

South of Embley Project

Environmental Impact Statement

This Environmental Impact Statement has been prepared to meet the assessment requirements for the Project under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

Section 11	Great Barrier Reef Marine Park
Section 12	World Heritage Area
Section 13	National Heritage Place
Section 14	Air Quality
Section 15	Noise and Vibration
Section 16	Water Resources
Section 17	Social and Economic Matters
Section 18	Cumulative and Consequential Impacts
Section 19	Tailored EIS Guidelines Compliance Tracking Table
Section 20	Conclusions
	References
	Glossary, Abbreviations and Units

This Environmental Impact Statement (EIS) has been prepared to meet the environmental assessment requirements under Commonwealth law.

Pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities has decided that the South of Embley Project is a “controlled action” for which a EIS is required. This EIS is submitted to meet the requirements of the tailored EIS guidelines issued 9 July 2012 for the Project.

1 Volume	Section 1	Executive Summary
	Section 2	General Information and Background
	Section 3	Description of the Proposed Action
	Section 4	Relevant Matters of National Environmental Significance
	Section 5	Threatened Species and Ecological Communities - Flora
2 Volume	Section 6	Threatened Species and Ecological Communities - Terrestrial Fauna
	Section 7	Threatened Species and Ecological Communities - Estuarine and Marine Fauna
	Section 8	Avian Migratory Species
	Section 9	Non-Avian Migratory Species
	Section 10	Commonwealth Marine Area
3 Volume	Section 11	Great Barrier Reef Marine Park
	Section 12	World Heritage Area
	Section 13	National Heritage Place
	Section 14	Air Quality
	Section 15	Noise and Vibration
	Section 16	Water Resources
	Section 17	Social and Economic Matters
	Section 18	Cumulative and Consequential Impacts
	Section 19	Tailored EIS Guidelines Compliance Tracking Table
	Section 20	Conclusions
		References
		Glossary, Abbreviations and Units
4 Volume	Appendix 2-A	Tailored EIS Guidelines
	Appendix 2-B	Study Team
	Appendix 2-C	RTA Health, Safety and Environment Policy
	Appendix 2-D	Submissions Summary and Response Table
	Appendix 2-E	Monitoring, Enforcement and Review Requirements
	Appendix 3-A	Phase 1 - Initial Consultation
	Appendix 3-B	Phase 2 - Recent Consultation
	Appendix 3-C	Ongoing Stakeholder Engagement Schedule
	Appendix 3-D	Existing Stakeholder Forums
	Appendix 4-A	Undescribed Species Records
	Appendix 4-B	Gouldian Finch Independent Review
	Appendix 4-C	Shipping Impact Assessment Summary
	Appendix 4-D	Stochastic Spill Modelling
	Appendix 5-A	Environmental Management Plan Outline - Threatened Flora Species
	Appendix 5-B	Cost of Mitigation
	Appendix 6-A	Review of Red Goshawk and Masked Owl
	Appendix 6-B	Red Goshawk and Masked Owl Prey Species
	Appendix 6-C	Environmental Management Plan Outline - Threatened Fauna Species
	Appendix 7-A	Dredge Modelling
	Appendix 7-B	Sea Dumping Permits
5 Volume	Appendix 7-C	Port Dredge Management Plan
	Appendix 7-D	River Facilities Dredge Management Plan
	Appendix 7-E	Environmental Management Plan Outline - Threatened Marine and Estuarine Species
	Appendix 8-A	Environmental Management Plan Outline - Avian Migratory Species
	Appendix 9-A	Environmental Management Plan Outline - Non-Avian Migratory Species
	Appendix 10-A	Environmental Management Plan Outline - Commonwealth Marine Area
	Appendix 10-B	Marine Species
	Appendix 11-A	Environmental Management Plan Outline - GBRMP, GBRWHA and GBRNHP
	Appendix 15-A	Underwater Noise Modelling
	Appendix 16-A	Artesian Groundwater
	Appendix 16-B	Water Monitoring and Management Conditions
	Appendix 17-A	Economic Modelling

11 Great Barrier Reef Marine Park	11-1
11.1 Introduction	11-1
11.1.1 General Structure of the Section	11-2
11.1.2 General Approach to Impact Assessment	11-2
11.2 Values.....	11-3
11.2.1 Zoning	11-3
11.2.2 Great Barrier Reef Marine Park Authority Risk Assessment	11-4
11.2.3 Assessable Criteria	11-5
11.3 Project-related Shipping Activities in the GBRMP	11-16
11.3.1 Bauxite Shipping	11-16
11.3.2 SoE Other Shipping	11-17
11.3.2.1 Construction Phase	11-17
11.3.2.2 Operations.....	11-17
11.3.3 Existing Shipping Activity	11-17
11.3.3.1 Inner GBR Designated Shipping Area	11-17
11.3.3.2 Port of Gladstone and Port of Cairns	11-19
11.3.4 Additional Shipping Activity	11-19
11.3.4.1 Construction Phase	11-19
11.3.4.2 Operations.....	11-20
11.4 Potential Impacts.....	11-23
11.4.1 Marine Ecosystem Health, Function or Integrity	11-23
11.4.1.1 Potential Project-related Shipping Impacts.....	11-23
11.4.1.2 Safeguards, Avoidance and Mitigation Measures	11-24
11.4.2 Marine Species	11-25
11.4.2.1 Potential Project-related Shipping Impacts.....	11-25
11.4.2.2 Safeguards, Avoidance and Mitigation Measures	11-28
11.4.3 Changes in Air Quality	11-28
11.4.3.1 Potential Project-related Shipping Impacts.....	11-28
11.4.3.2 Safeguards, Avoidance and Mitigation Measures	11-28
11.4.4 Changes in Water Quality	11-29
11.4.4.1 Potential Project-related Shipping Impacts.....	11-29
11.4.4.2 Safeguards, Avoidance and Mitigation Measures	11-31
11.4.5 Marine Pest Establishment.....	11-31
11.4.5.1 Potential Project-related Shipping Impacts.....	11-31
11.4.5.2 Safeguards, Avoidance and Mitigation Measures	11-32
11.4.6 Accumulation of Potentially Harmful Chemicals.....	11-32
11.4.6.1 Potential Project-related Shipping Impacts.....	11-32

11.4.6.2 Safeguards, Avoidance and Mitigation Measures	11-33
11.4.7 Heritage Values of Great Barrier Reef Marine Park	11-33
11.4.7.1 Potential Project-related Shipping Impacts.....	11-33
11.4.7.2 Safeguards, Avoidance and Mitigation Measures	11-33
11.5 Offset Measures	11-34
11.6 Conclusion and Summary of Residual Impacts	11-34
 12 World Heritage Area	 12-1
12.1 Introduction	12-1
12.1.1 General Structure of the Section	12-1
12.1.2 General Approach to Impact Assessment	12-11
12.2 Values.....	12-12
12.2.1 World Heritage Criteria	12-12
12.2.1.1 World Heritage Criteria VIII – Outstanding Example of Earth’s Evolutionary History	12-12
12.2.1.2 World Heritage Criteria IX – Example of Significant Ongoing Geological Processes, Biological Evolution and Man’s Interaction with his Natural Environment	12-13
12.2.1.3 World Heritage Criteria VII – Rare Natural Phenomena Formations and Exceptional Natural Beauty	12-13
12.2.1.4 World Heritage Criteria X – Habitats where Populations of Rare or Endangered Species Survive	12-14
12.2.2 UNESCO Reactive Monitoring Mission	12-14
12.2.3 Assessable Criteria	12-17
12.3 Project-related Shipping Activities in the GBRWHA	12-18
12.3.1 Bauxite Shipping	12-18
12.3.2 Cargo Shipping	12-19
12.3.2.1 Construction Phase	12-19
12.3.2.2 Operations.....	12-19
12.3.3 Existing Shipping Activity	12-20
12.3.3.1 Inner GBR Designated Shipping Area	12-20
12.3.3.2 Port of Gladstone and Port of Cairns	12-20
12.3.4 Additional Shipping Activity in the Inner GBR Designated Shipping Area	12-21
12.3.4.1 Construction Phase	12-21
12.3.4.2 Operations.....	12-22
12.4 Potential Impacts.....	12-25
12.4.1 World Heritage Criteria VIII – Outstanding Example of Earth’s Evolutionary History.....	12-25

12.4.2 World Heritage Criteria IX – Example of Significant Ongoing Geological Processes, Biological Evolution and Man's Interaction with his Natural Environment	12-26
12.4.3 World Heritage Criteria VII – Rare Natural Phenomena Formations and Exceptional Natural Beauty	12-26
12.4.4 World Heritage Criteria X – Habitats where Populations of Rare or Endangered Species Survive	12-27
12.5 Offset Measures	12-39
12.6 Conclusion and Summary of Residual Impacts	12-39
13 National Heritage Place	13-1
13.1 Introduction	13-1
13.1.1 General Structure of the Section	13-1
13.1.2 General Approach to Impact Assessment	13-11
13.2 Values.....	13-12
13.2.1 National Heritage Criteria	13-12
13.2.2 Assessable Criteria	13-13
13.3 Project-related Shipping Activities in the GBRNHP	13-14
13.3.1 Bauxite Shipping	13-14
13.3.2 Cargo Shipping	13-15
13.3.2.1 Construction Phase	13-15
13.3.2.2 Operations.....	13-15
13.3.3 Existing Shipping Activity	13-16
13.3.3.1 Inner GBR Designated Shipping Area	13-16
13.3.3.2 Port of Gladstone and Port of Cairns	13-16
13.3.4 Additional Shipping Activity in the Inner GBR Designated Shipping Area	13-17
13.3.4.1 Construction Phase	13-17
13.3.4.2 Operations.....	13-18
13.4 Potential Impacts.....	13-21
13.4.1 National Heritage Criteria A – Process: Natural Phenomena, Formations, Features and Exceptional Beauty	13-21
13.4.2 National Heritage Criteria B – Rarity: Uncommon, Rare or Endangered Aspects of Australia's Natural or Cultural History	13-22
13.4.3 National Heritage Criteria C – Research: Yield Information to Contribute to an Understanding of Australia's Natural or Cultural History.....	13-22
13.4.4 National Heritage Criteria D – Characteristics: Principal Characteristics of Natural or Cultural Places or Environments.....	13-23
13.4.5 National Heritage Criteria E – Aesthetics: Exhibiting Particular Aesthetics Valued by Community or Cultural Group.....	13-23

13.5	Offset Measures	13-24
13.6	Conclusion and Summary of Residual Impacts	13-24
14	Air Quality	14-1
14.1	Introduction	14-1
14.2	Ambient Air Quality	14-1
14.3	Relevant Impacts	14-1
14.3.1	Emission Sources	14-1
14.3.2	Potential Effects on Vegetation	14-1
14.4	Avoidance, Mitigation Measures and Residual Impacts	14-4
15	Noise and Vibration	15-1
15.1	Introduction	15-1
15.2	Terrestrial Noise	15-1
15.2.1	Ambient Noise Levels	15-1
15.2.2	Relevant Impacts	15-1
15.2.2.1	Noise Sources	15-1
15.2.2.2	Potential Effects on Terrestrial Fauna	15-2
15.2.2.3	Modelled Impacts	15-2
15.2.3	Avoidance, Mitigation, Enhancement Measures and Residual Impacts ..	15-7
15.3	Underwater Noise	15-8
15.3.1	Ambient Noise Levels	15-8
15.3.2	Relevant Impacts	15-8
15.3.2.1	Noise Sources	15-8
15.3.2.2	Potential Effects on Threatened Estuarine and Marine Fauna and Non-Avian Migratory Species	15-12
15.3.2.3	Modelled Impacts	15-17
15.3.3	Avoidance, Mitigation, Enhancement Measures and Residual Impacts	15-21
15.3.3.1	Pile Driving	15-21
15.3.3.2	Dredging	15-22
15.3.3.3	Shipping	15-23
16	Water Resources	16-1
16.1	Surface Water	16-1
16.1.1	Surface Water Hydrology	16-1
16.1.2	Existing Surface Water Users	16-9
16.1.3	Surface Water Quality	16-9

16.2	Surface Water – Potential Impacts and Mitigation Measures	16-21
16.2.1	Water Supply.....	16-21
16.2.2	Site Water Management	16-22
16.2.3	Surface Water Supply.....	16-26
16.2.4	Mining and Catchment Hydrology.....	16-38
16.2.5	Surface Water Quality Impacts.....	16-42
16.2.6	Regulatory Requirements	16-43
16.3	Groundwater	16-44
16.3.1	Regional Hydrogeology	16-44
16.3.2	Shallow Aquifer	16-46
16.3.3	Shallow Groundwater Quality	16-51
16.3.4	Artesian Aquifer	16-54
16.3.5	Artesian Groundwater Quality	16-58
16.4	Groundwater – Potential Impacts and Mitigation Measures	16-59
16.4.1	Shallow Aquifer	16-59
16.4.2	Artesian Aquifer	16-59
16.4.3	Regulatory Requirements	16-68
16.5	Monitoring.....	16-70
16.5.1	Surface Water	16-70
16.5.2	Shallow Aquifer	16-70
16.5.3	Artesian Aquifer	16-71
17	Social and Economic Matters.....	17-1
17.1	Introduction	17-1
17.2	Social and Economic Context	17-1
17.2.1	Existing Land Use	17-1
17.2.2	Population and Demographics	17-2
17.2.3	Employment and Economic Profile	17-2
17.2.4	Infrastructure and Services	17-3
17.2.5	Educational Facilities and Services	17-4
17.2.6	Health and Emergency Services.....	17-4
17.2.7	Housing	17-5
17.2.8	Project-related Shipping.....	17-5
17.3	Consultation.....	17-7
17.4	Social and Economic Impact	17-8
17.4.1	Economic Modelling	17-9
17.4.2	Cattle Industry	17-10

17.4.3 Commercial and Recreational Fishing.....	17-10
17.4.4 Other Businesses.....	17-15
17.4.5 Housing and Infrastructure	17-16
17.4.6 Tourism	17-17
17.4.7 Scientific Use.....	17-18
17.4.8 Traditional Use Activities	17-19
17.4.9 Non Indigenous Heritage.....	17-23
18 Cumulative and Consequential Impacts.....	18-1
18.1 Introduction	18-1
18.2 Relevant Projects	18-2
18.2.1 Existing RTA Operations North of the Embley River	18-2
18.2.2 Aurukun Bauxite Project (discontinued)	18-3
18.2.3 The Bauxite Hills Project.....	18-3
18.2.4 The Pisolite Hills Project	18-5
18.2.5 The Urquhart Point Mineral Sands Project.....	18-5
18.2.6 Roper Bar Iron Ore.....	18-6
18.2.7 Grey Boat Facility	18-6
18.2.8 Archer River Quarry	18-6
18.2.9 Shipping in the Gulf of Carpentaria	18-7
18.2.10 Shipping on the East Coast of Queensland	18-8
18.3 Mine, Port and Associated Infrastructure	18-10
18.3.1 Land.....	18-10
18.3.2 Surface Water	18-11
18.3.2.1 Surface Water Use	18-11
18.3.2.2 Mining and Catchment Hydrology.....	18-12
18.3.2.3 Surface Water Quality	18-12
18.3.3 Groundwater	18-14
18.3.3.1 Shallow Aquifers	18-14
18.3.3.2 Artesian Aquifers.....	18-14
18.3.4 Marine Ecosystems.....	18-16
18.3.4.1 Dredging Activities	18-16
18.3.4.2 Pile Driving Activities	18-17
18.3.4.3 Bauxite Shipping in the Weipa Area.....	18-18
18.3.4.4 Lighting.....	18-21
18.3.4.5 Small Vessel Activity.....	18-22
18.3.4.6 Fishing Activities	18-22
18.3.5 Threatened Terrestrial Flora, Fauna and Avian Migratory Species	18-23

18.3.5.1 Threatened Terrestrial Flora	18-23
18.3.5.2 Threatened Terrestrial Fauna	18-25
18.3.5.3 Migratory Avian Fauna	18-29
18.4 Shipping Activities in the Commonwealth Marine Area and Great Barrier Reef	18-31
18.4.1 Existing Risks	18-31
18.4.2 Cumulative Risk Assessment	18-33
18.4.2.1 Methodology	18-33
18.4.2.2 Oil Spills (large and small)	18-35
18.4.2.3 Grounding of Large Vessels	18-35
18.4.2.4 Exotic Species – Hull Fouling and Ballast Water	18-35
18.4.2.5 Vessel Strike	18-36
18.4.2.6 Vessel Discharges	18-37
18.4.3 GBRWHA Outstanding Universal Values	18-37
18.4.3.1 World Heritage Criteria VIII – Outstanding Example of Earth's Evolutionary History	18-38
18.4.3.2 World Heritage Criteria IX – Example of Significant Ongoing Geological Processes, Biological Evolution and Man's Interaction with his Natural Environment	18-38
18.4.3.3 World Heritage Criteria VII – Rare Natural Phenomena Formations and Exceptional Natural Beauty	18-39
18.4.3.4 World Heritage Criteria X – Habitats where Populations of Rare or Endangered Species Survive	18-40
18.4.4 Summary of Shipping Cumulative Impacts	18-41
19 Tailored EIS Guidelines Compliance Tracking Table	19-1
20 Conclusions	20-1
20.1 Outline	20-1
20.2 Justification for the Project	20-1
20.3 Environmental Acceptability of the Project	20-2
20.4 Compliance with the Objectives and Requirements of the EPBC Act	20-2
20.5 Summary of Avoidance, Mitigation and Enhancement Measures	20-8
20.6 Conclusion	20-20

References

Glossary, Abbreviations and Units

Figures

Figure 11-1	Designated Shipping Area and other GBRMP Zones	11-6
Figure 11-2	Risk Assessment of Threats to the Great Barrier Reef Ecosystem	11-15
Figure 11-3	Inner GBR Designated Shipping Area - Shipping Movements Per Annum.....	11-18
Figure 11-4	Construction Other Shipping Movements Compared to 2007 levels	11-20
Figure 11-5	Total Operational Shipping Movements Compared to 2007 Levels	11-21
Figure 11-6	Total Operational Shipping Movements Compared to Long Term Forecast	11-22
Figure 12-1	Great Barrier Reef World Heritage Area	12-2
Figure 12-2	Inner GBR Designated Shipping Area - Shipping Movements Per Annum.....	12-21
Figure 12-3	Construction Other Shipping Movements in the Inner GBR Designated Shipping Area Compared to 2007 Levels.....	12-22
Figure 12-4	Total Operational Shipping Movements in the Inner GBR Designated Shipping Area Compared to 2007 Levels.....	12-23
Figure 12-5	Total Operational Shipping Movements in the Inner GBR Designated Shipping Area Compared to Long Term Forecast.....	12-24
Figure 13-1	Great Barrier Reef National Heritage Place	13-2
Figure 13-2	Inner GBR Designated Shipping Area - Shipping Movements Per Annum.....	13-17
Figure 13-3	Construction Phase Shipping Movements in the Inner GBR Designated Shipping Area Compared to 2007 Levels.....	13-18
Figure 13-4	Total Operational Shipping Movements in the Inner GBR Designated Shipping Compared to 2007 Levels	13-19
Figure 13-5	Total Operational Shipping Movements Compared to Long Term Forecast	13-20
Figure 14-1	Modelled Deposited Dust	14-3
Figure 15-1	Modelled Day Period Noise (50Mdtpa)	15-4
Figure 15-2	Modelled Evening Period Noise (50Mdtpa)	15-5
Figure 15-3	Modelled Night Period Noise (50Mdtpa)	15-6

Figure 16-1	Weipa Region Catchment Boundaries	16-2
Figure 16-2	Project Area Catchment Boundaries.....	16-3
Figure 16-3	Surface water monitoring locations.....	16-5
Figure 16-4	Streamflow in response to rainfall	16-6
Figure 16-5	Boyd Water Management System.....	16-23
Figure 16-6	Norman Creek Water Management System	16-24
Figure 16-7	Dam C Spillway Design	16-28
Figure 16-8	Flow Downstream of Dam C at 15Mdptpa	16-32
Figure 16-9	Flow Downstream of Dam C at 30Mdptpa	16-33
Figure 16-10	Flow Downstream of Dam C at 50Mdptpa	16-33
Figure 16-11	Flow from Norman Creek Catchment	16-34
Figure 16-12	Norman Creek Flow at Dam C (15Mdptpa)	16-34
Figure 16-13	Norman Creek Flow at Dam C (30Mdptpa)	16-35
Figure 16-14	Norman Creek Flow at Dam C (50Mdptpa)	16-35
Figure 16-15	Cross Section through Artesian Host Formations	16-44
Figure 16-16	Groundwater Monitoring Locations	16-47
Figure 16-17	Groundwater Level in Response to Rainfall – MB01	16-49
Figure 16-18	Groundwater Level in Response to Rainfall – MB02	16-49
Figure 16-19	Groundwater Level in Response to Rainfall – MB03	16-50
Figure 16-20	Groundwater Level in Response to Rainfall – MB04	16-50
Figure 16-21	Spring Locations.....	16-56
Figure 16-22	Predicted Drawdown Contours – 12 GL/year Scenario Year 40	16-65
Figure 18-1	Other Possible Projects	18-4
Figure 18-2	Total Operational Shipping Movements Compared to Predicted Shipping Numbers ...	18-9
Figure 18-3	Risk Assessment of Threats to the Great Barrier Reef Ecosystem	18-32

Tables

Table 11-1	Summary of Project Predicted Average Annual Shipping Movements on East Coast Queensland – Construction Phase	11-19
Table 11-2	Summary of Project Predicted Average Annual Shipping Movements on East Coast Queensland – Operations	11-20

Table 12-1	Summary of Project Predicted Average Annual Shipping Movements on East Coast Queensland – Construction Phase	12-21
Table 12-2	Summary of Project Predicted Average Annual Shipping Movements on East Coast Queensland – Operations	12-23
Table 12-3	Assessment of Potential Impacts - World Heritage Criteria VIII	12-28
Table 12-4	Assessment of Potential Impacts - World Heritage Criteria IX.....	12-30
Table 12-5	Assessment of Potential Impacts - World Heritage Criteria VII	12-33
Table 12-6	Assessment of Potential Impacts - World Heritage Criteria X	12-35
Table 13-1	National Heritage Criteria and Corresponding World Heritage Criteria	13-12
Table 13-2	Summary of Project Predicted Average Annual Shipping Movements on East Coast Queensland – Construction Phase	13-17
Table 13-3	Summary of Project Predicted Average Annual Shipping Movements on East Coast Queensland – Operations	13-19
Table 15-1	Summary of Median Background Noise Levels at Evans Landing (dB(A)).....	15-1
Table 15-2	Pile Sizes and Source Levels.....	15-10
Table 15-3	Pile Schedule	15-10
Table 15-4	Behaviour Disturbance Criteria	15-14
Table 15-5	Injury Criteria	15-15
Table 15-6	Unmitigated Potential Behaviour Disturbance Distance (Port)	15-19
Table 15-7	Unmitigated Potential Behaviour Disturbance Distance (Humbug terminal)	15-20
Table 15-8	Unmitigated Potential Behaviour Disturbance Distance (Hornibrook ferry/tug terminal)	15-20
Table 15-9	Unmitigated Potential Behaviour Disturbance Distance (Hey River terminal).....	15-20
Table 15-10	Unmitigated Potential Behaviour Disturbance Distance (Navigation Aids)	15-21
Table 16-1	Catchment Areas.....	16-1
Table 16-2	Project Area Creek Characteristics	16-4
Table 16-3	AWBM Calibration Parameters.....	16-8
Table 16-4	Partitioning of Annual Rainfall	16-8
Table 16-5	Sampling Location by Category and Catchment	16-10
Table 16-6	Sampling Location, Habitat and Catchment	16-11
Table 16-7	Freshwater Stream Water Quality.....	16-13

Table 16-8	Freshwater Tree Swamp Water Quality.....	16-14
Table 16-9	Estuarine and Marine Water Quality	16-15
Table 16-10	Comparison of Fresh Water Quality in Tropical Streams.....	16-16
Table 16-11	Average Annual Water Balance	16-21
Table 16-12	Tailings Storage Facility Design Criteria	16-22
Table 16-13	Water Supply Dam Summary	16-26
Table 16-14	Effect of Dam C on Monthly Downstream Flow at 15Mdptpa	16-29
Table 16-15	Effect of Dam C on Monthly Downstream Flow at 30Mdptpa	16-30
Table 16-16	Effect of Dam C on Monthly Downstream Flow at 50Mdptpa	16-31
Table 16-17	Effect of Pumping from Ward River on Monthly Downstream Flow.....	16-37
Table 16-18	SoE Project AWBM Water Balance Characteristics.....	16-38
Table 16-19	Impact of Mining on Catchment Discharge.....	16-40
Table 16-20	Monitoring Bore Network	16-48
Table 16-21	SoE Project Groundwater Quality Results.....	16-52
Table 16-22	Artesian Aquifer Monitoring Bores	16-58
Table 16-23	Artesian Water Quality.....	16-58
Table 16-24	Abstraction Scenarios	16-60
Table 16-25	Predicted Drawdown	16-64
Table 16-26	Spring Factor Multipliers from GAB-ROP.....	16-67
Table 16-27	Spring Factors.....	16-68
Table 17-1	Outlook Report – Direct Use Impacts on Values	17-8
Table 17-2	Total Prawn Catch.....	17-10
Table 17-3	Gulf Commercial Net, Line and Charter Catch Data 2005-2009.....	17-12
Table 17-4	Population Projections for Weipa	17-16
Table 18-1	Summary of SoE Project Predicted Average Annual Shipping Movements on East Coast Queensland - Operations.....	18-8
Table 18-2	Land Clearing Summary.....	18-10
Table 18-3	Cumulative Bulk Carrier Port Calls in the Gulf of Carpentaria Area (assuming all projects proceed).....	18-19
Table 18-4	Summary of Habitat Suitability and Residual Impacts for Threatened Fauna Species within the Project Area	18-25
Table 18-5	Estimated Cumulative Impact on Preferred Red Goshawk Habitat.....	18-27

Table 18-6	Consequence Categories.....	18-34
Table 18-7	Likelihood Categories.....	18-34
Table 18-8	Hazard Risk Grades	18-34
Table 18-9	Summary of Potential Increase in Vessel Strikes associated with the Small Potential Increase in Project-related Bauxite and Cargo Shipping through the GBR.....	18-36
Table 18-10	Cumulative Risks from Shipping on Relevant Matters of NES	18-41
Table 20-1	Compliance with the Objectives of the EPBC Act	20-3
Table 20-2	Compliance with the Principles of Ecologically Sustainable Development	20-6
Table 20-3	Summary of Avoidance, Mitigation and Enhancement Measures – Threatened Terrestrial Flora	20-9
Table 20-4	Avoidance, Mitigation and Enhancement Measures – Terrestrial Fauna	20-12
Table 20-5	Avoidance, Mitigation and Enhancement Measures – Avian Migratory	20-13
Table 20-6	Avoidance, Mitigation and Enhancement Measures – Commonwealth Marine Area, Threatened Estuarine and Marine Fauna and Non-Avian Migratory Species – Dredging and Offshore Spoil Disposal	20-14
Table 20-7	Avoidance, Mitigation and Enhancement Measures – Threatened Estuarine and Marine Fauna and Non-Avian Migratory Species – Marine and River Facilities Construction and Operation.....	20-15
Table 20-8	Avoidance, Mitigation and Enhancement Measures – Threatened Estuarine and Marine Fauna and Non-Avian Migratory Species –Dam C Construction and Operation	20-16
Table 20-9	Avoidance, Mitigation and Enhancement Measures – Threatened Estuarine and Marine Fauna and Non-Avian Migratory Species --Project-related Shipping Activities.....	20-16
Table 20-10	Avoidance, Mitigation and Enhancement Measures – Commonwealth Marine Area, Great Barrier Reef Marine Park, Great Barrier Reef World Heritage Area and National Heritage Place --Project-related Shipping Activities	20-17