

Table of Contents

Volume 1 – EIS Main Sections

Glossary, Abbreviations and Units

Executive Summary

1	Introduction	1-1
1.1	The Project	1-1
1.2	The Proponent	1-1
1.3	Project Description	1-4
1.3.1	Relationships to other projects	1-5
1.3.2	Phased EIS Process	1-9
1.4	The Environmental Impact Assessment Process	1-9
1.4.1	Methodology of the EIS	1-9
1.4.2	Objectives of the EIS	1-10
1.5	Public Consultation Process and Submissions	1-10
1.5.1	Submissions	1-11
1.6	Project Approvals	1-11
1.6.1	Relevant legislation and policy requirements	1-11
1.6.2	Planning processes and standards	1-20
2	Project Justification and Sustainability	2-1
2.1	Project Justification	2-1
2.1.1	Project Need	2-1
2.1.2	Technical Feasibility and Commercial Viability	2-1
2.1.3	Compatibility with Policy and Regulatory Frameworks	2-2
2.1.4	Economic, Social and Environmental Costs and Benefits	2-2
2.1.5	Regional Socio-economic Issues	2-2
2.2	Ecologically Sustainable Development	2-4
2.2.1	Definition of Sustainability	2-4
2.2.2	Project Sustainability Principles	2-4
2.2.3	Ecologically Sustainable Development Principles	2-5
3	Project Description	3-1
3.1	Key Elements of the Project	3-1
3.2	Resource Description	3-5
3.3	Resource Utilisation	3-7
3.4	Mining Tenures	3-7
3.5	Mine Design	3-7
3.5.1	Mining Concepts	3-7
3.5.2	Product Coal Production Schedule	3-9
3.5.3	Mining Sequence	3-9

3.5.4	Mine Rehabilitation	3-10
3.5.5	Blasting	3-11
3.5.6	Mine Equipment	3-19
3.6	Mine Facilities and Infrastructure	3-19
3.7	Coal Handling and Preparation	3-20
3.7.1	Process Selection and Basis	3-20
3.7.2	CHPP Overview	3-20
3.7.3	CHPP Water Consumption	3-27
3.7.4	Air Services	3-27
3.7.5	Reagents/ Diesel System	3-27
3.8	Water Management	3-28
3.8.1	System Overview	3-28
3.8.2	Sediment Dams	3-28
3.8.3	Water Supply	3-30
3.9	Coal Transport	3-30
3.9.1	Train Movements	3-30
3.9.2	Port Capacity	3-30
3.10	Power Supply	3-31
3.11	Construction	3-31
3.11.1	Schedule	3-31
3.11.2	Material Volumes and Equipment	3-31
3.11.3	Transport of Plant and Equipment	3-32
3.12	Workforce	3-32
3.12.1	Project Management	3-32
3.12.2	Construction Phase	3-32
3.12.3	Operational Phase	3-32
3.13	Decommissioning	3-33
3.14	Project Alternatives	3-33
3.14.1	No Project	3-33
3.14.2	Alternative Locations	3-33
3.14.3	Mining Methods	3-33
3.14.4	Final Voids	3-34
3.14.5	Water Supply	3-35
4	Land Resources	4-1
4.1	Topography / Geomorphology	4-1
4.1.1	Existing environment	4-1
4.1.2	Potential impacts	4-1
4.2	Geology and Mineral Resources	4-1
4.2.1	Existing environment	4-1
4.2.2	Potential impacts	4-5
4.3	Soils	4-5
4.3.1	Existing environment	4-5

4.3.2	Potential impacts	4-25
4.4	Site Contamination	4-31
4.4.1	Existing environment	4-31
4.4.2	Potential impacts	4-31
4.5	Rehabilitation	4-32
4.5.1	Proposed Post Mining Land Use	4-32
4.5.2	Progressive Rehabilitation	4-32
4.5.3	Mine Rehabilitation Strategies	4-33
4.5.4	Topsoil Management	4-34
4.5.5	Revegetation	4-36
4.5.6	Rehabilitation Success Criteria	4-36
4.5.7	Rehabilitation Maintenance	4-37
4.5.8	Rehabilitation Monitoring	4-37
4.5.9	Decommissioning	4-37
4.6	Land Use and Land Tenure	4-37
4.6.1	Existing environment	4-37
4.6.2	Potential impacts	4-38
4.7	Sensitive Environmental Areas	4-38
4.7.1	Existing environment	4-38
4.7.2	Potential impacts	4-38
4.8	Visual Amenity	4-40
4.8.1	Existing Environment	4-40
4.8.2	Potential Impacts and Mitigation Measures	4-43
4.8.3	Summary of Proposed Mitigation Measures	4-50
5	Mineral Waste	5-1
5.1	Introduction	5-1
5.2	Geological Setting	5-1
5.3	Overburden and Coal Interburden - Waste Stream Identification	5-1
5.4	Site Investigations and Laboratory Analysis	5-2
5.5	Geochemical Analysis	5-3
5.5.1	Sulphur and Acid Generation Potential	5-3
5.5.2	Exchangeable Cations	5-6
5.5.3	Trace Metal Composition	5-7
5.6	Discussion and Mitigation Measures	5-8
5.7	Conclusion	5-9
6	Surface Water Resources	6-1
6.1	Surface Water Resources	6-1
6.1.1	Existing Environment	6-1
6.1.2	Potential Impacts	6-11
6.2	Surface Water Quality	6-20
6.2.1	Ephemeral Waters	6-20
6.2.2	Policy and Legislation Review	6-21

6.2.3	Water Quality	6-21
6.2.4	Potential Impacts	6-32
6.2.5	Mitigation Measures	6-33
7	Groundwater	7-1
7.1	Existing Resources	7-1
7.1.1	Previous Investigations	7-1
7.1.2	Geology and Hydrogeology	7-2
7.1.3	Existing Groundwater Monitoring Network	7-5
7.1.4	Groundwater Quality	7-7
7.1.5	Surrounding Groundwater Users	7-8
7.1.6	Legislation Relevant to Groundwater	7-8
7.2	Potential Impacts	7-11
7.2.1	Impacts on Groundwater – During Mining Operations	7-11
7.2.2	Impacts of Groundwater – Post Mining	7-24
7.3	Monitoring	7-27
7.3.1	Groundwater Monitoring	7-27
7.3.2	Post Closure	7-28
8	Terrestrial Ecology	8-1
8.1	Introduction	8-1
8.2	Overall Methodology	8-1
8.2.1	Literature Review	8-1
8.2.2	Aerial Photograph Interpretation	8-2
8.2.3	Field Surveys	8-2
8.3	Legislation	8-2
8.3.1	Commonwealth Legislation	8-2
8.3.2	Queensland Legislation	8-3
8.4	Terrestrial Flora Assessment	8-4
8.4.1	Methodology	8-4
8.4.2	Results	8-4
8.4.3	Assessment of Results	8-8
8.5	Terrestrial Fauna	8-10
8.5.1	Methodology	8-10
8.5.2	Results	8-10
8.5.3	Assessment of Results	8-16
8.6	Impacts	8-20
8.6.1	Construction Impacts	8-20
8.6.2	Operational Impacts	8-20
8.6.3	Impacts on Threatened Communities and Ecosystems	8-20
8.6.4	Impacts on Threatened Flora and Fauna	8-21
8.6.5	Impacts on Migratory Species	8-28
8.6.6	Impacts on Listed Marine Species	8-31
8.6.7	Impacts on Habitat Corridors	8-31

8.7	Mitigation Measures	8-31
8.7.1	Construction Impacts	8-32
8.7.2	Operational Impacts	8-32
8.7.3	Habitat Rehabilitation	8-32
8.7.4	Ongoing Monitoring of Flora and Fauna	8-33
8.8	Conclusions and Recommendations	8-33
9	Aquatic Ecology	9-1
9.1	Introduction	9-1
9.2	Method	9-1
9.3	Aquatic Environment	9-1
9.3.1	Locality Description	9-1
9.3.2	Site Descriptions	9-3
9.3.3	Project Site Mining Areas	9-3
9.3.4	Project Site Infrastructure Areas	9-5
9.4	Existing Environment	9-6
9.4.1	Habitat Description	9-6
9.4.2	Aquatic Flora	9-6
9.4.3	Fish	9-7
9.4.4	Macroinvertebrates	9-8
9.4.5	Turtles	9-12
9.4.6	Platypus	9-12
9.4.7	Summary	9-12
9.5	Potential Impacts	9-13
9.5.1	Impacts on Riparian Vegetation	9-13
9.5.2	Impacts on Maccrophytes	9-13
9.5.3	Impacts on Aquatic Fauna	9-14
9.6	Mitigation Measures for Aquatic Flora and Fauna	9-15
9.6.1	Construction	9-15
9.6.2	Operation	9-16
10	Air Quality	10-1
10.1	Introduction	10-1
10.2	Air Quality Guidelines	10-1
10.3	Existing Environment	10-2
10.3.1	Local Setting and Sensitive Receivers	10-2
10.3.2	Climate and Dispersion Meteorology	10-4
10.3.3	Existing Air Quality	10-6
10.4	Potential Impacts	10-8
10.4.1	Sources of Air Emissions	10-8
10.4.2	Emissions Estimation	10-8
10.4.3	Modelling Methodology	10-11
10.4.4	Modelling Results	10-11
10.4.5	Discussion	10-20

10.4.6	Mitigation Measures	10-20
10.5	Summary	10-21
11	Greenhouse Gases and Climate Change	11-1
11.1	Introduction	11-1
11.2	Background	11-1
11.2.1	Evidence and Causes of Climate Change	11-1
11.2.2	Greenhouse Gas Emissions	11-2
11.2.3	International Agreements	11-3
11.2.4	Government Policy	11-3
11.2.5	Greenhouse Policy of the Proponent	11-4
11.3	Emissions Methodology	11-4
11.4	Greenhouse Gas Emissions	11-6
11.5	Mitigation Measures	11-9
11.6	Climate Change Risk Assessment	11-10
12	Noise and Vibration	12-1
12.1	Introduction	12-1
12.2	Existing Noise Environment	12-1
12.2.1	Description of Sensitive Receivers	12-1
12.2.2	Background Noise Monitoring	12-3
12.3	Meteorological Influences	12-6
12.3.1	Meteorological Conditions During Noise Monitoring	12-6
12.3.2	Annual Meteorological Trends	12-7
12.4	Legislation and Project Guidelines	12-9
12.4.1	Overview	12-9
12.5	Noise Impact Assessment	12-13
12.5.1	Noise Modelling	12-14
12.5.2	Noise Sources	12-15
12.5.3	Predicted Noise Impacts from Modelling Results	12-20
12.6	Airblast Overpressure and Vibration Impact Assessment	12-25
12.6.1	Existing Vibrations and Airblast Overpressure	12-25
12.6.2	Assessment of Vibrations and Airblast Overpressure Impacts from the Project	12-26
12.7	Road Noise	12-28
12.8	Noise Impacts on Terrestrial Animals and Avifauna	12-28
12.9	Recommended Mitigation Measures	12-29
12.9.1	Mitigation of Noise Emissions	12-29
12.9.2	Mitigation of Vibration and Airblast Overpressure from Blasting	12-30
12.10	Conclusion	12-30
13.	Infrastructure and Traffic	13-1
13.1	Existing Environment	13-1
13.1.1	Existing Infrastructure and Facilities	13-1
13.1.2	Existing Traffic	13-2

13.2	Impacts and Mitigation Measures	13-4
13.2.1	Impacts of Construction Traffic	13-4
13.2.2	Traffic Impacts of the Operational Phase	13-12
14	Waste Management	14-1
14.1	Waste Management Regulations	14-1
14.1.1	Waste Definition	14-1
14.1.2	Waste Reporting	14-1
14.2	Waste Management Strategy	14-2
14.2.1	Environmental Value	14-2
14.2.2	Waste Management Procedure	14-2
14.2.3	Cleaner Production	14-3
14.2.4	Waste Tracking	14-4
14.2.5	Spill Containment and Remediation	14-4
14.2.6	Waste Monitoring	14-4
14.3	Waste Inventory, Characteristics and Management	14-5
14.3.1	Waste Characteristics	14-5
14.3.2	Construction Wastes	14-5
14.3.3	Operational Wastes	14-7
15	Cultural Heritage	15-1
15.1	Introduction	15-1
15.1.1	Legislation	15-1
15.1.2	Survey Areas	15-4
15.1.3	Methodology	15-6
15.1.4	State Database Search	15-6
15.2	Existing Values	15-11
15.2.1	Non-indigenous Cultural Heritage	15-11
15.2.2	Indigenous Cultural Heritage	15-12
15.3	Potential Impacts and Mitigation Measures	15-17
15.3.1	Non-indigenous Cultural Heritage	15-17
15.3.2	Indigenous Cultural Heritage	15-18
16	Community Consultation	16-1
16.1	Consultation Objectives	16-1
16.2	Stakeholder Identification	16-1
16.3	Consultation Strategies	16-2
16.3.1	Newsletter	16-3
16.3.2	Advertising and media releases	16-3
16.3.3	Fact sheets	16-5
16.3.4	Website	16-5
16.3.5	Static displays	16-5
16.3.6	Stakeholder consultation	16-6
16.3.7	Mobile displays	16-8

16.3.8	Feedback forms	16-10
16.3.9	Community Reference Group	16-10
16.4	Results	16-11
16.4.1	Stakeholder consultation	16-11
16.4.2	Mobile displays	16-13
16.4.3	Feedback forms	16-19
16.4.4	Community Reference Group	16-21
16.4.5	Property owner consultation	16-22
16.4.6	Community contact points	16-22
16.5	Conclusion	16-23
17	Social	17-1
17.1	Existing environment	17-1
17.1.1	Methodology	17-3
17.1.2	Population and Demographic Profile	17-5
17.1.3	Housing and Accommodation	17-18
17.1.4	Community Infrastructure and Services	17-23
17.1.5	Local Community Values and Lifestyles	17-31
17.1.6	Recreational, Leisure, Cultural and Sporting Facilities	17-31
17.1.7	Land Use and On Farm Activities On and Near the Project Site	17-32
17.1.8	Properties Directly Affected by the Project	17-32
17.2	Potential Social Impacts and Mitigation Measures	17-32
17.2.1	Impacts on the Demographic Profile	17-32
17.2.2	Impacts on Housing Demand and Supply	17-34
17.2.3	Ability to Participate in Regional and Local Employment and Training Opportunities	17-37
17.2.4	Impacts on the Economic Profile of the Region	17-39
17.2.5	Impacts on Local Enterprises	17-40
17.2.6	Property Values and Marketability	17-41
17.2.7	Recreation Facilities and Access	17-41
17.2.8	Impacts on Human Service Delivery	17-42
17.2.9	Impacts on Properties Directly and Indirectly Affected by the Project and the Local Area	17-43
17.2.10	Land Use and On farm activities On and Near the Project Site	17-45
17.2.11	Impacts on the Social Profile	17-45
17.2.12	Ability to Live in Accordance with Values and Priorities	17-47
17.2.13	Project Workforce and their Families	17-48
17.2.14	Cultural Profile	17-49
17.2.15	Access to Culturally Important Areas and Landscapes	17-49
17.2.16	Cumulative Impacts	17-49
17.2.17	Summary	17-50
18	Economy	18-1
18.1	Description of Environmental Values	18-1
18.1.1	Existing Economic Environment	18-1

18.2	Potential Impacts and Mitigation Measures	18-5
18.2.1	Methodology	18-5
18.2.2	Construction Phase	18-8
18.2.3	Operational Phase	18-9
18.2.4	Costs to Government	18-10
18.2.5	Short and long-term economic impacts	18-10
19	Health, Safety and Risk	19-1
19.1	Overview	19-1
19.2	Legislative Compliance	19-1
19.3	Project Health and Safety Policy	19-1
19.4	Dangerous Goods and Hazardous Substances	19-1
19.4.1	Construction Phase	19-2
19.4.2	Operational Phase	19-3
19.4.3	Concentration of Raw Materials in Operation Phase Storage Tanks	19-3
19.5	Project Risk Assessment	19-4
19.5.1	Method	19-4
19.5.2	Risk Analysis Criteria	19-5
19.5.3	Hazard Identification and Assessment	19-7
19.5.4	Risk Assessment – Conclusion	19-11
19.6	Construction and Operations Impacts and Controls	19-11
19.6.1	Emergency Response	19-11
19.6.2	Health Risks and Controls	19-12
19.6.3	Safety Risks and Controls	19-16
19.6.4	Security	19-20
19.6.5	Explosives	19-20
19.7	Health and Safety Management System	19-21
19.8	Future Risk Assessment	19-22
19.9	Monitoring	19-22
19.10	Emergency Planning	19-22
20	Cumulative Impacts	20-1
20.1	Introduction	20-1
20.2	Land Resources	20-2
20.3	Surface Water Resources	20-2
20.4	Groundwater	20-2
20.5	Terrestrial Ecology	20-3
20.6	Aquatic Ecology	20-3
20.7	Air Quality	20-4
20.8	Noise and Vibration	20-5
20.9	Traffic and Transport	20-5
20.10	Social	20-6
20.11	Economic	20-6



21	Draft Environmental Management Plan	21-1
	21.1 Introduction	21-1
22	References	22-1

Data Disclosure

Reasonable commercial and technical measures have been implemented in the creation and use of the mapping outputs in this report. The quality, content, accuracy or completeness of the Data has not been independently verified, nor is the publisher of this report responsible or liable for any costs, losses and/or damages suffered as a result of reliance on this mapping output.

The data comprised in this report is for use only on the Daunia EIS. Use of this data for any use other than for the project mentioned, is not allowed in any capacity. Users of this data should make themselves aware of the various Licensing Conditions associated with this data.

Volume 2 - Appendices

Appendix A – Terms of Reference

Appendix B – Terms of Reference Cross Reference Table

Appendix C – EPBC Matters

- C.1 – EPBC Matters Report
- C.2 – EPBC Referral

Appendix D – Study Team

Appendix E – BMA Corporate Documents

- E.1 – BHP Sustainable Development Policy
- E.2 – BMA Charter
- E.3 – BHP Billiton HSEC Management

Appendix F – Land Resources

- F.1 – 2008 Soil Survey
- F.2 – 2004 Soil Survey

Appendix G – Mineral Waste

Appendix H – Groundwater

Appendix I – Terrestrial Ecology

- I.1 – Flora Species Recorded within the Study Area
- I.2 – 2004 Flora and Fauna Survey Methods
- I.3 – Fauna of Conservation Significance

Appendix J – Aquatic Ecology

- J.1 – Field Data Sheets
- J.2 – Detailed Method and Site Description

Appendix K – Air Quality

- K.1 – Graphs of Climatic Data
- K.2 – Wind roses for Daunia (TAPM)

Appendix L – Greenhouse Gases and Climate Change

Appendix M – Noise and Vibration

Appendix N – Cultural Heritage

Appendix O – Community Engagement

- O.1 – Advisory Agencies
- O.2 – Individual and Group Stakeholders
- O.3 – Consultation Materials
- O.4 – Responses to Feedback Forms

Appendix P – Draft Environmental Management Plan

Figures

Figure 1-1	Project Location	1-3
Figure 1-2	Location of the BMA Bowen Basin Coal Growth Project Elements	1-6
Figure 2-1	Project Costs and Benefits	2-3
Figure 3-1	Project Layout	3-3
Figure 3-2	Project Access Roads and Worker Accommodation	3-4
Figure 3-3	Daunia Coal Deposit Typical Stratigraphic Section	3-6
Figure 3-4	Mining and Other Tenure	3-8
Figure 3-5	Proposed Mining Sequence Overview	3-12
Figure 3-6	Proposed Mining Sequence – Initial Box Cut Construction	3-13
Figure 3-7	Proposed Mining Sequence – Year 5	3-14
Figure 3-8	Proposed Mining Sequence – Year 10	3-15
Figure 3-9	Proposed Mining Sequence – Year 15	3-16
Figure 3-10	Proposed Mining Sequence – Year 20	3-17
Figure 3-11	Proposed Mining Sequence - Final Landform	3-18
Figure 3-12	Mine Infrastructure	3-22
Figure 3-13	CHPP Process Schematic	3-23
Figure 3-14	Water Management Schematic	3-29
Figure 4-1	Geology of the Bowen Basin	4-3
Figure 4-2	Daunia Geological Units	4-4
Figure 4-3	Daunia Project Soil Sampling Sites	4-7
Figure 4-4	Daunia Project Soil Distribution	4-10
Figure 4-5	Daunia Pre-mine Land Suitability – Cropping	4-21
Figure 4-6	Daunia Pre-mine Land Suitability – Grazing	4-22
Figure 4-7	Good Quality Agricultural Land within Project Site	4-24
Figure 4-8	Daunia Post-mine Land Suitability – Grazing	4-27
Figure 4-9	Daunia Post-mine Land Suitability – Cropping	4-28
Figure 4-10	Mine and Land Tenure	4-39
Figure 4-11	Location of Nearest Residences	4-42
Figure 4-12	View towards the Project Site from the Olive Downs Residence	4-44
Figure 4-13	Anticipated view towards the Project Site from the Olive Downs Residence at year 21	4-44
Figure 4-14	View towards the Project Site from the Daunia Residence	4-45
Figure 4-15	View towards the Project Site from the Mavis Downs Residence	4-45
Figure 4-16	View towards the Project Site from the Nev Farley Property (Natural landform on left horizon)	4-46
Figure 4-17	View towards the Project Site from the Moorvale Residence	4-46

Figure 4-18	View towards the Project Site from the Wotonga Residence on the Peak Downs Highway The natural hill in the middle distance prevents views of the Project Site	4-47
Figure 4-19	West view towards the Millennium and Poitrel Mine Sites	4-48
Figure 4-20	View from the Railway Access Road towards the Project Site	4-49
Figure 4-21	Anticipated view from the Railway Access Road towards the Project Site at year 21	4-49
Figure 5-1	Daunia Coal Deposit Typical Stratigraphic Section	5-4
Figure 5-2	Geochemical Sampling Sites	5-5
Figure 6-1	Surface Water Resources	6-2
Figure 6-2	Surface Water Drainage	6-3
Figure 6-3	Average Monthly Flows at Deverill Stream Gauge (NRW, 2007)	6-5
Figure 6-4	Hydrologic Model Calibration 1988 Event at Deverill Gauge (130410A)	6-6
Figure 6-5	100 year ARI Event - Existing Case Inundation Map Mining Areas	6-9
Figure 6-6	100 year ARI Event – Existing Case Inundation Map Infrastructure Area	6-10
Figure 6-7	100 year ARI Event – Developed Case Inundation Afflux Map Infrastructure Area	6-12
Figure 6-8	Water Balance Model Schematisation	6-16
Figure 6-9	Process Water Dam Storage Volume	6-18
Figure 6-10	Cumulative Number of Days Dust Suppression Demand Not Fully Satisfied	6-19
Figure 6-11	Releases from the Project Site	6-20
Figure 6-12	Typical drainage path section on the Project Site mining areas	6-23
Figure 6-13	Water Quality Sample Sites	6-26
Figure 6-14	Temperature results for Sites 1 – 9	6-27
Figure 6-15	pH results for Sites 1 – 9 (Red dotted line indicates QWQGs upper exceedance value)	6-27
Figure 6-16	Conductivity results for Site 1 – 9 (Red dotted line indicates upper QWQG exceedance value)	6-28
Figure 6-17	Dissolved oxygen results for Sites 1 – 9	6-28
Figure 6-18	DO (ppm) comparison with DO (% saturation) for Sites 1 – 9 (Red dotted line indicates QWQG exceedance value for % saturation)	6-29
Figure 6-19	Turbidity results for Sites 1 – 9 (Red dotted line indicates upper QWQG exceedance value)	6-29
Figure 7-1	Geology and Groundwater Bores in the Vicinity of the Project Site	7-3
Figure 7-2	Cross Section through Poitrel Mining Area	7-6
Figure 7-3	Hydrogeological Conceptual Model	7-13
Figure 7-4	Groundwater Inflow rates into the Daunia Mine Pit at Years 5, 10, 15 and 20 years	7-15
Figure 7-5	Groundwater Drawdown – Year 5 of Production	7-17
Figure 7-6	Groundwater Drawdown – Year 10 of Production	7-18
Figure 7-7	Groundwater Drawdown – Year 15 of Production	7-19
Figure 7-8	Groundwater Drawdown – Year 20 of Production	7-20
Figure 7-9	Riparian Vegetation Situated Along the Banks of the Isaac River	7-23

Figure 8-1	Vegetation Communities	8-6
Figure 8-2	Impact on Regional Ecosystems	8-23
Figure 9-1	Water Quality and Aquatic Flora and Fauna Sample Sites	9-2
Figure 9-3	Site 2 – Daunia East Upstream – Farm Dam	9-4
Figure 9-4	Site 3 – Daunia East – Middle	9-4
Figure 9-5	Site 4 – Daunia Upstream	9-4
Figure 9-6	Site 5 – Daunia – Farm Dam	9-4
Figure 9-7	Site 6 Daunia Downstream – Dry Site	9-4
Figure 9-8	Site 7 Daunia East Off Lease	9-4
Figure 9-9	Site 8 Daunia - Lower	9-5
Figure 9-10	Site 1 – Daunia Infrastructure Upstream	9-5
Figure 9-11	Site 9 Daunia Infrastructure - Downstream	9-5
Figure 10-1	Location of sensitive receivers	10-3
Figure 10-2	All Hours Windrose for Daunia (generated with TAPM)	10-5
Figure 10-3	PM10 concentrations (24 hour average) recorded at Olive Downs and Winchester Downs	10-6
Figure 10-4	Contour plot of maximum PM ₁₀ concentrations ($\mu\text{g}/\text{m}^3$) (24 hour average)	10-13
Figure 10-5	Contour plot of PM ₁₀ concentrations ($\mu\text{g}/\text{m}^3$) (annual average)	10-15
Figure 10-6	Contour plot of TSP concentrations ($\mu\text{g}/\text{m}^3$) (annual average)	10-17
Figure 10-7	Contour plot of dust deposition rates ($\text{mg}/\text{m}^2/\text{day}$) (annual average)	10-19
Figure 11-1	Breakdown of Global Anthropogenic Greenhouse Gas Emissions	11-2
Figure 11-2	Breakdown of Australia's Greenhouse Gas Emissions by State	11-3
Figure 11-3	Greenhouse gas emissions (in t CO ₂ -e) associated with diesel, electricity and explosives usage and fugitive methane emissions for each year of operation on annual and cumulative basis	11-8
Figure 12-1	Location of Noise Sensitive Receivers	12-2
Figure 12-2	All Hours Windrose for Daunia (TAPM)	12-8
Figure 12-3	Frequency of Different Stability Classes during Winter Nights (6pm to 7am)	12-9
Figure 12-4	Location of Construction Noise Sources and Sensitive Receivers	12-18
Figure 12-5	3D Image of Land Contours Used for Modelling of Cumulative Impacts in Year 20	12-19
Figure 12-6	Construction Stage Noise Levels for Worst Case Meteorological Conditions	12-21
Figure 12-7	Year 20 Noise Levels for Worst Case Meteorological Conditions	12-23
Figure 12-8	Graph of Constraint Levels against Charge Masses	12-27
Figure 12-9	Estimated Vibration Levels	12-28
Figure 13-1	Regional Road and Rail Networks	13-3
Figure 13-2	School Bus Routes	13-5
Figure 13-3	Project Site Location and Access	13-6

Figure 15-1	Cultural Heritage Survey Areas	15-5
Figure 15-2	Cultural Heritage Clearance Area 1	15-8
Figure 15-3	Cultural Heritage Clearance Area 2	15-9
Figure 15-4	Cultural Heritage Clearance Area 3	15-10
Figure 15-5	Contextual view of broken headstone	15-11
Figure 15-6	Grinding pebble and point (ID.1)	15-14
Figure 15-7	Pebble hammerstone with pitting (ID.11)	15-14
Figure 15-8	Single platform silcrete core (ID. 23)	15-14
Figure 15-9	Petrified wood core with 3 platforms (ID.13)	15-14
Figure 16-1	Mobile display	16-9
Figure 17-1	Local and Regional Study Areas	17-2
Figure 17-3	Population by Age and Sex in the Local Study Area, 2006	17-9
Figure 17-4	Housing prices and sales– Moranbah 1990 - 2006	17-21
Figure 17-5	Median Rental Prices – Moranbah 2001 – 2006	17-22
Figure 17-6	New Dwelling Activity Isaac and Mackay Region Councils between 2002 and 2008	17-23
Figure 17-7	Daunia Project Construction Workforce	17-33
Figure 19-1	Location of Sensitive Receivers	19-13

Tables

Table 1-1	Key Elements of the BMA BBCGP	1-5
Table 1-2	Key Approvals Required for the Project	1-12
Table 1-3	State Planning Policies	1-20
Table 1-4	WHAM Goals and Responses	1-22
Table 3-1	Project Coal - Indicative Quality Characteristics	3-5
Table 3-2	Daunia Project Land Tenure	3-7
Table 3-3	Indicative Mine Equipment	3-19
Table 3-4	Coal Handling and Preparation Plant – Throughput of Project Coal	3-21
Table 3-5	Construction Phase Material Quantities	3-31
Table 3-6	Indicative Construction Equipment	3-31
Table 4-1	Soil Mapping Units and Sampling Site Details	4-11
Table 4-2	Numbers of Sampling Sites and Sampling Techniques	4-12
Table 4-3	PAWC Criteria for Estimating Cropping Limitations	4-14
Table 4-4	Estimated PAWC and Limitation Levels for Cropping and Grazing	4-15
Table 4-5	Rainfed Cropping Land Suitability	4-16
Table 4-6	Land Suitability for Cattle Grazing – Effects of PAWC (Shields and Williams 1991)	4-18
Table 4-7	Land Suitability for Cattle Grazing – Effects of Slopes	4-18
Table 4-8	Grazing Land Suitability	4-19
Table 4-9	Land Suitability Classes – Pre Mining	4-20
Table 4-10	Pre and Post-mine Land Suitability – Cattle Grazing	4-26
Table 4-11	Erosion Causes and Control	4-30
Table 4-12	Indicative Rehabilitation Schedule	4-33
Table 4-13	Typical Soil Stripping Depth	4-35
Table 4-14	Visibility of the Project Spoil Dumps from Nearby Residences	4-43
Table 4-15	Summary of Scenic Values Mitigation Measures	4-51
Table 6-1	Hydrological Characteristics of Waterways and Drainage Paths	6-1
Table 6-2	DNRW Gauging Station Details	6-4
Table 6-3	Isaac River Largest Recorded Flood Flows at Deverill	6-4
Table 6-4	Isaac River RAFTS Model Parameters	6-5
Table 6-5	Project Site Model Parameters	6-7
Table 6-6	Details of Existing Surface Water Extraction Licences	6-8
Table 6-7	Rainfall Gauge for Stochastic Rainfall Generation	6-15
Table 6-8	Conceptual Soil Storage Capacity Parameters	6-15
Table 6-9	Water Balance Modelling Inputs and Demands	6-17
Table 6-10	Summary of Mine Water Management System Storages	6-17

Table 6-11	Reliability Demand for Site	6-18
Table 6-12	QWQG Guidelines (2006)	6-21
Table 6-13	EC values for the Fitzroy North zone as listed in the QWQG 2006	6-21
Table 6-14	Water Quality data from New Chum Creek (source BMA - Poitrel Mine)	6-22
Table 6-15	Water Quality results from the field investigation	6-24
Table 6-16	Water Quality Summary for the Deverill Gauging station	6-30
Table 6-17	Water quality data for the Isaac River	6-31
Table 7-1	Summary of Groundwater Related Studies, Daunia and Poitrel Prospects and Surrounds	7-2
Table 7-2	Construction Details of Groundwater Monitoring Bores	7-5
Table 7-3	Groundwater Level Records of Monitoring Bores	7-6
Table 7-4	Groundwater Analytical Results with Reference to Adopted Guidelines	7-9
Table 7-5	Information on Neighbouring Boreholes	7-11
Table 7-6	Maximum depths of coal mines assumed in the groundwater model	7-14
Table 7-7	Summary of Groundwater Inflow rates into the Daunia Mine Pit	7-15
Table 7-8	Estimated Groundwater Level Drawdown in Neighbouring Bores Screened in the Blackwater Group and Alluvial aquifer at Year 20	7-22
Table 8-1	Impact of the Project on Matters of National Environmental Significance	8-3
Table 8-2	Mapped Regional Ecosystem on the Project Site	8-5
Table 8-3	Observed Regional Ecosystems on the Project Site	8-7
Table 8-4	Declared weed species identified on the Project Site	8-9
Table 8-5	Summary of faunal diversity recorded in the Study Area	8-13
Table 8-6	Results of the bat trapping survey	8-14
Table 8-7	Results of the bat call detection surveys	8-14
Table 8-8	Fauna of conservation significance recorded from the Study Area	8-16
Table 8-9	Listed migratory species	8-18
Table 8-10	Likelihood of occurrence of threatened species	8-24
Table 8-11	EPBC Act assessment of significance on listed threatened species	8-25
Table 8-12	EPBC Act assessment of significance on endangered ecological communities	8-28
Table 8-13	EPBC Act assessment of significance on migratory species	8-29
Table 9-1	Mining Area Site Locations	9-3
Table 9-2	Infrastructure Area Site Locations	9-5
Table 9-3	Combined list of macrophytes that were recorded at the nine assessed sites	9-7
Table 9-4	Presence/absence of fish within the Project Site and neighbouring areas	9-8
Table 9-5	Presence/absence data and average SIGNAL2 score for the eight sites following Chessman (2003a, b)	9-8
Table 9-6	Results of the AusRivAS model – Observed/Expected Results	9-10
Table 9-7	Bandwidths for QLD regional – Coastal – Autumn – Pool AusRivAS model	9-11

Table 9-8	Macroinvertebrates caught in baited traps.	9-12
Table 10-1	Air Quality Goals for the Project	10-2
Table 10-2	Climatic Summary for Moranbah (BoM site 034038)	10-4
Table 10-3	Dust deposition rates (mg/m ² /day) at Olive Downs and Winchester Downs	10-7
Table 10-4	Adopted background particulate levels	10-7
Table 10-5	Mining Rates and Haul Distances for Five Operating Scenarios	10-8
Table 10-6	Mine information for year 20 operations of the Project	10-9
Table 10-7	Summary of Dust Emissions for Mining Operations in Year 20	10-10
Table 10-8	Predicted maximum PM ₁₀ concentrations (24 hour average) at nearest residences	10-12
Table 10-9	Predicted PM ₁₀ concentrations (annual average) at sensitive receivers	10-14
Table 10-10	Predicted TSP concentrations (annual average) at sensitive receivers	10-16
Table 10-11	Predicted dust deposition rate (annual average) at sensitive receivers	10-18
Table 11-1	Greenhouse Gas Emission Factors	11-5
Table 11-2	Scope 1 and 2 Greenhouse Gas Emissions from the Daunia Project	11-6
Table 11-3	Scope 3 Greenhouse Gas Emissions from the Daunia Project	11-7
Table 11-4	Change in climate for South-eastern Queensland by 2030, relative to 1990	11-10
Table 11-5	Potential Impacts of Climate Change Scenarios on the Project and Proposed Mitigation Measures	11-11
Table 12-1	Olive Downs Homestead Monitoring Details and Results	12-3
Table 12-2	Daunia Station Homestead Monitoring Details and Results	12-4
Table 12-3	Mavis Downs Homestead Monitoring Details and Results	12-5
Table 12-4	Summary of Background Monitoring between 1996 and 2007	12-6
Table 12-5	Summary of Background Monitoring 2008	12-6
Table 12-6	Recommended Outdoor Background Noise Planning Levels	12-10
Table 12-7	Maximum Values of Planning Noise Levels for Proposed Noise Sources	12-11
Table 12-8	Planning Noise Levels for the Daunia Coal Mine Project	12-13
Table 12-9	Airblast overpressure and vibration limits in sensitive places (EPA, 2006)	12-13
Table 12-10	Sound Power Levels of Noise Sources	12-14
Table 12-11	Equipment List for Construction Works	12-15
Table 12-12	Daunia Mine Equipment List	12-16
Table 12-13	Poitrel Mine Equipment List	12-16
Table 12-14	Summary of Different Scenarios Modelled	12-17
Table 12-15	Predicted Construction Noise levels	12-20
Table 12-16	Predicted Operational Noise levels with Neutral Meteorological Conditions	12-22
Table 12-17	Predicted Operational Noise levels with Adverse Wind Conditions and Temperature Inversion	12-22
Table 12-18	Recommended Indoor Limits for Non-tonal Low Frequency Noise for a Dwelling	12-24

Table 12-19	Summary of Predicted Low Frequency Noise Levels at Sensitive Receivers	12-25
Table 13-1	State-Controlled Roads Classification and Multi-Combination Vehicle Permits	13-1
Table 13-2	2007 (Actual) Traffic Volumes	13-2
Table 13-3	Estimated Daily Vehicle Trips Generated During Project Construction (vpd)	13-9
Table 13-4	Construction Stage Traffic Impact	13-10
Table 13-5	Estimated Project Vehicle Trips Generated Per day During Project Operation	13-14
Table 13-6	Operational Stage Traffic Impact	13-15
Table 14-1	Waste Management: Construction Phase	14-5
Table 14-2	Mining Waste	14-7
Table 14-3	Waste Management: Operation Phase	14-7
Table 15-1	Location of Artefact Scatters found in DNRW Database Search	15-7
Table 15-2	Stone artefacts recorded in Project Site by material and type (Hatte 2008)	15-13
Table 15-3	List of vegetation species in the region with known traditional uses.	15-17
Table 16-1	Mobile display locations, times and attendance	16-10
Table 16-2	Mobile display responses	16-14
Table 16-3	Community responses to local values	16-19
Table 16-4	Community responses to project issues	16-20
Table 16-5	Response by contact method	16-22
Table 16-6	Key issues and number of responses	16-23
Table 17-1	Resident Population by sex for the Local and Regional Study Areas, 2006	17-6
Table 17-2	Non-Resident Population by sex for the Local Study Area, 2006	17-6
Table 17-4	Average Annual Population Change for the Regional Study Area, 2002-2007	17-7
Table 17-5	Usual Place of Residence 5 Years Ago in the Local Study Area, Isaac and Mackay Regional Councils, and Queensland, 2006	17-7
Table 17-6	Indigenous status for the Local Study Area, Isaac and Mackay Regional Councils, and Queensland, 2006	17-8
Table 17-7	Population by age in Moranbah, 2001-2006	17-10
Table 17-8	Marital status for Local Study Area, Isaac and Mackay Regional Councils, and Queensland, 2006	17-10
Table 17-9	Family Structure for Local Study Area, Isaac and Mackay Regional Councils, and Queensland, 2006	17-11
Table 17-10	Dwelling type in the Local Study Area, Isaac and Mackay Regional Councils, and Queensland, 2006	17-12
Table 17-11	Dwelling and tenure types in the Local Study Area, 2006	17-12
Table 17-12	Labour Force Status for the Local Study Area, Isaac and Mackay Regional Councils, and Queensland, 2006	17-13
Table 17-13	Employment by industry category in the Local Study Area, Isaac and Mackay Regional Councils, and Queensland, 2006	17-14



Table 17-14	Occupation by sex in the Local Study Area, Isaac and Mackay Regional Councils, and Queensland, 2006	17-15
Table 17-15	Weekly individual income in the Local Study Area, Isaac and Mackay Regional Councils, and Queensland for persons aged 15 years and over, 2006	17-16
Table 17-16	Highest post-secondary educational qualification held – Local Study Area, Isaac and Mackay Region Councils, and Queensland, 2006	17-16
Table 17-17	Highest level of schooling completed in the Local Study Area, Isaac and Mackay Regional Councils and Queensland, 2006	17-17
Table 17-18	Moranbah Hospital Services	17-26
Table 17-19	Recreational and Sporting Facilities, Moranbah	17-31
Table 18-1	Annual economic impact of Project construction on the Mackay Region and Australia	18-8
Table 18-2	Annual economic impact of Project operation on the Mackay Region and Australia	18-9
Table 19-1	Legislative Compliance	19-1
Table 19-2	Indicative List of Dangerous Goods and Hazardous Substances	19-2
Table 19-3	Indicative List of Dangerous Goods and Hazardous Substances – Construction	19-2
Table 19-4	Indicative List of Dangerous Goods and Hazardous Substances - Operations Phase	19-3
Table 19-5	Likelihood of Occurrence for Hazardous Incidents	19-6
Table 19-6	Consequence Classes for Public Safety and Environmental Losses	19-6
Table 19-7	Risk Assessment Matrix	19-7
Table 19-8	Risk Assessment Table – Construction Phase	19-7
Table 19-9	Risk Assessment Table – Operations Phase	19-9
Table 19-10	Summary of Risks to Public Health	19-12
Table 19-11	Emergency Plan Elements for Mine-Site Related Emergencies	19-23
Table 20-1	Summary of Cumulative Impacts of the BMA Bowen Basin Coal Growth Project	20-7