

Contents

1.	Introduction	1-1
1.1	Purpose of the EIS	1-1
1.2	Proposal	1-1
1.3	Background	1-1
1.4	The Proponent	1-3
1.5	Description of the Project	1-4
1.6.	Legislative Framework and Environmental Approval Process	1-5
1.6.1	Introduction	1-5
1.6.2	Northern Territory Environmental Assessment Process	1-6
1.6.3	Commonwealth of Australia Environmental Assessment Process	1-6
1.7	Relevant Legislation	1-7
1.7.1	Introduction	1-7
1.7.2	Northern Territory Legislation & Licence Requirements	1-7
1.7.3	Commonwealth of Australia Legislation & Licence Requirements	1-7
1.7.4	International Treaties and Obligations	1-7
1.8	Land Use Planning	1-12
1.9	EIS Scope and Structure	1-12
2.	Objectives and Benefits of the Proposed Project	2-1
2.1	Socio-Economic Objectives & Impacts	2-1
2.1.1	Benefits to the Local Workforce & Economy	2-1
2.1.2	Benefits to Australia	2-1
2.1.3	Benefits to East Timor	2-2
2.2	Meeting Market Demand	2-3
2.3	Impacts on Local Economic Activities	2-3
2.3.1	Commercial Fisheries	2-3
2.3.2	Commercial Shipping	2-4
2.3.3	Other Activities	2-4
2.4	Local, Regional and Global Environmental Objectives	2-4
2.4.1	Environmental Policy Objectives	2-4
2.4.2	Occupational Health and Safety Objectives	2-5
2.4.3	National Greenhouse Strategy Implications	2-5
3.	Description of Design & Construction Phases	3-1
3.1	Overview	3-1
3.2	Gas Field Development Facilities	3-2
3.2.1	Location	3-2
3.2.2	Site Selection Criteria	3-2
3.2.3	Seabed Envelope & Sea Area Usage	3-3
3.2.4	Design Standards and Limitations	3-3
3.2.5	Construction Location & Materials	3-5
3.2.6	Wellhead Platform	3-5
3.2.7	Drilling Program	3-6
3.2.8	Production Compression Utilities Quarters (PCUQ) Platform	3-8
3.2.9	FSO	3-9
3.2.10	Mooring Facilities	3-9
3.2.11	Future Subsea Facilities	3-9
3.2.12	Intrafield Flowlines	3-10
3.2.13	Waste Management Practices	3-11
3.3	Subsea Pipeline	3-11
3.3.1	Route Selection Criteria	3-11
3.3.2	Description of Preferred Alignment and Implications	3-12

3.3.3	Sea Area usage	3-13
3.3.4	Infrastructure Requirements	3-13
3.3.5	Pipeline Specifications	3-13
3.3.6	Construction and Installation	3-15
3.3.7	Waste Minimisation and Management	3-17
3.4	Pipeline Testing and Commissioning	3-17
3.5	Tie-In Locations	3-18
3.6	Gas Field Development – FLNG Scenario	3-18
4.	Description of Operation and Decommissioning Phases.....	4-1
4.1	Offshore Field Operation - O LNG Scenario	4-1
4.1.1	Project and Reservoir Lifespans.....	4-1
4.1.2	Processes	4-1
4.1.3	Infrastructure and Utilities	4-2
4.1.4	Dangerous Goods/Chemicals.....	4-3
4.1.5	NPI Substances	4-4
4.1.6	Maintenance & Upgrade Requirements	4-4
4.1.7	Offshore Workforce	4-5
4.2	Export Pipeline	4-5
4.3	Sunrise Gas Field Operation - FLNG Scenario	4-6
4.4	Decommissioning	4-6
4.4.1	Offshore	4-6
4.4.2	Subsea Export Pipeline	4-7
5.	Alternatives.....	5-1
5.1	Introduction	5-1
5.2	No Development Option	5-1
5.3	Alternative Development Sites and Pipeline Routes	5-2
5.3.1	LNG Onshore/Offshore.....	5-2
5.3.2	Subsea Pipeline Routes	5-2
5.3.3	Alternative Platform Locations.....	5-3
5.4	Alternative Facilities.....	5-4
5.4.1	Drilling Rigs.....	5-4
5.4.2	Offshore Processing Facilities	5-5
5.5	Alternative Environmental Process Options	5-5
5.6	Greenhouse Emissions and Environmental Implications	5-6
6.	Existing Environment	6-1
6.1	Timor Sea Climate.....	6-1
6.2	Geology and Soils	6-1
6.2.1	Regional Geology and Soils	6-1
6.2.2	Subsea Pipeline	6-2
6.3	Seismicity.....	6-3
6.4	Bathymetry.....	6-5
6.4.1	Sunrise Gas Field	6-5
6.4.2	Subsea Pipeline	6-5
6.5	Hydrodynamics and Oceanography	6-5
6.5.1	Sunrise Gas Field	6-5
6.5.2	Waves	6-5
6.5.3	Tides	6-6
6.5.4	Currents	6-6
6.5.5	Water Temperatures.....	6-6
6.6	Major Offshore Habitats, Communities and Species	6-7
6.6.1	Sunrise Gas Field	6-7
6.6.2	Subsea Gas Pipeline Route	6-9

6.7	Protected Fauna	6-9
6.8	Ecological Considerations and Conservation Status	6-10
6.9	International Obligations for the Protection of the Marine Environment.....	6-11
6.10	Heritage Conservation & Aboriginal Sacred Sites.....	6-11
6.11	National Parks & Conservation Reserves	6-11
7.	Socio-Economic Environment	7-1
7.1	Local and Regional Economic Structure	7-1
7.2	Demographic Characteristics	7-3
7.3	Current Employment Levels and Characteristics	7-3
7.4	Community Services and Facilities	7-4
	7.4.1 Education.....	7-4
	7.4.2 Health Services.....	7-5
7.5	Housing and Accommodation	7-5
7.6	Transport Network and Usage	7-6
	7.6.1 Port and Shipping Facilities	7-6
	7.6.2 Air Transport Facilities.....	7-6
	7.6.3 Road Network.....	7-7
7.7	Mineral and Energy Exploration	7-7
7.8	Recreational Resources and Activities.....	7-8
7.9	Tourism.....	7-9
7.10	Commercial Fisheries Activities	7-9
8.	Environmental Impacts & Mitigation Measures	8-1
8.1	Introduction.....	8-1
	8.1.1 Impacts	8-1
	8.1.2 Mitigation Measures	8-1
	8.1.3 Commitments	8-2
8.2	Impacts during Drilling and Associated Activities.....	8-3
	8.2.1 Wellhead Platform Installation.....	8-5
	8.2.2 Drilling of Platform and Subsea Wells	8-7
8.3	Mitigation Measures for Drilling and Associated Activities	8-19
	8.3.1 Drilling Rig	8-19
	8.3.2 Drilling Muds.....	8-19
	8.3.3 Crew Induction.....	8-19
	8.3.4 Wildlife Protection.....	8-19
	8.3.5 Spills Prevention	8-19
	8.3.6 Chemicals and Hazardous Materials.....	8-20
	8.3.7 Emergency Response	8-20
	8.3.8 Waste Management	8-20
	8.3.9 Discharges to Sea	8-20
	8.3.10 Air Emissions and Energy Use	8-21
	8.3.11 Solid and Hazardous Waste.....	8-21
	8.3.12 Physical Presence of Rig.....	8-21
	8.3.13 Commitments	8-21
8.4	Impacts During Installation and Construction.....	8-22
	8.4.1 Subsea Facilities.....	8-22
	8.4.2 PCUQ Platform and FSO	8-25
	8.4.3 Subsea Pipeline Construction	8-26
8.5	Mitigation Measures During Installation and Construction.....	8-28
	8.5.1 General Measures	8-28
	8.5.2 Marine Support Vessels	8-28
	8.5.3 Commitments	8-29
8.6	Impacts During Commissioning and Operation.....	8-29
	8.6.1 Wellhead and PCUQ Platforms including Subsea Facilities	8-29

8.6.2	FSO and Shuttle Vessels	8-40
8.6.3	Subsea Pipeline	8-43
8.7	Mitigation Measures for Commissioning and Operation	8-44
8.7.1	Commissioning	8-44
8.7.2	Operation	8-44
8.7.3	Commitments	8-49
8.8	Impacts During Decommissioning	8-49
8.8.1	Wellhead Platform, Wells and Associated Subsea Facilities	8-50
8.8.2	PCUQ Platform and FSO	8-53
8.8.3	Subsea Pipeline	8-54
8.9	Mitigation Measures for Decommissioning Phase	8-55
8.9.1	General	8-55
8.9.2	Commitments	8-56
8.10	Preliminary Hazard Analysis	8-56
9.	Environmental Management.....	9-1
9.1	Environmental Management Strategy	9-1
9.2	Environmental Management Plans	9-1
9.2.1	Structure and Scope	9-2
9.3	Monitoring	9-5
9.4	Management Commitments	9-5
10.	Public Involvement and Consultation	10-1
11.	References	11-1
12.	Glossary	12-1
12.1	Glossary of Abbreviations	12-1
12.2	Glossary of Units:	12-2
12.3	Glossary of Terms:	12-2
13.	Study Team & Acknowledgments	13-1

List of Appendices

Appendix A: Guidelines for an Environmental Impact Statement on the Proposed Sunrise Gas Project Department Infrastructure Planning Environment & Environment Australia (August 2000)

Appendix B: Woodside’s Environmental Policy
Woodside’s Health and Safety Policy
Woodside’s Waste Minimisation & Disposal Policy

List of Figures

- Figure ES1 Sunrise Gas Field Location & Surrounding Gas Fields
- Figure ES2a Scope of EIS Scenario 1: O LNG
- Figure ES2b Scope of EIS Scenario 2: FLNG
- Figure ES3 Overview of Offshore Process Systems
- Figure 1-1 Sunrise Gas Field Location & Surrounding Gas Fields
- Figure 1-2 Woodside's Existing Offshore Assets for Western Australia and Northern Territory
- Figure 1-3 Indicative Project Schedule
- Figure 1-4 Northern Territory Assessment and Commonwealth Assessment Process
- Figure 2-1 Australia's Major Pipeline Systems
- Figure 2-2 Northern Australia Permits/Managed Fisheries
- Figure 3-1a Scope of EIS Scenario 1: O LNG
- Figure 3-1b Scope of EIS Scenario 2: FLNG
- Figure 3-2 General Gas Field Layout
- Figure 3-3 Transport of Jack Up on Barge
- Figure 3-4 Sunrise Generic Lithology vs Depth Plot
- Figure 3-5 Schematic of Cuttings & Fluids Re-Injection
- Figure 3-6 Bucket Foundation for PCUQ Facility
- Figure 3-7 Typical Lay Barge for Subsea Pipeline Installation
- Figure 4-1 Overview of Offshore Process Systems
- Figure 5-1 Subsea Preferred and Alternative Pipeline Route Options
- Figure 5-2 PCUQ Facility (Jackup)
- Figure 5-3 Full Fuel Cycle Emission Factors CO₂ Equivalent
- Figure 5-4 Average Carbon Dioxide Emission Factors
- Figure 6-1 Wind Roses for the Sunrise Gas Field
- Figure 6-2 Cyclonic Activity in the Timor Sea Region (1970-2001)
- Figure 6-3 Site Investigation Zones
- Figure 6-4 Earthquake History in the Sunrise Gas Field Area since 1900
- Figure 6-5 Bathymetry of the Sunrise Gas Field and Pipeline Route
- Figure 6-6 Wave Heights in the Vicinity of the Sunrise Gas Field
- Figure 6-7 Current Rose for the Sunrise Gas Field at 20 m Below the Sea Surface
- Figure 6-8 Current Rose for the Sunrise Gas Field at 100 m Below the Sea Surface
- Figure 6-9 Current Rose for the Sunrise Gas Field at 260 m Below the Sea Surface
- Figure 6-10 Sunrise Banks Location
- Figure 6-11 Pipeline Environmental Survey Sites
- Figure 6-12 Diagrammatic Representation of Sampling Sites -at Sunrise Platform Location
- Figure 8-1 Predicted Cumulative Loads of Cuttings During a High-energy Winter Period.
- Figure 8-2 Predicted Thickness of Cuttings During a high-energy Winter Period
- Figure 8-3 Predicted Cumulative Loads of Cuttings During a High-energy Summer Period
- Figure 8-4 Predicted Thickness of Cuttings During a High-energy Summer Period
- Figure 8-5 Predicted Cumulative Loads During a Low-energy Calm Period
- Figure 8-6 Predicted Bottom Thickness During a Low-energy Calm Period
- Figure 8-7 Probability of Surface Exposure to Diesel During Summer Conditions
- Figure 8-8 Predicted Surface Diesel Concentration During Summer Conditions
- Figure 8-9 Probability of Surface Diesel Exposure During Winter Conditions
- Figure 8-10 Predicted Surface Diesel Concentration During Winter Conditions
- Figure 8-11 Probability of Surface Diesel Exposure During Transitional Season Conditions
- Figure 8-12 Predicted Surface Diesel Concentration During Transitional Conditions
- Figure 8-13 Probability of Surface Condensate Exposure During Summer Conditions
- Figure 8-14 Predicted Surface Condensate Concentration During Summer Conditions
- Figure 8-15 Probability of Surface Condensate Exposure During Winter Conditions
- Figure 8-16 Predicted Surface Condensate Concentration During Winter Conditions
- Figure 8-17 Probability of Exposure to Condensate Spill during Transitional Season Conditions
- Figure 8-18 Predicted Surface Condensate Concentration During Transitional Conditions

List of Tables

Table ES1a	Summary of Potential Environmental Impacts for Drilling and Associated Activities
Table ES1b	Summary of Potential Environmental Impacts for Installation and Construction
Table ES1c	Summary of Potential Environmental Impacts for Commissioning and Operation
Table ES1d	Summary of Potential Environmental Impacts for Decommissioning
Table ES2a	Summary of Mitigation Measures for Drilling and Associated Activities
Table ES2b	Summary of Mitigation Measures during Installation and Construction
Table ES2c	Summary of Mitigation Measures for Commissioning and Operation
Table ES2d	Summary of Mitigation Measures for Decommissioning Phase
Table 1-1	Northern Territory Licences and Permits
Table 1-2	Commonwealth Legislation and Licences
Table 3-1	Key Characteristics of the Sunrise Gas Project
Table 3-2	Estimated Tidal Levels
Table 3-3	Construction Material, Types, Sources and Quantities
Table 3-4	Typical Profile of a Seven Kilometre Wellhead Platform Well
Table 3-5	Sunrise Export Pipeline Specifications
Table 6-1	Strongest Earthquakes Experienced within 600 km of the Sunrise Gas Field since 1900
Table 6-2	Estimated Tide Levels for Sunrise
Table 6-3	Infaunal Abundance in the Vicinity of the Sunrise Gas Field
Table 6-4	Zooplankton Abundance in the Vicinity of the Sunrise Gas Field
Table 6-5	Threatened Species that May be Present in the Sunrise Gas Project Area
Table 6-6	Significant Fauna Species Likely or Known to Occur in the Wickham Point Area
Table 6-7	Heritage sites recorded on Wickham Point by Heritage Surveys (1997)
Table 7-1	NT Population Employed in Manufacturing and Construction Industries
Table 7-2	Timor Reef Fishery Statistics
Table 7-3	Coastal Line Fishery Statistics
Table 8-1	Classification of Impacts
Table 8-2	Summary of Potential Environmental Impacts for Drilling & Associated Activities
Table 8-3	Available Biodegradation data for Ester Based Muds
Table 8-4	Toxicity Tests on Biogreen
Table 8-5	Available Bioaccumulation Data for Potential Ester Based Muds
Table 8-6	Summary of Field Studies of the Fate and Effects of SBM Cuttings Discharges
Table 8-7	Summary of Model Parameters for Fate of Drill Cuttings With EBM
Table 8-8	Assumed Particle-size Distribution for Drill Cuttings
Table 8-9	Prediction Spread of Cuttings Under Different Environmental Conditions
Table 8-10	Summary of Potential Environmental Impacts for Installation & Construction
Table 8-11	Summary of Potential Environmental Impacts for Commissioning and Operation
Table 8-12	Predicted Produced Formation Water
Table 8-13	Summary of Highest Predicted Loads for Any Condensate Spill Scenario
Table 8-14	Alternatives for Minimising Impacts of Noise, Vibration, Light and Heat.
Table 8-15	Summary of Potential Environmental Impacts for Decommissioning
Table 9-1	Draft Environmental Management Plan for Drilling and Associated Activities
Table 9-2	Draft Environmental Management Plan for Installation and Construction
Table 9-3	Draft Environmental Management Plan for Commissioning and Operation
Table 9-4	Draft Environmental Management Plan for Decommissioning
Table 9-5	Summary of Woodside's Commitments for the Sunrise Gas Project