

Metro Mining Table of Contents



Environmental Impact Statement



Table of Contents

Volume 1 - Chapters

1	Introduction	1-1
1.1	Environmental Impact Assessment and Statement	1-1
1.2	The Proponent	1-3
1.2.1	Company and Contacts.....	1-3
1.2.2	Experience and Business Activities.....	1-3
1.2.3	Environmental Record	1-5
1.3	Project Summary.....	1-7
1.3.1	Interrelated Projects	1-8
1.4	The EIS Process.....	1-10
1.4.1	Function of this EIS.....	1-11
1.4.2	Objective and Scope of this EIS	1-11
1.4.3	Accredited Process for Controlled Actions	1-12
1.4.4	Methodology of the EIS.....	1-12
1.4.5	Risk Assessment Methodology.....	1-15
1.4.6	Critical and Routine Matters	1-18
1.4.7	EIS Structure.....	1-18
1.4.8	EIS Submissions	1-19
1.5	Public Consultation Process.....	1-20
1.5.1	Terms of Reference Consultation	1-20
1.5.2	Consultation during Project Planning Phase.....	1-20
1.5.3	Public Consultation Program	1-24
1.5.4	Affected and Interested Persons	1-26
1.6	Project Approvals	1-27
1.6.1	Overview	1-27
1.6.2	EPBC Approval for a Controlled Action	1-28
1.6.3	Mining Lease.....	1-28
1.6.4	Environmental Authority.....	1-29
1.7	Relevant Legislation, Policies and Standards	1-31
1.7.1	Commonwealth Legislation	1-31
1.7.2	Key Queensland Legislation.....	1-33
1.7.3	Other Queensland Legislation	1-37
1.7.4	Considered Legislation and Guidelines	1-41
1.7.5	State, Regional and Local Plans	1-42
1.7.6	Standards, Codes and Guidelines	1-43
1.8	ToR Cross-reference.....	1-46
2	Description of the Project.....	2-1
2.1	Project Overview.....	2-1
2.2	Location.....	2-2
2.2.1	State Context.....	2-2
2.2.2	Regional Context.....	2-2
2.2.3	Local Context.....	2-2
2.2.4	Disturbance Area	2-8
2.3	Tenure, Land Use and Access	2-9
2.3.1	Tenure	2-9
2.3.2	Site Access	2-11
2.4	Resource Base and Mine Life.....	2-11

2.4.1	Regional Geology	2-11
2.4.2	Local Stratigraphy	2-12
2.4.3	Estimated JORC Resource Summary	2-16
2.4.4	Ongoing Evaluation and Exploration Activities	2-17
2.5	Project Needs and Alternatives	2-17
2.5.1	Global Bauxite Demand	2-17
2.5.2	Supply and Demand Drivers	2-19
2.5.3	Project Benefits	2-21
2.5.4	Alternatives to the Project	2-22
2.5.5	No Development Scenario	2-23
2.5.6	Alternatives	2-24
2.6	Infrastructure Requirements	2-30
2.6.1	Mine Infrastructure	2-30
2.6.2	Barge Loading Facility	2-32
2.6.3	Roll On/Roll Off Facility	2-38
2.6.4	Materials Handling	2-40
2.6.5	MIA Sediment Basin	2-40
2.6.6	Site Power and Water	2-40
2.6.7	Site Communications	2-43
2.6.8	Lighting	2-43
2.6.9	Site Waste Management	2-43
2.6.10	Workforce Accommodation	2-46
2.7	Construction	2-50
2.7.1	Overview	2-50
2.7.2	Construction Program	2-50
2.7.3	Onshore Infrastructure	2-52
2.7.4	Barge Loading Facility	2-54
2.7.5	Roll On/Roll Off Facility	2-61
2.7.6	Ancillary Construction Requirements	2-62
2.7.7	Construction Waste Management	2-63
2.7.8	Construction Site Management and Security	2-63
2.8	Operations	2-64
2.8.1	Mining Method	2-64
2.8.2	Mine Plant and Equipment	2-64
2.8.3	Operation	2-65
2.8.4	Mining Sequence	2-67
2.8.5	Product Handling	2-70
2.8.6	Barge Operations	2-71
2.9	Workforce	2-85
2.9.1	Workforce Management	2-86
2.10	Rehabilitation and Decommissioning	2-87
2.11	ToR Cross-reference	2-88
3	Climate	3-1
3.1	Project Overview	3-1
3.2	Objectives and Performance Outcomes	3-1
3.2.1	Protection Objectives	3-1
3.2.2	Performance Outcomes	3-2
3.3	Assessment Method	3-2
3.4	Existing Environment	3-3
3.4.4	Evaporation	3-5
3.4.6	Temperature Inversions	3-8
3.5	Climate Extremes and Natural Hazards	3-9
3.5.1	Tropical Storms and Cyclones	3-9

3.5.2	Storm Surge	3-11
3.5.3	Floods	3-12
3.5.4	Earthquakes	3-12
3.5.5	Bushfires	3-13
3.5.6	Drought.....	3-17
3.5.7	Coastal Erosion.....	3-17
3.6	Climate Change	3-20
3.6.1	Climate Change Adaptation Strategies.....	3-21
3.7	Cumulative Impacts	3-22
3.7.1	Opportunities for Collaboration with Gulf Alumina	3-23
3.8	Management and Mitigation Measures.....	3-23
3.9	Qualitative Risk Assessment.....	3-25
3.10	Summary.....	3-28
3.11	Commitments	3-29
3.12	ToR Cross-reference.....	3-30
4	Land	4-1
4.1	Project Overview.....	4-1
4.2	Regulatory Framework.....	4-1
4.2.1	Environmental Protection Act 1994	4-2
4.2.2	Land Act 1994	4-3
4.2.3	Regional Planning Interest Act 2014	4-4
4.2.4	Land Protection (Pest and Stock Route Management) Act 2002	4-4
4.2.5	Cape York Regional Plan	4-5
4.3	Objectives and Performance Outcomes	4-8
4.3.1	Protection Objectives.....	4-8
4.3.2	Performance Outcomes	4-8
4.4	Assessment Method	4-8
4.4.1	Topography.....	4-9
4.4.2	Geology.....	4-9
4.4.3	Soils.....	4-10
4.4.4	Landscape and Visual Amenity	4-16
4.5	Existing Environment	4-17
4.5.1	Geology, Topography and Soils	4-17
4.5.2	Landscape and Visual Amenity	4-41
4.6	Potential Impacts	4-49
4.6.1	Geology, Topography and Soils Impacts	4-49
4.6.2	Visual Amenity Impacts	4-52
4.7	Cumulative Impacts	4-59
4.8	Management and Mitigation Measures	4-61
4.8.1	Geology and Topography	4-61
4.8.2	Landscape and Visual Amenity	4-65
4.8.3	Rehabilitation.....	4-66
4.9	Qualitative Risk Assessment.....	4-90
4.10	Summary.....	4-91
4.11	Commitments	4-93
4.12	ToR Cross-reference.....	4-94
5	Terrestrial and Freshwater Ecology	5-1
5.1	Project Overview.....	5-1
5.2	Regulatory Framework	5-1
5.2.1	Commonwealth	5-2
5.2.2	State.....	5-2
5.3	Objectives and Performance Outcomes	5-8
5.3.1	Protection Objectives.....	5-8

5.3.2	Performance Outcomes	5-8
5.4	Assessment Method	5-8
5.4.1	Nomenclature.....	5-8
5.4.2	Desktop Assessment	5-9
5.4.3	Vegetation and Terrestrial Flora Assessment	5-10
5.4.4	Terrestrial Fauna Assessment	5-14
5.4.5	Freshwater Ecology Assessment	5-19
5.5	Desktop Assessment Results	5-21
5.5.1	Project Area Context	5-21
5.5.2	Habitat Connectivity	5-22
5.5.3	Environmentally Sensitive Areas	5-23
5.5.4	Regional Ecosystem Mapping	5-27
5.6	Existing Environmental Values – Field Survey Results	5-28
5.6.1	Terrestrial Flora.....	5-28
5.6.2	Terrestrial Fauna Values.....	5-36
5.6.3	Aquatic Ecological Values	5-54
5.7	Potential Impacts	5-63
5.7.1	Direct Impacts – Terrestrial Ecology	5-63
5.8	Cumulative Impacts	5-75
5.8.1	Cumulative Impact Assessment	5-77
5.9	Management and Mitigation Measures	5-80
5.9.1	Management of Direct Impacts	5-80
5.9.2	Management of Indirect Impacts	5-85
5.9.3	Matters of State Environmental Significance and Matters of National Environmental Significance	5-87
5.9.4	Summary	5-95
5.10	Offsets	5-96
5.10.1	Objectives.....	5-96
5.10.2	EPBC Act Environmental Offsets Policy	5-97
5.10.3	Environmental Offsets Act 2014.....	5-97
5.10.4	Significant Impact Assessments.....	5-99
5.10.5	Offset Delivery Evaluation.....	5-101
5.10.6	EPBC Act Offset Requirements.....	5-103
5.10.7	Queensland Offset Requirements.....	5-103
5.10.8	Next Steps	5-106
5.11	Qualitative Risk Assessment.....	5-107
5.12	Summary.....	5-109
5.13	Commitments	5-111
5.14	ToR Cross-reference.....	5-112
6	Marine Ecology	6-1
6.1	Project Overview.....	6-1
6.2	Regulatory Framework.....	6-1
6.2.1	Environment Protection and Biodiversity Conservation Act 1999	6-2
6.2.2	Nature Conservation Act 1992.....	6-2
6.2.3	Environmental Protection Act 1994.....	6-2
6.2.4	Coastal Protection and Management Act 1995.....	6-2
6.2.5	Fisheries Act 1994	6-3
6.3	Objectives and Performance Outcomes	6-3
6.3.1	Protection Objectives.....	6-3
6.3.2	Performance Outcomes	6-3
6.4	Assessment Method	6-4
6.4.1	Marine Development Footprint	6-4
6.4.2	Desktop Assessment	6-8

6.4.3	Field Surveys	6-8
6.5	Existing Environmental Values.....	6-9
6.5.1	Coastal Habitats	6-12
6.5.2	Benthic Habitats.....	6-19
6.5.3	Commonwealth Marine Area	6-22
6.5.4	Conservation Significant Species.....	6-26
6.5.5	Fisheries	6-36
6.6	Potential Impacts	6-37
6.6.1	Marine Habitats.....	6-38
6.6.2	Marine Species.....	6-42
6.6.3	Marine Pests	6-45
6.6.4	Fisheries	6-46
6.6.5	Summary of Impacts to Marine Ecology	6-47
6.7	Cumulative Impacts	6-48
6.7.1	Predicted Cumulative Impacts	6-49
6.8	Management and Mitigation Measures.....	6-51
6.8.1	Management of Impacts	6-51
6.8.2	Matters of State Environmental Significance	6-56
6.9	Qualitative Risk Assessment.....	6-70
6.10	Summary.....	6-73
6.11	Commitments	6-75
6.12	ToR Cross-reference.....	6-76
7	Matters of National Environmental Significance	7-1
7.1	Title of the Action	7-2
7.2	Proponent	7-2
7.3	Environmental Health and Safety Policy	7-2
7.3.1	Ecological Protection Objectives and Performance Outcomes	7-3
7.4	The Bauxite Hills Project.....	7-4
7.4.1	Project Justification	7-4
7.4.2	Project Benefits	7-6
7.4.3	Alternatives to the Project.....	7-7
7.4.4	Project Description.....	7-11
7.4.5	Relationships to Other Projects	7-15
7.4.7	Project Area	7-18
7.4.8	Project Consultation.....	7-20
7.5	Legislative Background.....	7-25
7.5.1	Other Approvals and Conditions	7-26
7.6	Environmental Context	7-26
7.6.1	Land Systems.....	7-27
7.6.2	Freshwater Resources.....	7-32
7.6.3	Marine Systems	7-43
7.7	MNES Assessment Methods	7-49
7.7.1	Terrestrial and Freshwater Ecology	7-49
7.7.2	Marine Ecology	7-61
7.8	MNES Results.....	7-63
7.8.1	Terrestrial Assessment Results	7-63
7.8.2	Marine Assessment Results	7-80
7.9	MNES Impact Assessment – Terrestrial	7-90
7.9.1	Listed Threatened Species	7-90
7.9.2	Listed Migratory Bird Species.....	7-111
7.10	MNES Impact Assessment - Marine Species	7-120
7.10.1	Commonwealth Marine Area	7-120
7.10.2	Potential Impacts and Mitigation Measures	7-123

7.10.2	Impact Assessment.....	7-133
7.10.3	Impact Assessment – Commonwealth Marine Area	7-146
7.11	Cumulative Impacts	7-148
7.11.1	Cumulative Impacts – Terrestrial Species.....	7-148
7.11.2	Cumulative Impacts – Marine	7-153
7.12	Summary of Impacts to MNES.....	7-157
7.13	Environmental Offsets Strategy	7-158
7.13.1	MNES Confirmed within the Project Area	7-161
7.13.2	MSES Confirmed within the Project Area	7-161
7.13.3	Financial Settlement	7-165
7.13.4	Land-based Offsets	7-165
7.13.5	Next Steps	7-168
7.14	Qualitative Risk Assessment.....	7-169
7.15	Conclusion.....	7-173
7.16	Commitments	7-175
7.17	ToR Cross-reference.....	7-177
8	Biosecurity	8-1
8.2	Regulatory Framework.....	8-1
8.2.1	Plant Protection Act 1989	8-2
8.2.2	Land Protection (Pest and Stock Route Management) Act 2002	8-2
8.2.3	Biosecurity Act 2014.....	8-3
8.2.4	Public Health Act 2005.....	8-3
8.2.5	Agricultural Chemicals Distribution Control Act 1966.....	8-3
8.2.6	Quarantine Act 1908.....	8-3
8.2.7	Biosecurity Act 2015.....	8-3
8.3	Objectives and Performance Outcomes	8-4
8.3.1	Protection Objectives.....	8-4
8.3.2	Performance Outcomes	8-4
8.4	Assessment Method	8-4
8.5	Existing Environment	8-5
8.5.1	Terrestrial Pests (Fauna)	8-5
8.5.2	Terrestrial Pests (Flora)	8-6
8.5.3	Marine Pests	8-6
8.5.4	Plant Disease	8-8
8.5.5	Vector Borne Disease.....	8-10
8.6	Potential Impacts	8-11
8.6.1	Terrestrial Pests (Fauna)	8-11
8.6.2	Terrestrial Pests (Flora)	8-12
8.6.3	Marine Pests	8-14
8.6.4	Plant Disease	8-15
8.7	Cumulative Impact	8-17
8.8	Management and Mitigation Measures	8-18
8.8.1	Terrestrial Pests (Fauna)	8-18
8.8.2	Terrestrial Pests (Flora)	8-19
8.8.3	Marine Pests	8-22
8.8.4	Plant Disease	8-24
8.8.5	Vector Borne Disease.....	8-25
8.9	Qualitative Risk Assessment.....	8-27
8.10	Summary.....	8-30
8.11	Commitments	8-31
8.12	ToR Cross-reference.....	8-31

9	Water Quality	9-1
9.1	Project Overview	9-1
9.2	Regulatory Framework	9-1
9.2.1	Environmental Protection Act 1994	9-2
9.2.2	Environmental Protection (Water) Policy 2009	9-2
9.2.3	Model Mining Conditions	9-3
9.2.4	Water Resource (Great Artesian Basin) Plan 2006	9-3
9.2.5	International Erosion Control Association Guidelines 2008	9-3
9.2.6	Strategy for Delivering Water Resource Management in Cape York 2014	9-3
9.3	Environmental Objectives and Performance Outcomes	9-4
9.3.1	Environmental Objective	9-4
9.3.2	Performance Outcomes	9-4
9.4	Assessment Method	9-5
9.4.1	Baseline Assessment	9-5
9.4.2	Water Quality Sampling Methods	9-5
9.5	Existing Environment	9-6
9.5.1	Environmental Values	9-8
9.5.2	Surface Water Quality Objectives	9-8
9.5.3	Historical Surface Water Quality	9-14
9.5.4	Surface Water Quality Data Specific to this Project	9-19
9.5.5	Surface Water Site Conditions of the Project Area	9-20
9.5.6	Surface Water Quality Results	9-25
9.5.7	Groundwater Quality	9-38
9.6	Potential Impacts	9-44
9.6.1	Sedimentation of Waterways from Mining Activities	9-44
9.6.2	Contamination from Waste, Hydrocarbons or Chemicals	9-45
9.6.3	Groundwater Contamination from Inflows and Seepage	9-45
9.6.4	Potential Ingress of Saline Water and Infiltration	9-45
9.7	Cumulative Impacts	9-46
9.7.1	Clearing and Stockpiling	9-46
9.7.2	Spills	9-47
9.8	Management and Mitigation Measures	9-47
9.8.1	Sedimentation of Waterways from Vegetation Clearing	9-48
9.8.2	Mine Pits and Sediment Management	9-49
9.8.3	Mine Infrastructure Area Drainage	9-52
9.8.4	Haul Road Cross-Drainage	9-53
9.8.5	Erosion and Sediment Control	9-54
9.8.6	Contamination from Hydrocarbons or Chemicals	9-55
9.8.7	Ingress of Saline Water and Infiltration	9-57
9.8.8	Receiving Environment Monitoring Program	9-57
9.8.9	Opportunities for Collaboration with Gulf Alumina	9-58
9.9	Qualitative Risk Assessment	9-59
9.10	Summary	9-60
9.11	Commitments	9-61
9.12	ToR Cross-reference	9-62
10	Water Resources	10-1
10.1	Project Overview	10-1
10.2	Regulatory Framework	10-2
10.2.1	Environmental Protection Act 1994	10-2
10.2.2	Environmental Protection (Water) Policy 2009	10-2
10.2.3	Water Act 2000	10-3
10.2.4	Water Resources (Great Artesian Basin) Plan 2006	10-3
10.2.5	Strategy for Delivering Water Resource Management in Cape York 2014	10-3

10.3	Objectives and Performance Outcomes	10-4
10.3.1	Protection Objectives.....	10-4
10.3.2	Performance Outcomes	10-4
10.4	Proposed Water Management Network.....	10-4
10.4.1	Mine Pits.....	10-4
10.4.2	Mine Infrastructure Area	10-4
10.4.3	Mine Haul Roads	10-5
10.4.4	Water Management Demands	10-5
10.4.5	Sewage Treatment	10-7
10.4.6	Fire Water Supply	10-7
10.4.7	Water Reuse.....	10-7
10.5	Assessment Method	10-7
10.5.1	Surface Water Resources Assessment Method	10-7
10.5.2	Groundwater Resources Assessment Method.....	10-13
10.6	Existing Environment	10-16
10.6.1	Climate	10-16
10.6.2	Hydrology	10-18
10.6.3	Hydrogeology	10-20
10.7	Potential Impacts	10-50
10.7.1	Surface Water Impacts	10-50
10.7.2	Groundwater Dependent Ecosystem Impacts	10-53
10.7.3	Water Supply	10-56
10.8	Cumulative Impacts	10-57
10.8.1	Former Mines	10-57
10.8.2	Existing Mines	10-58
10.8.3	Other Existing Users.....	10-58
10.8.4	Proposed Mines.....	10-58
10.8.5	Surface Water Cumulative Impacts	10-60
10.8.6	Groundwater Cumulative Impacts.....	10-60
10.9	Management and Mitigation Measures	10-61
10.9.1	Surface Water Management and Mitigation	10-61
10.9.2	Groundwater Management and Mitigation	10-64
10.9.3	Erosion and Sediment Control.....	10-65
10.10	Qualitative Risk Assessment.....	10-77
10.11	Summary.....	10-78
10.12	Commitments	10-79
10.13	ToR Cross-reference.....	10-79
11	Flooding and Regulated Structures	11-1
11.1	Project Overview.....	11-1
11.2	Regulatory Framework.....	11-2
11.2.1	Environmental Protection Act 1994	11-2
11.2.2	Environmental Protection (Water) Policy 2009	11-2
11.2.3	Water Act 2000	11-3
11.2.4	Water Resources (Great Artesian Basin) Plan 2006.....	11-3
11.3	Objectives and Performance Outcomes	11-4
11.3.1	Protection Objectives.....	11-4
11.3.2	Performance Outcomes	11-4
11.4	Assessment Method	11-4
11.4.1	Hydrologic Assessment	11-4
11.4.2	Hydraulic Assessment.....	11-9
11.5	Haul Road Crossing Conceptualisation	11-16
11.5.1	Rational Method Calculations	11-16
11.5.2	Culvert Sizing	11-18

11.6	Regulated Structures Assessment.....	11-20
11.7	Potential Impacts.....	11-20
11.7.1	Climate Change and Flooding	11-21
11.8	Cumulative Impacts.....	11-21
11.9	Management and Mitigation Measures.....	11-22
11.9.1	Haul Road Cross-Drainage	11-22
11.10	Qualitative Risk Assessment.....	11-23
11.11	Summary.....	11-24
11.12	Commitments	11-24
11.13	ToR Cross-reference.....	11-25
12	Air Quality	12-1
12.1	Project Overview.....	12-1
12.2	Regulatory Framework.....	12-1
12.2.1	Environmental Protection Act 1994	12-2
12.2.2	Environmental Protection (Air) Policy 2008.....	12-2
12.2.3	National Environment Protection (Ambient Air Quality) Measure	12-3
12.2.4	Guideline Mining – Model Mining Conditions.....	12-3
12.2.5	Emission Estimation Technique Manual for Mining.....	12-4
12.2.6	Application Requirements for Activities with Impacts to Air (EM960).....	12-4
12.2.7	Project Criteria for Particulate and Dust Deposition.....	12-4
12.3	Objectives and Performance Outcomes.....	12-5
12.3.1	Protection Objectives.....	12-5
12.3.2	Performance Outcomes	12-5
12.4	Assessment Method.....	12-5
12.4.1	Air Dispersion Modelling	12-6
12.5	Existing Environment.....	12-7
12.5.1	Existing Air Quality.....	12-7
12.5.2	Existing Sources of Air Pollutants.....	12-10
12.5.3	Assigning Background Concentrations.....	12-10
12.5.4	Meteorology	12-11
12.5.5	Equipment	12-15
12.5.6	Existing Contamination	12-16
12.5.7	Sensitive Receptors	12-16
12.6	Potential Impacts.....	12-19
12.6.1	Construction	12-19
12.6.2	Operation	12-19
12.6.3	Ecosystem Impacts.....	12-26
12.7	Cumulative Impacts.....	12-26
12.8	Management and Mitigation Measures.....	12-27
12.9	Qualitative Risk Assessment.....	12-28
12.10	Greenhouse Gas Emissions.....	12-30
12.10.1	Legislative Requirements.....	12-30
12.10.2	Greenhouse Gas Assessment	12-32
12.10.3	Cumulative GHG Impacts.....	12-36
12.10.4	GHG Assessment Summary	12-36
12.10.5	Mitigation Measures.....	12-36
12.11	Summary.....	12-37
12.12	Commitments	12-38
12.13	ToR Cross-reference.....	12-38
13	Noise and Vibration	13-1
13.1	Project Overview.....	13-1
13.2	Regulatory Framework.....	13-2
13.2.1	Environmental Protection Act 1994	13-2

13.2.2	Environmental Protection (Noise) Policy 2008.....	13-2
13.2.3	Model Mining Conditions.....	13-4
13.2.4	Application Requirements for Activities with Noise Impacts (EM962).....	13-4
13.2.5	EIS Information Guideline – Noise and Vibration.....	13-5
13.2.6	Operational Noise Criteria.....	13-5
13.3	Objectives and Performance Outcomes.....	13-6
13.3.1	Protection Objectives.....	13-6
13.3.2	Performance Outcomes.....	13-6
13.4	Assessment Method.....	13-6
13.4.1	Modelled Weather Scenarios.....	13-6
13.4.2	Sound Power Levels.....	13-7
13.4.3	Equipment and Location.....	13-8
13.4.4	Insect Noise.....	13-10
13.5	Existing Environment.....	13-10
13.5.1	Topography.....	13-10
13.5.2	Climatic Conditions.....	13-10
13.5.3	Noise Sensitive Locations.....	13-11
13.5.4	Background Noise.....	13-15
13.6	Potential Impacts.....	13-15
13.6.1	Construction Phase.....	13-15
13.6.2	Operational Phase.....	13-16
13.7	Cumulative Impacts.....	13-23
13.8	Management and Mitigation Measures.....	13-25
13.9	Qualitative Risk Assessment.....	13-26
13.10	Summary.....	13-26
13.11	Commitments.....	13-27
13.12	ToR Cross-reference.....	13-27
14	Waste Management	14-1
14.1	Project Overview.....	14-1
14.2	Regulatory Framework.....	14-2
14.2.1	Environmental Protection Act 1994.....	14-2
14.2.2	Environmental Protection Regulation 2008.....	14-2
14.2.3	Waste Reduction and Recycling Act 2011.....	14-3
14.2.4	Protection of the Sea (Prevention of Pollution) from Ships Act 1983.....	14-4
14.2.5	Transport Operations (Marine Pollution) Act 1995 and Regulations.....	14-5
14.2.6	Guidelines and Policy.....	14-5
14.3	Objectives and Performance Outcomes.....	14-6
14.3.1	Protection Objectives.....	14-6
14.3.2	Performance Outcomes.....	14-6
14.4	Assessment Method.....	14-6
14.5	Existing Environment.....	14-7
14.5.1	Visual Amenity.....	14-7
14.5.2	Surface Water and Land.....	14-7
14.5.3	Marine Environment.....	14-7
14.5.4	Groundwater.....	14-8
14.5.5	Ecological Values.....	14-8
14.5.6	Health and Safety of the Community.....	14-8
14.5.7	Regional Waste Management.....	14-8
14.6	Description of Anticipated Wastes.....	14-10
14.6.1	Wastes Generated During Construction Activities.....	14-10
14.6.2	Wastes Generated During Onshore Operational Activities.....	14-13
14.6.3	Wastes Generated During Offshore Activities.....	14-16
14.6.4	Wastes Generated During Decommissioning.....	14-18

14.6.5	Regulated Wastes	14-18
14.7	Potential Impacts	14-18
14.7.1	Onshore Wastes	14-18
14.7.2	Offshore Wastes	14-20
14.8	Cumulative Impacts	14-21
14.9	Management and Mitigation Measures	14-22
14.9.1	Onshore Wastes	14-22
14.9.2	Offshore Wastes	14-28
14.9.3	Waste Management Hierarchy	14-32
14.9.4	Cleaner Production	14-33
14.9.5	Waste Management Implementation	14-35
14.10	Qualitative Risk Assessment	14-36
14.11	Summary	14-37
14.12	Commitments	14-38
14.13	ToR Cross-reference	14-39
15	Cultural Heritage	15-1
15.1	Project Overview	15-1
15.2	Regulatory Framework	15-2
15.2.1	Environment Protection and Biodiversity Conservation Act 1999	15-2
15.2.2	Native Title Act 1993	15-2
15.2.3	Aboriginal and Torres Strait Islander Heritage Protection Act 1984	15-3
15.2.4	Aboriginal Cultural Heritage Act 2003	15-5
15.2.5	Queensland Heritage Act 1992	15-5
15.2.6	National Trust of Queensland Act 1963	15-7
15.2.7	Survey and Mapping Infrastructure Act 2003	15-7
15.2.8	Sustainable Planning Act 2009	15-7
15.3	Objectives and Performance Outcomes	15-8
15.3.1	Protection Objectives	15-8
15.3.2	Performance Outcomes	15-8
15.4	Indigenous Cultural Heritage	15-8
15.4.1	Assessment Method	15-8
15.4.2	Existing Environment	15-9
15.4.3	Potential Impacts	15-13
15.4.4	Cumulative Impacts	15-13
15.4.5	Opportunities for Collaboration with Gulf Alumina	15-13
15.4.6	Management and Mitigation Measures	15-13
15.4.7	Qualitative Risk Assessment	15-15
15.5	Non-Indigenous Cultural Heritage	15-16
15.5.1	Assessment Method	15-16
15.5.2	Existing Environment	15-17
15.5.3	Potential Impacts	15-19
15.5.4	Cumulative Impacts	15-20
15.5.5	Management and Mitigation Measures	15-20
15.5.6	Qualitative Risk Assessment	15-21
15.6	Summary	15-22
15.7	Commitments	15-22
15.8	ToR Cross-reference	15-23
16	Social and Economic	16-1
16.1	Project Overview	16-1
16.2	Regulatory Framework	16-2
16.2.1	Queensland State Planning Policy	16-2
16.2.2	Environmental Protection Act 1994	16-2
16.2.3	Social Impact Assessment Guideline 2013	16-3

16.2.4	Cape York Regional Plan 2014	16-3
16.2.5	Cook Shire Planning Scheme 2007 and Draft Planning Scheme 2014	16-5
16.3	Relevant Programs and Plan	16-7
16.3.1	Cook Shire Community Plan 2011-2021	16-7
16.4	Objectives and Performance Outcomes	16-8
16.4.1	Protection Objectives	16-8
16.4.2	Performance Outcomes	16-8
16.5	Assessment Method	16-9
16.5.1	Social Impact Assessment	16-9
16.5.2	Economic Assessment	16-12
16.5.3	Economic Contribution Assessment	16-12
16.6	Existing Social and Economic Environment	16-14
16.6.1	Existing Social Environment	16-14
16.6.2	Existing Economic Environment	16-26
16.6.3	Socio-Economic Indexes	16-27
16.7	Potential Impacts	16-32
16.7.1	Social Impacts	16-32
16.7.2	Economic Impacts	16-38
16.8	Cumulative Social Impacts	16-41
16.8.1	Surrounding Projects and Scheduling	16-41
16.8.2	Potential Cumulative Impacts	16-44
16.9	Management and Mitigation Measures	16-47
16.9.1	Social Management and Mitigation Measures	16-47
16.9.2	Economic Management and Mitigation Measures	16-54
16.10	Qualitative Risk Assessment	16-55
16.11	Summary	16-59
16.12	Commitments	16-60
16.14	ToR Cross-reference	16-61
17	Transport	17-1
17.1	Project Overview	17-1
17.2	Regulatory Framework	17-2
17.2.2	Air	17-2
17.2.3	Land	17-3
17.2.4	Sea	17-3
17.3	Objectives and Performance Outcomes	17-9
17.3.1	Protection Objectives	17-9
17.3.2	Performance Outcomes	17-9
17.4	Air	17-10
17.4.1	Assessment Methodology	17-10
17.4.2	Existing and Planned Air Transport Operations	17-10
17.4.3	Assessment of Regional Airports	17-12
17.4.4	Potential Impacts Air Transport	17-13
17.4.5	Potential Cumulative Impacts on Air Transport	17-13
17.4.6	Management and Mitigation Measures	17-14
17.5	Land	17-14
17.5.1	Assessment Method	17-14
17.5.2	Existing Public Road Infrastructure and Use	17-14
17.5.3	Potential Impacts Road Transport	17-17
17.5.4	Potential Cumulative Impacts on Road Transport	17-18
17.6	Sea	17-18
17.6.1	Assessment Method	17-18
17.6.2	Existing Shipping and Maritime Activities	17-18
17.6.3	Proposed Barging and Shipping Activities	17-28

17.6.4	Potential Shipping Impacts	17-44
17.6.5	Potential Cumulative Impacts on Barging and Shipping	17-53
17.6.6	Management and Mitigation Measures	17-55
17.7	Qualitative Risk Assessment.....	17-60
17.8	Summary.....	17-64
17.9	Commitments	17-65
17.10	ToR Cross-reference.....	17-67
18	Hazards and Safety.....	18-1
18.2	Regulatory Framework.....	18-1
18.2.1	Mining and Quarrying Safety and Health Act 1999.....	18-2
18.2.2	Work Health and Safety Act 2011.....	18-2
18.2.3	Disaster Management Act 2003.....	18-2
18.2.4	Fire and Rescue Service Act 1990.....	18-3
18.2.5	Coastal Protection and Management Act 1995.....	18-3
18.2.6	Transport Operations (Marine Safety) Act 1994	18-3
18.2.7	Maritime Safety Queensland Act 2002	18-4
18.2.8	Guidelines.....	18-4
18.3	Objectives and Performance Outcomes.....	18-5
18.3.1	Protection Objectives.....	18-5
18.3.2	Performance Outcomes	18-5
18.4	Assessment Method.....	18-5
18.4.1	Community Values and Receptors.....	18-5
18.4.2	Hazards and Impacts	18-6
18.5	Existing Environment	18-6
18.5.1	Sensitive Community Receptors.....	18-6
18.5.2	Environmentally Sensitive Receptors	18-7
18.5.3	State and Local Government Controlled Roads	18-7
18.6	Potential Impacts.....	18-9
18.6.1	Natural Hazards	18-9
18.6.2	Dangerous Goods and Hazardous Substances.....	18-17
18.6.3	Bauxite Mining Health and Safety	18-21
18.6.4	Malicious Acts	18-22
18.7	Cumulative Impacts.....	18-22
18.7.1	Opportunities for Collaboration with Gulf Alumina	18-22
18.8	Management and Mitigation Measures.....	18-23
18.8.1	Natural Hazards	18-23
18.8.2	Dangerous Goods and Hazardous Substance.....	18-25
18.8.3	Bauxite Hills Mining Health and Safety	18-28
18.8.4	Malicious Acts	18-32
18.9	Qualitative Risk Assessment.....	18-32
18.10	Summary.....	18-41
18.11	Commitments	18-43
18.12	ToR Cross-reference.....	18-43
19	Coastal Environment.....	19-1
19.1	Project Overview.....	19-1
19.2	Regulatory Framework.....	19-2
19.2.1	Environment Protection and Biodiversity Conservation Act 1999	19-2
19.2.2	Sustainable Planning Act 2009.....	19-2
19.2.3	Coastal Protection and Management Act 1995.....	19-2
19.2.4	State Planning Policy July 2014	19-2
19.2.5	Coastal Management Plan.....	19-3
19.3	Objectives and Performance Outcomes.....	19-3
19.3.1	Protection Objective.....	19-3

19.3.2	Performance Outcomes	19-3
19.4	Assessment Method	19-3
19.5	Proposed Coastal Activities	19-4
19.5.1	Alternative Options	19-4
19.6	Existing Environment and Coastal Processes	19-5
19.6.1	Regional Setting	19-5
19.6.2	Estuary Type.....	19-6
19.6.3	Bathymetry and Morphology.....	19-6
19.6.4	Coastal Processes	19-11
19.6.5	Water Level.....	19-11
19.6.6	Tidal Conditions.....	19-11
19.6.7	Waves	19-18
19.6.8	Storm Surge	19-20
19.6.9	River Flows.....	19-20
19.6.10	Sediment Transport.....	19-21
19.6.11	Sea Level Rise	19-22
19.6.12	Coastal Soils.....	19-23
19.6.13	Shoreline and Bank Evolution.....	19-24
19.6.14	Water Quality.....	19-26
19.6.15	Sediments and Particle Size Distribution.....	19-28
19.7	Potential Impacts	19-30
19.7.1	Water Level.....	19-30
19.7.2	Local Hydrodynamics.....	19-30
19.7.3	Morphology and Longshore Transport	19-31
19.7.4	Vessel Generated Waves	19-31
19.7.5	Sediment Transport	19-33
19.7.6	Propeller Wash.....	19-34
19.7.7	Acid Sulfate Soils.....	19-38
19.7.8	Climate change, Sea Level Rise and Storm Inundation.....	19-39
19.7.9	Shoreline and Bank Evolution	19-39
19.7.10	Offshore Transshipment Area and Bulk Vessels.....	19-39
19.8	Cumulative Impacts	19-40
19.9	Management and Mitigation Measures	19-42
19.9.1	Water Level.....	19-42
19.9.2	Local Hydrodynamics.....	19-42
19.9.3	Morphology and Longshore Transport	19-43
19.9.4	Vessel Generated Waves	19-43
19.9.5	Sediment Transport and Propeller Wash.....	19-45
19.9.6	Acid Sulfate Soils.....	19-45
19.9.7	Climate Change, Sea Level Rise and Storm Inundation	19-45
19.9.8	Shoreline and Bank Evolution	19-46
19.9.9	Offshore Transshipment	19-46
19.9.10	Marine Monitoring Program.....	19-47
19.10	Qualitative Risk Assessment.....	19-48
19.11	Summary.....	19-49
19.12	Commitments	19-51
19.13	ToR Cross-reference.....	19-52
20	Draft EA Conditions	20-1
20.1	Project Overview.....	20-1
20.2	Proposed Conditions	20-2
20.2.1	Environmental Authority Holders	20-2
20.2.2	Mining Leases.....	20-2
20.2.3	Environmentally Relevant Activity and Location Details.....	20-3

20.2.4	Schedule A – General Conditions	20-3
20.2.5	Schedule B – Air	20-6
20.2.6	Schedule C - Waste Management.....	20-7
20.2.7	Schedule D – Noise and Vibration.....	20-9
20.2.8	Schedule E - Groundwater.....	20-10
20.2.9	Schedule F – Water	20-13
20.2.10	Schedule G – Sewage Treatment.....	20-20
20.2.11	Schedule H – Land and Rehabilitation.....	20-21
21	References.....	21-1

List of Figures

Figure 1-1	Regional location of the Project.....	1-2
Figure 1-2	Project overview	1-9
Figure 1-3	EIS process	1-10
Figure 1-4	Electronic update example	1-23
Figure 1-5	IAP2 public participation spectrum and levels of engagement	1-25
Figure 1-6	Stakeholders	1-26
Figure 1-7	MSES	1-39
Figure 2-1	Regional location of the Project.....	2-4
Figure 2-2	Project location Cook Shire	2-5
Figure 2-3	Project infrastructure	2-6
Figure 2-4	Mine infrastructure area layout.....	2-7
Figure 2-5	Mining lease tenements and cadastre.....	2-10
Figure 2-6	Depositional basins with Great Artesian Basin	2-12
Figure 2-7	Surface geology.....	2-14
Figure 2-8	Typical stratigraphic profile of Western Cape region	2-15
Figure 2-9	Supply of bauxite by country	2-18
Figure 2-10	Bauxite reserves by country	2-18
Figure 2-11	Alumina output by country.....	2-19
Figure 2-12	Bauxite price	2-20
Figure 2-13	Chinese bauxite imports by source.....	2-21
Figure 2-14	Potential outloading berth locations	2-28
Figure 2-15	Indicative haul road cross section.....	2-31
Figure 2-16	Indicative barge loading facility concept	2-34
Figure 2-17	Indicative barge loading facility loading berth design	2-35
Figure 2-18	Longitudinal cross section of the barge loading facility concept.....	2-36
Figure 2-19	Barge loading facility concept typical design.....	2-37
Figure 2-20	Roll on/roll off facility design	2-39
Figure 2-21	Proposed water management network.....	2-41
Figure 2-22	Indicative accommodation camp design	2-48
Figure 2-23	Indicative accommodation camp design – 3D layout	2-49
Figure 2-24	Bent construction sequence step 1	2-56
Figure 2-25	Bent construction sequence step 2	2-57
Figure 2-26	Bent construction sequence step 3	2-57
Figure 2-27	Bent construction sequence step 4	2-58
Figure 2-28	Bent construction sequence step 5	2-58
Figure 2-29	Bent construction sequence step 6	2-59
Figure 2-30	Bent construction sequence step 7	2-59

Figure 2-31 Dolphin construction using SEP	2-60
Figure 2-32 Completed dolphin	2-61
Figure 2-33 Estimated total annual DSO bauxite production rates	2-66
Figure 2-34 Estimated annual DSO bauxite production rates for each pit	2-66
Figure 2-35 Mine development sequence	2-69
Figure 2-36 Indicative barge specifications for year 1 operations	2-71
Figure 2-37 Indicative barge specifications for year 2 to 12 operations	2-72
Figure 2-38 Indicative OGV anchorage area	2-78
Figure 2-39 Indicative general arrangement of a double skinned barge	2-80
Figure 2-40 Schematic of mooring and barge	2-81
Figure 2-41 Indicative barge mooring locations	2-82
Figure 2-42 Indicative barge mooring layout	2-83
Figure 2-43 Indicative day mooring design	2-84
Figure 3-1 Average annual evaporation for Australia	3-5
Figure 3-2 Seasonal wind directions	3-7
Figure 3-3 Recorded cyclone tracks within 100 km of the Project - 1970 to 2006	3-11
Figure 3-4 Australian bushfire threat	3-13
Figure 3-5 Bushfire history mapping for 2000 - 2015	3-14
Figure 3-6 Bushfire frequency for 2000 -2015	3-15
Figure 3-7 Bushfire hazard mapping	3-16
Figure 3-8 Indicative erosion prone area	3-19
Figure 3-9 Predicted temperature and rainfall change	3-20
Figure 3-10 Predicted wind speed and sea temperature change	3-21
Figure 4-1 Cape York regional land use categories	4-7
Figure 4-2 Soil sample locations	4-14
Figure 4-3 Effect of topography and vegetation on views	4-16
Figure 4-4 Typical stratigraphic profile of Western Cape region	4-18
Figure 4-5 Topography	4-20
Figure 4-6 Soils types and sample locations	4-23
Figure 4-7 Hypothetical soil profile showing the principal horizons	4-24
Figure 4-8 Probability of Australian acid sulfate soils occurring	4-36
Figure 4-9 Agricultural land classification	4-40
Figure 4-10 Current land uses	4-43
Figure 4-11 Sensitive receptors	4-48
Figure 4-12 Viewshed analysis at 5 m elevation from the sensitive receptor R44 in Mapoon	4-54
Figure 4-13 Viewshed analysis at 5 m elevation from sensitive receptor R13 in Mapoon	4-55
Figure 4-14 Viewshed analysis at 5 m elevation from the mouth of the Skardon River	4-56
Figure 4-15 Viewshed to sea from Mapoon Township and the Skardon River mouth	4-58
Figure 4-16 Progressive rehabilitation (conceptual)	4-67
Figure 4-17 Progression of rehabilitation of Darwin Stringybark forests at Gove	4-71
Figure 4-18 Original and mined surfaces – MLA 20676	4-78
Figure 4-19 Original and rehabilitated surface – MLA 20676	4-79
Figure 4-20 Original and mined surface – MLA 20688	4-80
Figure 4-21 Original and rehabilitated surface – MLA 20688	4-81
Figure 4-22 Original and mined surface – MLA 20689	4-82
Figure 4-23 Original and rehabilitated surface – MLA 20689	4-83
Figure 5-1 Project area location, protected areas and Strategic Environmental Areas	5-7
Figure 5-2 Terrestrial vegetation and flora survey sites	5-13
Figure 5-3 Terrestrial fauna and aquatic ecology survey sites	5-18
Figure 5-4 Wetlands	5-24
Figure 5-5 BPA mapping - corridors	5-25
Figure 5-6 Environmentally Sensitive Areas mapping	5-26

Figure 5-7 Revised Project area RE mapping	5-32
Figure 5-8 Groundwater dependent-ecosystems in the Project area	5-59
Figure 5-9 Vegetation clearing – Bauxite Hills Project	5-67
Figure 5-10 Significant development projects surrounding the Project area	5-76
Figure 5-11 Waterway stream order and riparian buffer zones	5-86
Figure 6-1 Barge Loading Facility and infrastructure	6-6
Figure 6-2 Indicative OGV anchorage area and reef habitat	6-7
Figure 6-3 Bathymetry of Skardon River (September 2009) with bed features noted	6-11
Figure 6-4 Skardon River marine vegetation and seagrass habitats	6-17
Figure 6-5 Skardon River wetland classification	6-18
Figure 6-6 Seagrass survey of the Skardon River entrance (Chartrand and Thomas, 2010)	6-20
Figure 6-7 West Cape York Commonwealth Marine Reserve	6-22
Figure 6-8 North Marine Region area	6-26
Figure 7-1 Alumina output by country	7-5
Figure 7-2 Regional Project location	7-16
Figure 7-3 Project infrastructure layout	7-17
Figure 7-4 Electronic update example	7-23
Figure 7-5 IAP2 public participation spectrum and levels of engagement	7-24
Figure 7-6 Average monthly rainfall and evaporation	7-32
Figure 7-7 Ducie Basin catchment map - watercourses, drainage features and wetlands	7-34
Figure 7-8 Groundwater dependent-ecosystems	7-39
Figure 7-9 Proposed water management network	7-42
Figure 7-10 Skardon River seagrass habitats	7-46
Figure 7-11 Bathymetry of Skardon River (September 2009) with bed features noted	7-47
Figure 7-12 Flora survey points and current DNRM RE mapping in the Project area	7-53
Figure 7-13 Fauna and aquatic ecology survey locations and DIWA wetland mapping	7-60
Figure 7-14 Revised vegetation mapping for the Project area	7-65
Figure 7-15 Vegetation clearing for the Project area	7-95
Figure 7-16 North Marine Region area	7-122
Figure 7-17 Significant development projects surrounding the Project area	7-150
Figure 8-1 Northern Australia Quarantine Strategy Zone	8-9
Figure 9-1 Ducie Basin catchment	9-7
Figure 9-2 Surface water sampling locations	9-21
Figure 9-3 Salinity (ppt) within the Skardon River from sites WQ1-WQ5 (2011-2014) during the wet and dry seasons	9-35
Figure 9-4 Skardon River pH from sites WQ1-WQ5 (2011-2014) during the wet and dry seasons	9-36
Figure 9-5 Turbidity (ntu) within the Skardon River from sites WQ1-WQ5 (2011-2014)	9-37
Figure 9-6 Piper diagram of groundwater samples	9-41
Figure 9-7 Proposed ESCP devices and locations	9-51
Figure 9-8 Proposed water management	9-52
Figure 10-1 Proposed water management	10-6
Figure 10-2 Skardon River and Namaleta Creek wetland classification	10-12
Figure 10-3 Hydrogeological study area	10-15
Figure 10-4 Graph of average monthly rainfall and evaporation for data drill	10-17
Figure 10-5 Comparison of SILO data to gauge data	10-18
Figure 10-6 Ducie Basin catchment map	10-19
Figure 10-7 Lunette and Namaleta aquifers	10-20
Figure 10-8 Wet season spring along Irish Creek	10-25
Figure 10-9 Timing of groundwater level peaks in shallow and deep bores	10-26
Figure 10-10 Interpreted end dry season groundwater level contours – January 2015	10-28
Figure 10-11 Interpreted peak wet season groundwater level contours – March 2015	10-29

Figure 10-12 Groundwater dependent ecosystems	10-31
Figure 10-13 Big Footprint Swamp – November 2015.....	10-33
Figure 10-14 Big Footprint Swamp hydrographs	10-33
Figure 10-15 Big Footprint Swamp schematic cross-section	10-34
Figure 10-16 Schematic hydrogeological cross-section	10-36
Figure 10-17 Predicted groundwater level difference at BH6MB3D	10-43
Figure 10-18 Predicted groundwater level difference at BH1MB3D	10-43
Figure 10-19 Predicted pool level difference in Big Footprint Swamp	10-44
Figure 10-20 Timing of predicted changes in Big Footprint Swamp pool level.....	10-44
Figure 10-21 Contours of predicted maximum increase in groundwater level	10-45
Figure 10-22 Contours of predicted maximum decrease in groundwater level	10-46
Figure 10-23 Predicted percentage change in groundwater discharge volume to Skardon River	10-47
Figure 10-24 Predicted percentage change in groundwater discharge volume to Big Footprint Swamp ...	10-48
Figure 10-25 Mine impact on flow paths	10-52
Figure 10-26 Groundwater dependent ecosystem impact assessment	10-54
Figure 10-27 Predicted change in Big Footprint Swamp inundation zone.....	10-55
Figure 10-28 Surrounding projects	10-59
Figure 10-29 Mine site drainage	10-72
Figure 11-1 RORB runoff routing model	11-5
Figure 11-2 RORB sub-catchment delineation	11-6
Figure 11-3 Skardon River catchment outlet hydrographs	11-9
Figure 11-4 Peak PMF depth map.....	11-11
Figure 11-5 Peak PMF velocity map.....	11-12
Figure 11-6 Peak 1,000 year ARI flood depth map	11-13
Figure 11-7 Peak 1,000 year ARI flood velocity map	11-14
Figure 11-8 Mine site drainage	11-19
Figure 12-1 Previous fire (2000 to 2016)	12-8
Figure 12-2 Fire frequency (2000 to 2016)	12-9
Figure 12-3 Comparison of rainfall days ≥ 1 mm at Old Mapoon and Weipa weather stations.....	12-12
Figure 12-4 Seasonal wind directions	12-13
Figure 12-5 Mixing height	12-14
Figure 12-6 Sensitive receptors	12-18
Figure 12-7 Annual TSP concentrations	12-22
Figure 12-8 24 hour average ground-level PM ₁₀	12-23
Figure 12-9 24 hour average ground-level PM _{2.5}	12-24
Figure 12-10 24 hour dust deposition.....	12-25
Figure 13-1 Location of noise sources as modelled for the year 2024	13-9
Figure 13-2 Potential sensitive receptors	13-14
Figure 13-3 24 hour worst case Laeq	13-19
Figure 14-1 Waste management hierarchy	14-4
Figure 14-2 Potential waste opportunity locations	14-9
Figure 14-3 Conceptual design of waste management area	14-23
Figure 14-4 Self-bunded storage container	14-33
Figure 15-1 Native title locations	15-4
Figure 16-1 Regulatory boundaries and Cape York Regional Plan	16-6
Figure 16-2 Social impact study area	16-11
Figure 16-3 Cooktown population pyramid	16-19
Figure 16-4 Mapoon population pyramid.....	16-20
Figure 16-5 Weipa population pyramid	16-21
Figure 16-6 Napranum population pyramid	16-22
Figure 16-7 Northern Peninsula population pyramid	16-23
Figure 16-8 Aurukun population pyramid.....	16-24

Figure 16-9 Cairns population pyramid	16-25
Figure 16-10 Relative socio-economic disadvantage	16-28
Figure 16-11 Relative socio-economic advantage and disadvantage	16-29
Figure 16-12 Economic resources	16-30
Figure 16-13 Education and occupation	16-31
Figure 16-14 Timeframe for Bauxite Hills and surrounding projects	16-43
Figure 16-15 Surrounding projects	16-46
Figure 16-5 IAP2 public participation spectrum and levels of engagement	16-52
Figure 17-1 Port Area of Skardon River and pilotage area	17-8
Figure 17-2 Site access	17-16
Figure 17-3 Ports in the eastern Gulf of Carpentaria	17-20
Figure 17-4 Australia's shipping lanes.....	17-21
Figure 17-5 West Cape York Commonwealth marine reserve.....	17-22
Figure 17-6 Proposed anchorage locations in relation to Marine Reserve.....	17-24
Figure 17-7 Northern Prawn Fishery.....	17-26
Figure 17-8 Indicative barge specifications for year 1 operations.....	17-28
Figure 17-9 Indicative barge specifications for year 2 to 12 operations.....	17-29
Figure 17-10 Vessel speeds.....	17-33
Figure 17-11 Schematic of mooring and barge.....	17-34
Figure 17-12 Indicative barge and crane barge mooring area.....	17-35
Figure 17-13 Indicative barge mooring arrangement.....	17-36
Figure 17-14 Indicative day mooring design.....	17-37
Figure 17-15 Indicative general arrangement of a double skinned barge.....	17-43
Figure 17-16 Summary of routine and unavoidable discharges and emissions from ships.....	17-44
Figure 18-1 Sensitive community receptors and environmentally sensitive receptors.....	18-8
Figure 18-2 Australian bushfire threat.....	18-10
Figure 18-3 Bushfire hazard mapping.....	18-11
Figure 18-4 Indicative erosion prone area.....	18-13
Figure 18-5 Recorded cyclone tracks within 100 km of the Project - 1970 to 2006.....	18-16
Figure 18-6 Risk and hazard assessment process.....	18-30
Figure 19-1 Tidal circulation in the Gulf of Carpentaria.....	19-5
Figure 19-2 Hydrographic survey of Skardon from November 1998.....	19-7
Figure 19-3 Hydrographic survey of Skardon from August 2002.....	19-7
Figure 19-4 Hydrographic survey of Skardon from August 2007.....	19-8
Figure 19-5 Hydrographic survey of Skardon from September 2009.....	19-8
Figure 19-6 Hydrographic survey of Skardon from April 2015.....	19-9
Figure 19-7 September 2009: long-section shown by dashed black line and approx. chainage in km.....	19-10
Figure 19-8 Predicted tidal signal based on 275 days of measured data at the Skardon River Barge Ramp for an 8 month period.....	19-12
Figure 19-9 Bathymetry of Skardon River (September 2009) with bed features noted.....	19-14
Figure 19-10 Skardon River bathymetry showing the model calibration locations (mouth site and upstream site).....	19-15
Figure 19-11 Current speed (m/s) showing measured and modelled values (Mouth (upper figure) Upstream (bottom figure)).....	19-15
Figure 19-12 Hydrodynamic model current extract locations (Ebb Bar, Mouth, Mid and Barge).....	19-16
Figure 19-13 Skardon River peak flood tide currents.....	19-17
Figure 19-14 Skardon River peak ebb tide currents.....	19-17
Figure 19-15 Seasonal wave roses over a 24 year period.....	19-19
Figure 19-16: Catchment delineation of the Skardon River and creeks to the south.....	19-21
Figure 19-17 Conceptualisation of sediment transport at the ebb bar of the Skardon River.....	19-22
Figure 19-18 Acid Sulfate Soils distribution and location of proposed development options.....	19-23
Figure 19-19 Aerial Photograph of Skardon River from 1989.....	19-25

Figure 19-20 Aerial photograph of Skardon River from 2014	19-25
Figure 19-21 Features of the coastline adjacent to the Skardon River	19-26
Figure 19-22 Skardon River sediment particle size and distribution	19-28
Figure 19-23 Sand waves recording bulk mobilisation processes along the proposed channel alignment within the mid estuary reaches	19-29
Figure 19-24 Active bed ripples showing sediment mobilisation over the seabed adjacent to the proposed BLF (PaCE, 2014 side scan sonar)	19-29
Figure 19-25 Spatial distribution of vessel generated wave risk	19-32
Figure 19-26 Propeller wash visualisation	19-34
Figure 19-27 location of the sub-bottom profiling work at the proposed RoRo location	19-37
Figure 19-28 The depth of soft sediments along the proposed RoRo shore location of less than 1m	19-38
Figure 19-29 Speed management plan	19-44
Figure 20-1 Project infrastructure layout	20-24
Figure 20-2 Groundwater monitoring bore locations	20-25
Figure 20-3 Surface water monitoring locations.....	20-26

List of Tables

Table 1-1 Metro Mining and consultant details.....	1-3
Table 1-2 Metro Mining tenement schedule	1-4
Table 1-3 EIS sub-consultants	1-13
Table 1-4 Definitions for assessment of hazard and risk	1-15
Table 1-5 Ratings for likelihood of occurrence	1-16
Table 1-6 Consequence ratings.....	1-16
Table 1-7 Risk assessment matrix	1-18
Table 1-8 Volume 1 chapter content	1-19
Table 1-9 Volume 2 specialist technical reports and results appended to this EIS.....	1-19
Table 1-10 Formal communication and engagement activities as of June 2015	1-21
Table 1-11 Project environmental approval requirements	1-27
Table 1-12 Environmentally relevant activities for the Project	1-30
Table 1-13 Threshold values of greenhouse gas emissions and production	1-33
Table 1-14 Anticipated notifiable activities for the Project	1-34
Table 1-15 Other relevant legislation	1-41
Table 1-16 ToR Cross-reference – introduction	1-46
Table 2-1 Project disturbance area by Regional Ecosystem	2-8
Table 2-2 Project tenure	2-9
Table 2-3 Mining tenements in the immediate vicinity of Project	2-9
Table 2-4 Stratigraphy.....	2-12
Table 2-5 Mineral and ore reserve estimates	2-17
Table 2-6 Indicative haul road design criteria.....	2-32
Table 2-7 Mine water demands	2-42
Table 2-8 Waste material calculations for the life of the Project	2-45
Table 2-9 Indicative construction schedule	2-51
Table 2-10 Indicative plant and equipment	2-65
Table 2-11 5 Mtpa mining schedule.....	2-65
Table 2-12 OGV class specifications.....	2-75
Table 2-13 Indicative Project staffing numbers	2-85
Table 2-14 ToR Cross-reference – project description	2-88
Table 3-1 Relevant weather station data.....	3-2

Table 3-2 Monthly mean maximum and minimum temperatures	3-3
Table 3-3 Monthly mean rainfall.....	3-4
Table 3-4 Monthly mean relative humidity	3-5
Table 3-5 Monthly mean wind speed	3-6
Table 3-6 Frequency of occurrence (%) of surface atmospheric stability at the Project	3-8
Table 3-7 Tailwater components – storm tide condition.....	3-11
Table 3-8 Qualitative risk assessment – climate	3-25
Table 3-9 Commitments – climate	3-29
Table 3-10 ToR cross reference table	3-30
Table 4-1 Stratigraphy of study area.....	4-18
Table 4-2 Mineral and ore reserve estimates	4-21
Table 4-3 Soil types mapped in the Project area	4-22
Table 4-4 Emerson class descriptions	4-28
Table 4-5 Soil sodicity/ESP ratings	4-28
Table 4-6 Soil sodicity/ESP results	4-28
Table 4-7 Risk of dispersion	4-30
Table 4-8 Soil salinity ratings	4-30
Table 4-9 Soil salinity results and ratings	4-31
Table 4-10 Ca:Mg ratio ratings.....	4-31
Table 4-11 Ca:Mg results	4-32
Table 4-12 Soil pH characteristics	4-32
Table 4-13 Cation exchange capacity and exchangeable cations interpretation criteria	4-33
Table 4-14 Cation exchange capacity and exchangeable cations interpretation criteria	4-33
Table 4-15 Preliminary ASS summary	4-37
Table 4-16 Visual impact assessment	4-52
Table 4-17 Decommissioning and rehabilitation objectives and completion criteria by domain.....	4-73
Table 4-18 Rehabilitation species list.....	4-85
Table 4-19 Qualitative risk assessment - land.....	4-90
Table 4-20 Commitments – geology, topography and soils.....	4-93
Table 4-21 Commitments – landscape and visual amenity	4-93
Table 4-22 Commitments – rehabilitation	4-93
Table 4-23 ToR cross-reference - land	4-94
Table 5-1 Fauna survey site locations and dominant vegetation	5-14
Table 5-2 Fauna trapping methods.....	5-15
Table 5-3 Total survey effort (trap nights) for Bauxite Hills Project and SRBP fauna ecology surveys	5-17
Table 5-4 Aquatic ecology assessment indicators	5-19
Table 5-5 Aquatic ecology site assessment descriptions	5-20
Table 5-6 Current certified mapped REs of the Project area	5-27
Table 5-7 Project vegetation community descriptions	5-30
Table 5-8 Potential for listed flora species to occur within the study area	5-33
Table 5-9 Likelihood of occurrence of conservation significant and migratory fauna.....	5-39
Table 5-10 In situ surface water sampling results (Feb 2015)	5-61
Table 5-11 Projected clearing of remnant vegetation	5-64
Table 5-12 Total clearing of remnant vegetation (DNRM, 2015).....	5-65
Table 5-13 Project MSES	5-87
Table 5-14 MSES significant impact criteria: Beach Stone-curlew and Estuarine Crocodile.....	5-88
Table 5-15 Assessment against significant impact criteria: Chocolate Tea Tree Orchid.....	5-90
Table 5-16 Assessment against significant impact criteria: Black-footed Tree-rat.....	5-92
Table 5-17 Assessment against significant impact criteria: Palm Cockatoo	5-94
Table 5-18 Impacts to MSES as a result of clearing	5-100
Table 5-19 Potential offset actions	5-104
Table 5-20 Qualitative risk assessment - terrestrial and freshwater ecology.....	5-107

Table 5-21 Commitments – terrestrial and aquatic ecology	5-111
Table 5-22 ToR cross-reference – flora and fauna	5-112
Table 6-1 Regional ecosystems within the Skardon River - marine vegetation	6-12
Table 6-2 Vegetation of the Skardon River (adapted from Roelofs <i>et al.</i> , 2002)	6-14
Table 6-3 Benthic habitat surveys undertaken from the Skardon River (1986-2015)	6-19
Table 6-4 Percentage cover from the Skardon River, anchorage options and a nearshore reef patch	6-21
Table 6-5 Conservation status listed species that are known to occur or likely to occur	6-27
Table 6-6 Listed marine species considered unlikely to occur	6-28
Table 6-7 Number of turtle nesting tracks at four beach regions along western Cape York (modified from Bell, 2004)	6-31
Table 6-8 Incidental snubfin dolphin sightings by PaCE in waters surrounding the Skardon River	6-34
Table 6-9 MSES as they apply to the Bauxite Hills Project	6-56
Table 6-10 Assessment against significant impact criteria: Flatback Turtle	6-60
Table 6-11 Assessment against significant impact criteria: Green Turtle	6-61
Table 6-12 Assessment against significant impact criteria: Hawksbill Turtle	6-62
Table 6-13 Assessment against significant impact criteria: Loggerhead Turtle	6-63
Table 6-14 Assessment against significant impact criteria: Olive Ridley Turtle	6-64
Table 6-15 Assessment against significant impact criteria: three sawfish species and Speartooth Shark	6-65
Table 6-16 Assessment against significant impact criteria: Narrow Sawfish	6-67
Table 6-17 Assessment against significant impact criteria: Estuarine Crocodile	6-67
Table 6-18 Assessment against significant impact criteria: Dugong	6-68
Table 6-19 Assessment against significant impact criteria: Australian Snubfin Dolphin and Indo-Pacific Humpback Dolphin	6-69
Table 6-20 Assessment against significant impact criteria: Coastal Manta Ray	6-70
Table 6-21 Qualitative risk assessment - marine ecology	6-70
Table 6-22 Commitments – marine ecology	6-75
Table 6-23 ToR cross-reference – flora and fauna	6-76
Table 7-1 Metro Mining and consultant details	7-2
Table 7-2 Project tenure	7-19
Table 7-3 Mining tenements in the immediate vicinity of Project	7-20
Table 7-4 Formal communication and engagement activities as of June 2015	7-20
Table 7-5 Potential groundwater dependent areas	7-38
Table 7-6 Benthic habitat surveys undertaken from the Skardon River (1986-2015)	7-44
Table 7-7 Fauna survey site locations and dominant vegetation	7-54
Table 7-8 Fauna trapping methods	7-55
Table 7-9 Total survey effort (trap nights) for SRBP fauna ecology surveys	7-57
Table 7-10 Survey effort relative to guidelines	7-58
Table 7-11 Field survey personnel – terrestrial ecology	7-61
Table 7-12 Field survey personnel – marine ecology	7-62
Table 7-13 Ground-truthed vegetation community descriptions	7-63
Table 7-14 Predicted EPBC Act listed species	7-66
Table 7-15 Likelihood of occurrence of EPBC Act listed threatened species	7-68
Table 7-16 Likelihood of occurrence of EPBC Act listed Migratory species	7-75
Table 7-17 Predicted EPBC Act listed species – marine fauna	7-80
Table 7-18 Likelihood of occurrence of EPBC Act threatened marine species	7-81
Table 7-19 Likelihood of occurrence of EPBC Act migratory marine species	7-83
Table 7-20 Number of turtle nesting tracks at four beach regions along western Cape York	7-85
Table 7-21 Incidental Snubfin Dolphin sightings	7-89
Table 7-22 Key data on threatened species	7-91
Table 7-23 Predicted impact on extant vegetation communities and MNES habitat	7-92
Table 7-24 Assessment against significant impact criteria: Chocolate Tea Tree Orchid	7-105
Table 7-25 Assessment against significant impact criteria: Black-footed Tree-rat	7-107

Table 7-26 Assessment against significant impact criteria: Palm Cockatoo	7-109
Table 7-27 Key data on listed migratory species	7-111
Table 7-28 Assessment against significant impact criteria: Little Tern and Gull-billed Tern	7-116
Table 7-29 Assessment against significant impact criteria: Whimbrel and Common Sandpiper	7-117
Table 7-30 Assessment against significant impact criteria: Eastern Osprey	7-118
Table 7-31 Assessment against significant impact criteria: Eastern Cattle Egret and Great Egret	7-118
Table 7-32 Assessment against significant impact criteria: Rainbow Bee-eater	7-119
Table 7-33 Assessment against significant impact criteria: Rufous Fantail	7-120
Table 7-34 Key data on threatened species or species groups	7-133
Table 7-35 Assessment against significant impact criteria: Flatback Turtle	7-136
Table 7-36 Assessment against significant impact criteria: Green Turtle	7-137
Table 7-37 Assessment against significant impact criteria: Hawksbill Turtle	7-137
Table 7-38 Assessment against significant impact criteria: Loggerhead Turtle	7-138
Table 7-39 Assessment against significant impact criteria: Olive Ridley Turtle	7-139
Table 7-40 Assessment against significant impact criteria: sawfish species and Speartooth Shark	7-141
Table 7-41 Assessment against significant impact criteria: Dugong	7-142
Table 7-42 Assessment against significant impact criteria: Estuarine Crocodile	7-143
Table 7-43 Assessment against significant impact criteria: Australian Snubfin Dolphin and Indo-Pacific Humpback Dolphin	7-144
Table 7-44 Assessment against significant impact criteria: Narrow Sawfish	7-144
Table 7-45 Assessment against significant impact criteria: Coastal Manta Ray	7-145
Table 7-46 Assessment against significant impact criteria for Commonwealth Marine Area	7-147
Table 7-47 Impacts to MSES through clearing for the Project	7-162
Table 7-48 Potential offset actions	7-166
Table 7-49 Qualitative risk assessment – MNES	7-169
Table 7-50 Commitments – MNES	7-175
Table 7-51 ToR cross-reference – MNES	7-177
Table 8-1 Plant diseases	8-10
Table 8-2 Weeds with potential to invade disturbed areas and likely to be present in the locality	8-13
Table 8-3 Qualitative risk assessment – biosecurity	8-27
Table 8-4 Commitments – biosecurity	8-31
Table 8-5 ToR cross-reference – biosecurity	8-31
Table 9-1 Water quality guideline values	9-10
Table 9-2 Water quality objectives for comparison to site specific data	9-12
Table 9-3 Gauge names and locations	9-14
Table 9-4 Dulhunty River gauge site water quality data	9-14
Table 9-5 Freshwater stream water quality from Amrun Project and the Pisolite Hills Project	9-16
Table 9-6 Estuarine/marine water quality (Amrun EIS, 2012 sites WP8, 10A, 10B and 21)	9-18
Table 9-7 Project specific surface water sampling	9-19
Table 9-8 SRBP surface water quality sampling	9-20
Table 9-9 Surface water quality sampling sites	9-20
Table 9-10 Surface water survey site descriptions (a to d)	9-22
Table 9-11 Freshwater stream water quality	9-26
Table 9-12 Estuarine/marine water quality	9-28
Table 9-13 Freshwater stream water quality comparisons	9-30
Table 9-14 Estuarine/marine water quality comparisons	9-32
Table 9-15 Groundwater bore information	9-38
Table 9-16 Project specific groundwater sampling	9-39
Table 9-17 Groundwater salinity	9-40
Table 9-18 Groundwater dissolved metals	9-42
Table 9-19 Objectives, targets and indicators for erosion and sediment management	9-54
Table 9-20 Qualitative risk assessment water quality	9-59

Table 9-21 Commitments – surface water quality	9-61
Table 9-22 Commitments – groundwater quality	9-61
Table 9-23 Cross reference to the ToR	9-62
Table 10-1 Mine water demands	10-5
Table 10-2 Australian water balance model calibration parameters	10-8
Table 10-3 Water balance model partitioning of annual rainfall	10-8
Table 10-4 Australian water balance model land use parameters	10-9
Table 10-5 Australian water balance model land use water budget results	10-9
Table 10-6 Australian water balance model land use partial areas – Skardon River	10-10
Table 10-7 Potential impact on water budget – Skardon River	10-10
Table 10-8 Australian water balance model land use partial areas – Namaleta Creek	10-10
Table 10-9 Potential impact on water budget – Namaleta Creek.....	10-10
Table 10-10 Australian water balance model land use partial areas – Big Footprint Swamp	10-11
Table 10-11 Potential impact on water budget – Big Footprint Swamp	10-11
Table 10-12 Data drill average monthly rainfall and evaporation	10-16
Table 10-13 Gauge information	10-17
Table 10-14 Wet season recharge estimate based on water table fluctuation method	10-24
Table 10-15 National Water Commission groundwater dependent ecosystem types	10-30
Table 10-16 Potential groundwater dependent areas.....	10-32
Table 10-17 Layers modelled	10-39
Table 10-18 Calibrated hydrogeological properties.....	10-41
Table 10-19 Calibrated recharge rates.....	10-41
Table 10-20 Calibrated recharge rates.....	10-42
Table 10-21 Groundwater threat and impact assessment on groundwater dependent ecosystems	10-56
Table 10-22 Objectives, targets and indicators for erosion and sediment management.....	10-66
Table 10-23 Sub-catchments, predicted soil loss and sediment control device type	10-67
Table 10-24 Maximum flow diversion bank spacing.....	10-75
Table 10-25 Qualitative risk assessment – water resources	10-77
Table 10-26 Commitments – water resources.....	10-79
Table 10-27 ToR cross-reference – water resources	10-79
Table 11-1 CRC-FORGE design point rainfall intensities (mm/h)	11-5
Table 11-2 Uncalibrated RORB peak outlet flow; $K_c = 41.18$, $m = 0.8$	11-7
Table 11-3 FFA stream gauge details	11-7
Table 11-4 FFA flow comparison to uncalibrated RORB output (m^3/s)	11-7
Table 11-5 RORB calibration to regional regression equation results	11-8
Table 11-6 Peak flood depths at locations of interest	11-15
Table 11-7 Peak water surface elevations at locations of interest	11-15
Table 11-8 Peak velocities at locations of interest	11-15
Table 11-9 Tidal levels at locations of interest	11-16
Table 11-10 Local catchment areas	11-17
Table 11-11 Coefficients of runoff	11-17
Table 11-12 Rational method peak flow	11-18
Table 11-13 Culvert sizing	11-18
Table 11-14 Qualitative risk assessment - flooding	11-23
Table 11-15 Commitments – flooding	11-24
Table 11-16 ToR cross-reference – flooding and regulated structures.....	11-25
Table 12-1 Description of legislated air pollutants	12-2
Table 12-2 Air NEPM ambient air quality standards.....	12-3
Table 12-3 Air criteria	12-4
Table 12-4 Assigned background levels for recent EIS assessments	12-11
Table 12-5 Assigned Project background concentrations.....	12-11
Table 12-6 Annual stability class distribution predicted	12-14

Table 12-7 Equipment quantity by year.....	12-15
Table 12-8 Nearest sensitive receptors to the Project	12-17
Table 12-9 Operations data and modelling parameters	12-20
Table 12-10 Summary of annual emissions	12-20
Table 12-11 Modelling results	12-21
Table 12-12 Qualitative risk assessment – air quality.....	12-28
Table 12-13 NGER reporting thresholds	12-31
Table 12-14 Emission factors	12-33
Table 12-15 Construction annual emissions (tonnes CO ₂ -e).....	12-34
Table 12-16 Operational annual emissions (tonnes CO ₂ -e)	12-34
Table 12-17 Summary of annual emissions (GHG).....	12-35
Table 12-18 Commitments – air quality.....	12-38
Table 12-19 ToR cross-reference – air quality	12-38
Table 13-1 EPP (Noise) acoustic quality objectives.....	13-2
Table 13-2 Model Mining Conditions noise criteria.....	13-4
Table 13-3 Site specific noise criteria as per the Model Mining Conditions methodology.....	13-5
Table 13-4 Equipment quantity by year.....	13-8
Table 13-5 Annual stability class distribution predicted	13-11
Table 13-6 Nearest sensitive receptors to the Project	13-13
Table 13-7 Comparison of noise monitoring results at Mapoon (27th January to 7th February 2010)	13-15
Table 13-8 Modelled sound power levels.....	13-16
Table 13-9 Predicted daytime noise levels during operations.....	13-17
Table 13-10 Predicted evening noise levels during operations	13-18
Table 13-11 Low frequency night time noise levels during operations	13-22
Table 13-12 Cumulative impacts of the Project and SRBP	13-24
Table 13-13 Qualitative risk assessment - noise	13-26
Table 13-14 Commitments – noise	13-27
Table 13-15 ToR cross-reference – noise and vibration	13-27
Table 14-1 Summary of waste disposal opportunities.....	14-8
Table 14-2 Summary of potential construction wastes	14-11
Table 14-3 Summary of potential onshore operational wastes.....	14-14
Table 14-4 Summary of potential offshore wastes.....	14-17
Table 14-5 Indicative treated sewage effluent characteristics	14-26
Table 14-6 Ship sewage treatment standards	14-30
Table 14-7 Cleaner production techniques.....	14-33
Table 14-8 Qualitative risk assessment - waste	14-36
Table 14-9 Commitments – waste	14-38
Table 14-10 ToR cross-reference – waste management	14-39
Table 15-1 Cook Shire Community Plan 2011 – 2021 cultural heritage goals and strategies.....	15-7
Table 15-2 Potential impacts to Indigenous cultural heritage values.....	15-13
Table 15-3 Qualitative risk assessment – Indigenous cultural heritage.....	15-15
Table 15-4 Qualitative risk assessment - non-Indigenous cultural heritage.....	15-21
Table 15-5 Commitments – Indigenous and non-Indigenous cultural heritage	15-22
Table 15-6 ToR cross-reference – cultural heritage	15-23
Table 16-1 Challenges facing the Cook Shire identified in the community plan	16-7
Table 16-2 Strategies identified in community plan to address social and economic challenges	16-8
Table 16-3 Measures of economic contribution.....	16-13
Table 16-4 Anticipated capital expenditure (\$m), FNQ Region and rest of Queensland.....	16-13
Table 16-5 Community population in comparison to Queensland population	16-16
Table 16-6 Community statistics.....	16-16
Table 16-7 Indigenous population in comparison to Queensland’s Indigenous population	16-17
Table 16-8 Labour force and employment statistics.....	16-17

Table 16-9 Population change and projections	16-18
Table 16-10 Summary of statistics	16-26
Table 16-11 Underlying regional economic trends	16-26
Table 16-12 Relative socio-economic disadvantage	16-28
Table 16-13 Index of relative socio-economic advantage and disadvantage	16-29
Table 16-14 Index of economic resources	16-30
Table 16-15 Index of economic resources	16-31
Table 16-16 Beneficial and adverse impacts	16-38
Table 16-17 Summary of construction phase contribution	16-38
Table 16-18 Summary of average annual operational phase (2016 to 2043) contribution	16-39
Table 16-19 Qualitative risk assessment – social and economic	16-55
Table 16-20 Commitments – social and economic	16-60
Table 16-21 ToR cross-reference – social and economic	16-61
Table 17-1 OGV class specifications	17-39
Table 17-2 Ship loading activities over the life of the Project	17-41
Table 17-3 Comparison of in-water sound source levels	17-49
Table 17-4 Functional hearing ranges of marine animals (potentially) in the Skardon River region	17-49
Table 17-5 Qualitative risk assessment – transport (air, land and sea)	17-61
Table 17-6 Commitments – transport (air, land and sea)	17-65
Table 17-7 ToR cross-reference – transport	17-67
Table 18-1 Indicative list of hazardous substances	18-19
Table 18-2 Preliminary risk assessment for construction and operational activities	18-33
Table 18-3 Commitments – hazards and safety	18-43
Table 18-4 ToR cross-reference – hazards and safety	18-43
Table 19-1 Tidal planes	19-12
Table 19-2 Existing current velocities (m/s) within the proposed channel alignment extracted from the hydrodynamic model at four locations (Ebb Bar, Mouth, Mid and Barge)	19-16
Table 19-3 Summary statistics for speed (m/sec) recorded from the mouth and upstream locations	19-18
Table 19-4 Projected sea level increases to 2100	19-22
Table 19-5 Predicted mass of sediment eroded and resultant SSC from the propeller jet	19-36
Table 19-6 Qualitative risk assessment – coastal environment	19-48
Table 19-7 Commitments – coastal environment	19-51
Table 19-8 ToR cross-reference – coastal environment	19-52
Table 20-1 Proposed Environmental Authority holder details	20-2
Table 20-2 Mining leases subject to the Environmental Authority	20-2
Table 20-3 Environmentally Relevant Activities subject to the Environmental Authority	20-3
Table 20-4 Schedule B – Table 1 Air criteria (Dust and particulate matter criteria)	20-6
Table 20-5 Schedule E – Table 1 Groundwater quality and level monitoring locations and frequency	20-10
Table 20-6 Schedule E – Table 2 Groundwater quality triggers and limits	20-12
Table 20-7 Schedule F – Table 1 Receiving waters and environmental monitoring locations and frequency – Freshwater and wetlands	20-13
Table 20-8 Schedule F – Table 2 Receiving waters and environmental monitoring locations and frequency – Marine and estuarine waters	20-14
Table 20-9 Schedule F – Table 3 Contaminant trigger levels – Freshwater and wetlands	20-14
Table 20-10 Schedule F – Table 4 Contaminant trigger levels – Marine and estuarine waters	20-15
Table 20-11 Schedule G – Table 1 Contaminant releases to land	20-20
Table 20-12 Schedule H – Table 1 Rehabilitation Requirements	20-21

List of Plates

Plate 2-1 Port of Skardon River infrastructure.....	2-3
Plate 2-2 Logistics barge loaded with construction materials	2-51
Plate 2-3 Typical Self Elevating Platform, Fuji	2-55
Plate 2-4 Typical onshore management area for PASS	2-62
Plate 2-5 Typical shallow draft tugboat that will be used during barge operations	2-73
Plate 2-6 Example of a typical floating crane that would be use to transfer bauxite to the OGV	2-74
Plate 2-7 Shallow draft work boat	2-74
Plate 2-8 Supramax Class OGV	2-75
Plate 2-9 Ultramax Class OGV	2-76
Plate 2-10 Panamax Class OGV	2-76
Plate 2-11 Mini Capesize OGV	2-77
Plate 2-12 Logistics barge loaded with mining equipment	2-79
Plate 4-1 Camping at the mouth of Skardon River.....	4-42
Plate 4-2 Eucalypt woodland	4-44
Plate 4-3 Melaleuca wetland	4-45
Plate 4-4 Project mangrove community	4-46
Plate 4-5 Mouth of the Skardon River	4-46
Plate 4-6 Existing Port of Skardon River infrastructure	4-47
Plate 4-7 Typical PASS management area.....	4-64
Plate 6-1: Typical saltmarsh (foreground) and mangroves (rear).....	6-13
Plate 6-2: Mangrove community in Project area	6-14
Plate 7-1 Port of Skardon River infrastructure.....	7-19
Plate 7-2 Palm Cockatoo	7-72
Plate 17-1 Skardon River Airport runway	17-11
Plate 17-2 Typical shallow draft tugboat that will be used during barge operations	17-30
Plate 17-3 Example of a typical floating crane that would be use to transfer bauxite to the OGV	17-31
Plate 17-4 Shallow draft work boat	17-31
Plate 17-5 Supramax Class OGV	17-39
Plate 17-6 Ultramax Class OGV	17-39
Plate 17-7 Panamax Class OGV	17-40
Plate 17-8 Minicape Class OGV	17-40
Plate 17-9 Logistics barge loaded with construction materials	17-41
Plate 17-10 Logistics barge loaded with mining equipment.....	17-42

Volume 2 – Appendices

Appendix A1 – Soil Sample Results

Appendix A2 – Contaminated Land Register

Appendix A3 – Conceptual Erosion and Sediment Control Plan

Appendix B1 – Terrestrial Ecology Technical Report

Appendix B2 – Aquatic Ecology Technical Report

Appendix B3 – Marine Ecology and Coastal Processes

Appendix C – Offsets Strategy

Appendix D – Water Quality Results

Appendix E1 – Groundwater Technical Report

Appendix E2 – Surface Water Technical Report

Appendix F – Air Quality and Greenhouse Gas Technical Report

Appendix G – Noise and Vibration Technical Report

Appendix H – Economic Technical Assessment

Appendix I – Shipping Technical Assessment

Appendix J – Bathymetric Survey Report – Skardon River

Appendix K – Environmental Management Plan

Appendix L – Consolidated Terms of Reference Cross-reference Table

Appendix M – Consolidated Commitments Table