remnant pastures to medium-value habitat (time frame: 15 years).

Each of the above gains is assessed separately using the *Offset Assessment Guide*, and summed to calculate an overall gain of the South Galilee Biodiversity Offsets Plan to the Koala (**Table 18**). Overall, the expected gains of the offsets plan are 306.2% of the expected impacts of the SGCP, giving a substantial net gain for the species.

Table 18 Offset assessment guide for the Koala

								Raw Gain	Confidence in Result	Adjusted Gain	Net Present Value (adjusted ha)	% OF IMPACT OFFSET	
Impact Calculator	Area of high-value habitat	1.34 Area (ha)	Offset Calculator	Benefit 1: Protection and improvement of existing high-value habitat	20 Time over which loss is averted	109.21 Start area (ha)	2 Risk of loss (%) without offset	1 Risk of loss (%) with offset	1.09	90	0.98	10.29	1.77
		9 Quality (score 0-10)					107.0 Future area without offset (adjusted ha)	108.1 Future area with offset (adjusted ha)					
		1.21 Total impact (adjusted ha)			15 Time until ecological benefit	9 Start quality (score 0-10)	9 Future quality without offset (score 0-10)	10 Future quality of offset (score 0-10)	1	90	0.9		
	Area of medium-value habitat	444.27 Area (ha)		Benefit 2: Protection and improvement of existing medium-value habitat	20 Time over which loss is averted	847.13 Start area (ha)	6 Risk of loss (%) without offset	1 Risk of loss (%) with offset	42.36	90	38.12	91.53	15.74
		5 Quality (score 0-10)					796.3 Future area without offset (adjusted ha)	838.7 Future area with offset (adjusted ha)					
		222.14 Total impact (adjusted ha)			15 Time until ecological benefit	5 Start quality (score 0-10)	5 Future quality without offset (score 0-10)	6 Future quality of offset (score 0-10)	1	90	0.9		
	Area of low-value habitat	3,582.6 Area (ha)		Benefit 3: Restoration of non-remnant pastures to regrowth with Koala food trees	20 Time over which loss is averted	5,095.91 Start area (ha)	95 Risk of loss (%) without offset	1 Risk of loss (%) with offset	4,789.97	90	4,310.97	1,679.09	288.70
		1 Quality (score 0-10)					254.8 Future area without offset (adjusted ha)	5,044.8 Future area with offset (adjusted ha)					
		358.26 Total impact (adjusted ha)			15 Time until ecological benefit	1 Start quality (score 0-10)	3 Future quality without offset (score 0-10)	4 Future quality of offset (score 0-10)	1	90	0.9		
	Total												306.21

5.4 RAINBOW BEE-EATER

5.4.1 Description

The Rainbow Bee-eater (*Merops ornatus*) is a migratory bird protected under the Japan-Australia Migratory Bird Agreement, and is therefore a matter of national environmental significance under the *Environment Protection and Biodiversity Conservation Act*. This species is common and widespread across Australia, utilising most habitats except extensive rainforests and treeless plains (Department of the Environment 2013c). Rainbow Bee-eaters feed almost exclusively on flying insects, which they catch by sallying from exposed perches on trees and shrubs. All vegetation types within the SGCP area provide potential foraging habitat for the species, although the value of non-remnant pastures is low due to the general lack of perches.

Rainbow Bee-eaters nest in burrows dug into sandy substrates, especially in banks. Disturbed sites such as roadside cuttings, quarries, gravel pits and mines are readily utilised as breeding habitat by the species (Department of the Environment 2013c). The species also nests in sandy woodlands (land zones 3 and 5) in the absence of banks, where burrows are constructed into level ground.

5.4.2 Residual Impacts of the South Galilee Coal Projects

The primary impact of the SGCP on the Rainbow Bee-eater is through the clearing of potential foraging and breeding habitat. It was conservatively assumed that all remnant vegetation growing on sandy substrates (land zones 3 and 5) constitutes potential breeding habitat for the species. While a large number of new breeding sites (soil stock-piles, roadside cuttings and other banks) will be created by the SGCP, their future usage by Rainbow Bee-eaters is unknown. Consequently, these potential benefits of the project are not included when calculating net impacts of the project.

All wooded habitats in land zones other than 3 and 5 are assumed to be high-value foraging habitat for the Rainbow Bee-eater. A lack of perches in non-remnant pastures means that the value of this foraging habitat is minimal.

Unlike the other matters of national significance assessed above, habitat values for Rainbow Bee-eaters were not possible to calculate based on BioCondition data. This is because all variables included in BioCondition assessments (see **Table 8**) are largely irrelevant to the species. Breeding habitats were assigned a value of 90/100 and high-value foraging habitats were assigned a value of 50/100 (**Table 19**). While these values were arbitrary, the same values were applied to habitats in offset and impact areas. The similarity of vegetation within the offset and impact areas (see **Section 4.6**) implies that this is a valid approach.

Table 19 Rainbow Bee-eater habitats to be removed by the SGCP

Habitat Type	Description	Area to be Cleared	Area Subject to Subsidence	Habitat Value
Breeding habitat	All remnant vegetation in land zones 3 and 5	770.61 ha	992.45 ha	90
High-value feeding habitat	All remnant vegetation in other land zones	30.12 ha	87.75 ha	50
Low-value feeding habitat	Non-remnant pastures	6,369.66 ha	5,150.11 ha	10

5.4.3 Proposed Offsets

The offset area contains a combination of breeding habitat, and low- and high-quality feeding habitats for the Rainbow Bee-eater (**Table 20**). The South Galilee Biodiversity Offsets Plan will have two benefits for the species:

- Improved protection of breeding habitats and high-value feeding habitats; and
- Creation of new breeding habitats and high-value feeding habitats from low-value feeding habitats.

Table 20 Rainbow Bee-eater habitats currently contained within the offset area

Habitat Type	Description	Area Contained in Offsets	Current Habitat Value
Breeding habitat	All remnant vegetation in land zone 3 and 5	4,430.64	90
High-value feeding habitat	All remnant vegetation in other land zones	3,585.73	50
Low-value feeding habitat	Non-remnant pastures in land zones 3 and 5	13,013.57	10
	Non-remnant pastures in other land zones	791.35	

5.4.4 Risk of Loss without Offsets

To assess the future risk of loss of habitat within the SGCP offset area in the absence of additional protection, current land-clearing rates were calculated for each land zone across the Brigalow Belt and Desert Uplands bioregions (data from Accad *et al.* 2012). The risk of clearing to remnant vegetation within the SGCP offset area was estimated by calculating the mean clearing rate across all land zones contained within the offset area, weighted by the relative amount of each land zone (refer to **Table 14**). Based on the most recent (2009) rates of clearing, the annual risk that breeding habitat within the offset area will be lost is 0.056%. This gives a risk of loss over 20 years of 1.12%. The annual risk that high-value feeding habitat will be lost is calculated to be 0.033%, giving a risk of loss over 20 years of 0.66%. Based on 2009 data, risk of loss of breeding and high-value feeding habitats within National Parks and Conservation Reserves is 0%.

The above calculations assume that current clearing rates are indicative of those over the next 20 years, which assumes that the level of vegetation protection will remain constant over this time. Due to the recent relaxation in land-clearing laws in Queensland (as of May 2013), risk of loss based on 2009 data is likely to underestimate the true risk. The return of future clearing rates to levels experienced prior to the introduction of the *Vegetation Management and Other Legislation Amendment Bill 2004 (Qld)* is unlikely, but can be considered as an upper limit of risk of loss. Based on clearing rates between 2000 and 2005 (Accad *et al.* 2012), the risk that remnant vegetation within the SGCP offset area will be lost over 20 years is 18.8% for breeding habitat and 8.8% for foraging habitats. For the purposes of the offset calculator, a conservative risk at the lower end of the range between 2009 and 2005 values, but twice the 2009 clearing levels (i.e., 2.24% risk of loss of breeding habitat), was chosen.

Young regrowth is not protected under any law. Non-remnant vegetation within the SGCP area is regularly re-cleared to maintain pastures, and a lack of regrowth older than 15 years implies that this re-clearing is frequent. This also implies that non-remnant areas within the SGCP offset area would almost certainly be re-cleared within the next 20 years. A risk of loss to non-remnant (marginal) habitats without intervention is estimated to be 95% in the offset calculator.

5.4.5 Time until Environmental Gains are Realised

Rainbow Bee-eaters readily utilise open habitats such as heathlands, vine thickets, mallee shrublands and coastal sand dunes for feeding and breeding (Department of the Environment 2013c), and are therefore not dependent on large trees, or a high density of trees. Consequently, the development of suitable perches in regrowth is likely to be fast. Based on data from elsewhere in drier regions of northern Australia, it is estimated that woody plants will develop a structure comparable to the aforementioned habitat types (e.g., reach of height of 5-7m) at 7-11 years of age (Brady and Noske 2009; Back *et al.* 2009b). Assuming that regrowth is already five years old, this will occur in 2-6 years.

However, while habitats will become available in this short time period, this is likely to occur even in the absence of offsets. The true gains of the offset are realised only after the time when the pastures would have otherwise been re-cleared of woody vegetation. It is estimated that this would have been likely within 10 years, as after regrowth becomes 15-years-old, it qualifies as high-value regrowth, protected to some extent under the *Vegetation Management Act*. Therefore, land managers seeking to maintain open pastures for grazing should undertake clearing prior to regrowth reaching this age.

5.4.6 Confidence in Result

Given the generalist habitat requirements of Rainbow Bee-eaters, and the known ability of local woody vegetation to regrow when left uncleared, there is very low risk of the offset not achieving its predicted outcomes.

5.4.7 Offset Assessment

The *Offset Assessment Guide* has been developed by the federal government to estimate impacts and offsets for threatened species and ecological communities using a balance sheet approach. The South Galilee Biodiversity Offsets Plan has three major benefits for the Rainbow Bee-eater:

- Increased protection for existing breeding habitats;
- Conversion of non-remnant pastures on land zones 3 and 5 to breeding habitat; and
- Conversion of non-remnant pastures on other land zones to high-quality feeding habitat.

Note that increased protection of high-quality feeding habitats is not included as a benefit in the assessment, as current clearing rates in these land zones are approximately 1.5% over 20 years, which is close to the low limit assumed for conservation estates. This suggests a negligible benefit of increased protection of these remnant habitats.

Each of the above gains is assessed separately using the *Offset Assessment Guide*, and summed to calculate an overall gain of the South Galilee Biodiversity Offsets Plan to the Rainbow Bee-eater (**Table 21**). Overall, the expected gains of the offsets plan are 360.2% of the expected impacts of the SGCP, giving a substantial net gain for the species. This gain is likely to be highly conservative, as it ignores the potential benefits to the species associated with the creation of new breeding sites where earth works are carried out, as well as the likely benefits of protecting all vegetation overlying underground mining.

Table 21 Offset assessment guide for the Rainbow Bee-eater

Impact Calculator									Raw Gain	Confidence in Result	Adjusted Gain	Net Present Value (adjusted ha)	% OF IMPACT OFFSET	
Area of breeding habitat	1,763.06 Area (ha)	9 Quality (score 0-10)	1,586.75 Total impact (adjusted ha)	Benefit 1: Protection of existing breeding habitat	20 Time over which loss is averted	4,430.64 Start area (ha)	2 Risk of loss (%) without offset	1 Risk of loss (%) with offset	44.31	90	39.88	35.18	1.26	
							4,342.0 Future area without offset (adjusted ha)	4,386.3 Future area with offset (adjusted ha)						
							1 Time until ecological benefit	9 Start quality (score 0-10)	9 Future quality without offset (score 0-10)	9 Future quality of offset (score 0-10)	0	90	0	
	Area of high-value feeding habitat	117.87 Area (ha)	5 Quality (score 0-10)	58.94 Total impact (adjusted ha)	Benefit 2: Conversion of low-quality feeding habitat to breeding habitat	20 Time over which loss is averted	13,013.57 Start area (ha)	95 Risk of loss (%) without offset	1 Risk of loss (%) with offset	12,232.76	90	11,009.48	9,712.43	347.16
								650.7 Future area without offset (adjusted ha)	12,883.4 Future area with offset (adjusted ha)					
								10 Time until ecological benefit	1 Start quality (score 0-10)	9 Future quality without offset (score 0-10)	9 Future quality of offset (score 0-10)	0	90	0
	Area of low-value feeding habitat	11,519.77 Area (ha)	1 Quality (score 0-10)	1,151.98 Total impact (adjusted ha)	Benefit 3: Conversion of low-quality feeding habitat to high-quality feeding habitat	20 Time over which loss is averted	791.35 Start area (ha)	95 Risk of loss (%) without offset	1 Risk of loss (%) with offset	743.87	90	669.48	328.12	11.73
								39.6 Future area without offset (adjusted ha)	783.4 Future area with offset (adjusted ha)					
		10 Time until ecological benefit	1 Start quality (score 0-10)	5 Future quality without offset (score 0-10)		5 Future quality of offset (score 0-10)	0	90	0					
Total													360.15	

*Because the Rainbow Bee-eater is not a threatened species, an arbitrary annual probability of extinction was selected for the purposes of the offset assessment. A value half that of Vulnerable species was selected (0.1%), which is likely to be a highly conservative value given the wide geographic range and abundance of Rainbow Bee-eaters.

5.5 EASTERN GREAT EGRET

5.5.1 Description

The Eastern Great Egret (*Ardea modesta*) is a common waterbird that is found throughout Australia (Department of the Environment 2013d). It was formerly considered a subspecies of the cosmopolitan Great Egret (*Ardea alba*), but has recently been elevated to full species status. Eastern Great Egrets are listed under the Japan-Australia Migratory Bird Agreement, the China-Australia Migratory Bird Agreement and the Bonn Convention on Migratory Species. As such, it is a migratory species protected under the *Environment Protection and Biodiversity Conservation Act*.

Eastern Great Egrets breed in large colonies on extensive wetland areas in coastal Northern Territory, the Channel Country and in the Murray-Darling Basin, with smaller colonies in scattered wetlands across the northern and eastern coasts of Australia (Department of the Environment 2013d). Breeding is highly dependent on rainfall (Geering 1993), and when not breeding the species disperses across Australia in search of smaller water bodies around which to forage. The species has undergone declines in the Murray-Darling Basin, where water extraction and long-term drought have reduced the amount of habitat available (Department of the Environment 2013d). In Western Australia, the species' population has recently expanded, and the conservation status of the total Australian population is of Least Concern (Department of the Environment 2013d).

When not breeding, Eastern Great Egrets inhabit any fresh or saline water bodies in which prey is located, including ephemeral pools and farm dams (Department of the Environment 2013d). Eastern Great Egrets forage in shallow water around the margins of water bodies, where they feed primarily on fish (Taylor and Schultz 2008). The closely related Great Egret also includes insects and crustaceans in their diet (Figueroa and Stappung 2003; Pretelli *et al.* 2012), and these are likely to also be eaten by the Eastern Great Egret.

5.5.2 Residual Impacts of the South Galilee Coal Projects

Ecological surveys revealed Eastern Great Egrets to be occasional non-breeding visitors to the SGCP area (see draft EIS). Any water bodies provide potential habitat for the species, especially those containing fish. Estimating the extent and value of habitat on-site is made difficult by the ephemeral nature of most of this habitat. Habitat is most widespread on-site during limited periods following heavy rain (usually between November-April), which coincides with when the species is likely to be breeding elsewhere (Department of the Environment 2013d) and when foraging habitat is not limiting in the region. Consequently, when estimating the extent of habitat impacted by the SGCP, it is appropriate to consider only permanent and semi-permanent water bodies, which provide foraging habitat during the dry season.

Based on aquatic surveys by ALS (2011), water bodies considered potential habitat for Eastern Great Egrets were 3rd order streams (lower reaches of Tallarenha and Sapling Creeks), Alpha Creek, and farm dams. All of these contain fish and macroinvertebrates, and all contain at least some pools of water into the dry season (ALS 2011). Of these, only habitat at farm dams will be removed by the SGCP.

Based on the above, the total loss of foraging habitat for Eastern Great Egrets is approximately 4.6 km of shoreline. This small, scattered farm dam habitat is awarded an arbitrary habitat value of 3/10 for the offset assessment.

5.5.3 Proposed Offsets

The main benefits of the South Galilee Biodiversity Offsets Plan for the Eastern Great Egret are through the exclusion of cattle from riparian areas. All riparian zones within the offset area are currently exposed to high grazing and trampling pressure from cattle, which increases siltation of creeks and removes semi-aquatic vegetation growing along shorelines.

No studies have specifically examined the effect of grazing on the Eastern Great Egret, although other heron species prefer undisturbed riparian habitats over grazed ones (Popotnik and Giuliano 2000). There are also several reasons to expect that food supply and habitat quality for Eastern Great Egrets

is reduced through grazing. Grazing by domestic livestock removes and degrades riparian vegetation (Robertson and Rowling 2000; Burger *et al.* 2010), reduces water quality (Belsky *et al.* 1999; Schmutzer *et al.* 2008; Wilcock *et al.* 2013), leads to loss of waterholes through siltation, reduces the structural complexity of streams important for fauna habitats (Robertson and Rowling 2000), leads to a reduced diversity of aquatic vegetation (Jansen and Healey 2003), and reduces the diversity and biomass of fish, frogs and crustaceans (Belsky *et al.* 1999; Howell 2001; Jansen and Healey 2003; March and Robson 2006; Schmutzer *et al.* 2008). Many of these deleterious effects can be reversed through the exclusion of livestock from riparian areas (Burger *et al.* 2010; Wilcock *et al.* 2013).

The amount of habitat currently contained within the offset area (estimated by length of shoreline) is 15.61 km. Because the offset area contains higher order streams (e.g., Alpha Creek, which makes up 76% of the total shoreline within the offset area) than the impact area, the habitat value of these for Eastern Great Egrets is expected to be higher. To what extent this habitat value is superior is unknown, so for the purposes of the offset assessment, offset areas were conservatively awarded the minimum possible value greater than that of impact areas (i.e., 1/10 higher).

Similarly, because the degree to which habitat is improved by excluding cattle is unknown, this gain was conservatively awarded the minimum possible value (an increase by 1/10).

5.5.4 Risk of Loss without Offsets

The risk of loss without offsets is difficult to predict as there are no data on which this may be based. As most of the water bodies on-site are used as stock watering points, it is highly unlikely that they would have been removed.

However, the activity of cattle around water bodies tends to damage the edges and leads to increased siltation of these bodies. This, in combination with drinking by livestock (Ridoutt *et al.* 2012), may reduce the size of the water bodies during dry periods. Ongoing grazing is likely to further diminish the quality of streams and other water bodies for fish and other prey items, although the degree to which this deterioration will affect habitat for Eastern Great Egrets is unknown. This future loss of habitat value without offsets was conservatively awarded the minimum possible value (a decrease by 1/10).

5.5.5 Time until Environmental Gains are Realised

The time until environmental gains are achieved depends on the speed of recovery of riparian vegetation and water quality after cattle are removed. Studies suggest that most water quality values respond within five years of excluding livestock (Wilcock *et al.* 2013). All the water bodies within the offset area currently contain fish and macroinvertebrates, so there is no lag expected due to colonisation by these potential prey items. Fish and macroinvertebrates also have short generation times and large potential for population growth (Forsyth *et al.* 2013). This implies that they would respond quickly to improvements in habitat quality.

5.5.6 Confidence in Result

Because there are no specific data on the benefits to the Eastern Great Egret of restoration of riparian and wetland edges, it is difficult to predict with confidence the overall gains of the offsets. Likewise, it is expected that new habitats may be created through mine-induced subsidence, but the extent and value of these habitats is largely unpredictable. To minimise the risk of overestimating the predicted gains of offsets, these gains were always awarded minimum values in the offset assessment. Nevertheless, there is a possibility that even these minimum values (usually 1/10) overestimate the gains, and therefore a lower confidence in result (i.e., 50%) was used for the Eastern Great Egret than for the other matters assessed.

5.5.7 Offset Assessment

The overall impact of the SGCP on the Eastern Great Egret is negligible, with only one or two individuals expected on-site at any one time, and no breeding expected within the region. The *Offset Assessment Guide* has been developed by the federal government to estimate impacts and offsets for threatened species and ecological communities using a balance sheet approach. By applying this guide

to the information summarised above, it is estimated that the offsets will lead to a net gain for the Eastern Great Egret of 133.7% (**Table 22**).

Table 22 Offset assessment guide for the Eastern Great Egret

Impact Calculator		Area of dry season habitat		4.6		Offset Calculator*		Restoration of riparian and aquatic habitats through livestock exclusion		20		15.61		1		1		Raw Gain	Confidence in Result	Adjusted Gain	Net Present Value (adjusted ha)	133.71	Total	133.71	
		Area (km shoreline)		3						Time over which loss is averted		Start area (km shoreline)		Risk of loss (%) without offset		Risk of loss (%) with offset									
		Total impact (adjusted km)		1.38						5		4		3		5									2

*Because the Eastern Great Egret is not a threatened species, an arbitrary annual probability of extinction was selected for the purposes of the offset assessment. A value half that of Vulnerable species was selected (0.1%), which is likely to be a highly conservative value given the wide geographic range and abundance of Eastern Great Egrets.

5.6 SUMMARY

The net benefits of the South Galilee Biodiversity Offsets Plan to five matters of national environmental significance were assessed using the *Offset Assessment Guide*, a balance sheet tool developed by the federal government. These matters were:

- the Endangered Brigalow ecological community
- the Vulnerable Koala
- the previously Vulnerable Brigalow Scaly-foot
- the migratory Rainbow Bee-eater
- the migratory Eastern Great Egret.

The estimated benefits of the offsets for all of these matters of national environmental significance exceed expected losses incurred due to the SGCP. All offsets are direct and land-based, the option preferred in the *EPBC Act Environmental Offsets Policy*. All estimated gains have been calculated using best available scientific data, combined with careful consideration of risk of failure. Where uncertainty existed, the most conservative values were always selected to avoid the risk of overestimating net gains. As such, the estimated gains should be considered worst-case scenarios.

The protected matters assessed utilise a wide range of different habitats on-site, and some generalist species (e.g., the Brigalow Scaly-foot and Rainbow Bee-eater) utilise all remnant and non-remnant vegetation to some extent. This means that the offsets proposed will not only benefit the species and ecological communities assessed, but will benefit most other species as well. Likewise, the increased area, connectivity and quality of habitats on-site will deliver net benefits to a range of matters of national environmental significance that have not been recorded on-site, but which have the potential to occur there (e.g., the Black-throated Finch [*Poephila cincta cincta*], Squatter Pigeon [*Geophaps scripta scripta*], Ornamental Snake [*Denisonia maculata*], Yakka Skink [*Egernia rugosa*], Dunmall's Snake [*Furina dunmalli*]) (**Table 23**).

Table 23 Offsets for matters of national environmental significance that potentially occur within the SGCP area

Species	Scientific Name	EPBC Status*	Description of high-quality habitat (HQH)	Area of HQH Impacted		Area of HQH Offset		% of impact offset**	
				To be cleared (ha)	Possible subsidence (ha)	HQH in offset (ha)	New HQH to be created (ha)	worst case†	best case†
Black-throated Finch	<i>Poephila cincta cincta</i>	E	Remnant eucalypt-dominated vegetation within 1 km of semi-permanent water	144.39	226.22	950.42	3,404.07	340.0%	872.7%
Squatter Pigeon	<i>Geophaps scripta scripta</i>	V	Remnant vegetation within 3km of semi-permanent water	592.68	1,080.19	5,922.48	11,422.08	365.2%	1,030.7%
Ornamental Snake	<i>Denisonia maculata</i>	V	Seasonally inundated, clay soils (regional ecosystems 10.3.3b, 11.3.1 and 11.4.8)	25.54	1.92	187.29	975.48	2540.9%	2731.9%
Yakka Skink	<i>Egernia rugosa</i>	V	All remnant vegetation	800.73	1,080.19	8,016.41	13,837.32	152.9%	285.8%
Dunmall's Snake	<i>Furina dunmalli</i>	V	All remnant vegetation	800.73	1,080.19	8,016.41	13,837.32	152.9%	285.8%

*Status under the *Environment Protection and Biodiversity Conservation Act 1999*. E = Endangered, V = Vulnerable.

Percentage of impact offset was calculated using the EPBC Offset Assessment Guide. Values used were tailored to each species, using similar rationale as that adopted throughout the rest of **Section 5.

†Worst case = all habitats overlying underground mining are removed by the SGCP; best case = no vegetation above underground mining will be impacted.

6 OFFSETS FOR THE EPSILON PROJECT

The South Galilee Coal Project will be carried out in stages, the first of which is the Epsilon Project. Likewise, biodiversity offsets will be delivered in phases to compensate for environmental impacts of each mining stage. **Sections 3 to 5** of this South Galilee Biodiversity Offsets Plan demonstrate how offsets for the final SGCP comply with state and federal policies. However, it must also be demonstrated that offsets delivered at earlier phases are appropriate to the level of ecological impacts incurred at such times.

The ecological footprint of the Epsilon Project is 17.4% of the total footprint for the SGCP, while the offsets to be delivered alongside the Epsilon Project constitute 64.3% of the offsets for the SGCP (see **Table 3**). This alone suggests that the offsets to be delivered alongside the Epsilon Project are likely to comply with state and federal offset policies. However, the appropriateness of an offset depends not only on total area, but on the habitats and vegetation communities contained within it. The following sections directly assess appropriateness of phase one offsets for the Epsilon Project.

6.1 DESCRIPTION OF EPSILON OFFSETS

Offsets to be delivered prior to the commencement of the Epsilon Project are a subset of the total offset package for the SGCP. These will be managed as described in **Sections 2.4 to 2.6** of this Offsets Plan.

Epsilon offsets are those contained within the rural properties Creek Farm and Sapling. The vegetation contained within these offsets is compared with that impacted by the Epsilon Project in **Table 24**. As there will be no underground mining as part of the Epsilon Project, all impacts are through clearing of surface vegetation.

Table 24 Regional ecosystems contained within the impact and offset areas for the Epsilon Project.

Regional Ecosystem	Description	Impact area (ha)	Offset area (ha)
10.3.3b	<i>Acacia harpophylla</i> and/or <i>Eucalyptus cambageana</i> woodland in frequently inundated areas.	4.46	15.34
10.3.12a	<i>Corymbia plena</i> and <i>Corymbia dallachiana</i> open woodland on sandy alluvial terraces.	0	10.83
10.3.14d	<i>Eucalyptus camaldulensis</i> woodland fringing watercourses.	0	5.67
10.3.27a	<i>Eucalyptus populnea</i> woodland on alluvial plains.	5.73	342.48
10.3.28a	<i>Eucalyptus melanophloia</i> woodland on alluvial fans.	17.92	141.00
10.5.1b	<i>Corymbia brachycarpa</i> , <i>Corymbia similis</i> and <i>Corymbia dallachiana</i> open woodland on sand plains.	16.41	125.21
10.5.5a	<i>Eucalyptus melanophloia</i> open woodland on sand plains.	75.04	1,222.59
10.5.10	<i>Corymbia leichhardtii</i> open woodland on sand plains.	0	21.10
10.5.12	<i>Eucalyptus populnea</i> open woodland on sand plains.	2.14	128.32
10.7.3	<i>Acacia shirleyi</i> woodland at margins of plateaus.	0	119.48
10.7.5	<i>Eucalyptus thozetiana</i> open woodland on scarps.	0	7.02
10.7.7b	<i>Melaleuca tamariscina</i> open shrubland on ferricrete.	4.22	91.88
11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains.	0	109.41
11.3.19	<i>Callitris glaucophylla</i> , <i>Corymbia</i> spp. and <i>Eucalyptus melanophloia</i> on alluvial plains.	0	208.16
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains.	0	226.93
11.3.6	<i>Eucalyptus melanophloia</i> woodland on alluvial plains.	0	119.81
11.3.7	<i>Corymbia</i> spp. woodland on alluvial plains.	0	56.62

11.3.25	<i>Eucalyptus camaldulensis</i> woodland fringing watercourses.	0	103.54
11.4.8	<i>Acacia harpophylla</i> and <i>Eucalyptus cambageana</i> woodland on clay plains.	0	27.99
11.5.3	<i>Eucalyptus populnea</i> and/or <i>Eucalyptus melanophloia</i> on sand plains.	0	62.79
11.5.5	<i>Eucalyptus melanophloia</i> and <i>Callitris glaucophylla</i> on sand plains.	0.71	223.12
11.5.12	<i>Corymbia clarksoniana</i> woodland on sand plains.	0.94	6.93
11.7.1	<i>Acacia harpophylla</i> and <i>Eucalyptus thozetiana</i> on lower scarp slopes.	0	80.06
11.7.2	<i>Acacia shirleyi</i> forest/woodland on lateritic duricrust.	0	131.64
11.10.4	<i>Eucalyptus decorticans</i> , <i>Lysicarpus angustifolius</i> woodland on sandstone.	0	157.49
11.10.7	<i>Eucalyptus crebra</i> woodland on sandstone.	0	297.04
11.10.13b	<i>Corymbia leichhardtii</i> woodland on sandstone.	0	278.42
Non-remnant pastures		1,879.18	9,721.92
Total		2,006.74	14,042.79

6.2 COMPLIANCE WITH THE GALILEE BASIN OFFSET STRATEGY

No conservation hubs, or other areas identified within the strategic footprint of the Galilee Basin Offset Strategy will be impacted by the Epsilon Project.

Offsets for the Epsilon Project are connected to a recognised key north-south linkage corridor (conservation priority two). By expanding the total area of this corridor, and linking it to vegetation along Alpha Creek, the value of this high-priority corridor will be enhanced.

6.3 COMPLIANCE WITH THE QUEENSLAND BIODIVERSITY OFFSET POLICY

All matters to be impacted by the Epsilon Project are appropriately offset prior to commencement of this phase of the SGCP (**Table 25**). A number of values that will not be impacted by the Epsilon Project, but will be impacted during the main phase of the SGCP, will be offset at this earlier time. This ensures that the time between impact and offset delivery is minimised, and overall benefits to each significant value are enhanced.

Table 25 Offsets for State-significant values impacted by the Epsilon Project

State Values	Impacts	Offsets
Endangered Regional Ecosystems	None.	137.4 ha of Res 11.3.1 and 11.4.8 will be protected within the offset area. 704.9 additional hectares will be restored from non-remnant pasture.
Of Concern Regional Ecosystems	None.	226.9 ha of RE 11.3.2 will be protected within the offset area. 1,639.7 additional hectares will be restored from non-remnant pasture.
Watercourses	1.3 km of ephemeral (1st-3rd order) drainage lines will be removed.	52.2 km of ephemeral (1st-3rd order) drainage lines are contained within the Epsilon offset area, and will be protected from livestock. 6.81 km of Alpha Creek will also be protected within the offset area. 19.5 km of watercourses that currently lack protective vegetation will be allowed to regrow.
Habitat Connectivity	State-significant wildlife corridors will be reduced by 92.4 ha.	2,468.4 ha of State-significant corridors and 622.5 ha of regionally significant corridors will be protected within the offset area. The corridor will be enlarged by 13,577.7 ha through the restoration of cleared pastures.

Vulnerable Species	127.6 ha of high-value habitat for the Brigalow Scaly-foot and 751.8 ha of low-value habitat will be removed.	4,320.87 ha of high-value habitat for the Brigalow Scaly-foot will be protected within the offset area. 9,721.92 ha of low-value habitat will be restored to high-value habitat.
Near Threatened Species	4.2 ha of habitat for <i>Micromyrtus rotundifolia</i> will be removed.	621.41 ha of habitat for <i>M. rotundifolia</i> will be protected in the offset area, including all local populations of the species.
	123.3 ha of high-value habitat for <i>Desmodium macrocarpum</i> will be removed. 1,883.4 ha of low-value habitat will be removed.	3,129.86 ha of high-value habitat for <i>D. macrocarpum</i> will be protected within the offset area. 10,912.93 ha of low-value habitat will also be protected, and 9,179.29 ha of this will be restored to high-value habitat.
	118.89 ha of habitat for the Little Pied Bat will be removed.	3,868.47 ha of habitat for the Little Pied Bat will be protected within the offset area. 9,721.92 ha of additional foraging habitat will be created.
	127.6 ha of habitat for the Square-tailed Kite will be removed.	4,320.87 ha of habitat for the Square-tailed Kite will be protected and 9,721.92 ha of new habitat will be restored.

6.4 COMPLIANCE WITH THE EPBC ACT 1999 ENVIRONMENTAL OFFSETS POLICY

The *Offset Assessment Guide* was reapplied to each matter of national environmental significance (MNES) to determine whether the offsets to be delivered as part of the Epsilon Project stage are appropriate for the impacts incurred in this stage.

The same values used in **Section 5** were applied, but the areas of offsets and impacts were changed in accordance with **Table 24**. The results of these assessments are presented in **Table 26**.

Table 26 Offset assessments for each MNES for the Epsilon Project

Protected Matter	Total Impact (adjusted ha)	Total Offset (adjusted ha)	% of impact offset
Brigalow threatened community	0	n/a	n/a
Brigalow Scaly-foot	879.35	4,689.33	533.3
Koala	53.84	1,322.36	2,456.1
Rainbow Bee-eater	301.09	6,913.68	2,296.2
Eastern Great Egret	0.39*	1.56*	400

*For the Eastern Great Egret, impacts and offsets are measured in kilometres of shore rather than hectares of habitat.

All matters impacted by the Epsilon Project are offset to a far greater degree than mandated by the *EPBC Act 1999 Environmental Offsets Policy*. This means that a large proportion of the total offsets will be delivered in a timely fashion; by the time the main phase of the SGCP commences, much of the offset benefits will be realised.

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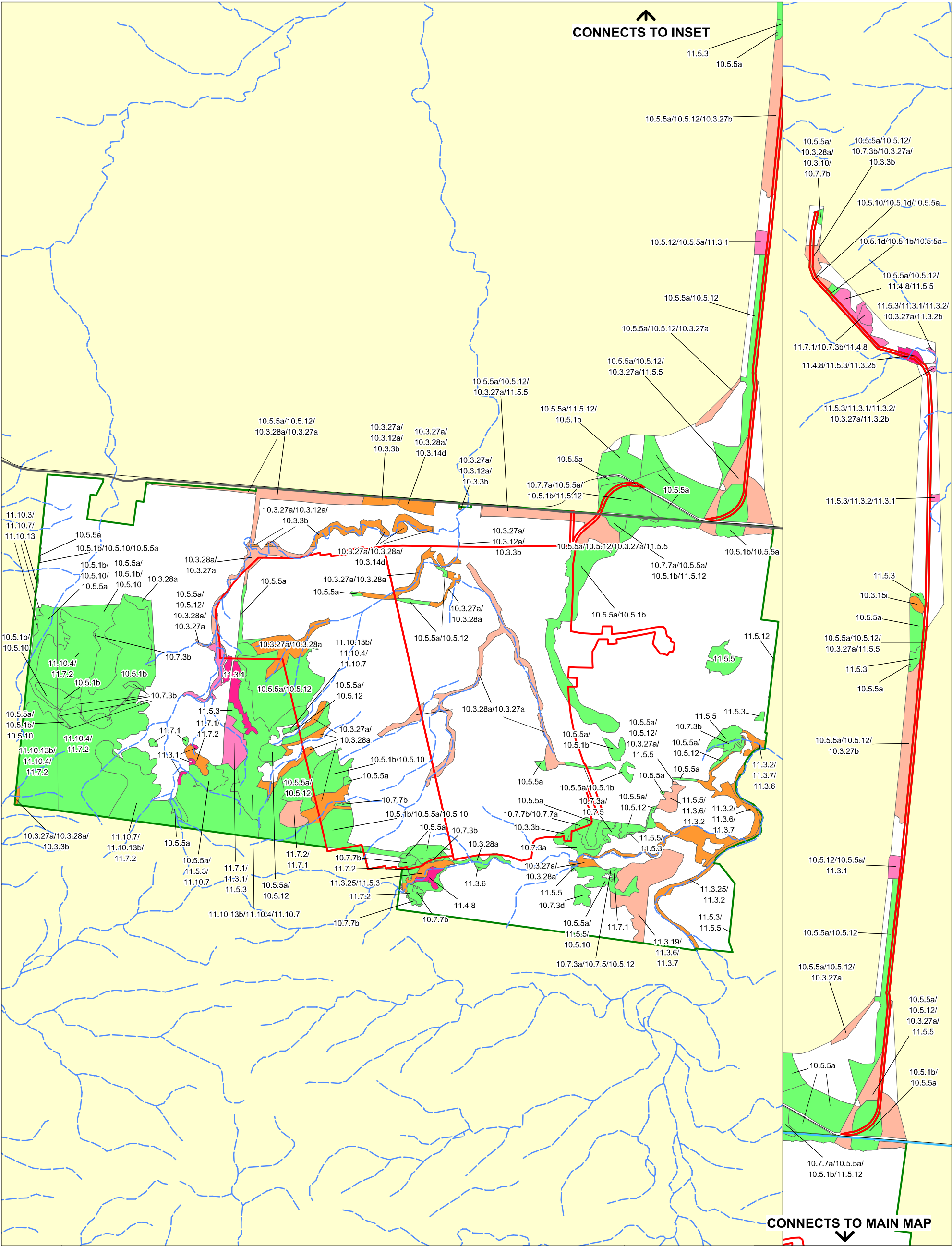
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APPENDIX A

FIELD-VERIFIED REMNANT VEGETATION MAP



Mining & Energy Technical Services Pty Ltd

SOUTH GALILEE

— Road (principal)

— Rail

— Hydrology

Impact Area

Offset Area

Remnant Vegetation
Biodiversity Status

	Endangered (dominant)
	Endangered (sub dominant)
	Of Concern (dominant)
	Of Concern (sub-dominant)
	Not of Concern
	Non-Remnant

Alpha Coal Pty Ltd

South Galilee Coal Project

Field-verified Remnant Vegetation

05

Kilometres

Scale: 1:130,000 (A3)

27/02/2014

Datum: GDA94
Projection: MGA55

APPENDIX A

Data Source: Tenement - DEEDI. Topography (250k) - Geoscience Australia. BPA (2014) - DERM.

APPENDIX B

BIOCONDITION BENCHMARKS DERIVED FROM REFERENCE SITES

Appendix B BioCondition benchmarks derived from reference sites. These were used for calculating BioCondition scores for the South Galilee Coal Project area.

Regional Ecosystem(s)	Description	Reference Sites	Mean Canopy Height (m)	Tree species richness (per 0.5 ha)	Canopy cover (%)	Large trees (per ha)	Shrub cover (%)	Coarse woody debris (m per ha)	Species richness-shrub (per 0.05 ha)	Species richness-grass (per 0.05 ha)	Species richness-forb (per 0.05 ha)	Perennial grass cover (%)	Organic litter (%)
10.3.14/11.3.25	<i>Eucalyptus camaldulensis</i> riparian forest	R4, R16	23.45	9.5	55.2	32	2.15	470	8.5	10	23	69.5	20.2
10.3.27a	<i>Eucalyptus populnea</i> on alluvial plain	R7, R14	17.55	8.5	26.7	27	6	63	13	15.5	21	47.8	42.6
10.3.28a/11.3.6	<i>Eucalyptus melanophloia</i> on sandy alluvial fan	R5, R19	13.25	7.5	45.9	22	2.15	58	8.5	11	21.5	57.9	26.5
10.5.1a	<i>Corymbia brachycarpa</i> open woodland on sand plain	R2, R18	9.2	6.5	25.8	7	23.8	356	12	6	10	9.7	31.1
10.5.4c	<i>Eucalyptus crebra</i> and <i>Corymbia brachycarpa</i> open woodland on sand plain	R3, R9	12.7	3.5	27.4	8	2.55	31	9	15	22.5	20.4	31.3
10.5.5a	<i>Eucalyptus melanophloia</i> woodland on sand plain	R6, R13	17.8	9.5	29.65	27	7.9	189.5	12.5	16	25	31.15	53.45
10.5.10	<i>Corymbia leichhardtii</i> on sand plain	R12, R17	15.25	8.5	52.65	16	11.55	234	11.5	14	25.5	27.4	61.45
10.5.12/11.5.3	<i>Eucalyptus populnea</i> on sand plain. <i>Triodia</i> usually present in understorey	R8, R20	13.6	9	25.1	13	4.2	102	12.5	15.5	21.5	26.4	42.2
10.7.3b/11.7.2	<i>Acacia shirleyi</i> woodland at margins of plateau	R10, R15	13.25	8.5	62.85	30.5	34.85	605	11	13	8.5	19.3	56.9
10.7.7b	<i>Melaleuca tamariscina</i> shrubland on ferricrete	R1, R11	4.4	5	19.15	18	6.7	36.5	12	8	22	25.3	5

APPENDIX C

BIOCONDITION SCORES FOR EACH ASSESSMENT SITE

Appendix C BioCondition scores for each assessment site

Site*	Regional ecosystem	Site-based attributes											Landscape attributes			BioCondition score	Mean score per land zone**		
		Large trees	Tree canopy height	Recruitment of canopy species	Tree canopy cover	Shrub canopy cover	Coarse woody debris	Native plant richness				Non-native plant cover	Native perennial grass cover	Litter cover	Size of patch			Connectivity	Context
								Trees	Shrubs	Forbs	Grass								
I1	10.3.27a	5	5	5	5	3	2	2.5	2.5	5	2.5	5	3	5	7	0	2	59.5	57.8
I5	10.3.28a	0	5	3	2	3	2	5	5	5	5	5	1	5	10	0	0	56	
I2	10.5.5a	5	3	5	5	3	2	2.5	2.5	5	2.5	10	1	5	7	2	2	62.5	76.2
I4	10.5.5a	5	5	5	2	3	5	0	2.5	5	2.5	10	1	5	10	0	2	63	
I7	10.5.12	15	5	5	3	5	5	2.5	2.5	5	2.5	10	5	3	10	2	4	84.5	
I8	10.5.10	0	5	3	5	5	2	2.5	2.5	5	5	10	3	5	10	4	5	72	
I9	10.5.1b	5	5	5	5	5	2	5	5	5	5	10	1	3	10	2	5	78	
I13	10.5.5a	5	5	5	5	5	2	2.5	5	2.5	5	10	5	5	10	2	4	78	
I19	10.5.5a	5	3	5	5	3	2	5	2.5	5	2.5	10	3	5	10	0	4	70	80.5
I20	10.5.1b	15	5	5	5	5	2	5	2.5	5	5	10	3	5	10	5	5	92.5	
I18	10.5.1b	10	5	5	5	3	2	5	2.5	5	5	10	1	3	10	4	5	80.5	
I14	10.5.12	10	5	5	5	5	5	5	2.5	5	5	5	5	3	10	0	5	80.5	
I6	10.7.3b	0	5	5	5	0	2	2.5	2.5	5	5	10	1	5	10	4	5	67	74.9
I10	10.7.3b	5	3	5	5	0	5	2.5	2.5	5	2.5	10	1	5	10	5	4	70.5	
I11	10.7.7b	15	5	5	5	5	5	2.5	2.5	2.5	5	10	1	3	10	5	4	85.5	
I15	10.7.7b	5	5	3	5	3	2	5	2.5	5	5	10	5	3	10	4	4	76.5	
I3	10.5.5a nonrem	0	0	5	0	3	2	0	2.5	2.5	2.5	3	1	5	0	0	0	26.5	36.4
SITES IN IMPACT AREA																			

I12	10.5.5a nonrem	0	0	5	0	3	5	0	2.5	5	2.5	5	5	0	0	0	0	38	
I16	10.5.5a nonrem	0	0	5	0	0	5	0	0	5	2.5	10	5	0	0	0	0	37.5	
I17	10.5.5a nonrem	0	3	5	0	5	5	0	2.5	2.5	2.5	10	3	5	0	0	0	43.5	
O11	11.3.6	10	5	5	5	3	5	5	5	5	5	5	0	3	10	2	4	77	
O21	10.3.27a	5	5	3	3	5	2	2.5	2.5	2.5	5	3	1	5	10	0	4	58.5	69.3
O1	11.3.25	5	5	3	5	5	2	2.5	2.5	2.5	2.5	10	3	3	10	2	4	67	
O24	11.3.25	15	5	5	5	3	2	2.5	2.5	5	2.5	3	1	5	10	4	4	74.5	
O2	10.5.4c	15	5	5	2	5	5	5	2.5	5	2.5	10	5	5	10	5	5	92	
O7	10.5.5a	15	5	5	5	0	2	5	5	5	2.5	10	5	3	10	4	4	85.5	
O8	10.5.1b	15	5	5	5	5	5	5	2.5	5	5	10	1	5	10	0	2	85.5	
O9	10.5.5a	10	3	3	5	5	5	5	2.5	5	2.5	10	1	5	10	4	2	78	76.2
O12	10.5.1b	15	5	5	5	5	0	5	2.5	5	5	10	0	5	5	0	2	74.5	
O14	10.5.12	15	5	5	5	3	2	5	2.5	5	5	10	3	5	2	0	2	72	
O22	10.5.5a	5	5	5	5	3	2	2.5	2.5	2.5	3	3	3	5	10	0	4	60	
O23	10.5.5a	5	5	5	5	3	2	2.5	2.5	2.5	5	5	5	3	10	0	4	62	
O3	11.7.2	5	5	5	5	5	5	2.5	2.5	0	2.5	10	5	3	10	5	5	75.5	
O17	11.7.2	10	5	5	5	3	2	2.5	2.5	5	2.5	10	5	5	10	4	4	80.5	
O10	10.7.3b	10	5	3	3	5	0	2	2.5	5	2.5	10	1	5	10	5	4	75	
O13	10.7.3b	5	5	3	2	3	5	2.5	2.5	5	2.5	10	1	5	10	5	4	70.5	
O15	10.5.5a nonrem	0	3	5	0	3	5	0	2.5	2.5	2.5	10	1	5	0	0	0	42	
O19	10.5.12 nonrem	0	0	5	0	5	2	0	2.5	5	2.5	10	5	5	0	0	0	42	39
O20	10.3.28a nonrem	0	0	5	0	0	2	2.5	2.5	5	5	3	1	5	0	0	2	33	

*Sites O6, O16, O18, I21 and I22 are not assessed due to a lack of benchmarks for these regional ecosystems.

**Land zone is indicated by the second number in the regional ecosystem code. 3 = alluvial creek and river flats, 5 = old loamy and sandy plains, 7 = ironstone jump-ups. Non-remnant sites are grouped.

APPENDIX D

RAW BIOCONDITION DATA FOR EACH ASSESSMENT SITE

Appendix D Raw BioCondition data for each assessment site

Site Name	Regional ecosystem	Large Trees (per ha)	Canopy height (m)	Emergent height (m)	Subcanopy height (m)	Tree Cover (%)	Shrub cover (%)	Recruitment (%)	Tree spp.	Shrub spp.	Grass spp.	Forb spp.	Woody debris (m/ha)	Weed cover (%)	Native grass cover (%)	Litter cover (%)	Size of patch (ha)	Context (%)	Connectivity (%)
O1	11.3.25	8	21.7	n/a	n/a	41.2	2.7	50	7	4	7	13	155	1.8	46.6	41.6	>500	59.1	38.82
O2	10.5.4c	8	12.3	n/a	n/a	7.6	3	100	7	4	7	22	39	0.13	45	31.4	>500	99.4	75.58
O3	11.7.2	4	11.3	17.9	4.1	89.3	30.2	100	3	6	7	2	1166	0	58.2	20	>500	100	92.92
O6	11.3.19	16	16.3	n/a	8.6	62.4	11.4	100	6	6	13	28	58	0.06	9.4	77.2	>500	49.7	28.35
O7	10.5.5a	28	13.7	n/a	6.5	19	0.2	100	9	12	11	36	388	0.25	70	23.4	>500	55.7	59.74
O8	10.5.1b	10	12.3	18	3.4	42.1	24.9	100	10	10	16	25	305	0.25	20.8	59.6	>500	27.9	1.13
O9	10.5.5a	18	11.4	n/a	4.8	15.4	8.2	50	13	10	11	32	148	0.75	14.2	55	>500	26.6	58.35
O10	10.7.3b	28	12.7	n/a	2.8	77.1	2.6	66	4	10	9	16	1727	0.06	3.8	76.2	>500	68.4	93.20
O11	11.3.6	12	18	n/a	12	35.6	4.7	100	11	8	16	31	53	9.1	2.6	62.4	>500	30.3	23.68
O12	10.5.1b	8	11.5	n/a	8.2	31.5	25.3	100	10	10	12	23	19	0.13	2.8	53.6	34	24.7	0
O13	10.7.3b	14	10.3	13.1	n/a	20.8	4.4	50	7	3	7	14	1004	0	2.2	44.8	>500	47.8	94.17
O14	10.5.12	18	14.9	n/a	6.6	24.4	19.3	100	9	9	14	13	436	0.06	18.2	34	7	16.9	0
O15	10.5.5a nonrem	0	6.7	n/a	n/a	0	1.5	100	8	8	9	10	275	4	13.6	43.4	n/a	1.33	0
O16	11.3.1	20	13.7	n/a	n/a	53.6	17.6	100	15	4	8	17	79	11.3	6.8	61.2	>500	76	79.45
O17	11.7.2	26	9.5	13.6	n/a	52.8	12.7	100	6	8	8	10	1427	0.13	27	62.8	>500	57.6	71.98
O18	11.4.8	18	13.6	n/a	8	43.2	18.3	50	10	11	15	29	639	9	20.8	38	>500	67.1	100
O19	10.5.12 nonrem	0	1.9	n/a	n/a	0.4	6.5	100	2	11	12	24	50	2.4	70.2	23	n/a	0	0
O20	10.3.28a nonrem	0	3.3	n/a	n/a	0.4	0	100	3	3	12	23	306	42	21.8	31.2	n/a	12.3	0
O21	10.3.27a	4	12.6	n/a	n/a	18.7	16.6	66	5	10	15	18	299	31.3	16	54.6	>500	58.2	6.58
SITES IN OFFSET AREAS																			

SITES IN IMPACT AREAS		O22	10.5.5a	8	13.4	n/a	5.3	36.5	1.5	100	5	7	12	16	92	48	17.8	63	>500	56.9	6.58
		O23	10.5.5a	8	13.8	n/a	4.8	54.4	3.6	100	8	5	10	20	506	7.4	33.8	26.4	>500	54.2	7.53
		O24	11.3.25	66	33.1	n/a	n/a	83.9	0.3	100	4	6	8	25	1088	48.9	21	15	>500	47.7	55.35
		I1	10.3.27a	6	14.4	n/a	6.1	38.4	50.4	100	7	6	12	22	550	10.1	38.4	50.4	129	17.7	9.91
		I2	10.5.5a	2	11.1	n/a	5.8	21.7	3.5	100	7	7	12	25	724	2	9.4	63.4	129	13.7	19.61
		I3	10.5.5a nonrem	0	1.2	n/a	n/a	0	1.8	100	0	7	10	11	84	45	5.8	35.2	n/a	0	0
		I4	10.5.5a	2	12.7	n/a	5.8	6.8	0.8	100	2	9	14	29	105	0.13	10.6	65.2	>500	19.4	1.13
		I5	10.3.28a	0	16.6	n/a	9	14.2	48	67	7	10	12	24	456	5.8	14.2	48	221	8.33	0
		I6	10.7.3b	0	9.6	n/a	n/a	45.2	0	100	5	5	16	8	191	0.38	2.6	79.4	>500	75.1	54.34
		I7	10.5.12	18	17.3	n/a	n/a	58.2	4	100	6	9	11	23	51	1.5	67.4	13.2	>500	60.7	46.75
		I8	10.5.10	0	12.6	n/a	n/a	33.8	14.6	50	4	7	15	26	68	2	24.4	42	>500	81.3	68.02
		I9	10.5.1b	2	11.1	n/a	15.4	31.9	13.7	75	6	12	12	31	159	0	13	67.8	>500	75.3	42.24
		I10	10.7.3b	2	8	10.4	n/a	45.9	3.1	100	6	4	11	10	523	0.13	2.6	58.8	>500	65.6	92.48
		I11	10.7.7b	20	4.8	8.4	n/a	12.5	10.1	100	2	5	14	19	45	0	6.2	17.4	>500	43.8	82.35
		I12	10.5.5a nonrem	0	<1	n/a	n/a	0	2	100	0	8	12	23	184	21.8	35.2	37.4	n/a	0	0
		I13	10.5.5a	4	14.1	n/a	6.7	16.6	15.4	80	5	15	15	19	68	0.13	30.2	56.4	>500	46.9	30.91
		I14	10.5.12	8	14.9	n/a	4.8	17.7	3.8	80	12	9	16	23	172	11.4	42.4	6.4	>500	100	5.67
		I15	10.7.7b	4	5.1	9.2	2.5	22.8	16.3	50	7	7	13	24	78	0	48.4	22.6	>500	58	66.34
		I16	10.5.5a nonrem	0	2.3	n/a	n/a	0	0.3	100	2	2	10	24	176	0.25	32	62.6	n/a	0.18	0
		I17	10.5.5a nonrem	0	4.9	n/a	n/a	0.8	10.1	100	2	8	9	22	289	0	25.8	36.6	n/a	1.44	0
		I18	10.5.1b	6	8.5	n/a	4.7	14.5	11.7	100	12	8	15	21	169	1.06	16.4	70.8	369	85.2	61.21
		I19	10.5.5a	10	12.1	n/a	5	36.6	18.5	100	10	9	13	30	503	0.63	20.4	61.2	>500	57.2	2.46
		I20	10.5.1b	8	13	n/a	n/a	18.6	15.9	100	10	9	14	12	155	0.06	48	50	>500	100	78.89
		I21	11.4.8	0	10.1	n/a	4.9	2	14.4	100	5	6	13	13	84	2.6	23.6	28.2	>500	58.2	50.41
		I22	11.3.19	8	17	n/a	10.5	51.4	9.6	100	7	7	10	18	288	62.5	2.2	55.8	75	42.9	54.36

APPENDIX E

SITE PHOTOS FOR EACH BIOCONDITION SITE AND REFERENCE SITE

Appendix E1 Photos of Reference Sites



R1

10.7.7b



R2

10.5.1



R3

10.5.4c



R4

10.3.14



R5

10.3.28a



R6

10.5.5a



R7

10.3.27a



R8

10.5.12



R9

10.5.4c



R10

10.7.3b



R11

10.7.7b



R12

10.5.10



R13

10.5.5a



R14

10.3.27a



R15

10.7.3b



R16

10.3.14



R17

10.5.10



R18

10.5.1



R19

10.3.28a



R20

11.5.3

Appendix E2 Photos of BioCondition sites in impact areas



I1

10.3.27a



I2

10.5.5a



I3

non-remnant



I4

10.5.5a



I5

10.3.28a



I6

10.7.3b



I7

10.5.12



I8

10.5.10



I9

10.5.1



I10

10.7.3b



I11

10.7.7b



I12

non-remnant



I13

10.5.5a



I14



I15

10.7.7b



I16

non-remnant



I17

non-remnant



I18

10.5.1



I19

10.5.5a



I20

10.5.1



I21

11.4.8



I22

11.5.5

Appendix E3

Photos of BioCondition sites in offset areas



01

11.3.25



02

10.5.4c



03

11.7.2



06

11.3.19



07

10.5.5a



08

10.5.1



O9

10.5.5a



O10

10.7.3b



O11

11.3.6



O12

10.5.1



O13

10.7.3b



O14

10.5.12



O15 **non-remnant**



O16 **11.3.1**



O17 **11.7.2**



O18 **11.4.8**



O19 **non-remnant**



O20 **non-remnant**



O21

10.3.27a



O22

10.5.5a



O23

10.5.5a



O24

11.3.25

9.13.2 Ecological Survey

9.13.2.1 Ecological Survey Summary

Discussions re the extent of the ecological survey coverage resulted in the need to conduct additional survey to verify the findings of the EIS. The post EIS survey follows as section 9.13.2.2 and includes the area coinciding to the relocated access road and adjacent railway spur.

ACM appointed Metserve to undertake the survey and prepare the report.

The survey established that the findings presented in the EIS are applicable to the SGCP.

9.13.2.2 Ecological Summary



Supplementary Fauna Survey South Galilee Coal Project

August 2013



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1 EXECUTIVE SUMMARY

The South Galilee Coal Project (SGCP) is a new open-cut and underground mining operation proposed on Mining Lease Application (MLA) area 70453. A draft environmental impact statement (EIS) was released for public and government comment from October to December 2012. As part of this impact assessment, extensive fauna and flora surveys were undertaken across the site, over several years and under different seasonal conditions. Data on the rates at which new species were being detected suggested that these studies provide a thorough assessment of the total biodiversity occurring on-site. Nevertheless, spatial gaps in our knowledge of the fauna on-site were highlighted during the review process. Supplementary fauna surveys were undertaken in November 2012, in order to fill those gaps.

Trapping (including pitfall, funnel, and Elliot traps) was conducted at three sites in areas nominated by the Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) as requiring further sampling effort. Trap sites were located in areas of best-available habitat, or in vegetation types that were under-represented in the original surveys. Bats were surveyed using harp traps and AnaBat recordings at seven sites across the survey area. This trapping effort was complemented by targeted searches throughout the survey area (day and night), which focused on habitats of highest quality for threatened species, or habitats poorly represented among, trap sites.

Overall, the habitats and species communities contained within the spatial gaps surveyed corresponded closely to predictions made in the draft EIS, based on data from elsewhere in the SGCP area. Of 154 species of fauna recorded during the 2012 survey, ten (6.5%) had not been recorded previously from the SGCP area, and only two (1.3%) of these were new records for the Alpha region. All new species recorded are common and widespread, and none are listed as threatened or Near Threatened under the *Nature Conservation Act 1992 (NC Act)* or the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.

The following three species of conservation significance were recorded during the 2012 survey: the Near Threatened (*NC Act*) Little Pied Bat (*Chalinolobus picatus*), and the migratory (*EPBC Act*) Rainbow Bee-eater (*Merops ornatus*) and Eastern Great Egret (*Ardea modesta*). All three were recorded during previous surveys of the SGCP area, and were assumed to occur within the surveyed spatial gaps in the draft EIS.

The 2012 supplementary survey recorded eight regionally significant species (priority taxa listed within *Biodiversity Assessment Mapping Methodology*). All are common and widespread species, known to inhabit the SGCP from previous surveys.

Overall, none of the ecological values recorded during the supplementary survey were not previously known from the SGCP area. Because impacts of the SGCP on these values are addressed and managed within the draft EIS, no additional assessments or management measures are required.

2 BACKGROUND

2.1 SOUTH GALILEE COAL PROJECT

The South Galilee Coal Project (SGCP) is a proposed new open-cut and underground coal mining operation, located approximately 12 km southwest of the township of Alpha in central Queensland. The SGCP is managed by AMCI (Alpha) Pty Ltd. The SGCP is located on Mining Lease Application (MLA) area 70453. It will extract and process up to 17 million tonnes per annum of product coal for the export market. Being a large-scale project, with a potential for environmental impacts, the SGCP is the subject of an Environmental Impact Assessment (EIA). To inform this assessment, a draft Environmental Impact Statement (EIS) was prepared and released for public and government review on the 20th October 2012. The consultation period closed on the 3rd December 2012. Comments arising from this review process will be addressed in a Supplementary EIS. To address some of the concerns raised during the consultation process, AMCI has contracted MET Serve to undertake supplementary fauna surveys. The findings of these surveys are presented in this technical report.

2.2 LEGISLATION

2.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* is the key piece of Commonwealth legislation to protect and manage important flora, fauna and ecological communities. The *EPBC Act* provides for the identification and management of matters of national environmental significance, including threatened flora and fauna species, ecological communities, migratory animals protected under the China-Australia Migratory Bird Agreement (CAMBA), migratory birds protected under the Japan-Australia Migratory Bird Agreement (JAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) and the Bonn Convention, wetlands of international importance (Ramsar) and critical habitat areas. Under the *EPBC Act*, an action will require approval from the Federal Environment Minister if the action has, will have, or is likely to have a significant impact on a matter of national environmental significance.

2.2.2 Environmental Protection Act 1994

The *Environmental Protection Act 1994 (EP Act)* regulates environmental management in Queensland, and aims to achieve ecologically sustainable development. The *EP Act* outlines legal obligations and the duty of care all persons have to the environment and directions for preparing environmental protection policies.

2.2.3 Land Protection (Pest and Stock Route Management) Act 2002

The *Land Protection (Pest and Stock Route Management) Act 2002 (LP Act)* imposes a legal responsibility for, and provides directives to, control of weeds and pest animals by all Queensland landholders on land under their management.

2.2.4 Nature Conservation Act 1992

The *Nature Conservation Act 1992 (NC Act)* regulates native flora, fauna and habitat conservation within Queensland.

2.2.5 Vegetation Management Act 1999

The *Vegetation Management Act 1999 (VM Act)* provides a planning framework for the management of native vegetation across Queensland. It regulates clearing of vegetation and aims to conserve Queensland's biodiversity through vegetation management.

2.3 PREVIOUS SURVEYS

As part of the EIS, extensive surveys of the terrestrial ecology of the SGCP area were undertaken. These included the following fauna surveys:

- 11-14 March 2009: Active searches for birds and other fauna during a pilot survey
- 14-19 October 2009: Trapping surveys targeting all fauna groups

- 26 April-3 May 2010: Trapping surveys targeting all fauna groups
- 18 May-1 June 2011: Trapping surveys targeting all fauna groups
- 18-21 September 2011: Active searches for birds during vegetation survey.

The total fauna survey effort carried out between 2009 and 2011 across the SGCP area is provided in **Table 1**.

Table 1 Summary of previous fauna survey effort at the SGCP

Survey method	Mar '09	Oct '09	Apr '10	May '11	Sep '11	Targeted species
Pit-fall buckets	–	150 trap-nights	150 trap-nights	180 trap-nights	-	Small snakes, skinks, geckos, legless lizards, dragons, frogs, small rodents and dasyurid mammals.
Funnel traps	–	120 trap-nights	120 trap-nights	240 trap-nights	-	As per pit-fall buckets, plus larger snakes, goannas and dragons.
Elliott traps	–	625 trap-nights	500 trap-nights	584 trap-nights	-	Small terrestrial mammals.
Harp traps	–	4 nights	4 nights	8 nights	-	Microchiropteran bats.
AnaBat detector	–	60 hours	36 hours	72 hours	-	Microchiropteran bats.
Spotlighting	–	7.5 person-hours	15 person-hours	6 person-hours	1.5 person-hours	Nocturnal reptiles, frogs, arboreal mammals, macropods and nocturnal birds.
Target searches and opportunistic sightings	40 person-hours	100 person-hours	100 person-hours	80 person-hours	80 person-hours	Birds, larger mammals, diurnal lizards, large snakes, calling frogs.

These surveys sampled all major fauna habitats present within the SGCP area and spanned several years and seasons. Based on the species accumulation curve (**Figure 1**), it is calculated that trapping successfully detected 96.5% of the species present and potentially detectable via trapping (95% confidence intervals = 92.4% - 100%). This implies that previous surveys provide a relatively thorough assessment of the fauna communities present within the SGCP area.

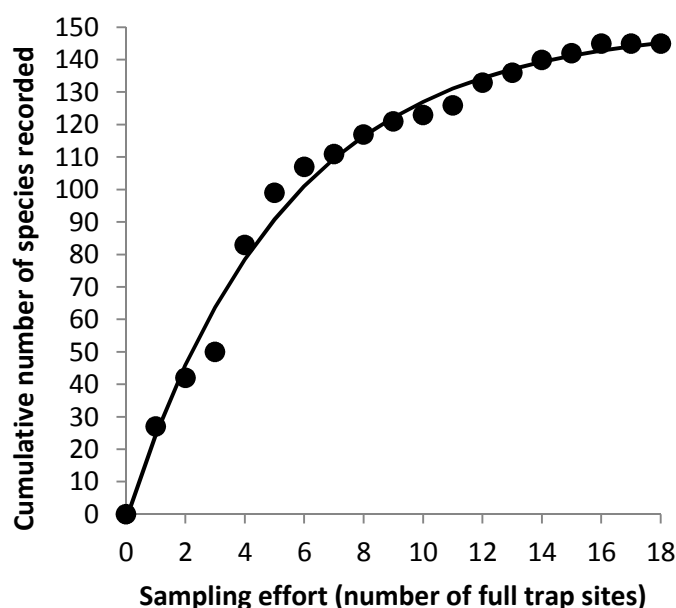


Figure 1 Species accumulation curve. Species accumulation curves show the rate at which new species are detected per sampling unit. Trap site is used as the sampling unit. The curve shows a negative exponential curve, fitted using JMP version 10. The asymptote of the curve was calculated to be 150.3 species, whereas a total of 145 species were recorded at trap sites. Note that these totals reflect fauna trap sites only, as other survey methods (e.g., bat call detection, targeted searches, spotlighting) use different units of survey effort and can therefore not be added quantitatively to the figure. Consequently, the complete diversity recorded using all survey methods is greater than that noted above, especially for certain groups such as bats and waterbirds. To avoid biases caused by sampling season, the order in which sites were added to the curve above was determined by a random number generator.

Previous surveys identified 230 species of fauna in the SGCP area, including the following threatened or near threatened species: Brigalow Scaly-foot (*Paradelma orientalis*), Koala (*Phascolarctos cinereus*), Little Pied Bat (*Chalinolobus picatus*) and Square-tailed Kite (*Lophoictinia isura*). Two migratory bird species protected under the *EPBC Act* have also been recorded on-site: the Rainbow Bee-eater (*Merops ornatus*) and Eastern Great Egret (*Ardea modesta*).

2.4 SCOPE OF SUPPLEMENTARY SURVEYS

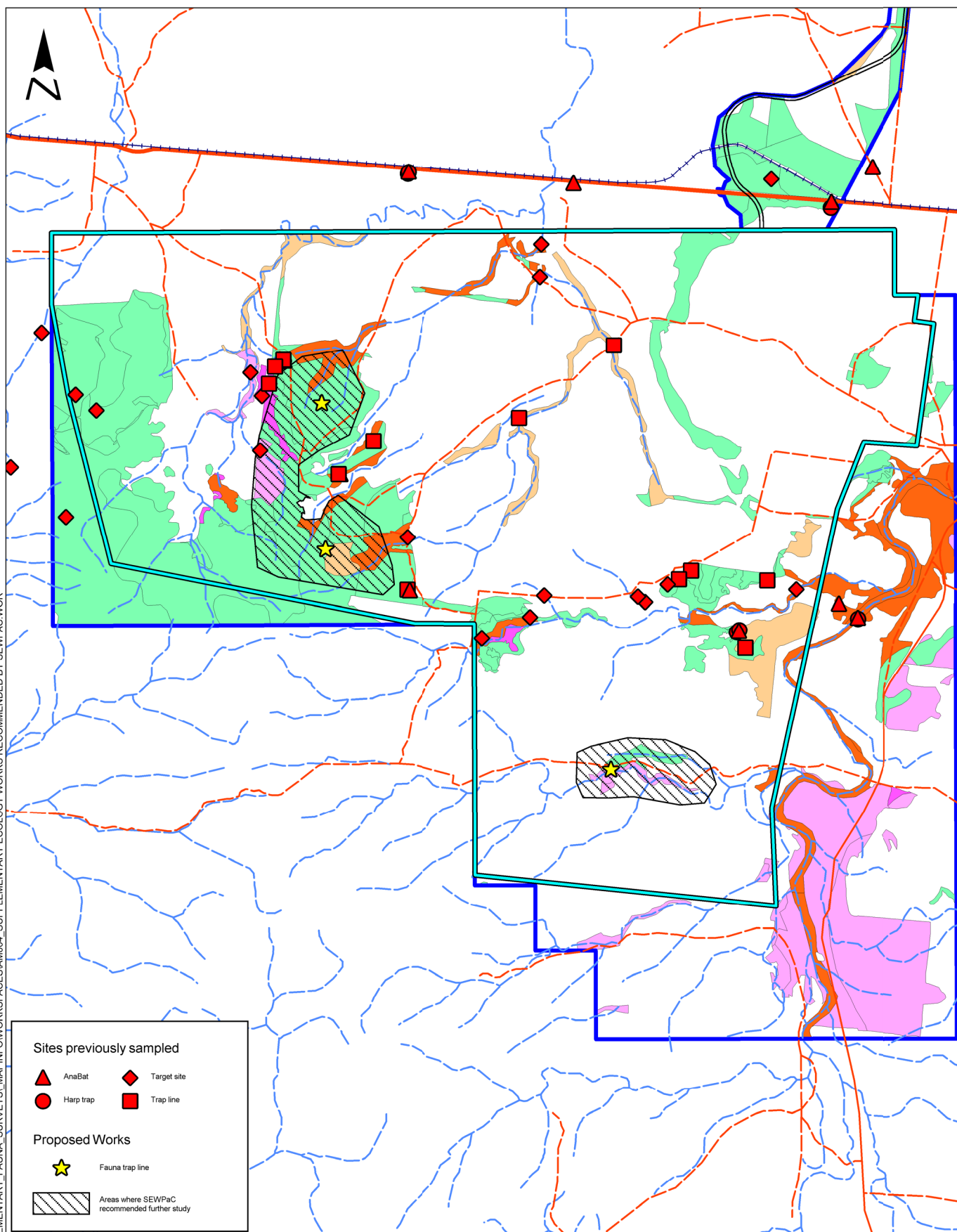
Despite the detail of previous surveys, potential knowledge gaps were identified during public and government review of the EIS. Specifically, the federal Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) considered there to be spatial gaps in our knowledge of fauna that may be impacted by the proposed activities. The following is an excerpt from SEWPAC's comments:

"While the department acknowledges the adequacy of the survey effort in most areas of the project site, it identified that there had been no survey work done along Dead Horse Creek. Also survey was needed in the area of the ephemeral streams west and north-west of the proposed Sapling Creek divergence, which would have flowed north into Tallarenha Creek."

These supplementary survey locations were clarified via correspondence with SEWPAC in August 2012 (**Figure 2**).

Specific aims of the supplementary surveys were:

- (1) to undertake additional sampling of fauna in and near areas identified by SEWPAC as requiring further study;
- (2) to clarify the habitat value of these areas for matters of national environmental significance and threatened species protected under the *NC Act*;
- (3) to increase the total amount of data available on the region's fauna, and to determine the efficacy of previous surveys;
- (4) to assess impacts of the SGCP on environmental values revealed by the surveys, but not previously known to occur on-site; and
- (5) to suggest measures to avoid and/or reduce any newly discovered impacts.



Sites previously sampled

- ▲ AnaBat
- ◆ Target site
- Harp trap
- Trap line

Proposed Works

- ★ Fauna trap line
- Areas where SEWPAC recommended further study

LEGEND

- MLA70453
- SGCP survey area
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

Remnant Vegetation Biodiversity Status

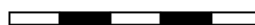
- Endangered (dominant)
- Endangered (sub-dominant)
- Of Concern (dominant)
- Of Concern (sub-dominant)
- Not of Concern
- Non-remnant

Alpha Coal Pty Ltd

South Galilee Coal Project

Supplementary Ecology Works Recommended by SEWPAC

0 5



Kilometres

Scale: 1:150,000 (A4)

23/07/2013

Proj. : MGA Z55
Datum: GDA 1994

FIGURE 2

METSERVE
Mining & Energy Technical Services Pty Ltd

SouthGalilee
COAL PROJECT

Data Source: Tenement - DEEDI, Topography (250k) - Geoscience Australia

3 METHODOLOGY

3.1 SURVEY TIMING AND CONDITIONS

The fauna survey was undertaken between 30 October 2012 and 4 November 2012. Based on data collected at the Alpha Post Office (Bureau of Meteorology), 18.4 mm of rain fell the day prior to the commencement of trapping, while an additional 2.4 mm fell during trapping.

The daily temperature range was (median) 15.9°C – 33.1°C.

These weather conditions were ideal for catching a range of amphibian and reptile species, although night-time temperatures may have been low for certain nocturnal reptiles. The timing of this survey, during the late dry to early wet season, is ideal for detecting a broad range of fauna and complies with the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre *et al.*, 2012).

3.2 SURVEY LOCATIONS

Three systematic fauna survey sites (containing pitfall, funnel and Elliott traps, and including targeted searches of the vicinity) were installed within the survey area. Seven additional sites were sampled for bats using one of two techniques, harp trapping or AnaBat sound detection. Targeted searches were also carried out across the remainder of the survey area. Locations were selected such that the best available habitat was sampled, and each trap site sampled a different vegetation unit:

- S1: *Acacia shirleyi* shrubland on a ridge
- S2: Open *Melaleuca tamariscina* shrubland with *Triodia pungens* understorey
- S3: *Eucalyptus camaldulensis* and *Corymbia tessellaris* woodland along Dead Horse Creek.

Sampling locations are shown in **Figure 3**, and the methodology employed at each is described in **Sections 2.3 to 2.8**. Detailed site descriptions are provided in **Appendix A**. Total survey effort is shown in **Table 2**.

3.3 PITFALL TRAPS

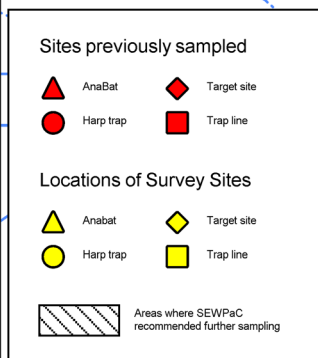
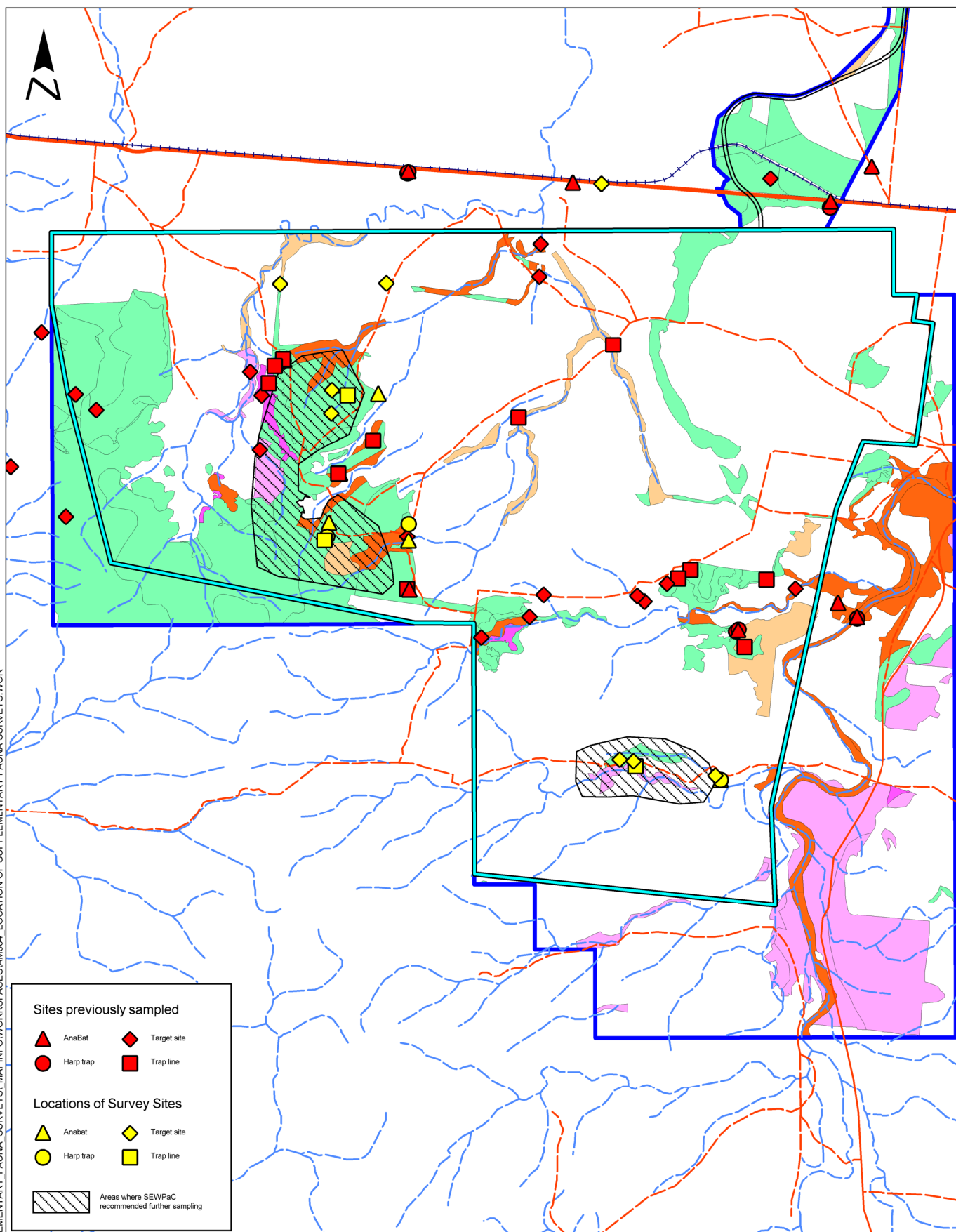
One pitfall trap-line was established at each of the systematic fauna survey sites. Each trap-line contained five evenly spaced 20L buckets buried flush with the ground and connected by a 40 cm tall drift fence made of aluminium fly-screen. This drift fence was 20 m long. The use of 20 L buckets instead of narrower pipes increases capture rates of small vertebrates (Friend *et al.* 1989). The design of this trap-line (i.e., a straight line, with buckets approximately 5 m apart) is optimal for catching the greatest diversity and number of reptiles (Hobbs *et al.* 1994).

Four pairs of funnel traps were placed at even spacing along each drift fence.

Traps were operational for four consecutive nights per systematic survey site. They were checked and cleared every morning and evening.

3.4 ELLIOTT TRAPS

At each systematic fauna survey site, 20 type-A Elliott traps were placed 5-10m apart and baited with standard small mammal mix (peanut butter, oats and honey). Elliott traps were generally arranged in two parallel lines running either side of the drift fence (approximately 20 m from the drift fence). Their exact placement targeted habitats of greatest complexity (dense vegetation, fallen timber and rock outcrops). Each trap was opened late each afternoon, and checked and closed the following morning before 9am. Traps were operational for four consecutive nights per site.



LEGEND

- MLA70453 (blue outline)
- SGCP survey area (blue outline)
- Principal road (red dashed line)
- Road (sealed) (red dashed line)
- Road (unsealed) (red dashed line)
- Railway (blue dashed line)
- Stream (blue dashed line)

Remnant Vegetation Biodiversity Status

- Endangered (dominant) (pink)
- Endangered (sub-dominant) (light pink)
- Of Concern (dominant) (orange)
- Of Concern (sub-dominant) (light orange)
- Not of Concern (green)
- Non-remnant (white)

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Location of Supplementary Fauna Surveys

0 5
Kilometres
Scale: 1:150,000 (A4)

23/07/2013

Proj. : MGA Z55
Datum: GDA 1994

FIGURE 3

3.5 BATS

Microchiropteran bats were censused using two techniques. The first entailed the recording and analysis of ultrasonic bat calls using an AnaBat SD-1 Bat Detector. The detector was operational for the entire night, ensuring that recording took place during periods of peak activity. Rather than record at systematic fauna survey sites as suggested by Eyre *et al.* (2012), locations for AnaBat recording were selected in suitable flyways near waterbodies where bat activity is typically high (Young and Ford 2000). This ensured that a greater number and diversity of bats were sampled. A total of four sites were sampled, and each site was recorded for one night.

To complement AnaBat recordings, harps traps were installed within potential flyways to catch low-flying bats. At appropriate sites, a pair of Faunatech two-bank harp traps was installed side by side. Suitable trapping locations were scarce in the SGCP area (due to the open midstorey vegetation), and therefore this technique was used opportunistically. Harp trapping was conducted at three locations, and traps were moved each night to optimise catch rate (Churchill 1998).

3.6 BIRDS

Bird species were recorded at each systematic site during the twice-daily visits to check traps.

In addition to the census of each systematic fauna survey site, a large number of species were recorded during targeted searches of the entire SGCP survey area. These targeted surveys were carried out opportunistically in all regional ecosystems occurring within the SGCP survey area by observers with excellent knowledge of bird calls. Particular focus was placed on waterbodies and riparian zones, which provided habitat for species not represented in censuses of the systematic fauna survey sites.

3.7 SPOT-LIGHTING

Surveys of nocturnal mammals, birds, reptiles and frogs were undertaken using a combination of 100w spotlights and head torches. Spot-lighting from vehicles afforded the greatest coverage of the site, while spot-lighting on foot targeted riparian zones, fallen timber and other habitats considered likely to support rich faunal communities.

3.8 TARGETED SEARCHES OF SHELTER SITES

Inspections of potential shelter sites (e.g., fallen timber, corrugated iron, riparian zones) were carried out during the day to search for additional species not recorded using other survey techniques. Records were collected of any species of vertebrate observed opportunistically while travelling around the SGCP survey area.

Table 2 Summary of survey effort during the 2012 survey

Survey method	Total (2012)	Total (2009-2011)	Combined total	Targeted species
Pit-fall buckets	48 trap-sites	480 trap-nights	528 trap-nights	Small snakes, skinks, geckos, legless lizards, dragons, frogs, small rodents and dasyurid mammals.
Funnel traps	72 trap-nights	480 trap-nights	552 trap-nights	As per pit-fall buckets, plus larger snakes, goannas and dragons.
Elliott traps	240 trap-nights	1,709 trap-sites	1,949 trap-nights	Small terrestrial mammals.
Harp traps	3 nights	16 nights	19 nights	Microchiropteran bats.
AnaBat detector	48 hours	168 hours	216 hours	Microchiropteran bats.
Spotlighting	20 person-hours	30 person-hours	50 person-hours	Nocturnal reptiles, frogs, arboreal mammals, macropods and nocturnal birds.
Target searches/opportunistic	76 person-hours	400 person-hours	476 person-hours	Birds, larger mammals, diurnal lizards, large snakes, calling frogs.

4 RESULTS

4.1 HABITAT VALUES

There was substantial spatial variation in the habitat values of the 2012 survey areas. Due to differences in management history and landform, the 2012 survey area is best considered as two discrete blocks with different habitat values (the southern block and western block (Figure 3)). The condition of the vegetation in these blocks, and across the entire SGCP area, has been assessed quantitatively using Queensland BioCondition methodology. The results of these assessments have been used to determine appropriate biodiversity offsets, and will be presented in the *South Galilee Offsets Strategy*. Meanwhile, a qualitative description of the habitat values contained within the two survey blocks is presented below. In general, the habitats contained within the 2012 survey area closely matched those already described in the vegetation maps of the site (as contained in the draft EIS). No novel habitats (those not identified previously elsewhere in the SGCP area) were discovered in the 2012 survey.

4.1.1 Southern block

The southern block consists of remnant vegetation along Dead Horse Creek. This block contained open eucalypt forests on sandy, alluvial soils (landzone 3). These were highly fragmented by past clearing, and heavily degraded by overgrazing. The midstorey was largely absent. The ground-cover was heavily trampled and grazed by cattle, and was dominated by the exotic grass *Cenchrus ciliaris*. The value of this southern block to terrestrial reptiles and mammals was limited by the lack of cover caused by heavy grazing. Concomitant with these poor habitat values was the low diversity of reptiles and mammals trapped at the site during surveys.

While Dead Horse Creek rarely flows, and lacked water during the 2012 surveys, there were several man-made dams in its vicinity. This, coupled with sandy soils favourable for burrowing frogs, supported high amphibian diversity.

The other main habitat value of the southern block was its corridors of *Eucalyptus camaldulensis*. This is an important food tree for Koalas and Common Brushtail Possums in arid regions. It also contains hollows used by bats and parrots for shelter and nests.

4.1.2 Western block

The western block consists of an extensive block of remnant vegetation in the headwaters of Tallarenha Creek. This block contained a diversity of woodland types, primarily on low sandy rises (landzone 5). Occasional low jump-ups (landzone 7) contained rocks, which provide shelter for some terrestrial fauna. The dominant trees in the western block included *Eucalyptus melanophloia*, *Eucalyptus populnea* and *Corymbia brachycarpa*. Within this matrix of eucalypt woodland were patches of *Acacia harpophylla* and *Acacia shirleyi* shrublands. The large amount of leaf litter and fallen debris associated with these shrublands is favourable for a range of small terrestrial fauna, and for this reason these habitats comprised a disproportionate total number of sampling sites. Also contained within the western block were small areas of open *Melaleuca tamariscina* woodland. These woodlands support a dense cover of *Triodia pungens*, a grass that provides habitat for a range of fauna. This habitat is scarce within the SGCP area. Because only one trap site had previously sampled this habitat type within the SGCP area, this was selected as a priority for sampling during the 2012 survey.

The only waterways within the western block were low-order drainage lines, which lacked water at the time of survey, and are unlikely to provide an important water source for fauna. Consequently, frog diversity in this western block was low. In contrast, reptile diversity was high, a consequence of the structural complexity of the ground layer and vegetation.

The condition of the habitats present in the western block was generally good. Grazing intensity was light, and weeds such as *Cenchrus ciliaris* were absent from large areas.

4.2 SPECIES DIVERSITY

A total of 154 species of terrestrial vertebrates were recorded during the 2012 survey (**Appendix B**). Of these, ten species (~6% of the total) had not been recorded during previous surveys of the SGCP area (**Table 3**). Eight of these new species were already known to inhabit the Alpha region, based on records in the WildNet database, and were presumed to occur within the SGCP area in the draft EIS. Only two species, the Marbled Velvet Gecko (*Oedura marmorata*) and Little Pied Cormorant (*Microcarbo melanoleucos*), were not previously known from the Alpha region.

Table 3 Summary of fauna records for the 2012 survey, compared with previous surveys

Taxonomic group	Total species known from previous SGCP surveys	Total species recorded in 2012	New species in 2012	Cumulative total
Amphibians	10	9	2	12
Reptiles	35	17	3	38
Birds	145	101	5	150
Mammals	40	25	0	40

None of the ten species recorded during the 2012 survey that were not previously known from the SGCP area are listed as threatened or Near Threatened under the *NC Act*, or threatened or migratory under the *EPBC Act*.

The revised species accumulation curve (**Figure 4**) suggests that the estimated species richness of the SGCP area has not changed significantly as a result of the 2012 surveys (compare to **Figure 1**).

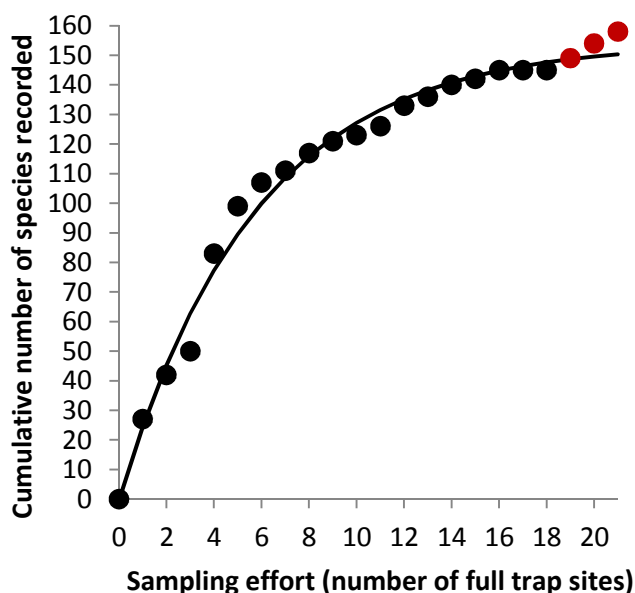


Figure 4 Species accumulation curve, combining data from the 2012 survey with previous surveys. The 2012 sites are shown in red. The curve shows a negative exponential curve, fitted using JMP version 10. The asymptote of the curve was calculated to be 154.3 species (95% confidence intervals = 148.1 - 160.6 species), whereas a total of 158 species were recorded at trap sites. These totals reflect fauna trap sites only, as other survey methods (e.g., bat call detection, targeted searches, spotlighting) use different units of survey effort and can therefore not be added quantitatively to the figure.

4.3 CONTRIBUTIONS TO KNOWLEDGE OF LOCAL FAUNA

Two species (Marbled Velvet Gecko and Little Pied Cormorant) recorded during the 2012 survey were not previously known from the Alpha region. However, the Alpha region is within both species' geographical distribution, and their occurrence there was not surprising. Neither species is of conservation significance.

Overall, the 2012 survey contributed little to our understanding of the region's faunal diversity. The 2012 survey increased the known faunal diversity of the SGCP area by only 0.7% (based on previous site-specific surveys and database records). The primary contribution of the 2012 survey is the increase in the total amount of data available, and therefore our confidence in assessing the region's ecological values and the potential impacts of the project.

4.4 CONFIRMED SPECIES OF NATIONAL AND/OR STATE CONSERVATION SIGNIFICANCE

4.4.1 Little Pied Bat

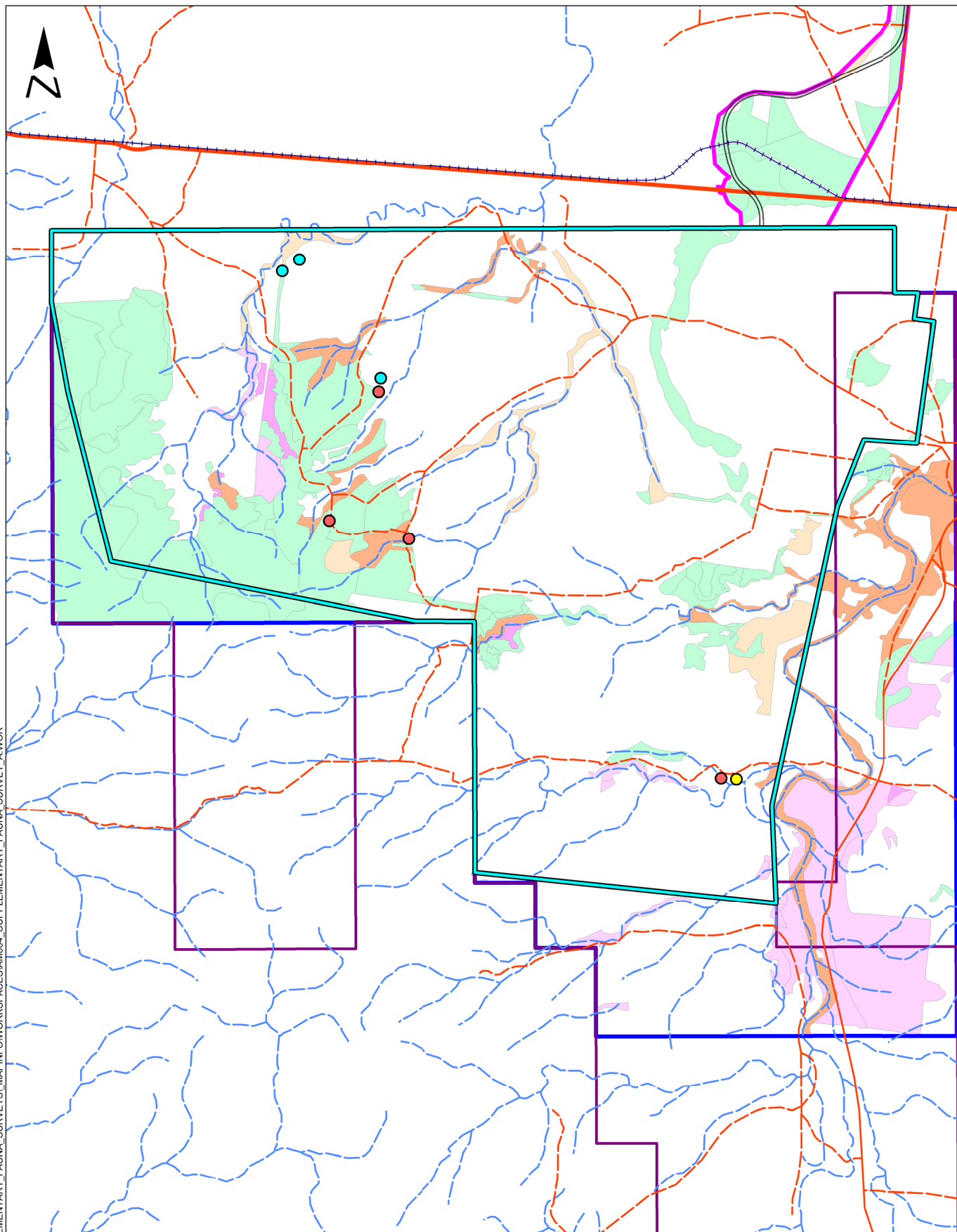
Calls made by Little Pied Bats (*Chalinolobus picatus*) were detected at two of the four AnaBat sites surveyed in 2012, and calls potentially from this species were detected at the remaining two AnaBat sites (**Appendix C**). Calls at the latter sites lacked consistent alternating pulse frequencies, and could have been from the Little Pied Bat, or the Inland Forest Bat (*Vespadelus baverstocki*), which are often difficult to distinguish between. This suggests that Little Pied Bats are likely to be common and widespread in the 2012 survey area. Little Pied Bats roost in hollow trees and forage within a broad range of inland woodland communities (Churchill 2008).

Little Pied Bats were recorded widely in past surveys of the SGCP area, and were considered common inhabitants of the region's woodlands in the draft EIS. Results of the 2012 survey are consistent with these past assessments.

4.4.2 Rainbow Bee-eater

The Rainbow Bee-eater is a migratory bird protected under the *EPBC Act*. Previous surveys of the SGCP area have revealed that the species is a common spring-summer breeding visitor to the region (see draft EIS). Their presence during the November 2012 survey supports this view. Locations where the species was recorded are shown in **Figure 5**.

Rainbow Bee-eaters inhabit a broad range of vegetation communities, including open woodlands, shrublands and cleared pastoral land. They are aerial foragers, sallying from exposed perches after flying insects. They breed in burrows dug into sandy ground, creek banks and roadside cuttings (Boland 2004; SEWPAC 2012). Pairs may breed singly, or as part of larger colonies in optimal habitat (Boland 2004). While no such colonies were observed during the 2012 survey, portions of the SGCP area with sandy soils are likely to offer potential breeding habitat to scattered pairs of Rainbow Bee-eaters. This is a widespread and common species, occurring across all of Australia, and parts of Papua New Guinea and Indonesia (SEWPAC 2012).



LEGEND

- MLA70453
- Exploration tenement
- Mine survey area
- Infrastructure corridor survey area
- SGCIP infrastructure corridor
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- Stream

Remnant Vegetation Biodiversity Status

- Endangered (dominant)
- Endangered (sub-dominant)
- Of Concern (dominant)
- Of Concern (sub-dominant)
- Not of Concern
- Non-remnant

Species of Conservation Significance

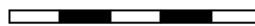
- Rainbow Bee-eater
- Eastern Great Egret
- Little Pied Bat

Data Source: Tenement - DEEDI, Topography (250k) - Geoscience Australia

Alpha Coal Pty Ltd

South Galilee Coal Project Supplementary Fauna Survey

0 5



Kilometres

Scale: 1:150,000 (A4)

04/07/2013

Proj. : MGA Z55
Datum: GDA 1994

FIGURE 5

METSERVE
Mining & Energy Technical Services Pty Ltd



4.4.3 Eastern Great Egret

The Eastern Great Egret (*Ardea modesta*) is a large heron that inhabits creeks, rivers, farm dams and flooded fields. It is a common and widespread species that may occur anywhere its prey (fish, frogs) can be found (Marchant & Higgins 1990). It had previously been recorded in the infrastructure corridor section of the SGCP area, although potential habitat was identified elsewhere across the SGCP area (see draft EIS). During the 2012 survey, a single Eastern Great Egret was recorded at a farm dam near Dead Horse Creek. Habitat for the species was limited in extent, due to the paucity of surface water on-site. The SGCP area does not support a significant population of the species or amount of the species' habitat.

4.5 POTENTIAL SPECIES OF NATIONAL AND/OR STATE CONSERVATION SIGNIFICANCE

No novel habitats (those not identified previously elsewhere in the SGCP area) were discovered in the 2012 survey. Furthermore, the habitats present closely corresponded with vegetation mapping undertaken on-site for the draft EIS. Consequently, the likelihood of species of conservation significance occurring on-site (as assessed in the draft EIS) has not changed as a result of the 2012 survey. Habitat for the following species was located in the 2012 survey areas:

- Brigalow Scaly-foot (western block)
- Koala (southern and western blocks)
- Square-tailed Kite (western block)
- Yakka Skink (western block)
- Ornamental Snake (southern and western blocks)
- Dunmall's Snake (western block)
- Squatter Pigeon (southern and western blocks)
- Black-throated Finch (western block).

The potential distribution of these species within the SGCP area, their general biology, potential impacts of the SGCP on them, and mitigation measures in place to reduce these impacts, have all been accurately addressed in the draft EIS.

4.6 REGIONALLY SIGNIFICANT SPECIES

Appendix 7 of the *Biodiversity Assessment Mapping Methodology* lists priority fauna taxa for each bioregion. The *Queensland Biodiversity Offset Policy* specifies that if any of these are present within an area to be impacted, they must also be present within the offset area. Eight species recorded during the 2012 survey are listed as priority taxa for the Brigalow Belt South bioregion (BRBS) and/or the Desert Uplands bioregion (DEU). All of these species have been recorded in previous surveys of the SGCP area.

4.6.1 Carpentaria Snake (*Cryptophis boschmai*) – BRBS

One Carpentaria Snake was recorded (at trap-site S2) in the western block. The species inhabits a broad range of woodland and shrubland communities, and is likely to be widespread across the entire SGCP area, especially in remnant vegetation.

4.6.2 Australian Bustard (*Ardeotis australis*) – DEU

Australian Bustards were relatively common across the SGCP area. They inhabit a broad range of open habitats, including non-remnant pastures (Grice *et al.* 1986). Australian Bustards avoid dense remnant woodlands (Grice *et al.* 1986).

4.6.3 Hooded Robin (*Melanodryas cucullata*) – BRBS, DEU

Hooded Robins inhabit open woodlands. They are moderately common in suitable habitat across the SGCP area.

4.6.4 Grey-crowned Babbler (*Pomatostomus temporalis*) – BRBS, DEU

Grey-crowned Babblers were common and widespread inhabitants of woodland and shrubland habitats across the SGCP area.

4.6.5 Narrow-nosed Planigale (*Planigale tenuirostris*) – BRBS

One Narrow-nosed Planigale was recorded (at trap-site S1) in the western block. The species is typically found in woodlands on clay soils (Houston *et al.* 2004) and is common throughout its range. The detection of the species in rocky soils, along with previous records from sandy substrates in the north of the SGCP area, suggests that a broad range of land zones and habitats are utilised by the species.

4.6.6 Desert Mouse (*Pseudomys desertor*) – DEU

One Desert Mouse was recorded (at trap-site S2) in the western block. The species favours dense *Triodia* hummocks (Kutt *et al.* 2004), which were a common feature at this site. Elsewhere in the SGCP area, the species has been recorded in other types of grassy woodlands, including lightly grazed, non-remnant pastures.

4.6.7 Common Brushtail Possum (*Trichosurus vulpecula*) – BRBS, DEU

One Common Brushtail Possum was detected (at trap-site S3) in the southern block. Riparian forests of *Eucalyptus camaldulensis* are likely to be important habitat for the species (Munks *et al.* 1996). This tree species grows along Dead Horse Creek, and (more extensively) along Alpha Creek and its tributaries.

4.6.8 Rufous Bettong (*Aepyprymnus rufescens*) – BRBS, DEU.

Rufous Bettongs are common inhabitants of grassy habitats (both remnant and non-remnant) across the SGCP area. The species was regularly observed while driving on-site at night.

4.7 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Two species that are matters of national environmental significance were recorded in the 2012 survey (i.e., the Rainbow Bee-eater and Eastern Great Egret). Both are migratory species protected under international agreements. No threatened species under the *EPBC Act* were recorded during the 2012 survey.

4.8 PEST ANIMALS

Four species of pest animals were recorded during the 2012 surveys:

- Cane Toad (*Rhinella marina*)
- Dingo/Wild Dog (*Canis lupus familiaris*)
- European Rabbit (*Oryctolagus cuniculus*)
- Feral Pig (*Sus scrofa*).

With the exception of the Cane Toad, all of the above species are listed as Class 2 pests under the *LP Act*. All four pest species recorded in 2012 were previously known from the site. It is likely that two additional pest species (Feral Cat and House Mouse) recorded during previous surveys of the SGCP area also inhabit areas surveyed in 2012.

Wild Dogs and Feral Pigs have a priority of 'high 1' under the Barcaldine Regional Council's Pest Management Plan. European Rabbits have a priority of 'medium 2' under the Barcaldine Regional Council's Pest Management Plan.

Data from the 2012 survey suggest no reason to revise the status of pest animals in the SGCP area from that published in the draft EIS.

5 IMPACTS TO NEWLY DISCOVERED ECOLOGICAL VALUES

No additional ecological values were recorded during the 2012 survey that were not already known from the SGCP area. The impacts of the SGCP on these ecological values have been assessed in the draft EIS and management measures proposed are appropriate.

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APPENDIX A

DESCRIPTIONS OF SAMPLING SITES

S1		Description: <i>Acacia shirleyi</i> shrubland with occasional emergent <i>Eucalyptus melanophloia</i>. <i>Triodia pungens</i> and other perennial grasses comprised the understorey. The groundcover was ~80%. The canopy cover was ~40%. Canopy height was 10m. There were some rocks present on the ground, and the site was positioned on a low ridge. Dates surveyed: 31/10/12-3/11/12
S2		Description: <i>Melaleuca tamariscina</i> open woodland, growing on shallow, sandy soil. <i>Triodia pungens</i> and <i>Schizachyrium fragile</i> were the dominant grasses. The ground cover was ~65%. The canopy cover was 5-10%. The median canopy height was 4m. Dates surveyed: 31/10/12-3/11/12
S3		Description: <i>Eucalyptus camaldulensis</i> open forest growing along Dead Horse Creek. <i>Corymbia tessellaris</i> was subdominant. <i>Callitris glaucophylla</i> was occasional in the midstorey. As was typical for alluvial sites across the SGCP area, the understorey was heavily grazed, and was dominated by exotic Buffel Grass, <i>Cenchrus ciliaris</i>. Dates surveyed: 1/11/12-4/11/12

APPENDIX B

LIST OF FAUNA RECORDED DURING THE 2012 SURVEY

Family			Status		New for SGCP	Trap Sites		
	Scientific name	Common name	NCA	EPBCA		S1	S2	S3
Amphibia: 9 (2 new)								
Bufonidae	<i>Rhinella marina</i>	Cane Toad	I					X
Hylidae	<i>Litoria caerulea</i>	Green Tree Frog						X
	<i>Litoria latopalmata</i>	Broad-palmed Rocket Frog						X
	<i>Litoria rubella</i>	Desert Tree Frog						X
	<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog						X
Limnodynastidae	<i>Limnodynastes terraereginae</i>	Scarlet-sided Pobblebonk			*			X
	<i>Neobatrachus sudelli</i>	Sudell's Frog			*			X
	<i>Platyplectrum ornatum</i>	Ornate Burrowing Frog						X
Myobatrachidae	<i>Uperoleia rugosa</i>	Chubby Gungan						X
Reptilia: 17 (3 new)								
Agamidae	<i>Amphibolurus nobbi</i>	Nobbi Dragon				X		
Boidae	<i>Aspidites melanocephalus</i>	Black-headed Python						
Elapidae	<i>Cryptophis boschmai</i>	Carpentaria Snake					X	
Gekkonidae	<i>Diplodactylus conspicillatus</i>	Fat-tailed Gecko			*		X	
	<i>Gehyra dubia</i>	Dubious Dtella						
	<i>Oedura marmorata</i>	Marbled Velvet Gecko			*			
	<i>Strophurus williamsi</i>	Eastern Spiny-tailed Gecko				X		
Pygopodidae	<i>Lialis burtonis</i>	Burton's Legless Lizard						
	<i>Pygopus schraderi</i>	Eastern Hooded Scaly-foot				X		
Scincidae	<i>Carlia munda</i>	Shaded-litter Rainbow-skink				X	X	X
	<i>Carlia pectoralis</i>	Open-litter Rainbow-skink						
	<i>Cryptoblepharus pannosus</i>	Ragged Snake-eyed Skink				X		
	<i>Ctenotus pantherinus</i>	Leopard Ctenotus						
	<i>Ctenotus robustus</i>	Eastern Striped Skink						
	<i>Eremiascincus fasciolatus</i>	Narrow-banded Sand-swimmer			*	X		
	<i>Lerista fragilis</i>	Eastern Mulch-slider				X		X
Varanidae	<i>Varanus tristis</i>	Black-headed Monitor						
Aves: 103 (5 new)								
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill						
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill						
	<i>Acanthiza reguloides</i>	Buff-rumped Thornbill				X		
	<i>Gerygone fusca</i>	Western Gerygone						
	<i>Smicrornis brevirostris</i>	Weebill				X	X	X
Accipitridae	<i>Accipiter fasciatus</i>	Brown Goshawk						
	<i>Aquila audax</i>	Wedge-tailed Eagle						
	<i>Circus assimilis</i>	Spotted Harrier			*			
	<i>Haliastur sphenurus</i>	Whistling Kite						
	<i>Milvus migrans</i>	Black Kite						
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar						
Anatidae	<i>Anas gracilis</i>	Grey Teal						
	<i>Anas superciliosa</i>	Pacific Black Duck						

Family	Scientific name	Common name	Status		New for SGCP	Trap Sites		
			NCA	EPBCA		S1	S2	S3
	<i>Aythya australis</i>	Hardhead						
	<i>Chenonetta jubata</i>	Australian Wood Duck						
	<i>Malacorhynchus membranaceus</i>	Pink-eared Duck						
Anhinga	<i>Anhinga novaehollandiae</i>	Australasian Darter						
Ardeidae	<i>Ardea modesta</i>	Eastern Great Egret		M				
	<i>Ardea pacifica</i>	White-necked Heron						
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow				X	X	
	<i>Artamus leucorhynchus</i>	White-breasted Woodswallow						
	<i>Artamus minor</i>	Little Woodswallow						
	<i>Artamus personatus</i>	Masked Woodswallow				X		
	<i>Artamus superciliosus</i>	White-browed Woodswallow						
	<i>Cracticus nigrogularis</i>	Pied Butcherbird				X		X
	<i>Cracticus tibicen</i>	Australian Magpie				X		X
	<i>Cracticus torquatus</i>	Grey Butcherbird						X
	<i>Strepera graculina</i>	Pied Currawong						
Cacatuidae	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo					X	
	<i>Eolophus roseicapillus</i>	Galah						
Campephagidae	<i>Coracina maxima</i>	Ground Cuckoo-shrike						
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike						
	<i>Lalage sueurii</i>	White-winged Triller					X	
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu						
Charadriidae	<i>Elseya melanops</i>	Black-fronted Dotterel						X
	<i>Vanellus miles</i>	Masked Lapwing						X
Columbidae	<i>Geopelia cuneata</i>	Diamond Dove			*			
	<i>Geopelia humeralis</i>	Bar-shouldered Dove						
	<i>Geopelia striata</i>	Peaceful Dove						
	<i>Ocyphaps lophotes</i>	Crested Pigeon						
	<i>Phaps chalcoptera</i>	Common Bronzewing					X	
Coraciidae	<i>Eurystomus orientalis</i>	Dollarbird					X	X
Corcoracidae	<i>Struthidea cinerea</i>	Apostlebird						X
Corvidae	<i>Corvus coronoides</i>	Australian Raven						
	<i>Corvus orru</i>	Torresian Crow						X
Cuculidae	<i>Cacomantis pallidus</i>	Pallid Cuckoo			*	X	X	X
	<i>Centropus phasianinus</i>	Pheasant Coucal					X	
	<i>Chalcites basalus</i>	Horsfield's Bronze-Cuckoo						
	<i>Chalcites lucidus</i>	Shining Bronze-Cuckoo			*			
Estrildidae	<i>Neochmia modesta</i>	Plum-headed Finch						
	<i>Taeniopygia bichenovii</i>	Double-barred Finch						
	<i>Taeniopygia guttata</i>	Zebra Finch						
Falconidae	<i>Falco berigora</i>	Brown Falcon						
	<i>Falco cenchroides</i>	Nankeen Kestrel						

Family	Scientific name	Common name	Status		New for SSCP	Trap Sites		
			NCA	EPBCA		S1	S2	S3
Gruidae	<i>Grus rubicunda</i>	Brolga					X	
Halcyonidae	<i>Dacelo leachii</i>	Blue-winged Kookaburra				X		
	<i>Dacelo novaeguineae</i>	Laughing Kookaburra						X
	<i>Todiramphus sanctus</i>	Sacred Kingfisher						
Hirundinidae	<i>Cheramoeca leucosterna</i>	White-backed Swallow						
	<i>Petrochelidon nigricans</i>	Tree Martin						
Maluridae	<i>Malurus lamberti</i>	Variegated Fairy-wren						
	<i>Malurus leucopterus</i>	White-winged Fairy-wren						
	<i>Malurus melanocephalus</i>	Red-backed Fairy-wren					X	
Megaluridae	<i>Cincloramphus mathewsi</i>	Rufous Songlark					X	
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater				X		
	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater						
	<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater						
	<i>Lichenostomus virescens</i>	Singing Honeyeater						
	<i>Lichmera indistincta</i>	Brown Honeyeater				X		
	<i>Manorina flavigula</i>	Yellow-throated Miner						X
	<i>Philemon citreogularis</i>	Little Friarbird						
	<i>Philemon corniculatus</i>	Noisy Friarbird					X	
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater		M				X
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark						
	<i>Myiagra inquieta</i>	Restless Flycatcher						
	<i>Myiagra rubecula</i>	Leaden Flycatcher						
Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian Pipit						
Nectariniidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird						
Odontophoridae	<i>Oriolus sagittatus</i>	Olive-backed Oriole				X		
Otididae	<i>Ardeotis australis</i>	Australian Bustard				X		
	<i>Pachycephala rufiventris</i>	Rufous Whistler					X	
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush						
	<i>Oreoica gutturalis</i>	Crested Bellbird						
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote						
Petroicidae	<i>Melanodryas cucullata</i>	Hooded Robin						
	<i>Microeca fascians</i>	Jacky Winter						
	<i>Petroica goodenovii</i>	Red-capped Robin						
Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant			*			
Phasianidae	<i>Coturnix ypsilophora</i>	Brown Quail					X	
Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe						
Pomatostomidae	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler						
Psittacidae	<i>Aprosmictus erythropterus</i>	Red-winged Parrot						
	<i>Platycercus adscitus</i>	Pale-headed Rosella					X	X
	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet						X
Ptilonorhynchidae	<i>Ptilonorhynchus maculatus</i>	Spotted Bowerbird						
Rallidae	<i>Fulica atra</i>	Eurasian Coot						

Family	Scientific name	Common name	Status		New for SGCP	Trap Sites		
			NCA	EPBCA		S1	S2	S3
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail						
	<i>Rhipidura leucophrys</i>	Willie Wagtail						
Threskiornithidae	<i>Platalea regia</i>	Royal Spoonbill						
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis						
Tytonidae	<i>Tyto javanica</i>	Eastern Barn Owl						
Mammalia: 25 (0 new)								
Canidae	<i>Canis lupus</i>	Dingo, Domestic Dog	I					
Dasyuridae	<i>Planigale tenuirostris</i>	Narrow-nosed Planigale				X		
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat						
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit	I					
Macropodidae	<i>Macropus giganteus</i>	Eastern Grey Kangaroo					X	X
	<i>Macropus robustus</i>	Common Wallaroo				X		
	<i>Macropus rufus</i>	Red Kangaroo						
Molossidae	<i>Austronomus australis</i>	White-striped Freetail-bat						
	<i>Chaerephon jobensis</i>	Northern Freetail-bat						
	<i>Mormopterus beccarii</i>	Beccari's Freetail-bat						
	<i>Mormopterus ridei</i>	Eastern Freetail Bat						
	<i>Tadarida australis</i>	White-striped Freetail-bat						
Muridae	<i>Pseudomys desertor</i>	Desert Mouse					X	
Phalangeridae	<i>Trichosurus vulpecula</i>	Common Brushtail Possum						X
Potoroidae	<i>Aepyprymnus rufescens</i>	Rufous Bettong						
Pteropodidae	<i>Pteropus scapulatus</i>	Little Red Flying-fox						
Suidae	<i>Sus scrofa</i>	Pig	I					
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna						
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat						
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat						
	<i>Chalinolobus picatus</i>	Little Pied Bat	NT					
	<i>Nyctophilus sp.</i>	Long-eared Bat species						
	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat						
	<i>Scotorepens greyii</i>	Little Broad-nosed Bat						
	<i>Vespadelus baverstocki</i>	Inland Forest Bat						
	<i>Vespadelus vulturnus</i>	Little Forest Bat						
Grand total: 154 (10 new)								

* NT = Near Threatened;.

APPENDIX C

ANABAT CALL IDENTIFICATION RESULTS



Microbat Call Identification Report

Prepared for ("Client"):	METSERVE
Survey location/project name:	Alpha area
Survey dates:	1 st – 5 th November 2012
Client project reference:	
Job no.:	MET-1304
Report date:	3 July 2013

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Methods

Data receipt and processing

Bat calls were recorded over four nights using an Anabat detector (Titley Scientific, Brisbane). The Anabat data file was downloaded by the client and sent to *Balance Environmental* for post-processing and analysis.

The data file was processed using *CFCread* (Corben 2012) to produce 1713 Anabat call sequence files (zero-crossing analysis format) for the four nights of this survey.

Call identification

All Anabat files were viewed using *AnaLookW* (Corben 2013) and a representative sub-set of all call types recorded on each survey night were extracted for identification. Species identification was achieved manually by viewing the extracted call sonograms in *AnaLookW* and comparing them with reference calls from southern and central Queensland and/or with published call descriptions (e.g. Reinhold *et al.* 2001; Pennay *et al.* 2004).

Species' identities were also guided by considering probability of occurrence based on published distribution maps (e.g. Churchill 2008; van Dyck & Strahan 2008) and/or online database records (e.g. Wildlife Online <http://www.ehp.qld.gov.au/wildlife/wildlife-online>; and the Atlas of Living Australia <http://www.ala.org.au>).

Reporting standard

The format and content of this report follows Australasian Bat Society standards for the interpretation and reporting of bat call data (Reardon 2003), available on-line at <http://www.ausbats.org.au/>.

Species nomenclature follows Churchill (2008).

Results & Discussion

Data quantity & quality

This was a very clean data set and most files contained good quality call recordings that enabled reliable species identification. A total of 303 bat calls were selected for identification from the more than 2000 calls available.

Species recorded

At least twelve and as many as fourteen species were recorded during this survey (see Table 1).

Eleven species were positively identified: *Chalinolobus gouldii*; *Chalinolobus morio*; *Chalinolobus picatus*; *Scotorepens balstoni*; *Scotorepens greyii*; *Vespadelus vulturnus*; *Austronomus australis*; *Chaerephon jobensis*; *Mormopterus beccarii*; *Mormopterus ridei*; and *Saccolaimus flaviventris*.

The twelfth reliably identified call type was attributable to *Nyctophilus*, but the species in that genus cannot be differentiated. Both *N. geoffroyi* and *N. gouldi* may be present in the study area.

Vespadelus baverstocki may also have been present, but its calls are very similar to those of *Chalinolobus picatus*. The latter species' calls were differentiated on some nights due to their characteristic alternating pulse frequency; however, a few calls on each night lacked consistent alternation and could have been from either *C. picatus* or *V. baverstocki*.

Table 1. Microbat species recorded at Alpha, 1-5 November 2012.

◆ = species positively identified from call data

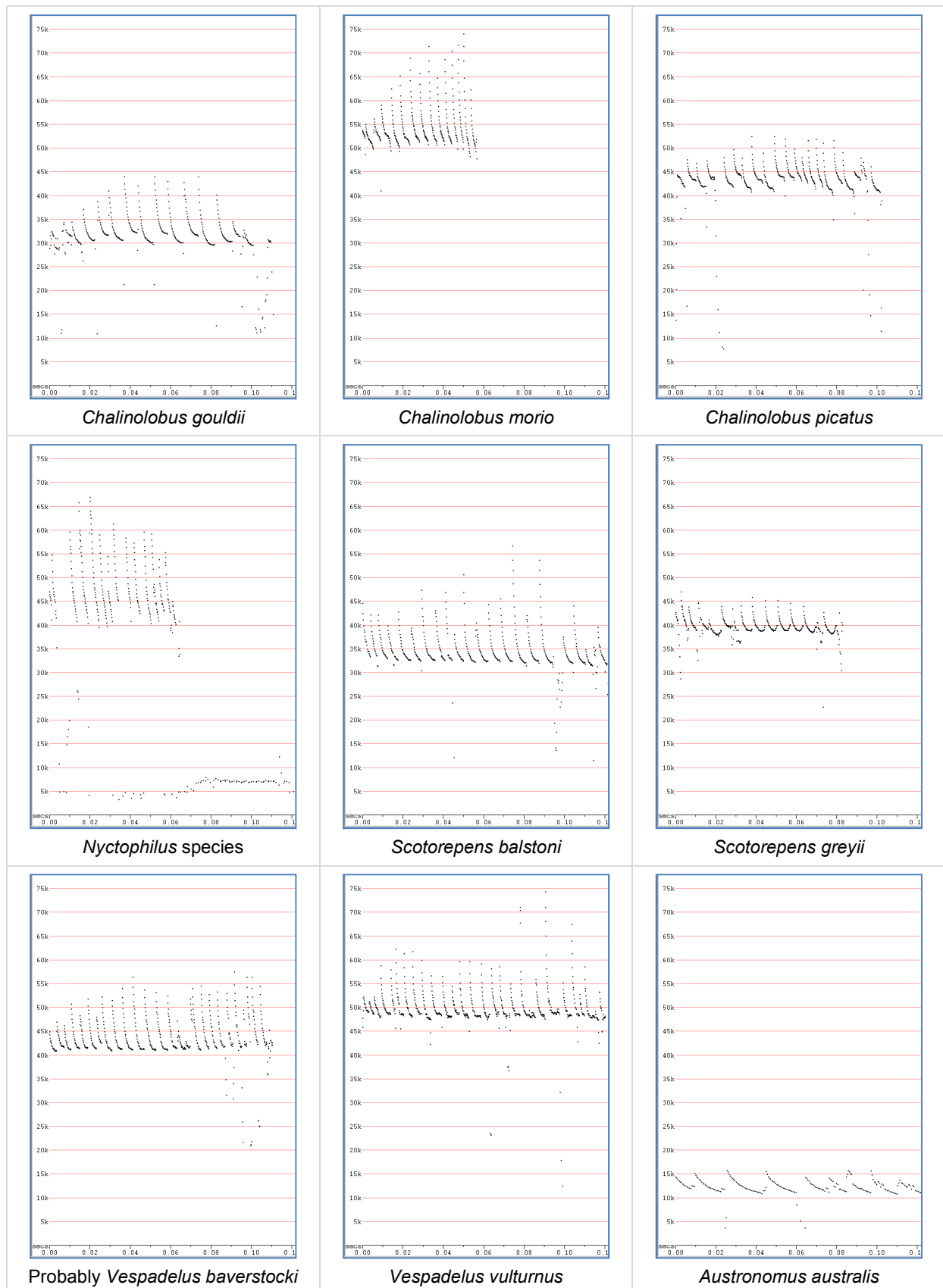
□ = species possibly present, but not reliably identified

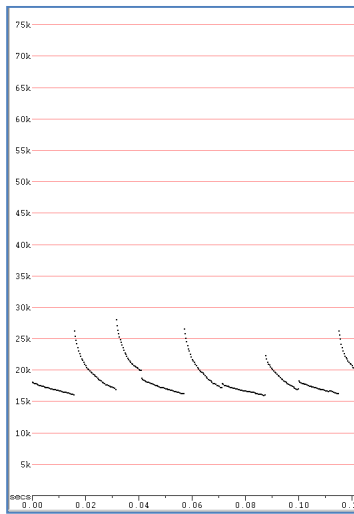
Date:	1/11/2012	2/11/2012	3/11/2012	4/11/2012
No. sequence files:	681	266	49	717
No. of calls identified:	90	54	27	132
SPECIES				
<i>Chalinolobus gouldii</i>	◆	◆	◆	◆
<i>Chalinolobus morio</i>	◆	◆		
<i>Chalinolobus picatus</i>	◆	◆	□	□
<i>Nyctophilus</i> sp.	◆	◆		
<i>Scotorepens balstoni</i>	◆	◆		◆
<i>Scotorepens greyii</i>	◆	◆	◆	◆
<i>Vespadelus baverstocki</i>	□	□	□	□
<i>Vespadelus vulturnus</i>		◆		◆
<i>Austronomus australis</i>	◆		◆	◆
<i>Chaerephon jobensis</i>	◆		◆	◆
<i>Mormopterus beccarii</i>	◆	◆	◆	◆
<i>Mormopterus ridei</i>		◆		◆
<i>Saccolaimus flaviventris</i>	◆	◆	◆	◆

References

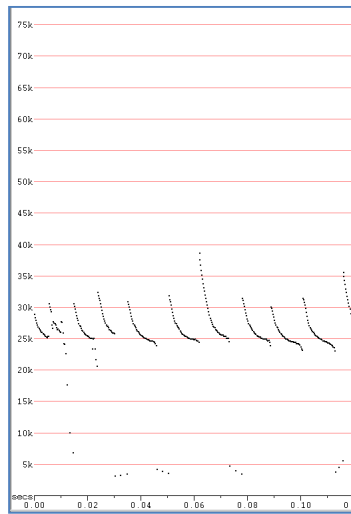
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APPENDIX Representative bat-call sequences recorded at Alpha, 1-5 November 2012.
(10msec per tick; time between pulses removed)

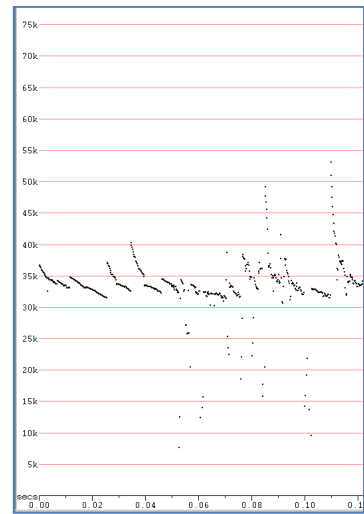




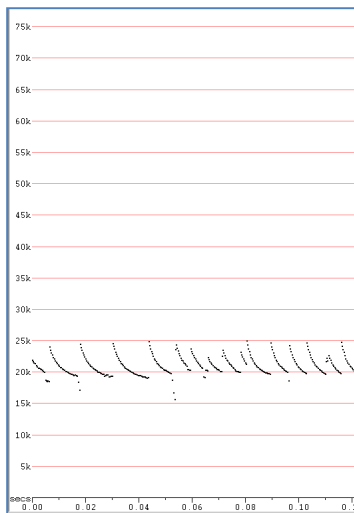
Chaerephon jobensis



Mormopterus beccarii



Mormopterus ridei



Saccolaimus flaviventris

9.13.3 Water Trigger Process

On 17 October 2013 the Minister for the Environment, the Hon Greg Hunt MP, made the decision under item 23 of Schedule 1 to the Environment Protection and Biodiversity Conservation Amendment Act 2013 that sections 24D and 24E of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (water resources) are controlling provisions for the SGCP (EPBC 2010/5496).

The consequence of this decision is that the SGCP will require assessment and approval under the EPBC Act for these controlling provisions which relate to the impacts of coal seam gas development and large coal mining development on water resources.

In making his decision the Minister for the Environment acknowledged that the SGCP is currently being assessed through the bilateral agreement between the Queensland and Commonwealth governments and that the Department of Environment (Cth).



9.14 Social Impact Assessment

9.14 Social Impact Assessment

9.14.1 SIA Summary

The EIS public review period together with the introduction by the State Government of its July 2013 Social Impact Assessment Policy necessitated a reassessment of the Social Impact aspects of the EIS. The reassessment is in accordance with the July 2013 Policy.

Alpha Coal Management Pty Ltd (ACM) commissioned SMEC Australia Pty Ltd (SMEC) to undertake the reassessment which follows as section 9.14.2.

The SIA is a critical component of the South Galilee Coal Project (SGCP) as it provides an in depth assessment of the potential and recognised impacts of the SGCP on the social environment. The document builds on work already undertaken as part of the Environmental Impact Statement (EIS) Social Impact Assessment (SIA) and Social Impact Management Plan (SIMP) and it also acknowledges the recent change to the policy context for social assessment in Queensland.

The SIA addresses core SIA principles as set out in the Queensland Government's Social Impact Assessment Guideline (July 2013) and recognises the Queensland Government's complementary guideline; "A new approach to managing the impacts of major projects in resource communities" (July 2013).

The document focuses on the social and cultural area of influence of the Barcaldine Region, with a particular focus on Alpha. From a regional perspective, areas such as Blackall – Tambo regional Council areas, Central Highlands and Isaac Regional Council have been identified as a secondary area of influence. Workforce sourcing was also used to define the regional area of influence of the SGCP.

In its most basic form the SIA assesses the impacts of the SGCP (both positive and negative) in these social and cultural areas of influence and identifies actions to manage and/or mitigate negative impacts and importantly it includes positive enhancement measures that will ensure SGCP is a sustainable part of the local community. The SIA contains four distinct 'Action Plans', which have been developed to address the identified key social and cultural impacts.

The Action Plans and rationale are as follows:

- Action Plan 1: Housing and Accommodation – the plan recognises that the majority of staff of the SGCP will be housed in a village on site and it is imperative that facilities and services are on site to properly accommodate workers. Additionally the Action Plan acknowledges the importance of reducing any potential impact on already limited housing in Alpha, by committing to monitoring affordability issues in Alpha and working with stakeholder to respond to supply issues through the Galilee Basin Round-table.
- Action Plan 2: Workforce Management – the plan focuses on local, regional and Indigenous employment opportunities, and increased workforce participation opportunities (beyond agricultural sector) through training and skills development (including Indigenous people) and diverse employment opportunities.
- Action Plan 3: Regional Business Development and Local Content – the plan recognises that increased revenue, diversification and expansion opportunities for local and regional business revenue may result due to the SGCP. In addition it outlines the need for strategies to reduce economic vulnerability of local businesses when mining ceases and plans to encourage fair and equitable access for local and

regional small business to register as a supplier or to tender for supply opportunities and develop the required capabilities.

- Action Plan 4 – Community Safety and Well-being – the plan addresses the potential impacts faced by the local community in regards to the SGCP. It recognises that development of the Galilee Basin will impact on the township of Alpha in the future. However, the proponent is committed to working with local community to ensure it contributes to improved livelihoods and amenity in project impacted communities. It will do this by working collaboratively with locals, other mining companies, key stakeholders and employees to ensure the wellbeing of the community.

The SIA also addresses impacts relating to adjoining and nearby landholders and ever increasing cumulative impacts that will be dealt with from a broader perspective through the Galilee Basin Roundtable and Local Area Infrastructure Plans.

The Proponent will manage the implementation of the SIA as well provide a representative for the Galilee Basin Roundtable. The SIA contains a commitment to monitoring, reporting and reviewing program which details how each of the action plans and commitments will be monitored.

Importantly, this SIA has been developed to be responsive to changing circumstances and increased knowledge of impacts over time. The monitoring program emphasises process and outcomes, coordination of planning and demonstration of continuous improvement as part of an adaptive management approach.

In addition to the project impacts, the SIA outlines the Proponents commitment to working closely with local communities to maximise the project benefits and avoid where possible negative impacts from mining operations. This will be done by engaging openly and honestly with all our stakeholders and responding to community complaints and enquiries through fair and equitable grievance and conflict resolution processes.

The proponent will encourage dialogue with all stakeholders as it works in partnership to implement SIA Action Plans and address cumulative impacts with other proponents through the Galilee Basin Roundtable. Local, state and federal agencies, other proponents and other key stakeholders have already begun to work collaboratively to investigate opportunities for the future, to address negative potential impacts, to enhance positive impacts and agree on outcomes for the local community, the region and the state.

A range of communication and engagement tools have been established at the outset of the EIS, SIA and AEIS process and will continue to be used to inform, engage and encourage participation from community members and other stakeholders throughout all project phases. Additionally, the Proponent has committed to a community liaison officer and a 24 hour enquiry and complaints hotline to ensure swift and fair response to community members and other stakeholders. A community consultative committee will also be formed to act as a two-way communication link between the SGCP and the community and provide necessary feedback to the project.

The SIA is a live document and will continue to evolve over the life of the project in consultation with government, community and other key stakeholders.

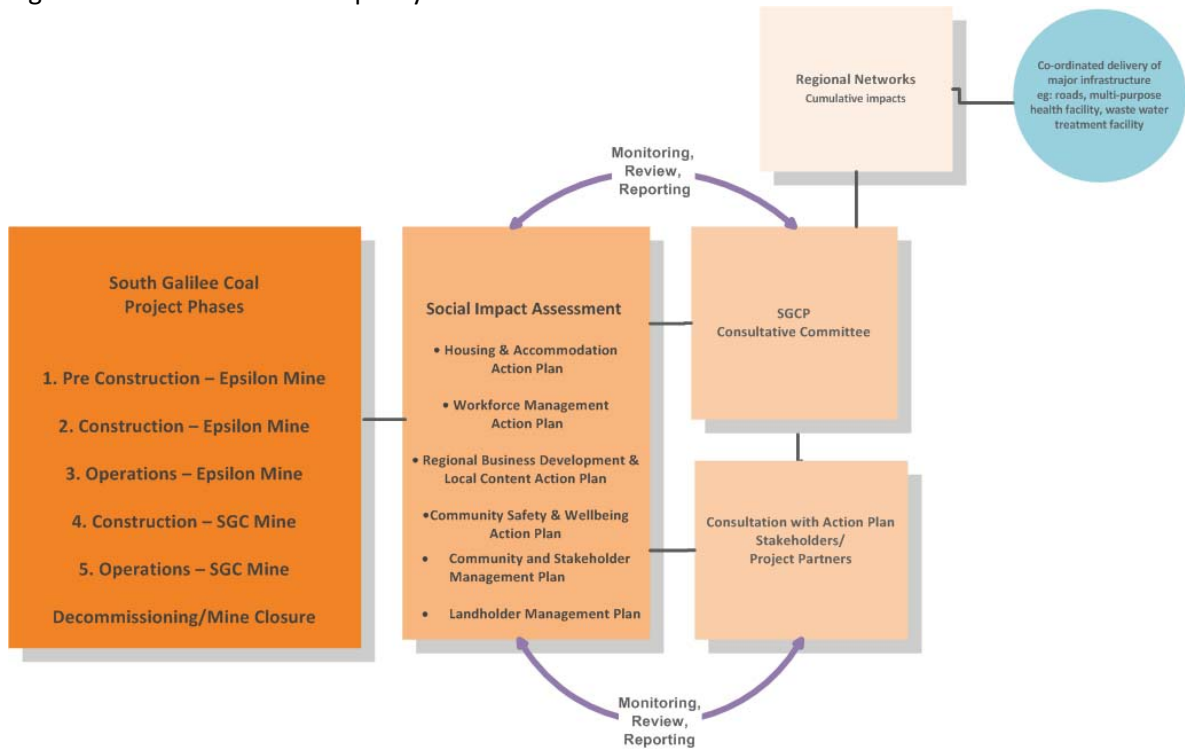
Volume 1 – Additional Environmental Impact Statement (AEIS) for South Galilee Coal Project

Section 9.10 – Social Impact Assessment



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ABBREVIATION TABLE	
Abbreviation	Definition
AEIS	Additional Environmental Impact Statement
BBIPP	Bowen Basin Indigenous Participation Partnership
BRC	Barcaldine Regional Council
CHPP	Coal Handling and Preparation Plant
CHRC	Central Highlands Regional Council
DATSIMA	Strait Islander and Multi-cultural Affairs
DCCSDS	Department of Communities, Child Safety and Disability Services
DCS	Department of Community Safety

ABBREVIATION TABLE	
Abbreviation	Definition
DETE	Department of Employment, Education and Training
DHPW	Department of Housing and Public Works
DSDIP	State Development, Infrastructure and Planning
EIS	Environmental Impact Statement
EMRP	Emergency Management Plan
ERP	Estimated Resident Population
FIFO	Fly in Fly Out
ICN	Industry Capability Network
LAIP	Local Area Infrastructure Program
MLA	Mining Lease Application
MoU	Memorandum of Understanding
OESR	Office of Economic and Statistical Research
QAS	Queensland Ambulance Service
QFRS	Queensland Fire and Rescue Service
QMEA	Queensland Mineral and Energy Academy
QH	Queensland Health
QPS	Queensland Police Service
QR	Queensland Rail
QRC	Queensland Resources Council
RAPAD	Central Western Regional Organisation of Councils
SIA	Social Impact Assessment
SGCP	South Galilee Coal project
TMP	Transport Management Plan
TMR	Department of Main Roads and Transport

INTRODUCTION

Purpose

This document builds on work undertaken to date by the South Galilee Coal project (SGCP) by (joint venturers AMCI and Alpha Coal as subsidiary of Bandana Energy (to be referred to herein after as 'the proponent') as part of the Environmental Impact Statement (EIS) Social Impact Assessment (SIA) and Social Impact Management Plan (SIMP). It also acknowledges that during the process of this assessment of the SGCP there has been a change to the policy context for social assessment in Queensland and three related project approvals have been granted since the proponent commenced their EIS.

This SIA has been prepared for inclusion in the Additional Environmental Impact Statement (AEIS) to address the core SIA principles as set out in the Queensland Governments' Social impact assessment guideline (July 2013) to assess impacts (both detrimental and beneficial) arising from the project and provide mitigation of impacts directly related to the project.

Structure of SIA

This SIA is structured as follows:

Section	Intent
Section 1	Introduction; Purpose, Policy Context and Related Project Approvals
Section 2	Project Details; an overview of the South Galilee Coal Project and the key phases of the project.
Section 3	Social Impact Assessment Summary; impact ratings and a direct cross referencing to specific actions (mitigations to minimise negative impacts or opportunities to maximise positive benefits) as set out in Action Plans (Section 4)
Section 4	Action Plans; mitigations and enhancement measures to address identified key social impacts (as set out in Section 3) for: • Housing and Accommodation • Workforce Management • Regional Business Development and Local Content • Community Safety and Wellbeing This section also sets out the mechanism for Monitoring, Review and Reporting of Action Plans and how SGCP will participate in regional engagement to address Cumulative Impacts.
Section 5	Stakeholder and Community Engagement Plan; outlines plans to engage with the community and other key stakeholders and sets out the communication mechanisms to be undertaken.
Section 6	Landholder Management Plan; including communication protocols, land access, grievance and dispute resolution and induction training and awareness, rehabilitation and monitoring and review procedures.

Policy Context

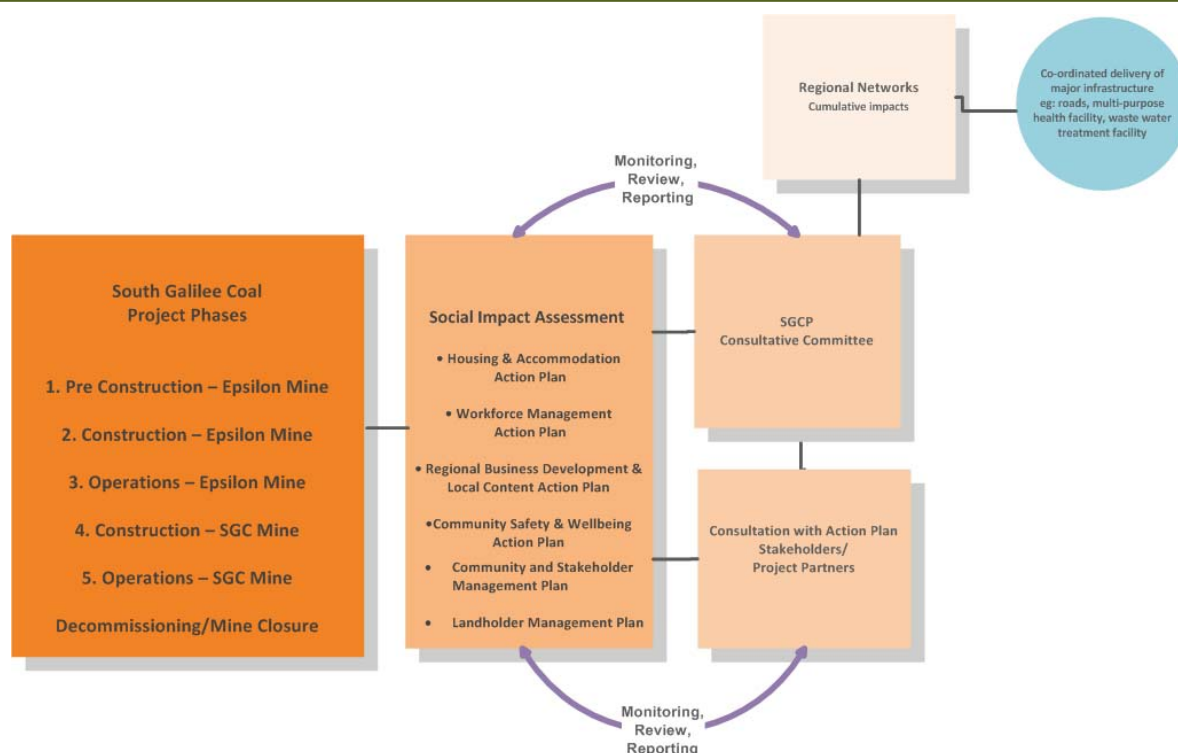
As part of the State Governments streamlining of approvals processes to provide reduced timeframes for Environmental Impact Statements (EIS), a revised *Social impact assessment guideline (July 2013)* document has been issued. This guideline complements the streamlined environmental impact assessment process through the:

- Promotion of a risk based approach to social impact assessment that focuses on outcomes to encourage innovative solutions to capitalise on social opportunities and mitigates detrimental impacts;
- Recognition of commitments that address social impacts directly related to projects; and
- Building of long term relationships between proponents, stakeholder and communities who are directly impacted projects.

This SIA has been prepared in this context and recognises the Queensland Government's complementary guideline; *"Managing the impacts of Major Projects in Resource Communities" (July 2013)*. This guideline is aimed at providing clarity on roles and responsibilities of industry, local government and government agencies in mitigating social, economic and infrastructure impacts of resource development.

Figure 1.1 describes the SIA and its core components, namely Action Plans that will be used as the key tool to mitigate direct project impacts. It also illustrates how regional networks will be used to better coordinate across a range of stakeholders the provision of core community infrastructure arising from cumulative project impacts.

Figure 1.1 – SGCP SIA in new policy context



Galilee Basin Development Strategy

The Galilee Basin Development Strategy was released by the Queensland State Government in November 2013. In developing this strategy, the Queensland Government is aware of the long term benefits of opening up the Galilee Basin to mining. However, it does acknowledge that there are significant upfront costs associated with early stage investment in this new resource region.

The Galilee Basin Development Strategy details government initiatives in relation to:

- Lower start-up costs which will include a ramp up to full royalty for an initial period;
- Streamlining land acquisition, planning , approvals and retape reduction which may involve the declaration of a Galilee Basin Development Area to enable a cost effective rail solution to be identified, as well as the option to declare Community Infrastructure Designations;
- Positioning Abbot Point as the Galilee gateway to the world by declaring Port of Abbot Point as one of five priority Port Development Areas ;
- Supporting infrastructure development and corridors by facilitating localised water solutions and facilitating private power investments; and
- Supporting regional communities through Local Area Infrastructure Program (LAIP) that will prioritise strategic infrastructure needs and address the phasing of strategic infrastructure.

It is the supporting of regional communities that is most relevant to the implementation of this SIA and identified cumulative impacts likely to result from the development of numerous projects in the Galilee Basin. This commitment will ensure that the Queensland Government will work to collaborate at the highest level with proponents and stakeholders to address the necessary community infrastructure that is needed to support sustainable development of the Galilee Basin.

Related Project Approvals

Since the proponent commenced the EIS process, a number of projects have been approved in proximity to the South Galilee Coal Project. These are detailed in Table 1.1. These approvals will require the need to identify and respond to cumulative social impacts in a coordinated manner.

All of these projects were approved and Social Impact Management Plans have been prepared with regard to the previous Queensland Government SIA Guidelines (2010). In order to facilitate co-ordination and consistency of approach to social impact mitigation, this SIA has had regard to the actions in their respective SIMP's related to SGCP, whilst recognising broader impacts will be addressed via active networks in the region.

Table 1.1 – Galilee Basin Related Project Approvals

Alpha Coal	GVK Resources and Hancock Galilee Pty Ltd	23 May 2012
Kevin's Corner	GVK Resources	9 May 2013
Galilee Coal Project (Northern Export Facility) (also known as China First)	Waratah Coal	19 August 2013

PROJECT DETAILS

Project Location

The proposed SGCP is located in the Galilee Basin, south- west of the township of Alpha. This small town of 359 people is located approximately 170 kilometres (km) west of Emerald and 450 km west of Rockhampton in Central Queensland as shown on Locality Map (*Figure 2.1*).

The Galilee Basin covers an area of approximately 247,000 square kilometres, containing large areas of high volatile, low sulphur thermal coal. The basin extends from Alpha and nearby township of Jericho north past Hughenden, south to Charleville and west beyond Winton to Middleton. The SGCP is one of a number of proposed coal mines in the Galilee Basin as shown on Figure 2.2. Others include:

- Galilee Coal Project (Northern Export Facility) also known as China First, proposed by Waratah Coal Pty Ltd
- Alpha Coal Mine, proposed by GVK Resources Pty Ltd
- Kevin's Corner, proposed by GVK Resources Pty Ltd
- Carmichael Coal Mine and Rail Project, proposed by Adani Mining Pty Ltd.
- China Stone Project (Macmines PTY LTD)



SouthGalilee
LOCAL PROJECT



South Galilee Coal Project

Social Impact Assessment

November, 2013

Figure 2.1 – Locality Map

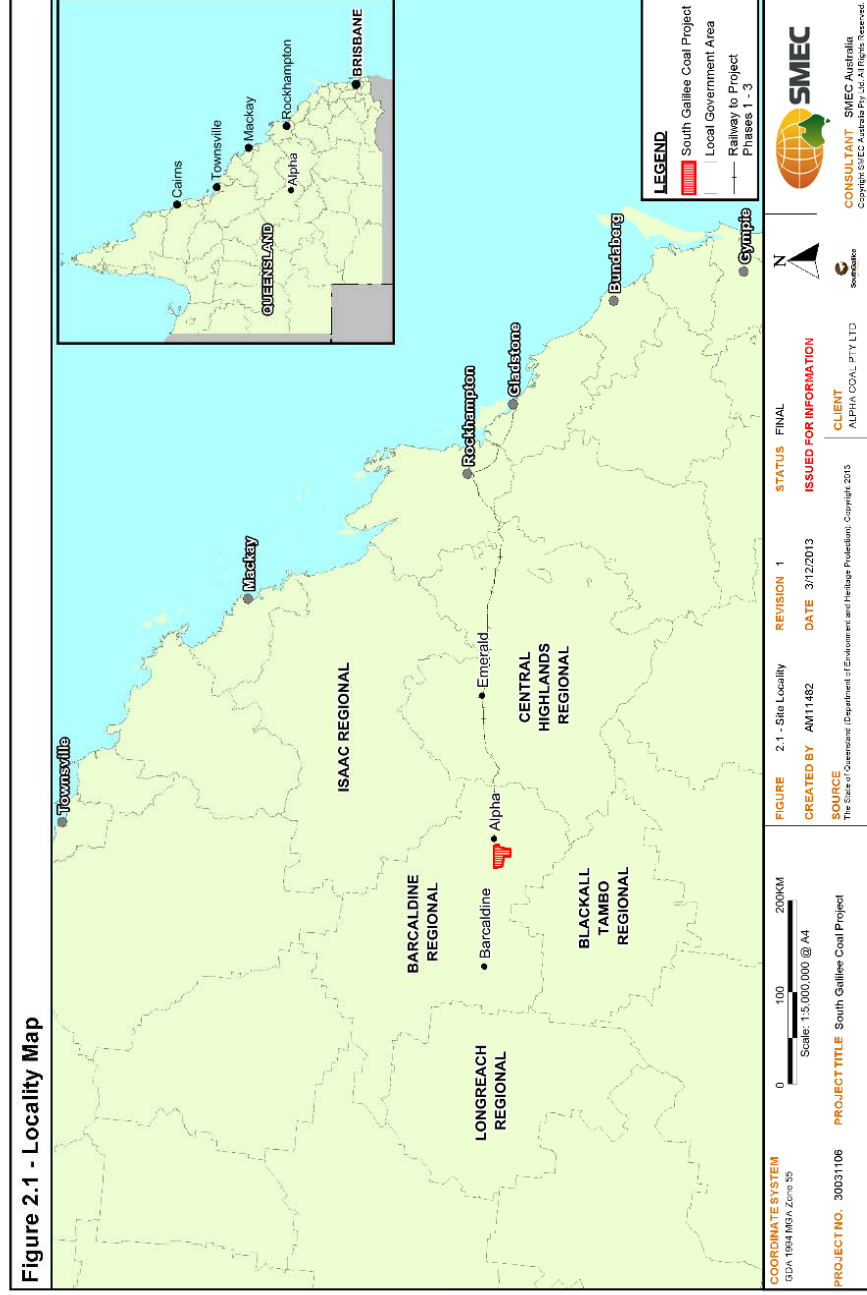
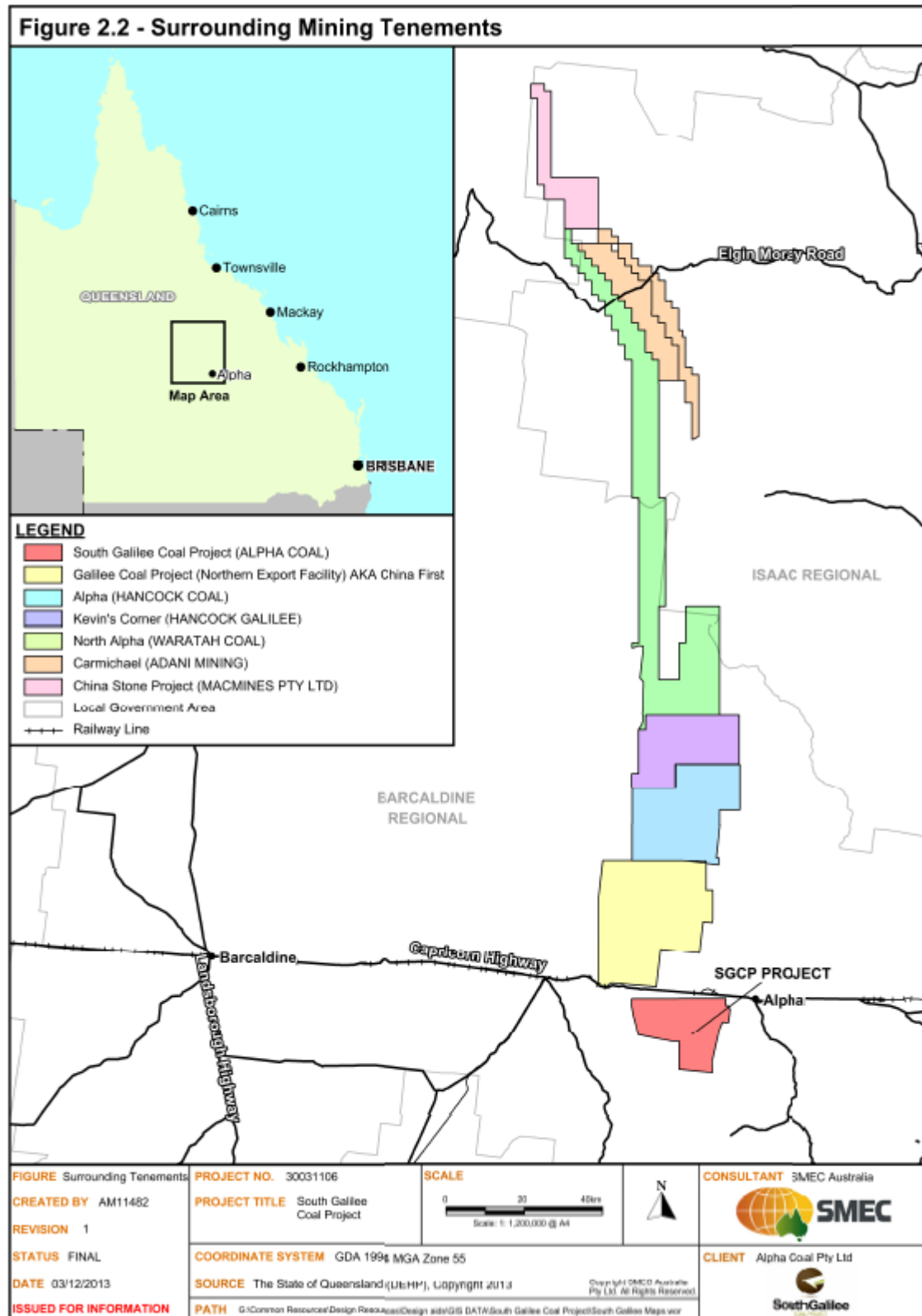


Figure 2. 2 – Surrounding Mining Tenements



Project Description

The SGCP is a joint venture between Alpha Coal Pty Ltd (a subsidiary of Bandanna Energy Limited) and the Proponent Mining Lease Application (MLA) 70453 covers the mine site.

The SGCP is a proposed open-cut and underground coal mining operation with an estimated mine life of approximately 35 years (2 years for construction, 33 years for operations). The project aims to produce up to 447 Million tonnes of product coal for the export market; however there may be opportunities in the future to continue to explore the mining tenement.

At full production the SGCP is a 15 Mtpa open cut and underground coal mine. To reach this target the Project has been split into distinct stages. A summary of the stages is listed below in Table 2.1.

Table 2.1 – SGCP Stages of Construction and Operation

Project Phase	Project Stage	Export tonnage	Construction Period	Operational Period
1-3	Epsilon Mine	3Mtpa	2015-19	2017-19
4 - 5	SGCP – Expanded Open Cut	5Mtpa	2018-19	2010 - 22
4- 5	SGCP – First Longwall	10Mtpa	2021-22	2023- 26
4- 5	SGCP – Second Longwall	15Mtpa	2025-26	2027-49

The Epsilon Mine concept

A key addition of the AEIS for SGCP is the “Epsilon Mine”. This stage has been developed by the proponent as an innovative solution to the challenge of the remoteness of the site and lack of an existing dedicated coal haulage rail link to the coastal ports. The ‘Epsilon Mine’ is the only proposed development in the region that doesn’t require extensive development of rail, port, water and power infrastructure. Instead the existing Central West railway will be upgraded and utilised for export of coal via Gladstone. The upgraded Central West line will then be used for operation freight haulage throughout the life of the mine, whereas the export of coal via this line will be limited to the Epsilon stage. Subsequent stages will export coal via a proposed new railway from the Galilee Basin to Abbot Point (by others).

The introduction of the Epsilon concept means that the existing Central West railway line can be used for supply of construction and operational materials throughout the Project. However, there are a number of upgrades (and a new spur line into the Project site) that are required before this line can be utilised. For this reason the supply of construction materials for the Epsilon Mine will be undertaken by truck. Following the construction period of the Epsilon Mine, the upgraded Central West line will be utilised for supply of operation freight as well as construction freight for subsequent expansion stages and other mines.

The Epsilon Mine is a significant consideration for the SIA as it will provide the initial impetus for the resource development in the Galilee Basin. The negative social impacts of the mine at this scale are likely to be low. However, there is an opportunity for considerable positive enhancement of the project in this early phase, in terms of workforce and local and regional economic development, for subsequent phases of the project. This SIA Action Plan timings reflect this mine phasing and they will provide the foundation to commence implementation of key activities and planning for future phases of SGCP and other resource development in the Galilee Basin.

Social Baseline Study and Community Engagement

A social baseline study was undertaken by MET Serve¹ on behalf of the proponents to describe the existing social conditions within the SGCP study areas (local and regional) for the EIS SIA. This was informed by an extensive community engagement program undertaken as part of the EIS. The community engagement program that was implemented and key outcomes is summarized in Appendix D of the EIS also prepared by MET Serve². Relevant issues were addressed and incorporated in the EIS SIA.

Both the EIS SIA and community engagement activities have been used as a basis to prepare this revised SIA for the AEIS. The social conditions were examined in the context of a number of key aspects as summarized in Table 2.2.

Table 2.2 – EIS SIA Summary of Key Aspects covered for Social Baseline Study

SIA Baseline	Aspects covered:
Settlement Patterns	- Local - Barcaldine Regional Council LGA - Alpha - Regional - Central Highlands Regional Council LGA - Coastal - Bundaberg Regional Council - Cairns Regional Council - Fraser Coast Regional Council - Townsville City Council LGA - Whitsunday Regional Council LGA - SEQ Sub-Group - Brisbane City Council LGA - Gold Coast
Demography	- Population and population trends - Age and gender distribution - Family structure - Registered marital status - Cultural and ethnic characteristics - Indigenous population, age and gender
Education	- Level of education within the community - Education and training facilities, including: - Early childhood - Primary and secondary schools - Tertiary facilities - School enrolments - Index of education and occupations
Economy, Employment and Income	- Industry breakdown - Number of businesses - Labour force statistics - Employment by occupation

¹ Social Impact Assessment for South Galilee Coal Project EIS (MET Serve: 2012)

² Community Engagement Report for South Galilee Coal Project (MET Serve 2011)

SIA Baseline	Aspects covered:
	• Gross Individual income • Index of relative socio-economic advantage and disadvantage
Infrastructure and Services	• Transport • Rail • Air • Power • Water • Telecommunications and media • Social infrastructure
Housing and Accommodation	• Household type and tenure • Household size • Rental market • Median house price, availability and housing repayments • New building approvals • Availability of social housing
Community Health and Safety	• Health and wellbeing • Health infrastructure and services • Disability prevalence • Community safety statistics and services
Culture and Community	• Community identity, values and lifestyles • Community vitality • Community aspirations

Social and Cultural Area of Influence – Local & Regional

The social and cultural area of influence for the SGCP focuses on the Barcaldine Region, with a particular focus on Alpha, which is the closest town to the mine site.

It is imperative that the local community is considered in the SIA and that appropriate action plans are developed to address potential impacts on their health and lifestyle and to ensure that interaction between mine staff and the community remain positive.

Previous studies indicate that a lifestyle that is safe, comfortable and ideally suited to families and raising children is of great importance to locals in the Alpha and Jericho area. During the SIA phase of the project it was also revealed that a “changing sense of place” was identified by locals as a concern due to the potential changes in the local, physical and social environment from mining.

From a regional perspective, areas such as Blackall -Tambo regional Council Areas, Central Highlands and Isaac Regional council have been identified as a secondary area of influence.

Previous studies for this area of influence indicate that greater economic prosperity and future business opportunities are of importance and are seen as a significant contributor to the future success of the region.

The Central Highlands Regional Council is not likely to comprise a high number for SGCP employees. However, it is included in regional secondary area of influence due to likelihood of Emerald being used as a service provision/training centre. It is also likely that some employees will be sourced for location to the west of SGCP (Blackall-Tambo, Longreach and surrounding locations). However, this will be limited by the drive time to SGCP being limited to 20 minutes.

Workforce sourcing was also used to define the regional area of influence of the SGCP. Although, ultimately workforce sourcing will be influenced by availability, for the purposes of the SIA the regional area of influence is divided into three (3) main categories including:

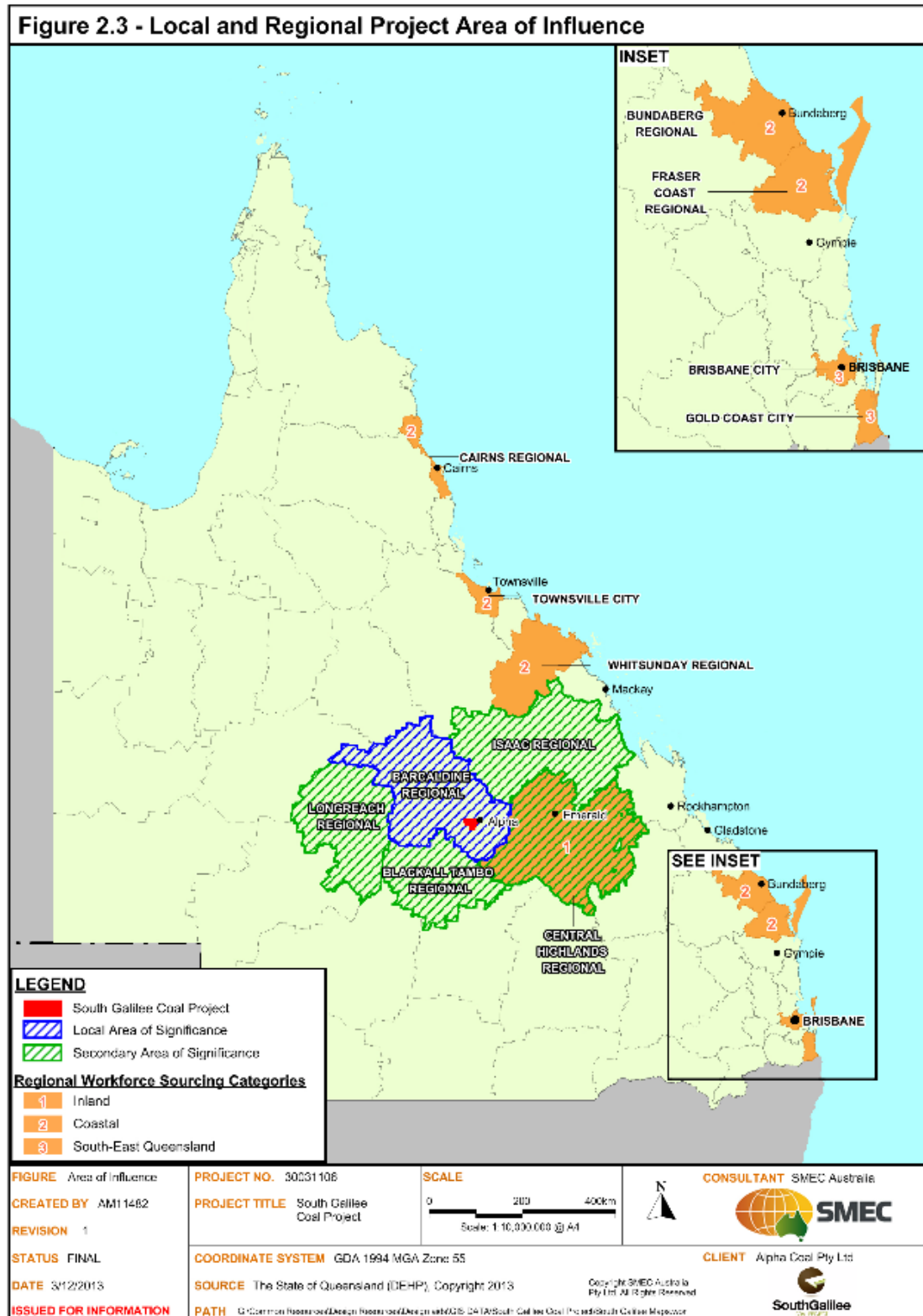
- Inland group (Central Highlands Regional Council, focussing on Emerald)
- Coastal sub group (Bundaberg Regional Council, Cairns Regional Council, Fraser Coast Regional Council, Townsville City Council and Whitsunday Regional Council); and
- SEQ sub groups (Brisbane City Council and Gold Coast City Council)

Striking the balance between regional and local needs will be a major challenge for mining proponents and the SGCP understands that following positive and negative impacts may occur:

- population growth;
- increased employment and training opportunities ;
- increases in personal income levels;
- diversification of the local economy;
- increases in the cost of living;
- increased demand on local emergency services;
- increased demand on public infrastructure and services;
- increased demand on housing and accommodation; and
- impacts on local health services.

Both the local and regional project areas of influence for the SGCP are shown on Figure 2.3.

Figure 2.3 – Local and Regional Project Area of Influence



Project Workforce

The SGCP workforce is anticipated to be up to approximately 1,600 personnel during the construction stage which will involve land clearing, earthworks and construction of the Coal Handling and Preparation Plant (CHPP), accommodation village expansion, road and rail infrastructure. Total workforce includes contractors, a more detailed breakdown of the workforce requirements is outlined in Appendix 1 of this document.

Up to 1,288 personnel will be required during the operational stage and up to 300 personnel during the decommissioning stage.

Table 2.2 and Table 2.3 below provide an indication of the anticipated workforce breakdown for the operational stage of the Epsilon, followed by the SGC Mine.

Table 2.3 – Workforce profile – Epsilon Mine

Position	Staff required
Site Management and Supervision	9
Drill and blast	4
Office Administration	5
Health, safety, environment, training	7
Plant and maintenance	10
Survey	2
Operations support	12
Operational staffing	144
Total number of employees	193
Contingency staff	19
Total	212

Table 2.4 – Workforce profile – SGC Mine

Position	Construction	Stage 1	Stage 2	Stage 3	Decommissioning
Management	7	11	12	12	4
Technical Services	18	25	35	49	21
Underground Operation	0	0	310	619	0
Open Cut Operation	0	214	214	214	0
CHPP and maintenance	17	174	194	214	20
Safety Department	21	20	23	28	12
Commercial	15	23	26	28	14
HR Department	11	18	18	18	11
FTE contractors	1410	0	21	21	177
Miscellaneous/ Other	101	22	33	85	41
Total	1,600	507	886	1,288	300

A more detailed indicative breakdown of the SGCP workforce is provided in Appendix A.

The overwhelming majority of the workforce will be Fly in Fly out (FIFO) and will be sourced from regional, coastal and south-east Queensland. Locals will also be encouraged to apply for positions at the mine and if they are located within 20 minutes of the site will not be required to live on site. The majority of the workforce however will be housed in an on-site accommodation village.

The decision to use FIFO workers lies in the capacity to supply an appropriate skilled workforce when considered in the context of mining development in the Galilee Basin. Additionally, given the remote location of the SGCP, attracting workers to the region is anticipated to be very difficult and not economically viable. This approach is also consistent with other mining proponents in the Galilee Basin and with limited housing and accommodation available in Alpha; existing infrastructure would not cope with the overwhelming demand.

The workforce would be required to fly into the Alpha Aerodrome with a bus service to be used to transfer staff to and from the mine.

Regional Economic Development

The long term economic benefits that projects such as the SGCP can bring to the Galilee Basin have recently been recognised by the State Government with the release of the Galilee Basin Development Strategy.

The strategy recognises the long term economic benefits that opening up the Galilee Basin to mining would bring and the potential to generate thousands of new jobs in mining, construction and other supporting industries.

Importantly, the strategy acknowledges the importance of building and maintaining community infrastructure to ensure that local townships and the region continues to grow and prosper.

The SGCP will contribute to the timely development expected in the Basin, with a total investment of approximately AUD \$4.4 billion. Royalties, Payroll tax, Port charges and workers tax equate to AUD \$147 million PA over the life of the mine. Company tax has not been estimated at this stage; however its contribution to State tax revenue would be significant.

The SGCP is already working with a variety of government and regional stakeholders and aligning with economic strategies and plans to ensure economic development opportunities are maximised, enable ongoing sustainability for the region and to create maximum benefits for the local community.

Work underway includes:

- Detailed discussions with DETE and local service providers to ensure local and regional employment opportunities are maximised;
- Negotiations with the Queensland Government and the major neighbouring resource companies (e.g. GVK Power and Infrastructure Ltd (GVK) as owner of the Alpha Coal Mine and Kevin's Corner, Waratah Coal Pty Ltd as proponent of the Galilee Coal Project and Adani Mining Pty Ltd as proponent of the Carmichael Coal Mine and Railway), with existing proposals for the development of coal rail and port infrastructure from the Galilee Basin;

Work to be undertaken includes:

- Co-ordinating with Department of State Development, Infrastructure and Planning (DSDIP) Regional services to develop local buy programs and work with local suppliers to build their capability, develop their capability statements, management systems and /or identify compliance requirements. These strategies will in turn develop local and regional business organisations capacity to provide private sector business investment opportunities and increase the provision of goods and services available for consumption locally; and
- Liaising with the Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA) and DSDIP Indigenous Services and Regional Services to ensure Indigenous participation in the project and encouraging Indigenous businesses to maximise opportunities wherever possible.

IMPACT ASSESSMENT SUMMARY

Impact Identification and Rating

For the purposes of this SIA the SIA Impact Assessment Criteria (prepared for the EIS by Met Serve) has been used. The EIS SIA assessed a broad spectrum of potential social conditions and impacts and were described and assessed in the context of a number of 'key aspects' (i.e. settlement patterns, demographics, education and training, economy, employment and income, housing and accommodation, community health and safety and culture and community). These key aspects have been used to illustrate the baseline environment and assess the potential project impacts and have been used in this AEIS SIA to flow into the mitigation and enhancement strategies contained in the Action Plans set out in Section 4.

Based on analysis of the baseline environment and in consideration of the project description and workforce profile, a list of potential impacts was developed using a risk assessment framework to generate an overall impact significance ranking, based on duration, type, probability and consequence of the impact as shown in Table 3.1. A summary of the assessment framework used is provided in Table 3.1.

Table 3.1 – SIA Impact Assessment Criteria

Impact Assessment Criteria	Parameter	Rationale
Duration / Phase	Construction	Potential impact predicted to occur during the SGCP construction phase.
	Operation	Potential impact predicted to occur during the SGCP operation phase.
	Decommissioning	Potential impact predicted to occur during the SGCP decommissioning phase.
	Beyond Project	Potential impact predicted to occur or continue beyond the life of the SGCP.
Type of Impact	Positive	The potential impact is expected to result in positive outcome/s.
	Negative	The potential impact is expected to result in negative outcome/s.
Probability	High	The potential impact is expected to occur or will probably occur in some circumstances.
	Medium	The potential impact may occur in some circumstances.
	Low	The potential impact is not expected to occur or could possibly occur in some circumstances.
Consequence	High	The potential impact is predicted to result in significant changes to the social environment, which are irreversible, widespread or severe.

Impact Assessment Criteria	Parameter	Rationale
	Medium	The potential impact is predicted to result in detectable changes to the social environment.
	Low	The potential impact is predicted to result in minor or undetectable changes to the social environment, within the range of natural variation.
Overall Impact Significance	High	Mitigation and/or management measures expected to be required to address impact. Monitoring required to measure the impact and the effectiveness of mitigation/management measures.
	Medium	Some mitigation and/or management measures expected to be required to address impact.
	Low	Specific mitigation and/or management measures not expected to be required.

1. Multiple phases may be listed if the impact is predicted to occur during more than one phase of the SGCP.
2. If the impact has both positive and negative outcomes, it will be listed twice with a separate impact assessment provided for each outcome.

A detailed consideration of impacts in the SIA and draft SIMP, submitted with the EIS (October 2012) has been undertaken and the social impacts and mitigations have been further refined to provide a more concise, logical and consistent approach to social impact assessment to align with Social Impact Assessment Guidelines (July 2013).

Social impact management strategies have been prepared for each of the main social impacts identified in Table 3.2. These mitigation and management measures are detailed in four (4) specific Action Plans:

- I. Housing and Accommodation
- II. Regional Business Development and Local Content
- III. Workforce Management
- IV. Community Safety and Wellbeing

Direct cross referencing to specific actions (mitigations to minimise negative impacts or opportunities to maximise positive benefits) as set out in Action Plans are detailed in Section 4, are shown in Table 3.2.

Table 3.2 – Impact Identification and Rating

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
Housing and Accommodation Action Plan						
Cumulative direct population increase in Alpha associated with relocation of permanent staff from multiple Galilee Basin mining proposals	Positive and Negative	High	Medium	High	Medium	1.1, 1.7, 1.8, 1.9
Secondary population increase associated with the relocation of employees from the SGCP and other mining proposals (e.g. employees' partners or families)	Positive and Negative	High	Medium	High	Low	1.1, 1.7, 1.8, 1.9
Minor direct population increase in Alpha associated with relocation of permanent SGCP	Positive and Negative	High	Low	Medium	Low	1.1, 1.7, 1.8, 1.9

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
staff						
Population growth may counteract existing demographic trends (e.g. population decline due to diminished tourism demand) and support/facilitate regional population growth in some source locations	Positive	Medium	Medium	Medium	Low	2.2, 2.3
Increased cost of living due to inflationary pressure from higher disposable incomes (particular impact on low income groups)	Negative	Medium	High	High	Medium	1.7
Increased demand for housing/accommodation	Negative	High	High	High	Medium	1.7, 1.8, 1.9

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
Reduced availability, suitability and affordability of housing due to cumulative demand and speculation	Negative	Medium	High	High	Medium	1.8, 1.9, 2.0, 2.1
Reduced availability, suitability and affordability of rental accommodation	Negative	High	High	High	Medium	1.1, 1.7, 1.8, 1.9
Increased demand for short-term accommodation associated with support services/staff travelling to site.	Negative	Medium	Medium	Medium	Low	1.1, 1.7, 1.8, 1.9
Increased house prices	Negative	Low	Medium	Low	Low	1.1, 1.7, 1.8, 1.9
Reduced availability, suitability and affordability of	Negative	Low	Medium	Low	Low	1.1, 1.7, 1.8, 1.9

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
rental accommodation						
Impacts on infrastructure at source centres for SGCP workforce associated with minor population increase	Negative	Medium	Low	Low	Low	2.1, 2.2
Workforce Management Action Plan						
Source centres for SGCP workforce may experience minor population increase	Positive and Negative	Medium	Low	Medium	Low	1.2
Increased demand for mining-related vocational training and qualifications	Positive	Medium	Low	Low	Low	2.0, 2.1, 2.2
Increased opportunity for traineeships/apprenticeships	Positive	Medium	Low	Low	Low	2.0, 2.1, 2.2

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
Increase in personal income levels in the Local Study Area, particularly Alpha	Positive	High	Medium	High	High	1.1, 1.5
Creation of employment opportunities	Positive	Medium	Medium	High	High	1.1, 1.3, 1.4
Positive economic impacts will contribute to the sense of community	Positive	High	Medium	Medium	High	1.2
Promotion of Indigenous business opportunities and increased training/employment for Indigenous Australians	Positive	Medium	Medium	Medium	High	1.6, 1.7, 1.8
Reduced availability of tradespeople	Negative	Medium	Low	Low	Low	1.3, 1.4, 1.9, 2.0, 2.1, 2.3
Regional Business Development and Local Content Action Plan						

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
Flow-on economic impacts (e.g. increased spending, opportunities for local business development/expansion)	Positive	Medium	Medium	Medium	High	1.1, 1.2
Diversification of the local economy and greater range of local businesses (e.g. buffer for the local economy in future economic downturns)	Positive	Medium	Medium	Medium	High	1.4, 1.8
Promotion of Indigenous business opportunities and increased training/employment for Indigenous Australians	Positive	Medium	Medium	Medium	High	1.8
Increased economic vulnerability due to reliance on the	Negative	Low	High	Medium	Low	1.2

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
mining industry						
Business development and employment opportunities in service and support industries	Negative	Low	Medium	Low	Medium	1.6, 1.7
Creation of employment opportunities	Positive	High	High	High	High	1.1
Business development and employment opportunities in service and support industries	Positive	Medium	High	High	High	1.2, 1.3, 1.4
Flow-on economic impacts (e.g. increased spending etc.)	Positive	High	Medium	High	High	1.2
Income disparity between mining and non-mining employees	Negative	High	High	High	Medium	1.2

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
Community Safety and Wellbeing Action Plan						
Disruption to road users (e.g. transport of construction materials, bus services between the Alpha Aerodrome and the SGCP, delivery vehicles etc.)	Negative	High	Low-Medium	Medium	Low-Medium	1.1, 1.2, 1.3, 1.4, 1.5
Decrease in agricultural production in those areas directly affected by the SGCP	Negative	High	Low	Medium	Low	2.7
Increased traffic leading to accelerated degradation of roads	Negative	Medium	Medium	Medium	Low	1.4
Increased potential for traffic accidents	Negative	Low	High	Medium	Low	1.1, 1.2, 1.3, 1.4, 1.5
Increased demand for emergency	Negative	High	Medium	Medium	Low	1.6

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
services impacting on capacity and/or staffing (either as a direct result of the SGCP or as a result of cumulative demand)						
Disruption to road users (e.g. heavy vehicles and wide loads)	Negative	High	Low	Medium	Low	1.4
Additional demand on QPS resourcing due to wide load transport, general policing requirements and road safety	Negative	Medium	Low	Low	Low	1.8
Increased traffic and traffic hazards	Negative	Medium	Medium	Medium	Low	1.1, 1.2, 1.3, 1.4, 1.5
Impacts on emergency services	Negative	Low	Low	Low	Low	1.6
Potential environmental	Negative	Medium	Medium	Medium	Low	2.6, 2.7

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
health and safety impacts (e.g. air quality, noise, subsidence etc.)						
Potential safety impacts (e.g. increased crime, violence, drug and alcohol use etc.)	Negative	Low	Medium	Low	Low	2.9, 3.5, 3.5, 3.6
Stress for landholders associated with uncertainty/delays with decisions (e.g. inability to sell properties)	Negative	Medium	Low	Low	Low	2.7
Impact on family relationships from FIFO/stress of shift work hours	Negative	Low	Low	Low	Low	3.1, 3.2, 3.4
Real or perceived health and safety impacts (e.g. recreational drug and alcohol use)	Negative	Low	Low	Low	Low	3.5, 3.6

Potential Impacts	Type of Impact	Probability	Consequence	SIA Overall Impact Significance	With SIA mitigation	Action Reference (Action Plan)
Introduction of new cultural values, aspirations, lifestyles and sense of community	Positive	Medium	Medium	Medium	Medium	2.6
People that relocate to Alpha may experience a period of adjustment and isolation	Negative	Low	Low	Low	Low	3.3
Perception that purpose-built accommodation camps (typically housing proportionally higher numbers of single males) may detrimentally impact the social values of local townships (e.g. potential to increase threats to property and public safety)	Negative	Low	High	Medium	Low	2.5

Stakeholder Engagement

The proponent recognises the need for ongoing engagement with stakeholders beyond the statutory project approval processes. The proponent will continue to engage the community and stakeholders to further develop and implement Action Plans listed in Section 4. This engagement will be managed through the ongoing Community and Stakeholder Engagement Plan for the Project as set out in Section 5.

Ongoing and expanding consultation with a range of agencies and key stakeholders as set out in Table 3.3, is planned that will facilitate the further development and implementation of the Action Plans throughout the life of the project.

Table 3.3 – SIA Stakeholders

Stakeholders and Project Partners	Action Plans:			
	Housing & Accommodation	Workforce Management	Regional Business Development and Local Content	Community Safety and Wellbeing
Mining Proponents				
The Proponent	•	•	•	•
The Proponent workforce	•	•		•
The Proponent contractors		•	•	•
Other mining proponents	•	•		
State and Federal Government Agencies				
Queensland Health (QH)	•			•
Department of Infrastructure, State Development and Planning (DSDIP) including Industry Capability Network (ICN)	•	•	•	•
Department of Employment, Education and Training (DETE)		•	•	

Stakeholders and Project Partners	Action Plans:			
	Housing & Accommodation	Workforce Management	Regional Business Development and Local Content	Community Safety and Wellbeing
Department of Aboriginal and Torres Strait Islander and Multi-cultural Affairs (DATSIMA)		•	•	
Department of Education and Department of Employment (Formerly DEEWR)	•	•		
Department of Trade and Treasury - Office of Economic and Statistical Research (OESR)	•			
Valuer General	•			
Department of Communities, Child safety and Disability Services (DCCSDS)		•		•
Department of Community Safety (DCS)				•
Department of Housing and Public Works (DHPW)				•
Department of Transport and Main Roads (TMR)		•		•
Local and Regional Government				
Barcaldine Regional Council (BRC)	•	•	•	•
Regional Councils including Central Highlands Regional Council (CHRC) and		•		•

Stakeholders and Project Partners	Action Plans:			
	Housing & Accommodation	Workforce Management	Regional Business Development and Local Content	Community Safety and Wellbeing
IRC				
Other Councils e.g.: Gold Coast City Council, Whitsunday Council		•		
Remote Area Planning and Development Board (RAPAD) – Central Western Regional Organisation of Councils		•	•	
Emergency Services and health providers				
Queensland Police Service (QPS)	•			•
Queensland Fire and Rescue Service (QFRS)				•
Queensland Ambulance Service (QAS)				•
Education, Employment and Training				
DETE	•	•		
TAFE		•		
Central Queensland University (CQU) & CQ Institute of TAFE ³		•		
RAPAD Skilling		•		
Local and registered training providers		•		
Job Services Australia		•		
Queensland Mineral		•		

³ Amalgamation scheduled for Quarter 2, 2014

Stakeholders and Project Partners	Action Plans:			
	Housing & Accommodation	Workforce Management	Regional Business Development and Local Content	Community Safety and Wellbeing
and Energy Academy (QMEA)				
Local Primary and Secondary Schools including Regional Boarding Schools)		•		
Community				
Directly impacted landowners			•	
Community interest groups			•	•
Local community members			•	•
Indigenous community, groups and organisations. E.g.: Barcaldine Negotiation Table.		•	•	•
Bowen Basin Indigenous Participation Partnership (BBIPP)		•		
Other local communities e.g.: Jericho and Tambo			•	
Not for profit organisations		•	•	
Local and online support groups for employees and families				•
Transport				
Freight and transport bodies – e.g.: Queensland Rail (QR), Aurizon, Pacific				•

Stakeholders and Project Partners	Action Plans:			
	Housing & Accommodation	Workforce Management	Regional Business Development and Local Content	Community Safety and Wellbeing
National				
Business				
Local and regional businesses and service providers			•	
Queensland Resources Council (QRC)	•	•	•	•

ACTION PLANS

Intent and Structure of Action Plans

The Action Plans are structured as follows:

Rationale: Provides an overview of the context of the key impact area that mitigations are based on. Information for this is drawn from the EIS, SIA and supporting documents and engagement undertaken with stakeholders.

Objectives: The overarching goals of the Action Plan upon which will be used to demonstrate the extent of achievement of the Action Plan

Actions: The activities that have been identified in consultation with stakeholders to mitigate negative impacts and enhance positive impacts. Where appropriate and agreed with other proponents who have been granted project approvals* (refer to Table 1.1), actions are aligned to provide a coordinated and consistent approach to the management of social impacts.

Timing: Recognises that SGCP is likely to be developed in five (5) key phases in key stages as per Table 2.1 and at the end with decommissioning, as follows:

Phase 1	Pre-construction of Epsilon Mine
Phase 2	Construction – Epsilon Mine
Phase 3	Operations – Epsilon Mine
Phase 4	Construction – SGC Mine
Phase 5	Operations – SGC Mine
	Decommissioning and mine closure

These phases are detailed more fully detailed in the Project Description (Section 2).

Key Stakeholders/Potential Partners: acknowledges that the proponent and government at all levels have a responsibility for planning and delivery for core services and that the proponent, in implementing these plans, will be facilitators of ensuring actions are undertaken with key stakeholders across a range of areas including health, education, emergency services, transport and infrastructure and employment and training initiatives. The specific accountabilities and responsibilities of stakeholders in relation to the development and implementation of the Actions Plans will be negotiated with key stakeholders.

Key Performance Measures: are quantifiable measures that will demonstrate performance against specific actions and are linked to the monitoring, review and reporting mechanisms developed for these Plans. To ensure KPI's are properly implemented, met and measured, the Proponent will reflect all KPI's agreed to in sub-contracting arrangements in the future.

**At the time of preparing this SIA the following projects had received Coordinator General Approval:*

- Alpha Coal – GVK Resources and Hancock Galilee Pty Ltd (May 2012)
- Kevin's Corner – GVK Resources (May 2013)
- Galilee Coal Project (Northern Export Facility) – Waratah Coal Pty Ltd (August 2013)

Action Plan 1 – Housing and Accommodation

Rationale

The proponent is committed to providing the majority of its workforce including contractors with accommodation on site. The village will include additional beds for specialists and consultants. Permanent shift staff will have dedicated rooms and personnel on continuous rotation will have motel-style accommodation.

The village will include en-suite accommodation, laundry facilities, multi-purpose sports courts, gymnasium, swimming pool, restaurant and stores. It will also include maintenance and service buildings and limited parking. The village will be located in the north eastern corner of MLA 70453, where the potential for disturbance from noise, vibration and light will be minimal for off-duty employees.

The workforce will be predominantly fly in fly out (FIFO) between the Alpha Aerodrome and the proposed workforce source locations. To minimise the volume of road transport, a bus service will transfer personnel from the Alpha Aerodrome to the accommodation village. Except for a limited number of senior employees who will be required to relocate to Alpha, accommodation will not be provided off-site. All personnel housed at the accommodation village will be required to stay on-site for the duration of their roster.

During the construction period, provision has been made to accommodate construction staff and contractors onsite using existing farm dwellings (refer to Tenure Policy) from property purchases on the mining lease. An onsite accommodation village will be developed in stages to accommodate all phases of the project (Epsilon through to full operation for the peak overlap of 1,600 personnel). The village will also include additional accommodation provided for specialist contractors and consultants.

The proponent intends to base up to eight staff during the peak operational phase of the project in Alpha. Although this number alone is not likely to provide a substantial contribution to the residential population, potential cumulative impacts from a number of proposed resource developments in the region may result in potentially significant increases in population in Alpha. In this respect the proponent does recognise the concerns raised by the community in regards to the impacts and costs of housing and temporary accommodation shortages that may be experienced as a result of mining in the area.

With a population of approximately 430 residents (Estimated Resident Population (ERP) 2010) in 300 private dwellings and key land development constraints such as infrastructure limitations and flooding, Alpha is vulnerable to demand pressures on its limited housing and temporary accommodation supply. The proponent is therefore willing to work with local council, government agencies and other regional mining proponents to monitor impacts which have been identified by the BRC and local community as high priority. This will involve working as a member of active networks in the region to proactively address cumulative housing supply and demand issues.

Based on the impacts identified in Table 3.1, this plan addresses the proponent's commitment to liaising with relevant stakeholders and government authorities to:

- Monitoring issues of housing affordability and accessibility in Alpha;
- Working with stakeholders to respond and supply housing in the region; and
- Providing input to a development plan for Alpha

Objectives

1. Providing accommodation solutions for the SCGP workforce (permanent and contract staff) and facilitating the provision of housing in Alpha for a small number of senior SGCP employees;
2. Implement with other stakeholders, an evidence based housing market monitoring program to monitor the adverse impacts of the SGCP on housing affordability and availability in Alpha and surrounding areas; and
3. Develop co-operative partnerships with other stakeholders to manage adverse impacts of the SGCP on the availability and affordability of housing in Alpha and the surrounding areas.

Action Plan – Housing and Accommodation

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
WORKFORCE MANAGEMENT AND ACCOMODATION			
1.1 Construct a site based mining accommodation village with capacity to accommodate contract and permanent of employees. The accommodation village will also include capacity for short-term contractors/ consultants to minimise demand in the surrounding area.	The Proponent BRC DSDIP	Phase 1	On site workers accommodation village constructed in advance of operations and ahead of demand. Workforce resides in the onsite accommodation throughout the duration of their roster.
1.2 Construction workforce to be accommodated on site on existing dwelling located on mining lease.	The Proponent	Phase 1	Construction workforce accommodated as per Tenure Policy.
1.3 Provide accommodation for up to 6 project staff in Alpha.	The Proponent	Phase 3	Suitable housing provided in Alpha.
1.4 Consult with a variety of stakeholders regarding the accommodation village its location, design, size and facilities (including medical).	The Proponent BRC DHPW	Phase 1	BRC and State Government support the accommodation village design, size and location. Workforce supports the village design and facilities.
1.5 Ensure sufficient facilities have been incorporated into the design of the onsite accommodation to enable social and recreational opportunities and to minimise impacts on Alpha's services, social values and safety.	The Proponent BRC	Phase 1	Workforce support the villages facilities State Government and BRC support accommodation facilities.
1.6 Implement a Good Neighbour Policy and Workforce Code of Conduct to minimise negative impact on Alpha community values.	The Proponent BRC QPS	Phase 1	Reported incidents of antisocial behavior in Alpha Number of Code of Conduct breaches

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
ACCOMMODATION IN ALPHA			
1.7 Work with other proponents, government agencies and service providers to plan for increased demand for infrastructure and services due to increased population from mine workers and their families who have relocated to the area. This includes minor direct population increase in Alpha associated with relocation of permanent SGCP staff and additional health service providers etc.	The Proponent Other mining proponents BRC Service providers Alpha community QH DETE	Phase 2	Evidence based housing market monitoring. Evidence of joint strategies with members of active networks.
1.8 Monitor the project impacts on housing availability and affordability in Alpha and the BRC area. Monitoring timeframes and triggers need to consider the time taken to release land for development and the planning frameworks (e.g. may need to consider 5 year look ahead).	The Proponent BRC Treasury Valuer General	Phase 1	Quantitative measures to be developed.
1.9 Monitor the impact on BRC rental stocks as a result of the Project and cooperate with the BRC, DHPW, other Project proponents and housing providers to develop strategies that offset negative impacts. This will include monitoring of affordable housing and where necessary, liaison with DHPW and DoC.	The Proponent BRC DHPW DoC	Phase 1	Residential affordability and vacancy rate in Alpha and BRC; Median land prices for housing in Alpha and BRC do not increase more than standard CPI (or equivalent measures). Number of vacant serviced lots of residential land in Alpha and Barcaldine Regional communities.
2.0 At the time of recruitment, identify the housing	The Proponent BRC	Phase 3	Workforce engagement which includes attitudes

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
intentions of new Project workforce members (contractors and permanent).	DSDIP		towards accommodation. Consultation with BRC and DSDIP
2.1 Explore options for delivering housing in Alpha if feedback from workers is that they intend to reside in Alpha.	The Proponent BRC DSDIP	Phase 3	Timely release of serviced land and housing in Alpha for Project workforce. Number of Project workers resident in Alpha.
REGIONAL HOUSING MARKET IMPACTS			
2.2 Inform the labour market in advance of plans to recruit through BIBO, FIFO and the locations of the points of hire.	The Proponent Department of Employment	Phase 3	Liaise with key stakeholders as part of WMP.
2.3 Work with relevant government agencies, organisations and other proponents to contribute to housing market research that identifies vulnerable locations in the workforce sourcing regions.	The Proponent SGCP workforce source communities (e.g. Brisbane, Gold Coast, Townsville, Cairns, Bundaberg, Maryborough, Proserpine, Whitsunday and Bowen). BRC QRC Treasury Valuer General	Phase 3	Establish baseline, target and triggers and strategies to support housing market monitoring as part of active networks.

Action Plan 2 – Workforce Management

Rationale

The development of the Epsilon Mine will mean that there is likely to be a staged approach (as set out in Table 2.1) to peak operating potential of the South Galilee Coal Project. The maximum anticipated workforce of Epsilon Mine of just over 200 is set out in Table 2.3. However, at maximum operational capacity the SGC mine will employ 1,600 personnel and will include indirect workers such as contractors. This staged approach to the mine will allow appropriate planning to maximise fair and reasonable employment opportunities for local, regional and state wide workforces. This will occur via a planned local and regional capacity building program in cooperation with key stakeholder and other proponents (if appropriate) to respond to future workforce needs.

The project represents a significant opportunity to develop local skills and diversify employment opportunities regionally, resulting in positive flow on economic benefits to all sectors of the community.

The proponent recognises that the Australian and Queensland Governments and QRC are entering a new one-year Memorandum of Understanding (MoU) from September 2013, committing 'to work in partnership with each other and with Indigenous stakeholders to create sustainable economic development and employment opportunities that will contribute to building strong and sustainable Indigenous families and communities in Queensland.' This unique partnership between both levels of government and the resources industry began when the first MoU was signed in 2007.

The overriding objective of the MoU will be achieved through joint efforts to overcome structural impediments and build the capacity of Indigenous Queenslanders in key areas such as education and training which will lead to increased employment opportunities in the resources sector.

It is also understood that Queensland's Department of Aboriginal and Torres Strait Islander and Multicultural Affairs is developing an action plan in early 2014 that will include distinct actions for communities and industry to support economic independence of indigenous Australians and Torres Strait Islanders in employment. The Proponent intends to support this framework wherever possible.

The Proponent acknowledges that project workforce requirements will be influenced by demand from other local projects in the Galilee Basin, regional projects in the Bowen Basin and Queensland wide. Project timing will impact on the ability of the project to draw on resources locally and regionally. This plan has been prepared to address these issues, while recognising there are still areas with Queensland where there are high unemployment rates with high labour force capacity. This plan also recognises the benefits of increasing indigenous workforce participation and the need to have proactive recruitment strategies that encourage greater participation from women and other disadvantaged groups.

Based on the impacts identified in Table 3.1, this plan addresses:

- local, regional and Indigenous employment opportunities, and

- increased workforce participation opportunities (beyond agricultural sector) through training and skills development (including Indigenous people) and diverse employment opportunities.

Objectives

- To maximise employment opportunities for local people, including local Indigenous people and other disadvantaged groups; and
- To facilitate opportunities for people, both locally and regionally to increase their skills capacity for employment in the mining sector.

Action Plan – Workforce Management

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
WORKFORCE SOURCING - LOCAL & REGIONAL			
1.1 The Proponent will attempt to recruit locally, where practicable and implement a Local Employment Policy (LEP) that: - Investigates the development of Pre-Employment Training Programs; and - Notifies local people of employment opportunities, through local newspapers and media, including Indigenous media.	Department of Employment, Education and Training (DETE) QRC, Local Councils Local training providers The Proponent	Phase 1	Local Employment Policy developed and successfully implemented; and Quantitative measures to be agreed.
1.3 Liaise with Department of Employment (formerly DEEWR)-funded FIFO Coordinators to source workers from areas around Queensland with high unemployment and areas with employment capacity. Liaise with DATSIMA to provide	Gold Coast City Council, Townsville City Council, Cairns Regional Council, Bundaberg Regional Council, Fraser Coast Regional Council and Whitsunday Regional Council DETE DATSIMA The Proponent	Phase 2	Numbers of workers recruited through - funded FIFO Coordinators; and Number of workers recruited from high unemployment areas

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
assistance in engaging with Aboriginal and Torres Strait Islander candidates from the communities that FIFO workers will be sourced from.	Department of Employment (Federal Govt)		
1.3 Participate in preparation of Central Queensland Workforce Development Strategy by providing workforce estimates and workforce profiles to relevant stakeholders in timely manner to assist with planning and program development and/or identifying short and long term employment gaps.	CQU TAFE DETE QMEA DSDIP Registered training providers	Phase 2	Key stakeholders have a list of job positions and skill requirements in a timely manner to enable appropriate planning responses.
1.4 Work closely with DETE to assist with the delivery of workforce development strategies that link with existing local and regional, training programs and up-skilling.	The Proponent DETE	Phase 2	Employment and Training Strategy developed and agreed between DETE and the Proponent.
INCREASED WORKFORCE PARTICIPATION			
1.5 Recruitment policies for the project will reflect equal opportunity for all, and facilitate active inclusion of disadvantaged groups, e.g. Indigenous people, women, mature workers and disabled people, specifically via: • Anti-discrimination	BRC Indigenous groups DETE DSDIP	Phase 1	Recruitment policy developed and successfully implemented. Anti-discrimination and cultural awareness training is included within induction and 100% of staff is inducted.

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
and cultural awareness training during induction; - Strategies to increase number and % of local area residents and underrepresented groups participating in skills development training; - Strategies to increase number of Indigenous employees; and - Number and % of staff trained, including number of apprentices, from the local area.			
INDIGENOUS PARTICIPATION			
1.6 Work closely with the Australian and Queensland Governments and QRC to implement their Memorandum of Understanding (MOU), as applicable to Project. The Proponent will work with key stakeholders to investigate the expansion of the Bowen Basin Indigenous Participation Partnership (BBIPP) to Galilee Basin.	Bowen Basin Indigenous Participation Partnership (BBIPP) DATSIMA Local Indigenous groups Department of Employment (Fed Govt)	Phase 1	Indigenous Participation Partnership established for Galilee Basin.
1.7 Appoint a dedicated Indigenous Liaison Officer position to provide employment information and business development and contracting	DATSIMA Local indigenous groups/Organisations Department of Employment (Federal Government) Job Services Australia	Phase 1	Attendance and participation at Negotiation Table meetings. Recruitment and retention of Indigenous Liaison Officer.

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
opportunities to Indigenous people, and assist with developing Indigenous Participation initiatives that identify direct employment opportunities offered by the Project, retention strategies and capacity building strategies locally and regionally for indigenous participation.			Regular meetings of ILC
1.8 Identify potential barriers to indigenous participation and work with key stakeholders to develop appropriate strategies to support increased indigenous workforce participation.	DATSIMA DETE DSDIP – Regional Services	Phase 1	Indigenous workforce participation. Evidence of supporting key stakeholder to develop programs to support increased indigenous workforce participation. This includes involvement in DATSIMA's Economic Participation Framework and subsequent action plan to improve employment opportunities.
TRAINING AND SKILLS DEVELOPMENT			
1.9 Work with DETE to identify skills gaps in the local community and to tap into opportunities, e.g. programs available for skilling workers to fill these gaps (ongoing assessment).	DETE TAFE CQU RAPAD Skilling BRC DSDIP – Regional Services DATSIMA Not-for-profit organisations / training providers	Phase 3	A suite of training programs have been documented to be delivered by government; and Relevant training partnership agreements with government.
2.0 Investigate the opportunity to establish	The Proponent, Other mining	Phase 3	Quantitative measures to be developed.

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
a combined proponent training association that provides a range of programs targeting core skills and competencies required for the Project.	companies DETE DoC BRC		
2.1 Engage with DETE, TAFE, CQU, and relevant registered training providers to develop a suite of training programs for delivery and/or private training providers.	The Proponent and/or major contractors RAPAD Skilling DETE TAFE CQU Training providers	Phase 3	Evidence of communication of workforce requirements to DSDIP and DETE. Number of BRC and other students given work experience and/or receiving scholarships or financial support.
WORKFORCE RETENTION			
2.2 Develop a multi-skilled workforce that promotes and supports individual career path progression. The Proponent will encourage staff retention through: - FIFO and attractive roster arrangements - Appropriate remuneration - Staff development programs, including a Professional Development program and career path progression	BRC DSDIP DETE	Phase 2	The Proponent labour force retention rates.
APPRENTICESHIPS AND TRAINEESHIPS			
2.3 Implement a structured training program in the BRC area (once peak operations – Phase 4 commence) targeted to both the industry requirements as well as wider community	BRC, local schools, DETE RAPAD Skilling BRC Not-for-profit organisations /training providers	Phase 4	Number of Project-funded apprentices and trainees employed by local businesses. Number and % of local area residents and underrepresented groups participating in

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
needs. In particular, the proponent will develop a: • Graduate Support Program; • Traineeship Program; • Indigenous training programs; and • Apprenticeship programs.			skills development training. Number of and type of training programs delivered across Project - by provider and trainee.
SCHOOLS TO INDUSTRY PATHWAYS			
2.4 Establish key contacts at key schools in BRC, IRC and CHRC. Schools to conduct presentations about vocational opportunities to encourage applications for workforce opportunities.	Emerald High School, Barcaldine High School, Marist College (Emerald) CHRC	Phase 4	Established contact at key schools; (including schools where local students maybe boarding). Annual presentation is given to BRC, IRC and CHRC schools.
2.5 Work with QMEA and QRC to expand their existing programs into the local area and in regional areas of high unemployment, as a means to encourage young people to start careers in the resource sector.	DATSIMA DETE	Phase 4	Number of school to industry pathway programs provided to local schools in local area.

Action Plan 3 – Regional Business Development and Local Content

Rationale

The Proponent recognises the importance of local industry participation and the potential economic benefits for local and regional businesses as a result of the SGCP. The potential benefits of the project include increase in personal income levels due to direct employment but also flow on economic impacts resulting in from increased spending and opportunities for local business development and expansion. Some key examples of where positive benefits are likely to arise from, are significant expansions of infrastructure in the local community of Alpha including the planned Airport expansion and ultimate development of an intermodal rail freight facility to facilitate expansion of Epsilon Mine to more intensive stages of the SGC Mine.

The project is likely to enhance regional business development by bringing numerous benefits to local and regional areas including the procurement of local products and services. Strengthening local supply chains with occur via the Local Content Plan and complementary Regional Capacity Building Programs undertaken in partnership with key stakeholders and other projects, as appropriate. This will serve to strengthen the proponent's relationship with the community from the outset and provide a foundation for sustainable regional development.

The project will also work with DATSIMA to provide opportunities to indigenous businesses wherever possible under the departments Economic Participation Framework. This will be further developed through an action plan to be developed and released by DATSIMA in mid 2014.

To ensure positive benefits are enhanced, a detailed Local Content Plan (LCP) will be developed in accordance with Queensland Resources and Energy Sectors Code of Practice for Local Content that gives local industry full, fair and reasonable opportunity to be considered for SGCP contracts.

Based on the impacts identified in Table 3.1, this plan addresses:

- Increased revenue, diversification and expansion opportunities for local and regional business revenue as a result of SGCP;
- Strategies to reduce economic vulnerability of local businesses when mining ceases; and
- Plans to encourage fair and equitable access for local and regional small business to register as a supplier or to tender for supply opportunities and develop the required capabilities.

Objectives

1. To ensure local and regional businesses maximise growth as a result of the SGCP
2. To ensure local and regional businesses are given fair and equitable access to tendering opportunities and supply chain services
3. To facilitate access to business opportunities for local and indigenous businesses

Action Plan – Regional Business Development and Local Content

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
LOCAL CONTENT PLAN			
1.1 Develop a Local Content Plan (LCP) based on the Queensland Resources and Energy Sectors Code of Practice for Local Content (2013) ensuring full, fair and reasonable opportunity for capable local industry to compete for the supply of goods and services for the project.	The proponent DSDIP ICN	Phase 1	Development and implementation of the LCP ICN portal established Number of regional businesses pre-qualified to supply SGCP. Evidence of utilisation of website by local and regional businesses.
CAPACITY BUILDING FOR LOCAL AND REGIONAL ECONOMIC BUSINESSES			
1.2 Work with relevant agencies/ organisations and locals to encourage the use of local and regional businesses where they are technically capable and commercially competitive (and aware of the company's expectations and requirements for accreditation) to: - Diversify the local economy - Increase spending in the area - Provide opportunities for local businesses to expand and develop.	The proponent (including Indigenous Liaison Officer) ICN OAM DSDIP BRC CHRC businesses Local businesses owners/managers	Phase 1	Development of a procurement policy that details reporting requirements to measure success of the policy in the supply chain. Existence and use of the Local Supplier Register listing regional businesses pre-qualified to supply to SGCP.

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
1.3 Partner with key stakeholders such as local government, DSDIP and ICN to introduce a Regional Capacity Building Program to facilitate training on generic tender and contract requirements (e.g. insurances, standards, quality, and documentation).	BRC IRC CHRC ICN DSDIP	Phase 1	Number of workshops held for local suppliers; Attendance rates of local suppliers at workshops. Number of procurement and tendering workshops in regional centres (Barcaldine, Emerald, Clermont, and Alpha).
1.4 Partner with key stakeholders to deliver a regional capacity building program including general business management seminars and to up-skill local and regional businesses in key areas such as business start-up, financial planning, resource management, OH&S, environmental management, capability, financial stability and quality.	BRC DSDIP – Regional Services Business community RAPAD Skilling Not-for-profit organisations	Phase 4	Number of workshops held for business development. Attendance rates of local and regional businesses at business development workshops.
1.5 The Proponent will prepare a detailed Mine Closure Plan (MCP) to assess local and regional impacts following the mines closure and develop management strategies well in advance of closure and decommissioning of the project including potential economic vulnerability when the mine closes. The MCP will be developed in consultation with appropriate	The Proponent Local Community	Phase 5	To be detailed in the MCP

Actions	Key Stakeholders / Responsible Parties	Proposed Timeframe	Key Performance Indicators
community and government stakeholders.			
PROCUREMENT			
1.6 Development and implementation of a 'buy local' program to support the sustainability of local and regional businesses (including indigenous businesses).	The Proponent Proponent Contractors BRC Local business DSDIP - Regional Services Indigenous groups	Phase 1	Existence and use of the Local Supplier Register; Number of regional businesses pre-qualified to supply The Proponent, and Use of Black Business Finder
1.7 Register with Industry Capability Network (ICN) website portal for suppliers to express their interest to work with the project and to look at procurement and tendering opportunities.	The Proponent ICN	Phase 1	Evidence of communication of contract opportunities to ICN.
INDIGENOUS PARTICIPATION			
1.8 Work with and consult with relevant agencies /organisations to promote Indigenous business opportunities and provide training/employment for Indigenous Australians.	The Proponent DSDIP – Regional Services DATSIMA BRC	Phase 1	Use of Black Business Finder to source opportunities for indigenous businesses Participation and regular attendance at Barcaldine Negotiation Table meeting to provide project updates and potential business opportunities. Work with DATSIMA on implementation of its framework for indigenous economic participation and action plan for business opportunities and development in local communities.

Action Plan 4 – Community Safety and Wellbeing

Rationale

Alpha is a small rural town with a strong identity and sense of community. Mining development in the Galilee basin is likely to change the identity of the region and the way it is perceived. A “changing sense of place” was identified by stakeholders as being of concern related to the potential changes in the local, physical and social environment of mining. In order to retain as much as a possible the values of the local community, a planned and sustainable approach to development will ensure community safety is not negatively impacted. The Proponent will do this by ensuring that the future wellbeing of the local community and personnel associated with the mine are proactively managed to provide positive benefits of the local community and their employees.

Development of the Galilee Basin, will impact on the township of Alpha in the future. However, the proponent is committed to working with the local community to ensure it contributes to improved livelihoods and amenity in project impacted communities. It will do this by working collaboratively with locals, other mining companies, key stakeholders and employees to ensure the wellbeing of the community.

Based on the impacts identified in Table 3.1, this plan addresses:

- The potential for an impaired road safety environment;
- Concerns over potential of increased pressure on Emergency Services and Service providers in the region such as police and hospitals;
- Concerns regarding the influx of a large workforce into the area which has the potential to decrease residents’ feeling safe and secure in their community due to potential for anti- social behaviour.
- Ensuring the needs of FIFO employees are being met – socially, culturally, religiously and ensuring adequate services and support is being provided to them and their families.

Objectives

The objectives of the Community Safety and Wellbeing Plan are:

- To support emergency services in the region during construction and operation of the mine;
- To minimise road safety risks to employees and the local community;
- To minimise the impacts on the safety and security of the local community;
- To ensure the safety of the mine and its employees.
- To provide support services to FIFO employees and their families to ensure social, cultural and religious values and needs are being met;
- To promote positive interaction between the workforce and local community, on and off the Project site; and

- To encourage and facilitate open and transparent engagement with key stakeholders on health and wellbeing issues and impacts.

Community safety and wellbeing impacts addressed by other South Galilee Coal Project plans:

- Impacts on road and transport safety- Transport Management Plan (TMP) and Road Use Management Plan (RUMP); and
- Emergency Management and Response Plan (EMRP).

Action Plan – Community Safety and Wellbeing

Action	Key Stakeholders / Potential Partners	Timeframe	Key Performance Indicators
ROAD SAFETY AND TRAFFIC			
1.1 Consult with stakeholders in the development of a TMP that looks at on-road traffic control, VMS systems, and education programs for employees and stakeholders and considers impacts on other local communities (e.g. Alpha and Jericho).	The Proponent QPS DTMR BRC Local community groups	Phase 1	Consultation undertaken and TMP prepared.
1.2 Review and update vehicle numbers to inform development of Road Use Management Plan (RUMP) and Traffic Management Plan (TMP) throughout the life of the Project.	The Proponent QPS DTMR BRC	Phase 1	TMP and RUMP reviewed and updated on a regular basis
1.3 Transport the majority of SGCP employees to and from site by bus, reducing the number of vehicles on the road.	The Proponent QPS	Phase 1	Percentage of employees transported to site by bus from airport
1.4 Transport as much construction material/equipment on the existing rail network as practicable, in order to minimize requirements for police escorts of wide loads and impacts on road safety.	The Proponent QPS Aurizon	Phase 2	Percentage of goods transported to site by rail
1.5 Work with stakeholders to develop and implement a RUMP that analyses opportunities for education and engagement of employees and other stakeholders (linking in with fatigue management procedure) and considers road	The Proponent DTMR QPS QFRS QAS QH BRC	Phase 1	Consultation undertaken and RUMP prepared.

Action	Key Stakeholders / Potential Partners	Timeframe	Key Performance Indicators
conditions.			
DISASTER AND EMERGENCY MANAGEMENT			
1.6 Implement an Emergency Management and Response Plan (EMRP) that looks at emergency transfer plans from mine site to key regional hospitals, first aid facilities and supplies and other key aspects. Development of the plan will be in consultation with emergency services and will capture the flow on effects of other service providers in the area.	The Proponent QAS QFRS QPS DCCDS Staff	Phase 1	EMRP prepared in consultation with key stakeholders.
1.7 Support local emergency service providers if required, in the event of a major emergency or natural disaster	The Proponent QPS DSDIP QH QFRS QAS BRC Local community	Phase 2	Support provided in emergencies and/or natural disasters
1.8 Ensure support for emergency services resource planning by providing relevant information such as work programs, employee statistics etc. This information will be regularly updated and provided.	The Proponent QPS QFRS QH DCCDS BRC QRC	Phase 2	Information provided on an annual basis Agency resourcing meets the needs of the local community and SGCP Information required from key agencies
1.9 Develop or link into Memoranda of Understanding (MoU) with existing key service providers to protocols for accessing assistance from mine-based resources and infrastructure.	The Proponent QPS BRC QH QFRS QAS DCCDS QRC	Phase 1	Engage with relevant stakeholders/agencies throughout the project and provide regular and updated information. MoU in place and considered in all

Action	Key Stakeholders / Potential Partners	Timeframe	Key Performance Indicators
The MOU should consider: • Ongoing consultation between emergency services agencies and the Proponent; • Compatibility set up and access to the Project communications system, and incident management systems; • Provision of a list of equipment retained on-site to facilitate use if required for major events or natural disasters. All equipment will be in accordance with Mine Safety Act requirements; • Regular inductions of current emergency services personnel; • Provision of site maps to assist in on-site emergencies including evacuation maps with arranged meeting points; • Cross-training exercises between the emergency service providers and the Project response and rescue team including multi-casualty major incident training; • Interface between emergency services and potential medical service contractors on-site (including services and supplies offered on-site); and • Use of site meeting room(s) during on-site			management plans and standard procedures.

Action	Key Stakeholders / Potential Partners	Timeframe	Key Performance Indicators
visits, work arrangements and emergencies.			
2.0 Manage a list of relevant local and regional emergency services providers and key personnel to facilitate the delivery of the action plan. Look at additional ways in which to interact with these providers and personnel to support the contact list. Eg: Web based interactive system.	The Proponent QPS QFRS QAS RFDS Rural Fire Brigade Central West and Central Queensland Health and Hospital Services	Phase 1	Ensure contact list is updated regular and distributed to relevant agencies and personnel on regular basis.
COMMUNITY HEALTH			
2.1 Continue to work with Queensland health and other health providers and other proponents to ensure an ongoing understanding of the capabilities and needs of local and regional medical centres/hospitals (E.g. Impact on Barcaldine and Emerald Hospitals due to population increase in Alpha) and specialist capabilities of the three main hospitals in the area (Emerald, Rockhampton and Gladstone).	BRC DSDIP QH QAS Local community RDA	Phase 1	Health services and facilities area discussed in active networks in the region.
2.2 Treat minor injuries on-site by first aid officers employed on-site and more serious injuries would be transported to health centres at employees' source location for treatment.	The Proponent BRC DSDIP QH QAS Local community	Phase 2	% of injuries treated on site versus % requiring treatment.
2.3 Actively promote healthy lifestyles through education, training and provision of recreational facilities on-site.	The Proponent	Phase 2	Establishment of health and fitness facilities on site. Number of proactive health education and

Action	Key Stakeholders / Potential Partners	Timeframe	Key Performance Indicators
			training programs delivered to staff.
2.4 Actively promote occupational health and safety through education and training in order to minimise the incidence of workplace accidents.	The Proponent	Phase 2	As per OH & S plans to be implemented.
COMMUNITY SAFETY			
2.5 Implement the following policies which all employees would be contractually bound to comply with, namely: • Drug and Alcohol Policy (including random testing prior to flights into Alpha), • Accommodation Village Behavioural Policy, • Workforce Code of Conduct.	The Proponent	Phase 1	All WMP policies prepared and form part of employment contracts.
COMMUNITY WELLBEING			
2.6 Develop and implement a Good Neighbour Policy to guide positive interactions between the Proponent staff, contractors and consultants, and the local community, particularly neighbouring landholders.	The Proponent Local Community Landholders	Phase 1	Good Neighbour Policy developed; Relevant education undertaken with 100% of employees and contractors; Number of infringement actions taken. Number of negative feedback received from workers/local community regarding behaviour.
2.7 Implement a Landholder Management Plan to ensure Proponent engages appropriately with adjoining landholders to monitor	The Proponent Landholders	Phase 1	Landholder Management Plan developed. Landholder meetings undertaken on

Action	Key Stakeholders / Potential Partners	Timeframe	Key Performance Indicators
impacts on agricultural productivity.			regular basis (appropriate timeframe to be confirmed with landholder). Number of issues resolved in consultation with landholders.
2.8 Prepare a Code of Conduct which would be strictly enforced for all SGCP employees and contractors and would apply to behaviour in and outside of the workplace.	BRC The Proponent Local community	Phase 1	An onsite social program would be developed and implemented. Awareness of social program among employees (measured by a survey). Participation in the social program. Relevant education undertaken with 100% of employees and contractors. Number of negative feedback received from workers/local community regarding behaviour.
2.9 Communicate company expectations including the need to maintain good relations with the local communities, via a Good Neighbour Policy, will be communicated regularly to the SGCP employees and contractors.	BRC The Proponent Local community	Phase 1	Good Neighbour Policy developed. 100% of employees and contractors aware of policy.
3.0 The Proponent would maintain a 24-hour free call community complaints hotline and all complaints would be recorded, addressed and reported. Proponent would also investigate	BRC The Proponent Local community	Phase 1	Grievances and disputes will be recorded and reported

Action	Key Stakeholders / Potential Partners	Timeframe	Key Performance Indicators
possibility of a community liaison officer to act as a conduit between employees and locals.			
WORKFORCE HEALTH & WELLBEING			
3.1 A FIFO workforce Family Support Plan will be developed, involving a variety of stakeholders. The Plan will identify the needs and aspirations of FIFO employees and their families in relation to health and accommodation services, recreational, social, religious needs and community facilities and initiatives that will support their wellness and quality of life. It will also outline plans for: - Distributing copies of The Survival Guide for Mining Families to all miners as part of relocation services. - Encourage the use of a variety of support services including www.miningfm.com.au and other access support services. - The establishment of a mining family support groups in towns identified as supplying FIFO workforce.	The Proponent Department of Employment Other Councils – e.g. GCCC, SCRC Mining Family Matters FIFO families Australian Mining Partners Happy Families Support Group (QLD) Mining Women Support Group (QLD) Proponent employees	Phase 2	Development and successful implementation of a Family Support Plan, Mining family support groups to be established. Participation in mining support groups. Measure the value of the group by surveying regularly.
3.2 Provide good communication services at the mine site, including phone and internet access	The Proponent	Phase 2	Communication services provided with minimal service disruption

Action	Key Stakeholders / Potential Partners	Timeframe	Key Performance Indicators
to assist workers in maintaining contact with family and friends as well as the provision of health and fitness support, facilities and recreational opportunities.			
3.3 Provide support for management staff required to relocate to Alpha and ensure they do not feel isolated during the adjustment process. A number of facilities will be available on site to provide activities.	The Proponent	Phase 4	Monitor support provided to employees.
3.4 Establishment of an Employee Assistance Program (EAP) to assist employees dealing with personal issues and cope with family changes.	The Proponent	Phase 2	EAP established and effectiveness evaluated regularly.
3.5 Implement Fit for Work - Fatigue Management Procedure. Development of the plan should also include relevant engagement and education of employees and stakeholders.	The Proponent QPS Local Community	Phase 1	Fatigue Management Policy developed. Low number of near miss reports and traffic incidents on public roads.
3.6 Implement an education program for workers and contractors incorporating (including but not limited to): - Fit for Work - Drug and Alcohol; - Fit for Work - Fatigue Management; - Socially acceptable behaviour; - Cultural awareness; - Dealing with changed family functioning and relationships; - Domestic violence; - Protecting the locals'	The Proponent Mining Families Local Community	Phase 1	To be developed as part of WMP. Number of negative reports and code breaches received from workers and local community regarding behavior. Program delivered to 100% of workers and contractors as part of their induction. Number of proactive education programs developed. Understanding of key components by

Action	Key Stakeholders / Potential Partners	Timeframe	Key Performance Indicators
way-of-life.			workers (measured via survey). Disciplinary measures implemented for the infringement of policies and codes of conduct.

Monitoring, Reporting and Review

It will be the responsibility of the proponent to manage the implementation of the SIA. The team who will manage the social performance of the Project will consist of the Operations Manager, Human Resource Manager, Community Liaison Officer, Indigenous Liaison Officer and Health, Safety and Environment department representatives of the proponent.

Detailed monitoring programs, set out in Table 4.1 are directly linked to the identified social impacts are presented in each of the Action Plans.

Adaptive Management Approach

The proponent will discuss with BRC and agree on key indicators (i.e. what they regard as most important) for improved livelihoods and amenity, and the means to measure them (such as through community surveys and the analysis of consultation feedback) for inclusion in the monitoring program.

Further additional monitoring measures are likely to emerge during ongoing consultation associated with the SIA and as the Action Plans are implemented. Importantly, this SIA has been developed to be responsive to changing circumstances and increased knowledge of impacts over time. This SIA and Monitoring, Reporting and Review program emphasizes process and outcomes, coordination of planning and demonstration of continuous improvement as part of an adaptive management approach.

Table 4.1 – Monitoring, Reporting and Review

Monitoring Program and Measures	Date Sources	Frequency	Responsibility
AP 1 – 4			
1. Audit the progress of all actions in Action Plans 1 - 4	SIA	Six monthly for first three years and annually thereafter	The Proponent
2. Review the evidence of continuing cooperative partnerships between the proponent, BRC, other proponents, the State Government, and other key stakeholders.	Meeting minutes of active networks	Six monthly	The Proponent
AP 1 – Housing and Accommodation			
3. Analyse the impact of the Project workforce accommodation strategy by reviewing: Percentage of Project workforce resident in	Proponent compliance register	Quarterly for the first two years; then annually for all subsequent years	The Proponent

Monitoring Program and Measures	Date Sources	Frequency	Responsibility
- on-site workforce accommodation during work rosters; • Percentage of Alpha rental stock occupied by Project workforce; and • Ability of Project workforce to satisfy their residential preferences.			
4. Engage (e.g. via surveys) with the Project workforce to determine: • Levels of satisfaction with workforce facilities • Worker's residential preferences.	Proponent HR EPC records of accommodation village tenants Workforce residential preference surveys	Quarterly for the first two years; then six monthly for three years and then annually for all subsequent years	The Proponent
5. Identify baseline local and sub-regional housing market data	Workforce engagement which includes attitudes towards accommodation	At time of recruitment; then six monthly for three year and then annually for all subsequent years	The Proponent
6. Determine the housing market targets and triggers to be used to initiate and guide mitigation strategies at local, sub-regional and regional scales	BRC records REIQ records State Government (OESR) data and analysis	At preconstruction	The Proponent
7. Apply housing market targets to the housing market trends to determine the impact of the Project and other resource projects on the Alpha and sub-regional	Queensland Treasury and Trade Valuer General REIQ records State Government (OESR) data and analysis	At preconstruction	The Proponent

Monitoring Program and Measures	Date Sources	Frequency	Responsibility
housing market			
AP 2 – Workforce Management			
8. Review Proponent employment statistics to determine: • Number of local employees; • Number of Indigenous employees; and • Number of women.	Proponent HR employment register	Quarterly for the first two years; then six monthly for three years and then annually for all subsequent years Annual reports	The Proponent
9. Review employment and training statistics to determine: • Number and % of local area residents and underrepresented groups participating in skills development training; • Number of and type of training programs delivered across Project - by provider and trainee; • Evidence of regular communication of workforce requirements to DSDIP and DETE; • Number of BRC and other students given work experience and/or receiving scholarships or financial support; • Number of local residents accessing training courses; and • Relevant training partnership agreements with	Proponent HR employment register DETE statistics	Quarterly for the first two years; then six monthly for three years and then annually for all subsequent years	The Proponent

Monitoring Program and Measures	Date Sources	Frequency	Responsibility
government developed.			
AP 3 – Regional Business Development and Local Content			
10. Review procurement reports to determine: - Percentage of contracts let to - local area, Central QLD, rest of Queensland, rest of Australia, Overseas (Construction and Operations); - Value of Contracts let to - local area, Central QLD, Rest of QLD, Rest of Australia, Overseas (Construction and Operations); and - Number of regional businesses pre-qualified to supply the proponent.	The Proponent Procurement reports	Quarterly for the first two years; then six monthly for three years and then annually for all subsequent years. A reporting format will be finalised in collaboration with ICN and DSDIP during preparation of the Local Content Plan. An annual report shall be submitted to DSDIP in July each year, in line with requirements set out in the Local Content Code of Practice (2013)	
11. Undertake local and regional business stakeholder surveys to determine satisfaction about access to opportunities at the Project.	Local and Regional business stakeholder survey	Report annually	The Proponent
12. Determine stakeholder participation in the Project by: Reviewing the number of workshops held for	Attendance rates at business training seminars and forums Key stakeholder records for number of workshops held for	Report annually	The Proponent

Monitoring Program and Measures	Date Sources	Frequency	Responsibility
business development; and Attendance rates of local and regional businesses at business development workshops.	business development.		
13.Undertake regular reporting as required by the Code of Practice Local Content 2013 Implementation Guide	Proponent procurement reports	Report annually to State Government	The Proponent
AP 4 – Community Safety and Wellbeing			
14.Survey the local community to determine: - Perceptions of safety and security (including antisocial behaviour as a result of drugs/alcohol) and effectiveness of plans/programs; - Awareness of upcoming traffic disruptions (during construction); and - Attitudes towards workforce interaction with the local community.	Community surveys	Six monthly during construction; yearly during operation	The Proponent
15.Analyse effectiveness of actions by reviewing: - Number of near miss reports and traffic incidents on public roads; - Number of security/safety incidents reported by local community, and attributed to mine	QPS incident/ infringement data (note: request for this information needs to be made in writing) The Proponent mine incident records The Proponent community information line records RUMP/TMP reports	Quarterly for the first two years; then six monthly for three years and then annually for all subsequent years	The Proponent

Monitoring Program and Measures	Date Sources	Frequency	Responsibility
employees; • Number of infringement notices issued for traffic incidents and safety/security incidents; and • Number of mine incidents and emergencies.	HSECH audits		
16. Review support for emergency services in the region to ensure access to services, equipment and resourcing as required	Proponent HR records and MOU partner records	At the time of setting up the MOU and at yearly review	The Proponent and MOU Partners
17. Audit the proponent induction/education programs to ensure 100% of employees and contractors are informed of: • Fit for Work - Drug and Alcohol; • Good Neighbour Policy; • Workforce Code of Conduct; and • Fit for Work - Fatigue Management;	Proponent HR records	Quarterly for the first two years; then six monthly for three years and then annually for all subsequent years	The Proponent
18. Survey employees and contractors to determine: • Awareness of workforce policies and programs; • Understanding of key components of induction/education program; • Awareness of medical services and EAP; • General health and	Employee/contractor survey Social/recreational program records	Quarterly for the first two years; then six monthly for three years and then annually for all subsequent years	The Proponent

Monitoring Program and Measures	Date Sources	Frequency	Responsibility
wellbeing; • Participation in social and recreational program; • Attitudes towards workforce interaction with the local community; and • Perception of effectiveness of workforce plans, procedures and programs.			
19. Survey mining families to determine: • Participation in mining family support groups; • Value derived from support groups; and • General health and wellbeing.	Mining family surveys	Annually for life of the Project	The Proponent
20. Review the evidence of continuing cooperative partnerships between the proponent, BRC, State Government agencies, other proponents and the local community on health and wellbeing issues	Proponent records of participation in collaborative forums Proponent records (employee/community survey results)	Quarterly for the first two years; then six monthly for three years and then annually for all subsequent years	The Proponent
21. Determine the safety of the environment, the workforce and the communities through analysis of: • Reported incidents of antisocial behaviour by KC workforce in Alpha; • Number of Workforce Code of Conduct breaches; and	QPS Proponent HR	Quarterly for the first two years; then six monthly for three years and then annually for all subsequent years	The Proponent

Monitoring Program and Measures	Date Sources	Frequency	Responsibility
Number of Health, Safety, Environment, Community and Heritage (HSECH) advisory bulletins delivered to residents.			

Cumulative Impacts

The SGCP is one of many large mining projects that will be developed in proximity to Alpha. As noted previously (Table 1.1) three projects have been previously granted approval by the Queensland Government Coordinator General. The proponent acknowledges that SGCP (specifically Phases 4 & 5) will contribute to cumulative social impacts, if developed at similar timeframes to other projects.

Table 4.2 sets out a number of impacts that were identified as part of the SIA that are likely to be cumulative. However, the recent *Galilee Coal Project Coordinator General Evaluation Report (August 2013)* suggest that the potential social cumulative impacts (positive and negative) arising from projects in the region during all stages are likely to include (but not be limited to):

- continued growth in employment opportunities
- increased demand for locally available goods and services required for mine construction and operations
- local skill shortages in other industries
- in-migration and increased demand for housing and temporary accommodation leading to higher housing costs
- increased traffic and road safety concerns and
- increased demand on social, emergency and commercial services.

It is not the purpose of this SIA to develop mitigation and management measures to address cumulative social impacts, but rather highlight a commitment from AMCI to participate in future planning coordination processes.

Table 4.2 – SIA Cumulative Impacts

Impact	Overall Project Significance	Cumulative Impact
Increased pressure on education facilities (e.g. childcare, schools) associated with secondary and indirect population growth.	Medium Negative	Medium Negative
Increased pressure on boarding schools associated with secondary and indirect population growth	Low Negative	Low Negative
Contribution to government incomes (via royalties, income taxes etc.)	High Positive	High Positive
Increased demand for community infrastructure (e.g. sewerage, waste infrastructure, etc.) associated with direct, indirect and secondary population growth in Alpha.	Medium Negative	Medium Negative
Increased demand for utilities (e.g. power, water) as a result of population growth.	Medium Negative	Medium Negative
Loss of skilled local labour from other industries (who generally cannot afford to	High Negative	High Negative

Impact	Overall Project Significance	Cumulative Impact
play the same salaries as mining operators) or difficulty in attracting employees to the area.		
Indirect population growth as a result of mining in the region (e.g. business relocation, development or expansion, additional education and health service providers, etc.)	Medium Negative	Medium Negative
Limited availability of land for new housing developments and limited housing availability	Medium Negative	Medium Negative
Economic benefits of mining 'taken away' from the local community through FIFO	Medium Negative	Medium Negative
Changes to family structure in source locations	Medium Negative	Medium Negative
Increased demand for medical services associated with population growth (e.g. Alpha and Barcaldine Hospitals, ambulance service and RFDS)	Medium Negative	Medium Negative
Increased number of people admitted to the Barcaldine and Emerald Hospitals due to population increase in Alpha	Medium Negative	Medium Negative

Galilee Basin Development Roundtable

The proponent acknowledges that the mechanics of the roundtable are yet to be confirmed. However, initially DSDIP will chair a Galilee Basin Development Roundtable series during 2014 to focus on innovative approaches to joint infrastructure arrangements. Where appropriate, these roundtables may also include peak bodies and relevant government agencies and may also address potential community benefits.

The roundtable may be tasked with developing short, medium and long term strategies for responding to regional impacts on infrastructure and services that are beyond the scope of individual project assessments. These strategies may be delivered through partnerships between industry, communities, and local governments and state agencies, and will inform and align with regional planning priorities.

Local Area Infrastructure Program

Proposed under the government's framework Managing the Impacts of Major Projects in Resource Communities, LAIPs will improve infrastructure planning and investment decisions and support the development of robust business cases for infrastructure projects. LAIPs will bring together industry, local government and government agencies to identify and prioritise strategic infrastructure needs, address the phasing of strategic infrastructure and explore how funding of projects can be aligned. LAIPs will link closely to the government's Royalties for the Regions program and Australian Government funding programs.

STAKEHOLDER & COMMUNITY ENGAGEMENT

Overview

The proponent is dedicated to continuing meaningful and proactive engagement with the community and its stakeholders and recognises that this can lead to better outcomes and increased community ownership of policies, programs and projects.

The proponent is committed to working closely with local communities to maximise the project benefits and avoiding negative impacts from their operations. This will be done by engaging openly and honestly with all our stakeholders and responding to community complaints and enquiries through fair and equitable grievance and conflict resolution processes.

This commitment has already commenced with significant community and stakeholder engagement undertaken by the proponent during the EIS SIA phases of the project. To date this has included one on one consultation with key stakeholders and participation in community and technical reference group meetings.

The proponent will encourage dialogue with all stakeholders as it works in partnership to implement SIA Action Plans and address cumulative impacts with other proponents through appropriate mechanisms. Local, state and federal agencies, other proponents and other key stakeholders have already begun to work collaboratively to investigate opportunities for the future, to address negative potential impacts, to enhance positive impacts and agree on outcomes for the local community, the region and the state.

A more detailed Community and Stakeholder Engagement Plan (CSEP) will be further developed prior to Phase 1.

This approach that will be detailed in a CSEP and will ensure:

- SGCP maintains its reputation (social licence to operate) with key stakeholders;
- Key community and stakeholder concerns are identified
- Key stakeholder roles and responsibilities are identified in relation to the SIA implementation; and
- Proactive and positive engagement with key stakeholders occurs throughout the duration of the project.

Objectives

SGCP will work with local and state agencies to develop the CSEP.

The objectives of the plan are to:

- continue to identify, monitor and respond to community members/organisations and other key stakeholders concerns and issues as relevant to SGCP;
- outline the communication tools needed to inform the broader community and stakeholders in the Alpha community and the regional area of project influence about SGCP;
- outline the mechanisms that will be used to enable key stakeholders to be consulted on key aspects of the project phases and SIA, via a community consultative group and other consultation methods (e.g. stakeholder meetings, workshops); and

- provide a framework in regards to managing issues, risks and community and stakeholder concerns.

CSEP - Framework

To ensure a well-managed and planned process for Community and Stakeholder Engagement, the SGCP's CSEP will be developed using best practice methods based on the International Association for Public Participation (IAP2) guidelines.

These guidelines provide a methodology for determining what level of influence the community and stakeholders have over decisions and what level of engagement is appropriate.

In line with these guidelines, the stakeholder engagement process for SGCP is outlined in Figure 5.1. It shows the 4 key steps of information, consultation, participation and evaluation that will be used by SGCP to achieve positive project and community and stakeholder outcomes.

Figure 5.1 – SGCP and Community and Stakeholder Engagement Methodology



A range of communication and engagement tools have been established at the outset of the EIS, SIA and AEIS process and will continue to be used to inform, engage and encourage participation from community members and other stakeholders throughout all project phases.

Tools to continue to be used throughout all phases include:

Project website - project information will be made available on the SGCP website (www.southgalilee.com.au) and will be regularly updated to provide progress reports, frequently asked questions, project details, photo galleries, community and stakeholder activities and details on how to lodge a complaint or enquiry. Notes from community meetings and community updates will also be made available.

Public Displays - Public displays will be held as required to coincide with local community events (e.g. Alpha Show) and/ or documents provided to relevant bodies (e.g.: Councils, local and regional libraries).

Enquires and complaints line – a dedicated 1800 number will continue to be maintained to respond quickly to stakeholder concerns and enquiries. Further details can be found in section 5.3.

Community updates – These will be produced as required through main project phases and will distributed to local businesses, residents, interest groups and other interested persons. Access to these updates will also be made available via the website or via other bodies such as Barcaldine Shire Council.

One and two way communication and engagement tools that have been and will continue to be used are summarised in Table 5.1.

Table 5.1 – Implementation of communication and engagement tools

Communication and Engagement Tools	Implementation Phases						
	EIS & SEIS Phase	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Decommissioning
Face to face meetings and workshops with local federal and state agencies, businesses, landowners etc.	•	•	•	•	•	•	•
Website updates – through existing websites	•	•	•	•	•	•	•
Community update/newsletter		•		•	•		•
Enquiries and complaints hotline	•	•	•	•	•	•	•
Email and post							
Community meetings		•					

Communication and Engagement Tools	Implementation Phases						
	EIS & SEIS Phase	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Decommissioning
*Alpha CRG and TRG	•						
*SGCP Community Consultative Committee		•	•	•	•	•	•
Regional networks	•	•	•	•	•	•	•
Public Displays at local community events		•			•		
SIA Review and Monitoring		•	•	•	•	•	•
Community Liaison Officer		•	•	•	•	•	
Indigenous Liaison officer		•	•	•	•	•	

As part of the CSEP, the proponent will also develop a yearly Communication Planner (with a monthly look ahead for communications with communities and stakeholders). This will include activities scheduled for construction, anticipated issues, issues management, stakeholders impacted, consultation proposed and consultation tools to be used to communicate with impacted community members/organisations and other stakeholders.

An example of the Communication planner is provided in Appendix B.

Community Consultative Committee

The proponent will maintain and support ongoing consultation with community and stakeholder groups which have been historically associated with the project and have been identified in the SIA and in particular responsibility assigned for the Action Plan implementation.

To date SGCP has convened a Technical Reference Group and Community Reference Group for the preparation of the EIS.

As the project moves from the planning (EIS and AEIS) to pre-construction planning members of the technical reference group will be most likely form part of collaborative groups so that common issues across projects can be worked on collaboratively.

However, there is likely to be project specific issues that relate directly to SGCP and a Community Consultative Committee will be the most effective way to proactively identify and respond to issues. This will most likely comprise community members and key agencies.

The main function of the Community Consultative Committee will be to:

- Receive regular briefings on the project's progress and provide information about the project to other community members and stakeholders;

- Ensure the community and stakeholders have been well informed during all phases of construction and operational phases;
- Represent the broad range of local community and stakeholder interests;
- Protect the SGCP's reputation and ensure positive public positioning;
- Provide advice to SGCP on how best to disseminate information via existing community networks;
- Act as a two-way communication link between the SGCP and the community and provide necessary feedback;
- Track key issues within the community; and
- Maximise face to face opportunities with SGCP and other key stakeholders and build trust and transparency.

Further details about this group and ongoing engagement with other stakeholder groups will be detailed in the CSEP.

All Stakeholders and Engagement Mechanisms

Table 5.2 below summarises the key stakeholder groups, activities and communication and engagement tools that will be implemented as part of the development of the CSEP.

The table builds on information and consultation already undertaken as contained in the EIS and SIA phases of the project.

Table 5.2 – Stakeholder Engagement List

Stakeholder	Involvement/Interest in the Project	Communication/Engagement tools
Adjacent property owners	Environmental impacts such as Noise/dust/air pollution Lack of notification of mining operations and plans.	Property condition reports prior to commencement of construction. Notification and/or meetings with property owners to provide information about project. Respond quickly to complaints or calls for project information. Community update/newsletter/fact sheet. Community enquiries and complaints line
Regional, State and Federal Government agencies and entities (as set out in Table 3.1)	Economic impacts and development Service delivery and resourcing Housing impacts and affordability Transport and road networks Employment and training Health, community wellbeing and safety impacts	Web updates Galilee Basin Round Table State Government Committees Briefings
Local and regional councils e.g: BRC	Business opportunities Housing supply and demand Changes to local demographics Local lifestyle and potential	Briefings Web updates Community updates/newsletters

Stakeholder	Involvement/Interest in the Project	Communication/Engagement tools
	impacts Impacts on local infrastructure e.g.: Roads	Enquiries and complaints line Galilee Basin Round Table
Local, state and Federal MP's	Community and business opportunities Infrastructure and lifestyle impacts	Briefings Web updates Community updates/newsletters Enquiries and complaints line Galilee Basin Round Table
Police, Fire and Ambulance services and other emergency service providers (as set out in Table 3.1)	Health care concerns Emergency responses	Briefings Web updates Community updates/newsletters Enquiries and complaints line Galilee Basin Round Table
Local community and environmental groups	Environmental issues – e.g.: noise/dust/air pollution Impacts on community lifestyle and safety	Website updates Community update/newsletter Community enquiries and complaints line Community Consultative Committee.
Indigenous community, non – government groups and organisations. E.g.: Barcaldine Negotiation Table and Bowen Basin Participation Partnership. (as set out in Table 3.1)	Employment and training opportunities Business opportunities Ensuring cultural and environmental values are preserved	Meetings Indigenous Liaison Officers Website updates Community update/newsletter Community enquiries and complaints line Community Consultative Committee.
Alpha community members and their local communities eg: Jericho and Tambo	Maintain a safe and relaxed lifestyle Impacts on demographics Infrastructure impacts Business opportunities Community cohesion	Website updates Community update/newsletter Community enquiries and complaints line
Transport and freight providers	Disruptions, delays, access to roads, changes to traffic conditions, vehicle access to and from site. Effects on local traffic in Alpha	Briefings with providers Updated material on website Community update/newsletter
Local and regional businesses and chambers of commerce.	Impacts and opportunities - local facilities Business opportunities and procurement opportunities Attraction of workers to the area	Briefings /meetings Updated material on website Community update/newsletter Community Consultative Committee
Government and non-government service providers	Local amenity Business/procurement opportunities Improved service delivery Attraction and retention of	Updated material on website Community update/newsletter Community Consultative Committee

Stakeholder	Involvement/Interest in the Project	Communication/Engagement tools
	workers to the region	
Schools and educational institutions	Education and training opportunities	Updated material on website Community update/newsletter Community Consultative Committee
Education, Employment and Training providers and agencies (as set out in Table 3.1)	Education and training opportunities	Face to face meetings Updated material on website Community update/newsletter Community Consultative Committee
Regional and local newspapers, radio and television	Approval of mine Opening of mine Progress reports Major announcements Safety incidents	Media release Updated material on website Community update/newsletter
Trade and mining media	Approval of mine Opening of mine Progress reports Major announcements	Media release Updated material on website Community update/newsletter
Proponent workforce	Living conditions Road safety Family and personal health issues and wellbeing	Educational and induction programs Ongoing programs offering support Complaints and enquiries line
Other projects	Cumulative social and environmental impacts Compliance and approvals	Active regional networks

Community & Indigenous Liaison Officers

A community liaison officer will also be appointed, to act as the main conduit between all stakeholders and the proponent. The Community Liaison Officer will also work closely with the Indigenous Liaison Officer who will have specific responsibility for ensuring indigenous workforce and business development opportunities are enhanced by the SGCP. While it is likely that the Community Liaison Officer position will be appointed in Phase 1, the SGCP will consider a support position for indigenous liaison to ensure that critical links are made with indigenous stakeholder occur as early as possible in the SGCP.

The Community Liaison Officer will also be responsible for:

- The development and review of the CSEP;
- Management of the communications and engagement program;
- Monitoring, reporting and review of SIA;
- Managing community complaints and enquiries;
- Developing positive working relationships with key stakeholders and the community;
- Ensuring effective and proactive communication about the SGCP is disseminated; and
- Preparing relevant collateral for distribution to community and other stakeholder such as community updates, website updates.

The Indigenous Liaison Officer will be responsible for supporting the Community liaison Officer in working with key stakeholder to ensure key actions outlined in the Workforce Management Plan and Regional Development and Local Content Action Plans are progressed throughout key phases of the SGCP.

Enquiry and Complaints Management

A key part of the community and stakeholder engagement process is the method for prompt and accurate enquiry and complaints resolution.

An enquiry and complaints management system will be established prior to the commencement of construction which will details plans for receiving, recording, tracking and responding to complaints, enquiries and feedback within a reasonable timeframe.

The Community Liaison Officer would also be responsible for managing the Community Enquiry and Complaints Line during all phases of the project.

This is a service that is available 24 hours, 7 days a week.

Enquiry/complaints/feedback mechanisms

The enquires, complaints and feedback received will be recorded via a community and stakeholder database which will collate information provided through various interaction, namely:

- Community consultative committee
- Complaints and enquiry line
- Feedback forms
- Website email enquiry/complaints facility
- Written submissions
- Through other sources eg: Barcaldine Regional Council, State Government Agencies; and

- Media monitoring

SGCP will consider the use of a web based data system that allows information to be recorded such as name and contact details of the complainant or enquirer, time and date of contact, location details, issue type and details, SGCP response, actions taken, personnel handling the representation and the current status details.

This information would be guided by the requirements of the Information Privacy Act (QLD).

Enquiries and complaints procedures

The Community Liaison Officer will be responsible for actioning the complaint and providing a response within a reasonable timeframe.

In responding to enquiries or complaints, the Community Liaison Officer will:

- Record details of every stakeholder and community enquiry and complaint received and how it managed/closed it out;
- Investigate the complaint or enquiry, ensure corrective action (if required) will be undertaken and prepare the relevant feedback/response;
- Seek advice and input from SGCP technical team members; and
- Forward/follow up any relevant complaints/enquiries to relevant agencies.

Table 5.3 below outlines the recommended response times to be implemented on the SGCP for enquires and complaints.

Table 5.3 – Complaint and enquiry response timeframes

Complaint or enquiry	Response timeframe	Resolution time
Complaints received via 1800 number or face to face	Within two hours of receiving complaint action must be taken to investigate. Complainant must be acknowledged and advised of actions being taken to address their concerns.	Within 48 hours
Enquiries received	Within 24 hours	Within 48 hours
Written submissions	Within 3 business days	Within 1 week

Complaint and Dispute resolution

The following steps will be undertaken to resolve complaints and/or disputes.

1. SGCP will use its reasonable endeavors to resolve all community and stakeholder complaints as a result of the project, at an early stage. Wherever possible, disputes will be negotiated directly between the community liaison officer and the stakeholder/community complainant;
2. If a resolution cannot be met, meetings will be held with the complainant in an effort to fully comprehend their issues and to attempt to resolve the matter to the satisfaction of both parties.
3. Failing resolution under Step 1 or 2, the complaint will be escalated to the Operations Manager (Step 3).
4. Failing this, an experienced and independent mediator (Step 4) may be called in to assist with the resolution of the dispute.

Figure 5.3 – Complaints & Dispute Escalation Flow Diagram



Community and Stakeholder Issues and Risk Management

Managing issues and risk throughout the life of the project is a key determining factor in a successful outcome.

The SGCP recognises that many issues could adversely impact on the reputation of the proponent and preliminary research indicates there are highly sensitive issues around mining in Alpha and the surrounding area. It is therefore anticipated that some stakeholders may hold firm views about the proposed mine.

SGCP remains committed to be proactive in planning for and managing issues of public concern during the project.

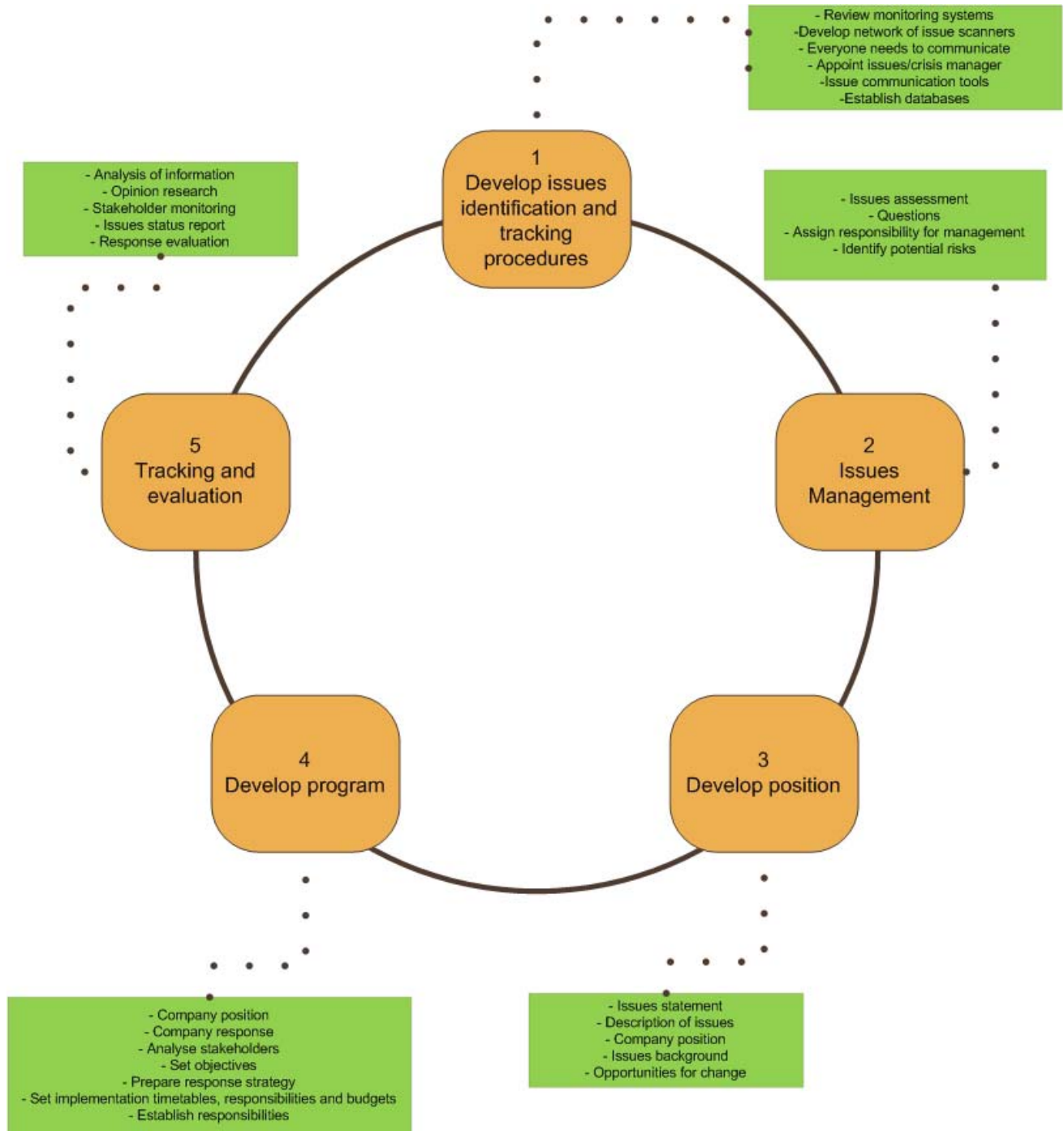
It is therefore imperative that an issues and risk management plan forms part of the CSEP to ensure:

- Clear ownership of issues;
- A centralised approach to information management and dissemination;
- Swift responses to issues such as major incidents;
- Decision makers are properly engaged;
- Strategies are in place to minimise long term impacts in the recovery from significant issues; and
- The reputation of the company is maintained.

The plan will also be supported / form part of proactive communication strategies, codes and guidelines, statements, policies and registers implemented as part of the project.

Figure 5.4 below outlines the process to be undertaken when developing the issues and risk management plan for the SGCP and how issues and risks should be identified and managed.

Figure 5.4 - Issues and risks - identification and response



Media management

It is likely that issues or difficulties will arise at some stage throughout the project. When these issues do emerge, it is important to provide journalists with timely and relevant information as quickly as possible to achieve balanced reporting.

SGCP is committed to ensuring issues are properly managed with the media and will develop a media management plan that:

- Identifies a range of possible issues and crisis situations;
- Strives to build open and positive relationships with the media to help achieve balanced coverage;
- Appoint and train a media spokesperson and monitor potential issues; and
- Ensure media protocols are followed by all personnel and offer fresh and accurate information

Monitoring, Reporting and Review

Reporting

The Community Liaison Officer will submit a monthly report to SGCP management team at the end of each month detailing community and stakeholder issues, complaints and enquiries along with details on communication and engagement tools proposed for implementation in the upcoming months.

The report will also include:

- A summary of complaints and enquiries and status update on how they were addressed/responded to;
- Follow up on any outstanding issues;
- Details of stakeholder liaison undertaken and requirements for the following month;
- Updated photographs;
- Meeting minutes from community consultative committee and any follow up required from this and any other meetings with stakeholders; and
- Any other information that may be relevant including ads, notices, and other interaction with community groups.

Monitoring and evaluation

The Community Liaison Officer and SGCP team will monitor the performance, effectiveness and efficiency of the CSEP and will modify processes and communication channels in light of any feedback or issues identified in the monitoring process.

It is expected that some relevant stakeholders may also be required to provide comment during the review process.

Activities to be monitored and evaluated include:

- Responsiveness and effectiveness of communication with the community and stakeholders as well as information flow;
- Availability, quality and distribution of information about the project to the community and other stakeholders;
- Currency and accuracy of the enquiries and complaints management system;
- Response to issues, complaints and enquiries and appropriateness of actions taken ; and
- Feedback received at information sessions, meetings with stakeholders and via other public information channels.

Additionally, KPI's may also be considered for community and stakeholder engagement through the Community Liaison Officer. Potential KPI's to be considered for the SGCP includes;

- A demonstrated level of understanding of community issues and concerns and a proactive approach to identifying and resolving issues;
- Identified stakeholders contacted and relationships maintained;
- Accurate and timely reporting of community and other stakeholder feedback to the project team; and
- Complaints or issues are identified and managed promptly and effectively.

LANDHOLDER MANAGEMENT

Overview

Landholders are key stakeholders in the development of the SGCP, and the proponent is committed to building strong and beneficial relationships with those properties adjoining the mine. The proponent proposes to minimise and mitigate the potential impacts to adjoining properties resulting from construction and operation of the SGCP.

The following areas have been identified for proactive management of potential impacts by the proponent throughout all stages of the SGCP:

- Groundwater;
- Stock routes;
- Air, noise, dust and visual amenity;
- Weeds and pests; and
- Complaints and dispute resolution.

Commitments

The proponent commits to:

- Ongoing consultation with landholders regarding the realignment of stock routes;
- Establishing make-good agreements that address the concerns regarding groundwater impacts resulting from SGCP;
- Minimising the impacts to visual amenity, air and noise on neighbouring landholders by taking into account the interests of landholders in the development of infrastructure and operating procedures during the design phase;
- Pest and weed management;
- Compensation on a case-by-case basis with some landholders; and
- Developing land access agreements and appropriate protocols with landholders to minimise access impacts.

In accordance with the objectives of our CSEP, the proponent is committed to proactive engagement and the implementation of a Landholder Management Plan (this document), which will ensure the proponent listens to its neighbours, communicates clearly and consistently about Project activities, responds effectively to issues, regularly reviews and updates land access procedures, and provides 'mutual assistance' where possible.

The proponent will seek to engage landholders as required to monitor and address issues such as agricultural productivity as they arise.

Managing Project Impacts

Key areas of concern to landholders impacted by the construction and operation of the SGCP have been identified through consultation during the EIS process. Each of these areas is addressed in Table 6.1. Additional concerns will be identified and addressed through ongoing engagement with landholders during the life of the Project.

Table 6.1 – Management of Project Impacts

Area of Impact	Response
Groundwater <i>Extraction of groundwater on the SGCP mine site may potentially reduce the usable groundwater resources in the area</i>	The proponent is committed to establishing make-good agreements with landowners, which will include: • A commitment that all groundwater monitoring will be conducted and assessed by a suitably qualified independent expert; • Details regarding the groundwater bore baseline data; • Access to groundwater data and monitoring results; • Groundwater level data trends and comparison to Environmental Authority Condition trigger values; • Details regarding the groundwater monitoring network and dewatering scheme; • Provision for the repair or replacement of damaged bores or water supply infrastructure, if the proponent is deemed to have caused the damage; • The replacement of diminished groundwater, or same quality or better water quality, and volume; • A subsidy to cover additional costs associated with larger pumps, deeper depths, additional water related infrastructure, power costs and spare parts; • Financial provisions to ensure future costs are covered; • A dispute resolution mechanism; and • In the absence of agreement, the provision for arbitration to settle the terms of the agreement. Baseline assessments will provide information on the characteristics of the groundwater and the water bore including: • Water level, quality, bore depth and diameter; • Type of construction; and • Type of pumping infrastructure and pumping details. A groundwater monitoring and reporting process for potentially impacted bores will be established by the proponent which is expected to include: • Regular testing of the bores; • Review of the results against the baseline and historical trends; and • Notification and sharing of results with the

Area of Impact	Response
	landholder.
Stock Routes <i>The development of a mine site and associated infrastructure with SGCP will impact on existing stock routes.</i>	The proponent has proposed to realign existing stock routes to maintain network connectivity. The new stock routes are currently being determined in consultation with affected landholders. It is intended that the proposed stock routes will share similar reserve widths and infrastructure provisions (e.g. bores, holding yards) as the existing routes.
Air, Noise, Dust and Visual Amenity <i>The visual amenity, noise and air quality of the surrounding landholders may potentially be impacted by the construction and operation of SGCP</i>	The proponent will develop an Environmental Management Plan and Plan of Operations which will ensure that air, noise, dust and visual amenity impacts from the construction and operation of the SGCP mine and associated infrastructure will be minimised. These documents will stipulate the management and mitigation measures that are to be undertaken on site to reduce impacts to surrounding communities. Ongoing monitoring will be conducted at sensitive receptor locations to ensure that the adopted air, noise and dust objectives are met. If through compliance monitoring during the construction and operational phase it is determined that sensitive receivers are being impacted in a way that was not predicted in the EIS and AEIS, then individual mitigation on a case by case basis will be discussed.
Pests and Weeds <i>The SGCP mine site may potentially become a source of weeds and pests, which may spread to neighbouring properties.</i>	The proponent has developed a Weed and Pest Management Plan (Section 9.10 of the AEIS presents the Management Plans, inclusive of a Weed and Pest Management Plan). The Weed and Pest Management Plan will stipulate a number of management measures that are to be undertaken on site to limit the impact of weeds and pests to surrounding properties.
Complaints and Dispute Resolution	Due to the small number of impacted properties, all landowners have been provided direct contact details for a senior representative of the proponent to whom they can address any complaints or disputes. The proponent is committed to continual engagement with landowners through the life of the Project. All landholders will also have access to the Complaints and Dispute Resolution process as set out in Section 5.3.

The SGCP Environmental Management Plan and Plan of Operations will stipulate measures to minimise impacts from the mine on adjoining properties, and an ongoing monitoring program to assess outcomes against adopted objectives. The proponent is committed to ongoing engagement with landholders through the life of the Project, and will address any unforeseen impacts as they are identified.

REFERENCES

The following references were used in the preparation of the AEIS SIA.

- Metserve; *South Galilee Coal Project – Social Impact Assessment (January 2012)*
- Metserve; *South Galilee Coal Project – Draft Social Impact Management Plan (January 2012)*
- Proponent; *South Galilee Coal Project – EIS – Section 17 (Social) (January 2012)*
- Hancock Galilee Pty Ltd; *Kevin’s Corner Project, Post EIS Supplementary Documents – Social Impact Management Plan (May 2013)*
- Waratah Coal; *Galilee Coal Project (Northern Export Facility) - Social Impact Management Plan (February 2013)*
- Department of State Development, Infrastructure and Planning; *Managing the impacts of major projects in resource communities*, July 2013
- The Coordinator General; *Social Impact Assessment Guideline*, July 2013
- Department of State Development, Infrastructure and Planning; *Galilee Basin Development Strategy*, November 2013

APPENDIX A – WORKFORCE PROFILES

An outline of the workforce composition during the construction, operation and decommissioning phases of the SGCP is provided in Appendix Table 1.

Position	Construction	Operations			Decommissioning
		Stage 1	Stage 2	Stage 3	
Management					
Mine General Manager	0	1	1	1	0
PA to Mine General Manager	0	1	1	1	0
Operations Manager	1	1	1	1	1
Mining Manager Underground	0	0	1	1	0
Mining Manager Open Cut	0	1	1	1	0
Technical Services Manager	1	1	1	1	1
Maintenance Manager	1	1	1	1	1
CHPP Manager	0	1	1	1	0
Safety Manager	1	1	1	1	1
Human Resources Manager	1	1	1	1	0
Commercial Manager	1	1	1	1	0
Administration Assistant	1	1	1	1	1
Subtotal	7	11	12	12	4
Technical Services					
Senior Mine Surveyor	1	1	1	1	1
Surveyor Assistant	2	2	2	2	2
Geotechnical Engineer	1	1	1	1	1

Position	Construction	Operations			Decommissioning
		Stage 1	Stage 2	Stage 3	
Mine Geologist	0	1	1	1	1
Exploration Geologist	0	1	1	1	0
Coal Quality Geologist	0	1	1	1	0
Environmental Engineer	1	1	1	1	1
Environmental Officer	2	2	2	2	2
Engineering Planning Superintendent	1	1	1	1	1
Senior Mine Planning Engineer	1	1	1	1	0
Engineering Planners & Schedulers	2	2	2	2	0
Statistics Clerk	0	1	1	1	0
Mine Production Engineer	0	1	1	1	0
Graduate Mining Engineer	0	1	1	1	0
Surface Coordinator	1	1	1	1	1
Senior Mining Engineer	0	0	1	2	1
Mining Engineer	0	0	2	4	2
Ventilation Officer	0	0	1	2	1
Conveyor Engineer	1	0	1	2	1
Surveyor	1	0	1	2	0
Geologist	0	0	1	2	0
IT Specialist	1	0	1	1	0
Senior Clerical Staff	2	2	2	4	2
Junior Clerical Staff	0	3	3	5	2

Position	Construction	Operations			Decommissioning
		Stage 1	Stage 2	Stage 3	
Electrical Engineering Manager	1	2	1	2	1
Control Room Officer	0	0	3	5	1
Subtotal	18	25	35	49	21
Underground Operations					
Shift Undermanagers	0	0	5	10	0
Development Coordinator	0	0	1	2	0
Development Mech. Eng.	0	0	1	2	0
Development Elec. Eng.	0	0	1	2	0
Longwall Coordinator	0	0	1	2	0
Longwall Mech. Eng.	0	0	1	2	0
Longwall Elec. Eng.	0	0	1	2	0
Outbye Coordinator	0	0	1	2	0
Project Group Coordinator	0	0	1	2	0
Project Group Engineers	0	0	2	4	0
Fire Officer/Stat Compliance Officer	0	0	1	2	0
Training Coordinator	0	0	2	3	0
ERZ Controller (Deputy)	0	0	12	24	0
Supervisor	0	0	12	24	0
Mine Driver	0	0	24	48	0
Shuttle Car Driver	0	0	24	48	0

Position	Construction	Operations			Decommissioning
		Stage 1	Stage 2	Stage 3	
Bolter Operator	0	0	12	24	0
Rousabout	0	0	12	24	0
Mechanical Trade/ Fitter	0	0	12	24	0
Electrician	0	0	12	24	0
ERZ Controller (Deputy)	0	0	12	24	0
Leading Hand Fitter	0	0	4	8	0
Leading Hand Electrician	0	0	4	8	0
Beltman	0	0	16	32	0
Pumpies	0	0	8	16	0
VCD Installation Crew	0	0	12	24	0
Road Maintenance Crew	0	0	8	16	0
Secondary Support Crew	0	0	12	24	0
Lamp Room / Bath Attendant	0	0	4	8	0
Subtotal	0	0	310	619	0
Open Cut Operations					
Project Engineer	0	2	2	2	0
Site Engineer	0	4	4	4	0
Planning Engineer	0	1	1	1	0
Senior Production Supervisor	0	1	1	1	0
Shift Supervisor	0	5	5	5	0
Shift Foreman	0	5	5	5	0

Position	Construction	Operations			Decommissioning
		Stage 1	Stage 2	Stage 3	
OCE's	0	5	5	5	0
Production System Operator	0	4	4	4	0
Site Clerk	0	4	4	4	0
Dewatering Crew	0	8	8	8	0
Operator – Level 3	0	25	25	25	0
Operator – Level 4	0	3	3	3	0
Operator – Level 5	0	145	145	145	0
Operator – Level 6	0	2	2	2	0
Subtotal	0	214	214	214	0
CHPP and Maintenance					
Maintenance Superintendent	0	1	1	1	0
Maintenance Planner	0	4	4	4	0
Fitter Tradesman - Level 2	0	30	30	30	0
Fitter Tradesman - Level 4	0	20	20	20	0
Electrician - Level 4	0	15	15	15	0
Administration Assistant	0	2	2	2	0
CHPP Superintendent	0	1	1	1	0
Production Coordinator	0	1	1	1	0
Washplant Supervisor	0	1	1	1	0
Control Room and Trainloading	0	8	8	8	0
ROM and Product	0	8	8	8	0

Position	Construction	Operations			Decommissioning
		Stage 1	Stage 2	Stage 3	
CPP Plant Operator	0	16	16	16	0
Electricians	0	0	8	16	0
Mechanical / Fitter	0	0	12	24	0
Maintenance Supervisor	1	1	1	1	1
Metallurgist	0	1	1	1	0
Metallurgical Graduate	0	1	1	1	0
Quality Control Engineer	0	1	1	1	0
Quality Control Technician	0	8	8	8	0
Field Maintenance Superintendent	1	1	1	1	1
Deputies	2	10	10	10	4
Electricians	4	15	15	15	4
Fitters	4	15	15	15	5
Electrical Engineer	1	1	1	1	1
Mechanical Supervisor	1	1	1	1	1
Mechanical Engineer	1	1	1	1	1
Workshop Supervisor	1	4	4	4	1
Graduate Mechanical / Electrical Engineer	0	1	1	1	0
PCS Engineer	0	1	1	1	0
Subtotal	17	174	194	214	20
Safety Department					
Safety Coordinator	2	2	4	4	1
Safety Officer	1	0	1	2	1
Health Rehabilitation	1	1	1	1	1

Position	Construction	Operations			Decommissioning
		Stage 1	Stage 2	Stage 3	
Officer					
Safety Administration Officer	1	1	1	1	1
Site Security	4	4	4	8	2
Ambulance Officer	5	5	5	5	2
OH&S Superintendent	1	1	1	1	1
OH&S Officer	1	1	1	1	1
First Aid (Site Nurse)	5	5	5	5	2
Subtotal	21	20	23	28	12
Commercial					
Administration Assistant	1	1	1	1	1
Stores / Purchasing Manager	1	1	1	1	1
Stores Officer	1	0	3	5	1
Storeman	1	4	4	4	1
Warehouse Clerks	1	5	5	5	1
Purchasing Officer	1	1	1	1	1
Senior Site Accountant	1	1	1	1	1
Accounting	1	1	1	1	1
Information Management	0	1	1	1	1
Contracts Coordinator	1	1	1	1	1
Contracts Administrator	1	1	1	1	1
Reception and Mail	1	1	1	1	0
Business Analyst	1	1	1	1	0
Site Paymaster	1	1	1	1	1
Payroll clerk	1	1	1	1	1
IT Supervisor	1	1	1	1	1
Subtotal	15	23	26	28	14
HR Department					
PA to HR Manager	1	1	1	1	1

Position	Construction	Operations			Decommissioning
		Stage 1	Stage 2	Stage 3	
Recruitment	1	1	1	1	1
IR Specialist	1	1	1	1	1
Operator /Trainer	1	8	8	8	1
HR Coordinator	1	1	1	1	1
HR Officer	1	1	1	1	1
HR Administration Officer	1	1	1	1	1
Community Liaison Officer	1	1	1	1	1
Training Coordinator	1	1	1	1	1
Subtotal	11	18	18	18	11
FTE Contractors					
Development	0	0	1	1	0
Longwall	0	0	1	1	0
Ventilation	0	0	3	3	0
Gas Drainage	0	0	2	2	0
Conveyors	3	0	3	3	0
Longwall Moves	0	0	2	2	0
Cleaning and Servicing	2	0	2	2	2
CHPP Stockpiles	0	0	1	1	0
Subtotal	1,410	0	21	21	177
Miscellaneous					
Cooks	48	10	14	40	9
Cleaners	48	10	14	40	9
Gardeners / maintenance work	5	2	5	5	5
Subtotal	101	22	33	85	41
Total	1,600	507	886	1,288	300

Source: AMCI and Bandanna Energy (2011)

APPENDIX B – COMMUNICATION PLANNER

Table 6.2 Example of communication look ahead plan

Responsibility	Communication Engagement tool /activity	Phase	Jan	Feb	Mar	Apr	May	Jun	July
Research and Planning									
Community Liaison Officer	Research analysis and preparation of CSEP	1		✓	✓				
Issues Management									
Crisis and Issues Management Team	Develop protocols, policies and issues management plan.	1							
Community Liaison Officer	Develop key messages and issues management as required.	1							
Media									
Community Liaison Officer	Develop media management plan	1							
Media spokesperson	Conduct media training	1							
Community Liaison Officer Media Spokesperson	Prepare for launch event for start of construction	1						✓	✓
Stakeholders									
Community Liaison Officer	Meet with local business owners to discuss potential joint opportunities	1			✓				
Community Liaison Officer	Hold first Community Consultative Committee	1			✓				

Responsibility	Communication Engagement tool /activity	Phase	Jan	Feb	Mar	Apr	May	Jun	July
	meeting								
Community Liaison Officer	Prepare for community opening event of mine	1						✓	✓
Community Management									
Community Liaison Officer	Manage 1800 number and respond to enquiries and complaints	1	•	•	•	•	•	•	•
Community Liaison Officer	Begin preparations for phase 2 construction community open day	1					•	•	•



9.15 Economics

9.15 Economics

9.15.1 Cost Benefit Analysis

The Epsilon stage of the SGCP development as presented in section 2 of the AEIS is dependent upon the existing railway between Alpha and Emerald being able to accommodate 20,000 tonne type trains. It, with the Aurizon railway system, presents an inbound freight option linking the Galilee Basin with the established Gladstone Port. The concept is consistent with the Queensland Moving Freight Policy.

The transport assessment in section 9.12 of the AEIS is inclusive of this potential freight service and its development includes an assessment of construction and operation freight tonnages for the mines in the southern part of the Galilee Basin. Of these tonnages, that which could be on rail, have been assessed.

The timing of the development of these mines is estimated for the purposes of the CBA. The ramp up of the freight tonnage is accordingly subjective but the service viability is underpinned by the Epsilon coal (3mtpa) which commences at day one.

ACM retained Synergies to undertake the CBA to the community of the freight service.

The analysis forecasts a net economic cost benefit for the rail freight solution of approximately \$687 million.

9.15.2 Road to Rail Cost Benefit Analysis



Report to Alpha Coal Management

Cost-benefit analysis of rail freight haulage proposal

March 2014
Synergies Economic Consulting Pty Ltd
www.synergies.com.au

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Executive Summary

Synergies Economic Consulting (Synergies) has been engaged by Alpha Coal Management (ACM) to conduct a cost-benefit analysis of a rail freight transport solution (the Rail Freight Solution). The Rail Freight Solution involves transporting construction and operational freight from various coastal Queensland ports to the coal mine projects in the South Galilee Basin using the Central West Railway, which is to be upgraded for the haulage of export coal from the Epsilon coal mine near Alpha to the Port of Gladstone.

There is the opportunity to use the upgraded Central West Railway to transport approximately 1.5 million tonnes of construction and operational freight per annum to five mine project sites.¹ This represents an alternative to the transport of this freight via the regional road network.

The purpose of this report is to quantify the costs of two scenarios:

- the haulage of all construction and operational freight on the regional road network (base case); and
- the diversion of a proportion of the construction and operational freight from the regional road network to the Central West Railway (alternative state).

The above scenarios will be characterised by different cost streams, including externalities. It is the difference in the Present Value (PV) of these cost streams that determines whether the proposal constitutes a net economic benefit or cost to society.

Under both the base case and alternative state, freight is to be transported by road and rail from four different locations – Brisbane, Gladstone, Mackay and Emerald. The freight splits (by mode and location) for the mine projects have been developed based on data provided by ACM in relation to the SGCP expansion project. Based on the resulting freight mode splits and the rail freight haulage profile provided by ACM, road and rail freight haulage profiles were developed for each of the mine projects under both the base case and alternative state.

The costs included in the analysis of the proposal were:

- capital cost of rail intermodal facilities
- road and rail haulage costs

¹ The Epsilon mine; the expansion stages of the South Galilee Coal Project; the Waratah Coal Pty Ltd Galilee Coal Project; and the GVK Kevin's Corner and Alpha mines.

- road damage costs and rail maintenance costs
- external costs of road and rail freight transport, including air and noise pollution, accident costs and the cost of greenhouse gas emissions.

The total economic cost to be incurred over the period of analysis under the base case and alternative state is estimated at \$1,673 million and \$986 million respectively, based on a real discount rate of 6.5%. This equates to a net economic benefit for the Rail Freight Solution of approximately \$687 million, with a Benefit Cost Ratio (BCR) of 1.7. The key drivers of this result are:

- the relatively low level of capital expenditure required under the alternative state due to the Central West Railway requiring an upgrade under both scenarios;
- the operating and maintenance cost advantage of rail infrastructure compared to the regional road network; and
- the lower external costs associated with rail freight transport compared to road freight transport.

Sensitivity analysis was conducted to show how this result is affected by changes to key variables. The table below summarises the results of the sensitivity analysis.

Results from sensitivity analysis: net benefit of Rail Freight Solution

Parameter	Net benefit of Rail Freight Solution (\$)	% change relative to base case
Base results	686,817,727	NA
Discount rate		
Low (3%)	951,881,665	+38.6%
High (10%)	508,971,883	-25.9%
Heavy vehicle RUC		
Low (13.07 cents per litre)	654,278,403	-4.7%
High (39.21 cents per litre)	719,357,050	+4.7%
Road haulage cost		
Low (7 cents per ntkm)	217,078,247	-68.4%
High (21 cents per ntkm)	1,156,557,207	+68.4%
Rail haulage and maintenance cost		
Low (\$12.50 per tonne)	839,330,545	+22.2%
High (\$37.50 per tonne)	534,304,909	-22.2%
External cost unit rates		
Low (-50% for all unit rates)	660,310,999	-3.9%
High (+50% for all unit rates)	713,324,454	+3.9%

Source: Synergies modelling.

This analysis highlights the robustness of the positive net benefits that could potentially accrue from the Rail Freight Solution. It remains NPV positive compared to the base case under all of the sensitivities tested above. The lowest outcome is where road haulage costs are only 7 cents per kilometre but is still NPV positive.

Scenario analysis was also undertaken to test the assumptions made regarding the modal splits under the base case and alternative state and how changing these splits impacts on the result of the analysis. This involved the modelling of two scenarios:

1. *The demand for rail freight transport is lower for all projects:* the freight shares for rail were reduced by 50% under the alternative state for all projects, with these tonnages transferring to road (Gladstone/Mackay); and
2. *One major project does not shift any freight to rail:* the freight shares for rail for the Kevin's Corner project (both in the construction and operational stages) were all transferred to road (Gladstone/Mackay).

Under the first of these scenarios, the NPV of the proposed Rail Freight Solution fell to \$310.6 million, a reduction of 54.8%. Under the second scenario, the NPV was \$546.1 million, a reduction of only 20.5%. While acknowledging the results of these scenarios, these outcomes are unlikely to arise as it is probable that incentives will be provided under the Queensland Government's 'Moving Freight' strategy to encourage the use of the Rail Freight Solution by the mine projects in the South Galilee Basin.

An analysis was also undertaken to determine the break-even point of the analysis for the modal shares. This analysis found that the rail freight share would need to fall across all projects to 3.8% and 7.0% for the construction and operational stages respectively for the proposal to have an NPV equal to 0.

Finally, it is also important to note that the study period is only 17 years. However, the operating lives of the mines transporting operational freight will extend beyond this. Accordingly, the actual NPV benefits generated by the Rail Freight Solution will be higher if the horizon was extended to encompass the total period of operations.

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1 Introduction

Synergies Economic Consulting (Synergies) has been engaged by Alpha Coal Management (ACM) to conduct a cost-benefit analysis of a rail freight transport solution (the Rail Freight Solution) that is currently under consideration for the coal mine projects in the South Galilee Basin. The Rail Freight Solution involves transporting construction and operational freight from various coastal Queensland ports to the coal mine projects using the Central West Railway, which is to be upgraded for the haulage of export coal from the Epsilon coal mine near Alpha to the Port of Gladstone. This represents an alternative to the transport of construction and operational freight via the regional road network.

The purpose of this report is to quantify the costs of the two scenarios (i.e. the transportation of all freight by road and the diversion of a proportion of the freight task to the Central West Railway) to determine which of the two scenarios represents the best outcome for the community, i.e. the lowest total economic cost. All costs are to be considered in this analysis, including the external costs of road and rail transport (i.e. noise and air pollution).

This report is set out as follows:

- section 2 provides background information on the Rail Freight Solution;
- section 3 provides an overview of the approach to the analysis and the key assumptions;
- section 4 sets out the key inputs and parameters applied in conducting the analysis;
- section 5 contains the results of the cost analysis of the base case and alternative state and the outcomes of the sensitivity analysis; and
- section 6 concludes the report.

2 Project overview

The South Galilee Coal Project (SGCP) is a joint venture between AMCI (Alpha) Pty Ltd and Alpha Coal Pty Ltd (Bandanna Energy). The parties are seeking to establish a greenfield open cut and underground mine on two of their exploration tenements in the Galilee Basin, located to the south-west of the Alpha township, approximately 170km west of Emerald.

The initial stage of the project, the Epsilon mine, will produce 3 million tonnes per annum (Mtpa) (and has the potential to be one of the first movers among the Galilee Basin projects). Annual production at the SGCP will increase to up to 17 Mtpa over the project's 35 year operating life. It is expected that the project will generate a total of 447 Mt of high volatile, low sulphur thermal coal over this period, all of which will be transported by rail for export. The initial 3 Mtpa of production from the Epsilon mine is to be transported through the Port of Gladstone via the existing narrow gauge railway, while production from Stages 1 to 3 will be transported via the new Galilee Basin railway through the Port of Abbot Point.

As Epsilon can be developed ahead of the other thermal coal mines in the region, there is an opportunity to use the upgraded Central West Railway between Gladstone and the project site to transport construction and operational freight to the other mine sites, as opposed to using the rural road network. The railway line runs east-west, immediately north of the SGCP, and adjoins the Blackwater system at Emerald before running to Hughenden via Longreach and Winton over a distance of approximately 780km.

Freight required in the construction phase of the Epsilon mine will be transported via the Capricorn Highway, as this will precede the upgrading of the railway. However, the railway will be available for the transportation of construction freight in the expansion stages of the SGCP, as well as operational freight. Table 1 sets out the stages for the development of the SGCP.

Table 1 SGCP project staging

Project stage	Export tonnage	Construction period	Operational period
Epsilon mine	~3 Mtpa	2015-16	2017-19
Stage 1 – expanded open cut	~5 Mtpa	2018-19	2020-22
Stage 2 – first longwall	~10 Mtpa	2021-22	2023-26
Stage 3 – second longwall	~15 Mtpa	2025-26	2027-49

Source: Aurecon, p 7.

While for mine developments in the region subsequent to the Epsilon mine coal is to be transported via a proposed new railway to the Port of Abbot Point, there is still an

opportunity to use the Central West Railway to transport construction and operational freight to these project sites over their operating lives. Across all of the Galilee Basin projects, under the proposed Rail Freight Solution there is an opportunity to use the upgraded Central West Railway to transport approximately 1.5 Mtpa of construction and operational freight to:

- the Epsilon mine (operational only)
- the expansion stages of the SGCP (construction and operations)
- the Waratah Coal Pty Ltd Galilee Coal Project (construction and operations)
- the GVK Kevin's Corner and Alpha mines (construction and operations).

While the Central West Railway will require an upgrade regardless of whether the Rail Freight Solution is pursued to enable the transportation of export coal from the Epsilon mine to the Port of Gladstone, the capital expenditure required for the upgrade has been included in the rail haulage rate that is to apply for the haulage of construction and operational freight to the mine sites.² The Rail Freight Solution also requires an up-front expenditure of \$70 million for the construction of an intermodal facility and fuel depot at the project site. This cost has been considered in this analysis.

While the Rail Freight Solution will result in a significant proportion of the construction and operational freight shifting from road to rail, there will still be some freight that must be transported on the road network. All freight that is transported via road will pass through the Alpha township. Three key roads will be used to transport freight to the project site:

- Capricorn Highway – major route linking Rockhampton with western Queensland, passing through Alpha. The part of the highway in close proximity to the project site is an east-west, two-lane, two-way sealed rural highway. It is frequently used by commercial and over-dimensional vehicles;
- Clermont-Alpha Road – a State-controlled road to the east of the project site, which runs in a north-south direction between Alpha and Clermont. The current traffic volumes on this road are very low. The road has vulnerable structures and is currently not proposed for use for the haulage of freight for the mine developments in the South Galilee Basin; and

² It should be noted that while the capital cost of the rail infrastructure upgrade has been included in the analysis as it is included in the quote for the rail haulage charge that has been provided to ACM, it is not consistent with the 'with and without' principle of cost-benefit analysis, as the capital cost of the upgrade will be incurred either with or without the Rail Freight Solution (i.e. the capital upgrade costs are not incremental costs that will be incurred as a result of the Rail Freight Solution). Removing the capital component of the rail haulage charge would result in an increase in the economic benefit of the Rail Freight Solution.

- Shakespeare Street – a 7 metre-wide two-way local road that is 800 metres in length, linking the Capricorn Highway to the Alpha east community.

The nature and scope of any necessary expansions to the road network to support the Galilee Basin developments is not yet known. It is understood that the Department of Transport and Main Roads commenced a Galilee Basin Area Road Infrastructure Improvements project in 2012-13.³

The Environmental Impact Statement (EIS) for the SGCP was completed in 2012. A public consultation process was then undertaken which was followed by the Coordinator-General submitting a request for additional information to the project proponents. AMCI (Alpha) Pty Ltd and Alpha Coal Pty Ltd are currently in the process of responding to this request with the Additional EIS (AEIS), due for submission in March 2014. The AEIS includes specific details relating to the Epsilon project.

³ Department of Transport and Main Roads, Queensland Transport and Roads Investment Program 2012-13 to 2015-16, Central West.

3 Approach

The decision to transport significant volumes of freight via road or rail not only has a direct impact on the Galilee Basin projects, but also the economy and the wider community. The scale of developments contemplated in the Galilee Basin results in a substantial freight task, particularly during the construction phases. This in turn could be expected to substantially increase the number of heavy vehicles using the road network, which may not have been designed to a standard that would readily accommodate the anticipated volumes. This could have a significant impact on road safety, amenity, air pollution and road condition.

It is important to be able to identify and where possible, value these impacts, along with the direct costs of road versus rail transport. In our view, cost-benefit analysis is the most appropriate method to use to evaluate the relative cost and benefits of the alternative freight solutions and this is the approach we have applied here. A brief overview of this methodology is provided below.

3.1 Cost-benefit analysis

The objective of a social cost-benefit analysis is to systematically identify and value the impacts that a proposal will have on the community. This includes all benefits and costs, whether they are direct, indirect, private or social. These benefits and costs are all valued on the basis of the standard principles of welfare economics (i.e. individuals' willingness to pay and accept change).⁴

In order to measure changes in social welfare it is necessary to compare two alternative states – the base or the 'without change' state and the alternative or 'with change' state. For this analysis, these two states are as follows:

- the haulage of all construction and operational freight on the regional road network (base case); and
- the diversion of a proportion of the construction and operational freight from the regional road network to the Central West Railway (alternative state).

These two scenarios will be characterised by different cost streams. It is the difference in the Present Value (PV) of these cost streams that determines whether the proposal constitutes a net economic benefit or cost to society.

⁴ Willingness to pay is the monetary value that an individual would be willing to pay for a non-monetary benefit associated with a project. Willingness to accept is the monetary value that an individual would require in order to be willing to accept an impact.

The making of value judgements is unavoidable in a cost-benefit analysis. It is important in terms of the accountability and transparency of the analysis that these judgements are made explicit in terms of the assumptions and approaches adopted in attributing values to costs.

3.2 Assumptions

In undertaking any cost-benefit analysis there are several key assumptions that must be made in developing the framework for the cost-benefit model. The key assumptions that have been adopted in undertaking this cost-benefit analysis are as follows:

- the future cash flows associated with the base case and alternative state have been modelled in real terms, meaning that the values have not been indexed over time to account for inflation;
- as the analysis assesses values at different points in time it is necessary to discount values that occur in the future. This requires an assumption for the social discount rate. In 2010, the Productivity Commission (PC) published a research paper examining evidence of possible market benchmarks for the social discount rate used in cost-benefit analysis. The review found that a range of 3% to 10% (real) was appropriate.⁵ On this basis, a real discount rate of 6.5% (the mid-point of the PC's range) has been applied in the analysis, with sensitivity analysis conducted using discount rates of 3% and 10%;⁶ and
- the period of analysis is 17 years, commencing in 2014. Whilst this is shorter than the standard study period for a cost-benefit analysis (usually 20 or 25 years), it is considered appropriate as there is only reliable data on freight volumes over this period. However, it is important to note that the operating lives of the mines transporting operational freight will extend beyond this. This means that the impacts of the Rail Freight Solution will continue beyond the period of this analysis.

⁵ Harrison, M. (2010). Valuing the Future: the Social Discount Rate in Cost-benefit Analysis, Visiting Researcher Paper, Productivity Commission, Canberra.

⁶ It is noted that Synergies typically applies a lower real discount rate in conducting social cost-benefit studies (typically the ten year Australian Government bond yield is used as the social discount rate, representing the risk-free rate of return. For this analysis, this would have resulted in a real discount rate of 2.51%. However, for this analysis, based on the views of stakeholders, a conservative approach has been adopted and the PC's range for the social discount rate has been adopted.

4 Inputs and key parameters

This section sets out the key inputs and parameters that have been used to define the freight task under the two scenarios and also to conduct the analysis of the costs to be incurred under both scenarios. The costs which have been modelled based on these inputs and parameters are set out in section 5 of the report.

4.1 Freight task

4.1.1 Haulage distances

The distances that freight is hauled to the mine sites is an important input in determining the freight transport costs that are to be incurred under the base case and the alternative state. The construction and operational freight that is to be transported to the mine sites in the Galilee Basin will be transported from four locations. These locations, and the distances that have been adopted for each of the locations in the cost-benefit model, are as follows:

- Brisbane (by road) – 780km
- Gladstone (by road or rail) – 550km
- Mackay (by road or rail) – 550km
- Emerald (by road) – 165km.

4.1.2 Freight splits

There are two important considerations in relation to the breakdown of the freight task for the purpose of defining it under the two scenarios:

- the location from which the freight is to be transported (i.e. origin of the freight)
- the mode via which the freight is to be transported (i.e. road or rail).

The freight splits differ for the construction freight (i.e. that freight that is to be used in the construction phases of the subsequent mine projects) and operational freight (that freight which is to be required over the operating lives of the mine projects).

The freight splits for the Epsilon coal mine and the SGCP expansion stages were based on information provided by ACM. Given the absence of any information on the composition of the freight tasks (by location and mode) for the projects other than the SGCP, assumptions had to be made regarding the freight split by mode and location under the two scenarios. The freight splits for the SGCP expansion provided by ACM,

was applied to the other mining projects, as the scale of the construction task is similar. This is clearly a key assumption that needs to be subject to sensitivity testing.

The following table details the freight split by both location and freight mode under the base case.

Table 2 Freight split by mode and location under base case

	Brisbane (road)	Gladstone/Mackay (road)	Emerald (road)
SGCP (Epsilon)			
Construction freight	20%	75%	5%
Operational freight	0%	87%	13%
Alpha			
Construction freight	8%	85%	7%
Operational freight	0%	85%	15%
Kevin's Corner			
Construction freight	8%	85%	7%
Operational freight	0%	85%	15%
SGCP Expansion			
Construction freight	8%	85%	7%
Operational freight	0%	85%	15%
Waratah			
Construction freight	8%	85%	7%
Operational freight	0%	85%	15%
Establishment			
Construction freight	8%	85%	7%
Operational freight	0%	85%	15%

Note: Splits for projects other than the SGCP were based on the SGCP Expansion splits provided by ACM.

Source: Aurecon/ACM.

The following table details the freight split by both location and freight mode under the alternative state.

Table 3 Freight split by mode and location under alternative state

	Brisbane (road)	Gladstone/Mackay (road)	Emerald (road)	Rail
SGCP (Epsilon)				
Construction freight	20%	75%	5%	0%
Operational freight	0%	5%	13%	82%
Alpha				
Construction freight	8%	41%	7%	44%
Operational freight	0%	5%	15%	80%
Kevin's Corner				

	Brisbane (road)	Gladstone/Mackay (road)	Emerald (road)	Rail
Construction freight	8%	41%	7%	44%
Operational freight	0%	5%	15%	80%
SGCP Expansion				
Construction freight	8%	41%	7%	44%
Operational freight	0%	%	15%	80%
Waratah				
Construction freight	8%	41%	7%	44%
Operational freight	0%	5%	15%	80%
Establishment				
Construction freight	8%	41%	7%	44%
Operational freight	0%	5%	15%	80%

Note: Splits for projects other than the SGCP were based on the SGCP Expansion splits provided by ACM.

Source: Aurecon/ACM.

4.1.3 Haulage profiles

ACM has provided estimates on the volume of freight that will be transported on the Central West Railway for each project. The use of the railway for transporting construction and operational freight will commence in 2015. The table below shows the freight volumes that are forecast to be transported on the railway from 2015 to 2025. The freight volumes from 2026 to 2030 are the same as the volumes to be hauled in 2025.

Table 4 Rail freight haulage profile ('000 tonnes)

Mine	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Epsilon	0	20	25	20	20	22	23	23	23	21	22
Alpha	751	779	779	301	320	320	367	367	414	414	414
Kevin's Corner	0	338	366	394	162	181	200	200	247	247	294
SGCP Expansion	0	250	278	288	141	141	391	391	391	226	226
Waratah	0	0	28	56	56	75	764	764	811	424	490
Establishment	19	19	28	28	38	38	38	38	38	38	38
Totals	770	1,406	1,505	1,088	738	777	1,782	1,782	1,923	1,369	1,483

Note: In the data provided by ACM, the freight to be transported on the railway was separated into fuel and freight. The fuel freight was converted from litres to tonnes using a conversion factor of one tonne = 0.939 kL of fuel oil.

Source: ACM.

Based on the freight mode splits set out above and the rail freight haulage profile provided by ACM, road and rail freight haulage profiles were developed for each of the mine projects under both the base case and alternative state. These profiles were then aggregated to produce overall freight haulage profiles for the two scenarios which

set out the net tonne kilometres of freight to be transported by location and mode. These aggregated freight haulage profiles are provided in Attachment A.

4.2 Freight costs

There are three types of costs typically associated with rail and road freight transport:

- capital costs – the capital expenditure required to enable the railway or road network to accommodate the required freight task;
- operating costs – the cost associated with paying for the haulage of the freight; and
- maintenance costs – either the ongoing costs associated with maintaining the railway or the costs of repairing the damage caused to the road network as a result of the use of heavy vehicles for freight transport.

There are also externalities associated with freight transport – both on road and rail – that must be taken into consideration when conducting a social cost-benefit analysis.

Each of the above costs are considered in the following sections.

4.2.1 Capital expenditure

Rail

As previously stated, the Central West Railway is to be upgraded to accommodate the transportation of coal from the Epsilon mine to the Port of Gladstone. While the rail infrastructure is to be upgraded regardless of whether the Rail Freight Solution is pursued, the rail haulage rate that has been estimated for the project does include the capital costs relating to this upgrade. An estimate of the upgrading costs of the Aurizon Network section of railway between Alpha and Emerald to enable 20,000 tonne type trains to be used to haul freight in and coal out has been completed. While the detail is subject to further investigation, the capital cost has been amortised and included in the rail haulage rate (see section 4.2.2).

Capital costs will also be incurred in the construction of the intermodal facility and fuel depot to enable the freight to be received at the mine sites. The estimated cost of these facilities is \$70 million. It has been assumed in the model that this cost will be incurred in 2014 under the alternative state.

The rail haulage rate also includes the capital costs that will be incurred in the procurement of rollingstock and the construction of above rail maintenance facilities required for the implementation of the Rail Freight Solution.

This also assumes that the upgraded Central West Railway will have the capacity to operate the anticipated coal traffic (which will be running loaded to Gladstone and then empty back to the mines) as well as the freight traffic. While we have not examined the appropriateness of this assumption in any detail, 1.5 million tonnes per annum of freight traffic is not necessarily significant in the context of the overall volumes being carried on this network.

Road

While the proposal will result in a proportion of the freight task being transported on the railway, there is still a proportion of freight under the alternative state that will be transported on the regional road network. As all of the roads will need to be upgraded to a sufficient level to be able to handle heavy freight vehicles, it has been assumed that there will be no difference in the up-front capital costs incurred under the two scenarios. The differences in the volumes of freight transported on the regional road network will manifest through differences in future road maintenance and repair costs (and any differential in the external costs of road and rail transport).

However, it is acknowledged that under the base case, there is the potential that the additional construction and operational freight that will need to be transported to the other mine sites could result in additional capital costs being incurred in upgrading the regional road network. This was noted in the EIS for the SGCP:⁷

Other proposed mining operations in the SGCP region have the potential to impact on the transport network. These combined operations may see significant increases in additional road, rail and ship movements on an annual basis.

Upgrades to the road network may be required, which could also be expected to reduce future road damage and hence maintenance costs. As noted above, we do not have any information on likely upgrade costs as it would appear that this is still in the planning phase. In the absence of this information there is no additional road capital expenditure included in the base case.

4.2.2 Haulage costs

ACM has provided estimates of the road and rail haulage costs. For road haulage, the estimated cost is 14 cents per net tonne kilometre (ntkm). This rate represents the average of several road haulage rates obtained through industry sources. The estimated cost of rail haulage is \$25 per tonne. This rate includes the cost of:

⁷ South Galilee Coal Project EIS, p ES-29.

- required upgrades and maintenance to rail infrastructure for the section of the track between Alpha and Emerald;
- securing access to the rail infrastructure between Alpha and Gladstone;
- above rail capital requirements (rollingstock and maintenance facilities); and
- operating costs.

This cost estimate has been provided by an experienced provider of bulk rail haulage services.

4.2.3 Road damage costs

There are two approaches that can be applied in order to determine an estimate for the road damage costs attributable to a freight task:

- an engineering-based approach
- a price-based approach.

Engineering-based approaches use formulas that contain variables relating to the physical characteristics of the freight vehicles and roads to calculate the road damage cost for each individual freight task. These methodologies are complex and information-intensive. Accurately estimating road damage cost using an engineering-based methodology requires information on vehicle types, number of axles, grouping of axles, degree of loading and road type. This information was not available for this analysis.

A price-based approach uses charges that are levied on heavy vehicle users as a proxy for the costs of the road damage that is attributable to heavy vehicles. This means that the estimate for road damage costs is derived from the price signals that are provided to heavy vehicle users. A price-based approach is therefore considered to be more appropriate for conducting an economic analysis. Furthermore, it is not as complex or information-intensive as an engineering-based approach. It does, however, assume that these charges adequately reflect road damage costs.

The pay-as-you-go (PAYGO) model that is applied by the National Transport Commission (NTC) to calculate heavy vehicle charges in all jurisdictions in Australia has been used as the basis for the calculation of road damage costs in this analysis. An overview of this model and how the NTC calculates Road User Charges (RUC) is provided in the box below.

Box 1 PAYGO model for calculating heavy vehicle charges

The PAYGO model, which was introduced in 1992, recovers revenue from heavy vehicle users through a two-part charge:

- a fixed annual registration charge, which is determined by state and territory governments
- fuel-based road user charges, which are determined by the Commonwealth Government.

Registration charges account for approximately 40% of the total revenue recovered from heavy vehicle users, with the remainder accounted for by the Commonwealth user charges.

The framework under which the NTC calculates road user charges is set out in the *Model Heavy Vehicle Charges Act* in combination with a set of key principles developed by the Standing Council on Transport and Infrastructure and the Council of Australian Governments. These principles are:

- full recovery of allocated infrastructure costs while minimising both the over and under recovery from any class of vehicle;
- cost effectiveness of pricing instruments;
- transparency;
- the need to balance administrative simplicity, efficiency and equity;
- the need to have regard to other pricing applications such as light vehicle charges, tolling and congestion;
- ongoing cost recovery in aggregate; and
- the removal of cross subsidies between vehicle classes.

The NTC calculated road user charges by using a seven year average for both expenditure and vehicle numbers. This approach removes the price shock effects that can be caused by short-term changes in expenditure levels. Vehicle number inputs are obtained from the ABS Survey of Motor Vehicle Use.

To ensure that heavy vehicle charges continue to be reflective of road-related expenditure, charges are automatically adjusted in July of each year, in accordance with the following formula:

$$\text{Annual Adjustment (per cent)} = \text{Road Expenditure Factor} + \text{Road Use Factor}$$

Once the NTC calculates the road user charges for the next 12 month period, the charges are submitted to the Federal Minister for Infrastructure and Transport for approval and implementation.

Note: In May 2012, it was agreed that the NTC would complete a comprehensive review of the heavy vehicle charging system. Following the completion of the review, the NTC has begun developing options for a new heavy vehicle charges determination. The NTC will present recommendations to the Standing Committee on Transport and Infrastructure in February 2014 and, if approved, the new charges determination will be implemented from 1 July 2014.

Source: National Transport Commission.

The PAYGO model is designed to recover the marginal costs of road wear for each heavy vehicle type and to ensure that heavy vehicles pay their share of road spending. It should be noted that the model has been widely criticised by several stakeholders, largely in relation to its inability to recover the full cost of heavy vehicle road use. For example, in its recent submission to the NTC's review of the heavy vehicle charging system, Transport for New South Wales stated that:⁸

...since 2004, PAYGO has led to the under recovery of \$1.3 billion in 2012-13 dollars (\$1.2 billion in nominal terms) of allocated heavy vehicle road expenditure. PAYGO

⁸ Transport for New South Wales (2013). 2013 Heavy Vehicle Charges Methodology Review – Transport for NSW Submission to the National Transport Commission, p 1.

has therefore failed in its principle (sic) objective to achieve ongoing recovery of costs allocated to heavy vehicle road users.

While the NTC considers that, overall, the PAYGO model has achieved its cost recovery objective, it does acknowledge that the model only represents a hypothetical approximation of the heavy vehicle share of total expenditure on roads. The NTC has also recommended that a reform project be established with the objective of moving from a financial to an economic cost recovery model.

It is also important to note that the RUC determined under the PAYGO model only accounts for the marginal cost of road use by heavy vehicles. Therefore, basing the estimate for the cost of road damage on this measure does not take into account potential major upgrades or refurbishment works that may be required in order to enable the regional road network to accommodate the freight task required to service the mining projects.

While it is likely that using the RUC determined by the NTC under the PAYGO model will result in the road damage costs in this analysis being an underestimate of the true cost of heavy vehicle use on the regional road network, it is considered appropriate to use this approach for the following reasons:

- a price-based approach is more appropriate for use in an economic analysis than an engineering-based approach;
- it has been independently and objectively determined;
- the model is currently applied by the NTC and is therefore reflective of actual charges facing heavy vehicle road users;
- it is more likely to result in an underestimate of road damage costs than an overestimate, meaning that the outcomes of the analysis will be more conservative in terms of valuing the relative benefits of the Rail Freight Solution; and
- it is more simplistic and less information-intensive than other approaches.

The annual registration charge – which accounts for around 40% of the revenue recovered through heavy vehicle charges – has been excluded from the calculation of the road damage costs as it does not vary with road use. The road damage costs have therefore been calculated using the RUC, which is levied on fuel consumption. The current RUC for heavy vehicles is 26.14 cents per litre.

To apply this input to calculate the road damage costs under the base case and alternative state, it is necessary to calculate the number of litres to be used by freight vehicles in each year of the study period for both scenarios. The Australian Bureau of

Statistics (ABS) conducts a survey of motor vehicle use in Australia on an annual basis. Among other issues, this survey assesses net tonne kilometres travelled and fuel consumption by various types of vehicles.

In 2012, freight vehicles travelled 194,033 million tonne kilometres in Australia. Of this total, 186,272 million (96%) was accounted for by articulated and rigid trucks, which consumed 6,909 million litres of fuel. This equates to a fuel consumption rate of 37.1 litres per 1,000 net tonne kilometres. This rate was applied to the freight haulage profiles over the study period to calculate the number of litres of fuel used under both the base case and alternative state. The RUC was then applied to determine a proxy estimate for road damage costs. Again, it is noted that there is a strong body of opinion that the RUC underestimates the true cost of road damage attributable to heavy vehicles.

4.2.4 External costs

There are several negative externalities associated with freight transport. A negative externality is a cost that is imposed on third parties as a result of an activity that is not captured by market values. The negative consequences of freight transport, such as increased pollution and increased incidence of accidents, impose a cost on society.

For this analysis, the following external costs of road and rail freight transport have been estimated:

- air pollution
- noise pollution
- the cost of accidents
- greenhouse gas emissions.

As external costs are not captured by market values, quantifying these costs can be difficult. In 2012, the Independent Pricing and Regulatory Tribunal (IPART) conducted a review of access pricing on the NSW grain line network. As part of this review, IPART compared the external costs of transporting grain by rail and road. IPART's analysis was based on estimates of the external costs of road and rail freight from two sources – a Queensland study quoted in a submission by Dr Philip Laird⁹ and a report by Booz Allen Hamilton.¹⁰

⁹ Philip Laird (2012). Submission to IPART Issues Paper on Review of Access Pricing for the NSW Grain Line Network.

¹⁰ Booz Allen Hamilton (2011). Final Report Re-Opening the Cowra Rail Lines: Cost Benefit Analysis and Policy Options.

Both of these studies estimated a range of external costs associated with road and rail freight transport, including accident costs, air pollution, noise pollution, and greenhouse gas emissions. The studies reported separate costs for urban and rural areas. Table 5 sets out the external unit cost rates (cents per ntkm) estimated for rural areas by both Dr Laird and Booz Allen Hamilton.

Table 5 Laird and Booz Allen Hamilton external unit cost rates (c/ntkm) for rural areas

External cost	Road		Rail	
	Laird	BAH	Laird	BAH
Air pollution	0.18	0.01	0.06	-
Noise pollution	0.10	0.03	0.06	0.02
Greenhouse gas emissions	0.25	0.08	0.08	0.03
Water pollution	-	0.07	-	0.01
Nature and landscape	-	0.12	-	0.03
Accidents	0.85	0.41	0.04	0.04
Road maintenance	1.41	1.26 ^a	-	-
Totals	2.79	1.98	0.24	0.13

^a This estimate was added to by IPART to make the Booz Allen Hamilton unit cost rates comparable to the estimates generated by Dr Laird.

Source: IPART (2012). Review of access pricing on the NSW grain line network. Transport – Final Report, p 35.

We have adopted a conservative approach by only including the four categories of external cost identified above in our analysis (that is, air pollution, noise pollution, accident costs and greenhouse gas emissions), as the extent to which the other external costs estimated in the above studies will materialise for the freight task are questionable. It is also noted that the analysis by Dr Laird includes an additional cost for road maintenance, which represents an allowance for under-recovered road system costs, being the difference between the RUC and the actual road damage caused by freight vehicles. The Booz Allen Hamilton study did not include such an allowance.

While IPART used the unit rates estimated by Dr Laird, we have adopted an average of the estimates produced by Dr Laird and Booz Allen Hamilton for the four external costs that have been included in the cost benefit analysis. Subsequently, the unit rates for the external costs that have been applied in undertaking the cost analysis are:

- air pollution – 0.095 c/ntkm for road and 0.03 c/ntkm for rail
- noise pollution – 0.065 c/ntkm for road and 0.04 c/ntkm for rail
- accident costs – 0.63 c/ntkm for road and 0.04 c/ntkm for rail
- greenhouse gas emissions – 0.165 c/ntkm for road and 0.055 c/ntkm for rail.

Attachment B provides more detailed information on the inputs and methodologies underpinning the unit cost estimates derived by Dr Laird. The Booz Allen Hamilton report was not publicly available.

5 Results

This section presents the results of the modelling of the economic costs of the base case and alternative state and the net economic impact of the Rail Freight Solution. It also presents the results of:

- sensitivity analysis that has been conducted on key parameters and assumptions; and
- scenario analysis, which assesses the economic feasibility of the Rail Freight Solution with different assumptions regarding the freight splits for the mining projects.

5.1 Base case

Table 6 contains the cost estimates under the base case. Only the cost estimates from 2014 to 2025 are included in the table. The cost estimates for 2026 through to 2030 are the same as the estimates for 2025.

Table 6 Cost analysis under base case (\$'000)

Cost	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Capital cost road upgrades	0	-	-	-	-	-	-	-	-	-	-	-
Road haulage costs	0	131,029	238,892	254,661	157,259	68,369	73,382	219,323	219,323	235,500	117,946	127,732
Road damage costs	0	9,077	16,548	17,640	10,894	4,736	5,083	15,193	15,193	16,313	8,170	8,848
Air pollution (road transport)	0	889	1,621	1,728	1,067	464	498	1,488	1,488	1,598	800	867
Noise pollution (road transport)	0	608	1,109	1,182	730	317	341	1,018	1,018	1,093	548	593
Accident costs (road transport)	0	5,896	10,750	11,460	7,077	3,077	3,302	9,870	9,870	10,598	5,308	5,748
Greenhouse emissions (road)	0	1,544	2,816	3,001	1,853	806	865	2,585	2,585	2,776	1,390	1,505
Total cost	0	149,044	271,736	289,673	178,880	77,768	83,471	249,477	249,477	267,878	134,161	145,294

Note: Totals may not add due to rounding.

Source: Synergies modelling.

Based on a real discount rate of 6.5%, the total PV of the cost of the freight transport task under the base case is estimated at \$1,673 million.

5.2 Rail Freight Solution (alternative state)

Table 7 contains the cost estimates for the alternative state. As with the base case, the cost estimates from 2026 through to 2030 are the same as the estimates for 2025 and hence the table only includes the costs for 2014 to 2025.

Table 7 Cost analysis under Rail Freight Solution (\$'000)

Cost	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Capital cost road upgrades	0	-	-	-	-	-	-	-	-	-	-	-
Road haulage costs	0	71,743	130,619	138,796	73,517	11,581	13,557	82,079	82,079	87,411	12,505	13,543
Road damage costs	0	4,970	9,048	9,615	5,093	802	939	5,686	5,686	6,055	866	938
Air pollution (road transport)	0	487	886	942	499	79	92	557	557	593	85	92
Noise pollution (road transport)	0	333	606	644	341	54	63	381	381	406	58	63
Accident costs (road transport)	0	3,228	5,878	6,246	3,308	521	610	3,694	3,694	3,933	563	609
Greenhouse emissions (road)	0	846	1,539	1,636	866	136	160	967	967	1,030	147	160
Capital cost rail intermodal	70,000	-	-	-	-	-	-	-	-	-	-	-
Rail haulage and maintenance	0	19,249	35,154	37,618	27,189	18,438	19,424	44,560	44,560	48,081	34,234	37,075
Air pollution (rail transport)	0	127	232	248	179	122	128	294	294	317	226	245
Noise pollution (rail transport)	0	169	309	331	239	162	171	392	392	423	301	326
Accident costs (rail transport)	0	169	309	331	239	162	171	392	392	423	301	326
Greenhouse emissions (rail)	0	233	425	455	329	223	235	539	539	582	414	449
Total cost	70,000	101,554	185,006	196,862	111,801	32,280	35,550	139,541	139,541	149,255	49,701	53,825

Note: Totals may not add due to rounding.

Source: Synergies modelling.

Based on a real discount rate of 6.5%, the total PV of the cost of the freight transport task under the alternative state is estimated at \$986 million.

5.3 Net impact of the proposal

As stated above, the total economic cost to be incurred over the period of analysis under the base case and alternative state is estimated at \$1,673 million and \$986 million respectively, based on a real discount rate of 6.5%. This equates to a net economic benefit of approximately \$687 million, with a Benefit Cost Ratio (BCR) of 1.7.

5.4 Sensitivity analysis

Sensitivity analysis shows how the results of the analysis are affected by changes to key variables. This is done by changing the value of one variable and holding all others constant. It provides an indication of how important assumed values are to decision rules used in the analysis and assists in identifying the key drivers of the overall results.¹¹ It is also useful to inform break even points, for example, at what level for a variable will the proposal become NPV positive (or negative).

Sensitivity analysis was conducted on the following parameters:

- discount rate
- heavy vehicle RUC
- road haulage cost
- rail haulage and maintenance cost
- external cost unit rates.

These parameters were selected based on the level of certainty of the variables, the estimates applied for each of the parameters and their expected impact on the results of the analysis. Table 8 presents the outcomes from this sensitivity analysis.

Table 8 Results from sensitivity analysis: net benefit of Rail Freight Solution

Parameter	Net benefit of Rail Freight Solution (\$)	% change relative to base case
Base results	686,817,727	NA
Discount rate		
Low (3%)	951,881,665	+38.6%
High (10%)	508,971,883	-25.9%
Heavy vehicle RUC		
Low (13.07 cents per litre)	654,278,403	-4.7%
High (39.21 cents per litre)	719,357,050	+4.7%
Road haulage cost		
Low (7 cents per ntkm)	217,078,247	-68.4%
High (21 cents per ntkm)	1,156,557,207	+68.4%
Rail haulage and maintenance cost		
Low (\$12.50 per tonne)	839,330,545	+22.2%

¹¹ In cost-benefit analysis a number of decision rules can be used to assess whether a change will be an overall benefit to the community. In this analysis we use a present value rule which states that a change is beneficial if the net present value is greater than zero.

Parameter	Net benefit of Rail Freight Solution (\$)	% change relative to base case
High (\$37.50 per tonne)	534,304,909	-22.2%
External cost unit rates		
Low (-50% for all unit rates)	660,310,999	-3.9%
High (+50% for all unit rates)	713,324,454	+3.9%

Source: Synergies modelling.

The sensitivity analysis shows that two parameters have a significant effect on the net impact of the Rail Freight Solution – the discount rate that is applied to future cashflows and the road haulage cost. Increasing the real discount rate to 10% results in a reduction to the base case NPV (\$687 million) of 25.9%, while lowering the real discount rate to 3% results in an increase to the base case NPV of 38.6%. For the road haulage cost, an increase (or decrease) of 50% to the haulage cost estimate results in an increase (or decrease) in the NPV of 68.4%.

The sensitivity analysis also showed that the NPV is somewhat sensitive to the estimate for rail haulage and maintenance cost (a 50% change in this parameter results in a 22.2% change in the NPV) whilst not being sensitive to the estimate for road damage costs or the external unit cost rates. The outcome of this analysis demonstrates the importance of the cost estimates used for road and rail haulage to the net impact of the proposed Rail Freight Solution.

This analysis highlights the robustness of the positive net benefits that could potentially accrue from the Rail Freight Solution. It remains NPV positive compared to the base case under all of the sensitivities tested above. The lowest outcome is where road haulage costs are only 7 cents per kilometre but is still NPV positive.

5.5 Scenario analysis

Scenario analysis tests the impact of changing more than one variable in combination. In addition to the parameters included in the sensitivity analysis in the previous section, the other inputs that have the potential to significantly alter the net impact of the proposal are the modal split for the various mine projects. The modal splits that have been assumed under the alternative state were set out in Table 3, which assumes that they are the same as the expansion stages of the SGCP. The actual modal split for each project will depend on its own requirements and the location and availability of key inputs.

In order to provide an indication of the impact of these modal splits on the net impact of the proposal, two scenarios were modelled:

1. *The demand for rail freight transport is lower for all projects:* the freight shares for rail were reduced by 50% under the alternative state for all projects, with these tonnages transferring to road (Gladstone/Mackay); and
2. *One major project does not shift any freight to rail:* the freight shares for rail for the Kevin's Corner project (both in the construction and operational stages) were all transferred to road (Gladstone/Mackay).

Under the first of these scenarios, the NPV of the proposed Rail Freight Solution fell to \$310.6 million, a reduction of 54.8%. Under the second scenario, the NPV was \$546.1 million, a reduction of only 20.5%.

This analysis shows that while the total loss of the expected rail freight tonnages from one of the major projects would result in a material reduction in the overall net benefit of the proposal, a significant shortfall in the rail volumes across all projects has the greater impact. However, even under the scenario where 50% of the rail freight tonnages across all projects are shifted to road, the proposal still results in a significant net benefit of \$310.6 million. While acknowledging the results of these scenarios, these outcomes are unlikely to arise as it is probable that incentives will be provided under the Queensland Government's 'Moving Freight' strategy to encourage the use of the Rail Freight Solution by the mine projects in the South Galilee Basin.

In addition to the above scenarios, modelling was also performed to determine the break-even point of the analysis for the modal shares. This was performed by modelling the reduction in the rail freight share that would be necessary in order for the proposal to be NPV neutral (i.e. NPV = 0). The analysis found that the rail freight share would need to fall across all projects to 3.8% and 7.0% for the construction and operational stages respectively. This means that even if only a very small amount of total freight tonnages are transported by rail as opposed to road (well below what has been assumed in the base analysis), the proposal will still produce an overall net economic benefit.

This outcome can be attributed to two key factors:

- the relatively low up-front capital expenditure required to implement the proposal; and
- the lower haulage costs and externalities associated with rail freight transport compared to road.

The outcome of this analysis should not be surprising. The lower relative costs and externalities of rail compared to road are well known. Further, the proposed Rail Freight Solution maximises the utilisation of an existing network. As noted above, the

analysis does assume that the network will have adequate capacity to carry the 1.5 million tonnes of freight per annum along with the forecast coal volumes. If this is not the case, any additional upgrade costs would need to be factored into this analysis.

6 Conclusion

The purpose of this report was to conduct an analysis of a proposal to use the upgraded Central West Railway to transport construction and operational freight to the coal mine projects in the South Galilee Basin. The proposal represents an alternative to the transportation of all freight via the regional road network.

The analysis, which was conducted out to 2030, compared the total economic cost of two scenarios – the transportation of all freight to the mine sites by road (the base case) and the transportation of a proportion of the freight task using the Central West Railway (the alternative state). The costs that were included in the analysis of the proposal were:

- capital cost of rail intermodal facilities
- road and rail haulage costs
- road damage costs and rail maintenance costs
- external costs of road and rail freight transport, including air and noise pollution, accident costs and the cost of greenhouse gas emissions.

Based on our assumptions the analysis of the costs of the two scenarios demonstrated that there is a total cost saving of approximately \$687 million in PV terms under the alternative state. The key drivers of this result were:

- the relatively low level of capital expenditure required under the alternative state;
- the operating and maintenance cost advantage of rail infrastructure compared to the regional road network; and
- the lower external costs incurred as a result of rail freight transport compared to road freight transport.

Sensitivity analysis was performed on key variables to determine their criticality to the results of the analysis. The results of the sensitivity analysis demonstrate that the overall economic impact of the proposal is sensitive to changes in both the discount rate and the road haulage cost estimate. While the results of the analysis are somewhat sensitive to the cost of rail haulage and maintenance, changes to the estimates for road damage costs and the external unit cost of road and rail transport did not have a material impact on the net impact on the relative benefits of the Rail Freight Solution.

Scenario analysis was also conducted to assess the impact of changes to the modal splits that were assumed. This analysis showed that a 50% reduction in the freight tonnages transferred to the Central West Railway under the alternative state would

result in a significant reduction (54.8%) in the net economic benefit of the proposed Rail Freight Solution, although still positive. While the loss of a major project (Kevin's Corner) was also found to have a material impact on the net benefit associated with the freight proposal, this effect (20.5%) was significantly less than that caused by a significant reduction in rail freight volumes across all of the projects.

A break-even analysis was performed which demonstrated that the rail freight share would need to fall across all projects to 3.8% and 7.0% for the construction and operational stages respectively. This result can be attributed to the relatively low level of up-front capital expenditure required to implement the proposal and the lower haulage costs and externalities associated with rail freight transport compared to road.

Finally, it is also important to note that the study period is only 17 years. However, the operating lives of the mines transporting operational freight will extend beyond this. Accordingly, the actual NVP benefits generated by the Rail Freight Solution will be higher if the horizon was extended to encompass the total period of operations.

A Aggregated freight haulage profiles

Base case

Aggregated freight haulage profile under the base case ('000 ntkms)

Mode and origin	2014	2015	2016	2017	2018	2019	2020	2021	2022
Road via Brisbane	0	106,530	193,914	205,899	104,696	7,990	10,653	108,355	108,355
Road via Mackay/Gladstone	0	809,093	1,475,458	1,573,477	988,494	457,900	489,924	1,406,805	1,406,805
Road via Emerald	0	20,299	36,629	39,629	30,090	22,457	23,580	51,453	51,453
Total by road	0	935,921	1,706,369	1,819,005	1,123,279	488,346	524,157	1,566,593	1,566,593
Mode and origin	2023	2024	2025	2026	2027	2028	2029	2030	
Road via Brisbane	114,993	0	0	0	0	0	0	0	
Road via Mackay/Gladstone	1,511,562	800,204	866,599	867,147	866,599	866,599	866,599	866,599	
Road via Emerald	55,590	42,264	45,775	45,800	45,775	45,775	45,775	45,775	
Total by road	1,682,146	842,468	912,374	912,947	912,374	912,374	912,374	912,374	

Alternative state

Aggregated freight haulage profile under the alternative state ('000 ntkms)

Mode and origin	2014	2015	2016	2017	2018	2019	2020	2021	2022
Road via Brisbane	0	106,530	193,914	205,899	104,696	7,990	10,653	108,335	108,335
Road via Mackay/Gladstone	0	385,620	702,079	745,870	390,339	52,272	62,606	426,490	426,490
Road via Emerald	0	20,299	36,997	39,629	30,090	22,457	23,580	51,453	51,453
Total by road	0	512,449	932,990	991,398	525,125	82,719	96,839	586,278	586,278
Total by rail	0	423,473	773,379	827,606	598,155	405,627	427,318	980,315	980,315
Total (road and rail)	0	935,921	1,706,369	1,819,005	1,123,379	488,346	524,157	1,566,593	1,566,593
Mode and origin	2023	2024	2025	2026	2027	2028	2029	2030	
Road via Brisbane	114,993	0	0	0	0	0	0	0	
Road via Mackay/Gladstone	453,780	47,054	50,959	50,991	50,959	50,959	50,959	50,959	
Road via Emerald	55,590	42,264	45,775	45,800	45,775	45,775	45,775	45,775	
Total by road	624,363	89,319	96,734	96,790	96,734	96,734	96,734	96,734	
Total by rail	1,057,783	753,150	815,640	816,157	815,640	815,640	815,640	815,640	
Total (road and rail)	1,682,146	842,468	912,374	912,947	912,374	912,374	912,374	912,374	

B Laird external cost estimates

This attachment provides additional information on the methodology and inputs underpinning the external unit cost estimates for non-urban road and rail freight transport submitted by Dr Phillip Laird to IPART as part of its 2012 review of access pricing on the New South Wales grain line network. It should be noted that the cost estimates included in Dr Laird's initial report were updated for this submission and hence the estimates in this attachment will differ from those cited in the report.

Accident costs

In developing his estimate for the accident costs associated with road and rail freight transport, Dr Laird sourced data from the Australian Transport Safety Bureau (ATSB), the Bureau of Infrastructure, Transport and Resource Economics (BITRE) and the ABS. The following BITRE cost estimates were used as inputs in Dr Laird's calculation of road and rail accident costs:

- an average economic cost of a fatality in a rail accident of \$1.9 million, as of 1999
- average cost of a road crash requiring hospitalisation of \$325,000
- average cost of a road crash resulting in minor injuries of \$12,000.

Using detailed Queensland road accident data, updated costings from the BITRE, and ATSB data on the number of fatalities involving articulated trucks, Dr Laird calculated the average unit cost of road crashes involving articulated trucks over the five years up to 2003 in Queensland at 0.66 cents per ntkm. As there was insufficient data to enable the cost estimate to be differentiated between urban and non-urban areas an estimate of 0.6 cents per ntkm was applied as an Australia-wide average accident cost for freight moved by articulated trucks.

Dr Laird's estimate for the unit cost of rail freight accidents was based on a 1995 estimate generated by the Bureau of Transport and Economics (BTE). The continued application of this estimate – 0.03 cents per ntkm – was supported by data from BITRE on the costs of rail accidents as well as data provided by Queensland Rail and Queensland Transport on the number of fatalities and injuries associated with rail freight transport.

Air pollution

Dr Laird's calculation of the cost of air pollution associated with articulated trucks for non-urban areas was derived from the BITRE estimate of the annual cost of motor vehicle-related air pollution in regional areas of \$332 million. ABS data was then used

to assign \$113 million of this total cost to the operation of freight trucks. Data on articulated truck distances was then used to derive a unit cost estimate of 0.13 cents per ntkm.

In order to produce an estimate for rail air pollution in rural areas, Dr Laird adopted the assumption that the health costs of air pollution caused by rail freight were the same as that caused by road freight, adjusted in accordance with the overall ratio of fuel used for general rail freight haulage to road haulage by articulated trucks. Data from the Australasian Railway Association (ARA) showed that rail is, on average, three times more fuel efficient than articulated trucks. Based on this ratio, the cost of air pollution from rail freight transport in non-urban areas was estimated at 0.04 cents per ntkm.

Noise pollution

Dr Laird's estimate for the unit cost of noise pollution attributable to road freight in non-urban areas was derived based on an estimate of 5 cents per km, which was reported in several sources.¹² An average load estimate of 22.62 tonnes, which was obtained by BITRE, was then applied to produce a unit cost estimate of 0.22 cents per ntkm in urban areas. Based on BITRE data, a ratio was derived to convert this unit cost estimate to an estimate for rural areas. This resulted in a non-urban unit cost estimate of 0.07 cents per ntkm. A similar methodology was applied to produce the estimate for the cost of noise pollution attributable to rail freight in non-urban areas – 0.04 cents per ntkm.

Greenhouse gas costs

The inputs and methodology applied by Dr Laird to estimate the unit cost of greenhouse gas emissions for road freight in non-urban areas was as follows:

- a value of \$25 was used to estimate the cost per tonne of CO₂e, based on the widespread adoption of this estimate in other studies; and
- conversion factors for Automotive Diesel Oil of 69.7 grams of CO₂ per MJ and 38.6 MJ per litre – both sourced from BTRE – were used to derive an estimate of 2.69 kg of CO₂ per litre of diesel.

Combining these two inputs resulted in an estimate of 6.725 cents per litre. Using ABS data on the articulated road freight task, the number of litres of diesel consumed was

¹² Dr Laird used this cost estimate despite the fact that using BIC and ABS data on the total cost of noise pollution from articulated trucks and the articulated freight task in capital cities produced an estimate of 8.07 cents per km.

then calculated (106.98 billion ntkm resulting in the use of 2,913 million litres of diesel). This resulted in an average of 36.72 ntkm per litre, which at 6.725 cents per litre resulted in an average unit cost of 0.183 cents per ntkm for road freight. Using the one to three ratio for the use of fuel by rail freight compared to articulated trucks discussed above, this results in a unit cost rate for rail of 0.06 cents per ntkm. These unit cost estimates were applied for both urban and non-urban areas.



9.16 Commitments Register

9.16 Commitments Register

9.16.1 AEIS Commitments

Surface Water Management

Have in place sub-water management plans prior to operations commencing:

- Erosion, Sediment control plan
- Standard operating procedure - Dams
- Operational Plan – Regulated Dams
- Water Balance Reports
- Receiving environmental monitoring plan

Implement the Water Management Objectives in 4.2 of Part 9.3.5 of the AEIS.

Adhere to the water management principles in 4.3 of Part 9.3.5 of the AEIS.

Adhere to the dam maintenance and monitoring principles in 4.8 of Part 9.3.5 of the AEIS.

Implement the performance criteria assessment presented in 5.4 of Part 9.3.5 of the AEIS.

Implement the Surface Water Monitoring Plan in item 6 of Part 9.3.5 of the AEIS.

Include the ERP aspects of item 7 of Part 9.3.5 in the site wide ERP.

Groundwater

One to three monitoring bores will be drilled and installed in the Clematis Sandstone and Tertiary sediments prior to the final EIS documents being lodged to ensure baseline data begins to be collected to allow an understanding of potential impacts once mining commences. Once landholder agreements are obtained, locations and construction details for the bores will be presented in a Monitoring Bore Construction Work Plan in consultation with DNRM.

Groundwater-surface water interaction will be assessed once nested bores are constructed within the Sandy Creek Alluvium and deeper coal seams.

A minimum of 12 groundwater baseline monitoring samples will be collected within 24 months to allow for the drafting of trigger levels, to be mutually agreed with DEHP. This will include groundwater level triggers.

Background data will be used as a basis for proposed release contaminant trigger levels for metals above the default guideline levels (ANZECC/ARMCANZ 2000). These levels can only be modified in those cases where the 80th percentile of background site data is significantly different to the default ANZECC trigger.

If monitoring and evaluation shows that the predicted drawdown impacts differ from actual impacts by 20%; this should trigger review and recalibration of the numerical groundwater model to the measured data, and preparation of appropriate reports. Subsequently, the model should be used as a management tool for the prediction of groundwater impacts throughout the SGCP life and the preparation and implementation of monitoring and management plans.

The Proponent has made a commitment to make-good affected groundwater supplies, consistent with licence conditions. Landholders who have groundwater supplies that are materially impacted by the operation, to a degree where groundwater is not able to be

used for its pre-mining beneficial use (in terms of quality and/or quantity) will be provided with an alternate water supply of comparable yield and quality. The specific arrangements for affected properties will be discussed with relevant landholders if they occur, with a view to reaching a mutually acceptable agreement.

Monthly groundwater monitoring program when construction commences.

Housing and Accommodation

ID	Commitment
1.1	The Proponent will put in place measures to reduce impacts on housing in Alpha, with majority of workforce to reside in onsite accommodation.
1.5	The Proponent will put in place measures to minimise impacts on Alpha's services, social value and safety by ensuring sufficient facilities have been incorporated into the design of onsite accommodation.
1.6	The Proponent will implement a good neighbourhood policy and workforce code of conduct to minimise negative impacts on Alpha community values.
1.7	The Proponent will work with other proponents, government agencies and service providers to plan for increased demand for infrastructure and services due to increased population from mine workers.
1.8	The Proponent will put in place measures to monitor housing affordability in Alpha.
1.9	The Proponent will work with BRC and DHPW and other proponents to develop strategies that monitor the impact of rental stocks and offset negative impacts on housing, including social housing.
2.2	The Proponent will inform the labour market in advance of plans to recruit through BIBO, FIFO and the location points of hire.
2.3	The Proponent will work with other proponents and agencies and establish targets and strategies to identify vulnerable locations in the workforce sourcing regions.

Workforce Management

ID	Commitment
1.1	The Proponent will implement a Local Employment Policy that investigates the development of pre-employment training programs and notifies local people of opportunities through the media.
1.2	The Proponent will liaise with DOE FIFO coordinators to source workers from areas around Queensland with high unemployment and capacity, and liaise with DATSIMA to ensure Indigenous candidates are provided opportunities.
1.3	Contribute to the Central Queensland workforce development strategy, providing workforce estimates and profiles to assist with planning and program development and identifying employment gaps.
1.4	Working with DETE to develop workforce strategies that link to local and regional training programs and up-skilling.
1.5	Disadvantaged groups will be actively included in recruitment and policies will be in place to reflect equal opportunities for all. Anti-discrimination and cultural awareness training will be undertaken and strategies implemented to increase the number of under-represented groups (eg: Indigenous people) participating in skills development training and those employed.
1.6	The Proponent will implement a Memorandum of Understanding with the Queensland Government and QRC and investigate the expansion of the Bowen Basin Indigenous Participation Partnership to Galilee Basin.
1.7	The Proponent will appoint a dedicated Indigenous Liaison Officer to assist with employment opportunities, initiatives and retention strategies for Indigenous people.
1.8	Work with relevant agencies to identify potential barriers to Indigenous participation and support Indigenous workforce participation.

ID	Commitment
1.9	The Proponent will work with DETE to identify skills gap in the local community and tap into opportunities.
2.0	The Proponent will investigate the opportunity to establish a combined Proponent training association.
2.1	The Proponent will work with agencies and relevant training providers to develop a suite of training programs.
2.2	A multi-skilled workforce will be developed that supports individual career path progression and staff will be encouraged through attractive rostering, remuneration and development programs.
2.3	The Proponent will develop a graduate support program, traineeship program, Indigenous trainee and apprenticeship programs.
2.4	Work with schools to promote vocational opportunities to encourage applications for workforce opportunities.
2.5	Work with QMEA and QRC to expand existing programs into the local area and areas of high unemployment to encourage young people to start a career in the resource section.

Regional Business and Local Content

ID	Commitment
1.1	The Proponent will develop a Local Content Plan to ensure full, fair and reasonable opportunity for local industry to compete for goods and services of the Project.
1.2	The Proponent will work with agencies and organisations and locals to encourage the use of local and regional businesses to help diversify the local economy, increase spending in the area and provide opportunities for local businesses to expand and develop.
1.3	The Proponent will work with key stakeholders to introduce a Regional Capacity Building Program to facilitate training on generic and contract requirements.
1.4	Partner with key stakeholders to deliver a Regional Capacity Building Program to assist local and regional businesses in areas such as financial planning and stability and resource management.
1.5	Work with relevant stakeholders to prepare a Mine Closure Plan to assess local and regional impacts following the mine's closure.
1.6	Develop and implementation of a 'Buy Local' program to support the sustainability of local and regional businesses.
1.7	The Proponent will register with the Industry Capability network website portal for suppliers to express their interest to work with the Project and to look at procurement and tendering opportunities.
1.8	The Proponent will work with and consult with relevant agencies and organisations to promote Indigenous employment opportunities.

Community Safety and Wellbeing

ID	Commitment
1.1	The Proponent will work with stakeholders to look at on road traffic control, VMS systems and education programs for employees and stakeholders and consider impacts on other local communities.
1.2	The Project will review and update vehicle numbers to inform development of Road Use Management Plan and Traffic Management Plan throughout the duration of the mine.
1.3	The Project will move employees to and from site by bus to reduce the number of vehicles on the road.
1.4	The Project will use the existing rail network as much as practicable to minimise police escorts.
1.5	The RUMP will be developed and implemented (linking with a fatigue management procedure) that analyses opportunities for education and engagement of employees and other stakeholders.

ID	Commitment
1.6	An Emergency and Disaster Management Response Plan will be developed in consultation with Emergency Services and aims to capture the flow on effects of other service providers in the area.
1.7	The Proponent has committed to supporting local emergency service providers in the event of an emergency.
1.8	The Proponent will provide relevant information such as work programs and employee statistics to emergency services on a regular basis.
1.9	The Proponent will link into a Memoranda of Understanding with existing key service providers to provide mine based resource and infrastructure assistance and will include involvement in cross training exercises and Emergency Services and ongoing consultation. Available mine resources are not available for offsite use when mining is occurring.
2.1	The Proponent will work with Queensland Health and other stakeholders to ensure an ongoing understanding of the capabilities and needs of local and regional medical centres/hospitals.
2.3	The Project would continue to promote health lifestyle through education, training and provision of recreational facilities to be built on site.
2.4	The Project will actively promote occupational health and safety through education and training to minimise the incidence of workplace accidents.
2.5	The Project would implement a Drug and Alcohol Policy and Accommodation Village Behavioural Policy and a Workforce Code of Conduct and ensure all employees are contractually bound.
2.6	The Project will develop and implement a Good Neighbour Policy to guide positive interactions between the Proponent staff, contractors and consultants, and the local community, particularly neighbouring landholders.
2.7	A Landholder Management Plan will be implemented to ensure the Proponent engages appropriately with adjoining landholders to monitor impacts on agricultural productivity.
2.8	A Code of Conduct will be prepared which would be strictly enforced for all SGCP employees and contractors and would apply to behaviour in and outside of the workplace.
3.0	The Proponent would maintain a 24-hour free call community complaints hotline and all complaints would be recorded, addressed and reported.
3.1	The Proponent will establish a FIFO workforce Family Support Plan, involving a variety of stakeholders. The plan will identify the needs and aspirations of all employee s including FIFO workers to ensure their wellness and quality of life.
3.2	Good communication services will be provided for employees to ensure they keep in contact with family and friends.
3.4	Ensure an Employee Assistance Program is implemented to assist employees in dealing with personal issues and coping with family changes.
3.5	The Proponent will implement a 'Fit for work' fatigue management procedure in conjunction with employees and other stakeholders.
3.6	The Proponent will implement an education program for workers and contractors incorporating ways drug and alcohol policies, fatigue management, socially acceptable behaviour, cultural awareness and lessons how helping to protect the locals' way-of-life.

Stakeholder and Community Engagement

Commitment
The Proponent will develop a Community and Stakeholder Engagement Plan that acknowledges the importance of engaging openly and honestly with stakeholders.
The Proponent will respond quickly and fairly to community and stakeholder enquiries and complaints and will continue to identify, monitor and respond to community members/ organisations and other key stakeholders throughout the life of the Project.

Commitment

The Proponent will conduct relevant public meetings and information sessions as required throughout the mine's lifespan, to ensure stakeholders and communities are kept informed of the Project's plans and actions.

The Proponent will encourage dialogue with all stakeholders and will work in partnership to deliver on SIA action plans and address cumulative impacts with other proponents through the Galilee Basin Roundtable.

The Proponent will implement a range of communication and engagement tools to inform, engage and encourage participation from the community such as public displays, updates and 24-hour hotline.

A Community Liaison Officer will be appointed to act as a conduit between the Project and the community and will be responsible for the roll out of all communication and community activities. The officer will also work closely with the Indigenous Liaison Officer to ensure opportunities are maximised wherever possible.

The Proponent will maintain and support ongoing consultation with the community and stakeholders that have been historically associated with the Project including the Technical Reference Group and Community Reference Group.

The Proponent will establish a Community Consultative Committee to pro-actively identify and respond to issues and provide information about the Project to other community members and stakeholders.

The Proponent will implement a complaint and dispute resolution system to ensure all community and stakeholder issues have been dealt with appropriately and closed out.

The Proponent will develop an Issues and Risk Management Plan as part of the Community and Stakeholder Engagement Plan to ensure a centralised and swift approach to issues that could adversely impact on the reputation of The Proponent.

The Proponent will develop a Media Management Plan to ensure open and positive relationships with the media to help achieve balanced coverage.

The Community Liaison Officer will monitor the performance, effectiveness and efficiency of the Community and Stakeholder Engagement Plan and modify processes and communication channels as appropriate.

Landholder Management

Commitment

The Proponent will listen to its neighbours, communicate clearly and consistently about Project activities, respond effectively to issues, regularly review and update land access procedures, and provide 'mutual assistance' where possible.

The Proponent will undertake ongoing consultation with landholders regarding the alignment of stock routes.

The Proponent will establish make-good agreements that address the concerns regarding groundwater impacts resulting from SGCP.

The Project will minimise impacts to visual amenity, air and noise on neighbouring landholders by taking into account the interests of landholders in the development of infrastructure and operating procedures during the design phase.

The Project will undertake Pest and Weed Management Plan as part of the Environment Management Plan.

Land Access Agreements will be developed and appropriate protocols with landholders to minimise access impacts.

The Proponent will seek to engage landholders as required to monitor and address issues such as agricultural productivity as they arise.

Cumulative Impact

Commitment

The Proponent will participate in a roundtable and this commitment is on the basis of similar commitments to be given by all proponents operating or intending to operate in the Galilee Basin whose projects have been declared a 'coordinated project' by the Coordinator General.

The Proponent understands that the roundtable may be tasked with developing short, medium and long term strategies for responding to regional impacts on infrastructure and services that are beyond the scope of individual project assessments. These strategies may be delivered through partnerships between industry, communities, and local governments and state agencies, and will inform and align with regional planning priorities.

The Proponent will work with the Local Area Infrastructure Program to bring together industry, local government and government agencies to identify and prioritise strategic infrastructure needs, address the phasing of strategic infrastructure and explore how funding of projects can be aligned.

LAIPs will link closely to the Government's Royalties for the Region's program and Australian Government funding programs.

Geochemical

- Develop and comply with PAF Management Plan.
- Design appropriate cover system for in-pit and ex-pit dumps.
- Blending of PAF and ANC material trials to assess lag times before the onset of PAF conditions.
- Dumping and traffic compaction lifts depths of PAF materials will consider the risk of accelerated oxidation through convection.
- Develop a geological model to predict PAF/NAF horizons for materials scheduling.
- Program for sampling and testing of interburden, overburden and processing wastes.
- Sampling and testing of dump run-off water program

Transport

Commitment to provide maintenance contributions to DTMR.

The inclusion in Appendix U – List of Proponent Commitments:

- (a) That bandwidth will be made available for Police and Emergency Services. (Police requirement is 1Mb);
- (b) That floor space be allocated within the main communications facility for a QPS secure equipment rack;
- (c) That access to support infrastructure such as an associated telecommunications tower is provided for the installation of QPS equipment (antenna); and
- (d) The provision of mains power (240 volt AC) for the operation of the radio communications equipment.

Assist with the upgrade of the local Aerodrome.

SGCP will develop alternate water supply agreements with landholders who will be potentially impacted by mine dewatering, as identified in section 3.2.3 of the South Galilee Groundwater Model 2013 Update for AEIS.

EMP commitment to develop alternative Water Supply Agreement with landholders who will be potentially impacted by mine dewatering prior to the commencement of mining

operations. As more information becomes available the Proponent will make good any identified impacted landholders.

Water License Annual Aquifer Performance Review – included in EMP.

7.032 Monthly groundwater monitoring.

Maintaining ongoing regular discussion with the BRC regarding future works programs and provide advance notice of off-lease works approval requirements.

General

Ongoing discussions with stakeholders re future works programs.

Mining under Sapling and Tallarenha Creeks will not occur.

Sapling Creek will not be diverted.

Implement the management plans in Part 9.10 of the AEIS.

Procure the properties in Part 9.8 of the AEIS to secure the Biodiversity Offset areas in Part 9.13.1 of the AEIS.

9.16.2 EIS Commitment Register Update

Appendix U - List of Proponent Commitments

The Terms of Reference (ToR) for the South Galilee Coal Project (SGCP) requires SGCP's commitment to be listed in the Environmental Impact Statement (EIS).

Proponent Commitment	AEIS	EIS
Introduction		
Stakeholder consultation will continue to be undertaken over the life of the Project.		✓
Project Rationale and Alternatives		
With the exception of recyclable waste, which will be transported off-site by recycling contractors, waste will be either treated on-site or disposed of in an on-site landfill designed and managed to the appropriate legislative standards.		✓
The accommodation village will utilise pre-fabricated components where practicable, in order to minimise disturbance and waste associated with its construction.		✓
The SGCP will work cooperatively with other proponents to coordinate or enhance impact mitigation measures already proposed for rail transport on the common user rail line.		✓
Project Approval		
The SGCP will follow relevant State Government processes to preserve and protect any Aboriginal cultural heritage values within the SGCP area.		✓
The SGCP will comply with the requirements of the <i>Equal Efficiency Opportunities Act 2006</i> .		✓

Proponent Commitment	AEIS	EIS
Once operational, the SGCP will be assessed against the <i>National Greenhouse and Energy Reporting Act 2007</i> (NGER Act) thresholds, and if triggered (whether as an individual facility, as part of another facility or as part of the entire controlling corporation group), will comply with all requirements of the NGER act.		✓
The SGCP will comply with all requirements of the <i>Explosives Act 1999</i> .		✓
The SGCP will obtain a license, authority or permit to store and to use explosives.		✓
Where material is extracted outside of Mining Lease Application (MLA) 70453, the SGCP will require a license to extract quarry material under the <i>Forestry Act 1959</i> .		✓
The SGCP will operate in accordance with the requirements of the <i>Mining and Quarrying Safety and Health Act 2009</i> .		✓
If required, the SGCP will submit development applications to the relevant local government authority for activities outside MLA 70453 requiring their approval.		✓
The SGCP will adhere to all requirements regarding duty of heavy vehicle operator, duty of driver and regulations pertaining to heavy vehicle height, width and length.		✓
The SGCP will comply with the standards set out in the Transport Operations (<i>Road Use Management – Vehicle Standards and Safety</i>) Regulation 2010.		✓
The SGCP will adhere with the <i>Transport (Rail Safety) Act 2010</i> and ensure that rail transport operators have the competency and capacity to carry out railway operations safely.	✓	
Project Description		
Coal contained in underground pillars and development workings will be sterilised along with coal below endangered Regional Ecosystems which will be avoided for conservation purposes.		✓
Rehabilitation activities will be undertaken progressively throughout the mine life.		✓
Construction inputs will be stored at designated laydown areas and temporary storage facilities within the area to be used for Mine Infrastructure Area (MIA) and Coal Handling and Preparation Plan (CHPP) in the operational phase.		✓
Ballast material for construction of the on-site rail component and the SGCP rail spur component will be stockpiled near the rail loop area within the MLA 70453 and at the northern end of Saltbush Road.		✓
Construction activities will typically be undertaken during daylight hours, seven days a week.		✓
The SGCP will finalise required land acquisitions and consent from other tenement holders prior to commencement of construction.	✓	
Land clearing will be undertaken progressively to minimise exposure of disturbed areas, degradation of topsoil and the spread of weeds. Topsoil will be removed and stockpiled in dedicated topsoil areas around the mine for later use in mine rehabilitation.		✓
A site access road will be constructed from the Capricorn Highway to the construction office site.		✓
A haul road will be constructed from the quarry on the Alpha-Tambo Road through MLA 70453, to connect with the proposed road alongside the SGCP rail line within the infrastructure corridor.		✓

Proponent Commitment	AEIS	EIS
State roads will be upgraded where required.	✓	
Temporary first aid, fire and emergency response facilities will be constructed where the MIA is proposed during the construction phase.		✓
Blasting will be undertaken in accordance with the conditions of the Environmental Authority (EA).		✓
Rehabilitation and Decommissioning		
The SGCP is committed to the rehabilitation goals listed in the Department of Environment and Resource Management (DERM) Guideline 18. This states that the rehabilitation landform is to be safe to humans and wildlife, non-polluting, stable, self-sustaining and free of maintenance, and able to sustain an agreed post-mining land use.		✓
The SGCP is committed to the salvage and use of all topsoil suitable for rehabilitation.		✓
A Coal Rejects Management Plan will be developed to manage the treatment and storage processes for coal rejects over the life of the SGCP.		✓
A Rehabilitation Management Plan will be prepared and updated as required.	✓	✓
To maintain the integrity of vegetation in areas adjacent to disturbed areas, appropriate erosion, sediment and dust controls will be established prior to and during soil disturbances. Prior to stripping the soil, regrowth vegetation will be cleared and windrowed. Where practicable, windrowed vegetation will be chipped or retained for fauna habitat.		✓
Ongoing investigation into dispersive material management will be undertaken and landform design and management strategies will be modified where necessary.		✓
Major earth works programs will be scheduled to avoid the high rainfall period between December and March, where practicable.		✓
Disturbed areas will be stabilised as quickly as possible to limit erosion. Progressive revegetation will be undertaken and erosion and sediment control measures will be employed.		✓
Decommissioning and rehabilitation of the SGCP will be undertaken in a manner that prevents environmental harm and risk to human health. Any dangerous goods or chemicals will be removed from site and any contaminated areas will be managed and rehabilitated to ensure that there is no danger posed to the wider public.		✓
Disturbance of areas with an extreme topography constraint will be avoided where practicable.		✓
The SGCP will manage the impacts of flooding in accordance with <i>State Planning Policy 1/03-Mitigating the Adverse Impacts of Flood, Bushfire and Landslides (SPP 1/03)</i> .	✓	
Flood levees will be constructed to minimise impacts of flooding and any potential for release contaminants to the environment, including protection of the final void at the end of mine life from the Probable Maximum Flood level.	✓	
Should a landslide/slippage occur, the SGCP will manage the impacts in accordance with SPP 1/03, in consultation with the Queensland Government State Disaster Management Group.		✓
When detected, any minor deleterious surface expressions of subsidence (e.g. surface cracking) will be rectified as soon as practicable.		✓

Proponent Commitment	AEIS	EIS
Monitoring of impacts associated with alterations to the drainage regime will be conducted on regular intervals and if necessary rectification works will be undertaken to mitigate affected areas.		✓
At the end of the mine life, haul roads will be rehabilitated to blend in with the surrounding landform, or retained if required by the landowner. Decommissioned roads will be revegetated. Any compacted areas will be ripped, topsoiled and reseeded.		✓
Any overhead powerlines no longer required will be dismantled and disposed of off-site by a licensed contractor. Any compacted areas around powerline footings will be ripped, topsoiled and reseeded.		✓
All infrastructure areas will be assessed for contamination prior to demolition, with contaminated material collected separately and treated in accordance with regulated waste procedures on-site.		✓
All waste material generated during the decommissioning process will be disposed of by an appropriately licenced contractor, with recycling of materials undertaken wherever possible. Hazardous materials, including waste oil, will be disposed of in accordance with the relevant Environmental Management Plan (EMP), environmental licence conditions, Material Safety Data Sheet (MSDS), requirements and Queensland waste tracking legislation.		✓
Rehabilitation will be monitored during operations and after final rehabilitation has been completed to validate rehabilitation performance and identify any additional work required to meet success criteria.		✓
A Rehabilitation Management Plan that details rehabilitation performance criteria will be submitted to the DERM for review and comment.		✓
In addition to rehabilitated areas, reference sites will be monitored to allow a comparison of the development and success of rehabilitation against a control.		✓
Rehabilitation areas will be monitored using the selected parameters and trends tracked to demonstrate progress towards a stable non-polluting, safe and self-sustaining ecosystem.		✓
Climate, Natural Hazards and Climate Change		
The potential impacts of flooding will be managed in accordance with the recommendations of SPP 1/03. Flood levees will be constructed progressively throughout the SGCP site as required to minimise impacts of flooding on mining activities and any potential for uncontrolled release of contaminants to the environment	✓	
As a bushfire mitigation measure, areas surrounding the SGCP infrastructure will be managed to meet the requirements of SPP 1/03. As mining construction and operations progress, fire breaks will be maintained to minimise risk of bushfire. Areas subjected to increased risk of bushfire will be regularly inspected to maintain them clear of vegetation and other combustible materials.		✓
The SGCP will follow the Queensland Fire and Rescue Service regulations and procedures and will have a dedicated, fully training SGCP Mines Rescue Team. Employees/contractors who form the team will have full senior and occupational first aid qualifications.		✓
Despite the low risk of occurrence, should a landslide/slippage occur at the SGCP that meets the definition in SPP 1/03, the SGCP will manage the impacts in accordance with the SPP 1/03 and in consultation with the Queensland Government State Disaster Management Group. The site Emergency Response Management Plan (ERMP) will also be implemented.		✓

Proponent Commitment	AEIS	EIS
In the unlikely event of an earthquake, the SGCP will follow the site ERMP.		✓
Land		
Topsoils will be stripped prior to any excavation works for later use in the rehabilitation and revegetation of the SGCP.		✓
The SGCP will undertake detailed design of the infrastructure corridor in consultation with the DERM Stock Route Management Unit and design concessions may include provision for an underpass or overpass.		✓
As a minimum, all areas significantly disturbed by mining activities will be rehabilitated to a stable landform with self-sustaining vegetation cover.		✓
A geochemical monitoring program will be established to routinely sample and test waste materials during operations.	✓	
In the event of a significant fossil find, the find will be demarcated and the Queensland Museum will be alerted.		✓
To maintain the integrity of vegetation in areas adjacent to disturbed areas, appropriate erosion, sediment and dust controls will be established prior to and during soil disturbance.		✓
Prior to stripping soil, vegetation on areas to be disturbed will be cleared and windrowed. The windrowed material may be retained for fauna habitat, shipped or burned on-site.		✓
Where there is variation in recommended stripping depths, detailed field checking will be undertaken prior to stripping to confirm appropriate stripping depth.		✓
Care will be taken to ensure that dispersive clay subsoils are not stripped and mixed with topsoil.		✓
An Erosion and Sediment Control Plan (ESCP) will be developed and implemented prior to the commencement of construction.	✓	
Selected final slopes on rehabilitation sites will be monitored to identify any exceedence of background soil loss rates.		✓
All chemicals and fuels will be appropriately stored in accordance with relevant Australian Standards.		✓
Facilities and procedures will be implemented to minimise the risk of land contamination and appropriately manage wastes at the SGCP.		✓
Waste management measures will be implemented to minimise the risk of land contamination at the site. Waste management will aim to promote sustainable waste management practices in accordance with the <i>Waste Reduction and Recycling Act 2011 (WRR Act)</i> .	✓	
Where direct light impacts could potentially occur, appropriate mitigation measures will be impacted, including the installation of light fixtures in accordance with AS 4282:1997 <i>Control of the obtrusive effects of outdoor lighting</i> and the direction of lights away from fauna habitats, where practicable.		✓
Nature Conservation		
Vegetation clearing will be undertaken in accordance with mitigation measures aimed to minimise the potential impacts. Clearing of vegetation will utilise a staged approach.		✓
The SGCP will implement measures to mitigate the intrusion of weed species into remnant vegetation due to edge effects.	✓	✓

Proponent Commitment	AEIS	EIS
Buffer zones will be established around areas of threatened ecological communities and communities with a conservation-significant biodiversity status, where clearing is adjacent to these areas.		✓
Retained areas of native vegetation will be monitored and managed for the life of the Project to reduce weed infestation and promote biodiversity values in the areas.	✓	
Trees will be felled into the construction zone to avoid impacting on vegetated margins.		✓
Topsoil and mulch will be stockpiled where practicable for use on retained vegetation and rehabilitation areas to promote revegetation and retention of soil quality.		✓
Vegetation clearing and construction will be limited to dry weather conditions where practicable to minimise erosion, runoff and soil disturbance.		✓
Disturbed vegetation areas that are no longer required post-construction will be stabilised and revegetated as soon as practicable and monitored for weeds.		✓
Reasonable measures will be taken to control velvety tree pear, prickly pear and harrisia cactus in the SGCP area, with particular focus on areas near and with remnant vegetation.		✓
A Weed and Pest Animal Management Plan (WPAMP) will be prepared and implemented over the life of the SGCP.	✓	
Vertebrate pest control activities will be undertaken in consultation and cooperation with local authorities and landholders, particularly for pests such as pigs, wild dogs and feral cats, in accordance with relevant best-practice management guidelines and the <i>Queensland Land Protection (Pest and Stock Route Management) Act 2002 (LP Act)</i> .	✓	
Where practicable, the SGCP will reduce new cane toad breeding opportunities by minimising the creation of additional small waterbodies suitable for cane toad breeding (e.g. ponding areas, roadside ditches or flood channels).		✓
SGCP employees and contractors will be made aware of environmental obligations and compliance requirements through the site induction program.		✓
Fauna spotter-catchers will be used to relocate any fauna species of conservation significance prior to clearing activities during the construction phase.		✓
Clearing will occur in one direction through the vegetation, to allow fleeing animals to disperse into adjacent habitat.		✓
Hollow-bearing trees will be inspected for fauna prior to felling.		✓
A Threatened Species Management Plan (TSMP) will be developed and implemented for the SGCP.		✓
Vehicles will use designated light or heavy vehicle roads on-site wherever practicable, and speed limits will be adhered to.		✓
A Biodiversity Offsets Strategy has been developed and will be implemented. Offset options are presented in the Biodiversity Offsets Strategy and outline measures that ensure these offsets are managed to maintain and enhance biodiversity values.	✓	
Water Resources		
The proposed water management system will aim to maximise reuse of water on-site, through the provision of large on-site water storages.	✓	

Proponent Commitment	AEIS	EIS
Water will only be released from the site dams in compliance with the EA conditions, which will be developed in consultation with DEHP to manage potential cumulative impacts.	✓	
All water, waste, fuel and chemical storage facilities will be designed, constructed, and operated (for example, to AS1940) to prevent seepage, thus the risk to groundwater resources will be limited. Monitoring will validate seepage control measures.	✓	
Shallow seepage monitoring will be required adjacent to the storage facilities to enable identification and assessment of potential seepage.		✓
Raw water suitable for potable demands will be stored in the proposed Raw Water Dam which will similarly be constructed early in the construction schedule.		✓
A water treatment plant will be constructed near the Raw Water Dam to supply potable water.		✓
During the course of the mine life, progressive rehabilitation of available (i.e. no longer required) disturbed areas will be undertaken and once established and demonstrated to produce acceptable quality runoff, these areas will be diverted away from the Mine Water Management System (MWMS) through clean water bypass drains.		✓
The bulk water supply will be treated on-site to potable quality using a package water treatment plant utilising a suitable technology such as reverse osmosis. Treated water will be reticulated to all the mine industrial and CHPP areas, and accommodation village via the proposed dedicated service corridors.		✓
Potable water will be stored in header tanks at the water treatment plant, accommodation village and all other industrial areas. Water will also be stored at the CHPP and all other areas where sufficient water reserve is required for fire fighting.		✓
All sewage water generated during the SGCP will be collected and treated on-site to Class C effluent standard.		✓
The MWMS will be limited to disturbed and mine affected areas (disturbed catchments, contaminated water sources and contaminating processes).		✓
The underlying premise for the MWMS is that clean water runoff from undisturbed catchments will be diverted around the active mining area.	✓	
Contaminant concentrations in pit water at the SGCP are likely to be in excess of levels required for protection of downstream receiving water values, and will be contained in a system with a low risk of discharge.	✓	
The sediment dams will be sized to contain runoff from the 10 year Average Recurrence Interval (ARI) 24 hour rainfall event.	✓	
All dams proposed as part of the SGCP will be designed, constructed and approved to minimise the potential for dam failure in coordination with the Department of Natural Resources and Mines (DNRM). All dams proposed for the SGCP will be subject to additional DNRM approval requirements (separate to this EIS) and detailed dam design and assessment will be undertaken.		✓
All building and operational areas will be protected from release waters in the event of a dam failure, minimising risk to human health and well-being, and potential loss of production.		✓

Proponent Commitment	AEIS	EIS
For the purposes of this EIS assessment, water balance modelling indicates that it will be unlikely for the SGCP to undertake controlled releases from the water management system to balance the mine water inventory during very high rainfall events. However, if this is required, water releases will be undertaken in accordance with an approved procedure and in compliance with Environmental Authority conditions.	✓	
All of the dams containing potentially saline water will be Regulated Dams and administered under the <i>Queensland Environmental Protection Act 1994 (EP Act)</i> .		✓
During more detailed design the referable category of the proposed Raw Water Dam will be determined through the undertaking of dam failure impact assessment as required under the <i>Water Supply (Safety and Reliability) Act 2008</i> .		✓
Surface exposures of dispersive soils will be either treated to minimise dispersion potential, or covered with topsoil so that the dispersive substrates are not left exposed.		✓
The nominal 3000 year ARI level of flood protection will be further reviewed as part of detailed design and subject to a detailed risk assessment including various consequences that may arise from different methods to recover the mine pit(s) in the event of an extreme flood. Discussions will be held with DEHP during the detailed design phase to agree on an appropriate risk based level of flood protection.		✓
The flood protection levee banks will be regulated structures with conditions administered through the EA. This will require design to be undertaken by a suitably qualified and experienced engineer and certification of the design and construction of the levee bank.		✓
The EA conditions will also require certified annual surveillance inspections by a suitably qualified and experienced engineer and obligation for the EA holder to rectify deficiencies identified in the annual surveillance outcomes.		✓
An ESCP will be developed and implemented throughout construction and operations to control erosion at the source.		✓
A monitoring plan will also be established over the underground subsidence area adjacent to Tallarenha Creek. The purpose of the plan will be to identify subsidence-induced changes to the floodplain drainage patterns that could prevent flow draining downstream. If these impacts are identified through aerial and ground survey of the area, channels will be constructed to direct flows downstream.	✓	
In order to mitigate the effects of ponded water from self-contained catchments, the progressive re-establishment of free drainage in the subsidence area will be completed as far as practicable.		✓
A post subsidence drain and waterway monitoring program will be implemented and surface cracks within drains and waterways that have not naturally filled after approximately three storm events will be sealed with clay.		✓
As part of the subsidence monitoring program, the ponding volumes and/or surface area extent of ponding will be monitored over time.		✓
The proposed surface water monitoring for the SGCP will include surface water quality monitoring.	✓	

Proponent Commitment	AEIS	EIS
Two programs are proposed for surface water quality monitoring. A baseline monitoring program and an on-going water quality monitoring program are proposed to assess the impact of the SGCP mine and infrastructure corridor operations on the receiving environment. Both programs would be undertaken in accordance with the <i>Monitoring and Sampling Manual 2009 (DERM 2010)</i> .		✓
A monitoring program will also be established over the underground subsidence area adjacent to Tallarenha Creek.	✓	
Landholders who have groundwater supplies that are materially impacted by the operation, to a degree where groundwater is not able to be used for its pre-mining beneficial use (in terms of quality and/or quantity) will be provided with an alternate water supply of comparable yield and quality. The proponent has made a commitment to 'make-good' affected groundwater supplies prior to construction commencing.	✓	
All water, waste, fuel and chemical storage facilities will be designed, constructed, and operated to prevent seepage, thus the risk to the groundwater resources is limited. Monitoring will be conducted to validate seepage control measures.		✓
The potential risks associated with seepage from mine waste and water infrastructure will be minimised via the appropriate design and construction of chemical, fuel and mine waste storage facilities.		✓
Groundwater monitoring will ensure compliance with water licence (for dewatering) conditions with regards to water level impacts, and groundwater quality compliance with EA conditions resulting from the EIS and EMP processes.		✓
After mining has ceased and decommissioning and rehabilitation works are complete, the Proponent will relinquish the SGCP mining lease.		✓
During mining, dewatering volumes will be measured and recorded regularly and volumetric rates compared to the model-predicted rates to confirm the modelling predictions.	✓	
Groundwater monitoring and sampling will be conducted by a suitably qualified and experienced professional in accordance with the current edition of the Water Quality Sampling Manual or subsequent updated versions; and the <i>AS/NZS 5667.11:1998 Australian/New Zealand Standard for water quality – sampling Part 11</i> ; guidance on sampling groundwater.		✓
An annual review of the monitoring data will be conducted by a suitably qualified and experienced hydrogeologist and will include assessment of groundwater level and quality data, and the suitability of the monitoring network.	✓	
All groundwater-based complaints will be investigated and a register kept of the nature of the complaint, the results of assessment, and any actions taken. The register will be made available to the regulating authority upon request.	✓	
Groundwater levels in the bores will be measured (quarterly) during the pre-mining and mining operation period.	✓	
Groundwater levels will be measured annually during the rehabilitation period.		✓
Air Quality		
If there are instances of spontaneous combustion, strategies such as smothering the fire by burial with waste rock will be used.	✓	✓

Proponent Commitment	AEIS	EIS
Although the overall impact of the SGCP on air quality is low, the mine will implement dust minimisation strategies, particularly during wind events.	✓	✓
A monthly report will be prepared to detail the results of monthly air quality monitoring results and the occurrence of any complaints.	✓	✓
Upon receiving a valid complaint in relation to dust nuisance, the complaint will be investigated and air quality mitigation measures must be implemented as soon as practicable if the complaints are substantiated.	✓	✓
The SGCP will achieve and maintain the level of dust control which is outlined in the EA.	✓	✓
All monitoring and sampling techniques will be in compliance with the DERM's Air Quality Sampling Manual and applicable Australian Standards.	✓	✓
The existing long-term real-time dust concentration monitoring network will be maintained by the Proponent to demonstrate seasonal variation of the air quality of the area.	✓	✓
Dust monitoring results will be subjected to regular review to determine if the SGCP is causing an increase in dust concentration above acceptable levels. Dust concentration data will include an analysis of the prevailing meteorological extraction rates and processes.	✓	✓
Local meteorological data will be collected from a weather monitoring station installed by the SGCP at the Creek Farm Homestead. This station will be used to collect temperature, relative humidity, rainfall and wind speed data over the life of the SGCP.	✓	✓
Dust deposition (fallout) monitoring will continue to be undertaken at these locations over the life of the SGCP.	✓	✓
A Dust Management plan will be developed and implemented to mitigate adverse air quality impacts under worst case meteorological conditions.	✓	✓
Greenhouse Gas Emissions		
A number of measures to maintain efficiency of the dragline will be implemented including load monitoring, regular bucket maintenance and electrical calibration checks.		✓
Longwall efficiency will be monitored.		✓
The compressed air circuit will be regularly monitored as leaks degrade the efficiency of the compressor.		✓
The energy efficiency of electrical equipment will be a consideration during purchase.		✓
The fuel efficiency of haul trucks will be considered during purchase.		✓
Access ramps will be designed to optimise truck diesel use efficiency.		✓
A conveyor will transport coal to the CHPP from the underground operation. Since this infrastructure passes the open pit, there are dump stations to the conveyor to significantly shorten the coal haul route.		✓

Proponent Commitment	AEIS	EIS
The EM Plan will address greenhouse abatement including: - commitments to the abatement of greenhouse gas emissions from the development - commitments to energy management, including undertaking periodic energy audits with a view to progressively improving energy efficiency - opportunities for offsetting greenhouse emissions, including, if appropriate, carbon sequestration and renewable energy uses; and commitments to monitor, audit and report on greenhouse emissions from all relevant and the success of offset measures.		✓
Identified strategies to adapt to changes in climate will be incorporated into the SGCP EMP. Strategies will include cooperating with government, other coal mining companies and other sectors where practicable to adapt to potential changes in climate.		✓
Noise and Vibration		
Where there exists the possibility that short-duration, high-level noise events may occur during the night-time hours (10.00pm to 6.00am) considerations will be given to the potential for sleep disturbances within the accommodation village and surrounding residences.	✓	✓
Modelling has been used to predict the impact of airblast overpressure on the areas surrounding the SGCP. The modelling is based on empirical data and will need to be refined using airblast overpressure measurements taken once the mine is operational.	✓	✓
A Noise Management Plan will detail ongoing noise monitoring requirements including responses to noise complaints.	✓	✓
It is proposed to monitor noise at the accommodation camp and initially monitor background creep at Chesalon Station homestead. A Noise Management plan will detail ongoing noise monitoring requirements including responses to noise complaints.	✓	✓
Reporting will be conducted internally on monitoring results, incidents and complaints and externally to relevant regulatory bodies on request.	✓	✓
Upon receiving a valid complaint in relation to noise and vibration nuisance, the complaint will be investigated and noise and vibration mitigation measures must be implemented as soon as practicable if the complaints are substantiated.	✓	✓
The SGCP will achieve and maintain the level of noise and vibration which is outlined in the EA.	✓	✓
Where site activities are the cause of a complaint, a revision of noise and vibration management procedures will occur for the activities identified as causing noise or vibration nuisance or a high noise event.	✓	✓
For the on-site accommodation village to comply with the indoor acoustic quality objectives, the accommodation units will be air conditioned, allowing the overall building structure to provide sufficient noise reduction.	✓	✓

Proponent Commitment	AEIS	EIS
To reduce background creep at Chesalon Station Homestead the following mitigation methods will be undertaken: - Operation of trucks behind mounding during evenings (i.e. not operating dump trucks in highly exposed locations on the top of overburden at night but at a lower level with the waste rock emplacement intervening and acting as a noise barrier). - Shovels and other heavy equipment operated during the evening should be used deep in the pit rather than close to the pit surface.	✓	✓
Waste		
The SGCP is committed to minimising the impact of waste on the environment and the community, where practicable, through the adoption of the waste and resource management hierarchy principles in the WRR Act as well as the goals identified in the Queensland Waste Strategy (DERM, 2010).		✓
A Waste Management Plan (WasteMP) will be developed prior to commencement of the SGCP.		✓
The WasteMP will be reviewed and updated as required.		✓
Waste management training will be provided to appropriate personnel and contractors.		✓
Waste will be managed in a manner that protects downstream water quality values.		✓
Waste management will aim to promote sustainable waste management practices in accordance with the WRR Act.		✓
In order to minimise inputs, natural resources (e.g. water, waste or process by-products) will be recycled where practicable. Techniques to maximise the reuse of waste water and recycling of waste products will be applied to the SGCP with appropriate refinement on the basis of operational experience.		✓
A continuous improvement approach will be adopted for the SGCP over the life of the mine. This waste related approach will involve reviewing and modifying processes, material and operating practices throughout the mine life when required. The development of key performance indicators will be included in the WasteMP.		✓
All regulated wastes will be segregated as required and will comply with all regulatory requirements and Australian Standards for their transport, handling, use, storage and disposal.		✓
Spillage of flammable and combustible liquids will be contained within an on-site containment system (primary bunding) and controlled in a manner that prevents environmental harm and maintained in accordance with <i>Section 5.9 of AS 1940</i> .		✓
In accordance with the EMP, training will be provided to personnel and contractors in the management of chemicals, hydrocarbons and wastes. Personnel and contractors will be made aware of the correct procedures for the prevention, management and clean-up of chemical and fuel spills. Spill management kits will be retained in the workshop and on service vehicles. Sites that become contaminated will be investigated and managed in accordance with the remediation, reporting and monitoring requirements of the contaminated land provisions of the EP Act.	✓	✓
The movement of regulated waste other than that specified in <i>Section 17 of the EP Regulation</i> is required to be monitored by a waste tracking system. Waste tracking will be undertaken at the SGCP with any wastes generated to be tracked in accordance with the EP Regulation.		✓

Proponent Commitment	AEIS	EIS
The SGCP will trigger a reporting obligation under the <i>National Pollutant Inventory (NPI)</i> and consequently SGCP will be required to estimate and report mine emissions to the NPI on an annual basis in accordance with the National Pollutant Inventory Guide and associated manuals.		✓
An on-site landfill facility will be established at the start of the construction phase following the approval of MLA 70453.		✓
Geochemical sampling and assessment will continue to be undertaken over the life of the SGCP to validate mine waste characteristics and the proposed management measures.	✓	
A detailed inventory of waste streams and volumes will be developed as part of the DFS and detailed engineering design processes.		✓
During both construction and operation, colour-coded, signed bins will be used to segregate and collect food wastes, paper and other recyclables.		✓
The consumption of raw water will be kept to a minimum by implementing water efficient work practices and recycling where practicable.	✓	
Vegetation clearing for fire breaks will be conducted where possible. Vegetation clearing will be performed around infrastructure, to ensure a buffer distance separates infrastructure from potential bushfires.		✓
Appropriate waste management procedures will be undertaken to prevent nuisance caused by odour or vermin on-site.	✓	✓
Tyres will be segregated, stored and stacked in a single designated tyre storage area before disposal in accordance with the DERM's <i>Disposal and Storage of Scrap Tyres at Mine Sites</i> . Any on-site disposal of used tyres will be documented in accordance with the site EMP and EA conditions.		✓
Any spillages that may occur will primarily be within the waste storage areas or within contained refuelling areas. Sumps within the containment areas will be kept clean and pumped regularly with both liquid and solid fractions stored in separate containers and removed off-site by a licensed hazardous waste management contractor.		✓
All hydrocarbon and chemical storage areas will be designed, constructed and stored in accordance with AS 1940.		✓
Appropriate actions will be taken to ensure potential impacts of regulated wastes on land are minimised.		✓
Sewage produced by the SGCP will be managed on-site. The Sewage Treatment Plant (STP) will be operated in accordance with manufacturer's recommendations and will be subjected to regular inspections to ensure efficient operation of the system.	✓	✓
A detailed decommissioning WasteMP will be prepared prior to the decommissioning phase once waste quantities, sources and management measures are confirmed.	✓	✓
A contaminated site assessment will be conducted as part of the Final Rehabilitation Report.		✓
The design of the on-site landfill facility will be finalised during the DFS and detailed engineering processes.		✓

Proponent Commitment	AEIS	EIS
The landfill site will be monitored over the life of the SGCP and will be rehabilitated.		✓
Transport		
The SGCP's internal road network will include parking for operational personnel and visitors, including appropriate disabled parking facilities.	✓	
Visitor transport and parking on site will be addressed by the Transport Management Plan (TMP).	✓	
The existing narrow gauge Queensland Rail (QR) central line will be used to transport Epsilon coal to Gladstone.	✓	
There will be no reduction of transport safety, efficiency or condition of road operations and assets above what is already in place. No significant interruptions to existing transport operations are expected during the construction or operational phases of the SGCP.	✓	
Provide maintenance contributions to DTMR.		
The inclusion in Appendix U – List of Proponent Commitments: - that bandwidth will be made available for police and emergency services. (Police requirement is 1Mb); - that floor space be allocated within the main communications facility for a QPS secure equipment rack; - that access to support infrastructure such as an associated telecommunications tower is provided for the installation of QPS equipment (antenna); and - the provision of mains power (240 volt AC) for the operation of the radio communications equipment.		
Assist with the upgrade of the Alpha Aerodrome.		
Indigenous Cultural Heritage		
SGCP will work with Traditional Owners to protect the Indigenous cultural heritage values located within the SGCP area.		✓
Field surveys will be ongoing and will be completed prior to the commencement of construction.		✓
The Proponent will continue to engage with the Wangan and Jagalingou People to identify any Indigenous cultural heritage sites, landscapes or places of cultural significance. Any items of cultural significance will be managed in accordance with the Cultural Heritage Management Plan (CHMP).		✓

Proponent Commitment	AEIS	EIS
The following general mitigation and management measures will be implemented at the SGCP to minimise impacts on Indigenous cultural heritage: - comprehensive field survey will be conducted prior to surface disturbance - where identified indigenous cultural heritage features are located proximal to proposed surface disturbance, these sites will be demarcated where practicable to minimise the risk of accidental damage - where direct disturbance is unavoidable, consideration will be given to collecting and relocating significant Indigenous cultural heritage features - all SGCP employees and contractors will be made aware of their responsibilities and obligations in relation to cultural heritage (including procedures to be followed in the event of accidental discovery of Indigenous cultural heritage material or skeletal remains) as part of the induction and training process. - In the event that significant Indigenous cultural heritage features are identified, a monitoring program will be developed in consultation with the Wangan and Jagalingou People prior to the commencement of construction in order to monitor the potential impact of the SGCP activities against baseline values.		
Non-Indigenous Cultural Heritage		
Should any potentially significant archaeological artefacts or archaeological places be identified during the operation of the SGCP, SGCP will comply with Part 9 of the Heritage Act. As required by Section 89 of the Heritage Act any person who discovers archaeological artefact (that is an important source of information about an aspect of Queensland's history) will notify the DEHP.		
A Non-Indigenous CHMP will be developed prior to the commencement of construction.		
SGCP will nominate an independent Cultural Heritage Advisor for the SGCP to provide expert advice, where required.		
Prior to the commencement of ground disturbance activities, Feature 4 (the only known non-Indigenous cultural heritage feature located within the SGCP area) will be demarcated and signed (e.g. with fencing or flagging tape) to avoid accidental damage associated with SGCP activities.		
Social		
Where a substantial portion of land will be required for mining operations, the Proponent proposes to acquire land by negotiation.	✓	
Economic Environment		
Rural properties that are adjacent to or are dissected by the infrastructure corridor may be impacted in terms of management/ operational practices such as restricted movement of stock, fence realignment and access to water points. The Proponent will proactively engage with these landholders to mitigate any management/operational impacts.		✓
The stock route that follows the Capricorn Highway is located on the northern side of the existing Central Line rail corridor. As the SGCP infrastructure corridor may dissect this stock route, the Proponent will work with the relevant agencies and stakeholders to allow unencumbered movement of stock to this stock route.		✓

Proponent Commitment	AEIS	EIS
Hazard and Risk		
The Proponent will implement its Corporate Environment Policy (Appendix T – Corporate Environment Policy) in order to reduce the hazard and risk associated with the SGCP.		✓
An integrated approach to risk management will be implemented at the SGCP, recognising the hazards at all points in the operation and providing control measures to minimise risk.		✓
The addition of any supplementary dangerous goods that may be required for the SGCP in minor quantities will be identified prior to their arrival on site and appropriate measures implemented to manage their safe storage and use in accordance with the requirements of the relevant Australian Standards.		✓
The MSDS for each chemical to be used will be available at appropriate locations such as chemicals storage facilities and the CHPP. Spill prevention and spill response strategies will be implemented.		✓
Frictional ignition will be minimised by using drums and picks on cutting machines with minimal potential to cause friction, using water sprays to suppress sparking, ventilation around cutting areas to reduce methane build-up and maintaining appropriate gas fire extinguishing equipment.		✓
Interactions with mobile equipment will be mitigated by: - identifying the conditions (operational and environmental) under which the mobile plant and equipment may be used - only using mobile plant and equipment within their approved design parameters - proper design and maintenance of roadways, including minimum dimensions and conditions - nominating maximum loads that may be carried or towed by the mobile plant and equipment - nominating maximum speeds at which the mobile plant and equipment may operate - ensuring personnel involved in the operation of mobile plant and equipment have competency and authorisation requirements - operators to carry out brake testing, pre-shift inspection and defect reporting to demonstrate that the mobile plant and equipment is safe for use.		✓
An ERMP will be developed.	✓	
A number of mitigation measures will be put in place, including limited access to the blast areas and ensuring that the blasts are undertaken by suitable qualified personnel with appropriate knowledge and training. Transportation of initiating explosives to site will be carried out by a licensed transporter that operates in accordance with the <i>Australian Dangerous Goods Code</i> . The storage of explosives, detonators and boosters will comply with the requirements of <i>AS 2187 Explosives-Storage, Transports and Use</i> and the additional requirements relating to explosives in the <i>Coal Mining Safety and Health Regulation 2001</i> .		✓
SGCP will ensure that an Energy Isolation Procedure is developed, implemented and maintained.		✓
A Working at Height Procedure and Permit System will be developed, implemented and maintained.		✓
A Lifting and Cranage Procedure and Permit System will be developed, implemented and maintained.		✓

Proponent Commitment	AEIS	EIS
A Confined Space Procedure and Permit System will be developed, implemented and maintained.		✓
The Tyre and Rim Management Plan will ensure that procedures are in place to lift, fit, remove, test, repair, maintain and change tyres and rims on mobile earthmoving equipment and workshop plant and equipment.		✓
Procedures to minimise electrical risk will ensure that competent personnel carry out electrical work. Electrical installations will comply with legislation and appropriate Personal Protective Equipment (PPE) will be identified and used.		✓
If mine and process water discharges to waterways are required they will be restricted to emergency discharges only during extreme rainfall and flood conditions. Any such discharges will be significantly diluted and flood waters to meet the conditions set in the EA.	✓	
Licensed transporters operating in compliance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code) will undertake the transport of dangerous goods to the transport site.		✓
The SGCP will adhere to planning and maintenance guidelines for fuel systems and construction of explosive storage facilities. With correct controls in place for dangerous goods and hazardous substances, there will be negligible risk to employees, adjacent land users, general public, property and the environment.		✓
To minimise the hazards associated with diesel leaking during tanker unloading, controls will be implemented to reduce risks to health and safety of site personnel and potential adverse impacts to the environment.		
All chemicals will be stored according to AS 1940 and managed in accordance with the Hazardous Material Management System developed for the mine, incorporating the provision and use of the respective MSDS.		
As the mine progresses, additional sampling will be conducted to validate the propensity of the coal to combust. Appropriate mitigation measures will be implemented as required.		
The SGCP will provide safety inductions for any personnel operating machinery or light vehicles on-site. Personnel and contractors will be required to have the appropriate level of training and licenses. All equipment at the site will be equipped with two-way radios for communication and appropriate traffic signage. Designated driving procedures will be used to minimise the risk of accidents occurring.		
At level crossings on minor roads, signal lights and signage will be installed to ensure the risk of collision is reduced.		
The Proponent will develop a FMP prior to the construction phase of the SGCP which will provide management approaches to protect human life and assets and to minimise the physical and environmental impacts of fires. The identification of fire risks will be achieved by the initiation of a detailed risk assessment.		
Prior to the commencement of construction activities, the Proponent will prepare a Bushfire Management Plan (BMP) which will provide a strategic approach to bushfire management at the SGCP.		

Proponent Commitment	AEIS	EIS
The Emergency Management and Response Plan (EMRP) provides step-by-step guidance for the management of any emergency such as fire, flood, landslide, dam collapse, fuel spill, explosion or radiation, which can impact on the SGCP and its employees. An EMRP will be developed by the SGCP prior to the construction phase of the Project.		
Regular hazard audits will be conducted to provide input into the EMRP.		
Guidelines for preparing EMRPs are available from the Queensland Government Department of Emergency Services and will be considered when preparing the EMRP for the SGCP. It will be developed in conjunction with stakeholders.	✓	
The SPP 1/03 will also be referred to when preparing the EMRP.		
Fire drills will be undertaken on a regular basis. The SGCP site will have a team of employees trained in fire fighting to Coal Competency Standard and hold senior first aid tickets. All fire fighting facilities and equipment will be installed, serviced, maintained and inspected by a certified body. The site will have a suitably equipped water truck that can support fire response requirements. Regular audits are conducted on the fire protection standards by external parties.		
Stores, workshops and offices will be fitted with approved and certified smoke detectors. The SGCP will be constructed to meet industry and fire protection standards. First aid, fire fighting equipment and exit locations will be suitably signed. All work areas will be within the required distance to reach emergency exits.		
Surrounding neighbours will also be notified in emergency situations, where appropriate.		
All SGCP employees will be inducted prior to working on the site and all contractors will undergo a contractor induction prior to commencing work. Mine site personnel and contractors are to be trained in basic first aid, emergency response techniques and the Safety and Health Management System (S&HMS) as part of the Queensland Coal Board generic induction and the SGCP site specific inductions. All visitors will be escorted by mine site personnel. The induction program, which will be competency based, will cover procedures in the S&HMS for personnel to do their duties. Refresher training will be undertaken and is to be a continuing process aimed at informing all employees, including contractors, of their duties associated with the S&HMS and procedures.		
The EMRP will be reviewed regularly to include results from operational hazard and regular hazard audits, and after any significant emergency situation that occurs. The plan shall be reviewed by a cross section of internal and external stakeholders.		
In accordance with <i>The Coal Mining Safety and Health Act 1999 (CMSH Act)</i> the SGCP will prepare and implement a Risk Management Plan (RMP) that integrates elements of risk management and practices to ensure the safety of employees and contractors.		
The SGCP will implement particulate and gas/vapour exposure standards and procedures.		
The effects of heat will be managed by provision of suitable working environments, equipment and protective clothing.		

Proponent Commitment	AEIS	EIS
All equipment (both fixed and mobile) will comply with the AS 1259.1.2 <i>Occupational Noise and the CSMH Act</i> in regard to design and operating noise levels.		
The SGCP will implement hearing conservation standards and procedures during construction and operation to ensure that employees and contractors will not suffer adverse health effects from noise generated in the workplace.		
All chemicals, including persistent organic chemicals, will be managed in accordance with the existing Hazardous Material Management System developed for the mine, incorporating the provision and use of the respective MSDS.		
Hydrocarbons will be stored and handled in accordance with <i>Australian Standard AS 1940:2004, The Storage and Handling of Flammable and Combustible Liquids</i> .		
Potable water quality will be regularly tested.		
If significant areas of weed infestation or other declared pest species (either flora or fauna) are identified and pose a significant risk to mine personnel, visitors, surrounding landholders, the environment or the operation, appropriate eradication and management measures will be taken.	✓	
Waste will be managed to avoid adverse impacts on the health of mine personnel and minimise risk of impact on the environment.		
Prior to being given access to the site, visitors will be required to complete mandatory registration and an environmental, operational, health and safety induction. Blood alcohol content testing and random testing for drugs will also be carried out. The scope of induction will reflect the type of work to be undertaken whilst on the SGCP site.		
Mine employees, contractors and visitors will be supplied with the relevant and appropriate PPE for the tasks to be conducted on site.		
The rehabilitation strategies planned for the SGCP will involve decommissioning and rehabilitation in a manner that prevent environmental harm and risk to human health.		
Matters of National Environmental Significance		
Land clearing will be minimised or avoided, where practicable.		
The TSMP will include specific mitigation and management measures to address predicted impacts on threatened species and communities. Such measures include: • remnant vegetation in the SGCP area will be managed for biodiversity values, including implementation of an appropriate fire regime, pest animal and weed management and exclusion of stock • revegetating cleared areas that do not form part of the operational mine (e.g. infrastructure corridor edges) • staged rehabilitation and revegetation of overburden as the mine operational life progresses in areas that are no longer being mined • fire regime management including precautions such as clearing fire breaks between coal stockpiles to avoid ignition of native vegetation from spontaneous combustion of coal, and restricting cigarette smoking and the dumping of rubbish (particularly glass) in areas of vegetation • where practicable, restricting unnecessary vehicle movement during and following rainfall • exclusion of cattle from waterways and remnant vegetation to prevent fouling and habitat degradation.		

Proponent Commitment	AEIS	EIS
The TSMP will contain the proposed monitoring and reporting timeframes for management of each threatened species impacted on by the SGCP to facilitate auditing of environmental performance measures.		
SGCP employees and contractors will be made aware of environmental obligations and compliance requirements through the site induction program. They will be notified of the potential presence of threatened and/or near threatened species and instructed to temporarily cease clearing if any species of conservation significance are observed.		
Trees will be felled into the construction zone to avoid impacting on vegetated margins. Vegetation clearing and construction will be limited to dry weather conditions where practicable to minimise erosion, runoff and soil disturbance.		
Rehabilitation of disturbance areas will be undertaken throughout the life of the SGCP in accordance with a Rehabilitation Management Plan. A Mine Rehabilitation and Closure Plan will be prepared to direct land rehabilitation during and after the operational life of the mine. Re-establishing vegetation cover will be undertaken with a view to creating self-sustaining ecosystems similar to surrounding ecosystems. The final land use will be a combination of grazing and native bushland.		
Disturbed vegetation areas that are no longer required post-construction will be stabilised and revegetated as soon as practicable and monitored for weeds as per the WPAMP.		
Retained areas of native vegetation will be monitored and managed for the life of the Project to reduce weed infestation and promote biodiversity values in the areas.	✓	
Vehicles will use designated light or heavy vehicle roads on-site wherever practicable, and speed limits will be adhered to. Reduced speed limits will be implemented near waterways to reduce the potential for transient fauna to be impacted by vehicle movements. Any road kills will be reported to the Environmental Supervisor.		
A WPAMP will be prepared and implemented over the life of the SGCP. The WPAMP will include a monitoring program and auditable performance measures, including reductions in class 1 and 2 pest animals and noxious weeds.		
The introduction and/or spread of weed species will be mitigated by: • restricting light vehicle movement in areas outside of regular activity, particularly on irregularly used tracks • restricting vehicle movement during and following rainfall, where practicable • implementing strict wash-down procedures for all vehicles (including clearing and construction machinery) entering clearance zones, grazing areas or conservation areas • controlling weeds according to guidelines under the relevant Weed Fact Sheet from DEEDI • training and awareness of all staff.		
Due to residual impacts on threatened species, their habitats and threatened Regional Ecosystems posed by the SGCP, a Biodiversity Offsets Strategy has been developed and will be implemented.		
The Draft Policy Statement: <i>Use of environmental offsets under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i> identifies eight principles for the use of environmental offsets under the EPBC Act. The SGCP Biodiversity Offsets Strategy will be developed in consideration of these principles.		

Proponent Commitment	AEIS	EIS
Detailed monitoring programs will be detailed in the following management plans to be prepared prior to the commencement of construction: • WPAMP • TSMP • FMP		
Reference sites will be monitored to allow a comparison of the development and success of the rehabilitation against a control. Reference sites indicate the condition of surrounding un-mined areas that the rehabilitated disturbance area will aim to replicate. Monitoring will be conducted periodically by independent, suitably skilled and qualified persons at locations which will be representative of the range of conditions on the rehabilitating areas. Annual reviews will be conducted of monitoring data to assess trends and monitoring program effectiveness.		