



SHUTE HARBOUR  
MARINA



# SHUTE HARBOUR MARINA RESORT

## Environmental Impact Statement

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# SHUTE HARBOUR MARINA RESORT ENVIRONMENTAL IMPACT STATEMENT

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>XII</b>
<b>GLOSSARY OF TERMS .....</b>	<b>XXXIV</b>
<b>1. INTRODUCTION .....</b>	<b>1</b>
1.1 Project Proponent .....	1
1.2 Project Description .....	2
1.3 Project Objectives and Scope .....	7
1.4 The EIS Process .....	11
<b>1.4.1</b> Methodology for the EIS.....	11
<b>1.4.2</b> Objectives of the EIS.....	13
<b>1.4.3</b> Submissions.....	14
1.5 Public Consultation Process .....	14
1.6 Project Approvals .....	19
<b>1.6.1</b> Relevant Legislation and Policy Requirements .....	19
1.6.1.1 Summary of Applicable Legislation .....	19
1.6.1.2 Relevance to the Development .....	20
1.6.1.3 Assessment Manager for Approvals .....	35
1.6.1.4 Required Approvals.....	35
<b>1.6.2</b> Program of Approvals .....	41
<b>1.6.3</b> Planning Processes and Standards .....	44
1.6.3.1 The SHMR Development Code.....	54
1.7 Accredited Process for Controlled Actions under Commonwealth legislation.....	57
<b>2. PROJECT NEED AND ALTERNATIVES .....</b>	<b>61</b>
2.1 Project Need .....	61
<b>2.1.1</b> Marina Demand.....	61
2.1.1.1 Community Support.....	63
<b>2.1.2</b> Accommodation .....	63
2.2 Location Suitability .....	66
2.3 Alignment with Policy and Regional Planning .....	67
<b>2.3.1</b> State Policies .....	67
2.3.1.1 Draft Mackay-Whitsunday Regional Coastal Management Plan..	68
<b>2.3.2</b> Regional Planning.....	69
2.3.2.1 Whitsunday Hinterland and Mackay Regional Plan (WHAM).....	69
2.3.2.2 Whitsunday Growth Management Initiative.....	71
2.4 The Benefits .....	72
<b>2.4.1</b> Social Benefits .....	73

2.4.2	Economic Benefits .....	75
2.4.3	Environmental Benefits .....	77
2.5	Alternatives to the Project .....	77
<b>3.</b>	<b>DESCRIPTION OF THE PROJECT.....</b>	<b>85</b>
3.1	Overview of Project.....	85
3.1.1	The Opportunity .....	85
3.1.2	Expected Project Cost.....	86
3.1.3	Project Duration and Timing.....	87
3.2	Ecological Sustainable Development.....	89
3.2.1	Design .....	90
3.2.2	Construction .....	91
3.2.3	Operation .....	91
3.3	Location.....	92
3.3.1	Regional Context.....	92
3.3.2	Local Context .....	92
3.4	Construction .....	93
3.4.1	General Construction Methods and Program.....	93
3.4.2	Maintenance Dredging .....	101
3.5	Infrastructure Requirements.....	102
3.5.1	Road.....	102
3.5.2	Shipping/Waterborne Transport .....	104
3.5.3	Energy .....	106
3.5.4	Water Supply and Storage .....	107
3.5.5	Stormwater Drainage .....	108
3.5.6	Telecommunications .....	110
3.5.7	Accommodation and Other Infrastructure .....	111
3.5.8	Transport Infrastructure Demand .....	112
3.6	Waste Management .....	113
3.6.1	Character and Quantities of Waste Materials .....	113
3.6.1.1	Construction .....	113
3.6.1.2	Operation.....	114
3.7	Financial Feasibility.....	115
<b>4.</b>	<b>ENVIRONMENTAL VALUES AND MANAGEMENT OF IMPACTS .....</b>	<b>116</b>
4.1	Land .....	116
4.1.1	Description of Environmental Values .....	116
4.1.1.1	Topography/Geomorphology/Bathymetry .....	116
4.1.1.2	Geology .....	117
4.1.1.3	Soils.....	118
4.1.1.4	Contaminated Land .....	118
4.1.1.5	Acid Sulfate Soils .....	119
4.1.1.6	Land Use .....	120
4.1.1.7	Infrastructure .....	121
4.1.1.8	Sensitive Environmental Areas .....	121

4.1.1.9	Landscape Character .....	122
4.1.1.10	Visual Amenity.....	123
<b>4.1.2</b>	<b>Potential Impacts and Mitigation Measures .....</b>	<b>125</b>
4.1.2.1	Land Use Suitability.....	125
4.1.2.2	Soil Suitability .....	127
4.1.2.3	Land Disturbance .....	127
4.1.2.4	Maintenance Dredging Spoil Disposal .....	130
4.1.2.5	Acid Sulphate Soils .....	130
4.1.2.6	Soil Contamination .....	131
4.1.2.7	Landscape Character and Visual Amenity .....	132
4.1.2.8	Lighting.....	133
<b>4.2</b>	<b>Transport.....</b>	<b>135</b>
<b>4.2.1</b>	<b>Road.....</b>	<b>135</b>
<b>4.2.2</b>	<b>Water/Air based .....</b>	<b>137</b>
<b>4.3</b>	<b>Climate .....</b>	<b>139</b>
<b>4.3.1</b>	<b>Rainfall .....</b>	<b>139</b>
<b>4.3.2</b>	<b>Temperature and Humidity.....</b>	<b>139</b>
<b>4.3.3</b>	<b>Wind.....</b>	<b>140</b>
<b>4.3.4</b>	<b>Climate Extremes.....</b>	<b>140</b>
4.3.4.1	Tropical Cyclones.....	141
4.3.4.2	Storm Surge .....	141
4.3.4.3	Landslip .....	141
4.3.4.4	Vulnerability to Hazards .....	142
<b>4.4</b>	<b>Water Resources .....</b>	<b>146</b>
<b>4.4.1</b>	<b>Description of Environmental Values .....</b>	<b>146</b>
4.4.1.1	Surface Waterways .....	146
4.4.1.2	Groundwater.....	147
<b>4.4.2</b>	<b>Potential Impacts and Mitigation Measures .....</b>	<b>149</b>
4.4.2.1	Surface Water and Water Courses .....	149
4.4.2.2	Groundwater.....	151
<b>4.5</b>	<b>Coastal Environment.....</b>	<b>152</b>
<b>4.5.1</b>	<b>Description of Environmental Values .....</b>	<b>152</b>
4.5.1.1	Water Quality.....	154
4.5.1.2	Sediment Quality .....	156
4.5.1.3	Coastal Processes .....	156
4.5.1.4	Biological Diversity .....	161
<b>4.5.2</b>	<b>Potential Impacts and Mitigation Measures .....</b>	<b>164</b>
4.5.2.1	Coastal Processes (Other than Ecological Processes).....	164
4.5.2.2	Coastal Resources and Values .....	166
<b>4.6</b>	<b>Air.....</b>	<b>205</b>
<b>4.6.1</b>	<b>Description of Environmental Values .....</b>	<b>205</b>
4.6.1.1	Background Data.....	205
4.6.1.2	Greenhouse Gas Emissions.....	206
<b>4.6.2</b>	<b>Potential Impacts and Mitigation Measures .....</b>	<b>206</b>
4.6.2.1	Mitigation Measures .....	207

4.6.2.2	Greenhouse Gas Abatement.....	208
4.6.2.3	Climate Change Adaptation .....	211
4.7	Waste.....	212
<b>4.7.1</b>	Description of the Environmental Values .....	212
<b>4.7.2</b>	Potential Impacts and Mitigation Measures .....	212
4.8	Noise and Vibration.....	215
<b>4.8.1</b>	Description of Environmental Values .....	215
<b>4.8.2</b>	Potential Impacts and Mitigation Measures .....	218
4.9	Nature Conservation .....	225
<b>4.9.1</b>	Description of Environmental Values .....	225
4.9.1.1	Terrestrial Flora .....	227
4.9.1.2	Terrestrial fauna .....	232
4.9.1.3	Aquatic Ecology.....	236
<b>4.9.2</b>	Potential Impacts and Mitigation Measures .....	248
4.9.2.1	Terrestrial Fauna and Flora.....	248
4.9.2.2	Aquatic Ecology.....	251
4.10	Cultural Heritage .....	261
<b>4.10.1</b>	Description of Environmental Values .....	261
4.10.1.1	Indigenous Cultural Heritage.....	261
4.10.1.2	Non Indigenous Cultural Heritage .....	264
<b>4.10.2</b>	Potential Impacts and Mitigation Measures .....	265
4.10.2.1	Indigenous Cultural Heritage.....	265
4.11	Social .....	267
<b>4.11.1</b>	Description of Environmental Values .....	267
4.11.1.1	Demographics .....	267
4.11.1.2	Housing .....	268
4.11.1.3	Social Infrastructure .....	269
4.11.1.4	Recreational and Leisure Infrastructure .....	271
4.11.1.5	Access and Mobility.....	272
4.11.1.6	Local Values, Vitality and Lifestyle .....	273
4.11.1.7	Summary of the Existing Social Environment .....	274
<b>4.11.2</b>	Potential Impacts and Mitigation Measures .....	275
4.11.2.1	Labour Force Impacts .....	275
4.11.2.2	Population Impacts.....	276
4.11.2.3	Demographic Impacts .....	278
4.11.2.4	Community Values and Lifestyle Impacts .....	279
4.11.2.5	Access and Availability of Social and Community Infrastructure and Services .....	280
4.11.2.6	Property Access and Location.....	281
4.11.2.7	Transport Accessibility and Safety Impacts.....	282
4.11.2.8	Impacts on Current Land Use .....	283
4.11.2.9	Potential Environmental Harm on Adjacent Areas .....	284
4.11.2.10	Implications for Future Development in the Local Area.....	284
4.11.2.11	Social Impact Mitigation Strategies .....	284
4.12	Health and Safety.....	287

<b>4.12.1</b>	Description of Environmental Values .....	287
<b>4.12.2</b>	Potential impacts and mitigation measures.....	288
4.13	Economy .....	296
<b>4.13.1</b>	Description of Environmental Values .....	297
4.13.1.1	Economic Overview.....	297
4.13.1.2	Business Numbers .....	297
4.13.1.3	Labour Market .....	297
4.13.1.4	Major Industry Assessments .....	299
<b>4.13.2</b>	Potential Impacts and Mitigation Measures .....	302
4.13.2.1	Quantitative Assessment of Economic Impacts .....	302
4.13.2.2	Qualitative Assessment of the Economic Impact of SHMR.....	306
4.13.2.3	Summary of Economic Impacts.....	312
4.13.2.4	Economic Impact Mitigation Strategies .....	313
4.14	Hazard and Risk.....	315
<b>4.14.1</b>	Description of Environmental Values .....	315
<b>4.14.2</b>	Potential Impacts and Mitigation Measures .....	321
4.15	Cross Reference with ToR.....	331
<b>5.</b>	<b>ENVIRONMENTAL MANAGEMENT .....</b>	<b>337</b>
<b>6.</b>	<b>CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>338</b>
<b>7.</b>	<b>REFERENCES.....</b>	<b>341</b>

## LIST OF TABLES

Table 1	List of Appendices .....	6
Table 2	Community Consultation Top Ten Issues/Values – Stakeholder Statistical Report: Total Events.....	17
Table 3	Table of Approvals Required .....	37
Table 4	Quantitative Cost Benefit Analysis Summary .....	73
Table 5	Size of Components of Original Proposal (Scotex P/L) .....	79
Table 6	Size of Components of Amended Proposal (SHMD P/L, 2005).....	80
Table 7	Development Summary .....	85
Table 8	Alignment of SHMR with Queensland Government Priorities.....	86
Table 9	Construction Phases.....	93
Table 10	Maximum Heavy Vehicle Total Deliveries, Timeframe and Frequency .....	98
Table 11	Potable Water Supply Design Criteria .....	107
Table 12	Monthly Mean Rainfall Recorded at the Hamilton Island Airport Weather Station	139
Table 13	Monthly Mean Temperature Recorded at the Hamilton Island Airport Weather Station.....	140
Table 14	Monthly Mean Wind Speed Recorded at the Hamilton Island Weather Station...	140
Table 15	Tropical Cyclone Severity Categories.....	141
Table 16	Natural Hazard Management Areas (Flood) - Specific Outcomes and Solutions	144
Table 17	Natural Hazard Management Areas (Bushfire) - Specific Outcomes and Solutions	145

Table 18	Natural Hazard Management Areas (Landslide) - Specific Outcomes and Solutions	145
Table 19	Details of Catchment Areas Used for Hydrologic Modelling .....	146
Table 20	Predicted Peak Flows from Hydrologic Modelling.....	147
Table 21	Predicted Annual Pollutant Loads in Discharge Waters .....	150
Table 22	Predicted Median Pollutant Concentrations in Discharge Waters .....	150
Table 23	Proposed Environmental Values of Shute Bay .....	153
Table 24	Median Water Quality Values .....	154
Table 25	Tide Levels .....	157
Table 26	Storm Tide Levels.....	157
Table 27	Design Significant Wave Heights around the SHMR Site.....	158
Table 28	Design Significant Wave Heights under Cyclonic Events – Mid-Marina (post development) .....	158
Table 29	Coastal Resource Values and Pressures in the Whitsunday Region .....	167
Table 30	Compliance with Policy 2.1.8 of the Regional Coastal Plan .....	178
Table 31	Long-Term Median Water Quality Objectives.....	187
Table 32	Summary of Ambient Dust Monitoring (PM10) at Shute Harbour Motel .....	206
Table 33	Air Quality Criteria for Dust Emission as per EPP (Air).....	207
Table 34	Greenhouse Gas Emission Factors (AGO, 2006).....	209
Table 35	Greenhouse Gas Emissions during Construction of the SHMR .....	210
Table 36	Greenhouse Gas Emissions during Operation of the SHMR.....	210
Table 37	Greenhouse Gas Mitigation Measures .....	211
Table 38	Waste Management Summary .....	213
Table 39	Summary of 2004 Ambient Noise Levels Site 1 – Western Residence .....	216
Table 40	Summary of 2004 Ambient Noise Levels Site 2 - Shute Harbour Motel .....	217
Table 41	Summary of 2007 Ambient Noise Levels.....	218
Table 42	Validation Monitoring at Sensitive Places (2007) .....	218
Table 43	Typical Construction Equipment and Activity Noise Levels .....	219
Table 44	Typical Construction Equipment Sound Pressure Levels at Sensitive Places.....	220
Table 45	Regional Ecosystems of the Site as Identified by RE Mapping .....	228
Table 46	Threatened Plant Species Results from Database Searches.....	228
Table 47	Threatened Fauna Species Results of Wildlife Online Searches .....	233
Table 48	Marine Megafauna likely to occur in Shute Bay and Whitsunday Region, their Preferred Habitat and Conservation Status .....	246
Table 49	Marine Megafauna Results of EPBC Protected Matters Search in the SHMR Study Area .....	247
Table 50	Direct Habitat Loss .....	251
Table 51	Marine Megafauna Risk Assessment Results .....	257
Table 52	Household Structure 2006 .....	268
Table 53	Household Income.....	268
Table 54	Total Construction Population Impact.....	278
Table 55	Total Operational Population Impact .....	278
Table 56	Health and Safety Legislation .....	287
Table 57	Details of Hazardous Substances and Dangerous Goods Proposed on Site .....	287
Table 58	Possible Consequences and Preventative Measures for Vector-borne Diseases	289
Table 59	Major Safety Components of the Marina SBMP .....	292



Table 60	Distance to Emergency Service Providers .....	295
Table 61:	Construction Phase Expenditure .....	302
Table 62:	Economic Impacts of the Construction Phase .....	303
Table 63:	SHMR Operating Phase Expenditure (2007).....	303
Table 64:	Economic Impacts of the Operational Phase.....	304
Table 65:	Cost Benefit Assessment Summary .....	305
Table 66	Dangerous Goods Classes.....	316
Table 67	Flammable and Combustible Liquids.....	316
Table 68	Hazard and Risk Likelihood Levels.....	320
Table 69	Hazard and Risk Consequence Levels.....	320
Table 70	Hazard and Risk Criteria.....	321
Table 71	Hazard Identification and Risk Mitigation – Construction.....	322
Table 72	Hazard Identification and Risk Mitigation – Marina Operation .....	323
Table 73	Hazard Identification and Risk Mitigation – Hazardous Substances and Dangerous Goods Storage.....	325
Table 74	Hazard Identification and Risk Mitigation – Marine Traffic.....	327
Table 75	Hazard Identification and Risk Mitigation – Road Traffic .....	328
Table 76	Hazard Identification and Risk Mitigation – Natural Hazards.....	329
Table 77	Cross Reference with ToR.....	331

## LIST OF FIGURES

Figure 1	Locality Plan
Figure 2	Master Plan
Figure 3	Precinct Plan
Figure 4	Development Approval Process
Figure 5	Zoning Plan
Figure 6	Cadastral Boundaries
Figure 7	Existing Contours
Figure 8	Design Contours
Figure 9	Environmentally Sensitive Areas
Figure 10	Coordinated Site Plan
Figure 11	3D Modelling Still Images
Figure 12	Road and Water Based Transport
Figure 13	Conceptual Stormwater Strategy
Figure 14	Geological Investigation Representations
Figure 15	State Significant Areas
Figure 16	State Significant Areas with Coral Communities
Figure 17	State Significant Areas with Mangrove Distributions
Figure 18	State Significant Areas with Seagrass Distributions in 1999 and 2000
Figure 19	State Significant Areas with Seagrass Distributions in 2007
Figure 20	Coastal Siltation Processes
Figure 21	Overlay of Regional Ecosystem Mapping

## DRAWINGS

Drawing No.	Description
7900/48/01-100	Cover Sheet
<b>GENERAL</b>	
7900/48/01-101	Locality Plan, Notes and Schedule of Drawings
7900/48/01-102	Master Layout Plan
7900/48/01-103	Boundary and wall location plan
7900/48/01-104	Proposed future works
<b>BULK EARTHWORKS</b>	
7900/48/01-105	Design surface
7900/48/01-106	Cut and fill volumes layout plan
7900/48/01-107	Cut and fill site sections – Sheet 1 of 4
7900/48/01-108	Cut and fill site sections – Sheet 2 of 4
7900/48/01-109	Cut and fill site sections – Sheet 3 of 4
7900/48/01-110	Cut and fill site sections – Sheet 4 of 4
7900/48/01-111	Boreholes and marine clay contours layout plan
7900/48/01-112	Boreholes and residual clay contours layout plan
<b>SHUTE HARBOUR ROAD</b>	
7900/48/01-200	Road layout plan
7900/48/01-201	Typical road cross sections
7900/48/01-202	Shute Harbour Road longitudinal section
7900/48/01-203	Shute Harbour Road proposed two lane cross sections – Sheet 1 of 5
7900/48/01-204	Shute Harbour Road proposed two lane cross sections – Sheet 2 of 5
7900/48/01-205	Shute Harbour Road proposed two lane cross sections – Sheet 3 of 5
7900/48/01-206	Shute Harbour Road proposed two lane cross sections – Sheet 4 of 5
7900/48/01-207	Shute Harbour Road proposed two lane cross sections – Sheet 5 of 5
7900/48/01-208	Drainage layout plan
7900/48/01-209	Drainage culvert section – Sheet 1 of 3
7900/48/01-210	Drainage culvert section – Sheet 2 of 3
7900/48/01-211	Drainage culvert section – Sheet 3 of 3
<b>MARINA</b>	
7900/48/01-300	Revetment wall and breakwater layout plan
7900/48/01-301	Wall 1 - Sheetpile revetment longitudinal section – Sheet 1 of 2
7900/48/01-302	Wall 1 - Sheetpile revetment longitudinal section – Sheet 2 of 2
7900/48/01-303	Wall 6 – Temporary sheetpile longitudinal section

7900/48/01-304	Wall 3 – Bund wall longitudinal section
7900/48/01-305	Walls 4 and 5 - Breakwater longitudinal section – Sheet 1 of 2
7900/48/01-306	Walls 4 and 5 - Breakwater longitudinal section – Sheet 2 of 2
7900/48/01-307	Revetment wall details – Wall 1
7900/48/01-308	Wall details – Walls 3 and 6
7900/48/01-309	Typical road cross sections
7900/48/01-310	Typical cross sections
7900/48/01-311	Drainage layout plan
7900/48/01-312	Dredge Spoil Treatment Area Section
7900/48/01-350	Walls 4 and 5 Breakwater – Typical elevation
7900/48/01-351	Walls 4 and 5 Breakwater – Option using concrete blocks – Typical elevation
<b>CONSTRUCTION</b>	
7900/48/01-400	Construction Master Plan
7900/48/01-401	Construction Phase 1
7900/48/01-402	Construction Phase 2
7900/48/01-403	Construction Phase 3
7900/48/01-404	Construction Phase 4
7900/48/01-405	Construction Phase 5
7900/48/01-406	Sediment and erosion control plan – Standard notes and details
7900/48/01-407	Sediment and erosion control plan – Phase 1
7900/48/01-408	Sediment and erosion control plan – Phase 2
7900/48/01-409	Sediment and erosion control plan – Phase 3
7900/48/01-410	Sediment and erosion control plan – Phase 4
7900/48/01-411	Sediment and erosion control plan – Phase 5

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## APPENDICES

Appendix A	Terms of Reference
Appendix B1	Proponent Details
Appendix B2	Study Team
Appendix C	Planning Report
Appendix D	Initial Advice Statement
Appendix E	Report on Matters of National Environmental Significance
Appendix F	Community Consultation Report
Appendix G	Net Benefit Assessment
Appendix H1	Marina Demand Study
Appendix H2	Marina Demand Study Update
Appendix H3	Accommodation Demand Assessment
Appendix I1	Geotechnical Summary
Appendix I2	Report on Acid Sulphate Soil and Sediment Contamination Investigation
Appendix I3	Acid Sulfate Soil Management Plan
Appendix J	Landscape Character and Visual Amenity Assessment
Appendix K1	Road Traffic Impact Assessment
Appendix K2	Marine Traffic Study
Appendix L	Electricity and Telecommunications Report
Appendix M	Water Supply and Sewerage Investigation
Appendix N	Stormwater Management Strategy
Appendix O	Coastal Processes Investigation
Appendix P1	Aquatic Ecology Report
Appendix P2	Marine Megafauna Impact Assessment and Management Plan
Appendix Q	Terrestrial Ecological Assessment
Appendix R	Road Traffic Noise Assessment
Appendix S1	Cultural Heritage Investigation
Appendix S2	Cultural Heritage Management Plan
Appendix S3	Cultural Heritage Consultation Report
Appendix T	Socio-economic Impact Assessment
Appendix U1	Construction Environmental Management Plan
Appendix U2	Waste Technical Report and Management Plan
Appendix U3	Marina Site Based Management Plan
Appendix U4	Cyclone Evacuation Plan

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## EXECUTIVE SUMMARY

### The Background

Shute Harbour is and will always remain the central hub for marine traffic in the Whitsundays, due to its proximity to the reef and resort islands, as well as its natural safe anchorage. Shute Harbour and the current Shute Harbour Transit Facility play a critical role in the Whitsundays as the mainland 'face' that the Whitsunday Region presents to the local, national and international visitors seeking to experience the beauty of this region.

As a tourism destination of local and international renown, expectations of visitors to the Whitsundays are becoming more demanding and sophisticated. For Shute Harbour to maintain its role in the economy of the Whitsundays and to make a positive impression on visitors, high quality, environmentally conscious marine development is required. The current "ad-hoc" nature of the commercial built form at Shute Harbour is not conducive to providing that objective.

The proposed development site was initially identified by government as being suitable for a marina. The site was seen as a strategically located safe haven in the event of a cyclone and a gateway to the Whitsunday Islands. As such, proposals for a marina development in the locality have existed since the 1980s. The site has been reported as the most strategically and environmentally appropriate marina site available in the region.

### The Proposal

Shute Harbour Marina Development Pty Ltd (the Proponent) proposes the Shute Harbour Marina Resort (SHMR).

The SHMR has been designated as a "significant" project in accordance with the provisions of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). The SHMR is introduced via this Environmental Impact Statement (EIS) prepared by Cardno (Qld) Pty Ltd, and addresses the Terms of Reference (ToR) prepared by the Department of Infrastructure and Planning on behalf of the Coordinator General issued in June 2007.

The SHMR site is situated at Shute Harbour on Queensland's central coast. The project area is located 10km south-west of Airlie Beach. The SHMR site currently consists of land, intertidal areas and waters covering an area of 45.2 hectares across two leasehold titles described as Lot 2 on SP117389 and Lot 273 on HR 1757 and an area presently subject to a Permit to Occupy. The SHMR site locality is presented in Figure 1.

The SHMR development proposal is a result of planning studies, extensive community consultation and scientific investigations. It is a development which has the proven support of Traditional Owners with the Proponent offering a world class marina and tourist facility, capitalising on the geographic advantages of Shute Harbour, and providing a valuable addition to the region's marina and tourism offerings. This is in addition to enhancing the strategic importance of Shute Harbour by acting as a catalyst in the overall revitalisation and sustainability of the precinct.

The key elements of the SHMR can be described as:

- a solid breakwater marina housing 669 berths (including 193 multi hull berths) and sewage disposal and refuelling facilities;
- resort accommodation including 4½ Star Hotel up to 5 storeys comprising 109 family suites;
- marina plaza precinct including a range of commercial retail and dining opportunities;

- Managed Resort Accommodation (MRA) precinct on 117 freehold allotments;
- charter boat base including purpose built facilities to support charter boat operations, co-located with a Marine Environment and Indigenous Cultural Heritage Centre;
- waterfront boardwalk network and Breakwater Parkland;
- marina office and amenities;
- realignment of Shute Harbour Road and construction of a new intersection;
- car parking facilities; and
- extensive landscaping.

The SHMR Master Plan is presented in Figure 2 with underlying aerial photography. Figure 3 illustrates the SHMR Precinct Plan.

### **The Objectives**

The objectives of the SHMR development are:

- to provide a world class integrated marina and tourism facility, providing a valuable addition to the marina and tourism offerings in the region;
- to enhance the strategic importance of the Shute Harbour precinct to the area by providing marine and tourism infrastructure in keeping with Shute Harbour's pivotal regional, State, National and International role;
- to support a vibrant and growing marine industry, that is underpinned by a variety of programs and policies implemented by all layers of government, and driven by consistently strong growth in recreational boating generating a shortage of marina berths throughout Queensland;
- to capitalise on the geographic advantages of Shute Harbour to improve the overall efficiency and experiences of marine interaction with the Whitsunday Island region;
- to design the built form to integrate with the natural environment providing an effective transition between the marina environment and the natural wooded backdrop;
- to respond to sustainable design principles, including passive climatic design, water management and storage, energy conservation and production and travel demand management;
- to help manage impacts of recreational boating in the Whitsundays;
- to provide a significant strengthening of the regional economy and employment;
- to ensure integration of land uses to provide a balanced, master planned marina resort environment;
- to protect the water quality of Shute Harbour;
- to improve linkages between the site and the transit terminal and the overall operation and perception of the precinct;
- to facilitate enhanced public transport linkages between Shute Harbour and Airlie Beach;
- to ensure the provision of high quality urban design standards for built form and landscaping, creating a coherent and sensitive overall design aesthetic;

- to protect important view corridors from Proserpine-Shute Harbour Road to nearby Islands;
- to provide a valuable addition to the social and recreational fabric of the region, providing a stronger community heart for Shutehaven residents and greater breadth of facilities for visitors to Shute Harbour;
- to provide public access to the Marina esplanade and Isthmus parkland, creating new foreshore access and views;
- to support Airlie Beach's role as the Whitsunday Island tourism hub;
- to increase the array of accommodation choices available to the community;
- to provide a long term management structure to maintain the marina and resort infrastructure at no cost to the community; and
- to further protect and communicate the site's indigenous and cultural heritage.

SHMR objectives align with a number of State and regional planning policies for the delivery of sustainable economic development that provides environmental, social and community benefits.

### **The EIS**

Due to the SHMR designation as a "significant" project, the development proposal is subject to a rigorous assessment process within the State of Queensland and bilaterally with the Commonwealth Government. The EIS assessment process is presented schematically in Figure 4.

The purpose of this EIS is to provide information on the SHMR, and the nature and extent of potential environmental, social and economic impacts (direct, indirect and cumulative) arising from the design, construction and operation of the proposed SHMR. The approach to all aspects of the development has been based on the awareness of the critical need to respect and enhance the natural environment of the area. The EIS also provides information on the nature and extent of management measures proposed to ensure potential detrimental impacts are avoided or mitigated wherever possible.

Detailed technical studies and consultations with key stakeholders have been undertaken to ensure SHMR achieves balanced environmental, social, and economic benefits and addresses the ToR satisfactorily. Technical studies undertaken by qualified professionals to assist in the proposed design, construction and operation of the SHMR development and are detailed in the EIS. An outline of these studies is given below and set out in Table ES1. In addition, Figures and Drawings are appended to illustrate a number of design, construction and operational concepts. The studies undertaken to develop the EIS include.

- Stakeholder consultation to provide a number of opportunities for government agencies and community members to participate in consultation and to learn about the SHMR and its potential benefits and impacts.
- Environmental, social, economic and demand assessments to demonstrate project need and assess potential alternatives.
- Net benefit assessment to determine the costs and benefits in each of the categories of economic, social and environmental impacts when assessed against economic, social and environmental criteria.
- Planning assessments to demonstrate the proposal's compliance with State, regional and local policy directions, including an approval strategy framework, and presents a Development Code tailored to achieve the intent of development and provide for a long term management structure to maintain all resort assets at no cost to the public.

- Topographical, cadastral and bathymetric surveys to inform the development outline and navigable access.
- Ecological assessments to determine potential impacts on ecological values and identify mitigation measures to preserve aquatic and terrestrial ecological attributes within the site and the immediate surrounds.
- Geotechnical analysis to determine land use capacities.
- Infrastructure and utility assessments to determine existing capacity and upgrade requirements to adequately service the development.
- Road and marine traffic impact assessments to ensure safe navigational access and road safety at the site access, and to determine upgrade requirements and inform the internal road network design and improve current marine traffic management.
- Landscape character and visual impact assessment to protect and enhance visual amenity.
- Hydrological and hydraulic modelling for stormwater management to determine impacts on water resources and inform construction methodology and operational aspects.
- Coastal process analysis to determine the impact of a marina and dredging on the area's natural landscape and environmental attributes.
- Air, noise and waste assessments to determine potential environmental impacts (including environmental nuisance) and achieve policy directions.
- Cultural heritage assessments to determine impacts on indigenous and non-indigenous cultural heritage.
- Social and economic assessments to determine complimentary facilities and service types to meet community needs and expectations and principles of ecologically sustainable development.

Management plans for the construction and operation of the SHMR development proposal have also been prepared to respond to existing site conditions and protect and enhance environmental values within and adjacent to the site, incorporating the recommendations contained within the technical studies.

**Table ES1 EIS Appended Technical Studies**

Topic	Author	Date	Appendix Reference
Terms of Reference	Coordinator General	June 2007	A
Proponent Details	Shute Harbour Marina Development Pty Ltd	28 July 2008	B1
Study Team	Cardno Environment	July 2008	B2
EIS Planning Report	Conics Brisbane (formerly PMM)	July 2008	C
Initial Advice Statement	Shute Harbour Marina Development Pty Ltd	July 2006	D
Matters of National Environmental Significance	Cardno Environment	July 2008	E
Community Consultation	Three Plus	30 July 2008	F
Net Benefit Assessment	AEC Group	July 2008	G
Marina Demand Study	Pacific Southwest Strategy Group	August 2006	H1
Marina Demand Study Update	Pacific Southwest Strategy Group	February 2008	H2



Topic	Author	Date	Appendix Reference
Accommodation Demand Assessment	AEC	March 2008	H3
Geotechnical Summary	Cardno Ullman Nolan	May 2006	I1
Report on Acid Sulphate Soil and Sediment Contamination Investigation	Cardno Ullman Nolan	January 2005	I2
Acid Sulfate Soil Management Plan	Cardno Environment	31 July 2008	I3
Landscape Character and Visual Amenity Assessment	Yurrah	17 July 2008	J
Traffic Impact Assessment	Cardno Eppell Olsen	July 2008	K1
Shute Harbour Marine Traffic Study	Thompson Clark Shipping	July 2008	K2
Electricity and Telecommunications Report	Lectel	29 July 2008	L
Water Supply and Sewerage Investigation	Cardno Water Supply and Sewerage	7 July 2008	M
Stormwater Management Strategy	Cardno Lawson Treloar	11 January 2008	N
Coastal Processes Report	Cardno Lawson Treloar	11 January 2008	O
Aquatic Ecology	FRC Environmental	July 2008	P1
Marine Megafauna Impact Assessment and Management Plan	Natural Solutions	28 July 2008	P2
Terrestrial Ecology	Place Environmental	3 July 2008	Q
Road Traffic Noise Assessment	Cardno Environment	31 July 2008	R
Indigenous Cultural Heritage Investigation	Hornery Institute	March 2008	S1
Cultural Heritage Management Plan	Hornery Institute	13 April 2008	S2
Cultural Heritage Report	Northern Archaeology Consultancies	July 2008	S3
Socio-economic Impact Assessment	AEC Group Pty Ltd	July 2008	T
Construction Environmental Management Plan	Cardno Environment	31 July 2008	U1
Waste Management Plan	Cardno Environment	15 July 2008	U2
Marina Site Based Management Plan	Cardno Environment	31 July 2008	U3
Cyclone Evacuation Plan	Cardno Environment	16 July 2008	U4

### Stakeholder Consultation

The SHMR is a major proposed development for the Whitsunday area and the Proponent has used a multi-layered approach to consultation. Consultation activities have been directed to:

- government interests – Commonwealth, State and Whitsunday Regional Council;
- stakeholder interests – ranging from business and industry groups through to indigenous groups; and
- community interests – including community action groups, local interest groups, community liaison groups coupled with community information sessions and public displays to encourage local residents to have their say.

For all aspects, the approach entailed dissemination of detailed information about the project design and potential impacts to each of those groups through a range of media and communication techniques. The consultation process undertaken by Three Plus provided a number of opportunities for government agencies and community members to participate in consultation to learn about the SHMR, its potential benefits and impacts, and provided the opportunity for feedback.

The Proponent is committed to the continuation of stakeholder consultation through construction, ongoing operation and maintenance of the SHMR.

### **Planning Processes and Standards**

The design and assessment of the site is subject to an array of Commonwealth, State and Local legislation, plans and policies. These instruments provide detailed guidance regarding the manner in which any development may take place, and the criteria which need to be considered in order to do so. The EIS has outlined this regulatory framework in detail to clarify the extent of relevant regulatory matters and to convey the manner in which the design and reporting has responded to this framework. It is concluded that the development meets the intent, and is in substantial compliance with all relevant regulatory mechanisms as detailed by Conics (July 2008) in the Town Planning Report.

Land use controls, to better respond to the attributes of the site, the surrounds and the development, have been specifically tailored and presented as the SHMR Development Code, which has incorporated elements from a range of codes included in the Draft IPA Planning Scheme for the Whitsunday Region.

The Proponent is committed to obtaining the relevant planning approvals for the construction and operation of the SHMR and comply with any reasonable and relevant development conditions.

### **Need for the Development**

The primary basis for the project is the continued strong growth in demand for marina berths. This demand is evident throughout Australia and internationally and is particularly strong in Queensland. The marina demand study by Pacific Southwest Strategy Group (PSSG) (August 2006, February 2008) provides evidence this demand exists in the region. A shortfall of 738 marina berths is predicted by 2010 and 3,133 by 2020.

While the need for a quality marina utilising the natural shelter of Shute Harbour forms the underlying rationale for the development, it is essential that a range of accommodation and other facilities are provided to complement and support the marina, such that the balance of uses work together in an integrated manner. The demand for Resort and MRA proposed for the development, in the context of current and future demand and supply projections, has been investigated in an Accommodation Demand Assessment by the AEC Group (March, 2008).

The need for the development at the proposed location has also been demonstrated over time with a series of proposals presented for the subject site. The suitability of the site has been demonstrated in a region wide marina demand analysis (Brown and Root, 2001) which ranked locations based on analysis of site selection issues (including environmental, engineering, locational and planning considerations) and constraints. This methodology was developed for strategic planning purposes as a means of comparing and ranking a number of possible marina sites. The ranking of localities revealed Airlie/Muddy Bay and Shute Harbour leading the order of preference for development of marina facilities in the region. The Airlie/Muddy Bay marina is currently under construction, yet the demand for marina berths still outstrips supply in the region.

## The Benefits of the Proposal

A central tenet of the approach to the SHMR development has been to ensure that clear net benefits are delivered by the project. This approach is considered to be essentially the most fundamental test regarding the relative merits of a project.

While this approach is used as a broad foundation for the project, a number of areas of State Government policy also specifically adopt this approach, and have adopted formalised definitions and methodologies to provide rigour around the reporting and assessment frameworks. The Net Benefit Analysis also provides a ready means of deriving balanced conclusions from the detailed socio-economic analysis.

AEC has accordingly prepared a Net Benefit Assessment (July, 2008) report to provide an analysis of the proposed SHMR in terms of its net benefit for the State of Queensland.

The quantitative cost benefit analysis found that the SHMR is expected to deliver:

- a total net benefit of \$299.4 million in present value terms at a discount rate of 10% for direct impacts (i.e. incurred by the proponent) and 6% for indirect impacts (i.e. to stakeholders other than the proponent);
- a present value of benefits of \$984.6 million and a present value of costs of \$685.3 million;
- an overall benefit cost ratio (BCR) of 1.44 (i.e. returns \$1.44 for every dollar spent in delivery of the project);
- a positive direct net benefit (i.e. to the proponent) in present value terms of \$93.6 million with a BCR of 1.46; and
- a positive indirect net benefit (i.e. to stakeholders other than the proponent) in present value terms of \$205.7 million with a BCR of 1.43.

The quantitative cost benefit analysis summary for direct, indirect and total impacts is tabulated below for economic, social and environmental criteria. The overall impacts of the project result in a clear net benefit.

**Table ES2 Quantitative Cost Benefit Analysis Summary**

<b>Quantitative CBA Summary</b>				
<b>Impact</b>	<b>PV of Benefits (\$M)</b>	<b>PV of Costs (\$M)</b>	<b>Net Present Value (\$M)</b>	<b>BCR</b>
<b><i>Economic</i></b>				
Direct Impacts	\$295.8	\$202.2	\$93.6	1.46
Indirect Impacts	\$570.6	\$461.4	\$109.2	1.24
<b>Total Impacts</b>	<b>\$866.5</b>	<b>\$663.6</b>	<b>\$202.8</b>	<b>1.31</b>
<b><i>Social</i></b>				
Direct Impacts	N/a	N/a	N/a	N/a
Indirect Impacts	\$94.0	\$0.0	\$94.0	N/a
<b>Total Impacts</b>	<b>\$94.0</b>	<b>\$0.0</b>	<b>\$94.0</b>	<b>N/a</b>
<b><i>Environmental</i></b>				
Direct Impacts	N/a	N/a	N/a	N/a
Indirect Impacts	\$24.1	\$21.6	\$2.5	1.12
<b>Total Impacts</b>	<b>\$24.1</b>	<b>\$21.6</b>	<b>\$2.5</b>	<b>1.12</b>
<b><i>Total</i></b>				
Direct Impacts	\$295.8	\$202.2	\$93.6	1.46
Indirect Impacts	\$688.8	\$483.1	\$205.7	1.43
<b>Total Impacts</b>	<b>\$984.6</b>	<b>\$685.3</b>	<b>\$299.4</b>	<b>1.44</b>

The benefits of the SHMR to Stakeholders (other than the Proponent) have been summarised below.

#### Economic Benefits

- Increased business activity at SHMR.
- Increased business activity outside SHMR.
- Appreciation of property values.
- Enhancing networking and linkages in the marine sector.
- Increased business confidence (investor attraction).
- Tourism support.

#### Social Benefits

- Increased amenity from lease of marina berths, piles, pontoons and revetment walls.
- Maintenance of the recreational value of the Great Barrier Reef World Heritage Area.
- Recognition of cultural heritage values.
- Contribution of \$2.5M to a new public boat ramp and parking facility.
- Improved access to areas for recreational and leisure activity.
- Additional employment opportunities.

#### Environmental Benefits

- Increased habitat from development of breakwater.
- Re-establishment of seagrass from relocation of swing moorings and replacement with moorings that minimise impacts to seagrass.
- Increased mangrove habitat along the western fringe of the isthmus from replanting (although natural colonisation is expected).
- Maintenance of the environmental and ecosystem services of the Great Barrier Reef World Heritage Area by the creation of a "Reef Conservation Fund" of an initial \$1M and annual contributions of \$150,000 in perpetuity.

The proposed SHMR development has been assessed to provide a net benefit for the State of Queensland with any costs associated with the project being outweighed by the total benefits provided in each of the categories of economic, social and environmental impacts.

#### **The Alternatives**

A series of alternative development options have been considered via the analysis of positives and negatives of previous detailed proposals which had been assessed at the SHMR site, as well as throughout the EIS process. The current proposal has benefited from and been adjusted via this detailed analysis. It is considered that the current proposal represents the highest and best use of the site, with design details optimized to provide an integrated, master planned development in balance with the importance, beauty and environmental sensitivity of Shute Harbour.

The consequence of not proceeding with the current development proposal has also been considered as an alternative to the current proposal. If taken literally, and the entire development did not proceed, adverse impacts within the region (and ultimately the State) are expected as there are no other sites within the region which could provide comparable benefits. The Whitsundays would miss an opportunity to advance its identity and quality of life through the tourism economy and conserve the area's natural landscape and environmental values, on which the region's growth is ultimately dependent.

## **Existing Environmental Values, Potential Impacts and Mitigation Measures**

### Land

The geology of the area is typical of the surrounding Whitsunday area, comprising volcanoclastic sediments interlain with intermediate volcanic flows and minor intrusions. The rocks form part of the Whitsunday Volcanic Province, an early Cretaceous aged sequence. Changes to relative sea and land levels have resulted in the area becoming drowned during the Tertiary Period. Overlying the basement rock at and below the shoreline is recent to Holocene aged marine sediments. The potential land contamination has been assessed as low because the site is largely undeveloped.

The SHMR site currently consists of land, intertidal areas and waters covering an area of 45.2 hectares across two leasehold titles and an area presently subject to a Permit to Occupy. The proposed site includes the existing lease area and 15.9 hectares currently held as a Permit to Occupy, with approximately 4 hectares of the existing lease north of Proserpine-Shute Harbour Road proposed to be returned to public ownership. The total lease area after consolidation is approximately 41.1 hectares. The site has a marina designation in the current Whitsunday Shire Council Strategic Plan, as illustrated in Figure 5.

The existing cadastral boundaries and land elevation contours are illustrated in Figure 6 and Figure 7 of the EIS. Figure 8 provides the land form concept on which the SHMR is to be constructed. Drawings describing the civil design and construction of the SHMR have been prepared and appended to the EIS.

The SHMR site abuts and is framed by Conway National Park, and the vegetated hillsides and the views to nearby islands over Shute Harbour provide an outstanding natural backdrop and outlook. The tidal lands and waters are within the Habitat Protection Zone of the Queensland *Great Barrier Reef Coastal Marine Park*, with part of the site within the outer margin of the Great Barrier Reef World Heritage Area. Environmentally sensitive areas are reproduced in Figure 9. It is relevant to note that the current foreshore within the site is littered and eroded. Figure 10 provides the development concept overlain on the Shute Harbour's marine chartlet.

The landform and terrain features present within the Shute Harbour locality have high environmental values. The existing landscape character assessed by Yurrah Pty Ltd describes the existing landscape character of the site as being largely influenced by previous and current land uses within and adjacent to the site. Adjacent land uses display a varied landscape character which is described as a heterogeneous mix of natural, semi-natural, tourism-orientated and port industrial landscape character values.

The potential impacts identified as a result of the proposed construction and operation of the SHMR development, relating specifically to land matters, include the following.

- Risk of subsidence/failure of geotechnically weak materials resulting from fill placement and excavation.

- Disturbance to land from vegetation clearing (for example mangroves), topsoil removal and excavation of surface soils as part of bulk earthworks to achieve the desired landform for construction of built form.
- Increased risk of erosion and sedimentation from land disturbance during rainfall, overland flow and from wind action/wave action during construction.
- Degradation of the marine environment within the marina, particularly hardening of substrate, loss of seagrass communities and decreased water quality from land disturbance and potential soil contamination during construction.
- Exposure of potential acid sulfate soils during construction and maintenance dredging episodes.
- Increased risk of contamination of soil and/or marine sediments during the operational phase.
- Impacts on landscape character and visual amenity during construction and operation.

Both construction and operational impacts from the SHMR development as they relate to land matters have been addressed through civil engineering, environmental management strategies (including sediment and erosion control mechanisms, bunding, soil remediation) and purposely located built form to maintain view corridors. The SHMR built form is expected to blend into the existing environment. Figure 11 provides still images from V2i 3D modelling, a DVD of which is included in the EIS.

The Proponent has committed to the following.

- Staging construction to successfully manage impacts on areas of conservation significance surrounding the site by reducing the land disturbance at any one time and reducing the potential for erosion and sedimentation. This includes programming construction such that major earthworks are principally undertaken in the drier months of the year.
- All necessary measures will be implemented to control impacts related to land disturbance during construction of the SHMR development, including erosion & sediment control, water quality management, traffic, noise, dust, cultural heritage and impacts on flora and fauna. Mitigation strategies are specified in detail in the Construction Environmental Management Plan.
- Measures have been specifically nominated to manage maintenance dredging works with an emphasis on water quality monitoring for the protection and enhancement of areas of conservation significance surrounding the site and the ongoing establishment of ecological communities within the marina basin as an off set to habitat loss. Mitigation strategies are detailed in the Marina Site Based Management Plan.
- Provision of landscape buffers along Proserpine-Shute Harbour Road between the commercial areas of the marina and the existing motel as visually represented in Figure 11.
- Relinquish land north of Proserpine-Shute Harbour Road back to public ownership improving the buffer between Conway National Park and the proposed SHMR site.
- Identify, treat and manage potential acid sulfate soils during works in accordance with the Acid Sulfate Soil Management Plan even though geotechnical investigations have not recorded the presence of actual or potential acid sulfate soils.
- Provide power, water, sewer, stormwater drainage and telecommunications, and upgrade power supply, a financial contribution for which will be provided by the Proponent.

## Transport

The site will be accessed by land using Proserpine-Shute Harbour Road which provides the only main connection to the site from the Bruce Highway, past Airlie Beach.

No pedestrian paths, bicycle lanes or bicycle awareness zones are provided by the existing road network and the existing verge is used for limited overflow parking for cars with boat trailers. This is due to a high demand for recreational fishing and a lack of parking amenities in the area.

No impacts on road traffic are expected from the introduction of the SHMR with traffic modelling demonstrating the existing network has the capacity to accommodate the development's traffic generation, taking into account a proposed upgrade to Proserpine-Shute Harbour Road.

Intersection analysis was undertaken to determine the capacity of a single unsignalised T-intersection such as that proposed to access the SHMR. Site access via an unsignalised T-intersection was deemed sufficient to cater for development volumes in the year 2022.

The site will be accessed by water through an existing channel that leads northeast from the commercial wharves associated with the Shute Harbour Transit Facility, past Low Rock (which is marked by cardinal marks) and into the Molle Channel, which is utilised by the majority of marine recreational and commercial vessels. Sea access to the SHMR shall be from the entrance at the southeast corner of the marina. Concept illustrations are presented in Figure 12.

The Proponent has committed to the following mitigation measures.

- Upgrade to the section of Proserpine - Shute Harbour Road adjacent to the development incorporating a new design surface, 2 metre shoulders and median strip with kerbing and dedicated area for future possible road widening to three lanes to improve road safety, congestion and travel times, including a new intersection to access the SHMR site, and new culverts for enhanced drainage.
- Include as part of the development sufficient car parking and financially contribute to the creation of additional car parking as part of the new public boat ramp to alleviate the deficiency in car parking at Shute Harbour.
- Facilitate enhanced public transport linkages between Shute Harbour and Airlie Beach by designing and constructing a potential bus lay-by area.
- Facilitate coastal access by designing and constructing a pedestrian boardwalk along the water frontage and pedestrian pathways along the two main internal collector roads to improve public access to coastal waters.
- Financially contribute to a new public boat ramp and trailer boat parking to enhance the Shute Harbour precinct as a memorable gateway to the Whitsunday Islands and Great Barrier Reef.
- Provision of a solution to separate commercial and recreational marine traffic to enhance safety by minimising the risk of collision by vessels on reciprocal courses entering and leaving Shute Harbour simultaneously including locating navigational aids.
- Relocate 57 standard swing moorings and replace with low impact to seagrass moorings.

## Climate

Shute Harbour is located at latitude 20° 17.65' S, above the Tropic of Capricorn, with a climate typical of a sub-tropical location. A wet season is generally experienced between January and March and a dry season between August and October. Located in a sub-tropical coastal location, the proposal site encounters various climatic extremes such as cyclones and storm surges.

The impact of extreme climatic conditions has been an important consideration throughout the design of the project. No potential adverse impacts to built form from such conditions are anticipated.

## Water Resources

The existing catchment area draining to Shute Harbour is predominantly natural vegetation with extensive areas of National Park. Hence, with the exception of the small area of existing harbour activities and Proserpine-Shute Harbour Road, water quality of existing run-off is good. During the wet-season, water run-off is likely to carry increased sediment levels.

Given the inferred geology of the coastal hillside of the site, it is expected that the dominant groundwater components are associated with an ephemeral shallow (near ground surface) groundwater, which may exist depending on seasonal climatic conditions. Existence of this shallow groundwater is expected to be more predominant in low-lying or discharge areas of the hillside, where interaction with deeper rock bearing groundwater may occur due to upward leakage.

No negative impact on water resources (surface and ground waters) are expected from the SHMR construction and operation. There will be beneficial impacts by diverting stormwater runoff from upper catchments through a grassed drain to polish waters that previously flowed directly to Shute Bay carrying sediments from the National Park and potential contaminants from the existing road network.

## Coastal Environment

While the Mackay-Whitsunday region contains a wide range of coastal resources, each with significant values and management pressures, specific Environmental Values (EVs) for Shute Bay and the Coral Sea have not been formally established. Shute Bay and ultimately the Coral Sea form the receiving environment for the proposed SHMR. From a range of literature, a study of EVs for similar water bodies, and consultation with relevant government agencies at State and Federal level, the EVs below are proposed for the site's receiving waters.

**Table ES3 Shute Bay Environmental Values**

<b>Environmental Value</b>	<b>Rating</b>	<b>Description</b>
<b>Aquatic Ecosystems</b>	High	The intrinsic value of aquatic ecosystems – for example, plants, animals and their ecological interactions.
<b>Wildlife Habitat</b>	High	Riparian wildlife and its habitat, food and drinking water – for example, key species such as turtles, platypus, seagrass and dugongs.
<b>Human Consumers of Aquatic Foods</b>	High	Health of humans consuming aquatic foods (such as fish, crustaceans and shellfish, other than oysters) from natural waterways.



Environmental Value	Rating	Description
<b>Primary Recreation</b>	High	Health of humans during recreation which involves direct contact and a high probability of water being swallowed – for example, swimming, surfing, windsurfing, diving and water-skiing.
<b>Secondary Recreation</b>	High	Health of humans during recreation which involves indirect contact and a low probability of water being swallowed – for example, wading, boating, rowing and fishing.
<b>Visual Recreation</b>	High	Amenity of waters for recreation which does not involve any contact with water – for example, walking and picnicking adjacent to a waterway.
<b>Cultural Heritage</b>	High	Indigenous and non-indigenous cultural heritage – for example: <ul style="list-style-type: none"> <li>• custodial, spiritual, cultural and traditional heritage, hunting, gathering and ritual responsibilities;</li> <li>• symbols, landmarks and icons (such as waterways, turtles and frogs); and</li> <li>• lifestyles (such as agriculture and fishing).</li> </ul>
<b>Aquaculture</b>	High	Health of aquaculture species and humans consuming aquatic foods (such as fish, molluscs and crustaceans) from commercial ventures.
<b>Oystering</b>	High	Health of humans consuming oysters from natural waterways and commercial ventures.
<b>Seagrass</b>	High	Maintenance and rehabilitation of seagrass habitat.

Prevailing south-easterly winds create waves that resuspend fine marine sediment within Shute Bay, particularly under low tide conditions in the upper harbour. It is also assumed that during a normal wet season the volume of water discharged into Shute Bay would contain elevated levels of total suspended solids and rocks of various sizes.

During construction, erosion and sediment control plans have been prepared and would be implemented to ensure mechanisms are installed to prevent impacts on environmental values in surrounding environmentally sensitive areas. The majority of excavation and dredging and reclamation will be undertaken “in the dry”. The marina revetment wall and the breakwater wall will be installed before dredging commences and as such the impacted waters will be wholly during dredging. Double silt curtains are proposed for the entrance which is sheltered from prevailing winds.

The operation of the SHMR will increase the potential for contaminated stormwater. The SHMR has integrated water sensitive urban design with stormwater managed on site using a variety of treatments prior to discharging to Shute Bay. Treatment train details are as follows.

- The stormwater runoff from the urban residential lots will pass through grassed swales with underlying bio-retention systems. Runoff will then flow through bio-retention basins before flowing offsite.
- All runoff from roofs will pass through rainwater tanks and into grassed swales with underlying bio-retention systems before passing through one of several bio-retention basins.
- Runoff from the car parking facility will be directed through an oil and grease separator and into a bio-retention swale and into one of several bio-retention basins.

- Road runoff will be directed through one of several bio-retention basins.

An extensive water quality monitoring program, in addition to treatment measures required of water-based recreational users, will aid in maintaining the existing high values of the SHMR site and surrounding waters. As part of this proposal, site specific water quality objectives have been determined.

#### *Coastal Processes*

The marine water quality in the vicinity of the site is dominated by coastal processes. Physical factors affecting marine water quality are tides, cyclones, wind and waves. Shute Harbour at the site is well flushed by tidal action due, to the high tidal range. The upper harbour to the west of the proposed marina shallows, and hence, wave and tidal action reaches the bed and can resuspend sediment runoff from the local hillside catchments (largely national park), though run-off coinciding with low tidal water causing localised bed scour of the inter-tidal zone. A large range of combined water levels, wind and wave conditions could influence morphological processes at the marina site and in Shute Bay.

By its nature and design the proposed completed marina will provide protection from severe to extreme wave climate, currents and coincident storm tide events. In the design and testing of the marina layout, several changes to the design of the isthmus on the western end of the marina were made to reduce siltation and scour impacts to acceptable levels. This involved the shortening and bending on the southern end of isthmus from the original straight proposal. It has been shown that the bathymetry is relatively stable post development and there is no significant erosion or deposition trend in Shute Bay which is consistent with the observed seabed bathymetry in recent times being relatively stable. Inside the marina basin, siltation rates and the resulting volumes of maintenance dredge spoil are modest.

The proposed design takes account of extreme cyclonic event storm tide coincident wave conditions, including allowance for 300 mm possible future sea level rise and an increase in cyclone central pressure due to greenhouse effects.

The resultant marina, as proposed is very safe by industry standards, and will provide safe refuge for boats in events up to the ARI 200 year event.

The Proponent has committed to the following mitigation measures (other than coastal engineering and water sensitive design standards) to maintain environmental values.

- Provide future residents protection from severe to extreme wave climate, currents and coincident storm tide events through the design of the SHMR development, as well as allowing for sea level rise.
- Provide emergency services and facilities by way of shelter for cyclones (car-park) and water based emergency service access (marina) to increase the safety standards for the community.
- Protect the water quality of Shute Harbour by providing appropriate sewage pump-out and refuelling facilities, polishing of current stormwater runoff from Proserpine-Shute Harbour Road and staging construction to ensure environmental harm is minimised during wet and dry excavation methods.
- Educate recreational boaters through an interpretative centre and education extension programs to assist in reducing potential detrimental impacts of recreational boaters on the reef by assisting locals, visitors and the recreational and commercial boating community to understand coastal processes and the marine environment and appropriate boating best practice.
- Operate the marina with regard to the Marina Industries Association of Australia 'Clean Marinas' accreditation programme.

- Use structures in the design of the SHMR that will encourage colonisation by marine fauna and fish passage through creating habitat complexity.
- Create a “Reef Conservation Fund” that will contribute to the ongoing sustainability of the coral reef including providing low impact to seagrass and coral moorings on the reef as well as education and awareness initiatives that is the Marine and Cultural Centre.

### Air

The air quality within the Shute Harbour area has been assessed as unlikely to contain elevated levels of air quality pollutants (for example, NO<sub>x</sub>, SO<sub>x</sub>) or particulate matter due to the coastal sea breezes (high level of air mixing), the lack of industry, the small scale nature of the residential development in the locality and the low number of heavy vehicles that use Proserpine-Shute Harbour Road.

The construction of the SHMR infrastructure and buildings has the potential to cause elevated levels of dust nuisance if not appropriately managed. The construction phase of the SHMR will require the implementation of appropriate mitigation and management strategies to ensure that dust emissions from the construction works will not unduly impact surrounding sensitive receptors, and which have been identified within the Construction Environmental Management Plan.

The SHMR will release greenhouse gases both indirectly and directly as a result of activities such as fuel use by vehicles and electricity use during both the construction and operational phases. Mitigation measures include (to name a few):

- architectural design of the SHMR development such that energy requirements are minimised through natural ventilation, strategic position of windows and eaves, light-weight construction materials;
- energy efficient fittings;
- no clearing of vegetation to the north of Proserpine-Shute Harbour Road such that vegetation will be available for natural carbon absorption processes when relinquished back to public ownership; and
- reuse and recycling of construction materials to reduce the demand on non-renewable resources.

In the event of an air quality complaint, an investigation will commence to resolve the complaint and ameliorate the excessive emission, if and where applicable.

### Waste

The SHMR site is currently susceptible to waste contamination through litter and inappropriate sewage disposal/refuelling activities from moored vessels in the natural harbour.

The SHMR construction and operation will potentially negatively and positively impact on environmental values with the possibility of waste spills and loss of containment of waste resulting in negative impacts to soils, surface water, groundwater, terrestrial and marine fauna, and human health. A positive impact arises with the SHMR offering appropriate vessel management and waste disposal facilities to improve the existing situation.

A Waste Management Plan has been prepared to inform appropriate waste management strategies for both the construction and operation of the SHMR which will, as far as practicable, mitigate potential impacts on environmental values from waste contamination.

## Noise and Vibration

The most significant existing noise and vibration source in the locality of the proposed SHMR is the Proserpine-Shute Harbour Road which is directly parallel and above the proposed site and Shute Harbour Transit Facility to the southeast.

Noise monitoring at the Shute Harbour Motel indicates traffic noise and wave action are the most likely significant sources of noise with relatively consistent noise levels across the week and short term peaks during the day. The noise levels at the residence to the west of the site are also affected by traffic noise and wave action but are generally higher than those at the motel reflecting the location of the residence being closer to the Proserpine-Shute Harbour Road. The major source of vibration within the SHMR site is traffic on Proserpine-Shute Harbour Road.

Potential noise and vibration sources during the construction of the marina phases will include: vehicle movements (including delivery trucks); sea wall construction using a vibratory hammer and conventional hammer; plant and equipment associated with both wet and dry excavation and building works.

Calm periods of pile handling and clutching will separate potentially noisy periods of pile driving. The piling time will be kept to a minimum. Inconvenience caused by the piling rig to Shutehaven is likely to be minimal, as it is distant from the proposed works and dominant winds would tend to push the sound away from the noise sensitive places.

Control measures will be implemented during the construction phase to minimise noise levels experienced at noise sensitive places surrounding the SHMR site with consideration to health effects of environmental noise and nuisance provisions.

While vibration from plant and equipment is expected during the construction phase of the SHMR, it is not expected to cause a significant impact due to the geological profile of the site and the limited number of and distance to noise sensitive places from the site.

Noise levels from the operation of the SHMR while having the potential to negatively impact adjacent noise sensitive places, will in character be consistent with the tourism-orientated development that exists in Shute Harbour.

In addition, as the development abuts a State-controlled Road, an assessment of the impact of road traffic noise on the sensitive places within the development was undertaken. The predicted noise levels when compared against relevant acoustic quality objectives specified in the Code of practice were excessive at proposed dwelling footprints located on lots directly backing onto Proserpine-Shute Harbour Road with other parts of the tourism precinct (including hotel) protected by building reflection and the 3 storey car park. Mitigation strategies include architectural treatment enforced through covenants to achieve an appropriate level of internal amenity. No exceedence of the objective at formal open spaces (i.e. balconies) and recreational areas of the SHMR development has been identified.

In the event of a noise complaint being received, an investigation will commence to resolve the complaint and ameliorate the excessive emission, if and where applicable.

## Nature Conservation

### *Terrestrial Flora*

A detailed floral inventory of the site recorded a total of:

- 64 families of native Australian and exotic flora;

- 145 genera of native Australian flora and 22 genera of exotic flora (with 4 genera across both distinctions); and
- 172 species of native Australian flora and 24 exotic species of flora.

Approximately 60% of the terrestrial portion of the SHMR site is vegetated with remnant or near remnant low eucalypt woodland, and 30% with remnant mangrove shrub land to low closed forest. The remaining portion supports regrowth eucalypt woodland, degraded wasteland (former quarry), degraded roadside batters and power-line and road easements. Regional Ecosystems on the site carry a vegetation management status of *Not of Concern* and a biodiversity management status of *No Concern at Present*.

Approximately 2.59 hectares of woody (remnant and regrowth) vegetation would be affected, of which 1.8 hectares is 'remnant' vegetation, the majority of which comprises mangrove Regional Ecosystem (RE) 8.1.1 (1.65 hectares). The small area of RE8.12.5 (0.05 hectares) and RE8.12.14 (0.1 hectares) that is woodland/open forest, lies within the Proserpine-Shute Harbour Road reserve.

Most of the vegetation communities of the site, with the exception of terrestrial vegetation closest to Proserpine-Shute Harbour Road and a former quarry site are relatively undisturbed and have good ecological value and function.

#### *Terrestrial Fauna*

A fauna inventory of the site identified a total of 41 species of terrestrial fauna that can be confirmed or tentatively confirmed as being present based on remote observation or detection of non-specific signs comprising of:

- 7 species (3 families) of reptiles;
- 25 species (14 families) of birds; and
- 9 species (8 families) of mammals.

None of the species identified on the site:

- are threatened species subject to the provisions of State or Commonwealth legislation;
- are at the extent of their geographic range; or
- represent an extralimital extension to a previously known geographic range.

The attributes of the existing terrestrial vegetation were assessed and the impacts of the proposed development on fauna groups were determined to be minimal.

#### *Aquatic Flora*

A highly variable seagrass community covers much of the sediment within Shute Bay. Seagrass species included:

- *Halodule uninervis*;
- *Halodule ovalis*; and
- *Zostera Muelleri*.

However, within and adjacent to the proposed SHMR site, predominantly bare substrate exists with patches of sparse to moderate seagrass. Approximately 14.59 hectares of sparse to moderately dense seagrass was recorded in the 2007 survey within the proposed SHMR site. The biomass of such communities was low. Within the disturbance area external to the SHMR site, a small amount of sparse to moderate *H. uninervis* communities occurs. Seagrass communities within the SHMR site and immediately surrounding this area are indicative of a frequently disturbed environment (i.e. predominantly from wind and wave action). The distribution, density and community structure of seagrasses within the bay have varied significantly over the past two decades.

Mangrove communities within Shute Bay are dominated by the red mangrove (*Rhizophora stylosa*) with lower abundances of the grey mangrove (*Avicennia marina*), river mangrove (*Aegiceras corniculatum*), myrtle mangrove (*Osbornia octodonta*), blind-your-eye mangrove (*Excoecaria agallocha*), mangrove apple (*Sonneratia alba*) and yellow mangrove (*Ceriops tagal*). The mangroves on the western and southern sides of Shute Bay cover a significantly greater area than those within and east of the proposed SHMR site.

Within the proposed SHMR site approximately 1.84 hectares of mangroves currently occurs. Mangroves give way to patches of saltmarsh on mostly rocky ground which then rises in a relatively steep bank to Proserpine-Shute Harbour Road. Mangroves act as a natural filter for overland flow, protect the shoreline from erosion and contribute to the establishment of islands and the extension of shorelines.

Mixed macroalgae communities were found throughout much of subtidal sections of Shute Bay significantly overlapping seagrass distribution. Within the proposed SHMR site approximately 35 hectares of mixed (low cover) macroalgae communities were surveyed.

Coral communities form an extensive spit that partially encloses the bay's southern entrance. Coral cover on the spit is highest on the seaward side, where tidal flushing is greatest bringing food and clear water to the community. The relative abundance of each hard coral genus is typical of inshore coral communities in the Whitsunday region, with sediment tolerant genera such as *Goniopora*, *Porites* and *Turbinaria* dominating. Within the proposed SHMR site approximately 10 coral colonies were recorded covering less than 2% of the substrate (approximately 0.44 hectares).

A loss of mangroves, seagrass and coral communities will occur as a result of the proposed SHMR. The loss of habitat is summarised as:

- 14.59 hectares of sparse seagrass;
- 1.84 hectares of fringing mangrove forest;
- 34 hectares of macroalgae;
- 10 small coral colonies.

#### *Aquatic Fauna*

Fauna diversity with Shute Bay is supported by the above floral communities with unvegetated soft substrate, rocky substrates, mangroves and seagrasses playing a critical role in:

- shelter and refuge;
- food;
- stabilising bottom sediments;
- water quality; and
- substrate.

The macro-invertebrate communities of Shute Bay are characterised by a diverse and moderately abundant fauna, a characteristic of the intertidal communities in the Whitsunday region.

The coral, mangrove and seagrass communities of Shute Bay support a diverse assemblage of fishes.

It was determined that marine megafauna including whales, Dugong, dolphins, marine turtles and crocodiles all have a presence within the Whitsunday region. A risk assessment (Natural Solutions, 2008) was undertaken as to determine the likelihood of potential impact on marine megafauna. Potential impacts are able to be managed appropriately with a marine megafauna management plan proposed for implementation during construction and operation of the SHMR.

To offset the potential impacts the Proponent proposes (to name a few):

- to replace 57 existing swing moorings with low impact to seagrass moorings, encouraging 950m<sup>2</sup> of seagrass colonisation;
- a “Reef Conservation Fund” funded initially by the Proponent and then via berth levies to construct public moorings to reduce anchor damage on the reef and undertake public education and awareness campaigns through establishment of a Marine and Cultural interpretive centre;
- construction of a marina to result in a mosaic of habitats associated with pontoons, piles and other intertidal and subtidal structures (and of course boats) which will provide substrate for many species of algae, hard and soft corals, sponges, ascidians and a variety of other invertebrate fauna;
- as water depth within the proposed marina is unlikely to support communities of seagrass and macroalgae, fish friendly structures are proposed to enhance fish habitat in the marina thereby raising the ecological value;
- compensatory habitat on the western edge of the isthmus will be replanted with mangroves, although colonisation will naturally occur;
- greater opportunity for access to the coast via a public boardwalk and breakwater parkland; and
- extensive environmental monitoring program to measure performance indicators as they relate to ecological systems.

### Cultural Heritage

No archaeological evidence for significant Aboriginal cultural heritage sites or materials has been found along the coastal fringe that is the SHMR site. However the Traditional Owners, the Gia and Ngaro people, have demonstrated that this area of coastline retains a high level of cultural significance to them.

These values include the following.

- Coastal values associated with coastal fishing and hunting grounds in pre-contact and post contact times.
- Flora and fauna of the development area and its value as bush tucker, including shellfish, food plants and medicines. Mangroves, reef habitat, seagrasses and dugongs were also viewed as important to traditional owners.

Consultation with Traditional Owners for the site (the Gia and Ngaro/Gia people) indicated that there were initially concerns regarding the impact of the development on the region's cultural heritage. These concerns primarily related to the potential impact of the proposed development on culturally significant flora and fauna, the potential to uncover archaeological findings and the involvement of cultural representatives in the construction phase of the development. Through a consultative process a Cultural Heritage Management Plan (CHMP) was developed that addresses these issues and demonstrates the high level of support for the project by the respondent parties.

The CHMP and the associated report that details the process by which it was achieved is a component of the EIS and has used the guiding principles and rationale of COAG's *Overcoming Indigenous Disadvantage – key indicators 2007* report to explore the determinants of net social benefit, which are aligned to the proposed SHMR and the aspirations initiatives agreed to in the CHMP.

The *Overcoming Indigenous Disadvantage – key indicators 2007* report, provides a robust 'roadmap' for actioning change to address disadvantage and contribute to 'closing the social, economic, environmental and wellbeing gap' between Indigenous and non-Indigenous Australians.

While the SHMR does not address all indicators of disadvantage for Gia and Ngaro/Gia communities, it is closely aligned to three of the four headline indicators. This alignment is demonstrated through the potential positive impact on Gia and Ngaro peoples through the opportunity to:

- participate in and share economic prosperity and cultural tourism opportunities,
- support the intrinsic benefits of governance and culture in community capacity building,
- maintain generational celebration and learning of cultural heritage traditions, language and expression,
- contribute to functional and resilient families and communities, and
- provide generational "care for country", while showcasing Indigenous pride and knowledge to local, regional and international tourists.

It is therefore concluded that the CHMP will contribute to positive long term outcomes for at least two Indigenous peoples – the Gia and Ngaro communities at a local community level.

The CHMP has been signed by the Gia and Ngaro/Gia people and the Proponent. The CHMP has been approved and registered by the Department of Natural Resources and Water in April 2008.

### Socio-economic

The socio-economic values associated with the SHMR development are listed below.

- The population in the Whitsunday Local Government Area (LGA) has grown rapidly in the past five years, above that of the Mackay Statistical Division (Mackay SD) and Queensland.
- The Whitsunday LGA has a higher average age when compared to the Mackay SD and the State, although the average age for the Whitsunday LGA has declined over the last five years. This is likely a result of young adults migrating to the region in search of job opportunities and coastal lifestyle, while older persons may be migrating to other regions to avoid the increasing cost of living.



- The Whitsunday LGA is a culturally diverse area, recording a high percentage of overseas born persons when compared to the Mackay North Coast, Mackay SD and Queensland. However, the Whitsunday LGA records a lower proportion of persons of Indigenous heritage.
- The Whitsunday LGA regional economy has been growing strongly over the past five years, in line with the State.
- The Whitsunday LGA economy is highly reliant on the accommodation, cafés and restaurants sector and the transport and storage sector, largely attributable to the Whitsunday's position as a key leisure tourism destination and significant air and sea transport infrastructure in the region.
- In line with the Mackay and State experiences, Whitsunday LGA is currently experiencing a tight labour market, with historically low levels of unemployment.
- Whitsunday LGA has a relatively high proportion of persons employed in the occupations of managers, labourers and community and personal service workers, and a relatively lower proportion of persons employed in the occupations of clerical and administrative workers and professionals.
- Whitsunday LGA has experienced a strong level of dwelling investment in the past three years, with the number and value of dwelling approvals growing at a faster rate than the Mackay SD and Queensland.
- Over the past year, Whitsunday LGA has experienced strong growth in the number and value of sales for house and unit properties, particularly in the suburbs of Cannonvale, Airlie Beach and Jubilee Pocket.
- The immediate area and surrounding service centre of the SHMR has considerable social, community and recreational infrastructure capable of servicing the majority of the local population's needs, while regional level services are primarily provided in Proserpine and Mackay.

A number of mitigation strategies are proposed to maintain socio-economic values. Mitigation strategies include the following commitments.

- Source labour from the local labour pool.
- Integrate the values of the existing community and their lifestyle in the proposed development.
- Enhance recreational, leisure and employment options in the longer term.
- Reduce impacts on access to health services from additional population.
- Reduce impacts on provision and access to sporting facilities from additional population.
- Facilitate local community access to recreational facilities provided by the SHMR.
- Reduce potential impacts on short stay accommodation availability, rental prices and the accessibility to traditional low-cost housing options.
- Ensure equitable access within the marina and associated facilities for all persons.
- Retain as much construction expenditure as possible in the regional economy.
- Retain as much visitor expenditure as possible in the regional economy.
- Facilitate benefits to and opportunities for local business.

Reduce potential impacts on short stay accommodation availability for tourists.

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## Conclusions

The proposed SHMR will be a sustainable development providing a world class tourism destination and marine facility of consistent quality to the experience offered by the natural and resort environments available in the Whitsunday Islands, aligning itself with Commonwealth, State and regional planning initiatives and priorities by achieving net environmental, social and economic benefits.

The EIS has been based on technical reports which have thoroughly assessed the potential environmental, social and economic impacts of every aspect of the proposed SHMR. The findings of the technical reports have informed the design of the SHMR and have driven the final form of the Master Plan and the formation of the environmental management plans.

Where potential adverse impacts have been identified, appropriate mitigation measures have been proposed to manage and control the impacts. Mitigation measures that have been proposed within the EIS take the form of physical infrastructure works, education and awareness, financial contributions and ongoing environmental management strategies outlined in the aforementioned commitments.

It is concluded that the SHMR development is suitable for approval subject to reasonable and relevant conditions. You are invited to read the completed SHMR EIS and view the DVD showing the visualisation of the proposal in order to fully appreciate the opportunities and benefits created by the project. The proponent welcomes your feedback and invites written submissions to the EIS as part of the formal notification process.

## GLOSSARY OF TERMS

ADSL	Asymmetric Digital Subscriber Line
AGO	Australian Greenhouse Office
ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Average Recurrence Interval
ASS	Acid Sulfate Soils
ASSMP	Acid Sulfate Soil Management Plan
BIAQ	Boating Industry Association of Queensland
BCR	Benefit Cost Ratio
CAMBA	China-Australia Migratory Bird Agreement
CBA	Cost Benefit Analysis
CEMP	Construction Environmental Management Plan
CHMP	Cultural Heritage Management Plan
CLR	Contaminated Land Register
CG	Coordinator General
CMD	Coastal Management District
CTMP	Construction Traffic Management Plan
Conway NP	Conway National Park
CW EIS	Connell Wagner Environmental Impact Statement
DEO	Desired Environmental Outcome
EDIP	Economic Development Issues Plan
EIS	Environmental Impact Statement
EMR	Environmental Management Register
ERA	Environmentally Relevant Activity
ESD	Ecological Sustainable Development
EHI	Environmental Health Index
EHMP	Ecosystem Health Monitoring Program
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EOI	Expression of interest
EP	Equivalent Person
EPA	Erosion Prone Area
EVs	Environmental Values
FTE	Full Time Equivalent
GBRMP	Great Barrier Reef Marine Park
GBRWHA	Great Barrier Reef World Heritage Area
GFA	Gross Floor Area
GHG	Greenhouse Gas
HAT	Highest Astronomical Tide
IAS	Initial Advice Statement
JAMBA	Japan-Australia Migratory Bird Agreement
IDAS	Integrated Development Assessment System
$L_{A10}$	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
$L_{A10(18hr)}$	The arithmetic average of the $L_{10(1hr)}$ levels for the 18 hour period between 6am and 12 midnight on a normal working day. It is a common traffic noise descriptor.
$L_{A90}$	The monitored background noise level, $L_{A90,T}$ is the A-weighted sound pressure level of the residual noise (dB) exceeded for 90 percent of a given time interval, T, measured using time weighting 'F' and quoted to the nearest whole number of decibels.
$L_{Aeq}$	Equivalent sound pressure level – the steady sound level that, over a specified period of time, would procedure the same energy equivalence as the fluctuating sound level actually occurring.

LAT	Lowest Astronomical Tide
LDGL	Large Dangerous Goods Location
LGA	Local Government Area
Mackay SD	Mackay Statistical Division
MRA	Managed Resort Accommodation
MCU	Material Change of Use
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MVA	Mega Volt Amperes
NEPM	National Environment Protection Measure
NEPC	National Environment Protection Council
NES	National Environmental Significance
NPV	Net Present Value
NOx	Oxides of Nitrogen
NSESD	National Strategy for Ecological Sustainable Development
OUM	Office of Urban Management
PASS	Potential Acid Sulfate Soils
Planning Scheme	Whitsunday Shire Council Planning Scheme 2000
PM <sub>10</sub>	Particulate matter with an aerodynamic diameter less than 10µm
PMT	Pad Mounted Transformer
Proponent	Shute Harbour Marina Development Pty Ltd
PSP	Planning Scheme Policy
QASSIT	Queensland Acid Sulfate Soils Investigation Team
QWQG	Queensland Water Quality Guidelines
RE	Regional Ecosystem
ROL	Reconfiguration of a Lot
SBMP	Site Based Management Plan
SHMR	Shute Harbour Marina Resort
SHTF	Shute Harbour Transit Facility
SOx	Oxides of Sulphur
SQUIDs	Stormwater Quality Improvement Devices
SPP	State Planning Policy
ToR	Terms of Reference as defined by Part 4 of the SDPWO Act
TIA	Traffic Impact Assessment
Transitional Scheme	Whitsunday Shire Council Planning Scheme 2005
WDC	Whitsunday Development Corporation
WHA	World Heritage Area
WHAM	Whitsunday Hinterland and Mackay Regional Plan 2005
WMDA	Whitsunday Marina Demand Analysis
WMP	Waste Management Plan
WTR	Whitsunday Tourism Region
WQOs	Water Quality Objectives
WSUD	Water Sensitive Urban Design
ToR	Terms of Reference
TBT	Tri-butyl tin

### Local, State and Commonwealth Agencies and Authorities

DEWHA	the Department of Environment, Water Heritage and the Arts
DIP	Department of Infrastructure and Planning (Qld)
DMR	Department of Main Roads (Qld)
DNRW	Department of Natural Resources and Water (Qld)
DPIF	Department of Primary Industries and Fisheries (Qld)
DTRDI	Department of Tourism, Regional Development and Industry
EPA	Environmental Protection Agency (Qld)
GBRMPA	Great Barrier Reef Marine Park Authority
MSQ	Maritime Safety Queensland

QT	Queensland Transport (Qld)
WSC	Whitsunday Shire Council
WRC	Whitsunday Regional Council

### Legislative Instruments

CPM Act	<i>Coastal Protection and Management Act 1995</i>
Coastal Regulation	<i>Coastal Protection and Management Regulation 2003</i>
Draft Regional Coastal Plan	Draft Mackay–Whitsunday Regional Coastal Management Plan
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EP Act	<i>Environmental Protection Act 1994</i>
EPP (Air)	<i>Environmental Protection (Air) Policy 1997</i>
EPP (Noise)	<i>Environmental Protection (Noise) Policy 1997</i>
EPP (Water)	<i>Environmental Protection (Air) Policy 1997</i>
EPP (Waste)	<i>Environmental Protection (Waste) Policy 1997</i>
DGSM	<i>Dangerous Goods Safety Management Act 2001</i>
DGSM Regulation	<i>Dangerous Goods Safety Management Regulation 2003</i>
Fisheries Act	<i>Fisheries Act 1994</i>
IP Act	<i>Integrated Planning Act 1997</i>
LP Act	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>
NC Act	<i>Nature Conservation Act 1992</i>
NC (Wildlife) Regulation	<i>Nature Conservation (Wildlife) Regulation 2006</i>
SDPWO Act	<i>State Development and Public Works Organisation Act 1997</i>
State Coastal Plan	State Coastal Management Plan – Queensland’s Coastal Policy
VM Act	<i>Vegetation Management Act 1999</i>
Water Act	<i>Water Act 2000</i>

### Consultants

AEC	AEC Group Pty Limited
Cardno	Cardno (Qld) Pty Ltd
CEO	Cardno Eppell Olsen
CLT	Cardno Lawson Treloar
Conics	Conics Brisbane Pty Ltd
FRC	FRC Environmental
Hornery	The Hornery Institute
Lectel	Lectel
NACH	Northern Archaeology Consultancies Pty Ltd
Natural Solution	Natural Solutions Environmental Consultants Pty Ltd
Place	Place Design Group (Environmental)
PSSG	Pacific Southwest Strategy Group
Thompson Clarke	Thompson Clarke Shipping Pty Ltd
Three Plus	Three Plus
Ullman and Nolan	Cardno Ullman and Nolan Geotechnic Pty Ltd
Yurrah	Yurrah Pty Ltd

## 1. INTRODUCTION

This Environmental Impact Statement (EIS) has been prepared by Cardno (Qld) Pty Ltd for Shute Harbour Marina Development Pty Ltd (the Proponent), in accordance with the Terms of Reference (ToR) prepared by the Department of Infrastructure and Planning (DIP) on behalf of the Coordinator General (CG) in June 2007, for the Shute Harbour Marina Resort (SHMR) proposal.

The SHMR is a proposed multi-use marina, combined with commercial, tourism, and managed resort accommodation (residential) uses, located within Shute Bay in the Whitsunday Regional Council Local Government Area. A site locality plan is presented as Figure 1, in which it is shown that the urban footprint of the SHMR is restricted to leased land described as Lot 2 on Plan SP117389 and additional land described under a permit to occupy.

Figure 2 provides a concept of the Master Plan for which this EIS is prepared.

This EIS has been structured like that of the ToR which is provided as Appendix A. As such the purpose of the EIS is to provide information on environmental values and the nature and extent of potential environmental, social and economic impacts (direct, indirect and cumulative) arising from the design, construction and operation of the proposed SHMR development on those environmental values. The EIS also provides information on the nature and extent of management measures proposed to ensure potential detrimental impacts are avoided or mitigated wherever possible. In this respect this EIS is prepared for a wide ranging audience, including the community and Government, to introduce the development concept and formally commence the necessary assessment process to seek statutory approval for the proposal.

### 1.1 Project Proponent

The Proponent is Shute Harbour Development Pty Ltd, a Queensland registered company with 50% of shares held by Port Binnli Shute Harbour Pty Ltd, the parent company who is Port Binnli Pty Ltd.

The other shareholders are represented by Mark Daniels and Gregory Phillips, William Kelly, Geoffrey Inglis, David Wade, John Robinson, Howard Young, Fergus Simpson, and David Inglis. This group holds a 50% interest in the company along with Port Binnli Shute Harbour Pty Ltd.

The ABN of the Proponent issued by the Australian Securities & Investments Commission is 28 081 285 832 and the registered office is in Spring Hill, Queensland.

Port Binnli has significant experience in the development and operation of marinas in Queensland. Appendix B1 provides a narrative of the experience of Port Binnli and provides an assurance that the SHMR development will be designed, constructed and managed as a world-class marina and tourist facility.

The Proponent has developed an Environmental Policy specifically related to this project of which the key elements are listed below.

- Ensuring the Stakeholders are informed of the development, and that environmental values and potential impacts are transparent, and best practice environmental management is adopted and achieved.

- Conducting the design, construction and operation of the project in a manner consistent with the principles of ecological sustainable development, specifically the precautionary principle.
- Constructing and operating the development in compliance with any statutory requirements for protecting and enhancing environmental values.
- Monitoring and auditing the performance of the development.

To achieve its environmental policy, the Proponent has commissioned a Study Team of professional consultancies to inform the preparation of the EIS and ensure that all relevant issues have been addressed in an objective way. Appendix B2 provides the relevant qualifications and experience of the Study Team.

A planning framework for obtaining statutory approval for the SHMR development proposal has been formulated based on planning advice by Conics and described in the planning report presented in Appendix C and summarised in Section 1.6 of this EIS.

## 1.2 Project Description

The SHMR, formerly referred to as the Shute Harbour Marina Development, is located at Shute Harbour in the Whitsunday Regional Council Local Government Area and encompasses land described as Lot 2 on Plan SP 117389 and seaward of this lot under a permit to occupy, Lot 279 on Plan HR1757 and a portion of Proserpine-Shute Harbour Road fronting the development site. The locality of the site is presented within Figure 1.

The proposed SHMR site has been determined by the State Government to be strategically located for use as a vessel safe haven in cyclone conditions as well as a gateway for vessel passage to the surrounding group of Whitsunday Islands.

The SHMR site covers an area of 45.2 hectares and is bordered by:

- Proserpine-Shute Harbour Road to the north;
- Conway National Park beyond Proserpine Shute Harbour Road to the north, north-east and north-west;
- an existing motel and the existing Shute Harbour Transit Facility (SHTF) to the east; and
- an existing marine salvage operation to the west.

The justification for the suitability of the locality has been demonstrated in the planning report presented as Appendix C to the EIS and is underpinned by a net benefit approach.

The SHMR is a proposed multi-use marina, combined with commercial, tourism, and managed resort accommodation (MRA) uses, located within Shute Bay in the Whitsunday Regional Council local government area.

Figure 2 provides a concept of the Master Plan for which this EIS is prepared. The urban footprint of the SHMR is restricted to Lot 2 on Plan SP117389 and the land under a permit to occupy. Figure 3 illustrates the proposed SHMR Precinct Plan within this urban footprint.

The SHMR development proposal will provide important maritime based services to the Whitsundays and a more attractive and functional tourist getaway to the Islands by including in its design 669 vessel berths, 117 high quality MRA lots, a 4½ tourist Resort (comprising 109 suites) and a base for charter boat activities.

The project aims to bring a world-class marina to the strategic transport hub of Shute Harbour, providing access to one of Australia's fastest growing and most scenic tourism destinations, the Whitsundays.

The development of a marina facility at Shute Harbour has been proposed for some time, through a range of proponents and proposals. The site has been the subject of a previous development proposal under an EIS process. An Initial Advice Statement (IAS) was lodged in September 2003 with the EIS lodged on Wednesday 20 April 2005 and advertised for public comment in June 2005. It was evident during this period that a significant amount of additional information was required to enable informed decision making with respect to approvals. A request to prepare a Supplementary EIS was made by the CG on 30 August 2005.

Port Binnli Pty Ltd, a specialist marina development organisation, purchased 50% of the shares in the Proponent in March 2006 and has subsequently redesigned the proposed marina facility in response to identified community concerns and environmental requirements following the previous EIS notification. The CG decided that the current proposal differs substantially from that declared to be significant in October 2003. As such, the provision of a Supplementary EIS was not deemed to be appropriate, and instead the EIS process recommenced from the first stage, the provision of an IAS.

An IAS was submitted in July 2006 for the current proposal. The IAS is presented as Appendix D. Since the issuing of the IAS the current SHMR development proposal has evolved with the significant changes from that presented in the IAS and detailed in the planning study, presented as Appendix C.

The SHMR Master Plan has been designed to incorporate, and thereby provide a valuable addition to the economic, social and recreational environment of the region, the following components.

- Marina, along with ancillary facilities such as sewage pump out, fuel dock, waste management, power and water.
- 4 ½ Star resort hotel precinct consisting of buildings up to 5 storeys.
- Marina Plaza comprising a village precinct consisting of a range of retail and dining opportunities within the Resort Hotel precinct.
- Marina office and amenities (as part of mixed use building).
- Charter Boat base including hire facilities and arrival / departure lounge as part of Marina Office building.
- Marine interpretive and Cultural Centre also as part of the Marina Office building.
- Managed Resort Accommodation (MRA) developed on freehold allotments, controlled by Code provisions and design guidelines.
- Marina Esplanade and Parkland.
- Car parking facilities.
- Extensive landscaping.

The current proposal involves civil earthworks including construction of a marina basin and breakwater, and reclaiming tidal land (including an isthmus which will project into the harbour) for the purposes of establishing supporting infrastructure for the marina thereby ensuring the viability of the development.

Civil engineering works are expected to occur over an approximate period of 2 years and will include:

- clearing of fringing mangrove vegetation;



- construction of a stormwater diversion channel to divert catchment runoff;
- reclaiming land using sheet pile revetment walls;
- construction of a solid breakwater using pre-cast concrete panels;
- dredging of the marina basin to a depth of -5.2m AHD using both dry and wet dredging methods;
- marina fit out using floating pontoons supported by driven piles, including a fuel dock and sewage pump-out facility;
- redevelopment of the existing Proserpine-Shute Harbour Road under the terms of an existing deed of agreement with the Department of Main Roads; and
- installation of infrastructure works including roadworks and services (power, water, sewer, stormwater drainage and telecommunications).

A drawing set for engineering works is provided as part of the EIS.

To provide continued and non-exclusive water access, maintenance dredging of the marina and access channel will be required for a period of 2 to 3 months every 5-7 years, dependant upon actual siltation rates as recorded by fixed settlement boxes. The extent of maintenance dredging was considered in the development's design and represents best engineering practices. Spoil from maintenance dredging will be dewatered and dried on the designated landscaped open space area, located on the isthmus and disposed of offsite prior to the following dredging cycle. A number of alternatives to the disposal of dredge spoil have been investigated and are discussed further in the EIS.

Structures will be constructed within the SHMR site subsequent to the formation of the necessary landform. Concept design of buildings and structures has been completed and a multimedia presentation has been completed by V2i (enclosed) which provides concept images of the proposed development form. This presentation is included to this EIS in DVD format.

In view of the size and strategic significance of the site, SHMR was declared a significant project pursuant to the *State Development and Public Works Organisation Act 1971* (SDPWO Act). As such, the project requires the preparation of an EIS in accordance with Part 4 of the SDPWO Act. A finalised ToR was issued for the EIS in June 2007. This EIS provides the information as a basis for the Local, State and Federal approvals for the proposal.

In addition to the CG's involvement in the EIS process, the statutory impact assessment process is the subject of a Bilateral Agreement between the Queensland and Commonwealth Governments under the SDPWO Act. This agreement relates to environmental assessment under the Commonwealth's *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) which requires the proponent to refer the proposal to the Australian Minister for Environment and Heritage. On 27 July 2007, the Minister stated that the proposal constituted a controlled action pursuant to Section 75 of the EPBC Act under the following controlling provisions.

- Sections 12 and 15A (World Heritage).
- Sections 18 and 18A (Listed threatened species and communities).
- Sections 20 and 20A (Listed migratory species).
- Sections 23 and 24A (Marine environment).

A stand alone report on Matters of National Environmental Significance (Cardno, August 2008) describes the controlling provisions providing targeted information for the Department of Environment, Water, Heritage and the Arts (DEWHA) assessment process, and is presented in Appendix E.

The primary purpose of the EIS is to provide information to community and decision makers on the concepts, aspects and impacts of the development proposal, through comprehensively identifying, evaluating, and providing mitigation for issues associated with the development.

The EIS also serves the purpose of identifying all necessary planning and environmental approvals including requirements pursuant to Local, State and Commonwealth legislation, and appropriately addresses these requirements.

All potential environmental impacts of the proposal have been identified and offset and mitigation measures have been proposed. These measures may take the form of infrastructure and facility design, or construction and operational management strategies, including a financial contribution for upgrades to existing local infrastructure to stage Shute Harbour as a tourist destination supporting a burgeoning tourism market, and conservation programs to conserve the area's natural landscape and environmental values.

The proposed SHMR development provides a positive net benefit for the State of Queensland with any costs associated with the project being outweighed by the total benefits provided. That is, the SHMR returns a positive net present value and a benefit cost above one. Indeed, the proposal provides a net benefit to the State in each of the categories of economic, social and environmental impacts.

The EIS has been informed by a range of technical studies and reports which have been commissioned to assess the potential impacts of the proposed SHMR, both positive and negative, and an extensive community consultation process.

Detailed technical studies and consultations with key stakeholders have been undertaken to ensure SHMR achieves balanced environmental, social, and economic benefits and addresses the ToR. Technical studies undertaken to assist in the development of the SHMR Master Plan and ultimate EIS include the following.

- Environmental, social, and economic demand assessments to demonstrate project need and assess potential alternatives.
- Stakeholder consultation to provide a number of opportunities for government agencies and community members to participate in consultation and to learn about the SHMR and its potential benefits and impacts.
- Planning assessments to demonstrate how the proposal conforms with State, regional and local policy directions set out in draft and current management plans and the planning scheme for the Whitsunday Regional Shire (WRC), including an approval strategy framework.
- Topographical, cadastral and bathymetric surveys to inform the development outline and navigable access.
- Ecological assessments to determine potential impacts on ecological values and identify mitigation measures to preserve aquatic and terrestrial ecological attributes within and the immediate surrounds.
- Geotechnical analysis to determine land use capacities.
- Landscape character and visual impact assessment to protect and enhance visual amenity.

- Hydrological and hydraulic modelling for stormwater management to determine impacts on water resources and inform construction methodology and operational aspects.
- Coastal process analysis to determine the impact of a marina and dredging on the areas natural landscape and environmental attributes of Shute Harbour.
- Air, noise and waste assessments to determine potential environmental impacts (including environmental nuisance) and achieve policy directions.
- Cultural heritage assessments to determine impacts on indigenous and non-indigenous cultural heritage.
- Social, economic and net benefit assessments to determine complimentary facilities and service types to meet community needs and expectations and principles of ecologically sustainable development.
- Infrastructure and utility assessments to determine existing capacity and upgrade requirements to adequately service the development.
- Road and marine traffic impact assessments to ensure safe navigational access and road safety at the site access, and to determine upgrade requirements and inform the internal road network design.

The technical studies are appended to the EIS along with other relevant supporting documentation, as listed in Table 1 below.

**Table 1 List of Appendices**

Title	Author	Date	Appendix Reference
Terms of Reference	Coordinator General	June 2007	A
Proponent Details	Port Binnli	28 July 2008	B1
Study Team	Cardno Environment	July 2008	B2
EIS Planning Report	Conics (formerly PMM)	July 2008	C
Initial Advice Statement	PMM	July 2006	D
Matters of National Environmental Significance	Cardno Environment	July 2008	E
Community Consultation	Three Plus	30 July 2008	F
Net Benefit Assessment	AEC Group	July 2008	G
Marina Demand Study	Pacific Southwest Strategy Group	August 2006	H1
Marina Demand Study Update	Pacific Southwest Strategy Group	February 2008	H2
Accommodation Demand Assessment	AEC Group	March 2008	H3
Geotechnical Summary	Cardno Ullman Nolan	May 2006	I1
Report on Acid Sulphate Soil and Sediment Contamination Investigation	Cardno Ullman Nolan	January 2005	I2
Acid Sulfate Soil Management Plan	Cardno Environment	31 July 2008	I3
Visual Amenity	Yurrah Pty Ltd	17 July 2008	J
Traffic Impact Assessment	Cardno Eppell Olsen	July 2008	K1
Shute Harbour Marine Traffic Study	Thompson Clark Shipping	July 2008	K2
Electricity and Telecommunications Report	Lectel	29 July 2008	L
Water Supply and Sewerage Investigation	Cardno Water Supply and Sewerage	7 July 2008	M

Title	Author	Date	Appendix Reference
Stormwater Management Strategy	Cardno Lawson Treloar	11 January 2008	N
Coastal Processes Report	Cardno Lawson Treloar	11 January 2008	O
Aquatic Ecology	FRC Environmental	July 2008	P1
Marine Megafauna Impact Assessment and Management Plan	Natural Solutions	28 July 2008	P2
Terrestrial Ecology	Place Environmental	3 July 2008	Q
Road Traffic Noise Assessment	Cardno Environment	31 July 2008	R
Indigenous Cultural Heritage Investigation	The Hornery Institute	March 2008	S1
Cultural Heritage Management Plan	The Hornery Institute	13 April 2008	S2
Cultural Heritage Report	Northern Archaeology Consultancies	July 2008	S3
Socio-economic Impact Assessment	AEC Group Pty Ltd	July 2008	T
Construction Environmental Management Plan	Cardno Environment	31 July 2008	U1
Waste Management Plan	Cardno Environment	15 July 2008	U2
Marina Site Based Management Plan	Cardno Environment	31 July 2008	U3
Cyclone Evacuation Plan	Cardno Environment	16 July 2008	U4

An EIS was prepared by Connell Wagner (2005) for a previous development proposal at the site and informs limited sections of this EIS, where referenced, following a review of the issues raised by regulatory authorities and only in cases where environmental values are not affected by the revised development proposal (for example Section 4.6 'Air'). The findings of the previous EIS have not been applied to matters of high environmental risk that ultimately resulted in a supplementary EIS request by the CG and change to the proposal by the Proponent. The background to development proposals at this site is discussed below in Section 1.3 'Project Objectives and Scope' and detailed in Section 2.5 'Project Alternatives'.

### 1.3 Project Objectives and Scope

The SHMR proposal has been created to respond to the high levels of tourism and population growth in the Whitsunday region, and to the related increases in marina demand.

The focus of the new design is a world class marina and tourist facility. The new design delivers a much needed marina at the strategic transport hub in one of Australia's fastest growing and most scenic tourism destination of the Whitsundays.

The proponent seeks to develop the site into a marina, along with ancillary facilities, 4½ star Resort precinct, Marina Plaza with a range of retail and dining opportunities within the Resort precinct, marina office and amenities, Charter Boat base, marine interpretive and cultural centre, MRA, marina esplanade and parkland, car parking facilities, and landscaping. These will provide a valuable addition to the economic, social and recreational environment of the region.

The development objectives of the proposal include:

- to provide a world class integrated marina and tourism facility, providing a valuable addition to the marina and tourism offerings in the region;

- to enhance the strategic importance of the Shute Harbour precinct to the area by providing marine and tourism infrastructure in keeping with Shute Harbour's pivotal regional role;
- to capitalise on the geographic advantages of Shute Harbour to improve the overall efficiency and experiences of marine interaction with the Whitsunday Island region;
- to design the built form to integrate with the natural environment providing an effective transition between the marina environment and the natural wooded backdrop;
- to respond to sustainable design principles, including passive climatic design, water management and storage, energy conservation and production and travel demand management;
- to help manage impacts of recreational boating in the Whitsundays;
- to provide a significant strengthening of the regional economy and employment;
- to ensure integration of land uses to provide a balanced, master planned marina resort environment;
- to protect the water quality of Shute Harbour;
- to improve linkages between the site and the transit terminal and the overall operation and perception of the precinct;
- to facilitate enhanced public transport linkages between Shute Harbour and Airlie Beach;
- to ensure the provision of high quality urban design standards for built form and landscaping, creating a coherent and sensitive overall design aesthetic;
- to protect important view corridors from Proserpine-Shute Harbour Road to nearby Islands;
- to provide a valuable addition to the social and recreational fabric of the region, providing a stronger community heart for Shutehaven residents and greater breadth of facilities for visitors to Shute Harbour;
- to provide public access to the Marina esplanade and Isthmus parkland, creating new foreshore access and views;
- to support Airlie Beach's role as the Whitsunday Island tourism hub;
- to increase the array of accommodation choices available to the community;
- to provide a long term management structure to maintain the marina and resort infrastructure at no cost to the community; and
- to further protection and communication of the site's indigenous and cultural heritage.

### **Background to Proposal**

The need for a marina at the current location in Shute Harbour has been identified for many years with proposals originally being mooted in the 1980s. In 1994 Shutehaven Marina Pty Ltd (Scotex) was granted a Special Lease and associated Permit to Occupy. Following 'prove up' of the validity of the project, Special Lease No 200573 and Permit to Occupy No 200056 were issued to allow the developer to proceed with a detailed EIS. The Special Lease and the new Permit to Occupy was transferred to the current Proponent in April 1998 and has been renewed so that it is current at the time of lodgement of this EIS.

An IAS was lodged in September 2003 which led to the previous development proposal being identified as a “significant” project requiring an EIS. The EIS was subsequently lodged on 20 April 2005 and advertised for public comment in June 2005. Following the submission and assessment of that EIS, the concept design was revised to take into consideration of substantial feedback from referral agencies comments and the public.

A revised concept for the new marina was proposed, and in July 2006 an IAS was lodged with the CG to be a project of significance pursuant to the SDPWO Act. On the 24 July 2006 the CG declared the SHMR a ‘significant project’ for which an EIS is required in accordance with Section 26(1)(a) of the SDPWO Act. This EIS has been prepared in accordance with the ToR, issued June 2007.

Elements of the previous marina design which have been superseded by the current proposal include:

- removal of the Transit Terminal and Ship Repair Facility;
- reduction in land based development;
- significant reduction in proposed dwellings;
- no development of land abutting Conway National Park;
- inclusion of a public esplanade along the entire frontage of the development, leading to a public park area at the southern end of the Isthmus;
- significant financial contribution to redevelopment of the existing boat ramp; and
- an increase in marina berths.

These elements were partly in response to the extensive community consultation undertaken for the development as described in the consultation report presented as Appendix F of the EIS.

### **Consequences of Not Proceeding with Development**

The consequence of not proceeding with the current development proposal has also been considered. If taken literally, and the entire development did not proceed, the consequences would be severe for the region as there are no other sites which could provide comparable benefits. It is considered that the Whitsundays would miss a significant opportunity to advance its identity and quality of life, and through the tourism economy conserve the area’s natural landscape and environmental values, for which the region’s growth is ultimately dependent upon.

At a local, functional level, failure to proceed would mean that the existing unsatisfactory public boat ramp interface with commercial marine traffic would remain unresolved, along with the undersupply of carparking. The opportunity to create a new ramp providing a safe route clear of commercial traffic would be forsaken, along with the creation of appropriate berthing and parking capacity at minimal public cost.

Not proceeding would deprive the local community, visitors to the area, and the regional economy of a range of associated net environmental, economic and social benefits. Such net benefits are documented in the Net Benefit Assessment, attached as Appendix D. Not proceeding would leave the foreshore areas including mangroves and sea grass communities undisturbed. However significant compensatory habitats, such as mangroves likely to colonise on the western side of the isthmus, fish habitats created in clean marina environments around the jetty structures, and the benefits of the seagrass friendly moorings funded by the “Reef Conservation Fund” ensure that a net environmental benefit is achieved.

As a tourism destination of local and international renown, expectations of visitors to the Whitsundays are becoming more demanding and sophisticated. A high quality, environmentally conscious marina resort is considered to be expected to ensure Shute Harbour maintains its role in the Whitsunday's economy. The current ad-hoc nature of the commercial built form and inappropriate foreshore activities of Shute Harbour is not conducive to providing that objective.

Failure to proceed with the development would deprive the region, the State and the country of the ability to better capitalise on the strategic importance of Shute Harbour, and would ultimately limit the number of visitors and decrease their overall satisfaction with the Whitsunday tourism experience.

### **Envisaged Time Scale for Implementation and Project Life**

SHMR will be developed in stages as described by the Drawings appended to this EIS and Gantt Chart presented in Section 3.1.3 'Project Duration and Timing'.

A Preliminary Approval will initially be sought for all land uses, overriding the current WSC Planning Scheme. The Preliminary Approval will seek approval of the SHMR Development Code including the Precinct Plan to provide a statutory basis for future approvals. This is presented in the planning report, attached as Appendix C.

The EIS also considers initial Development Permits for a Material Change of Use and Operational Works and provides the appropriate level of detail for these. These approvals are to enable the construction of the marina breakwaters, dredging of the marina and channels and reclamation of the land areas. Construction staging is discussed in detail within Section 3.4 'Construction' of the EIS.

Whilst construction of the marina is occurring, the detailed design work for the built form and subdivision will be undertaken in order to lodge relevant Development Permits. The built form precincts will also proceed in stages, commencing with the marina facilities and resort hotel, with future stage running from east to west.

It is intended that upon construction of the major development stages the land above the Mean High Water Springs (MHWS) will be progressively transferred to freehold, owned by SHMR. The land below MHWS is intended to be a 99 year seabed lease. The marina berths will be sublet to purchasers.

When the site is developed, the land will consist of a mixture of freehold (land above MHWS) and leasehold (marina). The freehold areas will be incorporated into a Community Titles Scheme, under the provisions of the *Body Corporate and Community Management Act 1997* (BCCM), which will deliver an enduring management structure for the benefit of all occupants of the project and limit the impact on public resources.

### **Establishment Costs and Actions Already Undertaken Within the Site**

Following the submission of the earlier EIS in 2005, substantial feedback was provided by both agencies and the community. A supplementary EIS was requested by the CG to respond to the submissions arising from the EIS proposal. Following the change of composition of directors and shareholders the project was subject to a detailed design review undertaken in order to address the areas perceived as causing community and agency concern.

The changes proposed were deemed to be of a scale that required a new assessment under the SDPWO Act. Subsequently a new ToR was released in June 2007 requiring technical studies to inform both the public and assessing authorities of the scope, benefits and impacts of the current proposal and of the measures proposed to mitigate potential impacts to result in an ecologically sustainable development. As such, substantial investment has been made by the Proponent in this EIS process in the order of \$4 million.

Within a Net Benefit Assessment, presented as Appendix G, the cost benefit analysis indicates that the cost to the Proponent to construct the SHMR is expected to total approximately \$254.4 million, with a present value of \$202.2 million.

This is a result of substantial design changes compared with the previous proposal including additional measures proposed offsite for improving the relationship of the development to the Shute Harbour Transit Facility and the development's net benefits to the region. For example the creation of a "Reef Conservation Fund" providing an ongoing funding stream linked to marina berth lease sales and ongoing contributions to be managed in conjunction with a local reference group. This shall also potentially support a Marine Interpretative and Cultural Heritage Centre.

## **1.4 The EIS Process**

### **1.4.1 Methodology for the EIS**

The SHMR was nominated to the Department of Infrastructure and Planning (DIP) to be a project of significance pursuant to the SDPWO Act. An IAS was submitted to the CG in July 2006 to present relevant information about the development to the public and agencies at the Local, State and Federal levels to determine the nature and level of its interest in the proposal. The IAS:

- was prepared to assist the CG to make a determination regarding the significant project declaration;
- was to facilitate the preparation of Terms of Reference for EIS for the proposal; and
- addresses relevant statutory approvals and processes that will be necessary for the proposal to proceed.

The IAS is presented as Appendix D.

The SHMR, declared a 'significant project' under Section 26(1)(a) SDPWO Act by the CG on 24 July 2006 required the preparation of a draft ToR which was released in August 2006 for public and agency comment. Publication of the Draft ToR was notified in print media (for example newspapers) and the CG website, and comments were invited on the Draft ToR. The final ToR was released in June 2007 having regard to all comments received on the draft ToR, which informed and directed the preparation of this EIS document.

The ToR essentially outlines the issues that should be considered in the preparation of the EIS. Furthermore, the ToR provides the framework for the EIS, including information on the purposes and role of the EIS and the factors considered to be most significant for the development proposal.

All potentially significant impacts arising from the proposed development have been investigated, and requirements for the mitigation of any adverse impacts have been detailed in this EIS.



For the purposes of this EIS, a definition of 'environment' has been adapted which includes social and economic aspects. The definition provided in Section 8 of the *Environmental Protection Act 1994* describes this and has been adopted throughout the assessment of values, impacts and mitigation measures. Environment includes:

- a. *"ecosystems and their constituent parts, including people and communities; and*
- b. *all natural and physical resources; and*
- c. *the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and*
- d. *the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c)".*

Technical studies assessing the potential environmental impacts of the SHMR have been ongoing since 2002. Initially these provided detailed information for past applications however as part of the current proposal, initial studies are now useful in determining background environmental conditions over an extended time period. The most recent (and relevant) technical studies appended to this EIS also address relevant issues raised by the community during the comprehensive public consultation process.

To meet the requirements of the EIS, a robust methodology was employed to ensure transparent and inclusive consultation and an effective, two-way, communication process during the drafting of the ToR and development of the EIS.

Two community information days were held to provide opportunity for community involvement and education, and allowing for the identification of broad issues of concern to the local community and interest groups. In addition a number of organised consultations with separate interest groups were conducted. These consultations are summarised in Section 1.5 'Public Consultation Process'.

The first community information day, held on 21 October 2006 described the preliminary marina design concept and the expected impacts on the surrounding area. The second, held on 18 August 2007, presented the findings of the EIS technical studies to date, providing a greater level of detail of the marina design, and impacts and mitigation measures. A further community consultation day will be held during public notification of the EIS, which will present the final marina design along with the EIS document and its findings. The community consultation process as it has been conducted within the EIS framework is illustrated in Figure 4. A report providing the overarching community consultation undertaken for the project is presented as Appendix F to the EIS.

Technical studies were undertaken between October 2006 and July 2008, providing detailed information in response to the requirements of the ToR. The studies, appended to this EIS document, were carried out by professionals within the related field of study, many of whom have had involvement in previous work in the Shute Harbour/Whitsunday areas. The EIS document has been prepared based upon the information provided in the technical studies.

Once the EIS has been prepared to the satisfaction of the CG, a public notice will be released and the EIS will be made available for public inspection. Submissions received will be assessed by the CG and the Proponent, and if deemed necessary, a Supplementary EIS will be prepared to address specific matters raised in submissions on the EIS.

After the public consultation period and submission of a Supplementary EIS if required, the CG must prepare a report evaluating the EIS and other related material pursuant to section 35 the SDPWO Act. The CG report will communicate conclusions reached on environmental effects of the project and mitigation measures taking into account all relevant information.

As the project involves development that would require an application for development approval for a Material Change of Use under the *Integrated Planning Act 1997*, the CG report may, under Section 39 of the SDPWO Act, state for the Assessment Manager one or more of the following:

- the conditions that must attach to the development approval;
- that the development approval must be for part of the development only;
- that the approval must be preliminary approval only.

Alternatively the CG report must state for the assessment manager:

- that there are no conditions or requirements for the project; or
- that the application for development approval be refused.

Further, the CG must:

- give reasons for the statements (above); and
- give the reasons to the assessment manager.

In addition to the decision by the CG, the Commonwealth Minister for Environment and Heritage will grant/refuse approval for the proposal under the EPBC Act, which is separate to the approval process pursuant to the SDPWO Act. A separate report will be released after the report by the CG, in which conditions may be attached to mitigate impacts on matters of National Environmental Significance.

#### **1.4.2 Objectives of the EIS**

The objective of the EIS is to provide information to community and decision makers on the concepts, aspects and impacts of the development proposal, through comprehensively identifying, evaluating, and providing mitigation for issues associated with the development.

The need for the development proposal has been demonstrated conclusively by the Proponent and is addressed in Section 2 'Project Need and Alternatives'.

To comprehensively identify relevant issues and appropriate mitigation measures, all potential environmental impacts of the proposal have been identified. Furthermore, appropriate infrastructure and facility requirements as well as design, construction and operational measures have been recommended to minimise or compensate for any adverse impacts as well as to further enhance benefits of the development proposal.

The EIS also serves the purpose of identifying all necessary planning and environmental approvals including requirements pursuant to State and Commonwealth legislation, and appropriately addresses these requirements.

It is noted that the EIS is not only a key environmental document providing advice to decision makers considering the approvals for the proposal, but is also crucial in informing the public. The EIS details the envisaged scope of the proposal, the acceptable levels of impacts (beneficial and adverse) on environmental values, and how environmental values will be protected and enhanced through the discussion of options and alternatives and their environmental management outcomes. It is relevant to reiterate here that the Proponent has considered the communities comments in the redesign of the SHMR development proposal following a previous EIS assessment process.

A series of environmental management plans have been prepared to detail the management measures which will be implemented to control and mitigate environmental impacts. The measures proposed within these plans incorporate the recommendations of the technical reports prepared to inform the design, construction and operation of the SHMR development proposal and support a favourable decision regarding the EIS.

### **1.4.3 Submissions**

The EIS will be advertised in relevant national, state and local newspapers. Over a 45 day public consultation period the public and private sector may make written comment to the CG.

The EIS will be forwarded to relevant Government agencies and made available to the wider community by:

- placement of paper and CD versions in publicly accessible locations, and
- access to electronic copies on the DIP's web page.

A properly made submission should be written, signed and received on or before the last day of the submission period. It is noted, however, that the CG may accept a written submission even if it is not a properly made submission (for example, it is anonymous).

The CG will provide a copy of all accepted submissions to the Proponent within 10 days of the completion of the submission period. Within 20 days of receipt of all accepted submissions (or longer if agreed by both the Proponent and CG), the Proponent must consider all submissions and provide the following to the CG.

- A summary of the submissions.
- A statement of the Proponent's response to the submissions.
- Any amendments of the submitted EIS because of the submissions.

The CG will subsequently consider the Proponent's summary of submissions, and give due weight to relevant points in the assessment of the EIS.

## **1.5 Public Consultation Process**

The SHMR is a major development for the Whitsunday area and the Proponent has used a multi-layered approach to consultation. The community engagement to inform the EIS is presented in Appendix F. Consultation activities have been directed to:

- government interests – Commonwealth, State and Whitsunday Regional Council;
- stakeholder interests – ranging from business and industry groups through to indigenous groups; and

- community interests – including community action groups, local interest groups, community liaison groups coupled with community information sessions and public displays to encourage local residents to have their say.

For all aspects, the approach entailed dissemination of detailed information about the project design and potential impacts to each of those groups through a range of media and communication techniques. The consultation process provided a number of opportunities for government agencies and community members to participate in consultation and to learn about the SHMR and its potential benefits and impacts.

Three Plus was commissioned by the Proponent to undertake community engagement for the development proposal. This role included:

- the development and maintenance of a stakeholder database;
- a toll free 24/7 1800 number;
- the coordination of community enquiries;
- a series of briefings and meetings with key stakeholders;
- Community Information Sessions for interested stakeholder clusters (residents, business, recreational boating);
- three community information days;
- three community newsletters;
- project shopfront (by appointment); and
- emails and an online feedback form.

Community engagement was implemented over a two year period (2006 -2008) and was underpinned by a commitment by the Proponent to open, transparent and inclusive consultation with key stakeholders and the wider Whitsunday region community.

A record of consultation was maintained by using best-practice<sup>1</sup> consultation database software, *Consultation Manager*, which enabled the project team to register all events, issues and stakeholder inquiries during the public consultation period from January 2006 to April 2008 (up to and excluding the public notification period that will be managed by the CG) and to action and track team responses.

During the EIS Phase, consultation was undertaken with key stakeholders and the wider community. The Action Plan, providing the consultation framework, and list of key stakeholders is provided in Section 5 of the consultation report presented as Appendix F. In summary these included:

- The (then) Whitsunday Shire Council (WSC);
- The (then) Bowen Shire Council;
- The Whitsunday Regional Council (WRC);
- Hon. Janice Jarratt (MP Whitsunday);
- Mr James Bidgood (Dawson Electorate);
- Tourism Whitsunday;
- Whitsunday Development Corporation (WDC);

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<sup>1</sup> Consultation Manager is an Australian Government Endorsed Supplier.

- (Whitsunday) Marine/Tourism Development and Queensland Transport, Maritime Safety Queensland;
- Charter Boat Industry Association;
- Shute Harbour Motel;
- Chocolate Fish;
- Fantasea;
- Whitsunday Rent-A-Yacht;
- Shute Harbour Residents Association;
- Save Our Foreshore;
- Residents Traffic Action Group;
- Whitsunday Sailing Club;
- Whitsunday Shute Harbour Secure Parking;
- Whitsunday Seagrass Watch;
- Order of the Underwater Coral Heroes;
- Sunfish Qld Inc;
- Engwirda Marine;
- Central Qld Land Council;
- GIA and NGARO/GIA;
- Proserpine High School;
- TAFE – Cannonvale;
- TAFE – Bowen/Townsville;
- Hamilton Island Enterprises;
- Qld Fire and Rescue Service;
- Qld Police Service;
- State Emergency Service;
- Youth – PCYC;
- GRMPA; and
- Previous Submitters.

During this period, 485 stakeholders registered their contact details. Based on stakeholder input and feedback, the community issues/values were identified, using Consultation Manager. The top ten community issues/values are presented in Table 2. In this context, an issue/value is defined as a topic that is raised during consultation (e.g. access) and is reported as a 'value'. It may be positive, negative or neutral.

**Table 2 Community Consultation Top Ten Issues/Values – Stakeholder Statistical Report: Total Events**

Issues	Events	Stakeholders Distinct	Stakeholders Total
Support - general	114	111	116
Business opportunities - EOI	70	70	72
Marina berths - general enquiry/ comment	46	48	49
Consultation - keep informed	44	66	89
Marina berth - EOI	32	32	32
Real estate - EOI	29	29	29
Traffic flow and access	25	35	35
Design - suggestion	23	23	25
Maintenance facility	23	26	26
Environmental impact - neutral	17	16	17
Events Matching Search	460	381	523

As represented in the above, the qualitative data gathered during the public consultation process has been used to generate the top ten community issues or values. 'Other issues' is represented as the highest issue/value reported (26.26%) and refers to issues/values that are either positive or negative (see Table 4 of Appendix F). and reported fewer than 17 times between January 2006 and April 2008. 'Other issues' includes reference, for example, to the size of the development, employment opportunities, environmental impact – negative, opposition – general, swing moorings and enquiry – general.

These issues are 'bundled' because they do not fall within the top 10 band. By comparison, general support for the project is the second highest 'significant' community value at 19.29%, based on anecdotal evidence that was recorded over 114 events (total events ≈ 461).

Another significant percentage of inquiry and feedback refers to general inquiries about business opportunities (11.84%), a marina berth (7.78%) and requests to be kept informed (7.61%). Expressions of Interest on a marina berth (5.41%) and the purchase of real estate (4.91%) are also represented in the top 10 issues/values. The top 20 values are included in Section 6 of the consultation report.

Overall, comment on construction impacts such as traffic flow and access (4.23%) and constructive comment on the preliminary design concept and the need for a maintenance facility (both 3.89%), as well as neutral comment on the environmental impact (2.86%), represents the least significant community issues/values.

However, this data should also be considered in conjunction with the results of the independent market research conducted by Footprints Market Research. For full reports see attachments to Appendix 4 of the consultation report. The research was commissioned by the Proponent at the end of the consultation process that informed the EIS, to ascertain community attitudes and values in relation to the proposed SHMR.

Two surveys were undertaken – a quantitative attitudinal telephone survey of 301 residents across the region in April 2008 and a qualitative telephone interview with 14 key stakeholders in May 2008.

Results of the quantitative attitudinal survey are summarised, as follows.

- Three quarters of residents (74%) surveyed feel that the proposed marina development would be of benefit to the local community.
- In terms of the full development concept, just over half of all residents (54%) support the development.
- In total, 29% of residents oppose the development, whilst 17% are undecided. This latter group feel they need either more information and/or reassurances that the environment will not be adversely affected by development.
- Residents who support the proposed marina development feel that it will be beneficial for the tourism industry.
- Concern for the environment is the key driver negatively impacting on support.
- In addition, one quarter of those opposed to the development (24%) feel that there are sufficient marinas to cope with demand.
- Those who become aware of the proposed marina development via their local paper are more likely to support the proposal. Those who become aware of the proposal via protest groups are more likely to oppose the development.
- Only 21% of residents were aware of the 'reef fund' component of the proposal at the time the survey was conducted. Those who are aware of the 'reef fund' are more likely to support the proposed marina development.

Fifteen key stakeholders were also invited to participate in a qualitative telephone interview during the final weeks of the EIS consultation. The Proponent's purpose in commissioning the interview was to ensure an independent research methodology informed the engagement with directly affected residents, property owners and businesses in the project area.

Fourteen stakeholders responded to the letter of invitation, although two declined to participate in the interview, choosing instead to provide written submissions.

The majority of key stakeholders who participated in the interview are either in favour of, or at least not opposed to the development. The development is seen as progress – a way to showcase Shute Harbour and increase tourism, bringing economic and social benefits to the area.

A summary of the findings (reasons for support and 'barriers' and concerns) and an evaluation (including recommendations based on assessment of qualitative data) is provided in Section 6.2.3 of the consultation report presented as Appendix F to this EIS, and listed below.

- The majority of key stakeholders are either in favour of, or at least not opposed to the marina development. The development is seen as progress – a way to showcase Shute Harbour and increase tourism, bringing economic and social benefits to the area.
- Two key stakeholders opposed or unsure of the development fear that the marina will negatively impact on their core business. They are Shute Harbour Motel and Fantasea Cruises. They require more knowledge of the planned elements via one-on-one consultation with the Proponent.
- Open and transparent communication between the Proponent and community groups as to how environmental impacts will be minimised will be beneficial, as will demonstrating a need for a development of this size. In short, the Proponent must demonstrate a certain sense of stewardship back to the local community.

Once the EIS is released for public comment, key stakeholders, lead Government Agencies and the wider Whitsunday community will have the opportunity to lodge a formal submission in response to the EIS.

## **1.6 Project Approvals**

### **1.6.1 Relevant Legislation and Policy Requirements**

#### **1.6.1.1 Summary of Applicable Legislation**

Commonwealth and State legislation and policy which are applicable to the proposed SHMR development include the legislation and Regulations listed below. The planning report, presented as Appendix C addresses in detail these regulatory provisions.

In summary, the regulatory assessment framework for the SHMR involves the interaction of legislation and statutory instruments which operate at various levels, namely:

#### Commonwealth Legislation

- *Environment Protection and Biodiversity Conservation Act 1999; and*
- *Great Barrier Reef Marine Park Act 1975 and the associated Whitsunday Plan of Management 2005.*

#### State Legislation

- *Integrated Planning Act 1997 including State Planning Policies and subordinate components, and*
- Other legislation incorporated through the IP Act through the inclusion of various activities as "assessable development" or requiring separate approvals including:
  - *Fisheries Act 1994;*
  - *Environmental Protection Act 1994;*
  - *Land Act 1994;*
  - *Dangerous Goods and Safety Management Act 2001;*
  - *Nature Conservation Act 1992;*
  - *Coastal Protection and Management Act 1995;*
  - *Transport Operations (Marine Safety ) Act 1994;*
  - *Transport Operations (Marine Pollution) Act 1995;*
  - *Marine Parks Act 2004;*
  - *Maritime Safety Queensland Act 2002;*
  - *Transport Infrastructure Act 1994;*
  - *Fire and Rescue Service Act 1990;*
  - *Vegetation Management Act 1999;*
  - *Building Act 1975; and*
  - *Aboriginal Cultural Heritage Act 2003.*



### 1.6.1.2 Relevance to the Development

Each relevant legislative instrument is briefly described below, and the relevance to the development is identified.

#### ***Environment Protection and Biodiversity Conservation Act 1999***

The EPBC Act seeks to protect the environment, particularly matters of National Environmental Significance (NES). The EPBC Act streamlines national environmental assessment and approval processes, protects Australian biodiversity and integrates management of important natural and cultural places.

The EPBC Act requires the Proponent to refer the proposed action to the Commonwealth DEWHA for assessment of impacts against matters of NES if the Proponent believes such matters would be affected.

The matters of NES identified in the EPBC Act are:

- National Heritage places;
- World Heritage properties;
- Ramsar wetlands of international importance;
- Migratory species protected under international agreements;
- Nationally threatened species and ecological communities;
- Commonwealth marine environment; and
- Nuclear actions.

#### **Relevance to Shute Harbour Marina Resort**

Part of the SHMR site is located within the Great Barrier Reef World Heritage Area (GBRWHA), that is those parts below low water (taken to be MLWS), and includes threatened species and communities as detailed in the stand alone report on Matters of NES attached as Appendix E.

The Proponent submitted a referral to the Minister for the Environment and Heritage in accordance with the provisions of the EPBC Act. The Minister declared the project to be a 'controlled action' on 27 July 2006.

The EIS process under the SDPWO Act has been accredited by the Commonwealth for the purpose of environmental assessment under the EPBC Act.

The controlling provisions are:

- Sections 12 and 15A (World Heritage);
- Sections 18 and 18A (Listed threatened species and communities);
- Sections 20 and 20A (Listed migratory species); and
- Section 23 and 24A (marine environment).

#### ***Great Barrier Reef Marine Parks Act 1975***

The *Great Barrier Reef Marine Parks Act 1975* (GBRMP Act) provides for:

- the establishment of the Great Barrier Reef Marine Parks Authority (GBRMPA);
- establishes the marine park; and

- provides a framework for the management and planning of the Great Barrier Reef Marine Park.

Under the *Great Barrier Reef Marine Park Regulation 1983*, permits are required for activities inconsistent with the marine park zoning and are assessed in conjunction with the State Government under the MP Act.

#### Relevance to Shute Harbour Marina Resort

Most of the GBRMP, generally that part seaward of 3 nautical miles from the Queensland coastline, is also a Commonwealth marine area. The *Great Barrier Reef Marine Park Zoning Plan 2003* is the primary planning instrument for the conservation and management of the Marine Park. The Zoning Plan takes account of the world heritage values of the Marine Park and the principles of ecologically sustainable development. Under the *Great Barrier Reef Marine Park Regulation 1983*, permits are required for activities inconsistent with the marine park zoning and are assessed in conjunction with the State Government under the MP Act.

As the Habitat Protection Zone of the GBRMP is located seaward of the SHMR site, the development will not require approval under this Act, but it is expected the GBRMPA will be an advice agency for works within the GBR Coast Marine Park, nominally the waters within 3 nautical miles seaward from MLWS (refer to Section 3.3 'Location').

#### ***Integrated Planning Act 1997***

The objective of the *Integrated Planning Act 1997* (IP Act) is to provide a framework to allow for integrated planning and development assessment with the aim of ensuring that that development and its effects are managed in a way that is ecologically sustainable. The purpose is to achieve Ecological Sustainable Development through improved coordination and integration of planning at the local, regional and State level by managing the process by which development occurs and the effects of development on the environment.

To this purpose the IP Act provides a system of integrated approvals required under certain legislation known as the Integrated Development Assessment System (IDAS).

IDAS provides a staged assessment process that includes:

- application stage;
- information and referral stage;
- notification stage; and
- decision stage.

Schedule 8 of the IP Act prescribes certain development to be assessable or self assessable. Assessable development defined under a local government planning scheme are processed through the IP Act.

Not all legislation/approvals are processed by means of the IP Act. For example, the *Marine Parks Act 2004* (MP Act), and certain provisions of other Acts including the *Dangerous Goods and Safety Management Act 2001* (DGSM Act) require separate approvals/permits to be obtained.

Under the IP Act it is a requirement to provide properly made applications. One element of a properly made application is the signature of the owner of the land, and for certain operational work, resource entitlement is required rather than owner's consent. The resource entitlement required and the entity that provides that entitlement is contained within schedule 10 of the *Integrated Planning Regulation 1998* (IP Regulation).

Applications made pursuant to IP Act are assessed through the Integrated Development Assessment System (IDAS). The IDAS has four basic steps for the assessment and approval of development applications, as shown below.

- (1) *Application Stage*: the stage where the application is lodged with the Assessment Manager (usually the local government).
- (2) *Information and Referral Stage*: the application is forwarded to the Referral Agencies and the extent of information provided with application is reviewed. During this stage the assessment manager and any Concurrence or Advice Agencies may request further information and particulars about the proposal.
- (3) *Notification Stage*: is the stage in which an impact assessable application is publicly advertised and comments on the proposal are invited from the community.
- (4) *Decision Stage*: is the stage in which the Assessment Manager makes a decision on whether the application is to be approved, often involving negotiation with the Applicant. After making a decision, the Assessment Manager advises the Applicant and any Submitters and referral agencies of their decision.

The IDAS process involves the following participants.

- The *Applicant*: the person or company responsible for lodging the application.
- The *Assessment Manager* is responsible for assessing and deciding the application and is usually the Local Government (Council), but may be a State Government agency depending upon the types of development involved.
- A *Referral Agency* is usually a State Government agency. There are two types of Referral Agencies: Concurrence Agencies (who to assess the application against legislation and policies which have been incorporated into the IDAS); and Advice Agencies (who provide advice to the assessment manager about specific issues). A Concurrence Agency has the ability to influence the ultimate decision and impose development conditions, which differs from an Advice Agency who has no devolved powers in the assessment process.
- A *Submitter* is a person, group or organisation who makes a submission about an impact assessable application to the assessment manager during the notification stage of IDAS. A properly made submission secures appeal rights for the submitter against the Assessment Manager's decision and/or conditions imposed.

The IP Act also contains provisions that require that local government planning documentation to reflect any additional regional plans and the State Planning Policies. A regional strategic plan has been prepared for the LGA of the Whitsundays.

#### Relevance to Shute Harbour Marina Resort

The Act allows for assessment of the following legislation/policy through the IDAS:

- *Environmental Protection Act 1994*;
- *Coastal Protection and Management Act 1995*;
- *Transport Infrastructure Act 1994*;
- *Transport Operations (Marine Safety) Act 1994*;
- *Marine Parks Act 2004*
- *Nature Conservation Act 1992*;
- *Fisheries Act 1994*;

- *Fire and Rescue Service Act 1990;*
- *Vegetation Management Act 1999;*
- *SPP 2/02 Planning and Managing Development involving Acid Sulfate Soils; and*
- WSC Planning Scheme.

A range of development types, approval triggers and statutory agencies have been incorporated into the IDAS. Development assessed under State legislation is listed in Schedule 8 to the IP Act, whilst Schedule 2 to the IP Regulation prescribes the referral agencies and their jurisdiction for various aspects of development assessable under IDAS.

It is relevant to note links are provided between the approval process of the IP Act and the SDPWO Act. The report by the CG under the EIS provisions of the SDPWO Act becomes a concurrence response under IP Act for the development requiring a Material Change of Use (MCU). As such the EIS process replaces parts of IDAS, principally the EIS assessment process overrides Stages 2 to 4 of IDAS, with the requirement to lodge a properly made application remaining.

As a development proposal may encompass a range of matters which fall under several pieces of legislation, Schedule 8A to the IP Act also identifies the Assessment Manager for a Development Application based on the combination of developments proposed. Local Government predominantly acts as the Assessment Manager as development commonly involves assessment against a Local Government Planning Scheme.

A summary of the role of agencies for the purposes of the IP Act is provided at the end of this section and also contained in the planning report attached as Appendix C.

#### ***Fisheries Act 1994***

The objective of the *Fisheries Act 1994* (Fisheries Act) is to provide for the management, use, development and protection of fisheries resources and fish habitats and including the management of aquaculture activities. It is also encompasses provisions relating to the prevention of shark attacks and for other related purposes.

The Fisheries Act and its subordinate regulations seek to regulate fisheries and protect fisheries habitat through the declaration of protected Fish Habitat Areas (FHAs) and protection of marine plants.

#### **Relevance to Shute Harbour Marina Resort**

Dredging or development of any areas containing marine plants has the potential to damage these marine plants and thus, approval is required under Item 29 of table 2 of schedule 2 of the IP Regulation with the Department of Primary Industry and Fisheries (DPI&F) as the concurrence agency. Thus, applications required for this development will be made through the IDAS process with the DPI&F as a concurrence agency.

No FHAs have been declared within Shute Bay.

#### ***Marine Parks Act 2004***

The MP Act provides for marine parks and the conservation of the marine environment amongst other purposes. The MP Act and regulations enable the declaration of Marine Parks and regulates activities contained within those designated areas or parks.

The Habitat Protection Zone of the GBRMP is located seaward of the landward boundary of the coastline pursuant to the Queensland *Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004*. Permits are required for commercial activities in the Marine Park and are issued jointly with those issued by the GBRMPA.

#### Relevance to Shute Harbour Marina Development

The development is within the boundaries of the GBR Coast Marine Park. Aspects of the development will require permits under the MP Act for:

- building works;
- reclamation; and
- dredging.

Thus, these components will require separate permits to be lodged under the IP Act, MP Act and the GBRMP Act.

#### ***Dangerous Goods and Safety Management Act 2001***

The DGSM Act regulates locations involved in the manufacture, storage or sale of Dangerous Goods and provides a number of obligations to minimise the risk of hazards associated with such materials. Part 4 of the *Dangerous Goods and Safety Management Regulation 2001* (DGSM Regulation) provides regulatory provisions for storage of flammable and combustible liquids such as fuel.

The overall objective of the DGSM Act is to protect people, property and the environment from harm caused by hazardous materials, particularly dangerous goods. The requirements of the DGSM legislation increase as the quantity of dangerous goods stored at any premises exceeds specified amounts. Premises are classified into one of four categories as the quantity of dangerous goods or hazardous materials increases:

1. Small quantities – minor storage workplaces (a minor storage workplace refers to ‘a workplace that is not a major hazard facility or a dangerous goods location, where stated dangerous goods or combustible liquids are stored or handled’);
2. Medium quantities – dangerous goods locations (DGLs);
3. Large quantities – Large Dangerous Goods Locations (LDGLs); and
4. Very large quantities – major hazard facilities (MHFs).

#### Relevance to Shute Harbour Marina Resort

The refuelling facility within the marina precinct will require approval and licensing by the Council under the provisions of the DGSM Act. Council is required to assess compliance with required standards for such matters as location to protected works, equipment used and fire protection systems.

#### ***Nature Conservation Act 1992***

The *Nature Conservation Act 1992* (NC Act) and its subordinate regulations provide specific protection for Queensland’s flora and fauna. It seeks to achieve this through an integrated and comprehensive conservation strategy for Queensland that involves:

- gathering of information and community education;
- dedication and declaration of protected areas;
- management of protected areas;

- protection for native wildlife and its habitat;
- use of protected areas to be ecologically sustainable; and
- recognition of interests of Aborigines and Torres Strait Islanders in nature and their cooperative involvement in its conservation.

Protected areas defined under the NC Act include:

- National Parks (scientific);
- National Parks;
- National Parks (Aboriginal land);
- National Parks (Torres Strait Islander land);
- National Parks (recovery);
- Conservation parks;
- Resource reserves;
- Nature refuges;
- Coordinated Conservation areas;
- Wilderness areas;
- World Heritage Management areas; and
- International Agreement Areas.

International Agreement Areas include areas of significance declared under another Act such as Ramsar wetlands.

Wildlife (flora and fauna) can be declared under the NC Act within regulations in the following classes according to section 71 of the NC Act:

- extinct in the wild wildlife;
- endangered wildlife;
- vulnerable wildlife;
- rare wildlife;
- near threatened wildlife;
- least concern wildlife ;
- international wildlife; and
- prohibited wildlife.

Management of wildlife is further regulated under a number of plans and regulations. The *Nature Conservation (dugong) Conservation Plan 1991* and *Nature conservation (whales and dolphins) Conservation Plan 1997* take effect under the NC Act as do the regulations of Nature Conservation Protected Areas.

Certain triggers under the IP Act for development either in or located near a protected area require that the Environmental Protection Agency provide advice regarding aspects relating to the protection of values of that park, in this case the Conway National Park (Conway NP).

### Relevance to Shute Harbour Marina Resort

The Conway NP is adjacent to the development site and is a 'Protected Area' pursuant to NC Act. The SHMR site contains an area on the north side of the State-controlled Road that is adjacent to the Conway NP. It is intended that this parcel of land be returned to public ownership.

Certain triggers under the IP Act for development either in or located near a protected area require that the EPA provide advice regarding aspects relating to the protection of values of that park, in this case the Conway NP.

Approvals are required under the NC Act should any endangered, rare or vulnerable wildlife be found on site requiring relocation.

### ***Coastal Protection and Management Act 1995***

The main objectives of the *Coastal Protection and Management Act 1995* (CPM Act) are to:

- i. provide for the protection, conservation, rehabilitation, and management of the coast, including its resources and biological diversity;
- ii. have regard to the goal, core objectives and guiding principles of the National Strategy for Ecologically Sustainable Development in the use of the coastal zone;
- iii. provide, in conjunction with other legislation, a coordinated and integrated management and administrative framework for the ecologically sustainable development of the coastal zone; and
- iv. encourage the enhancement of knowledge of coastal resources and effects of human activities on the coastal zone.

The CPM Act provides for the protection and management of the coast by preparing coastal management plans and declaring coastal management districts as areas requiring special development controls.

Various triggers contained within the IP Regulation exist for approvals to be required for development pursuant to the CPM Act. These triggers require assessment to be made under the provisions of the Act and relevant Coastal Management Plans.

The aspects of development include:

- i. natural coastal, riverine and estuarine processes, including for example, erosion and accretion, wave and tidal current, littoral drift, tidal prism and tidal inundation;
- ii. natural topography and drainage of coastal land including, for example the integrity of dune systems and natural surface runoff;
- iii. coastal wetlands and other coastal ecological systems including, for example, the wildlife, biological diversity and water quality of the wetlands or systems;
- iv. places or objects that have cultural heritage landscape, historical, anthropological, archaeological or aesthetic significance or value; and
- v. public access to the foreshore

Provisions are also contained within Section 105 of the CPM Act that includes the State and any regional coastal plans such as State Planning Policies for the purposes of the IP Act.

Removal of quarry material from state land will require approval of a resource allocation or approval of a dredge management plan under the provisions of the CPM Act. In deciding to approve either an allocation or dredge management plan the criteria contained in Section 75 of the CPM Act must be considered. The criteria include:

- State and regional coastal management plans;
- impact of the removal including:
  - supply of sediments,
  - physical integrity,
  - existing allocations, and
  - ecologically sustainable development of land or watercourses on land.
- effect on environmental values including water quality objectives;
- impact of removal and placement of spoil in regard to:
  - fish habitats, and
  - Marine Parks.

Schedule 8, Table 4, item 5 of the IP Act specifies that operational work for tidal work or work of a certain type in a coastal management district is assessable under the IP Act.

#### Relevance to the Shute Harbour Marina Resort

While the Draft Mackay-Whitsunday Coastal Management Plan describes and maps Coastal Management Districts, the Erosion Prone Area is identified by the Beach Protection Authority. Erosion Prone Area maps currently identify the location of the transitional Coastal Management Districts.

Assessment under the CPM Act is required for when there is a MCU under the Planning Scheme or a Reconfiguration of a Lot (ROL) is to be made for a development. For this development to proceed, both a MCU and ROL are required.

Dredging to form the marina basin and access channels, including any maintenance dredging, will require the provision of a resource allocation or approval of a dredge management plan pursuant to section 100A of the CPM Act for works on State coastal land.

In assessing either the dredge management plan or allocation, policies of the State Coastal Management Plan (State Coastal Plan) and Draft Mackay-Whitsunday Regional Coastal Plan (draft Regional Coastal Plan) must be considered.

Operational works that require approval under the CPM Act specified in Schedule 8, item 5, of Table 4 include:

- tidal works (including prescribed tidal works in a Local Government Tidal Area);
- interfering with quarry material on State coastal land above the high water mark;
- drainage across state coastal land; and
- reclaiming land under tidal water.



### ***Transport Operations (Marine Safety) Act 1994***

The *Transport Operations (Marine Safety) Act 1994* (Marine Safety Act) seeks to provide a system that achieves an appropriate balance between regulating the maritime industry to ensure marine safety, and enabling the effectiveness and efficiency of the Queensland maritime industry to be further developed.

In particular, the objectives of the Marine Safety Act include the establishment of a system so that marine safety can be effectively planned and managed allowing for the regulation of a range of matters in relation to the operational management of maritime activities.

#### **Relevance to Shute Harbour Marina Resort**

Development in or of certain areas adjacent to navigable waters must be referred to Queensland's Department of Transport, Maritime Safety to ensure that they are not likely to cause an impact or safety risk. The IP Act specifies that Operational Works that are Tidal Works or Prescribed Tidal Works are referred for approval pursuant to the Marine Safety Act.

Thus, the Maritime Safety Queensland (MSQ) (within the Department of Transport) will be Concurrence Agency for this development application.

### ***Transport Operations (Marine Pollution) Act 1995***

The *Transport Operations (Marine Pollution) Act 1995* (Marine Pollution Act) aims to protect Queensland's marine and coastal environment by minimising deliberate and negligent discharges of ship-sourced pollutants into coastal waters by seeking to achieve this purpose through:

- (i) providing an approach to protecting Queensland's marine and coastal environment from ship-sourced pollutants complementary to the approach of the Commonwealth and other states;
- (ii) making provision about the discharge of sewage from ships;
- (iii) giving power to deal with shipping casualties that are polluting, or are threatening to pollute coastal waters;
- (iv) enhancing, through education processes, industry and community awareness of the effects of ship-sourced pollutants on Queensland's marine and coastal environment; and
- (v) providing for the imposition of severe penalties on persons who pollute Queensland's marine and coastal environment in contravention to the Act.

The *Transport Operations (Marine Pollution) Regulation 1995* seeks to prescribe various matters pursuant to the Act.

#### **Relevance to Shute Harbour Marina Resort**

Regulations require vessels to have provision for containing waste including sewage. Offences are created for discharging such wastes into coastal locations such as marinas.

### ***Transport Infrastructure Act 1994***

This *Transport Infrastructure Act 1994* (TI Act) provides a regime for planning and management of transport infrastructure relating to roads, rail, ports and busways. It provides regulation of development that will impact on state controlled roads. The development is proposed along a state controlled road and the development will require referral to the Department of Main Roads (DMR).

#### Relevance to the Shute Harbour Marina Resort

The development will require referral to the DMR for assessment under triggers provided within the IP Regulation.

Resource entitlement may also be required for works within a State controlled road that interfere with a state resource. Schedule 10 of the IP Regulation lists the State Resources and the entity that provides entitlement to that resource. The DMR is the relevant Department to provide resource entitlement for applications made pursuant to the IP Act.

Subordinate legislation to the TI Act includes the *Transport Infrastructure (Public Marine Facilities) Regulation 2000*. This regulation contains provisions for the operation of public boat ramps and state harbours. This development will contribute financially toward the establishment of a new public boat ramp facility.

Furthermore, *Transport Infrastructure (State Controlled Roads) Regulation 2000* requires the approval of encroachments and ancillary works listed in schedule 1 of the regulation. The development is located along a State controlled road will require approval in accordance with the provisions of this regulation.

### ***Maritime Safety Queensland Act 2002***

The *Maritime Safety Queensland Act 2002* (MSQ Act) establishes the Maritime Safety Queensland (MSQ) Agency which provides advice and functions related to marine safety.

#### Relevance to the Shute Harbour Marina Resort

The MSQ administers provisions of this Act and subordinate legislation of this Act and other Acts in relation to marine activities such as the Marine Pollution Act as previously discussed.

### ***Fire and Rescue Service Act 1990***

The *Fire and Rescue Service Act 1990* provides for fire safety requirements for certain occupancies amongst other things. Obligations exist for persons to ensure that certain buildings have the required fire safety requirements.

#### Relevance to the Shute Harbour Marina Resort

Applications for marina developments are required to be referred for assessment under this legislation.

### ***Native Title Act 1993***

The *Native Title Act 1993* is a continuation of Commonwealth legislation reflecting the High Court decision recognising occupation of Aboriginal and Torres Strait Islanders prior to European Settlement.

### Relevance to the Shute Harbour Marina Resort

A special lease was issued in August 1995 for development purposes under the now repealed *Land Act 1962* for this site. This lease was renewed in 2007 in accordance with the *Native Title Act 1993*. The issuing of the special lease is classed as an exclusive possession act which extinguishes native title pursuant to Section 20 of the *Native Title Act 1993*. However, while freehold and leasehold property is not affected by this legislation, works outside of these areas will require notification.

### **Aboriginal Cultural Heritage Act 2003**

The purpose of the *Aboriginal Cultural Heritage Act 2003* (ACH Act) is to provide effective recognition, protection and conservation of Aboriginal cultural heritage. The legislation is applicable to providing a duty of care and in the development of management plans or treatment of areas.

### Relevance to the Shute Harbour Marina Resort

Gia and Ngaro traditional owners have been involved in the consultation process and studies have been conducted on the subject site with Gia and Ngaro field officers.

The proposed SHMR will assist Gia and Ngaro peoples through the opportunity to:

- participate in and share economic prosperity and cultural tourism opportunities;
- support the intrinsic benefits of governance and culture in community capacity building;
- maintain generational celebration and learning of cultural heritage traditions, language and expression;
- contribute to functional and resilient families and communities; and
- provide generational 'care for country', while showcasing Indigenous pride and knowledge to local, regional and international tourists.

While no artefacts or other information have been discovered for this site, the legislation will be applicable should any artefacts or other information be discovered on site during any of the scoping or development phases.

As the development is a significant project, a Cultural Heritage Management Plan is required and has been completed as part of this EIS.

It is strongly asserted that the Cultural Heritage Management Plan, now approved and registered by the Department of Natural Resources and Water (DNRW), will contribute to positive long term outcomes for at least two Indigenous peoples – the Gia and Ngaro communities – at a local community level.

### **State Development and Public Works Organisation Act 1971**

The object of the SDPWO Act is to provide for state planning and development through a coordinated system of public works.

The SDPWO Act provides for environmental assessment of major projects in Queensland and is the controlling legislation for this project at the state level. The SDPWO Act provides the power for the CG to designate major projects as "significant projects" and for these to be coordinated through environmental assessment provisions contained in section 26 of the SDPWO Act.

Following finalisation of the EIS, the CG prepares a report. This report may recommend the refusal or approval of the project and impose conditions. This report and conditions become a concurrence response for the purpose of the IP Act and replace the information and referral and notification stages of the IDAS of the IP Act. The office of the Coordinator General is the authority responsible for coordinating the EIS process.

#### Relevance to the Shute Harbour Marina Resort

This proposal has been declared a significant development for the purpose of this legislation and requires an EIS process to be undertaken in a manner required by the legislation. The EIS process under this Act is the accredited process for Commonwealth approval under a bilateral agreement.

#### ***Environmental Protection Act 1994***

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

The EP Act contains provisions that allow the regulation of certain activities and matters, obligating everyone to have an environmental duty, creating offences of environmental harm and providing policies relating to certain matters. Current policies relating to water, noise, air and waste exist. These are the:

- *Environmental Protection (Water) Policy 1997 (EPP Water);*
- *Environmental Protection (Noise) Policy 1997 (EPP Noise);*
- *Environmental Protection (Air) Policy 1997 (EP Air);* and
- *Environmental Protection (Waste Management) Policy 2000 (EPP Waste).*

The EP Act also provides provisions for contaminated land and provides a list of activities where notification is required to the Environmental Protection Agency (EPA) should these activities be conducted.

The *Environmental Protection Regulation 1998 (EP Regulation)*, provides a schedule of activities that require development approvals and requirements for registration certificates to be held. These are Environmentally Relevant Activities (ERAs) and include activities such as dredging and operating a Marina. These activities are administered by the EPA or the Local Government depending upon circumstances prescribed in section 39 (Devolution of powers- environmentally relevant activities) of the EP Regulation.

#### *Environmental Protection Policies*

These policies form part of the standard criteria to be considered by the Administering Authority (in this case the EPA) when making decisions under the EP Act.

#### EPP (Water)

This policy provides the framework for the identification of environmental values of waters and has allowed for the development of Queensland’s Water Quality Guidelines. The policy also allows for the protection of waters through offence provisions and to enable decisions regarding planning schemes or development to consider the provisions of the policy.

In regard to this proposal, offences exist under the policy for the release of soil or sediment or other contaminants to water through either the construction or operation of the facility.

### EPP (Noise)

This policy is relevant in identifying the acoustic environment to be protected.

### EPP (Air)

This policy specifies air quality indicators and goals to protect environmental values.

### EPP (Waste)

This policy provides a strategic framework for managing waste. The policy provides a waste management hierarchy to be considered when in the decision making process in order to minimise the impact of waste in the community and on available resources. Waste provisions are also supported in the *Environmental Protection (Waste Management) Regulation 2000* and the *Environmental Protection (Interim Waste) Regulation 1996* and provide the management of waste required.

### Relevance to the Shute Harbour Marina Resort

The ERAs that have been identified in regard to this development are:

**ERA 11a:** Crude oil or petroleum storing in tanks or containers having a combined total storage capacity of:

- (a) 10,000L or more but less than 500,000L
- (b) 500,000L or more.

**ERA 19c:** Dredging material – dredging material from the bed of any waters (other than dredging by a port authority for material for which a royalty or similar charge is not payable) using plant or equipment having a design capacity of:

- (a) Not more than 5,000t per year
- (b) 5,000t or more but less than 100,000t a year
- (c) 100,000t or more a year

**ERA 73:** Marina or sea plane mooring – operating a commercial marina or facility for mooring sea planes, including any land-based buildings or works used in association with the marina or mooring -

- (a) for less than 20 berths or moorings;
- (b) for 20 or more, but less than 100, berths or moorings; or
- (c) for 100 or more berths or moorings.

The quarrying of sand to provide materials required on site is also governed by the EP Act. The locations where material is to be sourced have existing ERA approvals for extracting material.

Development approvals for the abovementioned ERAs are required. These are to be assessed under the Standard Criteria of the EP Act specified in the schedule of definitions.

Operators of ERAs are required to hold registration certificates pursuant to the EP Act. Applications for registration certificates will be applied for following approval of the development.

Item 29 of Schedule 2 of the EP Act lists petroleum product or oil storage in underground tanks of more than 200L capacity or above ground tanks in quantities of more than those listed below, as being a notifiable activity for the purposes of contaminated land provisions of the EP Act. A time frame exists for notification once the activity has commenced:

- (i) Class 3 of packaging group 1 or 2 of more than 2,500L;
- (ii) Class 3 of packaging group 3 of more than 5,000L; or
- (iii) Combustible liquids of more than 25,000L.

The commencement of ERA 11(a) will require notification be made to the EPA under the requirements of section 371 of this Act.

Under the provisions of the IP Act and triggered through item 20 of table 3 and item 38 of table 2 of Schedule 2 of the IP Regulation, the development is required to be assessed against the provisions of the EP Act as it is located within 100m of a wetland. The development will be required to be assessed against all matters of the standard criteria that relate to the protection of wetlands. The EIS process will be used to make this assessment.

The development of any environmental management plans shall be required to be consistent with the provisions of the EP Act and its subordinate policies and regulations.

### ***Vegetation Management Act 1999***

The *Vegetation Management Act 1999* (VM Act) seeks to regulate the conservation and management of vegetation communities. Within this legislation regional ecosystems (RE) are defined as a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil.

The purpose of the VM Act is to regulate clearing of vegetation in a way that conserves:

- remnant endangered regional ecosystems;
- remnant of concern regional ecosystems;
- remnant not of concern regional ecosystems; and
- vegetation in declared areas.

The Act is also intended to:

- ensure clearing does not cause land degradation;
- prevent the loss of biodiversity; and
- maintain ecological processes while managing environmental effects and reduce greenhouse emissions.

To achieve this purpose requires the development of codes. Regional codes provide guidelines describing acceptable outcomes of when and how vegetation can be removed for development amongst other purposes.

### **Relevance to Shute Harbour Marina Resort**

The SHMR investigation shows approximately 2.59 hectares of woody (remnant and regrowth) vegetation would be affected, of which 1.8 hectares is 'remnant' vegetation. RE mapping shows RE 8.1.1 (1.65 hectares) and RE 8.12.14 (0.05 hectares) /8.12.5 (0.1 hectares) on the portion of the development site seaward of Proserpine-Shute Harbour Road. These RE are considered to be remnant and "not of concern".

Should the proposed site be considered an “Environmental Use” as it is vacant land, irrespective of its “Public Purpose” designation under the Whitsunday Planning Scheme, then referral to the Department of Natural Resources and Water is required for an IP Act approval. Irrespective of this, vegetation removal is considered within this EIS.

For urban or non urban areas on State Land, Table 3 of the Policy “*Concurrence Agency Policy for Material Change of Use, 20 November 2006*” is applicable.

Where the vegetation to be removed is “*not of concern*”, the application is assessed against the particular code for the development. Part S of the Vegetation Management Code for Coastal Bioregions is applicable for developments that have been declared significant projects under the SDPWO Act. Significant projects are considered a relevant purpose under the VM Act.

A property vegetation management plan will be required to accompany an application to clear any assessable vegetation.

### ***Land Act 1994***

The *Land Act 1994* consolidates laws relating to the administration and management of non-freehold land, deeds of grants in trust and the creation of freehold land and other related purposes.

The Department of Natural Resources and Water administers the *Land Act 1994* and is required to determine whether the proposed use is:

- a suitable use under the conditions of the existing lease;
- provide resource entitlement on state land; and
- determine appropriate tenure.

### **Relevance to the Shute Harbour Marina Resort**

The proposed development site is State land. The proponents were issued a lease pursuant to the *Land Act 1994* covering the site. This lease was issued for the purpose of constructing a marina and reclamation for residential, commercial and tourism purposes.

Resource entitlement to undertake works is required on State land. IP Act applications require resource entitlement instead of owners consent for certain operational works. Schedule 10 of the IP Regulation lists the resource entitlements and the entity to provide the entitlements.

The *Land Act 1994* is applicable for the registration of properties created through the reconfiguration or otherwise produced as a result of reclaiming land under water.

### ***Building Act 1975***

The *Building Act 1975* makes provision for assessment of developments through the IP Act. These assessments are dependent on the class of building (s) to be developed. The *Building Act 1975* calls up a set of Building Codes and Australian Standards which all building must comply with. These codes deal with structural design, fire and safety considerations and regulations.

### Relevance to Shute Harbour Resort

Building(s) will require approval from the Council the Queensland Fire and Rescue Authority or in some cases a private certifier depending on design. Once the development plans as been finalised, referral requirements can be identified.

#### **1.6.1.3 Assessment Manager for Approvals**

As described more fully in the Planning Report, the determination of the Assessment Manager for IP Act approval is dependant on the definition of the local government area. While the local government area which is normally defined as the area above the high water mark, the local government boundary ends 50m seaward of MHWS by definition of prescribed tidal work. This development however, seeks works that extend well beyond that mark.

Section 3.1.7 (1) (a-b) of the IP Act identifies that the Assessment Manager for an application mentioned in Schedule 8A is the entity stated for the application and administers and decides an application. However, subject to the inclusion of Referral Agencies, the Assessment Manager may not assess all aspects of the development for the application.

As the land subject to the development proposal is not completely within the local government's planning scheme area, Section 3.1.7 (3) applies. This section provides that above subsection (1) applies and that the local government has the jurisdiction to assess the application in respect to prescribed tidal work in addition to any other jurisdiction it may have.

Under Schedule 8A, Item 1 (c), the Local Government is the Assessment Manager for prescribed tidal work partly within a single local government tidal area and in no other local government tidal area or port authority strategic port land tidal area.

It is concluded that the proposed development best meets the tests of Section 3.1.7 (a-b) and Section 3.1.7 (3) as part of the land of the development application is within the boundaries of the Whitsunday Shire Planning Scheme, and includes development for prescribed tidal works. Pursuant to Schedule 8A Item 1 (c) it is concluded that the Whitsunday Regional Council is the Assessment Manager for the proposed development application because the land that is subject to the development application is partly in a single local government area and in no other local government tidal area or port authority strategic port land tidal area.

### Ministerial Designation

It has been concluded that the Whitsunday Regional Council is the applicable Assessment Manager in this instance. It is acknowledged that the drafting of the relevant IP Act provisions determining Assessment Manager appear to leave scope for interpretation. If it is considered that the interpretation offered is not sufficiently definitive, it is noted that the matter can be resolved by the Minister administering the IP Act. If this is to be the case it is suggested that this may form part of the CG's recommendations.

#### **1.6.1.4 Required Approvals**

As noted, the provisions of the SDPWOA modify the application of the IP Act in respect of the development approval process whereby the Information and Referral and Notification stages of the IPA are replaced by the EIS process under the SDPWOA. Therefore, while the CG report is taken to be a Concurrence Agency response under IDAS the referral status of the agencies is relevant as it informs the CG of the powers the agencies would have had for an IPA application, and it is the system understood by all stakeholders.



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Accordingly, the normal IDAS referral terminology has been used in this report for ease of reference and the following agencies have been identified as referral agencies pursuant to Commonwealth and State legislation.

A summary of required approvals, together with the specific trigger under the legislative instruments listed above, and the Agency involved in the assessment of the matter is provided in Table 3.

**Table 3 Table of Approvals Required**

Legislation	Reasons for approval	Specific trigger	Jurisdiction*
<b>Commonwealth</b>			
<i>Environmental Protection &amp; Biodiversity Conservation Act 1999</i>	Project has been declared a controlled action.	Section 67A of the Act requires action cannot be taken unless approval is given.	This EIS process under the SDPWO Act has been accredited by Department of Environment, Water, Heritage and the Arts.
<b>State</b>			
<i>Integrated Planning Act 1997</i>	Resource entitlement is required for: <ul style="list-style-type: none"> <li>leasehold land and other areas outside tenure of freehold land.</li> <li>works on a State-controlled Road.</li> </ul>	Section 12 of the <i>Integrated Planning Regulation 1998</i> .	DNRW to provide resource entitlement for leasehold land.  Department of Main Roads to provide resource entitlement on a State Controlled Road.
	MCU under the Whitsunday Council Planning Scheme.	Planning scheme provides the level of assessment. If a plan of development is approved under the Planning Scheme, then this will provide the basis for subsequent material change of use applications.	Whitsunday Regional Council (Assessment Manager).
	Reconfiguring of a lot.	Is assessable and cannot be made non assessable.	
	Operational works.	Planning scheme provides the level of assessment.	
<i>State Development and Public Works Organisation Act 1971</i>	Project declared a significant project.	Section 26 of the Act allows declaration of a significant project where EIS appropriate.	Office of Coordinator General to provide a report recommending decision and conditions based on this EIS.
<i>Environmental Protection Act 1994</i> 4	MCU for the commencement of ERA 19 Dredging. Registration certificate to be held by operator of activity.	Dredging in waters. Item 1, table 2 schedule 2 <i>Integrated Planning Regulation 1998</i>	EPA (Concurrence Agency).
	MCU for the commencement of ERA 73 Marina. Registration certificate to be held by operator of activity.	Operating a Marina. Item 1, table 2 schedule 2 <i>Integrated Planning Regulation 1998</i>	EPA (Concurrence Agency). Note that ERA 73 is normally devolved to local government except when undertaken on same site as a non devolved ERA.

Legislation	Reasons for approval	Specific trigger	Jurisdiction*
	MCU for the commencement of ERA 11a for the storage of fuel. Registration certificate to be held by operator of activity.	Storing Fuel. Item 1 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i> .	EPA (Concurrence Agency). Note that ERA 73 is normally devolved to local government except when undertaken on same site as a non devolved ERA.
	MCU for an urban purpose Within 100m of a wetland.	Item 20 of table 3 of schedule 2 of <i>Integrated Planning Regulation 1998</i>	EPA (Advice Agency).
	Reconfiguration of a lot within 100m of a wetland.	Item 38 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i>	
<i>Nature Conservation Act 1992</i>	MCU for an urban purpose as development within 100m of a protected area (Conway NP).	Item 40 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i> . Item 21 of table 3 of schedule 2 of the <i>Integrated Planning Regulation 1998</i>	EPA (Advice Agency).
	Reconfiguration within 100m of a protected area.	Item 39 of table 2 of schedule 2 of the <i>Integrated Planning Regulation 1998</i>	
<i>Coastal Protection and Management Act 1995</i>	Resource Allocation or Dredge Management Plan required for dredging.	Part 5 Div 1 of <i>Coastal Protection and Management Act 1995</i> (Non IP Act)	EPA (Concurrence Agency).
	Operational works- tidal works, & reclaiming land under tidal water including Prescribed tidal works.	Item 12 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i>	EPA (Concurrence Agency).
	MCU involving operational works or building works in a coastal management district	Item 6, table 3 of schedule 2 of <i>Integrated Planning Regulation 1998</i>	EPA (Concurrence Agency).
	Reconfiguring of a lot in a coastal management district	Item 13 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i>	EPA (Concurrence Agency).
<i>Transport Operations (Marine Safety) Act 1994</i>	Operational works that is tidal works	Item 14 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i>	Department of Transport - Maritime Safety Queensland (Concurrence Agency).
<i>Marine Parks Act 2004</i>	Permit required	Non IP Act.	EPA issues Marine Park Permits in conjunction with GBRMPA.

<b>Legislation</b>	<b>Reasons for approval</b>	<b>Specific trigger</b>	<b>Jurisdiction*</b>
<i>Fisheries Act 1994</i>	Disturbance to marine plants.	Dredging or building works that removes or damages marine plants Item 29 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i>	DPIF (Concurrence Agency).
<i>Fire and Rescue Service Act 1990</i>	Operational works that is Tidal work and involves a Marina.	Tidal work Item 17 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i>	Queensland Fire and Rescue Service (Advice Agency).
<i>Transport Infrastructure Act 1994</i>	MCU on land contiguous to a State-controlled Road.  Also applies for operational work, & reconfiguration.	Item 1 table 3 Schedule 2 of <i>Integrated Planning Regulation 1998</i>	Department of Main Roads (Concurrence Agency).
	Reconfiguration of a lot on land contiguous to a State-controlled Road.	Item 2 table 2 of schedule 2 of the <i>Integrated Planning Regulation 1998</i>	Department of Main Roads (Concurrence Agency).
<i>Dangerous Goods and Safety Management Act 2001</i>	Approval for the storage of flammable and combustible materials.	Licencing for storage of flammable and combustible liquids. Non IP Act.	Whitsunday Regional Council.
<i>Vegetation Management Act 1999</i>	Vegetation removal.  Although the land is designated Public purpose (an urban use) vacant land is considered "Environmental Use" and referral may be required if assessable vegetation to be removed.	Op works- Item 5 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i>  MCU- item 11 of table 3 of schedule 2 of <i>Integrated Planning Regulation 1998</i>  Reconfiguration- item 4 of table 2 of schedule 2 of <i>Integrated Planning Regulation 1998</i>	DNRW (Concurrence Agency).
<i>Native Title Act (Qld) 1993</i>	For works outside freehold or leasehold property where native title has not been extinguished.	Notification to be made	

<b>Legislation</b>	<b>Reasons for approval</b>	<b>Specific trigger</b>	<b>Jurisdiction*</b>
<i>SPP 2/02 Planning and Managing development involving acid sulfate soils Land Act 1994</i>	Dredging, excavation or filling in amounts exceeding specified volumes	Item 4 table 3 schedule 2 <i>Integrated Planning Regulation 1998</i>  Also a requirement of Whitsunday Shire Planning Scheme.	DNRW (Advice Agency).  Whitsunday Regional Council.
<i>Building Act 1975</i>	If buildings of a specified type referral is required to QFRA and/ or the Whitsunday Shire Council.	Item 1 table 1 schedule 2 <i>Integrated Planning Regulation 1998</i> .	Queensland Fire and Rescue Authority (Advice Agency). Whitsunday Regional Council .

\* Alternate Assessment Managers (under the IP Act) may be applicable depending on timing of applications and whether approvals are sought concurrently.

## 1.6.2 Program of Approvals

SHMR will be developed in stages. A Preliminary Approval overriding the Planning Scheme is to be sought for all land uses. The Preliminary Approval will seek approval of the SHMR Development Code including the Precinct Plan to provide a statutory basis for future approvals. The EIS also considers the first stage of Development Permits for MCU and Operational Works to be sought. These approvals are to enable the construction of the marina breakwaters, dredging of the marina and channels and reclamation of the land areas. Construction staging is discussed in Section 3.4 of the EIS.

The built form elements will be initially approved via a Preliminary Approval. Whilst construction of the marina is occurring the detailed design work for the built form and subdivision will be undertaken in order to lodge relevant Development Permits for MCU, Reconfiguration and Operational Works. It is imperative that the applications for development permit for the initial stages of built form and associated operational works can be considered whilst the construction of the marina is underway, reclaimed and the relevant sections of the lease converted to freehold.

The built form precincts will also proceed in stages, commencing with the marina facilities and resort hotel, with future stage running from east to west. As the Preliminary Approval would alter the level of assessment and the parameters for assessment through the SHMR Development Code, subsequent development permits for anticipated development would be either Code Assessable or Self Assessable, depending on the complexity of the use and compliance with the SHMR Development Code.

Subsequent development permits will be required for MCU and ROL applications which may include (but are not limited to) the following uses:

- Car park;
- Child Care Centre;
- Dual Occupancy;
- Dwelling House;
- Marina;
- Multiple dwelling;
- Office;
- Outdoor Recreation;
- Park;
- Professional Office;
- Resort Hotel;
- Restaurant;
- Shop.

It is envisaged that the approval process be completed in sequence.

(1) Initial Development Approvals for the SHMR (IDAS) – Combined Application:

- preliminary approval overriding the WSC Planning Scheme; SHMR Development Code including all Concept Master plan, proposed uses, Level of Assessment Table and development code;
- development permit – MCU (Marina incorporating MUC ERA 19 and 73);
- preliminary approval – MUC ERA 11;

- development permit – Operational Work:
  - staged construction of the breakwater walls;
  - revetment walls;
  - capital dredging of the marina basin and entrance channel; reclamation; and
  - associated works
- (2) Initial Development Approvals for the SHMR (Non-IDAS):
  - marine parks permit.
- (3) Phase 1 Development (IDAS):
  - uses and development parcels;
  - development permit/s – MCU Marina Resort (hotel + other commercial uses) and Car park;
  - development permit(s) – ROL Managed Resort Accommodation;
  - development permit(s) – MCU (where required under the SHMR Development Code) Managed Resort Accommodation buildings;
  - development permit – Operational Works:
    - maritime works: tidal works for marina (piles, pontoons etc);
    - internal works: civil construction of roads, services and building pads;
    - internal works: landscape Works; and
    - external works: external roads and services.
- (4) Tenure and Management Lots (Non-IDAS):
  - approval to progressively convert parts of lease to freehold (reclaimed land above MHWS); and
  - creation of Englobo lots as management lots.
- (5) Subsequent Development Stages (IDAS):
  - Uses and Development Parcels-
    - development permit/s – Material Change of Use (Other detailed proposals for components not applied for in Stage 1);
    - development permit/s – Reconfiguration of a Lot (Other detailed proposals for components not applied for in Stage 1);
  - Works-
    - development permit – Operational Works:
      - internal Works: Further civil construction of roads, services and building pads; and
      - internal Works: Further landscape Works.

The planning report provides additional detail required for regulating agencies to assess the planning framework prepared for the SHMR development proposal.

## CG Requested Outcomes

Upon assessment of the EIS, should the CG recommend approval of the project, a number of enabling recommendations will be required to facilitate more detailed legislative requirements. The CG report in response to this EIS will contain a wide range of recommendations considered necessary from a town planning perspective including the following.

## Tenure

- (1) Consolidation of leasehold areas in accordance with the request by SHMD Pty Ltd dated 10 March, 2008 to:
  - (i) incorporate the area of sea bed currently subject to the Permit to occupy;
  - (ii) relinquishment of the area of leasehold north of Proserpine-Shute Harbour Road (part of Lot 2 on SP117389 and Lot 273 on HR1757) to public ownership; and
  - (iii) issue of a replacement lease the terms of which provide for:
    - assessment of proposed uses and operational works against the SHMR Development code;
    - assessment to be undertaken by WRC in accordance with the IDAS process under the IP Act.
- (2) Provision of Resource Entitlements (prior to lodgement of initial Development Applications):
  - from DNRW for lease area to enable initial development applications are to be lodged;
  - from Department of Main Roads, for the areas of Proserpine-Shute Harbour Road over which development applications are to be lodged; and
  - from the Environmental Protection Agency, for the quarry material to be removed from the lease areas and access channel (for the dredging of the marina basin and access channel under the CPM Act).
- (3) Provision of Resource Entitlements (prior to the first phase of development applications):
  - From DNRW, for the areas of lease over which Development applications are to be lodged: (for MCU, Reconfiguration of a Lot and operational works over land to be reclaimed).
- (4) DNRW to authorise progressive conversion of leasehold areas above MHS to freehold at completion of earthworks stages fro reclaimed land (priority freeholding).

## Associated approvals, permits and administrative actions

- (1) Designation of the access channel as a navigation channel under the *Transport Infrastructure Act 1994* prior to submission of the Development Application seeking dredging work in the access channel.



### Local government: Area and Planning Scheme

- (1) The area of the consolidated lease to be designated as an Additional Territorial Unit under Division 3 of the *Local Government Act (1993)* for the purpose of defining the Local Government area and the jurisdiction of the Planning Scheme, to enable the making of a Development Application for Preliminary Approval overriding the WSC Planning Scheme to establish the SHMR Development Code in a timely manner, and the assessment of subsequent Development Applications against the Preliminary Approval;
- (2) If the inclusion of the area of the consolidated lease into the Planning Scheme is subject to significant delays, an infrastructure agreement between the proponent and the local authority will be entered into to confirm that Council will undertake informal assessment of proposed development applications against the provisions of the SHMR Development Code in the period prior to inclusion of the lease area in the Planning Scheme.
- (3) The making of consequential amendments to the Planning Scheme to update any areas of inconsistencies with the approval, such as the zone and overlay mapping.

### IDAS Matters

- (1) Designation of assessment managers as follows:
  - WRC as Assessment Manager for the Preliminary Approval under section 3.1.6 of the IP Act; and
  - WRC as Assessment Manager for the subsequent Development Permits for MCU, Reconfiguring a Lot and Operational Works made under the Planning Scheme.
- (2) Direction to the WRC regarding determination of the Preliminary Approval.
- (3) Identification of Concurrence Agencies for Development Applications.
- (4) Preliminary Approval conditions.
- (5) Development Permit for Operational Works conditions.

### 1.6.3 Planning Processes and Standards

This section provides the planning context and an assessment of the project's compliance with planning instrument of State, regional and local polices. A planning report has been prepared by Conics and this is presented as Appendix C.

The Whitsunday Hinterland and Mackay (WHAM) Regional Plan provides the strategic direction for guiding growth in the region over the next 15 to 20 years, while the local government planning schemes and policies of the Coastal plans are the main planning instruments.

There are a number of other policies, some of which are incorporated into the regional and local planning schemes which are relevant to this proposal and the relevant components of these have been assessed and mentioned in this section. The proposal is also assessed against both the transitional Local Government Planning Scheme and draft IP Act compliant schemes as both are currently relevant documents.

## State Planning Policies

While provisions of some State Planning Policies (SPPs) are called up through the IDAS of the IP Act as described in section 1.6.1, the planning policies generally set out the State government's interests in environmental management and development control. While the main purpose of SPPs is to shape Planning Schemes so that the State's requirements can be incorporated with those of Local Government's, SPPs are also relevant in the determination of Development Applications.

### *SPP1/02: Development in the Vicinity of Certain Airports and Aviation Facilities*

The intent of this SPP is to ensure that incompatible land uses do not compromise the function of key airports.

Preferred flight paths of the Whitsundays Airport located closest to the SHMR are adjacent to the site however this airport is of a small scale, privately owned and principally used as a base for charter flights. Further, the steep terrain adjacent to the site influences the local flight paths such that no flight path could be established low over the marina.

Other near airport and aviation facilities to the SHMR site are located off-shore on Whitsunday, Hamilton and Lindeman Islands. Due to the separation involved, there is no conflict between the development and the aviation operations.

### *SPP2/02 Planning and Managing Development involving Acid Sulfate Soils*

SPP 2/02 applies to all land, soil or sediment at or below 5 metres AHD where the natural ground level is below 20 m AHD where the excavation of, or otherwise removing, 100 m<sup>3</sup> or more of soil or sediment; or filling of land involving 500 m<sup>3</sup> or more of material with an average depth of 0.5 of a metre or greater.

The proposal involves the excavation of material on land less than 5m AHD and so this policy is relevant.

Management of potential ASS in earthworks and dredging operations is discussed in Section 4.1 'Land' of the EIS with the approach conveyed in an Acid Sulfate Soils Management Plan, presented as Appendix I3 of the EIS.

### *SPP 1/03 Mitigating the Adverse Impacts of Flood, Fire and Landslide*

The development is proposed for land that may be subject to floods. The Proponent will be required to meet the outcomes provided within the policy, to be assessed under applications made addressing the WSC Planning Scheme. This policy is not relevant for flooding due to storm tide inundation. This is addressed in the guideline *Mitigating the impacts of storm tide inundation* produced by the EPA.

While the requirements of the SPP are taken into account within the draft planning scheme Section 4.3 'Climate' of the EIS provides a response to these matters.

These responses conclude that the risks of adverse affects from these matters is low in this instance and the development location and design have taken sufficient regard of any potential risk.

*SPP 1/07: Housing and Residential Development (including Guideline)*

The SPP requires local governments to identify the housing needs of their community and, ensure that the Planning Scheme provides opportunities for a range of housing options that respond to the housing needs of the community. Preparation of the SHMR proposal and the SHMR Development Code has been undertaken with the objectives of SPP1/07 in mind.

**Coastal Plans**

*State Coastal Management Plan – Queensland’s Coastal Policy, August 2006*

Under the CPM Act, the State Coastal Management Plan and underlying draft Regional Coastal Management Plans have the status of State Planning Policies for the purpose of making and amending planning schemes and assessing and deciding development applications. The Coastal Management Plans seek to operate as a framework of desired outcomes, principles and policies which apply generally at the State level and are given more specific focus through the regional plans.

The effect of the development on coastal processes as required in Coastal Management Plans forms a major focus of the EIS and is addressed in rigorous detail in Chapter 4.5 Coastal Environment of the EIS, amongst other sections.

*Draft Mackay-Whitsunday Regional Coastal Management Plan 2006*

The Draft Mackay-Whitsunday Regional Coastal Management Plan provides direction for development management with the aim of protecting the unique ecosystem of the Mackay-Whitsunday Region within the framework of the State Coastal Management Plan. Accordingly the plan has the force of law to guide relevant decisions by State and local governments and the Planning and Environment Court.

It is a response to the growing demand for coastal residential and commercial development, and the challenge to protect local wetlands, flora, fauna, and erosion prone areas. Apart from providing environmental value, these resources contribute significantly to the social and economic well being of the region (EPA, 2006).

The draft Regional Coastal Plan addresses the following key coastal management issues for the region.

- Maintaining diversity of recreational opportunities to accommodate the diverse range of visitors.
- Planning and managing for natural coastal erosion processes.
- Maintaining biodiversity within the region.
- Balancing the need for urban expansion due to population growth with protection of environmental resources in the region.
- Improving quality of water entering the GBRMP and World Heritage Area.
- Recognition of the social and economic importance of the ports, airports and identified marine transport facilities.
- Identification and protection of significant scenic coastal areas and species habitats in the region.

Specific key principles of the draft Regional Coastal Management Plan are described in Section 4.5 'Coastal Environment', along with aspects of the SHMR which support these principles. To demonstrate project need, Section 2 'Project Need and Alternatives' of the EIS identifies key planning principles which align with the SHMR development proposal.

## **REGIONAL PLANNING**

### **The Whitsunday Hinterland and Mackay (WHAM) Regional Plan 2005**

The WHAM Regional Plan was established to provide a holistic and integrated approach to recognising and addressing the economic, social and environmental elements, issues and opportunities of the region. The key components of the WHAM Regional Plan include the following.

- A Regional vision that provides a conceptual image of what the WHAM region and its communities should desirably look like in the future.
- A summation of the key issues and opportunities facing the region.
- A set of Integrated Regional Goals and Strategies, aimed at achieving the Regional Vision, considering the following themes.
- Regional identity, leadership and management.
- Environment and natural resources.
- Economic development.
- Social infrastructure.
- Settlement pattern.
- Infrastructure.
- Transport.
- A Regional Structure Plan that sets out the preferred physical arrangement for the region, including settlement pattern and infrastructure servicing.
- A list of Regional Priorities to guide the implementation program.

The WHAM Regional Plan seeks to consolidate all future urban development within existing urban centres and promote development which enhances quality of life and protects the key values of the region. In terms of economic initiatives, the plan intends to promote the diversification of the tourism industry in order to reinforce the region's status as the pre-eminent tourist destination in Queensland.

Whilst not a statutory planning document in that it does not contain regulatory provisions, the WHAM Regional Plan provides key goals and implementation strategies which lay out the future direction for urban development in the region. These goals and strategies focus on a range of issues including environment and natural resources, economic development, social infrastructure, settlement pattern and transport.

The priorities and goals of the WHAM Regional Plan delivered by the Shute Harbour Development are assessed in detail in the planning report, situated as Appendix C in this EIS, and are described to justify the proposal in Section 2 'Project Need and Alternatives' of the EIS.

### **Whitsunday Growth Management Initiative**

The Whitsunday Growth Management Initiative was established by the Queensland Government and the WSC, to ensure a proactive response to rapid growth and development within the Whitsunday Shire (DIP, 2007). While it is particularly focused on the high growth areas of Cannonvale and Airlie Beach, the strategy is relevant for the surrounding localities as well.

The Growth Management Initiative is currently still under review, however the Growth Management Group has released its Strategic Infrastructure and Services Plan for the Whitsundays, of which key aims are outlined in planning report in Appendix C. Alignment with this regional plan is described in Section 2 'Project Need and Alternatives' to demonstrate that key growth management objectives are delivered by the SHMR proposal.

### **Mackay Whitsunday Regional Tourism Investment and Infrastructure Plan**

The Mackay Whitsunday Regional Tourism Investment and Infrastructure Plan 2006- 2016 (MWRTIIP) was developed to determine real opportunities for sustainable growth within the region, with the aim of creating collaborative opportunities for private and public sectors (Tourism Queensland and the Department of Tourism, Fair Trading and Wine Industry Development, 2006). The planning report presented as Appendix C details how the key aims are delivered by the SHMR proposal.

### **Whitsunday 2015: A Whitsunday Shire Economic Development Strategy**

A Whitsunday Shire Economic Development Strategy is an economic planning document that has been developed by the WSC and WDC.

Whitsunday 2015 aims to produce positive economic and social outcomes in the Whitsunday Shire by building on the region's competitive advantages whilst balancing the management of the environment and national parks and fostering community cohesion.

### **Whitsunday Destination Management Plan**

The Whitsunday Destination Management Plan has been developed to ensure the future of the tourism industry in the Whitsundays and Great Barrier Reef.

This plan supports the development of a sustainable and ecologically 'friendly' tourism industry and promotes industry growth whilst aligning with the environmental and sustainable obligation guidelines set out by the Government.

As provided in the planning report presented as Appendix C, the proposed SHMR is aligned to the goals and strategies of the Whitsunday Destination Management Plan through the following means:

- promoting the Whitsunday's as a desirable holiday experience in domestic and international markets;
- ensuring more effective distribution of travel information, products and services to the trade and consumers;
- identifying and facilitate the development of infrastructure and services that are appropriate to the needs of visitor s and residents; and
- promoting the value and importance of sustainable tourism practices.

## Shute Harbour Planning Strategy Interim Report – Issues and Directions

The Shute Harbour Planning Strategy Interim Report – Issues and Directions released in draft form in June 2007 (Jackson Planning, 2007) identified the strategic context and existing local conditions for Shute Harbour, and investigates likely future conditions and the desirable future role for Shute Harbour.

The intent of the study was to aid the direction of development of the entire Shute Harbour precinct. SHMR supported the intent of the study and was represented in the engagement process, however significant concerns were raised regarding the process undertaken in the study by a number of the participants, as well as some who were not aware of or invited to the workshops. These concerns were documented in a submission provided by SHMR dated 31 July, 2007, and presented in the planning report, attached as Appendix C.

To date, no official feedback has been received in relation to this, nor, it is understood, any other submissions to the study. As the EIS process for the SHMR had already formally commenced, the completion of the study was put on hold pending the completion and assessment of the EIS. The report has remained as an Interim Draft study since its release.

As previously identified in the justification for the SHMR, this interim planning study identifies Shute Harbour as a major tourist and freight facility and access point for the Islands and Great Barrier Reef. This role is supported by other maritime and tourist related uses with the residential enclave of Shute Haven relatively independent of these functions.

The future role and character for Shute Harbour is based on a set of relevant principles which has driven the planning and design of all components of the current proposal including:

- that Shute Harbour should continue to provide important maritime based services to the Whitsunday Region;
- the area's natural landscape and environmental values are acknowledged as extremely important assets to both the tourism industry and the community, and these values should be maintained and protected;
- public (recreational) access to the foreshore and water should be improved;
- future development should be designed to an appropriate scale and height that avoids visual intrusion and negative environmental impacts; and
- proposals outside the urban footprint and general port area should demonstrate that there is a need for the proposed facilities and their development would not compromise the visual and environmental values of Shute Harbour and should consider policy directions.

The SHMR has been designed with clear awareness of the above principles and conforms to the issues and directions of the interim planning study by demonstrating strong demand for a marina at this location and its ecological sustainable design and best practice construction and operational management techniques. It is noted that the interim planning study cannot be employed in the assessment of the current proposal but is highlighted herein to verify that the Proponent has considered future planning direction of the region in its proposal.

## LOCAL PLANNING

### Transitional Planning Scheme

Although WSC amalgamated with Bowen Shire in 2008 becoming the newly formed WRC, the current Scheme in force relevant to the proposed development site remains the Whitsunday Transitional Planning Scheme 2000. A draft of an IP Act compliant Scheme was publicly exhibited in late 2007 but is yet to be gazetted. As a result, the development has been reviewed against the provisions of both Schemes.

A detailed assessment of how the SHMR meets the criteria contained in the planning scheme has been conducted and contained within the planning report in Appendix C.

The subject site has been specifically nominated as a marina site within the Strategic Plan mapping which was consistent with previous investigations undertaken over the site. The subject site is specifically identified as a 'Possible Tourist Facility Focus' Preferred Dominant Land Use and includes a "Possible Tourist Facility Node that is of urban nature".

It is clear that a range of associated tourist accommodation and visitor and recreation uses were specifically envisioned for the subject site in support of the marina – which is consistent with the proposal. It is intended that these nodes be provided with full urban services and designed to be sympathetic to their waterfront and/or National Park setting and prominent positions at the main road and sea entries to the town. Development is intended to be encouraged where it meets a demonstrated community need.

Full urban services are proposed and the development has been designed in sympathy with both the waterfront and National Park setting. The planning report and EIS has demonstrated strong demand for marina berths, tourism accommodation, quality charter boat facilities and local recreational facilities such as cafes, upgraded boat ramp, parking and safety, as well as the need to support the Transit Terminal's critical role in the Shire. The proposal is considered to meet all of these needs.

The plan outlines a range of elements pertinent to the design and approval considerations for the development. These show that the SHMR has incorporated these elements in the following ways.

- Built forms remain low rise and subordinate to the landscape of foreshores, hill slopes and knolls, as viewed from the ocean and major coastal vantage points by incorporating built form predominantly less than 3 stories in height.
- Landscaping and built forms which integrate with and reflect the natural landform and reinforce the tropical, heavily treed nature inherent in the coastal village character, as reflected in forested hillslopes, mangroves and foreshores by incorporating extensively landscaped areas. Mangroves are expected to colonise on the western edge of the isthmus and the integrated nature of the development and the marina plaza in particular will be reflective of a coastal village atmosphere.
- Layouts that maximise public access to the ocean front, open spaces and commercial facilities by incorporating extensive esplanade boardwalks and public access to the ocean front. The boardwalk runs from the marina plaza, providing public access to the commercial areas of the development in a village atmosphere.

- Development themes, scales and character compatible with or complimentary to surrounding designations. The marina resort has been designed to compliment the transit terminal and considered to be a key catalyst in the overall integration of the precinct, contributing to the public boat ramp, and coinciding with separate plans for a significant upgrade of the Transit Terminal. The scale of the development is considered to be in keeping with the context of the surrounding area, as discussed above. The combined precinct will be much more in keeping with the critical role that Shute Harbour fulfils for the region and the State.
- Direct property access is minimised through use of design measures such as service roads and property amalgamation. A single intersection is proposed to the realigned Shute Harbour Rd at a safe location. No direct property access is proposed. Shute Harbour road will be safer as a result of the development.

The proposed development has been assessed against, and meets the stated objectives and performance criteria of, the Possible Tourist Facility Focus PDLU. The proposed development as planned will:

- ensure tourist facilities are of a scale, nature and character compatible with the natural and scenic features and desired character and amenity of the area;
- ensure development does not prejudice existing resort or ongoing attraction; and
- encourage sustainable land management practices that protect water, soil and the natural resources.

#### *Vision*

The Vision for the Shire, with which land use and development is intended to be consistent, is:

“A place where the diverse and unique atmospheres captured by the Shire’s:

- world renowned and pristine natural resources and pollution free climate;
- verdant and hilly coastline forming the backdrop to the Great Barrier Reef World Heritage Area;
- magnificent views of the beautiful but fragile aqua-marine ocean and Whitsunday Islands;
- opportunities for a diversity of quality coastal tourism activities which are socially, environmentally and economically sustainable;
- array of accessible and attractive boating and outdoor recreational opportunities;
- sustainable, low key, liveable, compact coastal urban villages and waterfront settlements consolidating the existing communities of Town of Whitsunday, Conway/Wilson, Dingo/Hideaway and contained by extensive rural and natural landscapes; and
- cultural and heritage values, images and identity, are identified, maintained and enhanced for future communities and tourists to appreciate”.

#### *Strategic Development Principles*

The planning report, presented as Appendix C, provides an assessment of the proposed development against the strategic principles of Environmental Management and Open Space, Shire Image, Provision of Social and Engineering Services, Land Use and Transportation Integration, Character and Identity, Employment and Economic Development.

- *Environmental Management and Open Space*



The proposal has undergone a detailed environmental impact study that addresses the design, construction and maintenance to ensure that there is minimal disturbance to the natural landform ecology and wildlife habitats. The EIS has demonstrated that the coastal habitats will not be degraded. The area north of Proserpine-Shute Harbour Road is to be protected and transferred to public ownership.

- *Shire Image*

The development responds directly to the strategic vision for the site, establishing a marina in accordance with the Strategic designation. The development enhances the Shire image through the following.

- Enhancing the gateway to the Whitsunday Islands and Great Barrier Reef through the construction of a world class marina and resort complex, catalytic effect on the enhancement of the marine transit facility and improved public access to the marina foreshore.
- Appropriate scale and height of development along the marina to provide for the demand of tourist accommodation in the region. The development intent and design is reflective of the coastal environment through use of design features, materials and landscaping. The development's environmental impact has been rigorously assessed in the EIS.
- The important vista from the Great Barrier Reef to the mainland, and from Proserpine-Shute Harbour Road out to the water has been maintained. The visual analysis presented in Appendix J of the EIS demonstrates that the proposed built form will have minimal impact on the view shed and important view lines.

- *Provision of Social and Engineering Services*

The SHMR is consistent with this principle as it makes efficient use of existing public infrastructure previously provided to Shute Harbour. The Proponent will be responsible for the cost generated for water supply, sewerage, roads, stormwater drainage, and associated utility infrastructure required by the development.

- *Land Use and Transportation Integration*

The proposed development plan addresses this issue and will assist the development of increased patronage on the existing bus service to Airlie Beach while providing two destination drivers for the route. The development also incorporates unrestricted and uninterrupted access to the foreshore via a prioritised pedestrian/cycle boardwalk and pathway.

- *Character and Identity*

The development will strengthen the character and identity of Shute Harbour, and the region.

- *Employment and Economic Development*

The proposed SHMR will provide approximately 821 FTE jobs to the region during construction with a value added contribution to the regional economy of approximately \$137.2 Million (\$105.3 M direct and \$42.3 flow on). Once completed the development will provide approximately 271 FTE operational jobs for the local community and additional value added annual contribution to the regional economy of \$37 Million (\$26.9M directly and \$10.1M flow on). Employment and Economic development are addressed in Section 4.13 of the EIS.

### *Zones and Assessment*

Lots 273 HR1757 & part of Lot 2 SP117389 of the proposed development site is included in the Public Purpose Zone. The water component (part of Lot 2 SP117389 + Permit to Occupy area) is undesignated.

The intent of the Public Purpose Zone is for:

- a) Crown land used for State and Local Government Purposes;
- b) National Parks and State Forests;
- c) Land owned by Council used for community purposes;
- d) Land under control of statutory authorities used for public or community purposes.

Land north of Proserpine-Shute Harbour Road comprising the land included in the Public Purpose Zone is to be relinquished from the lease and transferred back to public ownership, fully in accordance with the intent of this zone.

### **Draft Whitsunday Shire IP Act Planning Scheme**

The draft IP Act Planning Scheme was advertised in late 2007, attracting approximately 400 public submissions. The Draft Scheme has been subsequently reviewed by the former Whitsunday Shire Council and the new Whitsunday Regional Council taking the public submissions into consideration. It is understood that the review of the document was quite rigorous with a significant number of amendments being incorporated.

The draft scheme has since been returned to the DIP. It is understood that Council is currently liaising with the DIP to agree to final amendments. One of these submissions to the Draft Scheme was made by the Proponent with respect to the provisions in relation to the Shute Harbour area which included a number of apparent oversights. Whilst the amended version of the Scheme has not been released, it is understood that the content of the submission was generally accepted as being relevant to the area. The submission covered a number of aspects, however critical to the consideration of the development were the provisions which relate to the Shire Wide Strategies and the provisions directly related to Shute Harbour in the Local Strategies.

In order to make an assessment of the proposal in relation to the Draft IP Act Scheme, the provisions from the submission have been described in detail in the planning report in Appendix C. A full response to the Desired Outcomes for the site has been provided. As well, additions to the Shire Wide Strategies have been included in the submission.

### *Assessment Detail*

Pursuant to the draft IP Act scheme, the majority of the subject site is undesignated. Given that the uses incorporated within this proposal are located on land that is undesignated, the level of assessment for the proposed development under the IP Act planning scheme is considered to be Impact Assessable.

As the development area of the site is undesignated, the default provisions of the Scheme would include the land in the adjacent zone, being Open Space in this instance. While the intent of the Open Space Zone is relevant to adjoining land it is considered that the most appropriate zone for the proposed development is the Integrated Resort Zone code. Accordingly overall outcomes of this zone are discussed within the planning report in Appendix C.

The EIS has been based on an application for Preliminary Approval to override the Planning Scheme. A Development Code for SHMR has been proposed as part of this application.

The SHRM Development Code has incorporate elements of a range of codes included in the Draft IPA Planning Scheme, with provisions then specifically tailored in order for the land use controls to better respond to the attributes of the site, the surrounds and the development.

Accordingly the proposed provisions of the SHMR Development Code form the basis of future assessment of the project's development applications.

### **1.6.3.1 The SHMR Development Code**

Due to the scale of the development and the Strategic Intent for the site it is proposed for the future development be assessed against the proposed SHMR Development Code as part of the Preliminary Approval to override the Planning Scheme.

The Code will provide for additional and/or alternative Specific Outcomes to the Codes within the Planning Scheme.

The purpose of this Code is to provide a framework for managing the development of SHMR by:

- a) identifying the location of predominant land uses, and the delineation of precincts for the primary purposes of Marina, MRA, Resort Hotel and Marina Plaza, Marina Esplanade and Park, Access and Car Parking, Open Space and Future Maintenance Dredging Spoil Handling Area;
- b) identifying assessment categories for development being exempt, self-assessable, code assessable and impact assessable; and
- c) identifying codes for assessing self-assessable and assessable development, which specify appropriate standards of built form, amenity, and energy efficiency and minimizes environmental impact.

The SHMR Development Code will vary the effect of the WSC IP Act Planning Scheme for the development site, subject to the future Development Application for Preliminary Approval, pursuant to Section 3.1.6 of the IP Act by:

- a) stating the assessment categories for development that are different to the assessment categories for development stated in the Whitsunday Planning Scheme applying to the site; and
- b) identifying codes applying to development that:
  - i are different codes in the transitional and draft Whitsunday Planning Schemes; and
  - ii apply to development on the site differently to how codes in the Whitsunday Planning Scheme apply.

For the purposes of assessing the SHMR Development Code under the EIS, the Development Code has been prepared in accordance with the Draft IP Act Planning Scheme, in the anticipation that this will be the planning scheme in force at the time the Development Application for the Preliminary Approval is lodged. With respect to Section 3.1.6(3) of the IP Act the SHMR Development Code overrides the Whitsunday Planning Scheme, to the extent of any inconsistency with the planning scheme. The provisions of the Whitsunday Planning Scheme will apply to any areas not addressed by the Development Code.

The SHMR Development Code provides intents and outcomes for each of the precincts:  
The overall outcomes for the SHMR Development Code are:

- SHMR is an integrated, vibrant mixed-use centre that meets the needs of, and provides a rewarding experience, for residents and tourists;
- a range of accommodation dwelling choices, tourism and related commercial and retail activities focused around the marina, is provided;
- development is sympathetic to the coastal and natural environment;
- the scale and intensity of development is reflective of the surrounding coastal landscape and pedestrian orientation of the use;
- precincts have a sense of place based on their location, land use mix, interface with the natural environment, built form and proximity to the marina;
- precincts have a high level of amenity and embrace sustainable development practices;
- community facilities and social infrastructure directly support the community and visitor's needs;
- quality private and publicly accessible open space, active waterfront, recreational areas and landscaping soften the appearance of buildings and provide passive and active recreation opportunities;
- public access to an extensive marina esplanade network and breakwater parkland area is provided encouraging walking and cycling;
- the establishment of tourist facilities and services within or adjacent to tourist accommodation, to complement the use and enhance the attractiveness of the area is facilitated; and
- the viability and operation of the Shute Harbour Transit Facility and barge jetty is protected.

Precinct intentions are that the SHMR will provide for the establishment of an integrated marina and tourist resort and, together with the transit facility, this will act as a gateway to the Whitsunday Islands. A range of activities and uses such as small scale business and retail operations, cafes and restaurants, hotel and leisure uses and a range of dwelling choices will focus on the marina. Development will be intrinsically linked to its environment and will be sympathetic to the coastal landscape, whether viewed from the ocean, major coastal vantage points or Proserpine-Shute Harbour Road. The Resort will be linked aesthetically and functionally by buildings with complementary architectural themes, a waterfront promenade and high quality landscape and open space environments.

The SHMR Precinct Plan identifies five precincts, each with their own character and land use intent. SHMR Development Precincts are indicated on Figure 3, and described by Conics as the following.

- Precinct 1- Marina.
- Precinct 2-Managed Resort Accommodation.
- Precinct 3-Resort hotel.
- Precinct 4-Access and Carparking.
- Precinct 5-Openspace and Future maintenance Dredging Spoil area.

The SHMR Development Code is provided as an appendix to the planning report, presented as Appendix C to this EIS.

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## Conclusion

The design and assessment of the site is subject to an array of Commonwealth, State and Local legislation, plans and policies. These provide detailed guidance and considerations to be made regarding the manner in which any development must take place, and the criteria which need to be met in order to do so. The planning report, presented as Appendix C, has outlined this regulatory framework in detail in order to clarify the extent of relevant regulatory matters and to convey the manner in which the design and reporting has responded to this framework. It is contended that the development meets the intents of Local, Regional and State planning policies, and is in substantial compliance with all relevant regulatory mechanisms.

## 1.7 Accredited Process for Controlled Actions under Commonwealth legislation

A stand alone report entitled *Shute Harbour Marina Resort – Report on Matters of National Environmental Significance* by Cardno has been prepared in response to Section 1.7 of the ToR. The report has been presented as Appendix E to the EIS.

This report has been prepared in accordance with the Terms of Reference for an Environmental Impact Statement for the SHMR (formerly known as the Shute Harbour Marina Development), produced by the CG, June 2007.

The SHMR (or action) was referred to the then Commonwealth Department of Environment and Heritage (DEH) on the 17<sup>th</sup> of July 2006 for the Minister to determine whether Commonwealth approval is required for the action. A Decision Notice was issued on the 27<sup>th</sup> of July 2006 notifying that the proposal is a controlled action (i.e. requires Commonwealth approval) pursuant to Part 3, Division 1, of the EPBC Act. The controlling provisions were determined to be:

- Sections 12 and 15A (World Heritage);
- Sections 18 and 18A (Listed threatened species and communities);
- Sections 20 and 20A (Listed migratory species); and
- Sections 23 and 24A (Marine environment).

More specifically the SHMR has the potential to affect the following Matters of National Environmental Significance (Matters of NES):

1. the GBRWHA;
2. known and potential habitat for a diversity of listed threatened wildlife species; and
3. known and potential habitat for a diversity of migratory species listed under international agreements, including:
  - appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) for which Australia is a Range State under the Convention;
  - the Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment (CAMBA);
  - the Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); and
  - the Bilateral Agreement between the Government of Australia and the Republic of Korea for the Protection of Migratory Birds and their environment (ROKAMBA) .

The impact of loss of terrestrial and marine habitat will be mitigated and compensated through offsets and habitat gains as detailed in Section 2.5.3 of the report on Matters of NES presented as Appendix E of the EIS. Potential impacts on the above listed Matters of NES that may result from the SHMR include:

- major landform adjustment including the excavation of the marina basin to a depth of -5.2m AHD, the creation of an isthmus (approximately 5.7 ha) along the western boundary of the marina, construction of breakwaters along the marina's southern boundary and dredging of a marine navigational channel;

- direct physical impacts on seagrass communities, macroalgal communities, mudflat habitats, coral communities and fringing mangrove and saltmarsh vegetation as a consequence of the excavation of the marina basin and dredging of a marine navigational channel;
- direct physical impacts on fringing mangrove and saltmarsh vegetation as a consequence of the clearance of marine vegetation and associated development works;
- reclamation of tidal land for the purposes of constructing an integrated marina development including commercial, tourism and managed resort accommodation precincts (including internal roads and infrastructure) and supplementary 3 storey car park; and
- impacts upon Shute Bay and the GBRWHA, and marine fauna associated with maintenance dredging of the navigation channel and alterations to the patterns of usage of Shute Bay that will result from the establishment of the Shute Harbour Marina Resort.

The likelihood that the proposed SHMR would have a *significant impact* upon Matters of NES was assessed against the relevant criteria contained within the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines. The results of this assessment generally indicate that the proposed SHMR will not have a *significant impact* on Matters of NES that occur within and adjacent to the site. This assessment is based on the anticipated effectiveness of a number of environmental impact mitigation and management measures that are proposed as part of the SHMR, including:

- a Construction Environmental Management Plan which provides mechanisms in which environmental performance of the Shute Harbour Marina construction works can be measured and if required, provides procedures for identifying and implementing corrective actions;
- a Acid Sulfate Soils Management Plan that has been designed to ensure that no significant adverse impacts on the receiving environment occur as a result of the disturbance of actual or potential acid sulfate soils;
- a Marina Site Based Management Plan for various ERAs, associated with the marina, and provides an overarching framework for best practice environmental management for other ERAs that may be undertaken within the SHMR;
- a Stormwater Management Plan, provides details for the stormwater quality and quantity management of the proposed SHMR prior to discharge entering Shute Bay;
- a Waste Management Plan to ensure the SHMR does not adversely impact on the surrounding environment in terms of waster handling, storage and disposal; and
- a Marine Megafauna Impact Assessment and Management Plan which provides an assessment of the potential impacts of the SHMR on marine megafauna species and outlines management requirements aimed at ensuring the proposed development has minimal impact on marine megafauna.

The SHMR development also recognises the cultural importance of the GBRWHA to communities of Aboriginal or Torres Strait Islander origin. In this respect it is submitted that the SHMR development would not have a significant impact on the cultural heritage values of the GBRWHA. This assessment is based on an analysis of the following documents that form part of the SHMR EIS:

- *Indigenous Cultural Heritage Investigation, Shute Harbour Marina Development Project, Shute Bay, Whitsunday Shire*, prepared by Northern Archaeology Consultancies Pty Ltd and presented as Appendix S1 to the SHMR EIS;

- a Cultural Heritage Management Plan (CHMP), presented as Appendix S2 to the SHMR EIS; and
- *Cultural Heritage Management Plan – Shute Harbour Marina Development EIS Consultation Report*, prepared by the Hornery Institute and presented as Appendix S3 to the SHMR EIS.

The above reporting describes initial concerns were raised following consultation with Traditional Owners for the site (the Gia and Ngaro/Gia people) regarding the impact of the development on the region's cultural heritage. These concerns primarily related to the potential impact of the proposed development on culturally significant flora and fauna, the potential to uncover archaeological findings and the involvement of cultural representatives in the construction phase of the development. Through a consultative process a CHMP was developed that addresses these issues and demonstrates the high level of support for the project by the respondent parties.

The CHMP and the associated report that details the process by which it was achieved is a component of the EIS and has used the guiding principles and rationale of COAG's *Overcoming Indigenous Disadvantage – key indicators 2007* report to explore the determinants of net social benefit, which are aligned to the proposed SHMR and the aspirations initiatives agreed to in the CHMP.

While the SHMR does not address all indicators of disadvantage for Gia and Ngaro/Gia communities, it is closely aligned to three of the four headline indicators. This alignment is demonstrated through the potential positive impact on Gia and Ngaro peoples through the opportunity to:

- participate in and share economic prosperity and cultural tourism opportunities,
- support the intrinsic benefits of governance and culture in community capacity building,
- maintain generational celebration and learning of cultural heritage traditions, language and expression,
- contribute to functional and resilient families and communities, and
- provide generational 'care for country, while showcasing Indigenous pride and knowledge to local, regional and international tourists.
- It is therefore strongly asserted that the CHMP will contribute to positive long term outcomes for at least two Indigenous peoples – the Gia and Ngaro communities at a local community level.

The CHMP has been signed by the Gia and Ngaro/Gia people and the proponents. The CHMP has been approved and registered by the DNRW in April 2008.

The net impact of the SHMR upon Matters of NES will also be reduced by:

- the surrender of vegetated land to the north of Proserpine-Shute Harbour Road to public ownership, for potential incorporation into the adjoining Conway NP;
- creation of a "Reef Conservation Fund", which will complement the Commonwealth Government's Reef Rescue Plan, that will contribute to the ongoing sustainability of the coral reef including providing low impact to seagrass moorings on the reef as well as education and awareness initiatives;
- protection of the water quality of Shute Bay by providing appropriate sewage pump-out and refuelling facilities, and polishing of current stormwater runoff from Proserpine-Shute Harbour Road;
- relocation of 57 swing moorings and replace these with low impact to seagrass moorings;



- education of recreational boaters through an interpretative centre and education extension programs to assist in reducing potential detrimental impacts of recreational boaters on the reef by assisting locals, visitors and the recreational and commercial boating community to understand coastal processes and the marine environment and appropriate boating best practice; and
- the use of structures in the design of the SHMR that will encourage colonisation of marine fauna and fish passage.

It is also recognised that the EPBC Act aims to balance the protection of Matters of NES with society's economic and social needs based on the guiding principles of ecologically sustainable development. In this respect it is relevant as part of any assessment of the impact of the development upon Matters of NES to consider the social and economic benefits that would be derived from the proposal. As part of the EIS process a Net Benefit Assessment that provides an analysis of the action in terms of its environmental, social and economic costs and benefits was undertaken, and is presented as Appendix G to the EIS. The net benefit assessment determined that the SHMR would:

- provide a range of community, economic and environmental benefits including increased access and recreational space, employment and additional business activity across a range of industries; and
- contribute to a net, or overall improvement in the environmental conditions throughout the Whitsundays, valued through the increase of ecosystem services values and recreational value of the natural attributes of the Great Barrier Reef maintained as a result of the development.

Given the anticipated low likelihood of any significant impacts occurring on Matters of NES documented in Appendix E, and the environmental, social and economic benefits that would be derived, it was assessed that the action is consistent with the principal objective of the EPBC Act.

## 2. PROJECT NEED AND ALTERNATIVES

### 2.1 Project Need

The primary basis for the project is the continued strong growth in demand for marina berths. This demand has been evident for many years throughout Australia and internationally and is particularly strong in Queensland.

As early as 1996 the Whitsunday Tourism Strategy commented that:

*“inadequate facilities exist at present to service existing and growing boating needs. A new passenger terminal at Shute Harbour is necessary to provide improved service to islands and Reef”.*

The strategy identified the need for a vessel berthing facility to improve marine services, and passenger terminal facilities at Shute Harbour.

As outlined in the Planning report the attractiveness of the Whitsunday area for boating activities by a cross section of the population is providing a growing demand for marina and associated facilities.

The need for a marina at the current location in Shute Harbour has been identified for many years with proposals originally being mooted in the 1980's. In 1994 a Special Lease and associated Permit to Occupy was first issued. Shute Harbour is the central hub for marine traffic in the Whitsundays due to its proximity to resort islands and natural safe anchorage.

Given the trend of growing demand for marina berths, a *Whitsunday Region Marina Demand Analysis* (WMDA) was undertaken in 2001 by Brown and Root to identify the most appropriate locations for marinas in the Whitsunday region between and including Bowen and Mackay. Since then, it is evident that despite construction of Port of Airlie and other marinas expanding, demand is still outstripping supply.

#### 2.1.1 Marina Demand

In August 2006, Pacific Southwest Strategy Group (PSSG) were commissioned to undertake a current analysis of demand for a new marina in the region, taking into account extensions and construction of additional berths and marinas in the recent years. This Shute Harbour marina demand study was subsequently updated in February, 2008. The reports including the update are presented as Appendix H1 and H2 respectively.

The key findings identified that Queensland boat registrations have greatly increased over the period, exceeding 200,000 in January 2006 and 223,425 boats registered as of July 2007. Based on current growth it is forecast that boat registrations in Queensland will reach 247,500 by 2010 and 403,000 by 2020. Within the Mackay Statistical Division (SD), recreational boat registrations reached 18,685 at December 2007, up 1,670 (or 5.8%) from June 2006. Growth of recreational boat registrations was stronger in the Mackay SD than in Queensland overall for both total boat numbers and for boats greater than eight metres length for the period 2002 to 2007.

Based on the boat registration trends, PSSG has forecast that an additional 738 berths will be required by 2010 and 3,133 by 2020 within the Mackay SD (based on medium growth rates). These forecasts include the 121 berth unmet demand from 2005 noted in the 2006 report.

The 669 berth marina proposed for the SHMR will cater for about 90% of the additional berths required in the Mackay region by 2010 and 21 % of those required by 2020.

Further projections based on known projects for expansion of existing marina facilities, or provision of new facilities for the region show there are an additional 2,600 wet and dry berths in the planning stages (including SHMR) for the Mackay region.

Regional demand is forecast to be for an additional 3,133 berths by 2020. This suggests that without the construction of the SHMR there would be a shortfall of 1202 berths and even if SHMR were constructed a shortfall of 533 berths is still predicted in the region.

### **Large Vessels**

Of the 18,685 recreational boats registered in the Mackay SD at December 2007, 1,022 were from boats greater than 8 metres in length. The average annual growth trend for larger boats in the Mackay SD was 11.1 % per annum since 2001 compared to 6.5% for smaller boats. While still showing substantial growth, the PSSG updated report shows that the trend for larger boats has decreased to an annual growth of 6.4% in the Mackay SD. Boats larger than 8 metres typically require a mooring or berth for storage. Of the 669 marina berths proposed for SHMR, 193 berths are proposed for multi hull vessels. The relatively high percentage of allocations for multi hulled vessels is a reflection of the popularity of these vessels in the relatively calm waters of the Whitsundays.

A small number of berths have also been allocated to longer marine craft with lengths exceeding 25m (maximum length of 35m) to cater for a relatively limited ownership of vessels of this size. A single area near the refuelling area has been designed to accommodate the occasional visitation by 'super yachts' which tend to provide a marked stimulus to the local economy by virtue of the extensive provisions and supplies required for their operation.

### **Boat Ramp**

While the proposal does not include provision for a boat ramp directly as part of the SHMR development, the Proponent has proposed a financial contribution of \$2.5 million towards the construction of a new boat ramp and car and trailer parking facility which will substantially increase capacity and improve the safety of marine users.

The current public boat ramp is located adjacent to the Shute Harbour Transit Facility (SHTF), however it is severely constrained in size and location, being positioned between the commercial barge facility and the commercial ferry services. The creation of a new boat ramp facility would greatly enhance the overall operation of Shute Harbour precinct, and would provide an appropriate public benefit. The WRC has provisionally indicated that it is satisfied with the location of the proposed new boat ramp and carparking facility, subject to consideration of the overall development proposal, the location of which is presented as part of Figure 2.

### **Charter Boat Hub**

A major feature of the marina will be the presence of a number of charter boat operations for which SHMR is well suited. A purpose designed charter boat base will provide upgraded customer facilities.

Appendix C containing the planning report discusses the opportunity by the Proponent to provide marine charter facilities. The marina will provide for the needs of charter boat customers and operators as an important element of its design which is likely to become an important focus of the operation of the marina. Marine based activities are likely to be a key attractor for many of the tourists utilising the resort accommodation and Marina Plaza precinct.

The marina will provide refuelling, sewage pump out and waste management facilities which are essential to the marina and charter boat operations.

### **2.1.1.1 Community Support**

Reasons stated by the community for supporting the SHMR development, are provided below following an extensive consultation exercise as summarised in Section 1.5 'Consultation' and detailed in the consultation report presented as Appendix F of the EIS.

- Good for tourism (27%).
- Will add value to the area (14%).
- Improved facilities for boats (11%).
- Will provide more berths and anchorages (9%).
- Creates jobs (7%).
- Will provide entertainment activities for locals (6%).
- Will reduce cost of berths (5%).
- Will provide better infrastructure (4%).
- Long term need for it (3%).

### **2.1.2 Accommodation**

Whilst the need for a quality marina utilising the safe harbour characteristics of Shute Harbour forms the underlying rationale for the development, it is essential that a range of accommodation and other land based facilities are provided to complement and support the marina, such that the balance of uses work together in an integrated manner.

#### **Resort Hotel**

The Resort Hotel precinct is the centrepiece of the land based development. It includes and integrates with the Marina Plaza precinct to the east, enhancing the public realm and creating a focus for the marina. The Resort Hotel Precinct provides short-term accommodation which may include a range of hotel facilities such as a bar and dining, conference, spa and other indoor and outdoor recreation facilities.

#### **Managed Resort Accommodation**

The MRA precinct constitutes the majority of the land based development, located along the frontage of the marina and in the area to its immediate north. Development in this precinct is intended to provide a high quality environment with a tropical, residential tourism character. Development is to provide for a range of tourism accommodation choices to service the visitors to the Whitsunday Region, whilst helping to provide a critical mass of custom required to sustain the vitality and viability of the social and commercial uses associated with the Marina Plaza.

A range of lower rise residential uses are anticipated within the waterfront areas of the MRA precinct, such as villas, terraces, townhouses, dual occupancies and multiple dwellings.

### The Demand

AEC were commissioned to examine the demand for the Resort and MRA proposed for the development, in the context of current and future demand and supply projections. The accommodation demand assessment is provided as Appendix H3 to the EIS.

In summary, the report found that the Whitsunday Tourism Region (WTR) is currently experiencing high rates of overnight visitor growth and high occupation ratios, with percentages of growth and occupancy well above the Qld average. Despite a significant number of developments planned or under construction, there was found to be sufficient market demand for the accommodation to be provided at SHMR.

The SHMR accommodation demand assessment shows that:

- in 2007 a total of 1,499 room nights (5,190 visitor nights) were available;
- there was demand for 1,235 room nights (4,277) visitor nights; and
- this resulted in an occupancy rate of 82.4%, which is well above what is considered to be market equilibrium (indicatively between 60% and 70% occupancy).

The Queensland market for example, typically fluctuates around an average annual occupancy of approximately 65% (currently 67.7%).

AEC's research has predicted that by 2016:

- a total of 3,588 room nights (12,422 visitor nights) will be available;
- there will be demand for 2,605 room nights (9,018 visitor nights); and
- this will result in an average occupancy rate of 72.6%, which is slightly higher than would be expected in an efficient accommodation market, indicating that the market is again in or is moving to an excess demand position.

These predictions are based on the following key findings.

#### *Current Accommodation Demand*

Overnight visitors to the WTR increased by 177,846 since 2002, a total increase of 5.1% per annum. By comparison, Queensland overnight visitors increased by 9.6% in the same period, an average of 1.9% per annum.

Growth in overnight visitors to the WTR was driven by domestic visitors which increased from 426,000 in 2002 to 605,000 to June, 2007, an increase of 28% or 7.3% per annum; and international visitation has remained essentially static since 2002.

#### *Current Supply of Comparable Accommodation*

A wide range of accommodation options exist in the WTR. For the purposes of comparison the report considered all other 4 and 5 star accommodation options as reflecting the range of alternative market sectors relevant to visitors to the SHMR.

The accommodation demand assessment found that there are 1,499 rooms/units available in the WTR that could be considered comparable to the visitor accommodation at SHMR equating to 5,190 bed spaces.

However, this survey also revealed that there was an extremely limited supply of alternatives comparable to the MRA, particularly with respect to the option of detached accommodation dwellings, co-located with a marina which appears to be unique in the region. Accordingly, it would appear that this sector of the market is clearly under represented.

#### *Future Supply of Comparable Accommodation*

The accommodation demand assessment found there is an estimated \$2.3 billion worth of investment in accommodation related developments in the Whitsunday Local Government Area (LGA), which is either under construction, committed or under study relating to a future supply of 1179 rooms/units, (6,139 bed spaces).

#### **Marina Plaza**

The Marina Plaza is a Village precinct consisting of a range of retail and dining opportunities within the Resort Hotel precinct. This precinct is intended to function as the activity heart of the development and expected to provide a recreational and social hub for the development and visitors.

#### **Marina Esplanade and Park**

The Marina will incorporate a pedestrian boardwalk framing the perimeter of the marina. The boardwalk is anticipated to include appropriate urban design elements including landscaping, and seating areas and potential exists for viewing platforms to be located at intervals along the boardwalk.

The esplanade will allow for public access to the foreshore and provide linkage along the entire frontage of the marina, leading from the public areas of the Marina Plaza to the 'Breakwater Park' to the south.

It is intended that the boardwalk will link to prioritised pedestrian pathways through the Marina Plaza to Proserpine-Shute Harbour Road, ultimately connecting to a future enhanced pathway network providing a safe and enjoyable pedestrian and cyclist connection to the SHTF precinct southeast of the SHMR site.

#### **Open Space and Dredge Spoil Location**

A major landscaped open space area is provided at the western edge of the Isthmus. In the majority, this area is to be landscaped and available for passive recreation uses for resort guests. The area however is also to serve a function as the location for maintenance dredge spoil disposal. Maintenance dredging is expected to be carried out every 5-7 years, dealing with a volume of dredge spoil equating to approximately 3,000 m<sup>3</sup> per annum or 1,500 dry tonnes per annum. This small scale deposition rate is a result of best practice design of the marina footprint.

After completion of each maintenance dredging event and relocation of spoil for various purposes in consideration of the waste management hierarchy (the latter prior to the subsequent dredging event), the area will be reinstated with turf and vegetation to return the area to its former use as open space.

## 2.2 Location Suitability

This EIS demonstrates that Shute Harbour is ideally located achieving the following objectives.

- A strategically significant safe harbour to deliver a state of the art marina affording protection to marine vessels operating in the region from adverse weather condition including cyclonic activity incorporating 669 marina berths and appropriate land based infrastructure capable of accommodating a range of vessel types.
- An integrated marine resort and mixed-use centre that provides a rewarding experience for tourists and residents that enhances and consolidates Shute Harbour as the gateway to the Whitsundays.
- Managed resort accommodation and high quality resort environment having a built form appropriate to the region and the marina setting.
- Tourist accommodation consisting of 4½ star tourist resort with 109 suite accommodation and associated facilities.
- Strength to the regional economy through development of a tourist centre and associated commercial development having provision of employment opportunities within marine and tourism sectors in the region.
- A charter boat base with high grade facilities enhancing Whitsunday charter boating experiences.

Given the trend of growing demand for marina berths the WMDA was undertaken to identify the most appropriate locations for marinas in the Whitsunday region between and including Bowen and Mackay. The report included an analysis of sites on the basis of environmental, engineering, logistical and planning considerations and constraints in order to rank a number of possible marina sites.

The Shute Harbour locality used in the ranking process included potential sites east and west (current proposal) of the existing SHTF while the Airlie/Muddy Bay locality included the sites of the Abel Point marina expansion and Port of Airlie.

The report found Shute Harbour and Airlie/Muddy Bay scored well for access, environmental matters and proximity to services. Shute Harbour scored well for its sheltered position although both Shute Harbour and Airlie/Muddy Bay scored poorly due to perceived difficulties with dredging and disposal of dredge spoil.

Since the 2001 investigation, further analysis has been completed in regard to coastal process and dredging. These show dredging and disposal of spoil at SHMR are not a limiting factor as described in the WMDA report and that maintenance dredging is very manageable.

The WMDA also identified constraints as:

- Declared Fish habitat Areas;
- Dugong Protection Areas;
- National Parks;
- GBRMP zoning; and
- Seagrass areas of regional significance.

However, there are no Fish Habitat Areas or Dugong Protection Areas and land abutting the Conway National Park, north of Proserpine-Shute Harbour Road, is to be returned to public ownership.

The site encompasses the GBR Coast Marine Park which has a Habitat Protection Zone. The GBRMP habitat protection zone has the same conditions as the general use zone with the exclusion of trawling and permitting for shipping. Habitat protection zone correlates with the General Use 'B' zone in operation at the time of the WMDA report and is considered as an appropriate zone for a marina facility by that report. Furthermore, seagrass communities cover part of the marina basin to be dredged (14.59 ha) and are considered sparse to moderate having relatively low regional significance in that area.

The appeal of the SHMR to boat owners and operators is evidenced by the large number of craft on swing moorings in Shute Bay and the popularity of the adjacent SHTF. In addition, with the Queensland government actively encouraging the growth of marine industry, and with the unparalleled conditions provided by the 74 Whitsunday Islands and waters of the Great Barrier Reef, it would appear inevitable that the Whitsunday's will continue to attract increasing numbers of visiting and resident boats.

## **2.3 Alignment with Policy and Regional Planning**

SHMR objectives align with a number of State and regional planning policies for the delivery of sustainable economic development that provides environmental, social and community benefits producing prosperous communities including the following.

### **2.3.1 State Policies**

These key Queensland Government Priorities have been identified by the Queensland Government to provide directions in regard to the development of policy. These are outlined below showing outcomes delivered by the SHMR in alignment with the States priorities.

#### **Realising the Smart State (education, skills and innovation)**

SHMR will increase employment opportunities through the provision of a marina and tourism precinct which will provide both mid term construction employment and long term marina and tourism employment opportunities in identified priority *Smart State* industries.

#### **Protecting Children and Enhancing Community Safety**

Emergency services and facilities will be provided by way of shelter for cyclones (car-park) and water based emergency service access (marina) to increase the safety standards for the community.

The interpretative centre will include operating and safety guidelines particularly relevant to sometimes relatively inexperienced charter boat users.

#### **Managing Urban Growth and Building Queensland's Regions**

The site will cater to targeted increase in local and regional workforce and the marine industry facilities and maintenance services in the surrounding service centre will support the marina and marine tourism operators.



## **Protecting the Environment for a Sustainable Future**

SHMR will regulate marine and industry practices with a 'clean and green' philosophy, including provision of a trust fund to assist in the management and maintenance of marine ecology. The management and education of recreational boaters facilitated by the interpretative centre and education extension programs run by the marina is anticipated to assist in reducing potential detrimental impacts of recreational boaters on the reef by assisting locals, visitors and the recreational and commercial boating community to understand coastal processes and the marine environment and appropriate boating best practice.

The proponent has developed a "Reef Conservation Fund" to be operated as a trust funded from the sale of the marina berths, which would initially contribute approximately \$1,000,000 with an ongoing contribution in excess of \$150,000 per annum. This fund will contribute to the ongoing sustainability of the coral reef including providing coral and sea grass friendly moorings on the reef. Part of this funding is anticipated to be directed to ongoing public education and awareness campaigns, as well as a Traditional Owner cultural centre and marine environment interpretive centre.

The marina resort buildings and facilities are to incorporate best practice sustainable construction techniques and the resort is to be run according to industry best practice to ensure sustainable construction and operation practices.

## **Growing a Diverse Economy and Creating Jobs**

The development will provide direct and indirect flow on effects on employment with education and training opportunities to expand the skilled workforce base.

The development of retail, commercial and managed tourism accommodation, 4½ star hotel, and a large marina facility including charter boat hub has the ability to create a diverse community in Shute Harbour with a high standard of productivity and economic growth.

The increased supply of marina berths to a market that is currently undersupplied will help continue to meet the growing Queensland marine industry. Enhancement of the Shute Harbour Precinct's pivotal role in the Whitsundays will also help support the long term growth of tourism in the region.

### **2.3.1.1 Draft Mackay-Whitsunday Regional Coastal Management Plan**

Relevant planning key principals and their alignment to SHMR are described below in terms of the draft Regional Coastal Plan which conclusively demonstrates compliance with state planning instruments as they relate to coastal resources and their values.

#### *Recognition of coastal resources in development and planning*

The SHMR is directly reliant on coastal resources such as recreation and boating opportunities. The value of these resources is recognised in the design of the marina and resort facilities, initiation of education programs and the establishment of an environmental management trust fund.

*Coastal use, infrastructure, and development is planned and managed to ensure that significant adverse effects of activities on the natural environment are avoided, mitigated or remedied*

The SHMR will regulate marine and industry practices with a 'clean and green' philosophy, including provision of a trust fund to assist in the management and maintenance of marine habitat, including the provision of sea grass friendly moorings. Improved management and education of boat owners and operators will be facilitated by the initiation of education programs at the proposed marina, which is anticipated to assist in reducing potential detrimental impacts of boaters on the environment.

*Development and use of the coast should enhance and maintain quality of life for residents and visitors*

Increased transportation networks will provide more options for tourists, visitors and residents.

The development of the marine industry will provide skills training and employment for residents, and enhanced social infrastructure options for both visitors and inhabitants.

The enhanced infrastructure will provide more destination options and accommodation for tourists staying in the region and visiting the neighbouring islands.

The development of retail, commercial and managed tourism accommodation will create a diverse community in the region with the potential for high levels of productivity, growth, and expanding social opportunities and infrastructure

*Maintenance of functionality in areas of state significance (social and economic) and protection from incompatible land uses and activities that may adversely affect the continued use of those areas*

The SHTF is listed as a State significant (socio-economic) site. The proposed SHMR will act as a key catalyst in the overall upgrade and enhancement of the Shute Harbour precinct, allowing the SHTF to better fulfil its pivotal tourism role for the Whitsunday region.

The development itself is designed to be compatible with the operations of the terminal and barge facilities, and the construction of the public boat ramp facilitated by the proponent's monetary contribution will lead to increased capacity and safety for all users of the precinct. SHMR will enhance the accessibility and functionality of coastal dependent transport services offered in the region.

## **2.3.2 Regional Planning**

### **2.3.2.1 Whitsunday Hinterland and Mackay Regional Plan (WHAM)**

The Proponent delivers a development consistent with WHAM key priorities as described below which conclusively demonstrates project need.

#### **Regional Identity, Leadership and Management**

The development proposes to establish the region as a distinct economic, cultural, social and administrative entity through integration, coordination and streamlining of planning and management to improve quality and effectiveness of outcomes. This is to be achieved through:

- aiding the development of a regional identity towards a marine and tourism hub and enhance the overall Shute Harbour Precinct;
- providing integration of individual and stakeholder collaboration between the marine, tourism and transport sectors into a key development and strengthened Shute Harbour precinct; and

- securing investment in the Shute Harbour development with the capacity to support growth with provision of marina, tourism and commercial infrastructure (the construction of the development is a major investment and demonstrates economic confidence for the region).

### **Environment and Natural Resources**

The development proposes to manage and minimize potential social and economic impacts of natural disasters within the region through the provision of a safe harbour. The provision of a marina in Shute Harbour in conjunction with the Harbour's natural weather protection provides exceptional marine safety in extreme cyclonic events.

The management and education of recreational boaters proposed will reduce the risk of potentially detrimental environmental impacts, while the provision of a cyclone shelter area within the car park will procure human safety during extreme climatic events.

### **Economic Development**

The development will provide tourist facilities and include a 4½ star Resort Hotel; MRA, marina office, amenities, carparking, charter boat base, retail space and landscaped gardens entry and open space. The project will provide key industry investment in accommodation and supporting infrastructure for approximately one year's growth in the regional tourism sector. This will assist in enhancing tourism opportunities and experiences in the region and promote sustainable economic growth.

The provision of a world class facility will promote the identity of Shute Harbour and the Whitsundays to the international tourism market, capitalising on the unique attributes of the region. The establishment of a marina and tourism precinct will increase demand for skilled labour and employment opportunities in key sectors of the marine, tourism and hospitality industries. The development of key marine-based transport infrastructure, increasing access to the area and contribution towards the upgrading of the Shute Harbour precinct, is likely to help protect the Precinct's pivotal role for some decades, aiding the region's long term competition with other tourism areas.

### **Social Infrastructure**

The marina development provides transport infrastructure through the provision for marina berths to cater to current and expected future regional demand. The proposed development will improve transport links to the Shute Harbour region via provision of courtesy bus, improved road infrastructure through the deed of agreement with DMR and increased patronage on the existing bus route.

Recreational and leisure infrastructure is also provided by a development that includes the provision of retail, cafe and restaurant areas in the Marina Plaza Precinct. This will increase leisure opportunities in Shute Harbour and the surrounding service centre, and provide a meeting place for residents and visitors. The development also includes a \$2.5 million financial contribution to a new public boat ramp and car parking facility and the provision of pedestrian linkages and foreshore access via an approximately 1km length of boardwalk along the marina esplanade and isthmus parkland, creating new and unique vantage points to view the marina, Shute Harbour, Conway NP and the Islands to the east.

## **Infrastructure**

Power, water, sewer, stormwater drainage and telecommunications will be provided, but do not require infrastructure upgrades apart from power, a contribution for which will be provided by the Proponent. Appropriate planning will allow for the coordination of marina infrastructure with tourism, recreational, commercial, and transport infrastructure of the project. This includes the provision of pump out facilities to maintain high water quality and reduce instances of illegal or inappropriate sea disposal of waste.

Road infrastructure will be upgraded with the creation of a new intersection and modifications to Proserpine-Shute Harbour Road in line with the deed of agreement between the DMR and the Proponent.

## **Transport**

The establishment of 669 berths and supporting marina structure will provide significant facilities to the marine industry and increase the availability of aquatic activities in the region. The improvement of the seaport, facilities and capacity of marine vessel accommodation in the area will meet increasing demand for such services in the region. The provision of the public boat ramp facilitated by the proponent's monetary contribution will increase marine safety for all users and remove a current impediment for growth in capacity for the SHTF.

### **2.3.2.2 Whitsunday Growth Management Initiative**

The Growth Management Initiative as indicated in Section 1.6 'Planning processes and standards' is currently still under review, however the Growth Management Group has released its Strategic Infrastructure and Services Plan for the Whitsundays, of which key aims are described with their relevance to the SHMR development proposal.

## **Skills Development Opportunities**

The proposed SHMR will provide diversification of employment and skills development opportunities, including year-round options in the marine, tourism, recreation, and service industries.

## **Electricity and Water Supply**

Power, water, sewer, stormwater drainage and telecommunications will be provided, but do not require infrastructure upgrades apart from power, a component of which will be provided by the Proponent.

## **Support of the Marine Industry**

The marine industry facilities and maintenance services in the surrounding service centre will support the marina and marine tourism operators while the expansion of employment opportunities and the marine industry will provide a basis for developing a complementary skilled labour supply.

## Traffic Management

The development of a marina will provide key marine-based transport infrastructure, increasing access to the area by sea and providing transport which is focused on the coastline which is the key amenity in the region. A road upgrade has been designed to accommodate increasing amounts of visitors and labourers in the region as seen in series 200 of the Schedule of Drawings. Reports indicate the current condition of Proserpine-Shute Harbour Road is appropriate for additional traffic impact from the proposed development.

A regular bus service already exists from Airlie Beach to Shute Harbour and the proposed development includes a bus set down area. An increased demand for access to Shute Harbour can be expected to provide a commensurate increase in patronage on the bus route. As well, SHMR will provide a shuttle bus to facilitate connectivity where the market is initially insufficient to justify provision by a commercial operator.

## 2.4 The Benefits

The proposed SHMR provides a positive net benefit to the State of Queensland with any costs associated with the project being outweighed by the total benefits provided. Furthermore, the project provides net benefits to the State in all economic, social and environmental categories.

The SHMR development has been designed to ensure that clear net benefits are delivered by the project. A number of areas of State Government policy also specifically adopt this approach.

AEC has accordingly undertaken a Net Benefit Assessment to provide an analysis of the proposed SHMR in terms of its Net Benefit for the State of Queensland. The Net Benefit Assessment prepared by AEC is included as Appendix G of this EIS, and was developed in accordance with the draft EPA guidelines for Net Benefit Assessments and in direct consultation with EPA.

The proposed SHMR triggers assessable development under the CPM Act which references policies within the State Coastal Management Plan and reflected in the Draft Regional Coastal Management Plan under the CPM Act. Such policy requires that the proposed development demonstrate it provides a net benefit for the State of Queensland.

The definition of a net benefit for the State under the State Coastal Management Plan is:

*“there is a net benefit (taking into account all financial, social and environmental impacts) to the State as a whole, as distinct from sectoral, commercial, private or regional gain, and the proposal delivers the greatest net benefit of all viable alternatives.”*

The Cost Benefit Analysis (CBA) found that development of the SHMR is expected to deliver:

- a total net benefit of \$299.4 million in present value terms (NPV) at a discount rate of 10% for direct impacts (i.e. incurred by the proponent) and 6% for indirect impacts (i.e. to stakeholders other than the Proponent);
- a present value of benefits of \$984.6 million and a present value of costs of \$685.3 million; and

- an overall benefit cost ratio (BCR) of 1.44 (i.e. returns \$1.44 for every dollar spent in delivery of the project);
- a positive direct net benefit (i.e. to the proponent) in present value terms of \$93.6 million with a BCR of 1.46; and
- a positive indirect net benefit (i.e. to stakeholders other than the proponent) in present value terms of \$205.7 million with a BCR of 1.43.

A summary of the quantitative CBA impacts is shown in Table 4.

**Table 4 Quantitative Cost Benefit Analysis Summary**

<b>Quantitative CBA Summary</b>				
<b>Impact</b>	<b>PV of Benefits (\$M)</b>	<b>PV of Costs (\$M)</b>	<b>Net Present Value (\$M)</b>	<b>BCR</b>
<i>Economic</i>				
Direct Impacts	\$295.8	\$202.2	\$93.6	1.46
Indirect Impacts	\$570.6	\$461.4	\$109.2	1.24
Total Impacts	\$866.5	\$663.6	\$202.8	1.31
<i>Social</i>				
Direct Impacts	N/a	N/a	N/a	N/a
Indirect Impacts	\$94.0	\$0.0	\$94.0	N/a
Total Impacts	\$94.0	\$0.0	\$94.0	N/a
<i>Environmental</i>				
Direct Impacts	N/a	N/a	N/a	N/a
Indirect Impacts	\$24.1	\$21.6	\$2.5	1.12
Total Impacts	\$24.1	\$21.6	\$2.5	1.12
<i>Total</i>				
Direct Impacts	\$295.8	\$202.2	\$93.6	1.46
Indirect Impacts	\$688.8	\$483.1	\$205.7	1.43
Total Impacts	\$984.6	\$685.3	\$299.4	1.44

From the outcomes of the net benefit assessment, it is evident that the direct, indirect and overall impacts of the project result in an obvious advantage to the community.

#### 2.4.1 Social Benefits

A number of social benefits will be realised by the development within the region's community. Section 4.11 'Social' (and the relevant appended technical document) discusses social environment and impacts, including benefits, resulting from SHMR, however they are briefly described below.

#### Recreational and Lifestyle Benefits

The SHMR incorporates the development of a number of recreational and leisure based activities and facilities, including marina berths, a charter boat base, retail, café and restaurant precincts, open space and recreational infrastructure, as well as provision of a new four lane boat ramp (separate to this development). Recreational benefits are also realised through the provision of land adjoining the Conway National Park and the rehabilitation of degraded areas of the coast, both of which will benefit the community into the future.

The current government election promise outlined in the *Living the Queensland Lifestyle* (Queensland Government, 2006) document highlights a policy to encourage...“...Queenslanders to live a more relaxed, more healthy and less stressful outdoors lifestyle, to reconnect with family and nature”. *Living the Queensland Lifestyle* goes on to highlight the key components encouraged by the current government to include:

- greater participation in recreational fishing and boating;
- develop, upgrade and maintain boat ramps;
- coordination of regional outdoor recreation; and
- increased numbers of walking trails for locals and visitors.

The proposed SHMR facilitates the above factors and shows alignment with the broader lifestyle priorities of the State Government. With respect to encouraging boating, *Living the Queensland Lifestyle* outlines upgraded recreational boating facilities and infrastructure as being required, particularly in response to the anticipated increase in boat registrations in Queensland.

### **Community Interaction**

SHMR will provide additional facilities and meeting places that may enhance community interaction, including retail, café and restaurant precincts and open space such as a boardwalk and parkland area. Use of these facilities by the community has the potential to enhance community cohesion, interaction, vitality, wellbeing and prosperity. SHMR is also expected to enhance community interaction and cohesion in local Indigenous communities.

The *Overcoming Indigenous Disadvantage: Key Indicators Report 2007* (Council of Australian Governments, 2007) identifies the intrinsic role developers, amongst others, can play in contributing to the objectives of the report. Development of SHMR has considered the issues associated with disadvantage of local indigenous communities. While the SHMR does not address all indicators of disadvantage for Gia and Ngaro/Gia communities, it is closely aligned to three of the four headline indicators which provide an opportunity to:

- participate in and share economic prosperity and cultural tourism opportunities;
- support the intrinsic benefits of governance and culture in community capacity building;
- maintain generational celebration and learning of cultural heritage traditions, language and expression;
- contribute to functional and resilient families and communities; and
- provide generational ‘care for country’, while showcasing Indigenous pride and knowledge to local, regional and international tourists.

It is therefore strongly asserted that the proposed development will contribute to positive long term outcomes for the Gia and Ngaro communities at a local community level.

### **Maintenance of Great Barrier Reef World Heritage Area**

As part of the development the Proponent will develop a “Reef Conservation Fund” to be operated as a charitable fund and financed from the sale of the marina berths. An initial contribution will be provided by the Proponent following the settlement of each marina berth totalling approximately \$1 million, with an ongoing contribution of approximately \$150,000 per annum from leaseholders.

This fund will be used to develop environmentally friendly safe swing moorings that minimise impact to soft bottom and benthic communities. In addition, part of this funding is expected to be allocated to developing an interpretative centre to be co-located with the charter boat transit centre.

Approximately 66 swing moorings would be developed from the initial investment with additional swing moorings developed on an annual basis this is expected to lead to reducing the area of impact by approximately 0.49 hectares per mooring. The preservation of coral communities within the GBRWHA will assist in maintaining the recreational value of the reef for visitors.

### **Employment Opportunities**

The primary construction phase of the SHMR is anticipated to result in additional labour demand of approximately 78 Full Time Equivalent (FTE) workers on average, with a peak of 192 positions. Current skill availability in the surrounding and broader service areas and the implementation of education, training and skills development programs is expected to enable approximately 50% (39 average, 96 peak) of the labour requirement to be sourced from within the surrounding service centre. The remaining skill set will need to be attracted to meet labour requirements. The majority of the labour requirement for the secondary construction phase (total of 358 FTE over a four year period) is expected to be sourced from existing local residential and accommodation construction companies and represent a continuation of work for these companies and employees.

During operation, a total of 142 FTE positions are anticipated to be created, with 75% (106) of these anticipated to be filled using local labour. The remaining 36 employment positions are anticipated to need to be filled from outside the surrounding service centre. These are anticipated to be filled from within Queensland. Additional employment positions are also expected to be generated as a result of additional expenditure and business activities promoted by the SHMR development.

#### **2.4.2 Economic Benefits**

SHMR is expected to directly generate 552 FTE positions during the construction phase and a further 195 FTE positions in the operational phase within the Mackay SD. Further, indirectly 269 FTE positions would be created during the construction phase and 76 FTE positions in the operational phase in the Mackay SD. At the State level, it is anticipated that 1,174 FTE positions would be created during the construction phase and 220 FTE during the operational phase. The associated economic benefits are of significance to both the region and State's economies.

During the construction phase, it is estimated that Mackay SD regional output would increase by \$322.9 million and \$452.5 million at the State level. This would include an increase in value added production of approximately \$137.2 million and \$195.7 million at the regional and State levels respectively.

Following construction it has been estimated that Mackay SD regional output would increase by \$78.8 million per annum and \$61.4 million at the State level, including an increase in value added of \$37.0 million and \$28.9 million at the regional and State levels respectively.

Economic impacts are described in detail in Section 4.13 'Economy' and in the relevant technical appendix however other economic benefits derived from the development are briefly described below.



### **Increased Business Activity**

It is anticipated that while the marina and charter boat base will begin trading on completion of the primary construction phase, full operational capacity will be phased over a six-year period. In total, the marina and charter boat base is expected to generate approximately \$7.6 million in turnover per annum although only the value added component in association with the operation of the marina and charter boat base has been taken account in the analysis. It is estimated that the additional business activity generated by the marina and charter boat base on their own is \$3.8 million per annum once in steady state operation.

Once fully operational, the additional business activity generated by the land based aspects of SHMR is estimated to be approximately \$21.7 million per annum. In addition to direct benefits at SHMR, visitors to and users of SHMR are expected to undertake expenditure on goods and services in the wider region, in particular in the surrounding service area of Airlie Beach, Cannonvale, Flametree and Jubilee Pocket, which while existing will benefit from the increased visitor attractions. Visitors would also be expected to undertake expenditure on goods and services in the wider region, in particular in the surrounding service centre. It is estimated that the average expenditure would result in additional output of \$15.1 million per annum for businesses located in the surrounding service centre, with a value added component of \$7.6 million.

### **Marine Sector**

The marine sector is a high value industry with the potential to sustain a substantial support services network including businesses with direct marine connections, such as marine transport operators, marine engineering, boat manufacture and repair services; a service sector including clothing and equipment sales and administrative, financial and management functions (Queensland Department of State Development, 2007). The development of SHMR in close proximity to the existing transit terminal and salvage operation will provide opportunities for enhanced networking and linkages within the local and regional marine sector.

### **Investment Attraction**

The development of the SHMR is expected to provide a significant boost to regional business confidence and increase the attractiveness of the area to new business investment. The development is expected to result in an increase in economic activity within the local area and surrounding service centre, which provides an incentive for business investors to invest in the regional economy. As the number of businesses expending or locating to the region increases, additional opportunities would become apparent, further increasing economic activity within the region.

### **Tourism Support**

The SHMR is primarily targeted towards the tourism market, and is focused on providing visitors access to aquatic based activities in the region. SHMR will provide a first class facility that enables linkages between land and water based activities in line with the state government priorities outlined in *Living the Queensland Lifestyle* (Queensland Government, 2006) for encouraging and facilitating participation in boating leisure activities. There are significant opportunities and flow on benefits for other tourist attractions in the region while ameliorating some of the demand for berthing facilities in the Mackay SD.

The marina, tourist resort and MRA are expected to be popular with local residents and visitors from outside of the region given the rapidly expanding Whitsunday Coast tourism market and high demand for water based activities in the Whitsundays.

### **2.4.3 Environmental Benefits**

The development was assessed as providing a net environmental benefit through sensitive design and construction, as well as innovative initiatives such as the “Reef Conservation Fund”, creating a funding stream to proactively enable the replacement of traditional swing moorings with minimal seagrass impact moorings, as well as supporting greater environmental awareness of marina users through the planned cultural and interpretive centres. While this EIS examines environmental benefits and impacts associated with the development, the overall benefit assessment has listed positive impacts as follows.

#### **Increased Habitat from Development of Breakwater**

The fixed breakwater component of the marina development will provide 1.8 km of habitat capable of accommodating different aquatic species, such as mangrove jack, a common sport fish species in the region.

#### **Maintenance of the Values of Conway National Park**

The provision of land adjacent to the Conway NP will enhance the ecological values of the park while minimising impacts from the SHMR.

#### **Removal of Existing Swing Moorings**

The proposed marina and access channel will necessitate the relocation of approximately 57 swing moorings. These moorings currently impact on the seabed through chronic physical disturbance caused by chain dragging as the vessel responds to changing winds and tides. The removal of swing moorings will enable approximately 950 m<sup>2</sup> of seagrass to re-establish following the completion of the marina development in 2011, allowing a more stable and productive benthic community to develop.

#### **Mangrove Habitat along Western Fringe**

SHMR will result in approximately 0.93 hectares of land along the western side of the development site being colonised by mangrove communities. This mangrove habitat will provide some ecosystem value, in particular in terms of increased habitat for aquatic species, increased organic matter for nutrient cycling and erosion prevention.

#### **Maintenance of Great Barrier Reef World Heritage Area**

As outlined in the indirect social benefits, the Proponent will develop a “Reef Conservation Fund”, which will be used for the development of environmentally friendly swing moorings. The preservation of these areas will assist in maintaining key ecosystem functions such as habitat for aquatic species, food production and providing organic matter for nutrient cycling.

## **2.5 Alternatives to the Project**

A marina project at the SHMR site has been under consideration for a number of years. The long history of detailed design and assessment has provided ample opportunity to consider a variety of alternatives to the current proposal. The alternatives considered during the feasibility studies and this EIS included:

1. Original Proposal by Scotex Pty Ltd, around 1994;
2. Amended Proposal by SHMD Pty Ltd, 2005;
3. Current Proposal by SHMD Pty Ltd.

4. Alternative Locations;
5. Alternative Berthing Opportunities;
6. Alternatives to Dredge Spoil Disposal; and
7. Alternative of Not Proceeding with the Current Proposal.

A detailed description of each alternative is provided as follows.

#### **(1) Original Proposal by Scotex Pty Ltd, around 1994**

The original proposal by Scotex Pty Ltd incorporated a range of facilities that attempted to cater for the perceived needs within the local community and local tourism markets such as:

- two to three star resort complex providing a fully integrated accommodation resource;
- condominiums providing unique water frontage lifestyles;
- marina meeting the community's need for commercial, charter and private vessels;
- yacht club serving the community and visitors to the area;
- commercial area to provide for existing needs;
- community shopping centre within the Shutehaven area; and
- ship repair facility providing slipways, travel cranes and hard stand areas necessary for the maintenance of commercial and charter boats in the region.

The marina comprised 322 berths. Marina berths were to be equipped with electricity, water, telephone connections, standard bollards, fenders and refuelling and sewage pump-out facilities. The marina was to be serviced by a hardstand area, a slipway and overhead crane, a number of shops and offices complementary to marina activities as well as a dockmaster's office. Marina berths were to cater for casual and permanent berthing.

The proposed resort hotel was planned for two to three star status with 200 rooms. The resort complex was proposed to have a high quality finish and designed to blend with the maritime surroundings. The resort hotel was to include:

- bars and restaurants to service the local community, resort residents, condominium owners and marina tenants;
- large rooms with en suite, in-house video, Sky channel and modern entertainment systems; and
- public areas comprising of lobby, bars, restaurants, conference facilities, gymnasium, pool system and terraced areas.

The proposed development had 100 condominiums with waterfront accommodation, which would be two bedroom apartments of varying sizes from 110 m<sup>2</sup> to 140m<sup>2</sup>. Some of the condominiums were proposed to be located on the rock breakwater.

The Yacht Club was designed to become the focus of the entire project. It was designed to provide a venue for visiting yachtsmen, a yacht racing headquarters, a meeting venue for local residents and an entertainment and relaxation centre for members and guests.

Two commercial areas were planned. The first area of 900m<sup>2</sup> was located in the middle of the hard stand at the centre of marina activity. The second area of 1,400m<sup>2</sup> was located adjacent to the main road. The area featured tourism related business, for example bakeries, booking agencies, tourist shopping, water taxis headquarters, seaplane headquarters and other community services.

Arrangements had been made with Australian Bareboat Charters (Shute Harbour) Pty Ltd to provide a headquarters facility.

The size and distribution of specific land uses which made up the full development proposal is shown in Table 5.

**Table 5 Size of Components of Original Proposal (Scotex P/L)**

Project Component	Area (ha)	Unit Count
Resort	2.5	200 rooms
Condominiums	2.3	100 units
Marina	5.0	322 berths
Marina Commercial Centre/Shipyard	0.3	
Shopping Centre	0.25	
Charter Base	0.05	
Yacht Club	0.25	
Open Space	2.15	
Support Area Precinct	0.5	
Car Parking	2.0	500 spaces
<b>Total</b>	<b>15.3</b>	

The advantages of the original proposal were the benefits that a marina and residential development could bring to the Shute Harbour area. One of the major disadvantages of this proposal was that the project was not able to be proven as economically viable. Other disadvantages of the proposal were that it did not provide as many benefits to the community as the current proposal.

The disadvantages can be summarised by the significant visual impact of the rock breakwater and the tall buildings on the breakwater on views, aspect and visual amenity (compared to the visual amenity and landscape character assessment findings for the current proposal presented as Appendix J of the EIS), while the construction of the rock breakwater required importation of large volumes of armour rock with the consequent transport of numerous loads of rock by heavy trucks through the settled areas of Cannonvale and Airlie Beach and along Proserpine-Shute Harbour Road (compared to the traffic impact assessment of the current proposal presented as Appendix K1 to the EIS).

## **(2) Amended Proposal by SHMD Pty Ltd, 2005**

The master plan for the amended proposal was the subject of an EIS prepared by Connell Wagner (2005), and included a 33.45ha site incorporating the following land uses.

- Marina and associated infrastructure such as floating wave attenuator, ferry wharf, pontoons, slip, hardstand, chandlery, fuelling and sullage pump out facilities.
- Commercial precinct comprising Marine Transit Centre, offices, retail, sailing club, tavern, charter base, cyclone shelter, emergency services, sea rescue facilities and car parking.
- Residential precinct comprising 115 allotments for development of single dwellings.

- Resort precinct comprising a 75 suite resort and associated facilities such as reception, lounge, bars, function rooms, restaurant, kitchen, offices, carparking, pool and maintenance facilities.
- Landscaped roads, pathways and urban design elements.

The size and distribution of specific land uses which make up the full development proposal is shown in Table 6.

**Table 6 Size of Components of Amended Proposal (SHMD P/L, 2005)**

Project Component	~ Area (ha)	Unit Count
Resort		75 rooms
Residential Precinct	3.745	70 allotments
Residential Precinct Waterfront	2.407	45 allotments
Marina	17.6	360 berths
Slip and Hardstand	0.5	
Chandlery and Boat Repair Facility	0.07	
Retail	0.089	
Marina Transit Services and Office	0.112	
Tavern and Sailing Club	0.057	
Charter Base and Emergency Services	0.148	
Boat Storage	0.172	72 small craft
Underground Car Parking		121 spaces
Multi-story carparking		254 spaces

A number of alternatives to this design were considered however the amended option was chosen for reasons including limited environmental impact and maximum benefits, including economic viability. These options included:

- less resort and residential areas (which adversely impacted on the project feasibility);
- less carparking (which would not meet the future growth in parking demand);
- smaller marina (which would not be economically viable due to high capital costs of establishing the breakwater and reclamation area);
- less reclamation (which would result in less developable land and a project not financially viable);
- larger slip and hardstand (which would provide surplus facilities with the Mackay Marina in close proximity);
- less hillside cutting (which meant importation of materials through Airlie Beach township, which would be disruptive and undesirable);
- no resort (which adversely impacts on the project feasibility and results in a lost opportunity to develop a world-class resort);
- rock breakwater (which would adversely impact on views, aspects and visual amenity. The Proponent conducted an overseas investigation of various marinas that used alternative construction methods for breakwaters. It was found that floating breakwaters would be a feasible alternative for this marina (Kellogg Brown & Root Pty Ltd, 2004).

### **(3) Current Proposal by SHMD Pty Ltd.**

A supplementary EIS was requested by the CG to respond to the submissions from the EIS for the 2005 Amended Proposal. As a result the Proponent went to the community to seek local inputs on redesigning the development which would benefit the community and still result in a net benefit for the State of Queensland and a sound financial investment for the Proponent. The revised Master plan as previously described was deemed to be of a scale that required a new assessment under the SDPWO Act. Subsequently a new ToR was released in July 2006 requiring technical studies to inform both the public and assessing authorities of the scope, benefits and impacts of the Current Proposal and of the measures proposed to mitigate potential impacts to result in an ecologically sustainable development.

The current proposal includes environmental, social and economic benefits. A cost benefit analysis demonstrates a net benefit across the triple bottom line.

The current proposal encompasses 45.2 hectares and incorporates the following aspects (in summary):

- realignment and upgrade of the Proserpine-Shute Harbour Road in the development vicinity;
- surrender of lot land north of Proserpine-Shute Harbour Road to the State;
- marina (at a depth of -5.2m AHD) and associated infrastructure including public boardwalk and facilities, refuelling and sullage pump out facilities, solid breakwater, floating catwalks and pontoons, ancillary marine equipment (eg. navigation aids) and access channel;
- MRA precinct encompassing 117 residential lots with dwellings up to 3 floor levels, landscaped open space (including land to be used for maintenance dredge spoil) and internal road network;
- Resort Hotel precinct comprising a 4½ star tourism resort with 109 family suites and associated facilities such as reception, lounge, bars, function rooms, restaurant, kitchen, offices, underground carparking, pool and maintenance facilities;
- tourism orientated commercial ventures including food outlets and speciality shops;
- three storey carparking facilities;
- landscaped roads, pathways and urban design elements (including visual character and water sensitive); and
- designed entrance statement.

The extent of changes to the design since the IAS (refer to Appendix D) and original community engagement process are described in the planning report presented as Appendix C.

A number of alternatives to this design were considered however the current proposal was chosen for reasons including limited environmental impact and maximum benefits. These alternatives included:

- re-configuration of the isthmus to project at a 90 degree angle from the coastline (which would adversely impact on coastal processes and seaward access to the adjacent marine salvage yard and less public amenities);
- rearranged site access (which would result in road safety issues);
- single wave protection barrier (which solely would not reduce wave height and risk of property damage);

- differing stormwater and internal road design (which did not adequately manage water quality and quantity and facilitate public access); and
- 6m deep marina basin (in parts) to accommodate super yachts (which would result in increased dredge volumes).

The SHMR has been designed with clear awareness of the principles of the *Shute Harbour Planning Strategy Interim Report – Issues and Directions released in June 2007* (Jackson Planning, 2007). This report identified the strategic context and existing local conditions for Shute Harbour, and investigates likely future conditions and the desirable future role for Shute Harbour. An enquiry by design workshop has not yet been undertaken as the key third stage of the study.

The interim planning strategy identifies Shute Harbour as a major tourist and freight facility and access point for the Islands and Great Barrier Reef. This role is supported by other maritime and tourist related uses with the residential enclave of Shute Haven effectively independent of these functions. Principles of and the development's alignment with such principles was discussed in Section 1.6 'Planning processes and standards'.

#### **(4) Alternative Locations**

With the greater part of the population of Queensland located in the south-east corner, it is to be expected that the majority of vessels in Queensland are owned by residents of south-eastern Queensland and are moored in the south-east. However, the attractiveness of the Whitsunday area for boating activities is drawing the attention of retirees, "baby boomers" with disposable income, and younger people to relocate to the Whitsunday area for lifestyle reasons or to own a second home and marina berth in the area. In addition to this, the advent of cheaper airfares is increasing the opportunities for southern residents to base their boats in the Whitsundays.

Given the trend in demand for marina berths a WMDA was undertaken to identify the most appropriate locations for marinas in the Whitsunday region between and including Bowen and Mackay. The identification of the most appropriate locations was based on analysis of site selection issues (including environmental, engineering, locational and planning considerations) and constraints, as well as a sieve mapping process. This methodology was developed for strategic planning purposes as a means of comparing and ranking a number of possible marina sites.

The ranking of localities revealed Airlie/Muddy Bay and Shute Harbour leading the order of preference for development of marina facilities in the region. The Shute Harbour locality used in the ranking process included potential sites east and west (current proposal) of the existing SHTF while the Airlie/Muddy Bay locality included the sites of the Abel Point marina expansion and Port of Airlie.

The report concluded that the Airlie/Muddy Bay and Shute Harbour group score well for access to the marina from populated areas and favoured destinations from the marina. Both score well on environmental matters and proximity to services. This is particularly so for the Airlie/Muddy Bay locality, where in most cases facilities and services are available and considerable alteration to the natural environment has already occurred. Shute Harbour is better protected from cyclonic activity than Airlie/Muddy Bay and this is reflected in the scoring. However, both localities require extensive dredging and have potential difficulties with the disposal of dredge material and as a result each scored poorly in this criteria.

Of these two sites, the current site has the key advantage of being best able to integrate with and help complete the functioning of the SHTF, as well as being specifically supported as a marina location by the LGA Strategic Plan and current Development Lease / Permit to Occupy. The Brown and Root sieve analysis (i.e. the WDMA) noted that the eastern site had greater areas of seagrass and greater requirements for capital dredging. The site was further discounted due to lack of connecting infrastructure, weak relationship to the SHTF and unsuitable foundations.

It is considered that the current location is an optimum location for a new marina. Beyond the fact that it is the only reasonable option for a substantial marina in the region, its geographic advantage and linkage to the Transit terminal make it integral to the successful management of marine traffic in the region, whilst linking with the terminal to strengthen the region's image, identity and interface to the Whitsunday Islands and Great Barrier Reef.

The appeal of the SHMR site to boat owners and operators is already evidenced by the large number of craft on swing moorings in the Bay and the popularity of the adjacent SHTF, often referred to as Australia's leading gateway to the Whitsundays. In addition, with the Queensland Government actively encouraging the growth of marine industry, and with the unparalleled conditions provided by the 74 Whitsunday Islands and enticing waters of the Great Barrier Reef, it would appear inevitable that the Whitsundays will continue to attract increasing numbers of visiting and resident boats.

#### **(5) Alternative Berthing Opportunities**

Within the region, additional marina berths on Hamilton Island and as part of the expanded Abel Point marina and the recently approved Port of Airlie marina have proved popular however it is noted that this is still under construction. However with the growth in boat ownership and boating activities, the existing and developing marinas will not be able to meet future demands. This finding is confirmed in the SHMR marina demand technical reports attached as Appendices H1 and H2 respectively.

Also over the past four years, boat size and consequently purchase price has increased significantly, and there has been an increased focus on safeguarding investments in boats. Accompanying this is greater emphasis on safe berths and marinas offering not only a complete range of services and facilities but also embracing high environmental standards.

The concept for demand for marina berths within a safe harbour facility has driven the planning and design of the current proposal.

#### **(6) Alternatives to Dredge Spoil Disposal**

The alternative to dredge spoil disposal from maintenance dredging on the reclaimed isthmus in planned open space, which will be constructed with a sand filter for dewatering purposes, was at-sea disposal.

Sites for spoil deposition at sea were investigated by GHD for the Whitsunday Shire Council (1999) to dispose of dredge spoil associated with dredging for navigational safety at Lloyd Roberts Jetty. A spoil disposal site is located in the centre of Shute Bay approximately 800 metres west of the Lloyd Roberts Jetty.

The removal of dredge spoil and the disposal at sea for maintenance spoil was considered an alternative to ongoing disturbance of landscaped open space on the isthmus and the frequent introduction of necessary earthmoving equipment into an urban area.

No practical alternative to dredge spoil associated with the marina development was identified for the following reasons.



- Quantity of material.
- Characteristics of material (i.e. marine mud).
- Natural area constraints including marine park.
- Proximity to landfill.
- Suitability of material (when mixed with sand) for fill.

#### **(7) Alternative of Not Proceeding with the Current Proposal**

The alternative of not proceeding with the proposal entails leaving the site in its current state with a dilapidated structure on the northern side of Proserpine-Shute Harbour Road, inadequate and blocked culverts under the roadway, an accumulation of construction and other rubbish collected along the foreshore and a swing mooring ground for recreational boats.

Not proceeding with the current proposal would deprive the local community, visitors to the area, and the regional economy of a number of associated environmental, economic and social benefits as described above and detailed in the net benefit assessment presented as Appendix G; leaving Shute Harbour falling further behind in the extent that it fails to meet the increasingly discerning expectations of visitors to the reef and Whitsunday Islands.

### 3. DESCRIPTION OF THE PROJECT

#### 3.1 Overview of Project

An overview of the project in detail was provided in Section 1.2 of the EIS and is hereafter detailed in response to key issues dictated by the ToR. A development summary is given in response to this section of the ToR in Table 7 of the current development proposal to which this EIS relates. Figure 3 presents an illustration of the SHMR precincts referred to in the below table.

**Table 7 Development Summary**

Precinct 1	Name	Components
<b>Precinct 1</b>	<b>Marina</b>	669 berths (including 193 multi hull berths). Excavation and dredging of the marina basin to achieve navigation depths to suit the types and sizes of vessels. A solid breakwater located at the eastern and southern edges of the site. Floating pontoons supported by driven piles. Charter Boat base – including purpose built facilities to support the charter boat operations. Navigation aids, lights and signage to comply with MSQ. Sewage pump out + refuelling facilities.
<b>Precinct 1A</b>	<b>Marina Esplanade &amp; Breakwater Park</b>	Waterfront boardwalk network and Breakwater Parkland. Extensive landscaping.
<b>Precinct 2</b>	<b>Managed Resort Accommodation</b>	117 freehold allotments - subject to code provisions and design guidelines.
<b>Precinct 3</b>	<b>Resort Hotel</b>	4½ Star hotel up to 5 storeys comprising 109 family suites.
<b>Precinct 3 A</b>	<b>Marina Plaza</b>	Marina office and amenities. Charter boat base. Range of commercial retail and dining opportunities.
<b>Precinct 4</b>	<b>Access &amp; Parking</b>	New road - -realignment of Proserpine-Shute Harbour Road. New intersection at Proserpine-Shute Harbour Road and landscaped entry statement. Car parking facilities (up to 3 storeys).
<b>Precinct 5</b>	<b>Open Space &amp; Dredge Maintenance Area</b>	Extensive landscaping.

##### 3.1.1 The Opportunity

The SHMR development proposal represents a unique opportunity for the State of Queensland aligning with Queensland Government Priorities, described in previous sections and collated in the below Table 8.

**Table 8 Alignment of SHMR with Queensland Government Priorities**

Queensland Government Key Priorities	Delivered by Shute Harbour Development
Realising the <i>Smart State</i> (education, skills and innovation)	<p><b>Increase employment opportunities in <i>Smart State</i> priority industries (marine &amp; tourism sector):</b></p> <p>Provision of a marina and tourism precinct will provide both mid term construction employment and long term marina and tourism employment opportunities in identified priority <i>Smart State</i> industries.</p>
Protecting children and enhancing community safety	<p><b>Emergency services and facilities:</b></p> <p>Provision for a shelter in cyclonic events and water-based emergency service access to increase the safety standards of the community.</p> <p>The interpretative centre will include operating and safety guidelines particularly relevant to sometimes relatively inexperienced charter boat users.</p>
Managing urban growth and building Queensland's Regions	<p><b>Regional job creation:</b></p> <p>The site will cater to the targeted increase in local and regional workforce.</p> <p><b>Marine industry:</b></p> <p>Marine industry facilities and maintenance services in the surrounding service centre will support the marina and marine tourism operators.</p>
Protecting the environment for a sustainable future	<p><b>Sustainability:</b></p> <p>Regulation of marine and industry practices with a 'clean and green' philosophy, including provision of a trust fund to assist in the management and maintenance of coral.</p> <p><b>Improved management and education of recreational boaters:</b></p> <p>The management and education of recreational boaters facilitated by the proposed marina is anticipated to assist in reducing potential detrimental impacts of recreational boaters on the reef. A marine interpretive centre will be included as part of the charter boat waiting lounge.</p> <p><b>Rehabilitation and environmental management:</b></p> <p>The proponent has developed a "Reef Conservation Fund" to be operated as a trust funded from the sale of the marina berths, which would initially contribute approximately \$1,000,000 with an ongoing contribution in excess of \$150,000 per annum. This fund will contribute to the ongoing sustainability of the coral providing environmentally coral and sea grass friendly moorings on the reef. Part of this funding is anticipated to be directed to ongoing public education and awareness campaigns, as well as a Traditional Owner cultural centre and marine environment interpretive centre.</p> <p><b>Sustainable construction and operation practices:</b></p> <p>The marina resort buildings and facilities are to incorporate best practice sustainable construction techniques and the resort is to be run according to industry best practice.</p>
Growing a diverse economy and creating jobs	<p><b>Job creation and employment opportunity:</b></p> <p>Direct and indirect flow on effects on employment with education and training opportunities to expand the skilled workforce base.</p> <p><b>Diversification, productivity and growth:</b></p> <ul style="list-style-type: none"> <li>The development of retail, commercial and managed tourism accommodation, 4½ star hotel, and a large marina facility including charter boat hub has the ability to create a diverse community in Shute Harbour with a high standard of productivity and economic growth.</li> </ul> <p><b>Increasing capacity of the marina market:</b></p> <ul style="list-style-type: none"> <li>Increased supply of marina berths to the market that is currently undersupplied will help continue to stimulate the Qld marine industry.</li> </ul> <p><b>Supporting Shute Harbour precinct:</b></p> <ul style="list-style-type: none"> <li>Enhancement of the Shute Harbour Precinct's pivotal role in the Whitsundays will help stimulate and support the long term growth of tourism in the region.</li> </ul>

**3.1.2 Expected Project Cost**

The Net Benefit Assessment projected the expected project cost associated with the construction and operation of the SHMR in Appendix G. The assessment concluded:

- the SHMR is expected to deliver a total net benefit of \$299.2 million in NPV at a discount rate of 10% for direct impacts (i.e. incurred by the Proponent) and 6% for indirect impacts (i.e. to stakeholders other than the Proponent), with a present value of benefits of \$984.5 million and a present value of costs of \$685.3 million;
- overall, the development provides a BCR of 1.44 (i.e. returns \$1.44 for every dollar spent in delivery of the project);
- the project provides a positive direct net benefit (i.e. to the Proponent) in present value terms of \$93.6 million with a BCR of 1.46; and
- the project delivers a positive indirect net benefit (i.e. to stakeholders other than the proponent) in present value terms of \$205.7 million with a BCR of 1.43.

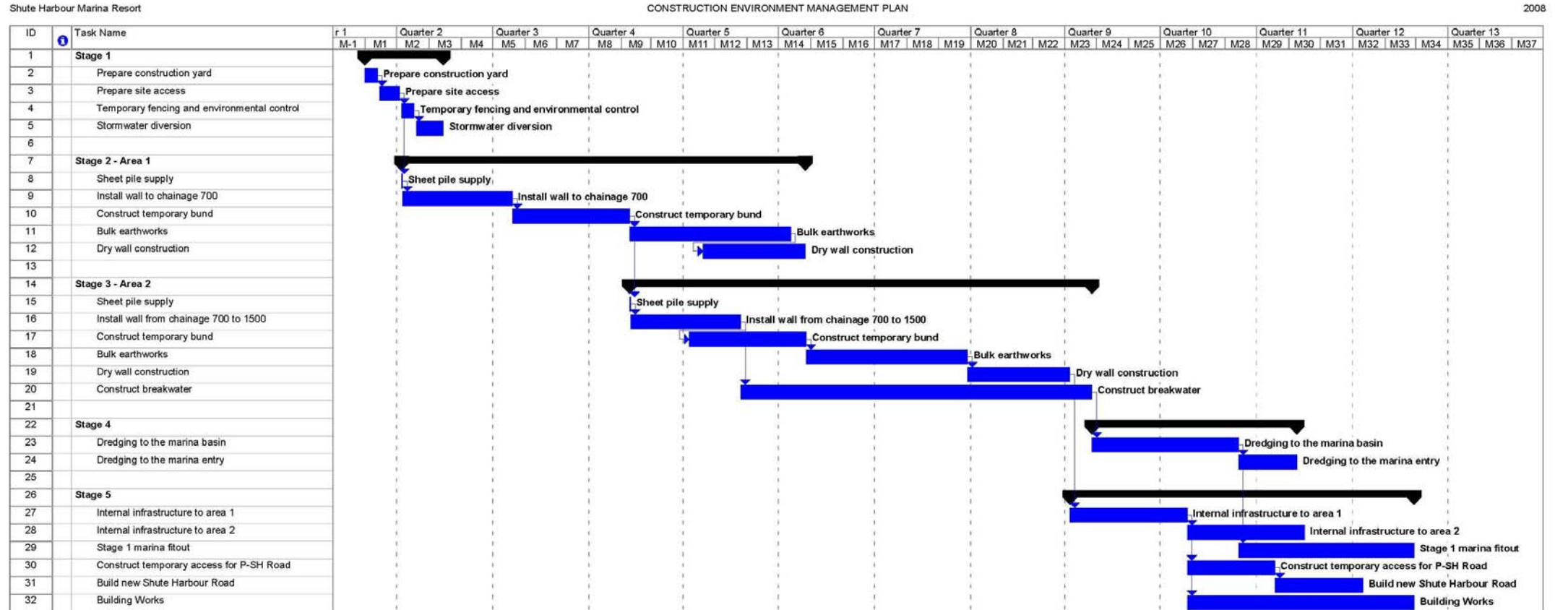
### 3.1.3 Project Duration and Timing

Following the EIS advertising period, the CG will provide a report that will make recommendations for activities that require statutory approval.

As the Commonwealth have approved Queensland's EIS process, operating under a bilateral agreement, DEWHA can then make a determination on whether the controlled action can proceed thereafter.

Development Approval applications will be lodged as described in Section 1.6.2 facilitating the commencement of the civil works which is anticipated to occur over 2 years. Following this built form will be constructed, with occupancy expected by 2012.

A Gantt chart of the assessment of the SHMR development proposal and construction stages and timing to operation is presented below.



## 3.2 Ecological Sustainable Development

In Queensland, objectives and principles of ecologically sustainable development (ESD) are imbedded in legislation as a result of a recognised need to incorporate the principles of sustainable development in environmental impact assessment. The National Strategy for ESD (NSESD) defines ESD as ‘using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased’ (Ecologically Sustainable Development Steering Committee, 1992).

The core objectives of the strategy are:

- enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- provide for equity within and between generations; and
- protect biological diversity and maintain essential ecological processes and life-support systems.

The guiding principles of the strategy are:

- decision making processes should effectively integrate both long and short term economic, environmental, social and equity considerations;
- where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- the global dimension of environmental impacts of actions and policies should be recognised and considered;
- the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised;
- the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;
- cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms; and
- decisions and actions should provide for broad community involvement on issues which affect them.

This EIS identifies that the proposed SHMR may have the potential to impact on the environment if particular elements are not critically managed during construction and operation. To manage these impacts the Proponent has adopted the “precautionary principle” in the assessment of all environmental issues and in the recommendations for environmental management to ensure the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

The Intergovernmental Agreement on the Environment, endorsed on 1 May 1992, describes the precautionary principle as the following.

*“Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*

- i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and*
- ii) an assessment of the risk-weighted consequences of various options.”*

In developing this EIS, the Proponent commissioned a range of technical studies to inform the following phases.

- Design phase.
- Construction phase.
- Operational phase.

The EIS is an important tool for Local and State authorities to understand the scope of works and as a consultation tool for the local community and other interested parties.

This EIS has identified both actual and potential adverse impacts of the proposed development. In identifying these, consideration has been given as to how these impacts may be mitigated. Due to the sensitive location of the SHMR, best practice standards, guidelines and operating procedures have been developed. The key reason for this is that any significant environmental impact from a potential incident will have a potentially adverse affect on the sensitive sites which surround this development making corrective action costly in both financial and environmental terms.

To this end, the precautionary principle is applied to the scoping and planning of this development and it can be seen through the design, construction and operation aspects of the proposed development that this marina will be of 'best practice standards'.

The EIS documents the impacts and mitigation strategies for design, construction and final marina operation. The following is an outline of the contents of the EIS relating to ESD principles.

### **3.2.1 Design**

This is the phase that the Proponent has placed most emphasis on in determining and mitigating impacts through good environmental, economic and planning design.

The Proponent has undertaken the following works as part of this EIS.

- Determining the need for the development at Shute Bay in environment, social and economic terms.
- Undertaking environmental assessment for all facets of the project so that the project design can be amended to reduce its impact.
- Investigating alternatives to the current design to mitigate impacts and obtain improved outcomes for the Proponent, the community and the environment.
- Designing the marina to minimise adverse impacts to coastal resources.
- Investigating and identifying any potential serious or irreversible threats to the environment including any potential hazards and risks.
- Developing management plans and outcome measures to mitigate these impacts and risks.
- Developing a monitoring and auditing program for the life of the project to determine if performance objectives are been met and if any unforeseen impacts are occurring that may require corrective action.

### 3.2.2 Construction

This phase of the project will carry the highest risk to the environment due to the nature of the development and its location. The Proponent is aware of this and as such has contributed significant resources to determining methods, processes and procedures to mitigate potential impacts as far as practical within the constraints of the design and economic feasibility.

The following strategies are proposed as part of the construction phase.

- Staging construction to prevent the release of potentially contaminated water to the GBRWHA and adversely affecting the aquatic ecology.
- Developing and implementing the Construction Environmental Management Plan described to manage and mitigate impacts from civil engineering as described in Section 5 'Environmental Management' of this EIS.
- Conducting regular monitoring and auditing of the site and the activities throughout the construction phase and implementing corrective actions necessary as a result of these monitoring and auditing programs.

### 3.2.3 Operation

Once constructed, the development will move into its operational phase and with this comes a different set of impacts that need management and mitigation such as:

- wastes through provision of waste reception facilities for general refuse, bilge waste, sewage and other wastes that are normally generated by activities at a marina will be provided and impacts from unlawful discharges will be mitigated through management strategies.
- oil spills through provision of refuelling facilities developed and managed in accordance with Australian Standard 1940-2004 and other relevant standards.
- maintenance dredging through development of a Site Based Management Plan to protect surrounding significant conservation areas.
- lack of knowledge/awareness through educational opportunities which promote the importance of the region, the necessity to protect and manage it and ensure that people develop an understanding of the area and it's regional, national and international significance.

NSESD is not solely concerned with the environment and its protection and enhancement. It is also concerned about ensuring developments provide social and economic benefits to the community. The development can clearly demonstrate a positive social and economic benefit to the local, regional and State community as described in the net benefit assessment presented as Appendix G and in Section 2 'Project Need and Alternatives' of the EIS.

Through innovative management from design through to operation, it is contended that this development will achieve compliance with the objectives of the NSESD.

The preparation of this EIS itself contributes to ensuring that the development and operation of the proposed development would comply with the principals of ESD. This EIS provides detailed information about the proposal and allows public and stakeholder discussion and comment on the proposed planned design, construction and operational aspects of the SHMR as well as the proposed mitigation aspects.



### **3.3 Location**

#### **3.3.1 Regional Context**

The SHMR site is situated on the Whitsunday Region coastline, on Queensland's central coast. The project area is located 10km south-west of Airlie Beach, 35km north-east of the Bruce Highway and a 30 minute or 2 hour drive from the Proserpine and Mackay airport respectively. Figure 1 provides a locality plan.

#### **3.3.2 Local Context**

The SHMR will be established on land within the coastal zone which encompasses 45.2 hectares of lease land and seabed, the latter under a permit to occupy, and is zoned under the Planning Scheme as open space intended for maritime infrastructure.

Areas surrounding the site are zoned for commercial and urban residential to the east and particular development "boat building" to the west. Located further to the east the SHTF is one of only five strategic port land areas of social and economic importance in the Mackay-Whitsunday region.

The locations of these zones are shown on Figure 5.

The SHMR site is located on land described as Lot 2 on Plan SP117389 and Lot 273 on Plan HR 1757, Mount Rooper. The cadastral bounds are presented in Figure 6.

The site is bound by:

- Proserpine Shute Harbour Road to the north – the land included in the current lease north of the Proserpine-Shute Harbour Road will be returned to public ownership;
- an existing motel, dwellings and the SHTF to the east;
- a marina salvage operation to the west; and
- the Great Barrier Reef Marine Park seaward of the boundary to the south.

The majority of the SHMR site is submerged by tidal waters that overflows a narrow wavecut platform, beach and seabed with MHWS located at 1.33m AHD. The seabed is sparsely vegetated. Mangrove communities fringe the shoreline with patches of salt marsh occurring on rocky ground up to the highest astronomical tide (HAT) level located at 2.35m AHD. Beyond this intertidal zone, the land is vacant and vegetated with remnant terrestrial vegetation. This part of the land rises in a gentle slope to Proserpine-Shute Harbour Road. The foreshore is also degraded through erosion and litter.

The site is currently used as a mooring location for recreational boats.

The existing land levels are provided in Figure 7 across the development site and beyond with the design levels shown in relation to the topography, presented as Figure 8.

The site is sheltered from cyclonic weather and a popular place for mooring given the locality's close proximity to the outer islands.

The SHMR site is surrounded by the following areas of conservation significance.

- The Great Barrier Reef Marine Park.
- The Conway NP to the north of the site which is protected by the NC Act in order to provide a foundation for spiritual, scientific, educational, recreational and visitor

opportunities, all of which must be environmentally compatible. (World Conservation Union (IUCN) 1994 definition). The Conway Range is an undeveloped vegetated peninsula with scenic coastal landscape value that provides the signature green backdrop to the Whitsunday Coast.

The locations of environmentally sensitive areas are shown in relation to the site on Figure 9. The tidal waters that form part of the development site lie within the:

- GBRWHA; and
- GBR Coastal Marine Park.

The tidal waters that form part of the development site, whilst included within the boundary of the Queensland's GBR Coastal Marine Park, are not within the Commonwealth's GBRMP.

There is a combined Zoning Plan for both Marine Parks. The site is included in the Habitat Protection Zone. The Habitat Protection Zone occurs seaward of the landward boundary of the coastline pursuant to the Queensland *Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004* and below mean low water pursuant to the Commonwealth GBRMP Act. This area is protected in order to conserve and maintain significant habitats, cultural heritage and amenity values of the marine park whilst also providing for reasonable public use.

The location and boundaries of the proposal footprint have also been provided in latitude and longitude underlain by a marine chart and shown on Figure 10. The quality of the figure has been reduced as a result of the Admiralty Chart AUS 253 being the best available and it having a scale of 1:37500. Drawing 7900/48/01-103 provides a coordinate grid system in eastings and northings.

### 3.4 Construction

#### 3.4.1 General Construction Methods and Program

Construction drawings are provided in the 'Drawings List' which includes series 001 to 005.

Written commentary in support of information contained within drawings, specifically on the construction phases and timing, is outlined in Table 9 below.

**Table 9 Construction Phases**

Stage & Timeframe	Construction Activity	Description
<p style="text-align: center;"><b>One</b> (Month 1 to 3)</p>	<p>Preliminary site works and earthworks</p>	<ul style="list-style-type: none"> <li>- Preliminary site works will include site setout to define the boundary of the project works and recording of pre-construction site conditions.</li> <li>- Monitoring for Cultural Heritage purposes will be implemented in line with the registered Cultural Heritage Management Plan for the project</li> <li>- Environmental control measures will be installed prior to construction works.</li> <li>- A temporary site access will be constructed, above the tidal zone.</li> <li>- Silt fences will be installed around the site access track.</li> <li>- Temporary fencing will be constructed to clearly define the extent of the site works and restrict access to the construction site.</li> </ul>

Stage & Timeframe	Construction Activity	Description
		<ul style="list-style-type: none"> <li>- Existing mangroves on the site between the shoreline and Shute Harbour Road will be cleared and disposed of off site prior to earthworks commencing.</li> <li>- Earthworks will commence with the establishment of a construction compound on a level platform approximately 20m wide using in-situ cut materials. The construction compound will be located on the seaward side of Proserpine-Shute Harbour Road. The construction compound will provide a centralised point for construction activities, storage for plant and equipment, a delivery point for construction materials such as sheet piles and the provision for truck turn around.</li> <li>- Earthworks will include the construction of a stormwater diversion channel parallel to Proserpine-Shute Harbour Road to the east of the site. This channel will be lined with geo-textile and will include rock checks for erosion control.</li> </ul>
<p style="text-align: center;"><b>Two</b> (Months 3 to 8)</p>	<p>Construction of walls to enclose Area 1 including:</p> <ul style="list-style-type: none"> <li>- temporary sheet pile wall (wall 6), and</li> <li>- temporary bund wall.</li> </ul>	<ul style="list-style-type: none"> <li>- The first 80m of the temporary sheet pile wall (wall 6) will be constructed using an excavator to install the sheet piles.</li> <li>- The continuation of wall 6 from chainage 80 to chainage 700 will be constructed from a piling rig mounted on a barge. The sheet piles will be transported to site by truck.</li> <li>- Imported material is required to be placed behind the sheet piles to provide the required resistance to design loads. This material will be transported to site by trucks. (50,000 m<sup>3</sup> of material is required).</li> <li>- A temporary bund will be constructed south from the shoreline to connect to wall 6 using imported material transported to site by trucks. (100,000 m<sup>3</sup> of material is required).</li> </ul>
<p style="text-align: center;">(Months 9 to 14)</p>	<p>Construction of Area 1</p> <ul style="list-style-type: none"> <li>- earthworks to excavate marina basin,</li> <li>- fill development area, and</li> <li>- construct revetment wall (wall 1)</li> </ul>	<ul style="list-style-type: none"> <li>- The area enclosed by wall 6 and the temporary bund, Area 1, will be defished and dewatered.</li> <li>- The marina basin in Area 1 will be excavated in the dry. Excavation to the finished basin level of RL -5.2m AHD requires approximately 232,900 m<sup>3</sup> of earthworks over an area of 8.9 ha.</li> <li>- The top 1.5 metres of the surface will be stripped in stages to enable monitoring for Cultural Heritage purposes to be carried out.</li> <li>- All soft material excavated will be stockpiled adjacent to Shute Harbour Road.</li> <li>- Earthworks operations will include the over excavation of the marina basin area to provide suitable material for filling to the development platform. The excavation will be benched at 2.5m intervals to a level of RL -12.5m AHD.</li> <li>- The construction of the revetment wall (wall 1) will be completed in the dry. The materials required to construct this block wall will be imported by trucks.</li> </ul>
<p style="text-align: center;"><b>Three</b> (Month 9 to 14)</p>	<p>Construction of walls to enclose Area 2</p>	<ul style="list-style-type: none"> <li>- Phase 3 will proceed similar to Phase 2.</li> <li>- 50,000 m<sup>3</sup> of imported material is required behind</li> </ul>

Stage & Timeframe	Construction Activity	Description
	including: <ul style="list-style-type: none"> <li>- temporary sheet pile wall (wall 6), and</li> <li>- rock faced bund (wall 3).</li> </ul>	wall 6 for the construction of the wall from chainage 700. <ul style="list-style-type: none"> <li>- 150,000 m<sup>3</sup> of imported material is required for the construction of wall 3.</li> </ul>
(Month 15 to 20)	Construction of Area 2 <ul style="list-style-type: none"> <li>- earthworks to excavate marina basin,</li> <li>- fill development area, and</li> </ul>	<ul style="list-style-type: none"> <li>- Excavation of the marina basin in Area 2 to the finished basin level of RL 5.2m AHD requires approximately 224,000 m<sup>3</sup> of earthworks over an area of 8.2 ha.</li> <li>- The fill in the peninsula on the western site of the development will be placed to a level 2.5m below finished surface level.</li> <li>- Geo-textile liners will then be installed along the length of the peninsula to provide a suitable volume for containment of future maintenance dredging material.</li> </ul>
(Month 19 to 23)	Construction of revetment wall (wall 1)	<ul style="list-style-type: none"> <li>- The construction of the revetment wall (wall 1) will be completed in the dry. The materials required to construct this block wall will be imported by trucks.</li> </ul>
(Month 12 to 23)	Construction of breakwater (walls 4 and 5)	<ul style="list-style-type: none"> <li>- Construction of the breakwater walls 4 and 5, will commence with the construction of wall 6 from chainage 700. The construction of the Breakwater is expected to take 12 months to complete.</li> </ul>
<b>Four</b> (Month 24 to 30)	Dredging of marina basin beyond temporary sheet pile wall (wall 6)	<ul style="list-style-type: none"> <li>- Following the construction of walls 4, 5 and 6 silt curtains will be installed across the two openings at the eastern end of the site.</li> <li>- Once the marina basin is enclosed, de-fishing operations will be carried out within the basin to remove any marine animals prior to dredging operations commencing.</li> <li>- The marina basin will be dredged using a 400mm cutter suction dredge. The quantity of dredge material to achieve the design depth in the marina basin is estimated to be 220,000 m<sup>3</sup> over an area of 9.7 ha.</li> <li>- The dredge material will be placed on the reclaimed area. This material will be spread, dried and mixed with excavated and dried clay materials, before being placed and compacted as fill material within the reclamation areas.</li> <li>- Dredging of access channel at the entrance of the marina requires the dredging of 54,600m<sup>3</sup> of material over an area of 3.1 ha.</li> </ul>
<b>Five</b> (Internal Works)	Roadworks, services , infrastructure and marina fit out.	<ul style="list-style-type: none"> <li>- On completion of the earthworks to the reclamation areas, the roadworks and services will be constructed. This will include:                             <ul style="list-style-type: none"> <li>o Construction of roadworks and services to Area 1; and</li> <li>o Construction of roadworks and services to Area 2.</li> </ul> </li> <li>- On completion of the dredging operations within the marina basin, a piling barge will install the piles to locate the pontoons and associated catwalks within the marina.</li> </ul>

Stage & Timeframe	Construction Activity	Description
<p align="center"><b>Five</b> (External Works)</p>	<p>Upgrading of Proserpine-Shute Harbour Road</p>	<p>- Construction of Proserpine–Shute Harbour Road will occur in a period of approximately 4 months. This work will be staged to enable required traffic access to be maintained and will require the import of materials by trucks.</p>

*Note:*

*\* The quantities of imported materials for the earth bund walls and the fill behind the sheetpile wall 6 include an allowance of 50% for displacement of insitu mud under the fill.*

In laymen’s terms the establishment of the marina will involve excavation of the marina basin to -5.2m AHD. Fill obtained from the excavation of the marina basin will be used as fill material to reclaim land for the SHMR development. No blasting will be undertaken during construction.

The total area of cut for the development is approximately 29.9 hectares, and the total approximate volume is 732,000m<sup>3</sup>. The cutting and excavation of the material in the marina basin will be completed using both dry excavation and wet dredging methods, as summarised below.

- The portion of the marina basin to be excavated in the dry covers an area of 17.1 hectares and requires the excavation of 456,900m<sup>3</sup> of material to achieve a basin level of RL -5.2m AHD.
- The portion of the marina basin to be dredged covers an area of 9.7 hectares and requires dredging of 220,500m<sup>3</sup> of material.
- The access channel will also be dredged and covers an area of 3.1 hectares and requires dredging of 54,600m<sup>3</sup> of material.

Cutter suction dredging is the preferred wet dredging method because:

- there is much less chance of sediment affecting sensitive environmental areas within Shute Bay;
- it minimises the plume compared to other equipment;
- silt curtains can be used; and
- the discharge line can be placed on the sea bed with minimal disturbance to vessel safety.

The area requiring fill for the development is approximately 13.5 hectares and requires 840,000m<sup>3</sup> of fill.

The proposed phasing of the construction works includes temporary works to enclose Areas 1 and 2 to enable the majority of the earthworks to be completed in the dry. These temporary works require the importation of fill material which will be utilised within the development platform on removal of the temporary works. The temporary works are summarised below.

- The construction of the temporary sheet pile wall (wall 6) requires 100,000m<sup>3</sup> of imported material to be placed behind the wall to resist the design loads. This material will be removed for placement within the site as fill as part of the removal of the temporary sheet pile wall (wall 6).
- The construction of the temporary bund wall to enclose construction Area 1 requires 100,000 m<sup>3</sup> of imported material and 9,700 m<sup>3</sup> of rock armour. This material will be reused within the site as fill following the removal of the temporary bund.

The construction of the rock faced bund (wall 3) requires 150,000 m<sup>3</sup> of material and 12,000m<sup>3</sup> of rock armour. The quantity of material to be imported for the construction of wall 3 is 100,000 m<sup>3</sup> of fill and 5,500m<sup>3</sup> of rock. This imported material will be required to construct the initial portion of the wall. The additional fill material will be won from the excavation of Area 1 and the additional rock armour material will be recovered from the temporary bund.

The upgrading of Proserpine-Shute Harbour Road requires additional fill material of 26,100m<sup>3</sup> for the road embankment and 7,300m<sup>3</sup> for the filling of the existing detention basin.

Imported fill materials will be trucked to site and are likely to be sourced from a quarry within the Whitsunday Shire near Gregory River, approximately 65 km north-west of the site.

The majority of the earthworks within the development will be constructed in the dry using conventional excavation and placement methods. This will be made possible by the temporary works to construct a sheet pile wall and earth bund to protect the work from tidal inundation. The earthworks will include the excavation, drying out and treatment of in-situ materials from the marina basin area for placement as fill material within the reclamation area.

The temporary sheet pile wall (wall 6) will be installed using a vibratory hammer. Where the required toe level is not achieved by vibratory hammer, a conventional hammer will be used to drive the piles to the required toe level.

Two alternative structures are included for the solid breakwater structure, both include steel pile structure to support precast concrete units. The construction of the solid breakwater will include driving of steel piles and the installation of precast concrete units. The steel piles will be driven using a conventional hammer pile driving rig mounted on a barge. The steel piles and precast concrete units will be delivered to site on semi-trailers and an onsite crane will be used to transfer the piles and concrete units from the trucks to a barge for transport to the piling barge.

The wet excavation of the marina basin will be undertaken using a cutter suction dredge. The dredging of the marina basin will not commence until the marina is enclosed by the revetment wall, breakwater, temporary sheet piling and silt curtain.

The floating pontoons and catwalks for marina fit out will be transported to site by road and unloaded into the water using site cranes. They will then be located in position using small work boats and connected to the piles. Installation of services including power, potable water and fire water services will be required to complete the marina.

Work on site will be limited to 12 hours a day during daylight (normally between 6:30am to 6:30pm), and 6 days a week with the exception of the dredging work which at times may be required on a continuous 24 hour 7 days a week basis.

All construction for the development will be undertaken on the seaward side of Proserpine-Shute Harbour Road. There will be no road traffic restrictions to Proserpine-Shute Harbour Road and no marine traffic restrictions to the adjacent boat ramp and jetty. However, no marine traffic will be allowed within the construction footprint of the marina until completion.

The upgrading of Proserpine-Shute Harbour Road will require road traffic restrictions which will be completed in accordance with the DMR conditions for road works.

## Methods of Transport

The proposed construction access to the site is in the form of an unsignalised T intersection, which has been designed to allow access by an Articulated Vehicle. No upgrade of the intersection is required for construction access. Arrangements for access of any indivisible loads or oversized vehicles, should these be required, would be detailed in due course by the appointed contractor as part of a construction traffic management plan.

The sheet piles will be transported to site on semi-trailers and lifted from the trucks to the piling barge using an onsite crane which will be located on the reclaimed land adjacent to Proserpine-Shute Harbour Road.

The materials required for the sheet pile revetment wall will be delivered to site by road. It is estimated that 185 truck loads will be required to deliver the sheet piles to site. The longest pile is expected to be 24 metres, but depending on the construction methodology standard 12 metre piles may be used and spliced together.

The materials required for the block revetment wall will be transported to site by road and it is estimated that 135 truck loads will be required to deliver the blocks to site.

The materials required for the breakwater will be delivered to site by road. The numbers of deliveries for the two alternative structures are described below.

- **Alternative 1 – Steel Pile & Precast Facing Panels**  
It is estimated that 175 truck loads would be required to deliver the steel piles and frames to site and approximately 590 truck loads to deliver the concrete units to site.
- **Alternative 2 – Steel Pile & Gravel Filled Concrete Boxes**  
It is estimated that 145 truck loads would be required to deliver the steel piles, 810 trucks to deliver the material for the boxes, 45 truck loads to deliver the reinforcement and 1,200 to deliver the gravel fill material to site.

The number of trucks required to import fill material have been estimated based on a need to import approximately 300,000m<sup>3</sup> of placed material using vehicles with an average payload of 28 tonnes. The material is required to be delivered to site over a period of 12 months.

Movement of materials will therefore be spread across the construction period with limited numbers in peak hours and is not expected that deliveries will impact the external road network. A summary of the maximum truck movements required for delivery of construction materials is outlined in Table 10. The peak construction vehicle numbers will occur either between month 3 and 8 with a combined total of 78 trucks per day or if the breakwater alternative 2 construction is used, in month 12 and 14, a combined total of 85 trucks per day will be required. Further details are provided in traffic impact assessment presented as Appendix K1 to the EIS.

**Table 10 Maximum Heavy Vehicle Total Deliveries, Timeframe and Frequency**

Type	Qty	Number of truck loads	Timeframe	Daily Vehicle Numbers
<b>Sheet piles</b>				
- Wall 6 – Ch 0 to Ch 700		85	6 months (Month 3 – 8)	1 truck
- Wall 6 – Ch 700 to end		100	6 months (Month 9 – 14)	1 truck
<b>Blockwork</b>				

Type	Qty	Number of truck loads	Timeframe	Daily Vehicle Numbers
<b>Revetment Wall</b>				
- Wall 1 – Ch 0 to Ch 600		65	6 months (Month 3 – 8)	1 truck
- Wall 1 – Ch 600 to end		70	6 months (Month 9 – 14)	1 truck
<b>Imported Fill Material</b>				
- Temporary Bund	100,000 m <sup>3</sup>	6,800	6 months (Month 3 – 8)	44 trucks
- Temporary Bund – Rock Facing	9,500 m <sup>3</sup>	790	6 months (Month 3 – 8)	5 trucks
- Wall 6 – Ch 0 to 700	50,000 m <sup>3</sup>	3,400	6 months (Month 3 – 8)	22 trucks
- Wall 6 – Ch 700 to end	50,000 m <sup>3</sup>	3,400	6 months (Month 9 – 14)	22 trucks
- Wall 3 – Rock Faced Bund - Fill	100,000 m <sup>3</sup>	6,800	6 months (Month 9 – 14)	44 trucks
- Wall 3 – Rock Faced Bund - <b>Rock</b>	5,500 m <sup>3</sup>	450	6 months (Month 9 – 14)	3 trucks
<b>Breakwater</b>			12 months (Month 12 – 23)	
<b>Concrete Panel Structure</b>				
- Steel piles		175	7 months	1 truck
- Concrete units		590	6 months	4 trucks
<b>Concrete Box Option</b>				
- Steel piles		145	6 months	1 truck
- Materials for Concrete boxes	12,000 m <sup>3</sup>	810	12 months	3 trucks
- Reinforcement for Concrete boxes	1,320 t	45	12 months	1 truck / week
- Gravel fill for Concrete boxes	17,500 m <sup>3</sup>	1,200	12 months	4 trucks

Due to the limited site area available for material storage, the delivery of materials will most likely be daily or every second day. Movement of materials will therefore be spread across the construction period with limited numbers in peak hours and is not expected that deliveries will impact the external network in terms of link capacity or intersection performance.

An average of 78 full time equivalent workers will be employed during the construction period, with a peak of 192 positions at the end of the construction period.

More information on construction traffic impacts is provided in the Traffic Impact Assessment by Cardno Eppell Olsen, presented as Appendix K1 to the EIS, and summarised in Section 4.2 'Transport' of the EIS.



### *Construction Environmental Management Plan*

A Construction Environmental Management Plan has been prepared to support the EIS (refer to Section 5 'Environmental Management' of the EIS). The Construction Environmental Management Plan identifies mitigation measures to manage potential impacts associated with construction works, in particular:

- bulk earthworks;
- dredging;
- erosion and sedimentation;
- water quality;
- acid sulfate soils;
- terrestrial and aquatic flora and fauna;
- air quality;
- noise and vibration;
- waste management;
- dangerous and hazardous materials;
- cultural heritage;
- traffic; and
- visual amenity.

In particular, the Construction Environmental Management Plan involves the following implementation strategies for the protection of marina flora and fauna, and to ensure that the water quality objectives for Shute Bay are met.

- Clearing works confined to the development footprint.
- Removing large marine megafauna by fish net prior to dredging works and relocating to a safe distance away where required.
- Dredging using double silt curtains and/or other appropriate mitigation devices, including the newly constructed breakwater to minimise turbidity plumes which have the effect of altering deposition rates within the Bay and reducing light attenuation.
- Limiting the dredge pump rate to ensure that discharge is not excessive into the reclamation area which could increase the water velocity and in turn increase the potential for uncontrolled runoff.
- Undertaking a water quality monitoring program including continuous turbidity monitoring external to the dredge area.
- Disposal of dredge spoil in appropriately designed settlement ponds with tailwater treatment ponds constructed, in addition to erosion and sediment control devices.
- Monitoring within the marina for any indicators of poor ecological health (i.e. algae blooms, dead vegetation, fish kills).
- Cessation of works in the event of a major fish kill (or other significant indicators of poor ecological health) until the cause(s) of the fish kill is identified and measures are implemented to treat the cause.
- Observation of marine turtles, dugong, whales or dolphins each half hour. Dredging shall be suspended if turtles, dugongs, whales or dolphins are observed within 200 metres of the dredge head (namely for dredging of the access channel whereas the

marina basin shall be cleared and closed to megafauna migration during capital works). Dredging shall only recommence when fauna have left the 200 metre buffer zone.

- Introduction of speed limits (6 knots) and 'Vessel Transit Lanes' to prevent boat strikes on marine vertebrates.
- Training and education of all dredging staff and contractors of the values of Shute Bay and associated areas of conservation significance.

The relationship between aquatic flora and fauna and water quality is discussed further in sections 4.5 'Coastal Environment' and 4.9 'Nature Conservation' of this EIS.

### **3.4.2 Maintenance Dredging**

Geomorphologic and coastal processes investigations, conducted by Cardno Lawson Treloar, to assess maintenance dredging requirements, indicate that siltation rates in the navigational channels and marina are low. They are 2.0cm per year in the approach channel, 3.0cm per year at the eastern end of the marina, and 0.6cm per year at the western end of the marina. Detailed hydrodynamic and geomorphologic modelling of Cyclone Celeste, a severe tropical cyclone, indicates that siltation in the marina basin would be less than 25mm, with up to a maximum of 125mm siltation in the approach channel. Hence, emergency maintenance dredging would not be required after a major cyclone event of this magnitude.

The coastal processes assessment which provides the technical background for the nominated siltation rates, is presented as Appendix O to the EIS. This siltation process is described in more detail in Section 4.5 'Coastal Environment'. A proposal to install settlement boxes within and surrounding the marina is included to ensure siltation predictions are reliable, and to enable maintenance dredging frequency to be adjusted to suit actual conditions. Maintenance dredging is proposed to occur every 5-7 years, producing 15,000 to 21,000 m<sup>3</sup> of spoil on each occasion. Part of the open space network on the west of the isthmus has been designated for disposal of dredge spoil. The disposal site has been suitably engineered to dewater maintenance dredge spoil whilst only temporarily preventing continuous use of the parkland. Drawing 7900/48/01-312 provides a section of the dredge spoil treatment area. Dewatering of maintenance dredge spoil is proposed using a sand bio-filter constructed as part of the western reclaimed land, known as the isthmus, which is an area of approximately 2 hectares. Dried out spoil prior to the next maintenance dredging event can be transported offsite to a nominated location for reuse or disposal. As such the spoil disposal site has the same life expectancy as the SHMR development.

The alternative to spoil disposal within the parkland on the isthmus is at sea disposal and was discussed in Section 2.5 'Alternatives to the project' of the EIS. Access to the disposal site and dimensions of spoil disposal area are shown in Drawing 7900/48/01-312. This includes a cross section of the lined parkland and runoff outlets.

For maintenance dredging, a small cutter suction dredge will be used. Double (two rows) silt curtains are proposed to be put in place across the entrance to the marina, and from the northern extent of the eastern breakwater to the shoreline during dredging works.

With the proposed low maintenance dredging rates and volumes, the potential for significant silt plumes and movement is small. Dredging could be restricted if necessary under adverse wind and tide conditions, in addition during significant breeding and/or feeding periods of key aquatic species. Water quality monitoring during maintenance dredging is proposed for key parameters and is described in Section 4.5 'Coastal Environment' of the EIS, and implemented as part of the Marina Site Based Management Plan (Marina SBMP).

Potential impacts to marine megafauna resulting from maintenance dredging are discussed in Section 4.9 'Nature Conservation' of the EIS, and in detail in Appendix P1 and P2 relating to aquatic biology.

Provision for maintenance dredging following extreme climatic events is not required given the best practice design of the marina as discussed in Section 4.5 'Coastal Environment'.

#### *Marina Site Based Management Plan*

A Marina SBMP has been prepared in support of the EIS (refer to Section 5 'Environmental Management' of the EIS) and comprises the elements nominated above for maintenance dredging works. An emphasis has been placed on water quality monitoring for the protection and enhancement of areas of conservation significance surrounding the site and the ongoing establishment of ecological communities within the marina basin as an off set to habitat loss.

### **3.5 Infrastructure Requirements**

#### **3.5.1 Road**

The site is accessed by Proserpine-Shute Harbour Road which provides the only main connection to Airlie. Department of Main Roads (DMR) has been gradually upgrading the road from Proserpine/Cannonvale/Airlie Beach towards Shute Harbour to a wider formation with sealed shoulders. The section of road along the site frontage is yet to be upgraded and has a two lane undivided road layout with a total sealed pavement width of approximately 6.0 - 7.0m. No maintenance works are proposed by DMR in its maintenance schedule for upgrading and/or modifying Proserpine-Shute Harbour Road adjacent to the area of site frontage.

The SHMR proposal in terms of road infrastructure will meet the traffic and transport requirements during both the construction and operational phases of the development. A technical assessment of the impact of road traffic on the existing road network is attached as Appendix K1.

The SHMR involves an upgrade to the section of Proserpine-Shute Harbour Road along the site frontage and, as indicated in the road traffic assessment, the construction of a single unsignalised T-intersection to enable access to the development site. This T-intersection will provide sufficient capacity for ultimate development traffic in the year 2022 and through traffic on Proserpine-Shute Harbour Road.

The proposed upgrade of the Proserpine-Shute Harbour Road along the site's frontage is shown in Drawing 7900/48/01-200 to 7900/48/01-211 attached to this EIS. The upgrade involves:

- minor realignment of Proserpine-Shute Harbour Road;
- new design surface;
- 2 metre wide median strip with kerbing;
- 2 metre shoulders;
- dedicated area for future possible road widening to three lanes;
- new culverts for drainage; and
- grassed swale stormwater drain.

Consultation between CEO and DMR has been undertaken with regards to the proposed road design with the civil engineering design based on the outcomes of these discussions. Evidence of consultation is provided in the traffic impact assessment presented as Appendix K1.

Construction works, including the Proserpine-Shute Harbour Road, over a period of approximately 2 years, as discussed in Section 3.4.1 'Construction' of this EIS, will result in the generation of varied construction traffic as detailed in Table 10. Sheet and steel piles, concrete panels/slabs, sand and revetment rock are required construction material for the SHMR, specifically for revetment wall and breakwater construction (and ~300,000 m<sup>3</sup> of sand for stabilising revetment walls and fill material). Drawings of the development are presented in Series 100-400 appended to this EIS.

The maximum total traffic generated by construction works based on number of construction workers and initial construction methodology between the year 2009 and 2011 is estimated at 168 vehicles per hour. A Construction Traffic Management Plan (CTMP) shall be prepared when a contractor is appointed and will depend on final construction methodology and staging. This CTMP is expected to form part of the development approval conditions and will include details of:

- site access;
- the volume, composition (types and quantities), origin of goods to be moved including construction and raw materials;
- anticipated times at which oversize movements may occur;
- details of oversize indivisible loads (including types and composition);
- the proposed transport routes;
- increased road maintenance; and
- barge operations (refer to Section 3.5.2).

Potential for generation of traffic during the operation of the SHMR has been assessed based on the ultimate site usage as per the SHMR Master Plan. The potential operational traffic generated by the development, including staff, is predicted to be 332 vehicles per hour in the peak hour from the year 2012 onwards, with the development not significantly increasing the number of heavy vehicles on the existing road network. Based on intersection analysis, the single unsignalised T-intersection has been deemed sufficient to cater for development volumes in the year 2022. It is recommended however that slip turn lanes and a left stand up lane is incorporated into the T-intersection layout to improve safety and capacity. Figure 12 provides a concept illustration of the proposed T-intersections.

The internal road network is shown on the Master Plan with road cross sections provided on Drawings 7900/48/01-309 and 7900/48/01-310.

Sufficient car parking is proposed for the construction and operational stages of the SHMR. Car parking during initial construction stages is not expected to be high with the majority of construction workers to be transported to the site by bus. It is expected that a higher demand for construction vehicles car parking will occur during marina fit out. By this stage the reclamation processes will be complete and ample land will be available on site for car parking by construction workers.

A minimum of 291 car parking spaces are required for the SHMR development, with marina village and hotel users expected to share a multi-level (3 storey) car parking structure. All MRA lots are expected to include parking or have amalgamated parking areas. The multi-level car park will provide for approximately 425 car parking spaces, providing greater capacity than required by the local Planning Scheme. Surplus car parks will improve the current deficiency in car parking available at Shute Harbour for those accessing the existing public boat ramp and the SHTF.

No pedestrian paths, bicycle lanes or bicycle awareness zones are provided by the existing road network and the existing verge is used for limited overflow parking for cars with boat trailers and heavy vehicles commensurate. This is due to the increasing popularity for recreational fishing and a lack of parking amenities in the area.

The SHMR proposal includes a potential bus lay-by area to facilitate public transport and pedestrian access. The bus lay-by, if provided, can serve as a stop for the local public transport company improving public access to the coast. A pedestrian boardwalk along the marina edge and pedestrian access along the two (internal) collector roads has been incorporated into the Master Plan.

The Proponent is considering a complementary bus courtesy service throughout the site with the route illustrated on Figure 8.1 of traffic impact assessment presented as Appendix K1. No bicycle pathways have been designed other than sealed shoulders in the Proserpine-Shute Harbour Road upgrade considering the logistics from the existing topography.

### **3.5.2 Shipping/Waterborne Transport**

A Marine Traffic Study has been undertaken for the proposed SHMR by Thompson Clarke Shipping, and is presented as Appendix K2.

The marine traffic study evaluates the existing marine transit lanes and the potential impact of the SHMR on existing marine transport and traffic, including marine infrastructure. The marine traffic study addresses Sections 3.5.2 and 4.2 of the ToR.

Sea access to Shute Harbour is through a channel that leads north-east (NE) from the commercial wharves associated with the SHTF, past Low Rock (which is marked by cardinal marks) out into the Molle Channel, which is utilised by the majority of recreational and commercial traffic. An alternative channel exists within Rooper Inlet leading north-south (NS), and this is marked by port and starboard hand markers. This channel passes to the south of Shute, Repair and Tancred Islands and south of the mainland, all of which are fringed with coral reefs. This channel is generally used by recreational craft.

Shute Harbour is the closest harbour to the offshore islands of the Whitsundays and is thus a base for operations for a number of commercial vessel activities ranging from commercial barge services to the hire of single kayaks. These activities are concentrated around the following four jetties located to the west of the residential development known as Shutehaven.

- Barge jetty, the most westerly jetty serving barges that travel regularly between Shute Harbour and a number of resort developments on nearby islands.
- Main jetty, almost exclusively used by ferry operator Fantasea for their services to the islands and their tourist boat operations.
- Council jetty, a common user jetty providing a range of berths for up to six vessels including a boat launching ramp providing small barge access and water access for the Salty Dog Kayak Hire business and local community.
- Whitsunday Rent a Yacht jetty, a base for the bareboat charter operator Whitsunday Rent a Yacht.

Located between the barge jetty and main jetty is a public boat ramp which has full tide access. Additional maritime infrastructure includes 300+ swing moorings and two designated anchorages and private jetty facilities associated with the Shute Harbour Motel and Engwirda Marine (a small salvage company).

Current marine traffic comprises a mix of commercial traffic and recreational boaters, which becomes particularly relevant on weekends and during holiday periods when the movement of vessels within Shute Harbour are the highest. Shute Harbour's marine chartlet is provided in Figure 12.

Sea access to the SHMR will be from the entrance at the southeast corner of the marina (this is also the site where access to a public boat ramp is proposed as discussed in response to Section 3.5.8 'Transport Infrastructure Demand' of the EIS), via a new access channel as shown in Drawing 7900/48/01-102. Navigational aids shall be appropriately located to prevent recreational craft from marina operations passing in close proximity to the proposed boat ramp.

Users of the SHMR will be encouraged to keep clear of commercial vessel berths and operations by utilising the southern navigational channel to the Whitsunday Isles and marked channel leading to the marina entrance.

A proposal to separate traffic on the NE channel has been presented in marine traffic study presented in Appendix K2 to enhance safety by minimising the risk of collision by vessels on reciprocal courses entering and leaving Shute Harbour simultaneously. This will become increasingly important as the traffic increases in Shute Harbour with the urban development of the islands and the general increase in tourism in the region, including that prompted by the SHMR project. The proposal involves separating outgoing vessels on the southern side of the channel and incoming vessels on the northern side. This scheme would require some additional navigational aids and specific communication with users, and possibly relocating some of the existing swing moorings close to Repair Island.

An illustration of the seaward access channel and proposed separation scheme for the NE channel is presented in Figure 12.

The SHMR involves dredging to a depth of -5.2m AHD providing appropriate keel clearance for yachts ranging up to 35 metres in size and ongoing maintenance dredging to ensure a 0.6m keel clearance for berthed vessels and 10% of a vessels draft for manoeuvring.

Associated impacts from an increase in recreational boats within the locality include oil pollution and road traffic. Both these potential impacts have been addressed in the traffic impact assessment, presented as Appendices K1 and K2. Oil spill response kits will be located on site and emergency response procedures have been developed as specified in the Marina SBMP (refer to Section 5 'Environmental Management' of the EIS). Car parking has been planned as part of the concept and the Proponent has committed to providing a financial contribution to a new public boat ramp with associated carparking facilities.

Vessel maintenance facilities are offered at existing sites within the region including the repair and maintenance facilities nearby at Abel Point Marina and those proposed as part of the Port of Airlie Marina. The Mackay Marina also provides maintenance facilities including a slip way and boatyard hardstand, located approximately 160 kilometres south of the site. The SHMR does not include a boat maintenance facility due to site constraints, primarily the proximity to conservation areas of State significance. Additionally, the community response to a previous proposal anticipating the inclusion of a boat maintenance facility was not supported.

### **3.5.3 Energy**

The Proponent engaged the services of Lectel Pty Ltd to undertake an assessment of the energy requirements and the potential service options for the proposed development. The assessment included both electricity and telecommunications, including the sustainability of each use, in conjunction with the conceptual design of the SHMR. A copy of the Lectel Pty Ltd report on electricity and telecommunications is provided in Appendix L of the EIS.

The SHMR development proposal requires an electricity supply of 1.9MVA from Ergon Energy. Electricity will be initially supplied to the development by an existing overhead 11kV network, which runs along the north side of Proserpine-Shute Harbour Road.

Connection of the development to the existing 11kV electricity supply will require an easement between the development and Proserpine-Shute Harbour Road.

Given that the nearby Mount Rooper zone substation is near capacity, an upgrade of the existing Mount Rooper zone substation or a new 66kV zone substation will be required to provide electricity for the whole development once fully operational. If a new zone substation is required near the SHMR, Ergon Energy will be responsible for building the zone substation with the Proponent providing financial contribution.

An outdoor zone substation takes approximately two years to build and requires an area of 78 metres by 66 metres, although this area can be significantly reduced by building an indoor zone substation.

Installation of an indoor zone substation will minimise the visual impact and reduces noise. Ergon Energy conducts its own environmental impact assessment prior to planning any new zone substations.

Gas is not intended to be used for energy supply within the development.

No conflicts with other infrastructure or surrounding sensitive environments were identified by Lectel Pty Ltd in its assessment of electricity infrastructure.

As the SHMR development will be managed under a “community title” arrangement, a low voltage internal electricity reticulation will be fed from an adjacent high voltage transmission system and ground mounted substation supplied by Ergon Energy.

The internal electricity reticulation, including the installation of six (6) Pad Mounted Transformers (PMTs) required for the development, will be privately owned and provided by the Proponent in accordance with *AS/NZS3000:2007 Electrical installations* (known as the Australia/New Zealand Wiring Rules).

Within the development, electricity will be run underground. Due to the size of the marina, a PMT is required within the marina. The marina PMT will be installed on piles above MHWS and will be air cooled, rather than oil cooled to minimise the risk of spills.

If the development is community titled a minimum 3 m wide easement is required for Ergon Energy electrical network assets within the community title area, this excludes the marina PMT as this will not be an Ergon Energy asset.

### 3.5.4 Water Supply and Storage

Cardno on behalf of the Proponent undertook an assessment of the expected water usage of the proposed development, including the quality, quantity, and sources of all water supplied to the site during the construction and operational phases. The assessment was prepared so as to address infrastructure requirements specified in Section 3.5.4 of the ToR; also considering water conservation and management measures to be incorporated into the design and operation of the proposed development. The water supply and sewerage report is presented as Appendix M of the EIS.

Water supply to the site during construction will be sourced from on site stormwater collection and potable supply network following agreement from WRC. Water demand for dust suppression and compaction purposes is not expected to be significant as the earthworks will largely be carried out on dewatered material which will have a high residual water content.

Water supply during operation will be sourced from potable town water supply and rainwater collection.

A potable water source for the site is available by way of a 250mm water main, currently under construction. This main will have the capacity to provide potable water supply requirements during the construction phase of the development. Further, with WRC officers have indicated that sufficient capacity is available within this main to service the expected demand for potable water during the operation of the development.

The predicted population of the development, also known as equivalent persons ('EP'), was determined based on an EP unit load of 800 L/EP/d as advised during consultation with WRC, but is expected to be much lower. The total EP in relation to water demand was calculated as 577, with a total water demand of 461 kL/d or 53.4 L/s. Key design criteria for the water supply system and the water supply calculations are provided in Table 11.

**Table 11 Potable Water Supply Design Criteria**

Design Parameter	Design Value	Total (L/s)
Average Day Demand (AD)	5.34 L/s	-
Mean Day Max Month (MDMM)	1.7 x AD	9.08
Peak Day Demand (PD)	2.3 x AD	12.28
Peak Hour Demand (PH)	4.5 x AD	24.03
Minimum Residual Pressure	22 m	-
Maximum Residual Pressure	50 m	-
Commercial Fire Flow	30 L/s	-
Fire Flow Residual	12 m	-

A water supply for fire fighting flow of 15L/s for residential areas and 30L/s for commercial areas is required; where a maximum yield for fire fighting reticulation will be limited to 30L/s. Any additional fire fighting flow requirements will be accommodated by on-site storage and booster pumps.



## Water Conservation and Management Measures

Water conservation and management measures have been incorporated into the construction and operation of the SHMR, as detailed in the stormwater management strategy by Cardno Lawson Treloar; Appendix N to the EIS. Such measures have the effect of reducing the site's demand on the WRC reticulated potable water network and supply.

The Development Code details measures for the supply of non-potable water, to be used where 'fit-for-purpose' within the SHMR - subject to the class of water quality required, and in line with current State and Council regulations regarding domestic use of recycled water. Non-potable water sources involve any non-town water source, including both rainwater and recycled grey-water, and will be utilised for high water-use activities, including toilet flushing, landscape irrigation, and vehicle washing.

RMA will include a minimum 3,000L rainwater tank for each of the 117 allotments. Such water may be used for similar non-potable uses as those detailed for the resort hotel accommodation.

Additionally, water minimisation measures will be implemented to reduce potable water used throughout the development. Such measures will be required to comply with the Federal Government's Water Efficiency Labelling and Standards ('WELS') Scheme, where a minimum of 3-star rating will be required.

### 3.5.5 Stormwater Drainage

A Stormwater Management Strategy is provided in Appendix N. The SWMS identifies the Environmental Values (EVs) of the site, specifies Water Quality Objectives (WQOs), and details conceptual stormwater quality treatment measures to ensure site runoff meets appropriate quality objectives.

Stormwater design for the site will comprise the following three main components.

- The upgrade of cross-drainage of Proserpine-Shute Harbour Road to provide minimum ARI 50 year immunity against flooding (in conjunction with the overall upgrade of Proserpine-Shute Harbour Road).
- Diversion of clean hillside run-off from the Conway NP around the site.
- Capture and treatment of urban run-off from within the proposed development, with discharge distributed the east and west of the site with no significant discharge into the marina.

The SWMS provides details of the proposed stormwater management for the development, addressing in detail the above three main components.

The proposed upgrade to Proserpine-Shute Harbour Road will involve the installation of additional cross drainage culverts. One 900mm diameter, two 1,200mm diameter, and two 1,500mm diameter pipes have been proposed. The upgrade also incorporates a collection and diversion channel on the downstream (southern) side of Proserpine-Shute Harbour Road. This channel (approximately 3m base width, 12m top width, and up to 1.5m depth) is to be landscaped and designed to act as an ephemeral stream, utilising natural channel design principles. The design of the upgraded road is presented in Drawings 7900/48/01-200 to 7900/48/01-211.

Some hydrological modification will be required around Proserpine-Shute Harbour Road given that the run-off from five sub-catchments currently discharge directly across Proserpine-Shute Harbour Road into Shute Bay. Four of the existing catchment discharges will be amalgamated and redirected immediately to the west of the development. The fifth catchment will flow to a culvert and will empty into Shute Bay to the east of the site. The proposed redirection works will improve the hydrological immunity of Proserpine-Shute Harbour Road, and will allow for improved water quality prior to discharge to Shute Bay, and ultimately the Coral Sea.

The redirection also has the additional effect of flushing deposited sediment to the western wall of the development, encouraging sediment movement, minimising the impact of the development on coastal processes and avoiding silting of the seaward access to the adjacent marine salvage company.

Gross pollutants are likely to be generated by the development during the construction and operation phases. Generally, pollutant movement can adversely affect coastal waters by:

- increasing turbidity (and subsequently decreasing euphotic depth);
- reducing water quality due to increased pollutant loads (including nutrients, sediment and attached pollutants) causing changes in water quality composition, thereby impacting upon flora and fauna; and
- reducing the aesthetics and amenity of an area.

Potential impacts on water quality from stormwater run-off will be managed by the design, construction and operation of the development which involves:

- water sensitive urban design;
- sediment and erosion controls; and
- a water quality monitoring program.

During construction, erosion and sediment movement is of particularly high risk where unprotected earthworks and exposed areas of soil and subsurface material interplay with freshwater run-off that enters the sensitive coastal environment.

The extent of stormwater management options for the construction of the development has been detailed for the two major phases (civil works and urban works) to address the above potential impacts and listed below.

- Floating silt curtains (water-based works).
- Earth bunds (water-based works).
- Sheet pile walls (water-based works).
- Sediment fences (land-based works).
- Perimeter bunding (land-based works).
- Catch drains (land-based works).
- Temporary bunding and sediment basins (land-based works).

Sediment and erosion control plans for each construction phase are provided in Drawings 7900/48/01-406 to 7900/48/01-411.

The ultimate development site will be serviced by a stormwater treatment train to ensure urban pollutants generated by the development are captured and treated prior to discharge to Shute Bay. A treatment train shall be in effect during both the construction and operational stages of the development. A summary of the operational treatment train is as follows.

- The stormwater runoff from the urban residential lots will pass through grassed swales with underlying bio-retention systems. Runoff will then pass through bio-retention basins before flowing offsite.
- Runoff from roofs will flow into rainwater tanks, from which the overflow will flow to grassed swales with underlying bio-retention systems before passing through a bio-retention basin.
- Runoff from the car parking facility will be directed through an oil and grease separator and into a bio-retention swale and into one of several bio-retention basins.
- Road runoff will be directed through bio-retention basins.

The conceptual stormwater management strategy is presented in Figure 13.

All SQIDs have been located within the lease area of the site and aim to:

- maintain natural drainage patterns;
- avoid collecting and concentrating stormwater flow into single point discharges;
- reduce the velocity of stormwater to minimise erosion at discharge points; and
- trap rubbish, coarse sediment and attached metals, oils and grease.

Stormwater management controls have been designed so as to achieve the industry standard load reductions of 80% total suspended solids, 60% total phosphorus, 45% total nitrogen prior to discharge to Shute Bay.

Both the Construction EMP and Marina SBMP (refer to Section 5 'Environmental Management' of the EIS) specify a water quality monitoring program (the latter also involving a maintenance program for SQIDs) based on the recommendations of the SWMS, enabling the effectiveness of these controls to be determined. The design of stormwater controls and the water quality monitoring program have been in accordance with relevant industry codes of practice and best practice guidelines to manage nutrient runoff, stormwater quality and erosion control.

### **3.5.6 Telecommunications**

The Proponent engaged the services of Lectel Pty Ltd to undertake an assessment of the potential impacts on existing telecommunications infrastructure in the subject area as well as the telecommunication infrastructure needs of the proposed development.

Telstra is currently mandated to provide a copper cable telephone network, free of charge to the developer (excluding trenching and any civil headworks costs). Although the network will be full-owned by Telstra, other service providers are able to resell their services to SHMR users across the Telstra-owned network.

Existing Telstra plans show adequate conduits and fibre optic cables available in the vicinity of the SHMR development. A Telstra fibre optic cable in conduit runs along the north side of Proserpine-Shute Harbour Road and a Telstra copper cable in conduit runs along the south side of Proserpine-Shute Harbour Road connecting to a pillar at the eastern boundary of the SHMR site. The existing network is capable of providing broadband via an ADSL. No additional conduits are required, however, Telstra may need to upgrade the cabling.

The proposal area is expected to receive adequate mobile phone coverage from Telstra and Optus.

No conflicts with other infrastructure or surrounding sensitive environments were identified in the assessment on telecommunication infrastructure.

The Lectel report presented as Appendix L provides full details of the proposed telecommunication infrastructure.

### **3.5.7 Accommodation and Other Infrastructure**

It is not intended that the SHMR will involve construction of temporary workforce camps or other special accommodation.

During the construction period, workers and equipment will be sourced from the local area where feasible. As such, no accommodation for construction workers is required as such workers will already be accommodated within existing residential housing in the local area.

It will however be necessary to draw construction workers from other sources outside the local area when existing supply does not meet the SHMR demand. These workers can be accommodated within available local housing, caravan parks and other residential accommodation within Airlie Beach, Cannonvale and Proserpine.

The SHMR site is readily accessible from existing townships with public transport routes along Proserpine-Shute Harbour Road terminating at the SHTF.

As part of construction works, refuelling of equipment is likely to be via mobile tanker. This will allow the utilisation of the existing gazetted fuel storage areas. However on site fuel storage may be necessary when the fuel type and quantity does not make mobile deliveries economically feasible. As outlined throughout this document, fuel storage and handling on site will be in accordance with Australian Standard 1940-2004 *The Storage and Handling of Flammable and Combustible Materials* (AS 1940-2004).

The reclamation of the land allowing building works to commence is expected to occur over 2 years and involve primarily heavy earthmoving equipment with the majority of revetment and breakwater wall components arriving on site pre-cast. Following the civil earthworks stage, construction workers will consist mainly of builders, carpenters, metal workers, tilers, painters, plumbers and electricians. Temporary equipment hardstands and fuel/chemical storage areas will be required. The location of such structures has not been defined at this early stage however performance standards for the design, construction and operation of any temporary storage areas have been provided as part of the management plans prepared under Section 5 'Environmental Management' of this EIS.

The operation of the SHMR will involve onsite storage of fuel in tanks to provide boat refuelling facilities. The location for placement of onsite (below ground) fuel storage tanks has yet to be determined however a Marina SBMP has been prepared to mitigate potential impacts from such infrastructure. The volume of fuel to be stored is expected to be approximately 50,000 litres as an upper maximum.

The impact of the SHMR on car parking has been assessed in the traffic assessment presented in Appendix K1, with the development proposing to provide sufficient car parking spaces in advance of demand.

### **3.5.8 Transport Infrastructure Demand**

Public transport to Shute Harbour currently operates from Airlie Beach and Proserpine over a 12 hour day, broadly between 6am and 6pm with services running approximately every 15 to 30 minutes. In addition, Whitsunday Transit has been contracted by Queensland Transport to provide school transport services.

The SHMR includes a bus lay-by within the development design to facilitate public transport to the site. The Proponent proposes to provide a courtesy bus throughout the development site to encourage public travel. However, it is a Queensland Transport decision to include SHMR as a destination on the current public transport route.

The SHMR also includes pedestrian access along the waterfront and two main collector roads. Ultimately pedestrian through fares will terminate at the SHTF. Although, it is expected pedestrian access from the SHMR to the transit facility will result from public demand once the development is fully operational. The Proponent proposes to contribute to the design and construction of a boardwalk style pedestrian access from the public boat ramp to the SHMR development as part of its contribution to the new public boat ramp.

The demand for associated infrastructure including car parking and boat ramps has also been identified by the Proponent. While the demand currently exists with an overflow of vehicles regularly seen along Proserpine-Shute Harbour Road verges, it is foreseeable that the demand for public car parking and an additional boat ramp will increase as a result of the SHMR. Part of the SHMR proposal involves a financial contribution for the construction of a public boat ramp facility and WRC car park to supplement the lack of existing parking facilities in the face of increasing tourism. The WRC propose to reclaim an area encompassed by the small un-named bay between the Shute Harbour Motel and the barge ramp to the east to provide (and manage) at a minimum for parking of 98 cars and trailers and a four lane boat ramp.

The current level of demand for maritime infrastructure by recreational boaters and commercial marine operations is significant with the majority of existing swing moorings shown on 'Admiralty Chart AUS 253' as fully occupied, as illustrated on Figure 10.

The marina footprint will require the relocation of about 26 swing moorings. According to the Regional Harbour Master, a further 31 swing moorings will need to be relocated to provide a suitable "setback" from the proposed marina and improvement to access channels. The Regional Harbour Master has indicated there is capacity in the bay to accommodate the relocation of the moorings which will be undertaken with Proponent funding. The moorings will be replaced with moorings that will prevent the anchor chain damage to the seabed and seagrass that currently occurs. This is predicted to result in the re-establishment of 950m<sup>2</sup> of seagrass.

The SHMR provides a further 669 marina berths of varying sizes (including 193 multi-hull berths) to meet the existing demand within the Whitsunday region as shown in the PSSG Marina Demand Study and updated report attached as Appendices H1 and H2 respectively. It is noted previously that swing moorings in Shute Bay were restricted to boat users having shallow drafts. The proposal will provide sufficient keel depth for a range of vessels previously restricted to anchorage in close proximity to the southern access channel (and which is generally fully occupied) where adequate depth is maintained at LAT.

A marina development has a number of advantages over swing moorings as emphasised throughout this EIS ranging from re-establishment of seagrass communities external to the footprint where some swing moorings were located to enhancing the ecological complexity of Shute Bay by introducing artificial structures and fish friendly devices.

As discussed in Section 3.5.2 'Shipping/Waterborne Transport' of the EIS, vessel transit lanes are recommended to manage the increase in recreational and commercial operations as a result of the SHMR to provide for safe and effective traffic management.

## **3.6 Waste Management**

### **3.6.1 Character and Quantities of Waste Materials**

SHMR will utilise the waste management hierarchy to guide design and implementation choices in all phases of the project development and operation. Some measures will apply across the hierarchy, such as:

- design of site development, infrastructure, and guidelines for buildings;
- training in construction environmental best practices for construction contractors and their employees;
- environmental best practices for commercial and retail outlets, the marina, and open space areas; and
- covenants, restrictions, and regulations placed upon the different precincts.

#### **3.6.1.1 Construction**

An inventory of wastes likely to be generated during the construction of the development is outlined in the Waste Management Plan (WMP) presented as Appendix U2 to the EIS. Actual waste estimates are approximate and may vary from that anticipated. Construction waste generation is anticipated to be 5m<sup>3</sup>/day based on examples of construction of marinas in Australia.

Whenever feasible, construction will include the use of modular components, purchase of materials cut to standard sizes or pre-fabricated materials to reduce the need for off-cuts. Material choices for building construction shall include a proportion of renewable or recyclable components, although use of renewable and recyclable components shall not compromise the construction of the buildings in accordance with the relevant development codes and the Building Code of Australia.

Separate skip bins will be provided within the construction compound to facilitate waste segregation and maximise economic reuse and recycling.

Contracts for builders and suppliers shall include an environmental performance component. Contractors and suppliers will have to pre-qualify for tendering based on environmental performance and consideration of potential environmental impact of supplying the material or goods. Builders and suppliers shall also be required to identify the source of the material or goods, seek to provide alternatives and not just automatically use new materials, provide options for pre-fabrication, minimise packaging materials and access to "just in time" ordering.

Construction project management is also important for managing waste streams. For example, works scheduling organising trades, material delivery and placement, construction compound layout and organisation can contribute to effective reuse and minimisation of wastes.

Plastic waste will be kept to a minimum with alternatives to plastic being a selection criterion for suppliers delivering materials for construction. For example when feasible, requisitions will order metal strapping instead of plastic wrapping or shrink wrap. Any plastic waste generated will be recycled, where possible.

Fuel storage will be kept to a minimum and will be used for refuelling of equipment during construction. Storage and handling of fuels will be conducted in accordance with AS 1940 – 2004. Where possible, a proportion of the fuel used in the construction vehicles, plant and equipment shall include renewable fuels and/or ethanol based fuel.

Capital dredging of the marina basin will be conducted during construction. Approximately 732,000 m<sup>3</sup> of dredge spoil will be generated. The dredge spoil shall be treated for potential ASS and used as fill for the reclaimed land part of the development.

Tailwater from the dredge spoil area may be produced during dredging activities. The tailwater treatment system will include a series of treatment ponds to be constructed within the dredge spoil disposal area on the west of the isthmus as shown in the Drawings. The tailwater treatment system will enable further settlement of sediment from the tailwaters. The water will be tested, and treated if necessary, to ensure the required water quality parameters are met, prior to being released to the receiving environment, namely Shute Harbour.

Any construction waste that cannot be recycled or reused and requires disposal, will be transported to the Kelsey Creek Road Landfill. A waste acceptance agreement must be sought from the Landfill Manager prior to dispatch of waste from the site.

Air emissions associated with the construction of the SHMR have been previously addressed in Section 4.6 'Air' of the EIS.

### **3.6.1.2 Operation**

Domestic and general waste will be the largest waste stream generated during operation of the development as highlighted in the WMP presented as Appendix U2 of the EIS. The remaining wastes streams generated include recyclable wastes such as paper, cardboard, plastics, glass, metals and organic waste.

Colour-coded and/or labelled bins will be provided to segregate and collect these wastes streams. These bins will be located at waste compounds to be designed and located at each residential lot, marina, hotel, commercial and retail outlet. These bin compounds will be designed and located to ensure that they are easily accessible from each part of the building and from the collection point and includes adequate access and manoeuvring space, at least an area equivalent to the combined footprint of the bins.

Plastic waste will be kept to a minimum and retail outlets will be encouraged to supply alternatives to plastic bags, such as biodegradable or cotton bags. Any plastic waste generated will be recycled, where possible.

Based on siltation modelling of Shute Harbour and available land for spoil disposal, maintenance dredging will be required every 5-7 years. Dredging of the navigational channel and marina basin will generate 1,500 to 21,000m<sup>3</sup> of dredge spoil at each dredging campaign.

The location for handling maintenance dredge spoil will be on the west of the isthmus. When this is not being used for dredge spoil treatment, it will be used as open parkland.

The existing Shute Harbour Pump Station will be updated during the course of construction of the SHMR. In conjunction with the construction of the new Funnel Bay PS, SHMR sewage will be directed to the Funnel Bay Pump Station via a 150mm rising main, and then will be moved on to the Jubilee Pocket Sewerage Treatment Plant for final treatment.

Use of hazardous chemicals will be minimal, however, some cleaning and other chemicals may be used during cleaning and maintenance of the hotel and other open space areas. Storage and handling of hazardous and other chemicals will be in accordance with the relevant Australian Standard.

An inventory of wastes likely to be generated during the operation of the development is outlined in the WMP, presented as Appendix U2 to the EIS. Actual waste estimates may vary from that anticipated.

### **3.7 Financial Feasibility**

This section will remain confidential as is indicated in the TOR. Information has/will be provided to the CG as necessary.

With regard to costs associated with the development and ongoing maintenance and operational costs, these have been identified as part of the economic impact assessment, and considered in drawing the conclusion of a resultant positive net benefit associated with the SHMR development proposal.



## 4. ENVIRONMENTAL VALUES AND MANAGEMENT OF IMPACTS

### 4.1 Land

#### 4.1.1 Description of Environmental Values

Cardno Ullman & Nolan (Ullman & Nolan) undertook an assessment of the topography, geomorphology and geology of the SHMR site. These works consisted of a desktop study and a site inspection. A summary of Ullman & Nolan's geotechnical investigation is provided as Appendix I1 to the EIS.

This section includes the following components to address the ToR.

- A description of the existing land use of the proposed development site including suitable maps.
- Plans of the existing infrastructure and proposed infrastructure as a result of the development.
- A description of the land- and marine-based environmental values that are potentially impacted on by the proposed development.

Potential impacts on the land- and marine-based environmental values and mitigation measures proposed are provided in Section 4.1.2. Mitigation measures are based on best practice management methods and the principles of ecologically sustainable development, with the objective of minimising and/or avoiding potential impacts from the proposed development and protecting and/or enhancing environmentally sensitive areas.

A number of existing geotechnical investigations and studies have been undertaken over an extended period of time as part of the engineering evaluation of the site, and these were used in recent analysis.

##### 4.1.1.1 Topography/Geomorphology/Bathymetry

The general topography of the SHMR site is characterised by a steep, east-west trending rocky hillslope above high water mark, a narrow wave-cut platform, and beach and sea bed below high water mark.

Proserpine-Shute Harbour Road follows the foreshore having been constructed on a cut to fill earthworks bench. The existing topography of the site is shown in Drawing 7900/48/01-105.

Four principal terrain units are present at the SHMR site which are:

- steep hillslopes;
- alluvial and colluvial deposits north of Proserpine-Shute Harbour Road;
- beach sediments; and
- marine sediments (muds).

The rocky steep hillslope is up to 35 m in elevation at the north western site boundary, and continues rising within the adjacent Conway NP beyond. The northeast boundary also slopes up to 25m high, and continues rising to the north within the Conway NP. In some parts, notably the lower slopes, residual and colluvial soils to about 2m maximum thickness exist.

The centre section of the northern boundary is lower-lying. Two adjacent alluvial lined gullies at about 5 m AHD are located at the toe of the hillslope, immediately to the north of Proserpine-Shute Harbour Road, which act as a natural detention basin.

Despite the hard and resistant nature of the rocky hillslopes and the relatively undisturbed vegetation cover, the combination of steep slopes and fractured rock exposures is conducive to the formation of landslips and rock slides. This is the principal land forming feature. As a result, colluvium on the lower footslopes is common, with beach deposits typically being of colluvial origin. This colluvium is then reworked and broken down further by tidal action.

The predominantly fine grained nature of the marine sediments reflects the depositional environment of the Shute Bay Inlet. A slightly coarser grained material occurs for a thickness of less than about 1m over the sea bed within the SHMR site, predominantly the western half. This has likely resulted from a “sorting” process where wave and tide action has washed out the finer grained clays and silts. Coarser materials have also been deposited nearer the high water mark with cobbles and gravel forming a beach like shore which supports mangrove populations. The finer grained silts and clays generally occur below low water tide level and increase in depth to more than 10m towards the centre of the bay.

#### **4.1.1.2 Geology**

The regional geology of the site is described in the 1:250,000 Geological Series Sheet for Proserpine. The geology of the area is typical of the surrounding Whitsunday area, comprising volcanoclastic sediments interlain with intermediate volcanic flows and minor intrusions. The rocks form part of the Whitsunday Volcanic Province, an early Cretaceous-aged sequence.

Geological faults are generally NW-SE trending, with the closest known one being the submarine Molle Fault, some 5km to the east of the site. The University of Queensland reports that hazard assessment of earthquakes associated with faults such as this is difficult, primarily because of the paucity of historical seismic data and a sparse seismic network. As a result, information has been obtained from the Queensland University Advanced Centre for Earthquake Studies, giving locations of earthquake epicentres and their magnitudes, and values of acceleration coefficients; and Australian Standard 1170.4 – Earthquake loads – Figure 2.3(g), acceleration coefficients, reproduced in the geotechnical summary presented in Appendix I1. It can be determined from this information that, while an earthquake risk exists for the Shute Harbour area, the hazard is small.

The dominant bedrock at the SHMR site has been classified as acid and intermediate pyroclastic flows of the Airlie Volcanics. The Airlie Volcanics were deposited in fresh water in the Permian Period and have subsequently been folded into a large, open syncline, which plunges south or south southwest at a low to moderate angle. Dips are moderate to low on the western limb and steeper on the eastern limb, nearer to the site.

Flow banded rhyolite is the dominant rock type observed in the road cuttings at the site. Localised folding of beds is also evident. A number of microdiorite (dolerite) dykes are recorded on the geological sheet, which strike approximately north south. These are clearly visible as relatively narrow (about 1m, but up to 5m wide) deeply weathered, subvertical zones within the flow banded rhyolite.

Changes to relative sea and land levels have resulted in the area becoming drowned during the Tertiary Period. Overlying the basement rock at and below the shoreline is recent to Holocene-aged marine sediments (marine muds).

#### 4.1.1.3 Soils

The soil is generally less than 0.6m thick on the hill slopes above the development, and typically consists of pale brown-grey sandy gravels or gravely sands with some clay and silt. Soils are either non-plastic or of low plasticity. The soils derive from local weathering of bedrock and in many places are covered by a thin veneer of angular scree, which together with coral sand, gravel and mud, now forms the beach/storm deposit shown in the typical cross section.

Below -1m AHD, the common soil type is soft highly plastic silty clay. Marine muds are covered by a surface of about 1 m thick or more of silty clayey sands with gravel.

The marine muds are comprised of principally soft, dark grey, medium plasticity silty clays with shells and coral fragments described as gravelly clayey sand. They vary in thickness from zero at the head of the beach to in excess of 10m at the southern boundary of the site.

Marine muds are underlain by competent residual soils and weathered rock. The soil profile of the site is shown in Figure 14 of the EIS.

The residual soils both onshore and offshore comprise mainly of stiff, medium plasticity clayey sand. Residual soils are typically some 2m thick and overlie weathered rock.

The typified soil profile of the marina basin can be described as comprising of "soft, medium plasticity sandy clays followed by very soft, medium to high plasticity clays".

Borehole logging as part of this geotechnical assessment has described the depth, moisture, consistency and visual characteristics of each soil profile according to the Australian soil and land survey field handbook and Australian soil classification. Particle size distribution tests have been undertaken for each material classified to provide an indication of erodibility. The soft marine muds have an estimated permeability of  $10^{-7}$  m/s (based on grading and plasticity characteristics) and low to moderate dispersibility.

#### 4.1.1.4 Contaminated Land

The potential for land contamination is considered low because the site is largely undeveloped. However potentially contaminative activities have been undertaken at parts of the site, and a sediment analysis was undertaken by Ullman & Nolan to determine the actual level of contamination present in marine sediments. The investigation was undertaken to inform the recommendation of appropriate mitigation measures for implementation during the construction and operational phases of the proposed development.

Past and/or current activities identified as potential contamination sources include the following.

- Minor boat and engine repairs in the flattened area to the south east of the site. No visible evidence of soil contamination has been observed in this area.
- Contamination of sediment within the harbour from private and down coast boat maintenance activities.
- Past motor maintenance workshop activities carried out up gradient to MHWS on Lot 273 on HR17572.

Possible contaminants as a result of the above past and/or current activities include tributyl tin (TBT) from antifouling paint, metals and petroleum hydrocarbons. Sediment contamination sampling and analysis was undertaken with consideration of the *National Ocean Disposal Guidelines for Dredged Material* (Environment Australia, May 2002) and the *ANZECC Guidelines for Fresh and Marine Water Quality 2000*.

The *ANZECC 2000 Sediment Quality Guidelines* are intended to reflect levels of contaminants in sediment that might be harmful to aquatic ecosystems and have conservative trigger values that identify when further investigation or special management measures may be appropriate to ensure that adverse impacts on ecosystems are avoided.

Sediment analysis included:

- Heavy metals (Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc and Mercury);
- Total Petroleum Hydrocarbons (TPH)/Benzene, Toluene, Ethyl Benzene and Xylene (BTEX);
- Poly Aromatic Hydrocarbons (PAH);
- TBT; and
- Total Organic Carbon (TOC).

The results of sediment analysis undertaken identified a small portion of the surface sediments are contaminated by TBT, with 2 sample results above the ANZECC 2000 Sediment Quality Guideline values in the northern and eastern areas of the site. Other contaminant concentrations were not of environmental significance when compared with applicable guideline values. However the laboratory control reported poor duplication precision of one of the contaminated samples due to sample heterogeneity. This implies that the TBT in the samples is most likely present in paint flecks that may not be randomly distributed and bound to sediment. No visible paint flecks in waters were noted at the time of the investigation.

TBT is a tin-based organic compound that has historically been the active ingredient in marine anti-fouling paints. TBT compounds are extremely toxic to marine organisms.

The northern and eastern sites of the development are more than likely the location for past and current mooring for recreational boats and private boat maintenance as it is more sheltered.

There was no evidence of contaminants at depth and therefore it is expected any contamination is concentrated in the top 0.5m of sediment. The results indicated that the upper 0-0.1 layer must be less contaminated, due to the declining use of TBT in recent years.

The potential for release of environmentally significant levels of contaminants during dredging and/or disposal of sediments is considered minimal. Findings of the sediment contamination investigation are provided in the contamination investigation presented as Appendix I2 of this EIS.

#### **4.1.1.5 Acid Sulfate Soils**

Acid sulfate soil mapping has not been undertaken by the Department of Natural Resources and Water (DNRW) for the Shute Harbour area. Ullman & Nolan completed a detailed acid sulfate soil investigation for the site in 2005, which included both the onshore and offshore areas, the intertidal zone and the proposed access channel.

The sampling methodology, analysis results and investigation findings are provided in the contamination investigation presented as Appendix I2 and were undertaken in accordance with the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland*.

The acid sulfate soil investigation involved the drilling and sampling at 54 locations. The investigation was conducted in accordance with the Queensland Acid Sulfate Soil Investigation Team (QASSIT) guidelines. The boreholes were distributed over the entire area of marine and alluvial sediments within the development site at an intensity of two (2) holes per hectare. Holes were drilled to 1m below the proposed typified dredge depth shown in Drawing 7900/48/01-102 with borehole locations shown in Drawings 7900/48/01-111 and 7900/48/01-112.

The results of the acid sulfate soil investigation show that marine sediments have a potential for acid generation. However marine muds in the project area have an acid neutralising capacity deemed by Ullman & Nolan to be sufficient to eliminate net acid production. This natural buffering capacity derives from particles of calcium carbonate (coral and shell) in the marine sediments.

#### **4.1.1.6 Land Use**

Land use has been described in detail in the planning report, presented as Appendix C to the EIS. Comment on land encompassing the site is provided hereafter as a summary only. Figure 5 of the EIS provides the zoning plan overlay.

##### *Lot 2 on RP177389*

Lot 2 on RP117389 is vacant leasehold land. The site is adjacent to lands classified as Regional Open Space (Conway NP) to the north and west, and partially within the World Heritage GBRMP to the south and east. A Term Lease (TL 0/219495) over Lot 2 (and Lot 273 on HR17572) has been issued to the Proponent under the *Land Act 1994* for marine works purposes, namely for the construction of a marina and reclamation for residential, commercial and tourism purposes. Upon completion of the development the land above the MHWS will be freehold, owned by SHMR. Concurrently a 99 year lease for the area below the MHWS will be granted to SHMR. This term lease is consistent with the strategic direction under the Planning Scheme for the project area as a marina.

Pursuant to section 23B of the *Native Title Act 1993* – the issuing of the special lease is classed as an exclusive possession act which extinguishes Native Title pursuant to section 20 of the *Native Title Act (Qld) 1993* due to the following reasons.

- It is a Category A intermediate period act and is therefore valid pursuant to section 8A of the *Native Title Act (QLD)*.
- It was issued prior to 23 December 1996.
- It consists of the granting of a scheduled interest.

##### *Lot 273 on HR17572*

Lot 273 on HR17572 is zoned “Commercial” under the Planning Scheme. A derelict shed occupies Lot 273 which was once used as a motor maintenance workshop is still in existence. This use has been discontinued and it is proposed to demolish the remaining structure and surrender the lease land beyond the Proserpine-Shute Harbour Road to the State, thereby returning that portion of the land to public ownership.

#### *Seabed south of Lot 2*

A permit to occupy the sea bed to the south of the lease land has been granted by the DNRW.

#### *Adjoining Land Tenures*

Adjoining uses include a single residential dwelling on the western headland and marine salvage company, and the Shute Harbour Motel immediately to the east of the SHMR site. The public boat ramp and barge and ferry facilities are located further east of the SHMR site.

#### *Cultural Heritage*

Northern Archaeology Consultancies (NAC) has undertaken a cultural heritage assessment on behalf of the Proponent for the SHMR site which is discussed in more detail in Section 4.10 'Cultural Heritage' and in the technical reports presented as Appendices S1 to S3.

The SHMR site lies within the traditional homelands of the Gia and Ngaro peoples. The precise location of traditional territorial boundaries between these two distinct indigenous groups is the subject of extended anthropological and Native Title research, well beyond the scope of the current study. For the purposes of the SHMR project, representatives from both groups have been included in the cultural heritage assessment, as both have indicated strong interests in land development and land management issues in the wider Shute Harbour region. There is currently one Native Title claim relevant to the wider Bowen-Proserpine coastal area, claim QC99/24 lodged by the Gia people.

#### **4.1.1.7 Infrastructure**

The SHMR site will be constructed with appropriate infrastructure as discussed in Section 3 'Description of the project' of this EIS. The location of existing and proposed infrastructure as it relates to road and water based transport, energy, water supply and sewerage, and stormwater drainage is illustrated with suitable figures in the relevant appended documents to this EIS. These aspects were addressed in Section 3.5 'Infrastructure Requirements' of the EIS.

The potential impact from the installation of proposed infrastructure required by the proposal on environmental values is addressed throughout this EIS. In short the installation of infrastructure has been designed and will be constructed and maintained to minimise and/or avoid potential environmental harm and maximise the benefits to the existing and proposed community at Shute Harbour.

#### **4.1.1.8 Sensitive Environmental Areas**

The SHMR is located within the GBRWHA and GBR Coast Marine Park (Habitat Protection Zone) and is surrounded by Conway NP and GBRMP. The location of the SHMR in relation to these environmentally sensitive areas, referred to as areas of state significance (natural resources) as mapped under the draft *Mackay-Whitsunday Regional Coastal Management Plan* (August 2006) are presented in Figure 15. As part of this proposal the Proponent has mapped coral, mangroves and seagrass communities (the latter over time in 1999-2000 and 2007) as shown in Figure 16, Figure 17, Figure 18 and Figure 19 respectively.

Environmentally significant areas can be summarised as:

- Habitat Protection Zone of the GRBMP and Great Barrier Reef (Coast) Marine Park;

- Significant Coastal Wetlands including seagrass and coral reefs;
- Significant Coastal Dunes;
- Endangered Regional Ecosystems; and
- Protected Areas (i.e Conway NP).

The GBRWHA is one of Australia's first World Heritage Areas (WHA). It is the world's largest WHA extending 2,000km and covers an area of 35 million hectares. It was inscribed in 1981 for the following outstanding natural universal values.

- An outstanding example representing the major stages in the earth's evolutionary history.
- An outstanding example representing significant ongoing ecological and biological processes.
- An example of superlative natural phenomena.
- As containing important and significant habitats for in situ conservation of biological diversity.

The GBRWHA contains coral reefs, seagrass meadows, mangroves, soft bottom communities and island communities. It provides nesting grounds for the endangered green and loggerhead turtles and is a breeding ground for humpback whales. The islands and cays support several hundred bird species and some breeding colonies. The WHA is also culturally significant containing numerous important archaeological sites of Aboriginal and Torres Strait Islander origin. The area contains numerous shipwrecks and historic ruins and lighthouses. Approximately 98% of the WHA is within the GBRMP with the remainder being Queensland waters and islands (DEWHA, 2007).

Shute Bay contains numerous habitats of ecological importance, including mangroves, soft sediments and small patches of seagrass saltmarsh and coral communities. The distribution, density and community structure of seagrasses within the bay have varied significantly over the past two decades.

A more detailed assessment of environmentally sensitive areas is discussed in Sections 4.5 'Coastal Environment' and 4.8 'Nature Conservation' of this EIS and technical reports referenced therein, specifically:

- Appendix E pertaining to Matters of NES;
- Appendix P1 pertaining to aquatic biology;
- Appendix P2 pertaining to marine megafauna; and
- Appendix Q pertaining to terrestrial ecology.

This opportunity is taken to reiterate that as part of the SHMR development, leased land north of Proserpine-Shute Harbour Road (part of Lot 2) will be relinquished back to public ownership, potentially to be managed as part of the Conway NP.

#### **4.1.1.9 Landscape Character**

The landform and terrain features present within the Shute Harbour locality have high environmental values. A number of values identified in the WSC Planning Scheme are relevant to the site and include:

- pristine natural resources;
- verdant hilly coastline forming the backdrop of the GBRWHA; and

- magnificent views of the ocean and tropical Whitsunday Islands.

The WSC Strategic Plan identifies a number of other valued aspects of Shute Harbour and the surrounding area, which includes:

- the array of accessible and attractive boating and outdoor recreational opportunities; and
- cultural and heritage values, images and identity are identified, maintained and enhanced for future communities and tourists to appreciate.

The existing landscape character was assessed by Yurrah Pty Ltd. The landscape character assessment is presented in Appendix J and describes the existing values of the site as being largely influenced by previous land uses within and adjacent to the site. Adjacent land uses display a varied landscape character which is described as a heterogeneous mix of natural, semi-natural, tourism-orientated and port industrial landscape character values. The site lies in a transition zone between the natural areas of Conway NP to the west and the more developed areas of Coral Point to the east. A similar transition exists from north to south with the natural areas of Conway NP and Mount Rooper giving way to more tourism and transport-based land uses within the bay.

Figures 3 and 4 of the landscape character and visual amenity assessment presented as Appendix J gives an illustration of the Landscape Character Plan dividing the subject site and surrounds into four broad landscape character zones.

The landscape character to the east, west, north and south of the SHMR site has been discussed in detail in Appendix J.

3D modelling of the SHMR development has been undertaken by V2i (DVD enclosed) to aid the visual representation of the development in the context of its environment. Figure 11 provides a selection of still images from the 3D modelling, on which the landscape character and visual amenity impacts were assessed.

#### **4.1.1.10 Visual Amenity**

The existing visual values of the site are based on two major components being:

- an area of coastline which is framed by two high ridgelines to the north-east and north-west; and steep vegetated slopes directly to the north; plus
- an adjoining area of sea bed which is located within the waters of Shute Bay.

The existing visual values were assessed by Yurrah Pty Ltd. This assessment is presented in Appendix J.

The ridgelines to the north of the site, coupled with minor ridges further to the east and west create a number of visual sub-catchments within the broader visual catchment. Only parts of the SHMR site are visible from most land-based viewing locations. The SHMR site is relatively low lying but is expected to be entirely visible from open waters of Rooper Inlet and parts of the Whitsunday Passage, however this fades with distance from the shoreline.

Views into the site may be obtained from nearby roads and transport corridors (i.e. Shute Harbour Road), residential allotments along Coral Point ridge, individual dwellings adjoining Shute Bay, public and private facilities within Shute Bay (including ferry terminal, boat ramps and jetties), the open waters of Shute Bay and Rooper Inlet, and public tracks and trails such as those within Conway NP and Conway State Forest. The SHMR site therefore has the potential to be visually prominent from a number of locations.



Local and regional transport corridors, tracks and trails, and areas of open water was assessed to identify a number of regional vantage points, some of which offered clear views to the SHMR site. Photographs were taken from major views, view sheds, existing land and sea based viewing outlooks, ridgelines (including the Whitsunday Great Walk) and these are presented within the landscape character and visual amenity assessment presented as Appendix J.

Photographs, in combination with the landscape character plans and typical sections should be referred to in determining:

- the image of the area;
- the character of the local and surrounding areas; and
- the value of existing vegetation as a visual screen.

Day time views across the SHMR site from the west are:

- clear across the open waters from Proserpine-Shute Harbour Road;
- clear to filtered from Mount Hayward and the Whitsunday Great Walk; and
- clear from Shute Bay up to 1km distance.

Day time views to the north the SHMR site from the north are:

- clear to filter from Mount Rooper Walk;
- significantly filtered from 50 to 100m west of the site on Proserpine-Shute Harbour Road;
- limited to none due to built form, topography and vegetation from parts of Proserpine-Shute Harbour Road to the north-east; and
- clear from the existing residence to the north-west and motel to the north-east.

Day time views across the SHMR site from the east are:

- clear to filtered from the barge jetty and western jetty of the SHTF;
- limited to none due to interceding vessels and terminal buildings from the eastern side of the existing SHTF;
- clear to filtered to part of the site and limited to none of the northern aspect of the site from Lion's Lookout to the east; and
- significantly filtered of southern parts and limited to none of northern parts of the site from local roads (Neerim Crescent) and accommodation/residential areas (i.e. Coral Point).

Day time views across the SHMR site from the south are not affected by the SHMR development. Figure 11 provides visual representations (i.e. still images) of the SHMR development in the context of its environment (Source: V2i 3D Modelling DVD (enclosed)).

In summary, visibility of the SHMR site from the above viewing locations ranges from high (as viewed from the open waters of Shute Bay, adjacent areas of Proserpine-Shute Harbour Road and the nearby residence and motel) to moderate (as viewed from local and regional walking tracks and the existing SHTF), and low (areas north-east of the SHTF, including Coral Point).

Nocturnal views from all compass points were also assessed. Parts of the site are expected to be visible at night however views at night are expected to be in keeping with the character of the existing SHTF buildings and existing motel where lights are prominently located.

#### **4.1.2 Potential Impacts and Mitigation Measures**

The potential impacts identified as a result of the proposed construction and operation of the marina, relating specifically to land matters, include:

- adverse land use impacts on adjacent land uses specifically environmental nuisance at residential and commercial sites;
- increased risk of subsidence/failure of geotechnically weak materials resulting from fill placement and excavation;
- disturbance to land from vegetation clearing (for example mangroves), topsoil removal and excavation of surface soils;
- increased risk of erosion and sedimentation from land disturbance during rainfall, overland flow and from wind action/wave action;
- degradation of the marine environment within the marina, particularly hardening of substrate, loss of seagrass communities and decreased water quality from land disturbance;
- exposure of potential acid sulfate soils;
- increased risk of contamination of soil and/or marine sediments; and
- impacts on landscape character and visual amenity.

This section also identifies, in response to the potential impacts, measures which will protect and/or enhance environmental attributes and minimise and/or avoid environmental harm.

##### **4.1.2.1 Land Use Suitability**

###### **Adjacent Land Uses**

###### Impacts

The proposed location of the commercial components of the marina towards the shoreline has the potential to create some degree of conflict with the adjacent Shute Harbour Motel in the long term. However commercial uses within the SHMR site will also provide some synergies removing the existing 'ad hoc' nature of commercial development at Shute Harbour.

The proposed marina is also located approximately 50m east of an existing residential land use which may be affected by loss of visual amenity.

In addition, the construction of the marina will also remove the availability for recreational boats to moor freely in a sheltered cove.

Other construction impacts including traffic, dust and noise are discussed in their relevant sections as structured by the ToR, specifically Section 4.2 'Transport', Section 4.6 'Air' and Section 4.9 'Noise and Vibration' respectively.

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## Mitigation Strategies

### *Shute Harbour Hotel*

The commercial aspects of the proposed development do not abut the Shute Harbour Motel boundary (zoned commercial and urban residential) and the master plan provides for a reasonable area of landscape screening and fencing which will ameliorate some of the likely noise (refer to section 4.8 for more detail), lighting and visual impacts. A discussion of the master planned development is provided in Section 3.1 with the likely construction impacts assessed in Section 3.4.

Further mitigation strategies for the construction phase of the proposed development include:

- providing generous landscape buffers along Proserpine-Shute Harbour Road between the commercial areas of the marina and the existing motel;
- staging construction to vary the use of noisy plant and equipment to provide periods of minimal impact;
- limiting construction times to 12 hours per day during daylight only, except during dredging of the marina basin to provide for reclamation fill; and
- consulting with the public on construction schedules for high noise generating activities.

### *Western Residence*

The adjoining residential allotment will share a common boundary with the proposed dwellings.

This residence currently enjoys unobstructed views to the north-east. It is envisaged that these views will be partially obstructed by the proposed residential component but direct views across the Bay will not be interrupted.

The proposed residential uses in the east of the site should also provide a suitable physical buffer to mitigate impacts associated with the more commercial areas of the development, as shown by the Precinct Plan in Figure 3 of the EIS.

Additional mitigation measures to minimise adverse construction impacts on adjacent land uses include:

- use of visual screens and hoardings;
- early establishment of landscaping and buffer zones; and
- landscape-sensitive placement and design of infrastructure such as roads and transmission lines.

## **Recreational Moored Boats**

During the civil earthworks for the SHMR, the ability for recreational boats to harbour within the SHMR site and immediate surrounds will be restricted. The temporary lack of recreational boating moorings is a short term impact as the marina development is intending to provide a managed mooring area for existing and additional recreational boat users. This management strategy will alleviate the potential impacts from unauthorised wastewater release within environmentally sensitive areas and anchor use on seabed seagrass and benthic communities.

#### 4.1.2.2 Soil Suitability

The suitability of the land for use in construction was assessed by Ullman & Nolan and reported in the geotechnical summary presented as Appendix I1, in particular the suitability of the marine muds for reclamation purposes. Soft marine muds have been identified as having a low bearing capacity, both in situ and when placed as fill.

The risk of subsidence/failure of geotechnically weak materials resulting from fill placement will be addressed through the construction methodology and further geotechnical testing (including soil settlement and bearing monitoring) during the development to ensure a suitable building platform is prepared for building works. In particular, the marine sediments will be placed and compacted as fill material within the reclamation areas, after being dried to a moisture content that will permit mechanical compaction and mixed with competent terrestrial fill materials (eg. sand) to give the desired construction performance characteristics. The rate of reclamation filling will be controlled so as to ensure that the foundation is not overstressed and that the clay soils will achieve progressive strength increase during the loading and consolidation process. The stratigraphy within the reclamation area therefore may be typified by a gravelly sandy clay underlay of between 1.5m – 4m in depth topped by a maximum of 1.5m of dried and mixed marine mud.

Marina and walkway piles driven into the marine sediments are expected to gain adequate support from the sediments, as such piles are only lightly loaded in the lateral direction. Piles with significant axial loads will be driven into competent residual soils and weathered rock.

The potential impact associated with the operational phase with regard to land use stability includes settlement and stabilisation issues associated with the use of reclaimed fill. It is expected that the proposed structures may impose relatively large loadings on the ground. After constructing the initial platform from excavation of in situ materials and sheet piling, the dominant founding material will be stabilised and appropriate time will be allowed for settlement. Footings for all structures will be engineered to appropriate standards. For larger buildings with high superimposed loads, footings are likely to be piles driven to bedrock with structural columns supported on concrete pile caps and floors engineered as suspended slabs. Such systems will mitigate any effect of fill settlement on building structures.

#### 4.1.2.3 Land Disturbance

##### Impacts

The construction of the development will change the topography as a result of the construction of a new plateau as shown in Figure 8 and dredging of the marina basin. The plateau will extend from the sheet pile line edging the Marina Basin up to match the new site levels at the re-aligned Proserpine-Shute Harbour Road further north. The new profile of the site is indicated on the cross sections shown in engineering drawings 7900/48/01-200 to 7900/48/01-211. A stormwater channel will be permanently located between the upgraded Proserpine-Shute Harbour Road and reclaimed land to divert clean stormwater from Conway NP around the development.

An increase in erosion and sedimentation may occur as a result of:

- change to topography;
- drainage of water across State coastal land by diverting sheet runoff from Conway National Park around the SHMR site;
- rainfall;

- overland flow;
- wind action/wave action; and
- removal of fringing marine vegetation.

Erosion and sediment is a particularly high risk where there are unprotected earthworks and exposed areas of soil and subsurface material and a concentration of freshwater flows in a sensitive coastal environment.

The existing rate of landform change as a result of erosion is variable, depending principally upon the incidence of prolonged wet weather, which exacerbates both instability and the erosion process. The alluvial and marine sediments are likewise subject to erosion during high rainfall events and storm activity.

As such, components of the SHMR proposal that will potentially impact on the water quality of the surrounding environment by increasing erosion and sedimentation include:

- development of laydown areas, haul routes, access tracks and material storage areas;
- construction of a series of bund walls for the purpose of providing access for sheet piling, onshore works and the separation of areas to receive materials extracted from the harbour;
- preliminary excavation, filling, vegetation clearing and site preparation activities;
- material storage and stockpiling;
- installation of underground services; and
- construction of master planned service and development buildings.

An increase in erosion and sedimentation may have an adverse effect on coastal water quality and associated seabed flora and fauna through a smothering effect within the marina basin and a decrease in flushing and intermixing from fresh water with marine waters in the project area.

The requirement for maintenance dredging every 5 to 7 years over a 2 to 3 month period as a result of the development and operation of the marina will also lead to disturbance of land for the purposes of spoil dewatering and disposal.

#### Mitigation Strategies

Erosion and sediment control plans are shown on Drawings 7900/48/01-406 to 7900/48/01-411 for construction phases 1 – 5. The erosion and sediment control plans read in conjunction with the EIS address the content and application requirements of *Erosion Prevention and Sediment Control Plan* (Fact Sheet, WRC, 2008) for development sites and consider the major influence the timing and the installation of control measures has on the management of erosion and sedimentation, and ultimately stormwater.

The sediment and erosion control plans prepared for each construction phase have the following objectives.

- Reduce the potential for erosion and subsequent sedimentation.
- Minimise the effect on the marine water quality and drainage path.
- Ensure materials that may contaminate watercourses and the marine environment are not released to any waters in a direct or indirect manner, or unmanaged on land as a result of construction and operational activities.

Mitigation measures to minimise potential impacts from land disturbance on soils and landforms include the following:

- phased construction as per Section 3.4 'Construction' of this EIS to minimise extent of exposed surface and subsurface material;
- progressive stabilisation and rehabilitation of disturbed areas to protect exposed earthworks;
- installation of engineer-designed temporary and permanent erosion protection measures in accordance with the Institution of Engineers (Qld Division) Manual for Erosion and Sediment Control (1996) which will adequately contain runoff from all areas of disturbed land and promote controlled releases, and which will include as a minimum:
  - silt curtains during dredging of marina;
  - sediment control fences;
  - sedimentation ponds and basins;
  - cut off drains;
  - gross pollutant traps;
  - bunding;
  - erosion control mats;
  - mulching;
  - vehicle/equipment shakedown areas;
  - vehicle/equipment washdown areas; and
  - stormwater and overland flow diversion structures.
- temporary and permanent erosion and sediment control devices shall be installed prior to the commencement of works and will be checked daily to determine their effectiveness over the first 6 months of construction and during the wet season and thereafter fortnightly, or after a rainfall event greater than 25mm.

Disturbance of the sea bed and intertidal flats through reclamation and dredging will increase sedimentation within the waters of the SHMR site and has the potential to impact on waters outside the SHMR site. Controls to protect water quality in the surrounding environment are addressed in Section 4.5 'Coastal Environment'.

Given the low bearing capacity of marine muds and subsequently the need for drying of marine muds in the process of filling reclaimed land, all of the major earthworks will be undertaken in the drier months of the year from April to December, which will:

- assist with the drying and mixing process of the reclamation materials;
- avoid cyclonic weather during sheet pilling; and
- limit potential erosion during construction.

Although the majority of cleared and excavated areas will be revegetated, there is the potential for erosion to occur during marina operations. However with the up gradient stormwater diverted around the site, the potential for erosion as a result of overland flow from Conway National Park is minimal. The main areas of concern are the stormwater flow channels within the development. Appropriate batter angles will be applied to the fill slopes over the site, and therefore instability is unlikely to be an issue.

Other mitigation strategies, in addition to the erosion and sediment control plan developed for each construction stage to minimise potential impacts from land disturbance have been proposed and are detailed in the CEMP. Section 5 'Environmental Management' sets the stage for this plan, with the CEMP presented as Appendix U2 of the EIS.

#### **4.1.2.4 Maintenance Dredging Spoil Disposal**

Maintenance spoil will be dewatered and temporarily disposed of in landscaped green space 'breakwater parkland' on the western side of the isthmus which has been designed for this purpose being lined with a sand filter during construction as shown in the Drawing schedule. On each occasion, maintenance spoil will be disposed offsite (on land) subject to relevant Commonwealth, State and Local Government requirements.

The Marina SBMP includes control provisions for dewatering and disposal of maintenance spoil. The Marina SBMP encompassing the control requirements for maintenance dredging and spoil disposal is attached as Appendix U3.

#### **4.1.2.5 Acid Sulphate Soils**

##### Impacts

The ASS investigation for the project area identified ASS material closely intermixed with significant quantities of calcium carbonate derived from shell and coral which will effectively self buffer the ASS and prevent the release of sulphuric acid to the environment. Given this EIS is based on the precautionary principle the potential impacts from disturbance of ASS are described and mitigation measures are proposed.

The potential environmental impacts resulting from disturbance of ASS or PASS include:

- changes to water chemistry of receiving waterbodies and groundwater resources;
- sedimentation and erosion (due to loss of aquatic vegetation from changes to water quality);
- loss of good quality fertile soils through expression of soil acidity; and
- impacts on fauna species (disease, mortality) of affected ecosystems, particularly within receiving aquatic ecosystems.

Queensland legislation requires adequate containment, treatment and management of runoff/leachate generated during the disturbance of ASS affected material in order to ensure the protection of coastal ecosystems, particularly wetlands and waterway areas.

The construction methodology incorporates the hierarchy of ASS management principles in line with the *Queensland Acid Sulfate Soil Technical Manual - Soil Management Guidelines* (Version 3.8) (2002) of:

- avoidance;
- minimisation of disturbance;
- neutralisation;
- hydraulic separation; and
- strategic reburial.

### Mitigation Strategies

Mitigation measures to minimise potential impacts from land disturbance of acid sulfate soils, given the low probability for acid generation due to self buffering capacity of marine muds, include:

- development of an acid sulfate soil management plan including identification of areas which require specific management strategies;
- storage of agricultural lime (CaCO<sub>3</sub>) within the project area;
- erosion and sediment controls;
- minimisation of disturbance of the natural surface and subsurface drainage regimes, such as retaining/maintaining existing flow pathways and directions for both surface water and groundwater resources and minimising changes to water table levels and tidal influences;
- design of embankments, bunds and other construction activities to incorporate measures to minimise/prevent subsidence, uncontrolled settlement of unconsolidated alluvial material, settlement creep, surface or subsurface heaving or deformation;
- staging of construction activities in areas rated as having moderate to extreme risk for ASS material to ensure that disturbance is minimised and rehabilitation/reinstatement is progressive and timely;
- design and construction of lined and bunded ASS material treatment pads in close proximity to the area of proposed ASS disturbance (but ensure that these areas are located within stable landform areas); and
- design of runoff control measures specifically for areas of proposed ASS disturbance, stockpiling and treatment so that runoff and overland flow can be adequately captured, contained, treated and monitored prior to release and is completely separate from other drainage control/management systems.

An Acid Sulfate Soil Management Plan (ASSMP) has been prepared for capital and maintenance dredging and is presented as Appendix I3 of the EIS.

#### **4.1.2.6 Soil Contamination**

##### Impacts

The results of sediment analysis undertaken as part of the geotechnical investigation by Ullman & Nolan indicate that a small portion of the surface sediments exhibit minor contamination, but not in environmentally significant concentrations. There was no evidence of contaminants at depth. As such there is no requirement to investigate the site in accordance with the *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland* (EPA, 1998) as contaminant levels are obviously well below trigger guidelines. The potential for release of environmentally significant levels of contaminants during dredging and/or disposal of sediments is hence considered minimal.

With regard to proposed construction activities, land could be contaminated by site activities including:

- fuel and chemical storage;
- oil spills from on site plant and equipment;
- accidental release of wastewater on connection to sewer; and
- incorrect disposal of waste materials.



Operational activities that may have a potential to cause contamination include:

- installation and operation of an underground fuel storage and fuelling facility onsite;
- ongoing waste generation, collection and temporary storage onsite associated with:
  - food waste;
  - boat waste (including sullage pump out and quarantine wastes);
  - paper and general office and workshop wastes;
  - wastewater;
  - paints;
  - miscellaneous chemicals; and
  - site maintenance wastes.

### Mitigation Strategies

Potential environmental impacts during the construction phase will be managed and mitigated by the implementation of various management plans including a Waste Management Plan and CEMP.

Mitigation strategies that are part of the WMP include at a minimum the following tasks.

- All fuels and chemicals stored in accordance with relevant Australian Standards and in accordance with approval requirements with containment areas designed to prevent entry of stormwater and rainfall.
- A manifest detailing the nature and location of all hazardous materials maintained on site and regularly updated.
- Spill equipment located on site including staff trained in spill equipment and spill procedures.
- Plant and equipment maintained in good working order and inspected daily.
- Provision of appropriate methods for the collection and lawful disposal of wastes produced at the site during the works. Instructions to site workers for the handling, storage, and disposal of each type of waste shall be provided by the Contractor in both the site preparation and construction phases.
- Refuelling plant and equipment occurs in a designated and bunded area.

A Marina SBMP attached as Appendix U3 has been prepared to minimise operational activities potentially contaminating the site and beyond environmentally sensitive areas.

Further details on waste and hazardous substances management are provided in Section 4.7 'Waste' and 4.14 'Hazard and Risk' of this EIS.

#### **4.1.2.7 Landscape Character and Visual Amenity**

##### Impacts

The landscape character has the potential of being adversely impacted with the construction and operation of a marina on the SHMR site however it is important to note there are existing tourism-orientated and port-industrial land uses in the locality including:

- Shute Harbour Motel;
- SHTF;

- public boat ramp;
- barge jetty; and
- marine salvage operation.

Views of the proposed site will maintain the dominant natural character values with the master planning and architectural design ensuring the development is not conspicuous from a backdrop of natural vegetation and open coastal waters and is consistent with existing land uses. As a result, aspects of the master plan in relation to preventing adverse impacts to the existing landscape character and visual amenity, and dictated by the SHMR Development Code include:

- high density built form located on the western portion of the SHMR site as illustrated by the Precinct Plan in Figure 3 of the EIS;
- restricted building heights;
- low set dwellings across the rest of the development site;
- shaded dwellings to prevent reflection as illustrated in Figure 11; and
- interceding streetscapes and amenity vegetation as illustrated in Figure 11.

A change to the visual values of the area from different aspects has been ascertained in the visual amenity assessment provided in Appendix J. Yurrah Pty Ltd, the author, identified a decrease in visual values resulting from a change to views from the north of Proserpine-Shute Harbour Road, Whitsunday Great Walk to the southwest and south of the subject site from open water and small vessels to proposed moorings and masts of large vessels in the operational phase. Construction works will also require barges which will temporarily alter views.

Screening is proposed along the southern side of Proserpine-Shute Harbour Road during the early construction stages. Early planting of fast-establishing vegetation in future open space on reclaimed land is proposed to reduce the impact from construction activities on the local landscape values. Such screening is expected to limit open water views from Proserpine-Shute Harbour Road however such views are not long-lived with a car travelling at 60km/hr taking approximately 6-9 seconds to traverse the site. Views without screening can be expected to be similar to the existing views from Shute Harbour Road, looking north across the Port of Airlie marina development at nearby Muddy Bay.

Construction within the site as viewed from the Whitsunday Great Walk to the south west would not be easily concealed. However it is expected that the character and appearance of construction machinery, for example the cutter suction dredge, and ultimately marine vessels in the operational phase, will merge with the existing character of the barge jetty, shipping access and recreational boaters.

The views from the open water will also be staggered with the boat masts fronting residential development.

#### **4.1.2.8 Lighting**

Parts of the proposal are expected to be visible at night with three major components of the SHMR being lit.

- New and existing roads.
- Proposed buildings.
- Proposed moorings within the marina.

For health and safety purposes lighting will be required at night. Lighting will comply with relevant standards in order to minimise glare and spillover lighting in sensitive areas. The Natural Solutions megafauna assessment, attached as Appendix P2, recommends artificial lighting devices and strategies to minimise impact on marine megafauna including:

- timers and motion detectors for external lights;
- shielding of external lights along roads to reduce light entering marine environment;
- yellow tinted incandescent lights (“bug lights”) for all external lighting; and
- landscaping to shield lighting extents.

Moorings will be lit with low-impact lighting to minimise nocturnal impacts on marine vertebrates. However it is noted that the site is not a nesting spot for marine turtles that usually judge the brightest component in their vision as water.

Yurrah has assessed the potential impact of the construction and operation of the SHMR from various vantage points in the locality on the night scenery. Given that most viewing locations are not generally frequented at night, the SHMR site is not expected to be readily visible, other than from Proserpine-Shute Harbour Road. In this instance Yurrah has recommended specific site requirements for the construction and operation of the SHMR including:

- retention of existing vegetation to the north of Proserpine-Shute Harbour Road;
- screening an early planting works to the southern side of Shute Harbour Road; and
- early planting of reclaimed isthmus as areas of spoil are dewatered.

These requirements to mitigate potential impacts from night on the landscape character and visual amenity have been imbedded in the CEMP and SBMP for the Shute Harbour marina establishment and operation.

## 4.2 Transport

### 4.2.1 Road

Cardno Eppell Olsen has undertaken an assessment of the impacts of the SHMR on road traffic, and this traffic impact assessment is attached as Appendix K1. This assessment was undertaken in accordance with the *DMR Guidelines for the Assessment of Road Impacts of Development* (2006) and in consultation with the local DMR regional office.

The road impact assessment was undertaken determine:

- site traffic generation potential during operation & construction of the SHMR;
- the development impact on the surrounding road network, in particular on Proserpine-Shute Harbour Road;
- any new, modified or upgraded road infrastructure required as a result of the proposal;
- short and long term car parking provision and layout; and
- the implications for existing and future public transport (scheduled public transport and courtesy services), pedestrian and bicycle facilities.

The site will be accessed by Proserpine-Shute Harbour Road which provides the only main connection to the site from the Bruce Highway, past Airlie Beach. From the Proserpine-Shute Harbour Road traffic will ultimately access the site via an unsignalised T-intersection. Inspection of the site suggests that adequate sight distance can be achieved at the proposed location. Proposed operational changes to improve road safety are summarised in Section 5 of the traffic impact assessment, presented as Appendix K1 of the EIS.

The SHMR involves an upgrade to the existing Proserpine-Shute Harbour Road along the site frontage as shown in Drawings 7900/48/01-200 to 7900/48/01-211. The works will comprise a:

- minor realignment of Proserpine-Shute Harbour Road;
- new design surface;
- 2m wide median strip with kerbing;
- 2m shoulders;
- dedicated area for future possible road widening to three lanes;
- new culverts for drainage; and
- grassed swale stormwater drain.

The existing Proserpine-Shute Harbour Road will be redeveloped under the terms of an existing deed of agreement with the DMR.

Road impacts from the construction and operational works are summarised below, with detail already provided in response to Section 3.5.1 of this EIS as required by the ToR and need not be duplicated herein.

Strategic modelling of traffic was undertaken based on proposed land uses and yields to establish the following:

- traffic generation with and without the development for both the construction and operational phases; and
- traffic distribution of development generated traffic.

Traffic generation and distribution with and without the SHMR is presented in Appendix K1.

Construction works are proposed over a period of approximately 2 years which will result in the generation of varied construction traffic, in addition to construction worker vehicles. From the assessment of the preliminary construction programme and methodology, and number of construction workers, a maximum total traffic generation of some 168 vehicles per hour is expected. This estimate of traffic generation is considered a worst case scenario as the nature and locality of the SHMR is likely to encourage public travel by a significant proportion of construction workers.

Potential for generation of traffic during the operation of the SHMR has been assessed based on the ultimate site usage as per the SHMR master plan. The potential operational traffic generated by the development, including staff, is predicted to be 332 vehicles per hour in the peak hour from the year 2012 onwards with the development not significantly increasing the number of heavy vehicles on the existing road network. The traffic impact assessment concludes that 20% of the traffic generated by the development is expected to travel in the direction of the SHTF and 80% to Airlie Beach Township.

The modelling results demonstrate that the existing road network has the capacity to accommodate this demand, taking into account the proposed upgrade to Proserpine-Shute Harbour Road.

Intersection analysis was undertaken to determine the capacity of a single unsignalised T-intersection such as that proposed to access the SHMR. Site access via an unsignalised T-intersection was deemed sufficient to cater for development volumes in the year 2022.

The conceptual unsignalised T-intersection is presented in Figure 12.

A CTMP is proposed and is a requirement of the CEMP, which will include details of:

- site access;
- car parking;
- the volume, composition (types and quantities), origin of goods to be moved including construction and raw materials;
- anticipated times at which oversize movements may occur;
- details of oversize indivisible loads (including types and composition);
- the proposed transport routes;
- increased road maintenance; and
- barge operations (refer to section 4.2.2).

Car parking demand during construction is expected to fluctuate depending on the construction activities at the time. It is expected that during the first phase limited car parking will be required. The majority of construction workers will be operators of heavy equipment and can be shuttle bussed to/from the site as and if required. Only during the fit out of the marina is it expected that a higher demand for car parking will be required. At this stage the reclamation process will be complete and ample land will be available on site to provide for more than sufficient space for a workers car parking area.

A minimum of 291-341 car parking spaces are required during operation of the SHMR with marina village (including hotel) users expected to share a multi-level (up to 3 levels) car parking structure. All allotments are expected to contain parking spaces. The multi-level car park will provide for approximately 425 car parking spaces and is therefore expected to meet the demands of the development and also address the existing deficiency in parking available at Shute Harbour for those accessing the existing public boat ramp and the SHTF.

The Proponent is also proposing to fund the design and construction of an additional Council car park within the locality and an additional boat ramp facility as a community benefit.

No pedestrian paths, bicycle lanes or bicycle awareness zones are provided by the existing road network and the existing verge is used for limited overflow parking for cars with boat trailers and heavy vehicles waiting to unload/load ferries. This is due to a high demand for recreational fishing and a lack of parking amenities in the area. The SHMR proposal includes in its design a potential bus lay-by area to facilitate public transport, and pedestrian boardwalk along the water frontage and pedestrian pathways along the two main internal collector roads to facilitate public access to coastal waters and the current precinct that is SHTF.

#### **4.2.2 Water/Air based**

A marine traffic study has been undertaken for the proposed SHMR by Thompson Clark Shipping, presented as Appendix K2.

The marine traffic study evaluates the existing marine transit lanes and the potential impact of the SHMR on existing marine transport and traffic, including marine infrastructure. The study addresses ToR requirements for Sections 3.5.2 and 4.2.2 of the EIS.

Water based traffic impacts from the construction and operational works are summarised below, with further detail provided in section 3.5.2 of this EIS.

Shute Harbour is accessed through a channel that leads northeast (NE) from the commercial wharves associated with the SHTF, past Low Rock (which is marked by cardinal marks) and into the Molle Channel, which is utilised by the majority of marine recreational and commercial vessels. An alternative channel exists within Rooper Inlet, leading northsouth (N/S), and this is marked by port and starboard hand markers. This channel passes south of Shute, Repair and Tancred Islands and south of the mainland, all of which are fringed with coral reefs. This channel is predominantly used by recreational craft. The seaward access channels are presented as Figure 12 of the EIS.

Shute Harbour is the closest harbour to offshore islands and is thus a base for operations for a number of commercial vessel activities ranging from commercial barge services to the hire of single kayaks. These activities are concentrated around four jetties located to the west of the residential development known as Shutehaven, Council owned public boat ramp and 300+ swing moorings.

Sea access to the SHMR shall be from the entrance at the southeast corner of the marina via an access channel as shown in on drawing 7900/48/01-102. At the marina seaward access a public boat ramp currently exists. An existing jetty borders the western portion of the SHMR operated by the Shute Harbour Motel.

The current marine traffic issue is the mix of commercial traffic and recreational boaters, which becomes particularly relevant on weekends and during holiday periods when the movement of vessels within Shute Harbour are at their highest.

Recreational users of the SHMR shall be encouraged to keep clear of commercial vessel berths and operations by utilising the southern navigational channel to the Whitsunday Isles and a marked channel leading to the marina entrance.

A proposal to separate traffic on the NE channel has been presented in the marine traffic study (Appendix K2 of the EIS) to enhance safety by minimising the risk of collision by vessels on reciprocal courses entering and leaving Shute Harbour simultaneously. This will become increasingly important as the traffic increases in Shute Harbour with the urban development of the islands and the general increase in tourism in the region, promoted in part by the SHMR project. The proposal involves separating outgoing vessels on the southern side of the channel and incoming vessels on the northern side. This scheme would require some additional navigational aids and specific communication with users and possibly, relocation of some existing swing moorings close to Repair Island.

The concept of marine traffic movement and possible traffic separation for the SHMR is illustrated in Figure 12.

Navigational aids shall be appropriately located to prevent recreational craft from marina operations passing in close proximity to the existing boat ramp and jetty.

The impact of the SHMR on existing marine transport stakeholders was assessed in a consultation process. No particular opposition to the project by existing marine stakeholders has been identified however concerns have been raised by the Shute Harbour Motel and Engwirda Marine regarding access and siltation respectively and these concerns have been addressed in the design of the proposal, specifically through appropriate coastal engineering and construction of a swale to redirect uncontaminated water from the Conway NP catchment. Outcomes from stormwater and coastal process investigations are presented in Appendices N and O respectively.

The SHMR will not impact on air based transport in the region. Preferred flight paths of the Whitsundays Airport located closest to the SHMR are adjacent to the site however this airport is of a small scale, privately owned and principally used as a base for charter flights. Further, the steep terrain adjacent to the site influences the local flight paths such that no flight path could be established low over the marina.

## 4.3 Climate

Shute Harbour is located at latitude 20° 17.65' S, above the Tropic of Capricorn, with a climate typical of a sub-tropical location. A wet season is generally experienced between January and March and a dry season between August and October.

No permanent weather station currently operates in the immediate vicinity of Shute Harbour. Alternatively, data recorded at the Hamilton Island Airport weather station by the Bureau of Meteorology was utilised to define the site's climate characteristics. The Hamilton Island Airport station is approximately 17 km from the site. The locality is similar to that of Shute Harbour; positioned in a coastal location to the east of the Conway Range.

### 4.3.1 Rainfall

Hamilton Island experiences an annual average rainfall level of 1,734mm. Monthly rainfall data for the weather station is presented in Table 12.

**Table 12 Monthly Mean Rainfall Recorded at the Hamilton Island Airport Weather Station**

Month	Hamilton Island Airport - Rainfall (mm)
	Mean (1985 – 2007)
January	239.0
February	298.5
March	229.6
April	217.2
May	142.5
June	100.8
July	71.1
August	51.3
September	21.9
October	51.3
November	92.9
December	198.2
Annual	1734.4

### 4.3.2 Temperature and Humidity

Hamilton Island experiences a mean annual morning (9am) temperatures of 24.4 degrees Celsius; and a mean annual afternoon (3pm) temperature of 25.5 degrees Celsius. Further, the area experiences a mean annual morning humidity of 78%, and a mean annual afternoon humidity of 74%.

Monthly temperature data for morning and afternoon readings are provided in Table 13. The data presented was recorded from 1985 - 2002.



**Table 13 Monthly Mean Temperature Recorded at the Hamilton Island Airport Weather Station**

Month	Hamilton Island Airport – Temperature (°C)	
	Morning (9am)	Afternoon (3pm)
January	28.0	29.1
February	27.7	28.9
March	26.7	27.6
April	25.1	25.8
May	22.9	23.8
June	20.3	21.5
July	19.5	20.9
August	20.5	21.9
September	22.9	24.2
October	25.3	26.2
November	26.7	27.6
December	27.7	28.6
Annual	24.4	25.5

#### 4.3.3 Wind

The annual prevailing wind directions recorded at the Hamilton Island Airport weather station are south/south-easterly. The mean annual morning wind speed experienced is 22.3km/hr, and the mean annual afternoon wind speed is 24km/hr. Mean monthly and annual wind speeds experienced in the morning and afternoon are provided in Table 14; the data for which was recorded from 1985 - 2002. The variation in winds to that proposed at the SHMR is discussed in the coastal processes investigations provided in Appendix O.

**Table 14 Monthly Mean Wind Speed Recorded at the Hamilton Island Weather Station**

Month	Hamilton Island Airport – Wind speed (km/hr)	
	Morning (9am)	Afternoon (3pm)
January	20.0	23.2
February	21.1	23.8
March	24.7	26.5
April	25.9	26.5
May	25.3	25.0
June	26.1	24.5
July	23.9	22.4
August	22.3	22.8
September	20.4	23.4
October	19.0	22.8
November	19.3	23.3
December	19.8	23.7
Annual	22.3	24.0

#### 4.3.4 Climate Extremes

Located in a sub-tropical coastal location, the SHMR site encounters various climate extremes such as cyclones, storm surges, and landslip. The following sections provide further detail as to the typical characteristics of these climate extremes.

#### 4.3.4.1 Tropical Cyclones

Tropical cyclones are low pressure systems in the tropics with a well-defined clockwise wind direction, deriving energy from warm tropical oceans with temperatures above 26.5°C. Destructive winds, storm surge, and heavy rains are characteristic of tropical cyclones. Tropical cyclones dissipate over land and colder seas, primarily occurring during the cyclone season of summer and early autumn.

Tropical cyclones are categorised from 1 to 5, relating to the zone of maximum winds. Table 15 provides the characteristics of each cyclone category and typical events caused by the occurrence of a tropical cyclone.

**Table 15 Tropical Cyclone Severity Categories**

Category	Strongest Gust (km/hr)	Typical Effects (indicative only)
1 – Tropical Cyclone	Less than 125 (Gales)	Negligible house damage. Damage to some crops, trees and caravans. Craft may drag moorings.
2 – Tropical Cyclone	125 – 169 (Destructive winds)	Minor house damage. Significant damage to signs, trees and caravans. Heavy damage to some crops. Risk of power failure. Small craft may break moorings.
3 – Severe Tropical Cyclone eg. Roma	170 – 224 (Very destructive winds)	Some roof and structural damage. Some caravans destroyed. Power failure likely.
4 – Severe Tropical Cyclone eg. Tracey	225 – 279 (Very destructive winds)	Significant roofing loss and structural damage. Many caravans destroyed and blown away. Dangerous airborne debris. Widespread power failures.
5 - Severe Tropical Cyclone eg. Vance	More than 280 (Very destructive winds)	Extremely dangerous with widespread destruction.

Research previously undertaken for the WRC has shown 77 cyclones within a 500km study area covering the previous WSC LGA have occurred during a 44-season recording period (GHD - SEA, 2003). This average equates to 1.83 cyclones per season. The worst cyclone recorded during this period was Cyclone Ada, a Category 4 cyclone which occurred at the Whitsunday Islands in 1970 causing serious damage to infrastructure (CW, 2005).

The impact of cyclonic wave conditions has been an important consideration throughout the design of the project.

#### 4.3.4.2 Storm Surge

Storm surge is an extreme climatic condition, generally occurring as a consequence of regional cyclonic conditions. A storm surge has the ability to destabilise land areas causing landslides. Moreover, the area impacted can be extensive if a storm surge occurs at the same time as a high tide, particularly along low-lying coastlines. More information on the relevance of storm surge and cyclonic waves in relation to the SHMR is provided in Section 4.5 'Coastal Environment' of the EIS.

#### 4.3.4.3 Landslip

Landslips are caused when a large portion of sloping ground surface separates and slides downhill. Loss of binding in soil structure caused by excessive soil saturation induces

surface separation, especially on land cleared of vegetation. Slope is a critical factor in the onset of landslide, and cleared slopes steeper than 15% are at high risk of land movement (DLGP & DES, 2003).

Further information on the impacts of rainfall on soil erosion has been previously detailed in Section 4.1 'Land' of the EIS.

#### **4.3.4.4 Vulnerability to Hazards**

The vulnerability of the proposal site to natural or induced hazards i.e. storm tide, floods, cyclones and bushfires, and the potential impacts of long term global warming are addressed in the following sections. The proposal has been assessed against relevant State and local policies, plans and guidelines.

Policy 2.2.4 Coastal Hazards of the State Coastal Plan is addressed in Section 4.5 'Coastal Environment' of the EIS.

*State Planning Policy 1/03 – Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (SPP 1/03)*

SPP 1/03 sets out the State's interest in ensuring that the natural hazards of flood, bushfire, and landslide are adequately considered when making decisions about a proposed development.

Outcome 1 of this policy designates that development within natural hazard management areas, to which this policy applies, is to be compatible with the nature of the hazard i.e. the type of hazard and its severity. Natural hazard management areas applicable to Outcome 1 are those prone to flood, bushfire, and landslide. Annex 2 of SPP 1/03 specifies the Whitsunday Shire Council is located within an area which the SPP applies for bushfire and landslide.

#### Flood

The SPP 1/03 states that a natural hazard management area (flood) is land inundated by a defined flood event (DFE) and which is identified in a relevant planning scheme. The Whitsunday Shire Planning Scheme states that urban developments should be given adequate flood immunity through the exclusion of urban development in areas subject to inundation in a Q<sub>100</sub> storm event. It is noted the proposed development has been designed with immunity to Q<sub>100</sub> storm events.

Specific outcomes required of natural hazard management areas relevant to flood, bushfire, and landslide are detailed in the SPP Guideline 1/03. These outcomes assist to determine the compatibility of the development proposal with the nature of applicable natural hazards.

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Table 16 provides the specific outcomes and solutions relevant to Natural Hazard Management Areas (Floods) as lifted from the CW EIS and deduced in the preparation of the EIS following sustainable engineering outcomes to potential environmental impacts.

**Table 16 Natural Hazard Management Areas (Flood) - Specific Outcomes and Solutions**

Specific Outcome	Solution
1. Development maintains the safety of people on the development site from all floods up to and including the DFE (Defined Flood Event).	The design base height of all buildings within the development meets the requirement of the WRC Planning Scheme for the exclusion of all urban development from areas inundated by a Q <sub>100</sub> storm event.  Further, Proserpine-Shute Harbour Road provides adequate access from the site in the event exit due to emergency is required.
2. Development does not result in adverse impacts on people's safety or the capacity to use land within the floodplain.	Being located on the shoreline of Shute Bay, the development resides at the base of the flood catchment. As such, no impediments block the drainage of flood waters, allowing for minimal flooding within the built area.
3. Development minimises the potential damage from flooding to property on the development site.	Proserpine-Shute Harbour Road has been designed to have 100 year ARI flood immunity and to divert hill-slope run-off around the SHMR site into Shute Bay.
4. Public safety and the environment are not adversely affected by the detrimental impacts of floodwater on hazardous materials manufactured or stored in bulk.	No hazardous materials will be manufactured on the site. Any hazardous materials will be stored above the defined flood level.
5. Essential services infrastructure (e.g. on-site electricity, gas, water supply, sewerage and telecommunications) maintains its function during a DFE.	Proserpine-Shute Harbour Road and the proposed development have been designed to have 100 year ARI flood immunity and to divert hill-slope run-off around the SHMR site into Shute Bay. Therefore the development, its access and services should be protected under most circumstances.

These outcomes are relevant to the development proposal as the development will involve a material change of use and associated reconfigurations of a lot that increase the number of people living or working in the natural hazard management area (i.e. residential development, tourist facilities, industrial or commercial uses). The outcomes are also relevant as building works will be undertaken involving physical alteration to a watercourse or floodway including vegetation clearing. Further, the project will require filling in excess of 50 m<sup>3</sup>.

### Bushfire

Table 17 provides the specific outcomes and solutions for the Natural Hazard Management Areas (Bushfires) which are relevant to the development proposal. As the development will involve a material change of use and associated reconfiguration of a lot, the number of people living or working in the natural hazard management area (bushfires) will be increased.

**Table 17 Natural Hazard Management Areas (Bushfire) - Specific Outcomes and Solutions**

Specific Outcome	Solution
<p>1. Development maintains the safety of people and property by:</p> <ul style="list-style-type: none"> <li>(a) avoiding areas of High or Medium bushfire hazard; or</li> <li>(a) mitigating the risk through: <ul style="list-style-type: none"> <li>• lot design and the siting of buildings; and</li> <li>• including firebreaks that provide adequate: <ul style="list-style-type: none"> <li>- setbacks between buildings/structures and hazardous vegetation, and</li> <li>- access for fire-fighting/other emergency vehicles;</li> </ul> </li> <li>• providing adequate road access for fire-fighting/other emergency vehicles and safe evacuation; and</li> <li>• providing an adequate and accessible water supply for fire-fighting purposes.</li> </ul> </li> </ul>	<p>It is noted that although the site is in close proximity to the Conway NP, there is no existing vegetation within site boundaries. Thus, if a bushfire were to occur in the NP, the risk of fire transferring and occurring within the site is minimal. Additionally, Proserpine-Shute Harbour Road will act as a fire break for any fires that may occur to its north.</p> <p>It is also noted that a Fire Management Strategy for Conway NP has been developed by the EPA, consequently reducing further risk of fire within the national park area.</p>
<p>2. Public safety and the environment are not adversely affected by the detrimental impacts of bushfire on hazardous materials manufactured or stored in bulk.</p>	<p>No hazardous materials are to be manufactured on site.</p> <p>Although the risk of bushfire is minimal, any hazardous materials stored on site will be provided with adequate fire fighting equipment. All hazardous materials will be appropriately stored in a secure, covered, and bunded area to contain any releases in the case of disturbance by bushfire.</p>

Landslide

Table 18 provides the specific outcomes and solutions for the Natural Hazard Management Areas (Landslide) which are relevant to the development proposal. The SPP is applicable to the site because the development will involve a material change of use and the associated reconfiguration of a lot. Consequently, the number of people living or working in the natural hazard management area (landslide) will be increased. Additionally, earthworks will be in excess of 50 m<sup>3</sup> (other than the placement of topsoil), vegetation will be cleared, and the existing flow of surface water will be redirected.

**Table 18 Natural Hazard Management Areas (Landslide) - Specific Outcomes and Solutions**

Specific Outcomes	Solution
<p>1. Development maintains the safety of people, property and hazardous materials manufactured or stored in bulk from the risk of landslide.</p>	<p>It is noted that the area of the site in which buildings will be located has a flat slope, and consequently has minimal risk of landslide. Some sloped land does occur to the north of Shute Harbour Road, however does not pose risk to landslide due to separation of this area from proposed built form on the southern side of the road.</p>

## 4.4 Water Resources

### 4.4.1 Description of Environmental Values

Surface waters which may be impacted by the development consist of the tidal waters and flats bounded by Shute Bay. No freshwater bodies exist within the proposed site area and consequently no freshwater bodies will be impacted by the development. Impacts upon the water quality and quantity of Shute Bay are detailed in Section 4.5 'Coastal Environment'. The response to Section 4.4 of the ToR therefore details the existing quality and quantity of stormwater runoff, potential impacts upon these waters and any potential mitigation measures that may be required to preserve the condition of these waters.

The site does not contain water resources with environmental values as defined in such documents as the EP Act, EPP Water and ANZECC 2000. Further, the proposed development will not impact upon any watercourses as defined by the Water Act.

Appendices relevant to this section include the CLT SWMS, presented as Appendix N to the EIS.

#### 4.4.1.1 Surface Waterways

Surface water run-off from the Conway NP drains from a catchment area of approximately 48.2ha directly to Shute Bay. The catchment contains eight sub-catchments, the details of which are provided within the SWMS presented as Appendix N. The largest gully has an area of approximately 25 ha, the top of the catchment being 800m north of the existing Proserpine-Shute Harbour Road. Drainage from the Conway NP traverses down steep hillside slopes in a southerly direction. All gullies adjacent to the site are ephemeral and prone to flash flooding during the wet season. The existing topography is shown in Figure 7.

A hydrologic assessment of the flow from catchments upstream of the development site was undertaken using the Watershed Bounded Network Model Version 1.03, in accordance with the Queensland Urban Drainage Manual. The details of each catchment are provided in Table 19.

**Table 19 Details of Catchment Areas Used for Hydrologic Modelling**

Catchment	Total Area (ha)	Sub Area Land Use (ha)		Fraction Impervious (%)	
		Urban	Open Space	Impervious	Pervious
C1	25.2	-	25.2	0	100
C2	7.9	-	7.9	0	100
C3	1.6	-	1.6	0	100
C4	4.3	-	4.3	0	100
C5	1.0	-	1.0	0	100
C6	2.2	1.7	0.5	63	37
C7	1.2	1.2	-	80	20
C8	4.8	4.8	-	80	20

Predicted peak flows for each catchment derived from the hydrologic modelling are provided in Table 20, and further details of the modelling are provided in the SWMS presented as Appendix N of the EIS.

**Table 20 Predicted Peak Flows from Hydrologic Modelling**

ARI (years)	Peak Flow (m <sup>3</sup> /s)							
	C1	C2	C3	C4	C5	C6	C7	C8
2	2.79	1.22	0.34	0.76	0.23	0.74	0.46	1.64
5	4.22	1.79	0.49	1.09	0.34	0.99	0.61	2.17
10	5.46	2.23	0.63	1.33	0.44	1.16	0.71	2.54
20	6.66	2.68	0.76	1.61	0.52	1.36	0.83	2.97
50	8.00	3.18	0.91	1.99	0.62	1.54	0.92	3.30
100	9.22	3.66	1.04	2.29	0.70	1.73	1.03	3.71

Flooding of Proserpine-Shute Harbour Road has previously occurred at the sag point and main gully crossing. The design of the proposed Proserpine-Shute Harbour Road upgrade, depicted in Drawings 7900/48/01-200 to 7900/48/01-207 has sought to rectify issues causing flooding within the road reserve and development area. All proposed stormwater diversion works are designed to occur downstream of Proserpine-Shute Harbour Road. Stormwater will be diverted around the development area to the western side by a grassed drainage channel and to the east by a culvert. All diverted stormwater will flow into Shute Bay as shown in Drawings 7900/48/01-208 to 7900/48/01-211.

### Existing Surface Water Quality

Stormwater currently traversing the site is sourced from the Conway NP. As this conservation area is an expansive and undisturbed vegetated area, stormwater run-off is likely to be uncontaminated and of a high quality before reaching Proserpine-Shute Harbour Road. During the wet-season, water quality is likely to carry increased sediment levels. As stormwater runoff is assumed to be of high quality due to its source location, water quality monitoring was not conducted for the purposes of this study.

#### 4.4.1.2 Groundwater

An assessment of the groundwater hydrology within the coastal area surrounding the development site was undertaken for the preparation of the CW EIS. This assessment was based on a site inspection by a Hydrogeologist along with existing geology and soil data for the area. Specific hydrogeology field investigations were not conducted during the groundwater hydrology assessment. Consequently, the interpretation of the local groundwater hydrology at Shute Harbour has been based on similar environments and on existing site-related data regarding geology, topography and climatic conditions.

### Methodology

The methodology of the hydrogeological assessment undertaken for the CW EIS involved the following steps.

- Inspection of the site.
- Collation and review of existing reports and records.
- Consultation with DNRW and landowners in regard to groundwater uses.
- Consultation with all other stakeholders including the GBRMPA.
- Description and mapping of all receptors to variations in groundwater quality and quantity potentially influenced by the development of the site.
- Description of the present water uses, description and mapping of existing surface drainage patterns, determination of flows in major drainage paths, assessment of



proposed modifications to natural fresh water flows along drainage lines and determination of the nature and extent of flooding.

- Description of the general quality and quantity, average and maximum heights of the water table in relation to the proposed development.
- Assessment of the impact of construction activities on the groundwater regime (quantity and quality) within the site and adjoining areas.
- Assessment of changes to groundwater flow dynamics following land use changes.
- Assessment of potential groundwater contaminants and their transport and recommendations to avoid contamination of groundwater.

### **Existing Groundwater Environment**

The findings of the CW EIS hydrogeological assessment are as follows.

Any presence of groundwater within the land-based sections of the site is likely to be minimal due to the geology, small catchment areas, and proximity to intertidal areas. A geotechnical (seismic) survey of the area undertaken for Ullman and Nolan by Velseis Pty Ltd (1993) indicated that weathered rock exists within the top 5 to 14 metres of the profile (but typically 8 to 10 metres), with a seismic velocity of less than 2,000m/s. Knowledge of local geology would suggest the upper horizon comprises distinctly more weathered flow-banded rhyolite with a number of deeply weathered, sub-vertical microdiorite dykes. At depth, the rock has the same characteristics however is generally less weathered; indicating limited opportunity for significant groundwater flows.

Given the inferred geology of the coastal hillside of the site, it is expected that the dominant groundwater components are associated with an ephemeral shallow (near ground surface) groundwater, which may exist depending on seasonal climatic conditions. Existence of this shallow groundwater is expected to be more predominant in low-lying or discharge areas of the hillside, where interaction with deeper, rock bearing groundwater may occur due to upward leakage.

The identification of weathered rock conditions to a depth of 10 metres or more indicates the probable presence of fractured conditions. Fractured conditions may provide pathways for flow of water from upland hillside areas to the low-lying hillslope, then on-flow towards the drainage or seepage lines and final discharge into Shute Bay. Although their bulk permeability may be very small, water flow velocity (and hence transport velocities) within these cracks and fissures may be relatively fast. Groundwater within the lower aquifer is likely to be less affected by deep-rooted vegetation and evaporative forcing, and hence may be a more permanent component of the local groundwater hydrology.

Quantification of the groundwater flow rates could not be made without a more complete drilling and hydraulic testing investigation, however it is expected that within the area, a relatively steep groundwater gradient may occur (0.5 to 1%) with a moderate to low profile-averaged transmissivity (0.1 to 10m<sup>2</sup>/day). This would lead to relatively low seepage rates and velocities.

The quality of the shallow groundwater is likely to be high, with a total dissolved salt concentration of less than 1,000mg/L due to the high degree of flushing by rainfall infiltration, steep slopes and relatively rapid horizontal flushing. Nutrients levels (nitrogen and phosphorus) are likely to be minimal, meaning the shallow groundwater is likely to be oligotrophic. Small amounts of heavy metals may be present due to weathering of rock materials but are likely to be at low concentrations.

As the agricultural history of the site is unknown, the presence of persistent agricultural chemicals cannot be quantified. However, due to the site's distance from existing agricultural land, levels of agricultural chemicals are likely to be minimal.

#### **4.4.2 Potential Impacts and Mitigation Measures**

##### **4.4.2.1 Surface Water and Water Courses**

###### **Water Quality**

###### Construction

The upgrade works on Proserpine-Shute Harbour Road will involve substantial earthworks with the potential to cause increased sediment movement resulting in contaminated run-off. Management strategies during these works will focus on preventing the dispersal of sediment and contamination of water outside the construction site. To mitigate sediment movement during the upgrade works, stormwater will be conveyed through an existing culvert under Proserpine-Shute Harbour Road to a grass swale leading to Shute Bay on the western side of the SHMR as shown by Drawings 7900/48/01-208 to 7900/48/01-211. The grassed swale will be constructed to the south of the upgraded Proserpine-Shute Harbour Road at the outset of construction works.

###### Operation

The stormwater runoff from proposed land uses will be treated on site through a treatment train approach. Treatment train details are as follows.

- The stormwater runoff from the urban residential lots will pass through grassed swales with underlying bio-retention systems. Runoff will then flow through bio-retention basins before flowing offsite.
- All runoff from roofs will pass into rainwater tanks with overflow into grassed swales with underlying bio-retention systems before passing through one of several bio-retention basins before flowing offsite.
- Runoff from the car parking facility will be directed through an oil and grease separator and into a bio-retention swale and into one of several bio-retention basins before flowing offsite.
- Road runoff will be directed through one of several bio-retention basins before flowing offsite.

Table 21 shows that the proposed mitigation measures lead to a reduction in loads from the SHMR site in accordance with current industry standards. With suitable operation and maintenance of the treatment devices it is expected that the treatment devices will meet the performance shown below.

**Table 21 Predicted Annual Pollutant Loads in Discharge Waters**

Pollutant	Annual Load (kg/yr)		Reduction - Mitigated to Unmitigated	Industry Standard Reduction Recommended	Requirement Met?
	Post-Development	Mitigated			
Suspended Solids (SS)	9430	1840	81%	80%	Yes
Total Phosphorus (TP)	19	6	71%	60%	Yes
Total Nitrogen (TN)	107	45	58%	45%	Yes

Table 22 summarises the predicted pollutant concentrations that discharge from the SHMR. This data demonstrates that with the implementation of the proposed treatment devices, water runoff from the proposed SHMR will meet the water quality objectives discussed in Section 4.5 'Coastal Environment'.

**Table 22 Predicted Median Pollutant Concentrations in Discharge Waters**

Pollutant	Post-Development	Mitigated	Water Quality Objective
SS	157.0 mg/L	1.0 mg/L	15.0 mg/L
TP	0.34 mg/L	0.01 mg/L	0.02 mg/L
TN	2.09 mg/L	0.16 mg/L	0.2 mg/L

## Hydrology and Hydraulics

### Construction

During construction, the increase in impervious surfaces will cause a greater volume of water to combine with existing flow paths, impacting upon peak discharges, volumes and velocities. Clean hillside run-off will pass via the existing culvert under Proserpine-Shute Harbour Road to the grass swale designed to flow into Shute Bay. The grassed swale has been designed so as to divert run-off from upper catchment areas from entering the construction site.

### Operation

Stormwater will be diverted around the development area to the western side by a grassed drainage channel and to the east by a culvert. All diverted stormwater will flow into Shute Bay.

The proposed development includes the improvement of Proserpine-Shute Harbour Road to achieve 100 year ARI local flood immunity. The diversion culverts and channel diverting external stormwater around the SHMR will reduce the flood hazard within proposed allotments with no worsening of flooding conditions elsewhere. The design land contours for the proposed SHMR development are detailed in Drawing 7900/48/01-105 and are protected by a series of seawall designed to withstand extreme climatic events, as described in the coastal processes investigation presented as Appendix O and engineered in Drawings 7900/48/01-300 to 7900/48/01-308, 7900/48/01-350 and 7900/48/01-351.

During operation, failure of on-site SQIDs may cause blockages and subsequent stalling of run-off. A build-up of upstream run-off has the capacity to cause scouring and the creation of alternative run-off routes which are not appropriate for such purposes. SQIDs will be maintained to ensure efficient conveyance of stormwater through and around the site.

#### **4.4.2.2 Groundwater**

##### Potential Impacts

During the construction phase, servicing of construction equipment which will require storage of fuel and oils as well as disposal facilities for waste hydrocarbons, may influence groundwater quality through spillage.

During operation of the development, seepage of nutrients and herbicides from landscaping application and hydrocarbons from on-site fuel storage has potential to contaminate groundwater. These substances, however, are unlikely to be applied in great quantities and in addition to the storage requirements and SWMS, are unlikely to significantly seep to contaminate groundwater. Spillage from on-site sewage pump out facilities also has potential to cause groundwater contamination.

##### Mitigation Measures

During the construction phase, appropriate on-site storage of construction materials and their wastes, such as chemicals, paints, and petroleum products, shall be provided and maintained so as to ensure no uncontrolled release to the surrounding environment.

The CEMP prepared for implementation of environmental controls during construction works addresses potential impacts by proposing the above and additional mitigation measures to protect environmental values of the adjacent environmentally sensitive areas. The CEMP is presented as Appendix U2 of the EIS.

During the operation, appropriate on-site storage of chemicals and petroleum and hydrocarbon products will be provided so as to ensure no uncontrolled release to the surrounding environment. Furthermore, on-site holding tanks shall be in accordance with best practice guidelines for *Waste Reception Facilities at Ports, Marina and Boat Harbours in Australia and New Zealand*.

The Marina SBMP prepared for implementation of environmental controls during marina operations addresses potential impacts by proposing the above and additional mitigation measures to protect environmental values of the adjacent environmentally sensitive areas. The Marina SBMP is presented as Appendix U3 of the EIS.

## 4.5 Coastal Environment

The coastal environment within the locality of the SHMR site is described in detail within the following reports.

- CLT (2008). *Stormwater Management Strategy to Support EIS*. This report is presented as Appendix N.
- CLT (2008). *Coastal Processes Report to Support an EIS*. This report is presented as Appendix O.
- FRC (2008). *Aquatic Ecology*. This report is presented as Appendix P1.
- Natural Solutions (2008). *Marine Megafauna Impact Assessment and Management Plan*. This report is presented as Appendix P2.
- PLACE Design (2008). *Terrestrial Ecological Assessment*. This report is presented as Appendix Q.

Additionally, to address the Section 4.5 of the ToR in its entirety, reference is made to the majority of appended technical reports given the scope of matters identified.

### 4.5.1 Description of Environmental Values

The SHMR is located in the Mackay-Whitsunday region which is becoming an increasingly sought after location for both tourism and residential development with its picturesque beaches and islands, large wetland areas and green peninsulas and ranges. A population expansion is predicted with development occurring on or near the coast as demand for residential coastal land with views or water frontage increases. This pressure has resulted in a draft Regional Coastal Plan being developed.

The draft Regional Coastal Plan follows the framework provided by the State Coastal Management Plan developed under the CPM Act to deliver the objects of that Act, which are to:

- provide for the protection, conservation, rehabilitation and management of the coast, including its resources and biological diversity;
- have regard to the goal, core objectives and guiding principles of the National Strategy for Ecologically Sustainable Development in the use of the coastal zone;
- provide, in conjunction with other legislation, a coordinated and integrated management and administrative framework for the ecologically sustainable development of the coastal zone; and
- encourage the enhancement of knowledge of coastal resources and the effect of human activities on the coastal zone.

The draft Regional Coastal Plan provides specific management advice for protection of the coastal resources and their values within the coastal zone in the area to which it applies. The draft Regional Coastal Management Plan applies to an area that includes local government areas of (then) Whitsunday Shire, Mackay City and the coastal catchment of Sarina Shire, extending eastward to include Queensland Waters within these local government areas. It is relevant to note that the draft Regional Coastal Plan does not have the force of law as a statutory instrument.

The SHMR site is located within the coastal zone of the Mackay-Whitsunday region. The coastal zone can be defined as “*coastal waters and all areas to the landward side of coastal waters in which there are physical features, ecological or natural processes or human activities that affect, or potentially affect, the coast or coastal resources.*”

Coastal resources are defined under the CPM Act as:

*“the natural (natural and physical features and processes of the coastal zone, including wildlife, soil, water, minerals and air) and cultural (places or objects that have anthropological, archaeological, historical, scientific, spiritual, visual or sociological significance or value such as significance or value under Aboriginal tradition or Island custom) resources of the coastal zone”.*

While the Mackay-Whitsunday region contains a wide range of coastal resources, each with significant values and management pressures, specific Environmental Values (EVs) for Shute Bay and the Coral Sea have not been formally established. Shute Bay and ultimately the Coral Sea form the receiving environment for the proposed SHMR. From a range of literature, a study of EVs for similar water bodies, and consultation with relevant government agencies at State and Federal level, the EVs in Table 23 are proposed for the site’s receiving waters.

**Table 23 Proposed Environmental Values of Shute Bay**

<b>Environmental Value</b>	<b>Rating</b>	<b>Description</b>
<b>Aquatic Ecosystems</b>	High	The intrinsic value of aquatic ecosystems – for example, plants, animals and their ecological interactions.
<b>Wildlife Habitat</b>	High	Riparian wildlife and its habitat, food and drinking water – for example, key species such as turtles, seagrass and dugongs.
<b>Human Consumers of Aquatic Foods</b>	High	Health of humans consuming aquatic foods (such as fish, crustaceans and shellfish, other than oysters) from natural waterways.
<b>Primary Recreation</b>	High	Health of humans during recreation which involves direct contact and a high probability of water being swallowed – for example, swimming, surfing, windsurfing, diving and water-skiing.
<b>Secondary Recreation</b>	High	Health of humans during recreation which involves indirect contact and a low probability of water being swallowed – for example, wading, boating, rowing and fishing.
<b>Visual Recreation</b>	High	Amenity of waters for recreation which does not involve any contact with water – for example, walking and picnicking adjacent to a waterway.
<b>Cultural Heritage</b>	High	Indigenous and non-indigenous cultural heritage – for example: <ul style="list-style-type: none"> <li>• custodial, spiritual, cultural and traditional heritage, hunting, gathering and ritual responsibilities;</li> <li>• symbols, landmarks and icons (such as waterways, turtles and frogs); and</li> <li>• lifestyles (such as agriculture and fishing).</li> </ul>
<b>Aquaculture</b>	High	Health of aquaculture species and humans consuming aquatic foods (such as fish, molluscs and crustaceans) from commercial ventures.

<b>Oystering</b>	High	Health of humans consuming oysters from natural waterways and commercial ventures.
<b>Seagrass</b>	High	Maintenance and rehabilitation of seagrass habitat.

Valued aspects of Shute Harbour and the surrounding area have also been identified under the Local Government Planning Scheme and include:

- pristine natural resources;
- verdant hilly coastline forming the backdrop of the Great Barrier Reef World Heritage Area;
- magnificent views of the ocean and tropical Whitsunday Islands;
- the array of accessible and attractive boating and outdoor recreational opportunities; and
- cultural and heritage values, images and identity.

An assessment of the site's values has been undertaken by expert consultants with the existing environment of Shute Bay discussed hereafter in the context of coastal values identified in the State Coastal Plan and draft Regional Coastal Plan, specifically water quality, coastal processes and biodiversity.

#### 4.5.1.1 Water Quality

The water quality of Shute Bay has been monitored by the Proponent. A detailed water quality monitoring program has been established and is presented in the SWMS attached as Appendix N and will be implemented as documented in the CEMP and Marina SBMP, presented as Appendices U2 and U3 respectively. Preliminary background water quality monitoring has been carried out to enable the nomination of appropriate water quality indicators and parameters for the assessment of potential impacts of the development on the receiving waters. Median water quality values are presented in Table 24.

Water quality data was recorded at monitoring locations surrounding the site during two separate seasons. Figure 4 of the SWMS in Appendix N illustrates monitoring locations sampled to obtain background water quality data. Full baseline water quality monitoring results are provided in the SWMS.

**Table 24 Median Water Quality Values**

Site ID	Dissolved Oxygen (%)	pH	Turbidity (NTU)	Total Nitrogen (mg/L)	Total Phosphorous (mg/L)	Suspended Solids (mg/L)
SW1	100.3	8.04	4.49	0.1	0.04	37
SW2	97.9	8.10	4.09	0.1	0.03	26
SW3	93.7	8.12	4.02	0.1	0.02	70
SW4	95.7	8.08	3.74	0.1	0.02	27
SW5	94.9	8.08	4.11	0.1	0.02	30
SW6	95.8	8.10	2.29	0.1	0.02	28
SW7	99.5	8.07	5.83	0.1	0.02	64
SW8	94.8	8.12	3.02	0.1	0.02	34
FW3	130.1	-	41.7	1.1	0.09	78
<b>Median</b>	<b>95.8</b>	<b>8.09</b>	<b>4.09</b>	<b>0.1</b>	<b>0.02</b>	<b>34</b>

Prevailing south-easterly winds create waves that resuspend fine marine sediment within Shute Bay, particularly under low tide conditions in the upper harbour. It is also assumed that during a normal wet season the volume of water discharged into Shute Bay would contain elevated levels of total suspended solids and rocks of various sizes. The existing catchment area draining to Shute Harbour is predominantly natural vegetation with extensive areas of National Park. Hence, with the exception of the small area of existing harbour activities and Proserpine-Shute Harbour Road, water quality of existing run-off is generally good.

Based on background sampling results presented in Table 24 dissolved oxygen as a percent of saturation, pH, turbidity, total nitrogen and total phosphorus generally meet the proposed WQOs for all saltwater monitoring locations defined in response to draft regional policy 2.4.1 *Water Quality* in Section 4.5.2.2. Total Suspended Solids (TSS) does not meet the WQO at the saltwater monitoring locations due to bed mud re-suspension from the action of waves and wind. The single freshwater sample currently indicates levels above the proposed WQOs.

Heavy metals, oil and grease and total petroleum hydrocarbons were analysed in the same monitoring periods with results presented in appendices E1 and E2 of the Stormwater Management strategy assessment by CLT. Metals were generally recorded at low levels with oils below the detectable limit in most samples, with the exception at monitoring locations SW8 in the September monitoring period where oil and grease levels were detected at 20 mg/L. This result was most likely the result of increased number of boat users in the September school holidays.

The marine water quality in the vicinity of the site is dominated by coastal processes. Physical factors affecting marine water quality are tides, cyclones, wind and waves. Shute Harbour at the site is well flushed by tidal action due, to the high tidal range. The upper harbour to the west of the proposed marina shallows to only a few metres depth, and hence, wave and tidal action reaches the bed and can resuspend sediment runoff from the local hillside catchments, though run-off coinciding with low tidal water does cause localised bed source of the inter-tidal zone. Figure 14 shows that sediment within the upper harbour west of the proposed SHMR has extensive fine silts, whereas in deeper water sands, sandy silts and coral rubble dominate.

Current velocities within Shute Bay are generally not large enough to mobilise significant quantities of sediment (GHD 1999) however resuspension of bed material often occurs where wind and waves contribute. The water is generally well mixed due to the very large proportion of water exchanged in the tidal prism and the efficient removal of water from the Bay entrance by high currents in the deep channel to the east.

During severe cyclone events, significant sediment re-suspension throughout the harbour occurs. Waves during Cyclone Celeste, which intensified into a category 3 cyclone in January 1996, reached 2.5m in height at the SHMR site and these waves drive the re-suspension process, resulting in highly turbid water throughout the harbour.

Fine silts resettle on higher tides or when wind conditions ease. The coastal processes investigations provided in Appendix O, give a detailed description of currents, waves, tide heights, siltation patterns and water depths, based on detailed two-dimensional modelling under a range of conditions.

The proposed water quality objectives are discussed in detail in Section 4.5.2.



#### **4.5.1.2 Sediment Quality**

There is little detailed data on seabed sediments in the Whitsunday region. However, some descriptive data is provided in GHD (1999). The regional sediments can be described as silty-sands. Within Shute Harbour there is significant spatial variation in seabed sediment composition as shown in Figure 14.

The sediments of Shute Bay are largely characterised by mobile silty sands and sandy silts. Layers of coarse rubble integrated with finer sediments exist toward the centre of the bay, and shell and rubble fragments are abundant along the south-western shoreline.

Sediment analysis was undertaken by Ullman & Nolan with results provided in the contamination investigation, presented as Appendix I2 of the EIS, to a minimum depth 1m greater than the proposed design bed depth of RL -5.2m to determine the actual level of contamination present in marine sediments compared to applicable guideline values. The investigation was undertaken to prepare appropriate recommendations to prevent or mitigate environmental harm during the construction and operational phases of the proposed SHMR with dredging the principle activity disturbing contaminated soils.

Past and/or current activities identified as potential contamination sources were assessed. This assessment, including the sediment analysis and results are detailed in Section 4.1 of this EIS. In summary the results of sediment analysis identified a small portion of the near surface sediments contaminated by TBT, with 2 sample results above the ANZECC 2000 Sediment Quality Guideline values in the northern and eastern areas of the SHMR site. The assessment suggests that the TBT in the samples was most likely present in paint flecks that may not be randomly distributed and bound to sediment. There was no evidence of contaminants at depth and therefore it is expected any contamination is concentrated in the top 0.5m of sediment. The results indicated that the upper 0-0.1m layer is less contaminated, due to the declining use of TBT in recent years. In short, provided that sediment which has been identified as contaminated is removed and disposed of lawfully, the potential for release of environmentally significant levels of contaminants during construction of revetment walls and the breakwater, dredging and land reclamation processes is considered minimal.

#### **4.5.1.3 Coastal Processes**

Physical factors affecting coastal processes in the area are dominated by wind, waves, tides (water levels) and currents. These, in turn, affect sediment transport and re-suspension of bed fines.

##### **Bathymetry**

Shute Harbour is one of the best natural harbours in the Whitsunday area. Surveyed by Captain JFLP Maclear in 1881 aboard HMS Alert, the first detailed chart of the area shows Shute Bay as a horse shoe shaped muddy bay of 225 hectares in area elevated at Lowest Astronomical Tide.

On latest charts the bay slopes approximately 1:1,000 in the east direction. At its eastern boundary a fairly steep 1:10 slope intersects with the Rooper Inlet channel which is about ten metres deep.

The southern part of the Bay is fringed by a nearly vertical coral reef. This 300 m low lying reef closes the southern end of the bay. The northern end of the bay forms a 5m deep hook around Shutehaven Point. This hook has been partially maintained by dredging to provide deep-water access to the local jetties.

## Coastal Geomorphology

Various geological and morphological areas surround Shute Bay. Fringing coral reefs and a few detached coral outcrops lie east of Shute Harbour. The Shute Harbour Islands are surrounded by fringing reefs where soft corals are common. An extensive mangrove area bounds Shute Bay's southern and western edges.

## Tides

Tides in Shute Bay are semi-diurnal, that is, there are two high and two low tides each day, normally. There may also be significant diurnal difference, that is, a significant difference between successive high tides and successive low tides. Tidal levels are presented in Table 25.

**Table 25 Tide Levels**

Tidal Plane	Water Level	
	Lowest Astronomical Tide (m)	Australian Height Datum (m)
Highest Astronomical Tide (HAT)	4.3	2.4
Mean High Water Springs (MHWS)	3.3	1.4
Mean High Water Neaps (MHWN)	2.5	0.6
Mean Sea Level (MSL)	1.9	0.0
Mean Low Water Neaps (NLWN)	1.2	-0.7
Mean Low Water Springs (MLWS)	0.5	-1.4
Lowest Astronomical Tide (LAT)	0.0	-1.9

## Storm Tide

Queensland Transport records tide and storm tide data continuously at the Shute Harbour Ferry Wharf. Recommended storm surge level (Harper 1999) for various Averaged Recurrence Intervals (ARI) are indicated in Table 26.

**Table 26 Storm Tide Levels**

Averaged Return Interval (years)	Cyclone Storm Tide in metres above HAT
50	0.3
100	0.5
500	0.9
1,000	1.1

An additional 0.1m wave set-up allowance is recommended on top of these figures. These levels were obtained by numerical modelling, considering the moderately deep water surrounding the Whitsunday area, and the sheltering from storm tide brought by the larger islands (effective fetch reduction). Recent storm surge numerical modelling undertaken by the Whitsunday Shire for its hazard mapping study. GHD-SEA (2003) has identified similar storm surges to those in Table 26.

## Climate Change

An allowance for sea level rise of 0.3m during the next 50 years has been adopted as part of the detailed design stage of the project. Drawing 7900/48/01-105 provides an illustration of the design land contours, which range from RL 3.5-4.5m. This is consistent with the 2002 CSIRO recommendation (refer to response to coastal policy 2.2.4 *Coastal Hazards* under Section 4.5.2.2 of this EIS) and recent research. Occurrence and strength of cyclones may increase in this region as a result of global warming, and storm surge levels will be considered with the appropriate engineering judgement during the detailed design stage of the project.

## Wave Climate

### Cyclonic Wave Climate

Based on detailed wave (SWAN) and cyclonic modelling detailed in the coastal processes report, maximum wave heights at the proposed development site are as follows in Table 27.

**Table 27 Design Significant Wave Heights around the SHMR Site**

ARI (years)	H <sub>s</sub> (m)
10	0.91
25	1.30
50	1.55
100	1.78
200	2.00
500	2.30

### Wave Climate within the Marina

Allowing for up to 40 m/s local wind, on top of cyclonic wave, fine grid SWAN modelling predicts waves within the marina. Table 28 below details wave climate mid-marina under cyclonic conditions.

**Table 28 Design Significant Wave Heights under Cyclonic Events – Mid-Marina (post development)**

ARI Years	H <sub>s</sub> (m)
10	0.36
20	0.47
50	0.59
100	0.67
200	0.75
500	0.86

## Hydrodynamic Processes

The regional hydrodynamic processes in Shute Harbour are complex due to the bathymetry and landform of the island group and the Great Barrier Reef, together with the tidal range in the area, which is up to 4.3m at Shute Harbour. Seawalls have been designed to RL3.5m accounting for this tidal range and shown on Drawings 7900/48/01-300 to 7900/48/01-308, 7900/48/01-350 and 7900/48/01-351. A regional hydrodynamic model covering the whole of the Whitsundays extending from Bowen in the north to Mackay in the south was developed by CLT with parameters as detailed in the coastal processes investigation presented as Appendix O to the EIS. This model was used to develop realistic water level and discharge boundary conditions inside the Whitsundays; to then apply to the boundaries of a finer scale model of the Shute Harbour study area. The regional Delft3D model was driven by predicted tidal water level boundaries. The principal tidal constants from the following tidal stations were utilised at the water level boundaries of the regional model (Australian Hydrographic Service, 2007).

- Bowen (No. 59320).
- Unnamed Reef No. 2 (No. 59280).
- Mackay Outer Harbour (No. 59510).
- Penrith Island (No. 59500).

The regional model featured 250m x 250m grid resolution and was run in 2D (depth-averaged) mode. The regional model was verified at Shute Harbour using the predicted tide there for a selected simulation period.

The finer scale model covers Shute Harbour and surrounding areas of the Whitsundays. It is designed to describe tidal and wind driven currents realistically, together with wave processes due to local sea conditions. The model features a curvilinear grid which is aligned with the shoreline of Shute Harbour. Grid resolution near the marina is as fine as 15m by 15m horizontally. The model was run in 3D mode with 10 vertical layers.

Figures 4.8 to 4.11 of the coastal processes investigation present the spring tide velocity currents at 2-hourly intervals near the marina site for the existing condition. A wind condition of the 7m/s from south-east was applied, which is representative of median conditions during the SE Trade season.

Both ebb and flood tide results are shown. Velocities generally decrease from east to west, with upper harbour velocities typically of 0.1m/s, with eastern harbour velocities up to 0.4m/s.

Wind has a strong influence on currents and circulation. Wind conditions at the site are dominated by winds from the south-easterly sector.

## Sedimentation Processes

Siltation can be a major factor for the economical and operational success of harbours and marinas. The proposed marina is in a silty/sandy location and waves can frequently cause local sea energy levels that are sufficient to re-suspend nearshore sediments. Tidal and wind driven currents can transport these sediments to more tranquil areas, for example, the proposed marina, where they may settle on the seabed. Even more muddy conditions may develop in a severe cyclone. The sedimentation process in ambient and cyclonic conditions is discussed further below.

### Ambient Conditions

The sediments in the southern portion of Shute Bay, in the lee of the coral reef, are finer than the northern portion, with the northern side partially fed by the fines. Oscillatory wave current steers the finer particles in suspension and the tidal and wind-induced current transports the sediments offshore through the Shute Harbour channel. Within areas containing seagrass, canopy effects will protect the seabed from wave oscillatory currents. For this reason sediment transport is the most intensive during low tide, when wave dissipation on the seabed is higher.

In the surf zone, longshore transport is the dominant sedimentation process. The distribution of softer fraction of existing sediments in this instance will correspond with the direction of the breaker waves. Sediments nearer the land edge are transported offshore and generally will deposit on the far southern and western portion of the Bay (inlets and small creeks where seagrass and mangroves grow) that is protected from high energy waves.

In the northern part of the bay, a protective gravely seabed has been sorted by the longshore sedimentation.

The existing case shows very little change in the bathymetry over the 5-years period. Natural processes produce up to 15cm siltation per annum and up to 10 cm scour in the existing bay.

### Cyclonic Conditions

Cyclone events have the potential to change the morphology of Shute Bay due to a number of factors including sediment influx, storm surge and associated currents and high wave conditions.

In cyclonic conditions, the waves induced become large enough to steer large quantities of sediment in suspension and initiate advective transport. This results in the bay becoming murky for a period of time as suggested by the dredging re-deposition study (GHD 1999). The even bathymetry does not favour any particular direction of transport and as such cyclic movements are likely to dominate, making the overall transport of sediment minor despite a large increase in siltation rate and turbidity.

The content of moisture within the substrate profile in this instance could increase, weakening the soils around the seagrass roots, dissolving the soil in fluid mud.

On the shoreline, above LAT, debris of corals and stones are transported along the shoreline where the intensive dissipation of waves creates scour holes and local erosion spots. The existing Proserpine-Shute Harbour Road may be threatened by erosion, as it is located in the direction of the maximum fetch and the existing mangroves will not guarantee protection, however the proposed realignment of this road, the proposed breakwater, and the proposed fill at appropriate levels will reduce the risk of erosion occurring in this essential infrastructure and related area.

## Plumes

Even in flood conditions, sediments suspended in stormwater flowing into Shute Bay (from the upper National Park catchment) are not significant in comparison with the resultant sedimentation from tidal action, and will not result in significant hydrodynamic forcing outside the estuary vicinity. Drainage flows therefore have a minimal effect on sedimentation. Fresh water and sediment load flow through the mangroves (providing partial screening and deposition of a fraction of coarser sediments) into the bay and can result in plumes in the western portion of the bay. Wind has an effect on these plumes, as they tend to float, but the sediment from the upper catchments of Conway National Park are generally coarse and settle fast.

Plume modelling has been undertaken by CLT and because of a lack of regional sediment data, two general seabed sediment types were defined in the modelling. The general sediment composition has been described as a sand/silt mix. The sand fraction has been specified as 70% of the overall sediment composition and the silt fraction has been selected as 30% of the composition. Physical testing of similar seabed sediments with greater than 60% sand content indicate that although the silt component is only 30% of the seabed, the character and physical properties of the sediment are dominated by the silt/clay fraction rather than the sand fraction. Un-erodable areas have also been described in the model, for example, the Intertidal Reef.

The morphological modelling does not consider other sediment loads, for example, catchment sediment loads or ambient suspended sediment in tidal flows that would be transported into Shute Harbour from time-to-time. There is very little reliable data to quantify these processes; however the catchment area is limited and deeper waters beyond the entrance of the Bay are normally clear. The morphological modelling has focused on the potential for sediment redistribution inside the Harbour following construction of the proposed marina.

A large range of combined water level, wind and wave conditions could influence morphological processes at the marina site and in Shute Bay. An initial simulation was undertaken to investigate the influence of tides and wind (including local sea waves) on the siltation process. Under calm conditions, very little sediment becomes re-suspended – virtually zero. Local sea bottom stirring by waves is the primary sediment re-suspension mechanism and tidal/wind currents act to transport this material.

### **4.5.1.4 Biological Diversity**

The SHMR is located within the GBRWHA and is surrounded by areas of state significance as follows.

- Habitat Protection Zone of the Great Barrier Reef Marine Park, an Important Wetland in Australia.
- Significant Coastal Wetlands including seagrass communities.
- Significant Coastal Dunes.
- Regional Ecosystems.
- Coral Reefs.
- Protected Area.
- Strategic Port Land.

The GBRWHA is one of Australia's first WHA. It is the world's largest WHA extending 2,000km and covers an area of 35 million ha. It was inscribed in 1981 for the following outstanding natural universal values.

- An outstanding example representing the major stages in the earth's evolutionary history.
- An outstanding example representing significant ongoing ecological and biological processes.
- An example of superlative natural phenomena.
- As containing important and significant habitats for in situ conservation of biological diversity.

The GBRWHA contains coral reefs, seagrass meadows, mangroves, soft bottom communities and island communities. It provides nesting grounds for the endangered green and loggerhead turtles and is a breeding ground for humpback whales. The islands and cays support several hundred bird species and some breeding colonies. The WHA is also culturally significant containing numerous important archaeological sites of Aboriginal and Torres Strait Islander origin. The area contains numerous shipwrecks and historic ruins and lighthouses. Approximately 98% of the WHA is within the GBRMP with the remainder being Queensland waters and islands (DEWHA, 2004).

The location of the SHMR in relation to areas of state significance as mapped under the draft Regional Coastal Plan and EPA wetland data are presented in Maps 2, 5 and 6 of the draft Regional Plan Mapped as State Significant Areas and reproduced as Figure 15. Areas of State significance under the draft Regional Coastal Plan have been mapped using a variety of map data sources and are variable with respect to scale, accuracy and currency.

In order to design an ecologically sustainable development and accurately assess the potential impact on coastal resources and their values from the construction and operation of the proposal, the Proponent has ground-truthed (mapped) in detail the existing and current distributions of seagrass, saltmarsh, macroalgae, mangroves and coral communities which are presented in the following figures (in relation to mapped EPA State Significant Areas (Map 5) and Coastal Wetlands (Map 6)).

Figure 16: State Significant Areas with Coral Reef Communities in 2007.

Figure 17: State Significant Areas with Mangrove Distributions in 2007.

Figure 18: State Significant Areas with Seagrass Distributions in 1999 and 2000.

Figure 19: State Significant Areas with Seagrass Distributions in 2007.

The recognised conservation value of the site and the surrounding environment has been detailed by FRC in the aquatic ecology investigation presented as Appendix P1. In summary, Shute Bay comprises a number of communities including seagrass, mangroves, macroalgae, coral and benthic invertebrates which is summarised below in order to determine impacts on biological diversity in the context of state planning policies and is detailed further in Section 4.9 'Nature Conservation' of the EIS.

## Flora

A highly variable seagrass community covers much of the sediment within Shute Bay. Seagrass species included:

- *Halodule uninervis*;
- *Halodule ovalis*; and
- *Zostera Muelleri*.

However within and adjacent to the proposed marina footprint, predominantly bare substrate exists with patches of sparse to moderate seagrass as shown on Figure 19. Approximately 14.59 ha of sparse to moderately dense seagrass was recorded in the 2007 survey within the marina footprint. The biomass of such communities was low. Within the predicted dredge plume, an over conservative approach to the impact assessment following the revision to the engineering design (i.e. construction methodology) detailed in Section 3 of the EIS, a small amount of sparse to moderate *H. uninervis* communities occurs. Seagrass communities within the development footprint and immediately surrounding this area are indicative of a frequently disturbed environment (i.e. predominantly from wind and wave action). The distribution, density and community structure of seagrasses within the bay have varied significantly over the past two decades.

Mangrove communities within Shute Bay are dominated by the red mangrove (*Rhizophora stylosa*) with lower abundances of the grey mangrove (*Avicennia marina*), river mangrove (*Aegiceras corniculatum*), myrtle mangrove (*Osbornia octodonta*), blind-your-eye mangrove (*Excoecaria agallocha*), mangrove apple (*Sonneratia alba*) and yellow mangrove (*Ceriops tagal*). The mangroves on the western and southern sides of Shute Bay cover a significantly greater area than those within the east of the proposed development area.

Within the development footprint approximately 1.84 ha of mangroves currently occurs. Mangroves give way to patches of saltmarsh on mostly rocky ground which then rises in a relatively steep bank to Proserpine-Shute Harbour Road. Within the predicted dredge plume, approximately 0.19 ha of mangroves occur however this is over-estimated as the area calculation does not consider the since changed construction methodology which includes dry excavation of part of the marina basin which will significantly reduce the potential dredge plume. Mangroves act as a natural filter for overland flow, protect the shoreline from erosion and contribute to the establishment of islands and the extension of shorelines.

Mixed macroalgae communities were found throughout much of subtidal sections of Shute Bay significantly overlapping seagrass distribution. Within the development footprint approximately 35 ha of mixed (low cover) macroalgae communities were surveyed. Within the predicted dredge plume approximately 9.06 ha of low cover (<20%) mixed macroalgae communities and 3.41 ha of *Hypnea* sp. dominate communities, however this is over-estimated as the area calculation does not consider the since changed construction methodology which includes dry excavation of part of the marina basin which will significantly reduce the potential dredge plume.

Coral communities form an extensive spit that partially encloses the bay's southern entrance. Coral cover on the spit is highest on the seaward side, where tidal flushing is greatest bringing food and clear water to the community. The relative abundance of each hard coral genus is typical of inshore coral communities in the Whitsunday region, with sediment tolerant genera such as *Goniopora*, *Porites* and *Turbinaria* dominating. Within the development footprint approximately 10 coral colonies were recorded covering less than 2% of the substrate (approximately 0.44 ha).

## Fauna

Fauna diversity with Shute Bay is supported by the above floral communities with unvegetated soft substrate, rocky substrates, mangroves and seagrasses playing a critical role in:

- shelter and refuge;
- food;
- stabilising bottom sediments;



- water quality; and
- substrate.

A full list of fauna species surveyed during the aquatic ecology investigations is provided in Appendix P1 and list of marine megafauna species identified by Natural Solutions is provided in Appendix P2 of the EIS. Both technical reports are discussed in detail in response to Section 4.9 'Nature Conservation' of the ToR.

#### **4.5.2 Potential Impacts and Mitigation Measures**

Potential impacts and mitigation measures have been described in the context of the State Coastal Plan and draft Regional Coastal Plan. This section:

- assesses the impact of construction and operational activities of the proposed SHMR on coastal process (including bathymetry, coastal geomorphology, hydrodynamic processes, sediment transport (and plumes), tides, changes in seal level and coastal hazards (e.g. cyclones and storm tide surge));
- assesses the impact of construction and operational activities of the proposed SHMR on coastal resources and their values (including defining and describing the water quality objectives within Shute Bay) including ecological processes; and
- identifies mitigation strategies for potential adverse impact to coastal processes and resources (and their values).

##### **4.5.2.1 Coastal Processes (Other than Ecological Processes)**

###### **Waves, Currents and Extreme Event Water Levels**

By its nature and design the proposed completed marina will provide protection from severe to extreme wave climate, currents and coincident storm tide events. Significant wave heights within the marina site are reduced to less than 0.6m and 0.8m for ARI 50 and 100 to 200 year events, compared to 1.5m and 2m had the marina not been in place.

Extreme water levels will be reduced significantly along Proserpine-Shute Harbour Road in the lee of the proposed development because it will be protected from wave set-ups, run-up and overtopping.

Under more normal operational wave conditions, the proposed marina will result in a localised increase in wave height adjacent to the south-western corner of the marina. However, only for south-easterly direction winds above 12.5m/s (45km/h) is there any potential for bed sediment re-suspension or any change in currents, which is addressed below. The marina also reduces wave and current energy across much of the upper harbour. In relation to normal operational waves and navigation, the marina will have no significant adverse impact away from the walls.

Under extreme cyclonic conditions, such as those produced during Cyclone Celeste where wind speeds exceeded 40m/s or 144km/h, under existing conditions without the proposed marina, bed sediment is mobilised across the entire upper harbour, from east of the proposed development. Whilst it is predicted that bed scour potential will be increased locally, immediately south and east of the proposed development the existing materials are already suspended because of the localised nature of impacts. Therefore the introduction of a marina will have an insignificant impact on bed scouring. The upper harbour will be protected by the proposed development, with less scouring impact during such events, and no significant accretion predicted.

The construction process involves the progressive construction of the seawalls, with any impacts on waves current and water levels being proportional to the percentage complete, relative to the fully completed development.

### **Sediment Transport and Geomorphology**

A series of simulations were developed to describe the long term siltation patterns. Comparing the existing and post-marina cases, the marina will act as a flow constriction. During the simulated flood tide period in the Shute Harbour region (06:00 to 12:00, 3 January 2006), the presence of the marina increases the currents along the southern shoreline opposite the marina. During the ebb tide, currents near the tip of the western breakwater are significantly increased.

The coastal processes assessment presents figures estimating the average annual siltation and erosion rates for the existing and post-marina cases for the first 5-years post-construction. The increase in re-suspension of seabed material along the southern shoreline is shown by increased erosion in this area. Once the combined tidal and wind driven currents reach the upper section of Shute Cove, the additional material in suspension in the post-marina case will settle out of the water column. The model results for the existing case show that the model bathymetry is relatively stable and there is no significant erosion or deposition trend in Shute Bay. This is consistent with the observed seabed bathymetry in recent times being relatively stable

The change to the initial seabed bathymetry for the post-marina layout and the post 5- and 10-years bathymetry has been assessed with Figure 19 illustrating a process, after 5 years, of deposition to the west of the western breakwater and erosion along the southern shore immediately opposite the marina. Average annual siltation rates for the 5 to 10 years post-construction period for the existing and post-marina layouts show the rate of annual morphological change as decreasing. Post 10 years there is a limited accretion zone predicted immediately west of the western wall and some additional scouring of the southern bay close to the shoreline. Without the development in 10 years the model predicts similar results. In summary compared with the post-marina case, there has been little to no change to the existing bathymetry of Shute Bay, as illustrated by Figure 19.

Inside the marina basin, over a 10-year period there is predicted to be up to 0.3m of deposition in the eastern end of the basin. This will raise the seabed levels in this region from -5.2m AHD to -4.9m AHD. In the western half of the basin, total siltation depths are in the order of 0.03 to 0.06m over a 10-year period. In the access channel, siltation rates over a 10-year period are up to 0.2m (western end). The average annual siltation volume in the marina basin is approximately 3,000m<sup>3</sup>, which corresponds to a dry mass of 1500 tonnes per year using a bulk density ratio of 2:1.

Figure 20 provides graphical illustrations of predicted siltation 5- and 10-years post development.

Model calibration and validation details and full results are provided in the coastal processes investigation presented in Appendix O.

In summary the long term geomorphologic analysis of the existing harbour shows that the embayment is relatively stable, with bed changes (scour or accretion) of 15cm likely over a typical five year period, in the absence of an extreme cyclone.

The impact of the fully completed marina is the reduction of wave energy and current in the upper harbour, which will result in an increase in siltation immediately west of the development, as shown in the coastal processes investigation. In general, average annual bed changes are of a similar order to the existing situation. Over a 10 year period, siltation rates reduce and a stable bed form results.

Inside the marina basin, siltation rates are modest in areas that are proposed to be dredged to maintain the basin at a safe navigable depth.

During severe cyclone events, there is no appreciable difference in siltation or scour across the harbour between the existing and proposed cases, except in the approach channel marina entrance, where up to 0.25m accretion is predicted.

During construction, the sea wall comprising of sheet piling / pile and pre-cast panel will be installed before dredging commences. Double silt curtains are proposed for the entrance to contain any dredge head plumes. Silt curtains have been used successfully on a number similar projects previously (for example, Sydney Third Runway, Port of Airlie, Hong Kong Airport and Darling Harbour).

Generally, it is best to control the re-suspension of fines at the dredge head because the successful deployment of silt curtains across the development extent is a difficult task and not particularly practical. This is because the tidal flow into and out of the marina will cause loads on the curtain, especially as it becomes blocked by suspended sediments. To be effective the curtain must have fine pores. Hence there will be a head difference across the curtain. If the trapping rate is high the curtains will need to be cleaned frequently.

With such a small entrance area relative to the marina basin area to be dredged, the risk of any significant silt movement beyond the basin is very low.

In the design of the marina layout, several refinements occurred to the reclamation finger on the western end of the marina to reduce siltation and scour impacts to acceptable levels. This involved the shortening and bending on the southern end of the finger from the original straight finger proposal.

The proposed design takes account of extreme cyclonic event storm tide coincident wave conditions, including allowance for 300 mm possible future sea level rise and an increase in cyclone central pressure due to greenhouse effects.

The resultant marina, as proposed is very safe by industry standards, and will provide safe refuge for boats in events up to the ARI 200 year event.

#### **4.5.2.2 Coastal Resources and Values**

The existing values of coastal resources in the Whitsunday region and the locality of the proposed development, and the pressures at these have been determined and are presented below in Table 29.

**Table 29 Coastal Resource Values and Pressures in the Whitsunday Region**

Coastal Resource	Values	Pressures
Soft-bottom (benthic) systems	<ul style="list-style-type: none"> <li>- fishing</li> <li>- habitat for native plants and animals</li> <li>- nutrient sink and source</li> <li>- nursery habitat</li> <li>- biological productivity</li> <li>- Indigenous Traditional Owner fishing practices</li> </ul>	<ul style="list-style-type: none"> <li>- boating and anchoring</li> <li>- catchment run-off</li> <li>- trawling</li> <li>- dredging and extraction</li> <li>- land reclamation</li> <li>- shipping access</li> <li>- predicted impacts of climate change and sea-level rise</li> <li>- invasive pests and weeds</li> </ul>
Mid-water column (pelagic) systems	<ul style="list-style-type: none"> <li>- biological productivity and diversity</li> <li>- commercial and recreational fishing</li> <li>- habitat for native plants and animals</li> <li>- Indigenous Traditional Owner cultural resources</li> <li>- feeding habitat and migration pathway for marine species</li> </ul>	<ul style="list-style-type: none"> <li>- catchment run-off</li> <li>- commercial and recreational fishing intensity</li> <li>- sand extraction</li> <li>- water pollution</li> <li>- boat strikes on marine animals</li> <li>- shipping access</li> <li>- predicted climate change impacts (eg. ocean warming)</li> <li>- recreational and tourism activities</li> </ul>
Coastal and estuarine waters	<ul style="list-style-type: none"> <li>- scenic amenity</li> <li>- recreational amenity</li> <li>- Indigenous Traditional Owner cultural resources</li> <li>- Indigenous Traditional Owner fishing practices</li> <li>- cultural heritage</li> <li>- habitat for plants and animals</li> <li>- feeding and breeding habitat for marine species</li> <li>- migration pathway for marine species</li> <li>- recreational and commercial fish species</li> <li>- setting for tourism activities</li> <li>- setting for maritime activities</li> <li>- setting for coastal dependent development</li> </ul>	<ul style="list-style-type: none"> <li>- coastal development</li> <li>- land clearing</li> <li>- catchment run-off and siltation</li> <li>- dredging and extraction</li> <li>- land reclamation</li> <li>- fishing intensity</li> <li>- introduced marine species</li> <li>- acid sulfate soil disturbance</li> <li>- recreational/tourism activities</li> <li>- boating</li> <li>- boat strikes on marine species</li> <li>- water pollution including industrial discharges</li> <li>- predicted impacts of climate change and sea-level rise</li> <li>- invasive pests and weeds</li> <li>- dams, weirs, barriers</li> </ul>
Indigenous Traditional Owner cultural resources	<ul style="list-style-type: none"> <li>- Indigenous Traditional Owner spiritual significance, cultural significance, economic significance and knowledge systems</li> </ul>	<ul style="list-style-type: none"> <li>- coastal development</li> <li>- land clearing</li> <li>- sand mining</li> <li>- illegal collecting of native species</li> <li>- recreation and tourism activities</li> <li>- water extraction</li> <li>- water pollution</li> <li>- boating and anchoring</li> <li>- fishing intensity</li> <li>- habitat loss</li> <li>- boat strikes on marine animals</li> <li>- dams, weirs, irrigation channels</li> <li>- erosion and land degradation</li> <li>- acid sulfate soil disturbance</li> <li>- predicted impacts of climate change and sea-level rise</li> <li>- reclamation</li> </ul>

Coastal Resource	Values	Pressures
Cultural Sites	<ul style="list-style-type: none"> <li>- cultural understanding</li> <li>- aesthetic features</li> <li>- social and community identity</li> <li>- scientific significance</li> <li>- historic heritage</li> <li>- educational role</li> <li>- spiritual significance</li> <li>- Indigenous Traditional Owner spiritual significance</li> <li>- Indigenous Traditional Owner knowledge systems</li> </ul>	<ul style="list-style-type: none"> <li>- land clearing</li> <li>- coastal development</li> <li>- lack of understanding and respect</li> <li>- recreation and tourism activities</li> <li>- predicted climate change impacts</li> </ul>

The policies under the State Coastal Plan and draft Regional Coastal Plan that are applicable to the development proposed are hereafter discussed in terms of the proposal's consistency with the principles of relevant policies. Relevant policies are listed below.

- 2.1.1 Areas of State Significance (Social and Economic).
- 2.1.2 Settlement Pattern and Design.
- 2.1.5 Maritime Infrastructure.
- 2.1.8 Dredging.
- 2.1.9 Reclamation.
- 2.1.10 Tourism and Recreational Activities.
- 2.2.1 Adaptation to Climate Change.
- 2.2.2 Erosion prone areas.
- 2.2.4 Coastal hazards.
- 2.3.1 Future need for access.
- 2.4.1 Water quality management.
- 2.4.4 Stormwater management.
- 2.4.5 Groundwater quality.
- 2.4.6 Acid sulfate soils.
- 2.5.2 Involvement of Indigenous Traditional Owners in managing their cultural resources.
- 2.6.2 Cultural Heritage.
- 2.7.1 Areas of State Significance (scenic coastal landscapes).
- 2.8.1 Areas of State significance (natural resources).
- 2.8.2 Coastal wetlands.
- 2.8.3 Biodiversity.
- 2.8.4 Rehabilitation of coastal resources.
- 2.8.5 Pest species management.

**Policy 2.1.1 Areas of State significance (social and economic)**

This policy seeks to ensure that areas of state significance (social and economic) in the Mackey Whitsunday Region which includes strategic port land, regional airports, and coastal dependent recreational and/or marine transport facilities are not affected by incompatible neighbouring land uses including the operation of these key areas.

### Response

The SHMR site is located sufficiently west of significant coastal-dependent recreational and marine transport facilities in the form of the SHTF for the development to not adversely affect the area of state significance (social and economic). Located between the SHMR site and the Transit Facility is a barge operation, public boat ramp and private jetties.

Furthermore, the SHMR will not adversely affect the operation of the SHTF with the issues of marine traffic addressed with proposed Vessel Transit Lanes. It is in fact expected to significantly enhance the operation of the Transit Facility through reducing the demand for car parking and provide an exciting link to the major getaway terminal to the Whitsundays.

### **Policy 2.1.2 Settlement Pattern and Design**

Land on the coast has been identified under this Policy as a valuable and finite resource that has important ecological, economic and social values. These resources and values contribute significantly to the high desirability and liveability of the region, and underpin the contribution of tourism and recreation to the economy of the region. As such, the development of urban land uses has a major impact on coastal resources and needs to be carefully planned and managed to minimise adverse impacts.

To the extent practicable this Policy advocates that the coast is conserved in its natural or non-urban state outside of the existing urban areas. Growth of urban settlements should in particular not occur on or within erosion prone areas, significant coastal wetlands, riparian sites, sites containing important coastal resources of economic, social and cultural and ecological values, or areas identified as having or the potential to have unacceptable risk from coastal hazards.

### Response

The population of the Mackay-Whitsunday region has significantly increased over the past ten years with future projections for the region between 117,400 and 122,000 in the year 2011 (EPA, 2006). The marina demand reports by PSSG demonstrate that the regional population is forecast to grow to 207,419 in the year 2026 (Appendix H2).

A significant proportion of this predicted growth is expected to occur adjacent to or near the coast resulting in pressure on coastal processes, resources and their values from recreational activities. The demand for marine infrastructure has been a result of an increase in recreational activities, including recreational boating, as well as public transport and marine tourism having been previously caused by:

- continuing urbanisation of the environment and the premium placed on waterfront land;
- the growth in leisure time, combined with low-cost, mass-produced, high-speed recreational craft; and
- the growth in tourism.

Tourism provides the highest economic injection in the Whitsunday tourist region generating over \$550 million annually and directly providing over 34% of the Shire's total employment (WRC, 2006). In particular the Whitsunday region enjoys significant competitive advantage in maritime based activities, and the region's coastal and island destinations are internationally recognised. The region has Australia's largest group of charter boat operators as well as six bareboat charter companies operating over 200 vessels from Abel Point Marina, Shute Harbour and Hamilton Island.

As such, there is a significant demand for marina berths in Queensland even with the existing six marinas in the Whitsunday region.

The updated marina demand study by PSSG, presented as Appendix H2 of the EIS, identifies that the average annual growth trend for boat registrations in Queensland since 2002 was:

- +4.9 percent for overall boat numbers; and
- +7.7 percent for boats over eight metres in length.

The average annual growth trend for boat registrations in the Mackay SD since 2001 was:

- +6.5 percent for overall boat numbers; and
- +11.1 percent for boats over eight metres in length.

Growth of recreational boat registrations was stronger in the Mackay SD than in Queensland for both overall boat numbers and for boats greater than eight metres length for the period 2002 to 2007.

PSSG in discussions with Mr Barry Hibberd, General Manager of Marine Queensland (formerly Boating Industry Association of Queensland (BIAQ)) advised that marina operators had ceased maintaining waiting lists as the situation has not changed in recent years and there was no point to updating them. He went on to say that the shortfall in berths was similar to that reported in January 2005.

With the constant influx of migrants to Queensland and the increased boat registrations particularly in the lengths greater than eight metres, Mr Hibberd suggested that demand would increase and that there was a need to build a significant numbers of marina berths throughout the State.

In January 2005, the waiting list for berths totalled 1,480 with the majority of the demand in Southeast Queensland.

Based on the boat registration trends, the project team prepared a marina berth demand model for the Mackay SD.

Demand for marina berths is mainly for boats in the eight metres in length or more. Based on the boat registration trends, PSSG in the marina demand study update, presented in Appendix H2, estimates that the Mackay SD will an additional 738 berths by 2010 and 3,133 by 2020. These predictions are similar to those in Appendix H1, the 2006 PSSG marina demand study, which suggested that 737 would be required in the region by 2010 and 3,129 by 2020.

The SHMR addresses this future demand by proposing a marina development designed to sustainably manage the recurrent impacts of increased recreational activities by incorporating into the design:

- waste reception facilities;
- seagrass sensitive moorings; and
- bunded refuelling bays and storage tanks.

The 669 berth marina proposed as part of the SHMR will cater for about 90 percent of the additional berths required in the Mackay SD by 2010 and 21 percent of those required by 2020.

The SHMR proposal also incorporates MRA and commercial (retail) land uses to ensure the economic and social viability of the entire tourism-orientated development and Shute Harbour precinct.

Based on the existing demand for marine berths and no alternative sites, the (then) WRC Planning Scheme designation gives a broad indication of the acceptability in principle of a marina development at the proposed site. Development of the SHMR site will not result in scattered satellite development along the coast being located in close proximity to the existing SHTF, Shute Harbour Motel, and existing residences and commercial ventures along Proserpine-Shute Harbour Road.

The design of the SHMR is consistent with a major planning study undertaken for Shute Harbour location by Jackson Planning (2007). This interim planning study suggested that the desirable future role and character for Shute Harbour would be based on the following relevant principles.

- Shute Harbour should continue to provide important maritime based services to the Whitsunday Region.
- The area's natural landscape and environmental values are extremely important assets to both the tourism industry and the community, and these values should be maintained and protected.
- Upgrading or redevelopment should generally be contained within the confines of the existing urban footprint and general port area (SHTF, barge facilities, Whitsunday Rent-a-Yacht and all car parking areas and ancillary facilities).
- Public (recreational) access to the foreshore and water should be improved.
- Future development should be designed to an appropriate scale and height that avoids visual intrusion and negative environmental impacts.
- Any proposals for development outside the existing urban footprint and general port area should demonstrate that there is a need for the proposed facilities and that their development would not compromise the visual and environmental values of Shute Harbour and should be consistent with the policy directions set out in the State and draft regional coastal management plans and the planning scheme.

Comprehensive and extensive assessments have been undertaken in relation to interest areas of this policy and relevant planning principles regarding the development proposal including:

- coastal processes (refer to response to policies 2.1.2, 2.2.1, 2.2.2, 2.2.4);
- stormwater (refer to response to policies 2.4.4, and Section 4.4 'Water Resources');
- economic impact (refer to Section 4.13 'Economy');
- social impact (refer to Section 4.11 'Social');
- aquatic and terrestrial ecology (refer to response to policies 2.8.2 and 2.8.3, and Section 4.9 'Nature Conservation');
- landscape character and visual amenity (refer to policy 2.7.1 and 2.7.2, and Section 4.1 'Land'); and
- essential services (road, water supply and sewerage) (refer to Section 3.5. 'Infrastructure requirements').

With respect to the State Coastal Plan and draft Regional Coastal Plan the following points are relevant in the assessment of this policy against the proposal.

1. The site is located wholly within the CMD as mapped by the draft Regional Coastal Plan Map 12.3.
2. The site is located within the GBRWHA, an Important (and significant) Wetland in Australia.



3. The site contains sparse to moderate *Halodule univervis* seagrass communities, significant coastal wetland.
4. The site is not within but is adjacent to the GBRMP.
5. The site does not contain significant coastal dune systems.
6. The site is adjacent to an area of state significance (social and economic) (i.e. SHTF).
7. The site contains a coral dominated community but does not contain declared FHAs.
8. The site contains Regional Ecosystems (RE) 8.12.5/8.12.14 in an approximate distribution of 70%/30%, and a littoral fringe of RE 8.1.1.
9. The site has been investigated and it has been determined that mangrove and seagrass communities have a low fisheries value due to fragmentation from other mangroves stands and seagrass communities.

In order for the development to proceed within and immediately adjacent to significant areas and entirely within the CMD, a Net Benefit Assessment was undertaken by AEC to demonstrate the SHMR has a net benefit for the State as required under this and other policies. Policies within the State Coastal Plan and draft Regional Coastal Plan identified, in consultation with Queensland EPA, as triggering the net benefit assessment in relation to the proposed SHMR include:

- 2.1.5: Maritime infrastructure;
- 2.1.9: Reclamation;
- 2.8.1: Areas of State Significance (Natural Resources);
- 2.8.2: Coastal Wetlands; and
- 2.9.4: Private Use of State land on the coast.

Additional State and regional planning principles for Shute Harbour also adopt a Net Benefit approach in their decision making on development approvals.

The net benefit assessment reports on the suitability of the proposed development according to the requirements of the State Coastal Plan in relation to net State benefit, considering the draft status of the Regional Coastal Plan. It is contended that any net benefit for the State has a net regional benefit. The net benefit assessment compared the SHMR with the current site usage across the triple bottom line (economic, social and environmental). Where the positive (beneficial) impacts of development outweigh the negative impacts (costs) across the triple bottom line, the development will be deemed to deliver a net benefit to the State.

The net benefit assessment is presented as Appendix G of the EIS.

A net benefit for the State is defined under the State Coastal Plan as:

*“there is a net benefit (taking into account all financial, social and environmental impacts) to the State as a whole, as distinct from sectorial, commercial, private or regional gain, and the proposal delivers the greatest net benefit of all viable alternatives.”*

The net benefit assessment was undertaken in accordance with the EPA (updated) *Draft Net Benefit Assessment Guidelines – General Requirements for Net Benefit Test*.

The net benefit of the development has been compared to the current site usage across the triple bottom line (economic, social and environmental) in a regional and, where applicable, State context. Where the positive impacts of the development outweigh the negative impacts, the development was deemed to deliver a positive net benefit locally, regionally and across the State.

The CBA found that development of the SHMR is expected to deliver a total net benefit of \$299.2 million in present value terms (NPV) at a discount rate of 10% for direct impacts (i.e. incurred by the proponent) and 6% for indirect impacts (i.e. to stakeholders other than the Proponent), with present value of benefits of \$984.5 million and a present value of costs of \$685.3 million. Overall, the development provides a benefit cost ratio (BCR) of 1.44 (i.e. returns \$1.44 for every dollar spent in delivery of the project).

The project provides a positive direct net benefit (i.e. to the Proponent) in present value terms of \$93.6 million with a BCR of 1.46.

The project delivers a positive indirect net benefit (i.e. to stakeholders other than the Proponent) in present value terms of \$205.7 million with a BCR of 1.43.

All aspects across the triple bottom line (economic, social and environmental) are anticipated to record a net benefit as a result of the project.

AEC's research anticipates that the overall net benefit is understated by the above results as where possible a conservative approach was applied. A number of economic and social benefits were unable to be quantified, with these benefits expected to outweigh the economic and social costs identified from the SHMR project that have not been able to be quantified, which further supports this assessment potentially understating the benefits delivered by the development.

From the outcomes of the Net Benefit assessment, it is clear that the direct, indirect and overall impacts of the project result in a clear benefit to the community. That is the development will provide significant employment, community, tourism and environmental opportunities enhancing the community that supports it.

Net benefits for the State as quantified by AEC are presented in Table 4.

Strategies to mitigate potential impacts (i.e. negatives) from the construction and operation of the proposed SHMR have been assessed by expert technical consultants whose advice has been incorporated into both the design process and subsequent environmental management plans prepared in response to Section 5 'Environmental Management' of this EIS.

By its nature and design the proposed completed marina will provide protection from severe to extreme wave climate, currents and coincident storm tide events. In the design of the marina layout, several refinements occurred to the reclamation finger on the western end of the marina to reduce siltation and scour impacts to acceptable levels. This involved the shortening and bending on the southern end of the finger from the original straight finger proposal. Post development it has been shown that the bathymetry is relatively stable and there is no significant erosion or deposition trend in Shute Bay. This is consistent with the observed seabed bathymetry in recent times being relatively stable. Inside the marina basin, siltation rates are modest in areas that are proposed to be dredged to form the basin.

The proposed design takes account of extreme cyclonic event storm tide coincident wave conditions, including allowance for 300 mm possible future sea level rise and an increase in cyclone central pressure due to greenhouse effects.

The resultant marina, as proposed is very safe by industry standards, and will provide safe refuge for boats in events up to the ARI 200 year event.

The following documents detail the proposed management strategies to mitigate potential impacts of the SHMR.

- Marine Megafauna Management Plan, presented as Appendix P2.
- ASSMP, presented as Appendix I3.
- CEMP including marina fit out, presented as Appendix U1.
- WMP, presented as Appendix U2.
- Marina SBMP, presented as Appendix U3.
- Cyclone Evacuation Plan, presented as Appendix U4.

These management plans ensure a net benefit is securely achieved for the State long term and thus it is considered the development proposal complies with policy 2.1.2 'Settlement pattern and design' and those policies which necessitate a demonstrated net benefit for the State.

In addition, the SHMR Development Code varies the effect of the local planning instrument for the SHMR by providing a framework for managing the SHMR and specifying appropriate performance criteria and acceptable solutions.

#### **Policy 2.1.5 Maritime Infrastructure**

This policy identifies the need to balance the requirements of the growing population with the protection and management of significant coastal resources and their values when constructing new maritime infrastructure. It is a preference that new maritime infrastructure is located in developed tidal waterways in locations which recognise public access requirements and protection of natural, cultural and landscape values.

This policy recognises that it is important to ensure that State land and waters are used for the most appropriate purpose and that the highest level of protection of coastal resources and their values is given.

Under the regional context of this policy new maritime infrastructure is not supported which will necessitate capital dredging or an increase in maintenance dredging to provide access to the proposed facility unless generally it is:

- major infrastructure of net benefit for the State; or
- a public facility necessary for improved environmental protection and management of natural coastal resources; or
- necessary for improved public safety.

#### **Response**

Tourism in the Whitsundays has generated significant infrastructure to service the needs of both the international and domestic markets. The existing major maritime infrastructure within the Mackay-Whitsunday region is listed below.

- Major infrastructure of economic importance associated with the Ports of Mackay and Hay Point.
- Large-scale marine transport facilities at Hayman Island, Airlie Beach, Shute Harbour, Hamilton Island, Laguna Whitsundays and Mackay.
- Privately owned boat ramps, jetties, pontoons and moorings throughout the region.

- Public boat ramps at Shute Harbour, Airlie Beach and Cannonvale.
- A 240 berth Port of Airlie Marina is currently under construction.
- Marine maintenance facilities at Abel Point Marina and Edges Muddy Bay facility.

This maritime infrastructure plays an integral role in public and private marine activities and contributes significantly to commercial marine activities in the region, including the nation's largest group of charter boat operators with an annual turnover in excess of \$100 million.

The predicted population expansion on or near the coast in the Whitsunday Region is expected to increase the demand for maritime infrastructure, particularly as recreational boating is becoming increasingly affordable. The 669 berth marina proposed as part of the SHMR will cater for about 90 percent of the additional berths required in the Mackay SD by 2010 and 21 percent of those required by 2020.

From market research and field consultation on the region's marine industry, PSSG concluded there was:

- strong demand for marina berths and dry boat storage particularly for those at competitive price points;
- a shortage of marina berths and dry storage;
- continuing growth in boat ownership based on a high percentage of high income earners due to proximity to the coal fields; and
- continuing trend for interstate boats to permanently locate in the region.

The market research also revealed that the Whitsunday region has:

- sufficient supply of normal suburban residential land to cope with forecast growth; but
- limited supply and high demand for premium residential coastal land with views or water frontage.

Based on a situation analysis by PSSG, it was concluded that the SHMR presented opportunities in:

- marina berths;
- dry boat storage;
- charter boat base;
- time and fuel saving for Shute Harbour as a boat base for visitors to the islands, compared to Airlie Beach;
- retail;
- car parking; and
- residential.

The SHMR site is located on State coastal land and will entail capital dredging of the marina basin and access channel removing approximately 780,00m<sup>3</sup> of spoil and maintenance dredging to maintain appropriate keel depth for safe navigation. Despite the fact that parts of the proposed access channel are required to be dredged periodically because of an existing public boat ramp facility managed by Council, some aspects of the proposal are inconsistent with the requirements under this policy. Therefore a net benefit assessment was undertaken in order to demonstrate consistency with this policy.

As discussed in the response to policy 2.1.2 a positive net benefit for the State arises from the proposed SHMR across the triple bottom line.

In addition to the above net benefit for the State, the proposal has also been designed to ensure no significant adverse impacts to the existing environment. In fact the development will ultimately improve the environment, as the development has been designed to minimise environmental impact during construction and operation. In particular, the marina:

- provides facilities to limit unauthorised discharges and anchor damage;
- provides a safe haven in cyclone events (i.e. improved public safety) (refer to policy 2.2.4 *Coastal Hazards* for further details);
- provides charters to the reef increasing public access to the coast and Whitsunday Isle (refer to policy 2.3.1 *Public Access* for further details); and
- provides an attractive destination in Shute Harbour which is aesthetically pleasing from various vantage points (refer to response to policy 2.7.1 *Areas of State significance (scenic coastal landscapes)* for further details).

Provided the development is designed, constructed and operated in accordance with civil engineering drawings assembled within this EIS and management plans which focus on environmental protection of existing sensitive places in the short- and long-term, it is clear that the proposal for a marina at the designated site will avoid a net loss to coastal resources and their values.

In summary the SHMR proposal having demonstrated a net benefit for the State is consistent with policy 2.1.5 of the State and draft Regional Coastal Plans.

#### **Policy 2.1.8 Dredging**

This Policy identifies major coastal management issues associated with dredging in the region, namely that dredging activities, combined with the subsequent disposal of the dredge spoil, have the potential to adversely impact on water quality and marine habitats such as seagrass and algae beds, coral reefs and sandy and other benthic habitats. As such this policy suggests that dredging operations which are not essential to the functioning of areas of state significance (social and economic) are located outside, and avoid impacts on, areas of state significance (natural resources).

In a regional context, dredging is generally associated with maintaining access for vessels accessing the Ports of Mackay and Hay Point and also for public boat ramps and larger marine facilities such as Mackay Marina, Abel Point and Laguna Whitsundays.

#### Response

In assessing development applications involving dredging it is understood the dredge operations are to minimise impacts on marine habitats and coastal processes by measures including:

- minimising the suspension of sediment, and preventing or limiting the movement of suspended sediment away from the dredging operation;
- monitoring the effects of dredge spoil placement on the coastal environment; and
- remedial measures should the placement of material have a detrimental effect on coastal resources and their values.

This application involves dredging approximately 730,000 m<sup>3</sup> of dredge spoil from the proposed marina basin and access channel for a marina development and to provide safe passage for boats using this facility. Dredging shall be undertaken using a cutter suction dredge with material piped to reclamation areas and controlled by devices shown in Drawings 7900/48/01-406 to 7900/48/01-411. The dredge spoil is proposed to be utilised as reclaimed fill (in addition to commercial sand products) to enable land levels to be constructed to prevent slumping and flood and storm surge impacts to built form.

Potential impacts from the proposed development may be direct or indirect. In particular the main concern arising from dredging operations during construction of the SHMR is the loss of coastal habitat and potential increase in turbidity (poor water quality) in Shute Bay due to disturbance of sediments at the dredge site. A decrease in the depth to which light penetrates (euphotic depth) could potentially impact on floral & faunal communities in the bay. Management of dredging activities must focus on the control of turbidity and development conditions are expected to reflect appropriate turbidity levels.

The sediments within the footprint are comprised mainly of fine silts which have the potential to create extensive sediment plumes unless restricted by environmental controls. The dewatering of dredge spoil on the development site will occur in specified areas intended for filling with run-off treated so as to ensure any discharge of water is of a sufficient quality to prevent environmental harm at surrounding environmentally sensitive areas. Drawings depict the sediment and erosion controls proposed for each construction phase from site establishment to infrastructure installation in Drawings 7900/48/01-400 to 7900/48/01-411.

In order to manage dredging impacts, excavation and dredging shall only occur within a fully enclosed marina basin with the breakwater acting as a physical barrier to the potential release of suspended sediment and double silt curtains acting as a barrier across the access channel. Sheet piling for revetment wall and breakwater installation is not expected to generate plumes (i.e. minimal disturbance to substrate) and access channel dredging will be undertaken with silt curtains arranged at the dredge head to minimise sediment suspension. In addition a comprehensive water quality monitoring program before, during and after construction will be implemented with appropriate corrective actions proposed to prevent a significant adverse impact to water quality and associated flora and fauna.

Dredging and spoil disposal during construction shall be managed via construction staging shown in Drawings 7900/48/01-400 to 7900/48/01-405 and environmental controls specified in the CEMP, attached as Appendix U1.

The retention time required to achieve discharge water quality requirements (as specified in response to policy 2.4.1 *Water quality*) at all stages of construction and design of settling ponds to prevent leakage, re-suspension or short-circuiting of flow will be determined at the operational works stage where the water quality parameters have been conditioned by government agencies. In the interim it is deemed sufficient that the sediment and erosion control plans shown in Drawings 7900/48/01-406 to 7900/48/01-411 will ensure compliance with the policy requirements for dredge spoil disposal, treatment and short term management.

Ongoing maintenance dredging of both the marina basin and access channel will be necessary with a Marina SBMP, presented as Appendix U3, prepared to manage the effects of re-suspension during dredging works. It is important to note that the existing environment is highly turbid as a result of wind and wave action, particularly during strong winds which are common along the open coast. Drawing 7900/48/01-312 illustrates this long term dredging strategy with a section of the spoil disposal area. Maintenance dredging is discussed in more detail in Section 3.4.2 'Dredging'.

Table 30 below has been prepared to demonstrate compliance with policy 2.1.8 *Dredging*.

**Table 30 Compliance with Policy 2.1.8 of the Regional Coastal Plan**

Requirement	Response
<p>No degradation or alteration of surrounding natural environment.</p>	<p>The degradation or alteration of the surrounding natural environment shall not be caused through dredging with environmental controls proposed to prevent reduced water quality, excessive siltation and change to coastal processes. Dredging during both the construction and operation of the proposed SHMR will be managed by best practice methods available including silt curtains and an extensive water quality monitoring program.</p> <p>No ecologically significant net loss or gain of seagrass or mangrove habitat within Shute Bay is predicted as a consequence of altered hydrodynamics and related sediment deposition and scouring. Particularly the Proponent proposes a “Reef Conservation Fund” to conserve the surrounding areas natural beauty and ecological function.</p> <p>If constructed in accordance with engineered plans and constructed and operated in accordance with environmental management plans, the proposed development will not impact on any features of geological or geomorphological significance within the world heritage area; containing the Great Barrier Reef Marine Park (refer to response to policy 2.8.1 <i>Areas of State Significance (Natural Resources)</i>).</p>
<p>No impact on groundwater levels, recharge rates or the supply of water to coastal wetlands.</p>	<p>The limited depth of dredging proposed is not expected to result in alteration of groundwater levels, groundwater recharge rates or the supply of water to coastal wetlands.</p>
<p>No impact to coastal habitats.</p>	<p>A loss of mangroves, seagrass and coral communities will occur as a result of the proposed SHMR. The loss of habitat is summarised below.</p> <ul style="list-style-type: none"> <li>• 14.59 hectares of sparse seagrass.</li> <li>• 1.84 hectares of fringing mangrove forest.</li> <li>• 34 hectares of macroalgae.</li> <li>• 10 small coral colonies.</li> </ul> <p>However both mangroves and seagrass communities within the marina footprint were assessed as having low value to fishes as habitat due to their fragmentation from other extensive seagrass and mangrove communities within the bay. The loss of mangroves, seagrass and macro algae communities within the development footprint is therefore expected to not impact on the functioning of the ecosystems in the bay. It is noted however even in their fragmented state, mangroves, seagrass and macro algae support food webs and are generally involved in the reproduction and rearing of fish, crab and prawn species. The ecological attributes of each habitat are discussed briefly in Section 4.5.1 of this EIS and further in Section 4.9 ‘Nature Conservation’.</p> <p>The potential loss of coral communities is minimal with 2% coverage within the marina footprint. A more extensive spit occurs at the entrance to Shute Bay where tidal flushing is greatest supporting a large diversity of organisms.</p> <p>Significant disturbance to the unvegetated substrate shall occur through dredging. As a result there will be loss of coastal habitat however the impact to coastal habitat within Shute Bay will be minimal with the majority of mangroves, saltmarsh, seagrass, macroalgae and reefal communities occurring outside the development footprint which will be protected from indirect development impacts.</p> <p>To offset this loss of coastal habitat the Proponent proposes a “Reef Conservation Fund”, replacement of existing swing moorings with environmentally sensitive mooring at locations on the reef experiencing high rates of visitability by vessels and habitat complexity in the form of a marina. The “Reef Conservation Fund” will be operated as a charitable fund and administered by the Proponent. The “Reef Conservation Fund” will be funded from the sale of the marina berths, with an initial contribution, to be provided by the proponent upon the settlement of each marina berth, of approximately \$1.0 million in total, and an ongoing contribution of approximately \$150,000 per annum. The ‘Reef Conservation Fund’ will</p>

Requirement	Response
	<p>contribute to the ongoing sustainability of the coral providing low impact to seagrass and coral moorings on the reef. Part of this funding is expected to be used for ongoing public education and awareness campaigns as part of cultural and marine interpretive centres.</p> <p>The marina will require the relocation of a number of existing swing-moorings, which currently impact the seabed through chronic physical disturbance as the vessel responds to changing winds and tides, and replace them with low impact to seagrass and coral moorings. Existing seagrass communities external to the footprint of the marina will be able to re-establish at these moorings and create a more stable and productive benthic community. The conversion of 57 moorings is expected to result in a 'gain' of approximately 950m<sup>2</sup> of seagrass and macroalgal habitat.</p> <p>Construction of the SHMR will result in a mosaic of habitats associated with pontoons, piles and other intertidal and subtidal structures (and boats) which may provide substrate for many species of algae, hard and soft corals, sponges, ascidians and a variety of other invertebrate fauna. This habitat development is expected to provide shelter and food for a variety of fishes and other fauna and a degree of shade important in attracting fish species.</p> <p>FRC in the aquatic ecology investigation attached as Appendix P1 has presented evidence from studies showing that the total abundance of fishes increases with an increase in rugosity (structural complexity) and quality of water. In fact studies of natural and artificial habitat have shown that each may support a fish fauna of similar species richness – yet different (but often overlapping) assemblages. At a local scale the existing structures at the SHTF support a diverse flora and fauna community (as shown in Appendix F of the FRC report) with pilings and sheltered rock groyne supporting an abundance of soft coral and macroalgae communities, approaching 100% cover on available substrate. As such it is expected the proposed artificial structures of the SHMR will exhibit a similar cover and diversity.</p> <p>As water depth within the proposed marina is unlikely to support communities of seagrass and macroalgae, fish friendly structures are proposed to enhance fish habitat in the marina thereby raising the ecological value. Specific design guidelines are included for several features proposed as part of the SHMR including guidelines for general small boat harbours and marinas, jetties and pontoons, boat ramps, stabilisation structures, dredge spoil and mooring buoys (Derbyshire, 2006).</p> <p>The gain in coastal habitat as a result of the marina is further discussed in response to policies 2.8.2 and 2.8.3.</p> <p>Indirectly dredging activities may result in:</p> <ul style="list-style-type: none"> <li>• increased suspended sediment;</li> <li>• release of nutrients from the disturbed sediment;</li> <li>• spills of hydrocarbons and other contaminants;</li> <li>• disturbance of ASS;</li> <li>• increased human activity in relation to noise and light levels temporarily;</li> <li>• altered hydrodynamics and ultimately sediment deposition and erosion; and</li> <li>• megafauna strikes and kill.</li> </ul> <p>The indirect impacts from construction and operational dredging has been assessed in reports by CLT and FRC on coastal processes, stormwater and aquatic ecology (refer for more detail to responses to policies 2.2.2, 2.2.4, 2.4.4 and 2.8.3) with management plans prepared to minimise and/or avoid detrimental impacts to water quality and coastal processes, resources and their values including, but not limited to:</p> <ul style="list-style-type: none"> <li>• design of the marina to ensure minimal disruption to longshore drift and changes to sediment deposition and erosion;</li> <li>• water quality monitoring program before, during and after construction and long term operational water quality monitoring;</li> <li>• ecological community monitoring;</li> </ul>



Requirement	Response
	<ul style="list-style-type: none"> <li>• design of fuel and waste reception facilities (including operation) in accordance with Australian standards.</li> </ul> <p>Management plans prepared to address the impact on coastal habitat from dredging include:</p> <ul style="list-style-type: none"> <li>• Construction Environmental Management Plan;</li> <li>• Marina Site Based Management Plan including Water Quality and Ecological Monitoring Program;</li> <li>• Acid Sulfate Soil Management Plan;</li> <li>• Waste Management Plan; and</li> <li>• Megafauna Management Plan.</li> </ul> <p>Management plans nominated above are attached as appendices to this EIS.</p>
<p>Rehandling of dredge material involving the treatment of material such as silts, muds and clays to stabilise contaminants and remove water for eventual placement at land-based sites.</p>	<p>Dredge spoil shall be placed on reclaimed land within the development footprint, in addition to sand sourced from approved quarries within the region to provide for engineered fill. Run-off from dredge spoil disposal treatment basins shall be directed into a closed marina during dredging which will negate the impact of dredge spoil disposal and reclamation processes on existing sensitive areas surrounding the site. The marina shall only be opened when sediments have settled and water quality parameters within the basin comply with the long term median WQOs (refer to response to policy 2.4.1 <i>Water quality</i>).</p> <p>Maintenance dredge spoil shall be located on reclaimed land within the open space precinct of the SHMR for dewatering and ultimate disposal off site. Refer to Section 3.4.2 of this EIS for specific details.</p>
<p>Contaminated dredge spoil can pollute dredge-management placement sites, groundwater and adjacent areas.</p>	<p>The proposed dredge spoil within the defined dredge area has been assessed for toxicant levels. The dredge spoil has no unacceptable contaminants. As such the toxicity of water runoff is expected to be within water quality guidelines.</p> <p>Material that may be released to receiving waters from dredge spoil disposal areas and tailwater treatment ponds is not foreign to the receiving environment and generally will have minimal impact on coastal wetland functions with the marina closed to prevent dredge plumes external to the marina footprint.</p>
<p>Dredging activities will avoid adverse impacts on coastal resources in areas of state significance.</p>	<p>With proposed water quality objectives and monitoring regime as discussed in response to policy 2.4.1 and 2.4.4, adverse impacts will be identified early and corrective action proposed in accordance with the CEMP and Marina SBMP.</p> <p>It is expected that potential dredging impacts, specifically increased TSS, will be minimal due to the proper handling of the dredge spoil and the mitigation measures proposed by the management plans.</p>
<p>Appropriate handling and treatment procedures for dredge-material in which ASS are present must be established.</p>	<p>No actual ASS has been identified through borehole testing. As a conservative approach all material has been assumed as potential ASS and the ASSMP has been prepared to ensure appropriate handling and treatment of dredge material that is found to be potential ASS, presented as Appendix I3 to the EIS.</p>

### Policy 2.1.9 Reclamation

This policy identifies that reclamation can result in the degradation and loss of coastal resources including foreshores, wetlands and wader bird habitats as well as adversely affecting coastal processes and scenic landscape values. Under this policy land below highest astronomical tide can only be reclaimed in certain circumstances, in particular where the development or operation is of net benefit for the State and no other practicable alternatives are available.

## Response

Land is proposed to be reclaimed as part of the SHMR development for the purposes of constructing an integrated marina, residential and commercial development with public open space. It is understood that reclamation is not a preferred means of dredge spoil placement but which is considered acceptable if the development is of net benefit for the State and no other practicable alternatives are available.

The Shute Harbour topography and environmental and landscape values create significant physical constraints to the expansion of the urban footprint above the high water mark and therefore reclamation of land is essential to the development. As discussed in response to policies 2.1.2 *Settlement Pattern and Design* and 2.1.5 *Maritime Infrastructure* a net benefit for the State has been demonstrated and which therefore is consistent with this policy's outcomes.

Section 2 provides a description of the investigations into the alternative site available for marina developments to address the growing demand for berths by the public. The suitability of the SHMR site is supported as it aligns with State and regional planning, in particular the site:

- is accessible by road and water (and fitted with essential services), and is located adjacent to mainland which is close to the Great Barrier Reef tourist attractions;
- is sheltered from severe cyclonic activity;
- is devoid of declared FHAs;
- is devoid of Dugong Protection Areas;
- is devoid of State significant cultural heritage sites;
- is clustered with State significant (social and economic) areas (i.e. SHTF); and
- does not support regionally significant coastal wetlands, including seagrass.

In support, land that is part of Lot 2, northwards of Proserpine-Shute Harbour Road (and abutting the Conway NP) is to be returned to public ownership.

The site is however part of the GBR Coast Marine Park mapped as Habitat Protection Zone under the GBRMP Zoning Plan.

The GBRMP habitat protection zone has the same conditions as the general use zone with the exclusion of trawling and permitting for shipping. The habitat protection zone is consistent with the General Use 'B' zone in effect at the time of the WDMA, and as such was considered as an appropriate zone for a marina facility (and subsequently included in the Strategic Plan under the Shire Plan).

Furthermore the Queensland government actively encourages the growth of marine industry, and with the unparalleled conditions provided by the 74 Whitsunday Islands and waters of the Great Barrier Reef, it is inevitable that the Whitsundays will continue to attract increasing numbers of visiting and resident boats. It is the intent of the SHMR development proposal to meet this demand and encourage strong economic growth in the region.

In conclusion a marina at this location is the most suitable of investigated (alternative) sites in the WDMA report for reasons including:

- proximity to services and onshore infrastructure;
- proximity to high value natural areas;
- natural protection from cyclonic conditions;
- impact on terrestrial and aquatic ecosystems (compared to alternative sites); and

- compatibility with the WRC Strategic Plan.

Other identified locations in this study were deemed impracticable for marina development for the following reasons:

- difficult access;
- high impact on terrestrial and aquatic ecosystems;
- low protection from cyclones;
- low suitability for foundations; and
- impact on foreshore amenity.

### **Policy 2.1.10 Tourism and Recreational Activities**

This policy requires that the diversity and quality of recreational and tourism opportunities are maintained while ensuring that the coastal resources and their values, upon which experiences rely, are protected. It is expected that new tourist or recreational developments are compatible with the coastal landscape values of the area and be of a scale that does not result in a significant impact on coastal resources and their values.

#### Response

The SHMR will not adversely affect existing tourism and recreational activities in the Whitsundays, but will rather add to the suite of attractive destinations for residents and tourists alike to enjoy the GBRWHA by:

- opportunity for commercial tour companies encouraging activities centring around coastal waters such as swimming, snorkelling, diving, boating and fishing;
- providing additional fishing stations;
- providing public access to coastal waters where there was previously inaccessible rocky foreshore; and
- waterfront tourism and residential development with coastal views.

Regionally tourism in the Mackay-Whitsunday region is significant in terms of local employment and to the region's and State's economy. The SHMR development will encourage more diverse tourism and recreational activities within the locality. Tourism provides the highest economic injection in the Whitsunday tourist region generating over \$550 million annually and directly employing over 34% of the Shire's total employment (WRC, 2006).

The SHMR in addition to adding to the diversity and quality of tourism and recreational activities aims to manage adverse impacts on significant natural resources, erosion prone areas, scenic coastal landscapes, public access and water quality.

Of particular relevance are the following key points.

- Impacts on significant natural resources are minimised with the SHMR design, construction and operation considering *Areas of State significance (natural resources)* as a high priority.
- No cultural heritage items and areas have been identified in accordance with policy 2.6.1 *Areas of State significance (cultural heritage)*.
- the erosion prone area shall be fully developed however the change to hydrodynamics and geomorphology will not result in an significant adverse change to coastal processes.

- Loss of coastal habitats and associated biodiversity is expected when assessed in accordance with policy 2.8.3 *Biodiversity* however the artificial structures of the marina have been investigated as compensatory habitat with a high possibility marine facilities will in the long term support a slightly alike assemblage of organisms to that of a natural environment.
- The marina and associated buildings have been designed to minimise impact on scenic coastal landscapes as discussed in response to policy 2.7.1 *Areas of State significance (scenic coastal landscapes)* with buildings orientated and shaded to avoid reflection and boat masts expected to be natural in a coastal setting (particularly when the site has long been acting as a safe haven for recreational boaters);
- The “Reef Conservation Fund” will assist in minimising the environmental impact of tourism activity within the GBR Coast Marine Park.
- Compensatory habitat on the western wall of the isthmus will ensure the quantity of vegetation on the site is maintained.
- An environmental net benefit will be established by the site through replacement of 57 swing moorings with seagrass sensitive moorings in high visitability areas, allowing approximately 950m<sup>2</sup> of degraded sea grass to re-establish as an important functioning system.
- Short and long term management of marina water quality through environmental controls during construction and operation and a comprehensive water quality monitoring program and treatment train for urban runoff (refer for more detail to response to policy 2.4.4 *Stormwater Management*).

It is considered these key actions constitute a net gain in coastal resources and values.

The proposal to establish a marina at Shute Harbour will not conflict with existing uses and activities given its clustering with existing maritime infrastructure, including the SHTF and public boat ramp.

The scale of the development will not lead to demand for community services comprising of short-stay accommodation, with permanent residential accommodation only provided for the purposes of ensuring economic viability for the long term management of the tourism and recreational facility.

### **Policy 2.2.1 Adaptation to Climate Change**

Scientific research indicates that the greenhouse effect will have an impact on global mean sea level, higher average air and sea temperatures and possibly increased climatic variability. Changes will have physical, social and economic impacts on the coastal zone and human settlements.

This policy seeks to address the potential impacts of climate change through the following hierarchy of approaches.

- Location of new development in areas not vulnerable to the impacts of climate change.
- Planned retreat of land, ecosystems and structures in vulnerable areas.
- Accommodation of changes with adjustments such as altered building design of near-coastal areas.
- Defence of vulnerable areas, population centres, economic activities and coastal resources.

## Response

The SHMR is a proposed multi-use marina, commercial, tourism, and residential precinct. The majority of the development is dependant on its location in close proximity to the coast.

Predictions of global sea level rise due to the greenhouse effect vary considerably. It is impossible to state conclusively by how much the sea may rise and policy direction is limited to that published by CSIRO. In relation to climate change the significant impact at the SHMR site will be in relation to the intensity and frequency of cyclonic events and the potential increases in the storm tide level and wave conditions.

Based on a number of global greenhouse models, a guide to future ocean level rises is presented in the CLT coastal processes investigation report in Appendix O of the EIS. Other recent investigations undertaken by CSIRO advise a mean sea level rise of 0.2m over the 50-years period from 1998 for the Queensland coastline. Investigation of the Australia State of the Environment Report 2001 web-site advises a mean sea level rise of 0.09m to 0.88m by 2100. Thus there is considerable uncertainty in this parameter estimate.

It is also acknowledged that the enhanced greenhouse effect is changing the world's climate and that these changes would also have significant impacts on the nature and extent of coastal hazards, particularly in relation to storm tide inundation. These impacts have been considered when developing hazard mitigation strategies for the proposed development and are discussed in more detail in the response to policy 2.2.4 *Coastal Hazards* of the State Coastal Plan.

An increase in storm tide level of 0.3m has been adopted in the design levels of the SHMR to allow for potential climate change effects over a 50-year planning period and is considered conservative and representative of engineering design guidelines under Queensland legislation (i.e. Prescribed Tidal Works Code).

## **Policy 2.2.2 Erosion Prone Areas**

This Policy recognises the importance of land directly adjoining the coast as a valuable feature warranting protection from development to protect life and property. To the extent practicable, erosion prone areas are to remain undeveloped apart from acceptable temporary or relocatable structures for safety and recreational purposes.

## Response

Coastal process modelling has been undertaken by CLT and presented in Appendix O which has, through changes to development design, predicted minimal change to coastal processes, and certainly no significant adverse impact as detailed in the Ecoaccess Operational Policy entitled *State and Regional Coastal Management Plans – Interpretation of the policy terms “no” or “no significant” adverse impact*. A summary of the no significant adverse impact on coastal processes is provided in Section 4.5.2.1.

Where proposed development within the erosion prone area is threatened by erosion, the following matters have be considered in determining the most appropriate defensive action to protect land uses and infrastructure.

- a. The value (economic, social and environmental) of the existing development.
- b. The practicality and cost of any defensive action.
- c. The potential adverse impacts to coastal resources and values associated with any defensive action.

It is an objective of this development that works are consistent with the CPM Act. Erosion protection involves hard engineering at this site which is understood to be supported where:

- a. there is an immediate or critical threat of loss or damage to existing development from erosion impacts;
- b. no viable alternatives such as revegetation or bank reconstruction have been demonstrated to provide a similar or adequate level of protection from erosion; and
- c. potential adverse impacts on coastal processes and scenic amenity are minimised through remedial actions.

No significant adverse impacts result using hard engineering for the SHMR on coastal processes, in particular sediment transport and erosion/accretion. For the protection of the future residents and in align with State and regional planning policies, the use of soft engineering is not suitable.

The development has been shown to increase public access to the coast (refer to response to policy 2.3.1 *Future need for access*) and have no adverse impact on natural coastal processes as discussed in Section 4.5.2.1 of this EIS and not increase the threat of coastal hazards (refer to response to policy 2.2.4 *Coastal Hazards*).

#### **Policy 2.2.4 Coastal Hazards**

Coastal hazards include events such as storm tides, cyclone effects and related inundation. These events can place human life and property on the coast at risk over and above the risks associated with overland flooding events from high rainfall in the catchment.

When determining new areas for urban land uses on the coast, an evaluation is to be carried out to identify the level of potential risk to life and property from coastal hazards. Development in areas on the coast identified as having a risk of being affected by coastal hazards needs to be carefully considered and wherever possible, be retained undeveloped. Where areas vulnerable to storm tide inundation have been developed, further development in these areas needs to address:

- its vulnerability to sea level rise and storm tide inundation; and
- the proposed access to and protection of evacuation routes.

#### **Response**

The EPA's guideline *Mitigating the Adverse Impacts of Storm Tide Inundation* published in 2006 provides advice and information on interpreting and implementing the coastal hazards policy of the State Coastal Management Plan.

The proposed development has been assessed against the criteria specified in the EPA guideline and it has been determined that the proposed development complies with the intent of the coastal hazard policy of the State Coastal Plan.

The proposed development is located within a natural hazard management area (storm tide). However, the CLT coastal processes assessment has shown that the proposed development does not adversely impact on the storm tide implications for the surrounding area. The CLT coastal processes assessment is included as Appendix O.

The proposed development will increase the number of people living or working within the natural hazard management area. However the development has been tailored to the nature of the storm tide hazard on the site through the design of the marina and the development levels for fill and habitable floor levels as shown in Drawing 7900/48/01-105, which range from RL 3.5m to 4.5m. The proposed development has been designed to satisfy the specific outcomes for development within a natural hazard management area (storm tide) including the following.

1. The development maintains the safety of people on the site from storm tide inundation up to and including the Defined Storm Tide Event.
2. The development does not increase the severity of the storm tide hazard on adjacent properties.
3. The development minimises the potential damage from storm tide inundation to property on the development site. In particular, building work within existing undeveloped areas of high storm tide hazard area is not considered to be compatible with the nature of the hazard.
4. Essential services infrastructure (e.g. on-site electricity, gas, water supply, sewerage and telecommunications) maintains its function during a Defined Storm Tide Event.
5. Physical coastal processes are protected from development impacts and are generally allowed to occur naturally.

The proposed marina development site has been determined by the State Government to be strategically located for use as a vessel safe haven in cyclone conditions as well as gateway for vessel passage to the surrounding group of Whitsunday Islands. The project will increase public access to the waterfront at Shute Harbour and will provide 669 vessel berths, 117 lots of high quality MRA, a 4½ tourist Resort with 109 suites and a base for charter boat activities.

A cyclone evacuation plan, presented as Appendix U4, has been prepared in the event of storm tide.

There is a demonstrated need for additional marina facilities along this section of coast as indicated in response to section 2.1.2 *Settlement Pattern and Design* and 2.1.5 *Maritime Infrastructure*. The proposed development is also dependent on proximity to the coast and there are no other suitable or reasonably available sites for the proposal.

The proposed development is therefore considered to comply with the intent of policy 2.2.4 of the State Coastal Plan.

### **Policy 2.3.1 Future Need for Access**

This Policy was prepared to protect public access to the foreshore or of public useability of coastal waters given the public demand for access.

#### Response

The SHMR involves the development of new coastal-dependent land uses which includes a public marina and access for the public to the erosion prone areas and coastal zone, previously denied to the public, that is contained within the SHMR site.

Mechanisms which will enhance public access to the coast include:

- public fishing jetties;
- public boardwalks and paths (pedestrian and bicycle access);

- public picnic and toilet facilities;
- public marina promenade;
- hotel accommodation;
- refuelling and sewage pump out facilities; and
- provision of public transport from regional centres of Airlie Beach and Cannonvale.

The SHMR development also plans for the establishment a charter base within the marina for which to access the GBRWHA, particularly during whale seasons, offering sight seeing activities and diving adventures.

### Policy 2.4.1 Water Quality Management

This Policy identifies that the management of water quality is vital for the protection of public health and wellbeing in addition to the protection and maintenance of coastal resources.

The objective of this policy is to:

- identify and establish EVs and WQOs for coastal waters;
- manage water quality in coastal waters according to those values and objectives;
- manage the release of contaminants to coastal waters; and
- manage changes to runoff quantity and quality from coastal catchments from human use and management practices to meet WQOs.

The State Coastal Plan and draft Regional Coastal Plan as they relate to development and use of the coastal zone refer to the EPP (Water) (Schedule 1), in which environmental values and WQOs have been determined for coastal waters.

### Response

In response to this policy the following draft Ecoaccess Operational Policies (EPA, 2007) have been referred to.

- *Statutory assessment of ERAs discharging to aquatic environments.*
- *Waste water release to scheduled high ecological value surface water.*

The quality of the existing waters can be compared in the context of WQOs. Based on the EVs for Shute Bay, it has been agreed with both the EPA and GBRMPA that long term WQOs are derived from 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality' (ANZECC, 2000) in recognition of the high value of the receiving environment. Long term median WQOs are shown below in Table 31.

**Table 31 Long-Term Median Water Quality Objectives**

Water Quality Parameter	Water Quality Objective
pH	8.0 to 8.4
Dissolved Oxygen	90-100%
Turbidity	< 6 NTU
Total Phosphorus	< 0.02 mg/L
Total Nitrogen	< 0.2 mg/L
Suspended Solids	< 15 mg/L



Water Quality Parameter	Water Quality Objective
Chlorophyll 'a'	< 0.002 mg/L
Ammonia	< 0.008 mg/L
Oxidised Nitrogen	< 0.003 mg/L
Reactive Phosphorus	< 0.006 mg/L
Diuron	< 0.001 mg/L
Secchi Disk Depth	> 1.5 m
Faecal Coliforms	< 150 orgs/100mL for Primary Contact
Total Aluminium	< 0.2 mg/L
Total Iron	< 0.02mg/L
Total Organic Carbon	-*
Dissolved Organic Carbon	-*
Dissolved Inorganic Nitrogen	-*
Dissolved Aluminium	-*
Dissolved Iron	-*

\*To be specified following complete background water quality monitoring.

Background water quality monitoring indicated that levels of some parameters are outside the requirement dictated by the WQOs. Following the completion of background monitoring, appropriate WQOs for the marina will be formulated based on existing water quality.

Management plans for the construction and operation of the marina will be amended to ensure best practice environmental management and afford protection to environmentally sensitive areas.

Water quality in the Great Barrier Reef is a priority concern with significant increases in sediment and nutrient loads and pesticides in runoff from adjacent land uses recorded recently (GBRMPA, 2007).

Potential impacts to the existing (and undisturbed) environment a result of the proposed development include both direct and indirect impacts during both the construction (and establishment) and operational phases of the proposal. As such management measures will be required to address potential direct and indirect impacts during these phases.

Potential sources of water contamination during construction that will require mitigation are:

- site establishment;
- bulk earthworks (including reclamation);
- dredging;
- disturbance of acid sulfate soils;
- erosion and sedimentation from disturbed areas;
- material stockpiling;
- removal of marine plants;
- hydrocarbon and chemical leaks including small scale spill from vehicles;
- hydrocarbons and chemical spills from storage areas;

- discharges from temporary sewerage and site facilities;
- storage and disposal of waste material; and
- construction of master planned service and development buildings.

The primary construction related impact is likely to be soil erosion and sedimentation caused by:

- changes to topography (and bulk earthworks);
- rainfall;
- overland flow;
- wind action/wave action;
- removal of fringing marine vegetation; and
- dredging.

Erosion and sedimentation is a particularly high risk where there are unprotected earthworks and exposed areas of soil and subsurface material and a concentration of freshwater flows in a sensitive coastal environment. Sediment transportation can adversely affect coastal waters by:

- increasing turbidity (and consequently decreasing euphotic depth);
- reducing water quality due to increased pollutant loads (including nutrients, sediment and attached pollutants) causing changes in water quality composition, thereby impacting upon flora and fauna; and
- reducing the aesthetics and amenity of an area.

Potential impact sources have been identified during marina operations that are likely to affect water quality including:

- use of Proserpine-Shute Harbour Road;
- use of the internal road system and car park;
- application of fertilisers and pesticides for landscape maintenance;
- residential living including car parking and garden maintenance; and
- marina operations (including fuel and/or oil spills); and
- commercial operations.

When upgraded, Proserpine-Shute Harbour Road will carry a higher volume of traffic than the current case however, with the forecasted population growth and increase in recreational activity, this would have been inevitable. An increase in fuel/chemical spills may result with this increase in road traffic.

The internal road system and car park may generate runoff containing elevated levels of sediment, heavy metals, petroleum hydrocarbons, polynuclear aromatic hydrocarbons (PAH) and nutrients. Motor vehicles are the predominant source of road runoff pollutants. Release of contaminants from motor vehicles result from breakdown, spillage and normal operational emission of automotive components such as tyres, clutch and brake linings, hydraulic fluids, automotive fuels or lubricants, particulates from exhaust emissions and materials (eg soils, mud and litter) tracked, carried, washed, blown or thrown from the under body or payload of vehicles. Windblown soils and vegetative matter from roadside plantings and vegetation are also potential road runoff contaminants.

Operational aspects of the resort that may influence stormwater quality includes landscape maintenance, and in particular, the application of fertilisers and pesticides.

The MRA precinct has the potential to impact upon water quality by undertaking household tasks such as car washing and fertilising gardens. These tasks can be avoided and recommendations can be made to households for alternatives.

Contaminants from marina and commercial precinct operations of the SHMR are discussed in further detail in the response to policy 2.4.3 *Waste Disposal Facilities*. Specifically, the risk of oil spills from shipping at the site has been mapped as low (GBRMPA, 2007). Oil spills may result from inappropriate storage and handling of oil/fuel stores and boat accidents. An oil response plan in the event of an oil spill has been drafted and is presented in the CEMP and Marina SBMP attached as Appendix U1 and U3 respectively. A WMP is presented as Appendix U2.

The potential adverse impacts on the natural environment caused by the development principally include:

- degradation of the quality of stormwater runoff discharging to Shute Bay and the GBRWHA and ultimately the GBRMP;
- contamination of underlying soils and possibly groundwater;
- loss of vegetation and fauna existing within and surrounding water environments, including freshwater, estuarine and marine waters, where particular species of concern include seagrass, coral, turtles and dugong; and
- increased sedimentation and flooding.

Integrated water management principles will be applied to the site to address the potential increase in runoff associated with development of the site. Increases in peak discharge, variation in the time to peak of runoff, and increase in sediment load in runoff have been addressed. A 'water quality treatment train' approach has also been adopted to reduce the level of potential contaminants in water runoff entering coastal waters to protect areas of state significance (natural resources) and biological diversity (refer to response to policy 2.4.4 *Stormwater Management* for further details) in addition to a comprehensive water quality monitoring program.

### **Policy 2.4.3 Waste Disposal Facilities**

This policy identifies that waste discharges to the coast can have adverse impacts on coastal resources and their values, in particular contamination of surface waters, habitats and coastal amenity where there is poor handling and management of waste generated from boating and slipway activities.

#### Response

The SHMR involves a marina that comprises urban development having the potential to directly or indirectly release contaminants to waters and marina development having the potential for discharge of contaminants to waters (including ballast waters, sewage and oils) from boats.

The EPP (Waste) establishes a waste management hierarchy which lists the preferred order of waste management practices to achieve best environmental outcomes. A WMP, presented as Appendix U3 has been prepared to deliver a strategy which is in accordance with the EPP (Waste).

The SHMR is committed to protecting the coastal waters in which it is located from waste releases by (but not limited to):

- developing contracts for marina berths, storage and mooring agreement containing conditions relating to nil release policy from vessels into waters of the marina;
- boat operation education;
- providing appropriate waste reception facilities;
- providing pump out facilities for the reception of sewage;
- bunding refuelling bays;
- providing land-based toilet and shower facilities to encourage patrons not to use on-board facilities;
- operating waste facilities at Shute Harbour Marina in accordance with best practice guidelines for *Waste Reception Facilities at Ports, Marina and Boat Harbours in Australia and New Zealand*;
- not allowing hull and propeller cleaning in marina waters to prevent the possible release of contaminants or introduced marina pests;
- not allowing boat maintenance;
- installing gross pollutant traps, bunds and other controls to prevent litter from on shore areas from reaching coastal waters.
- encouraging the use of oil absorbing materials in bilge areas of vessels with inboard engines;
- providing facilities for the collection and storage of waste oil;
- storing booms, spill kits and containment systems on site for emergency use to contain spills; and
- dry vacuuming of paved areas within the marina rather than hosing is to be implemented.

The purpose of the Marina SBMP is to demonstrate the environmental commitment by the Proponent to carry out their activities in accordance with a structured program that:

- sets the environmental objectives or standards to be achieved over time;
- identifies the potential environmental harm and extraordinary factors that may cause environmental harm resulting from routine operations and establishes and documents measures to avoid and/or manage this harm as far as practicable;
- ensure all persons carrying out the activity are aware of environmental risks, and are trained in the measures and contingency plans to deal with them;
- implements monitoring of environmental performance to ensure the effectiveness of the measures and contingency plans;
- assists the communication of environmental information throughout the organisation and to the administering authorities; and
- provides for continual improvement.

In addition the disposal of waste anywhere in the world into the sea is prohibited under the *International Convention for the Prevention of Pollution from Ships* (known as MARPOL 73/78). MARPOL 73/78 also prohibits the disposal of all other types of garbage within 12 nautical miles of the outer reef. The law provides for fines of up to \$1.2 million for companies and \$220 000 for individuals illegally discharging garbage at sea.

#### **Policy 2.4.4 Stormwater Management**

Under this policy stormwater runoff (quality and quantity) must be managed in accordance with best practice, to ensure the environmental values of estuaries and other coastal waters are protected. In particular, ecosystems which have experienced minimal impacts and are particularly vulnerable to the effects arising from stormwater runoff are a priority.

##### Response

The development site will be serviced by a stormwater treatment train to ensure urban pollutants generated by the development are captured and treated prior to discharge to the east and west of the site. A stormwater treatment train shall be in effect during both the construction and operational stages of the development as discussed below.

Potential impacts on water quality from stormwater runoff will be managed principally by a stormwater strategy as recommend in the SWMS prepared by CLT, attached as Appendix N, in which controls have been developed for both the construction and operational development phases, including:

- stormwater management plan involving SQIDs;
- sediment and erosion controls;
- water sensitive urban design; and
- a water quality monitoring program.

All SQIDs have been located within the lease area of the site and aim to:

- maintain natural drainage patterns;
- avoid collecting and concentrating stormwater flow into single point discharges;
- reduce the velocity of stormwater to minimise erosion at discharge points; and
- meet relevant water quality guidelines prior to discharge.

The quality of the water draining from existing catchments will be treated with the proposed development incorporating a grassed swale along its boundary which has the effect of reducing the velocity of runoff allowing sediment settlement. All significant external catchment run-off currently entering the site will be diverted to the west via this grassed swale. The construction of a swale has the dual effect of flushing deposited sediment at the western wall of the development to encourage longshore transport of sediment and minimising the impact of the coastal development on coastal processes (including erosion and deposition rates). It is noted that immediately up coast of the development there is no ecosystem relying predominantly on sediment for continued survival. In fact a reduction in sediment transport along the coast in Shute Bay will encourage seagrass distribution where currents, wind and wave action cause a highly turbid environment and thus fragmented and sparse seagrass and macroalgae communities distribution (and diversity).

Erosion control and stormwater runoff management systems have been designed to effectively control erosion, maintain the quality of stormwater runoff and discharge the water without eroding of the bed or banks of the receiving waters during at least a 1 in 5 year rainfall event as shown in Drawings 7900/48/01-405 to 7900/48/01-409.

Water quality control of urban runoff water will be mitigated on site during marina operations to achieve WQOs by the following devices.

- Flush kerbs.
- Gross pollutant traps.

- Oil and grease separators.
- Rainwater tanks.
- Bio-Retention basins.
- Vegetated swales with underlying bio-retention system.
- On-site landscaping.

These controls shall have the effect of:

- trapping rubbish;
- removing nutrients and metals;
- trapping coarse sediment and attached metals; and
- trapping oils and grease.

The design of stormwater controls and the water quality monitoring program has been in accordance with relevant industry codes of practice and best practice guidelines to manage nutrient runoff, stormwater quality and erosion control.

The components of the SWMS are embedded as part of the following integrated management plans to be implemented during construction and operational works.

- ASSMP, existing as Appendix I3 of the EIS.
- CEMP, existing as Appendix U2 of the EIS.
- Marina SBMP, existing as Appendix U3 of the EIS.

The CEMP, ASSMP and Marina SBMP specify a water quality monitoring program (with the Marina SBMP also suggesting a maintenance program for installed SQIDs as recommended in the SWMS). The water quality monitoring program involves monitoring of specific water quality parameters (at relevant frequencies) within Shute Bay surrounding the SHMR site. The objective of the monitoring program is to determine whether long term median WQOs are achieved and later, to determine compliance with development approvals.

Not all parameters which were monitored as part of the background sampling program have been included for construction and optional phases given the nature and scale of the proposal. In the event of an incident the background data can be utilised as the relevant point of reference. Sediment analysis is also proposed as part of the operation of the marina for Diuron and Heavy Metals following consultation with GBRMPA.

Flushed water quality exiting the development will be within current ambient range or 95% *ANZECC 2000 Species Protection Guidelines* as discharge waters of proposed development will meet industry standard load reductions of 80% total suspended solids, 60% total phosphorus, 45% total nitrogen and comply with the set WQOs (as justified in the response to policy 2.4.1 *Water Quality*). Compliance with the legislative framework relating to water quality has been detailed in the SWMS presented in Appendix N of the EIS.

A sediment sampling program is also proposed with limits to be determined by development approval conditioning.

In association with the recommended ecological monitoring program by FRC in the aquatic ecology study presented as Appendix P1, the Proponent will be able to determine impacts (detrimental or beneficial) of the development and implement corrective action where necessary to enhance the EVs of Shute Bay.

The water quality monitoring program includes reporting and contingency plans in the event of non-compliant monitoring results to promote continual improvement in the management of water resources within the marina leased land. The proposed integrated water quality monitoring program is consistent with the management framework for integrated monitoring strategies under ANZECC 2000 Water Quality Guidelines.

The provision for stormwater management controls within the design, construction and operation of the proposed development is consistent with the strategies under the Reef Water Quality Protection Plan (Aust. Government, 2003) including:

- self management approaches; and
- education and extension.

The SHMR proposes to contribute to the objectives of the Reef Water Quality Protection Plan by:

- researching the existing environment and potential development impacts;
- incorporating sustainable design principles;
- monitoring and evaluating potential development impacts; and
- funding conservation and rehabilitation.

It is considered these key actions constitute a net gain in coastal resources and values.

#### **Policy 2.4.5 Groundwater Quality**

This Policy identifies that the loss of groundwater quality can have impacts on the quality of coastal waters and on coastal ecosystems such as wetlands.

Under this Policy groundwater quality and recharge processes are to be maintained and land uses and activities are not to lower the watertable to expose ASS or permit unsustainable ingress of saline water to freshwater aquifers.

#### **Response**

Any presence of groundwater within the land based sections of the SHMR site is likely to be minimal due to the geology, small catchment areas, and proximity to intertidal areas. The impact on groundwater resources as a result of the development proposal is expected to be minimal as the development does not involve groundwater use. As such any impact will be restricted to issues related to receiving areas of the groundwater. The construction and operation of the SHMR focuses on protecting receiving areas of groundwater by best practice environmental management as indicated throughout this EIS.

Changes to the local hydrogeological regime attributed to the development of the land-based components are unlikely to be significant and are expected to be within the range of variation that may be experienced naturally due to the variations in groundwater forcing (climatic) conditions.

The proposed development therefore is viewed as consistent with this policy's principles and outcomes.

#### **Policy 2.4.6 Acid Sulfate Soils**

This policy identifies that ASS occur naturally and are most common in low-lying, flood-prone coastal areas and that issues arise for coastal management when these soils are disturbed. Exposure to the atmosphere through excavation or lowering of the watertable can result in acid leachate, which can have adverse impacts on the quality and values of coastal waters and ecosystems.

Regional direction under this Policy is to refer to the SPP 2/02.

### Response

ASS mapping has not been undertaken by the DNRW for the Shute Harbour area with WSC Planning Scheme overlay not identifying ASS within the development footprint, including access channel.

Ullman & Nolan completed a detailed ASS investigation for the site in 2005, presented as part of the contamination investigation in Appendix I2 of the EIS, which included both onshore and offshore areas, the intertidal zone and the proposed access channel. A summary of the ASS investigation is provided in the geotechnical summary (Appendix I1 of the EIS).

The sampling methodology, analysis results and investigation findings described in the contamination investigation are in accordance with recommended guidelines.

The marine sediments were shown to have a potential for acid generation. However marine muds in the SHMR site were assessed as having an acid neutralising capacity deemed to be sufficient to eliminate net acid production. This natural buffering capacity derives from particles of calcium carbonate (coral and shell) in the marine sediments.

An ASSMP has been prepared to define the management of ASS during construction works where there is potential to disturb ASS. The ASSMP is attached as Appendix I3 of the EIS. The focus of the ASSMP has therefore been identification of ASS with mitigation measures proposed in the event of identification.

Mitigation measures to minimise potential impacts from land disturbance of acid sulfate soils contained within the ASSMP include:

- development of an acid sulfate soil management plan including identification of areas which require specific management strategies;
- storage of agricultural lime ( $\text{CaCO}_3$ ) within the project area;
- erosion and sediment controls;
- minimisation of disturbance of the natural surface and subsurface drainage regimes, such as retaining/maintaining existing flow pathways and directions for both surface water and groundwater resources and minimising changes to water table levels and tidal influences;
- design of embankments, bunds and other construction activities to incorporate measures to minimise/prevent subsidence, uncontrolled settlement of unconsolidated alluvial material, settlement creep, surface or subsurface heaving or deformation;
- staging of construction activities;
- design and construction of lined and banded ASS material treatment pads in close proximity to the area of proposed ASS disturbance (but ensure that these areas are located within stable landform areas and a minimum of 50 m from receiving waters) when identified; and
- design of runoff control measures specifically for areas of proposed ASS disturbance, stockpiling and treatment so that runoff and overland flow can be adequately captured, contained, treated and monitored prior to release and is completely separate from other drainage control/management systems.



### **Policy 2.5.2 Involvement of Indigenous Traditional Owners in managing their Cultural Resources**

This policy provides state direction in relation to involvement of Indigenous Traditional Owners in managing their cultural resources. Indigenous Traditional Owner Involvement should be encouraged where there is assessment of application to develop or use the land.

#### Response

The project area lies within the traditional homelands of the Gia and Ngaro peoples. The precise location of traditional territorial boundaries between these two distinct indigenous groups is the subject of extended anthropological and Native Title research, well beyond the scope of the current study. For the purposes of the SHMR project, representatives from both groups have been included in the cultural heritage assessment, as both have indicated strong interests in land development and land management issues in the wider Shute Harbour region. There is currently one Native Title claim relevant to the wider Bowen-Proserpine coastal area, claim QC99/24 lodged by the Gia people.

A cultural heritage survey, presented as Appendix S1 suggests no significant finds. In fact the proposed SHMR will assist Gia and Ngaro peoples through the opportunity to:

- participate in and share economic prosperity and cultural tourism opportunities;
- support the intrinsic benefits of governance and culture in community capacity building;
- maintain generational celebration and learning of cultural heritage traditions, language and expression;
- contribute to functional and resilient families and communities; and
- provide generational 'care for country', while showcasing Indigenous pride and knowledge to local, regional and international tourists.

The CHMP, now approved and registered by the DNRW and presented as Appendix S2, will contribute to positive long term outcomes for at least two Indigenous peoples – the Gia and Ngaro communities – at a local community level.

The extensive consultation process undertaken to format and agree to the CHMP is provided in an additional report by the Hornery Institute, attached as Appendix S3.

Section 4.10 'Cultural Heritage' of the EIS discusses this aspect in more detail.

The "Reef Conservation Fund" will also potentially fund an interpretive centre so as to involve indigenous traditional owners in the management of the natural environment of the SHMR and to provide education and awareness facilities of local indigenous cultures for visitors of the SHMR site.

### **Policy 2.6.2 Cultural Heritage**

This policy notes that cultural heritage is important as it provides a key understanding of the past and a sense of identity for all Queenslanders. In addition to its role in promoting social and community well-being, cultural heritage also provides significant economic benefits through tourism and recreation.

Under this Policy development and use of the coast is to be managed to conserve cultural heritage places and objects in accordance with relevant State and Commonwealth laws.

### Response

Northern Archaeology Consultancies (NAC) has undertaken a cultural heritage investigation on behalf of the Proponent for the SHMR. The assessment has been attached as Appendix S1.

No cultural heritage places and objects of significance have been identified at the proposed development site as listed in Schedule 1 of the draft Regional Coastal Plan. However cultural heritage management strategies have been identified in the event a significant (and reportable) find occurs during construction and/or operation of the development which are presented in both the CEMP and Marina SBMP respectively following the agreement with Traditional Owners in the form of a CHMP, presented as Appendix S2.

Policy 2.6.2 of the draft Regional Coastal Plan is therefore considered to be addressed.

It is considered the CHMP agreed to by the Traditional Owners and the Proponent constitutes a net gain in coastal resources and values.

### **Policy 2.7.1 Areas of State Significance (Scenic Coastal Landscapes)**

This policy identifies areas of outstanding and distinctive scenic quality and high priority areas for scenic landscape management within Queensland. Areas in the Mackay-Whitsunday region include: large wetland complexes associated with bays, estuaries and inlets; the undeveloped vegetated peninsulas; the coastal islands; and the coral cays and reefs. Under this policy the values of these areas are to be protected from incompatible development.

### Response

A study titled "A View of the Coast" (EDAW, 1996) for the (then) Queensland Department of Environment (Coastal Management Branch) provides an overview of the scenic resources of the Queensland coast. It identifies the Whitsunday islands (and peninsula) as having high priority due primarily to its significant landform, land cover and water form attributes.

The draft Regional Coastal Plan identifies Areas of State significance (scenic coastal landscapes) on Map 4. The development site is situated within Shute Bay and is surrounded by:

- undeveloped vegetated peninsulas (Conway NP);
- Whitsunday islands; and
- coral cays and reefs of the Great Barrier Reef Marine Park.

It is understood that development within these areas should be designed so that it does not detract from the scenic coastal landscape values and is consistent with the relevant measures specified in Schedule 2 of the draft Regional Coastal Plan.

A landscape character and visual amenity assessment has been undertaken for the proposal by Yurrah, attached as Appendix J, which identified scenic management issues for the area including maintenance of ridgelines, maintenance of natural character, siting of infrastructure, sensitive management of any new development, and maintenance of backdrop to settled areas on mainland.

The SHMR is situated in an area containing:

- pristine natural resources;

- verdant hilly coastlines forming the backdrop of the Great Barrier Reef World Heritage Area; and
- magnificent views of the ocean and tropical Whitsunday Islands.

Other features for this area include the following as identified in the EDAW study.

*Integrity of landscape* – mostly a highly intact landscape, however some tourism development dominates the natural setting.

*Rarity* – the landscape type is unique at both a regional and state wide level. In particular, the number and size of close to shore islands, the ruggedness of the landform and landscape and the strong relationship with the mainland peninsula.

*Distinctive features* – steep, vegetated mountain ranges, protected waterways framed by islands and the mainland, numerous small bays and near continuous vegetation coverage.

*Historical landscape elements* – coastal villages and fringes (numerous individual tourism developments).

The SHMR is a development designed to be sympathetic and blend with surrounding development and natural areas by:

- ensuring that the design, colour and form of structures blend with the natural environment
- locating high density residential on the western portion of the site;
- restricting building heights;
- shading dwellings to prevent reflection; and
- designing interceding streetscapes and planting amenity vegetation.

Figure 11 provides a visual representation of the SHMR development, consisting of still images from the 3D modelling by V2i.

Policy 2.7.1 of the draft Regional Coastal Plan is therefore considered to be complied with and satisfactorily addressed.

### **Policy 2.8.1 Areas of State significance (natural resources)**

This Policy states that “*land identified to be developed in the future for urban, maritime and rural land uses in regional plans, planning schemes and port land use plans is to be located outside of areas of state significance (natural resources). Existing urban, maritime and rural land uses within ‘areas of state significance (natural resources)’ will not expand in these areas unless it can be demonstrated that there will be no adverse impacts on coastal resources and their values.*”

#### Response

The site is located within the GBRWHA, an internationally recognised and important wetland under Commonwealth legislation. The GBRWHA is also therefore deemed a significant coastal wetland under Queensland legislation.

Areas of State significance (natural resources) surrounding the development include:

- the Habitat Protection Zone of the GBRMP, an Important Wetland in Australia;
- significant Coastal Dunes; and
- Conway NP.

These Areas of State significance (natural resources) have been illustrated in Figures 15-19.

The SHMR proposal will involve construction of residential and maritime infrastructure within the GBRWHA and thus a direct loss of coastal habitat as reported as part of the aquatic ecology investigation contained in Appendix P1 including:

- 14.59 hectares of sparse seagrass;
- 1.84 hectares of fringing mangrove forest;
- 34 hectares of macroalgae; and
- 10 small coral colonies.

The loss of coastal habitat from construction of the SHMR within an area of State significance (natural resources) is inconsistent with the principles and outcomes of this policy. It is understood in this event that the policy seeks to ensure where there will adverse impacts on coastal resources, the development is of net benefit for the State and there is no viable alternative location(s).

Adverse impacts on coastal resources (and their values) have been assessed in technical studies on:

- terrestrial ecology;
- aquatic ecology;
- marine megafauna; and
- landscape character and visual amenity;

In each technical assessment the impacts of the development have been identified with mitigation strategies proposed to minimise such impacts. Such measures have been summarised throughout the responses to coastal plan policies, in particular 2.8.2 *Coastal Wetlands*, 2.8.3 *Biological Diversity*, and 2.7.1 *Areas of State significance (scenic coastal landscapes)*.

Mitigating measures have been incorporated into the design, construction and operation of the SHMR. The following positive outcomes are expected.

- Creation of coastal habitat through artificial structures (refer to response to policy 2.8.3 *Biological Diversity*).
- Gain of seagrass (refer to response to policy 2.8.2 *Coastal Wetlands*).
- Improved water quality catchment run-off (of which biological diversity is directly correlated with) (refer to response to policy 2.4.1 *Water Quality*, 2.4.3 *Waste Disposal Facilities*, and 2.4.4).
- Creation of the "Reef Conservation Fund" and consequent benefits to the Great Barrier Reef.

It is considered the positive outcomes constitute a net gain in coastal resources and values.

As discussed in response to policy 2.1.2 *Settlement Pattern and Design*, a net benefit assessment has been undertaken by AEC, and presented in Appendix G, which attributes SHMR as having a net benefit for the State which is therefore deemed to address the requirements of this policy where development is occurring in an *Area of State significance (natural resources)*.

In addition to complying with the net benefit for the State requirement of this policy, a review (refer to Section 2.2 of the EIS) on the extent of suitable sites for marina development in the Mackay Whitsunday region has also been undertaken using source material from the WMDA and discussed further in response to 2.1.9 *Reclamation*.

### **Policy 2.8.2 Coastal Wetlands**

This policy under the State Coastal Plan states that:

*“Direct and cumulative impacts from increased urban development and industrial, recreational and tourism activities have resulted in the loss, modification, fragmentation and/or degradation of coastal wetlands and values.”*

Development activities for future infrastructure must demonstrate minimisation and mitigation of impacts on coastal wetlands and values by identifying measures or strategies to mitigate potential adverse impacts, such as mangrove planting on the breakwater, offsetting loss of wetlands to ensure a net gain of coastal resources and values, and the rehabilitation of other coastal wetland areas.

### Response

Coastal wetlands play a significant role in the diversity and abundance of plants and animals providing important habitat and refuge, providing water storage and improving water quality. Locally the Great Barrier Reef is under threat from urban and rural runoff and plays a significant role in protecting the coast from destructive natural events such as erosion, storm surge and flooding (GBRMPA, 2007). The GBRMP Act has been enacted to protect the GBRMP.

Coastal wetlands have been mapped by the EPA in the draft Regional Coastal Plan (Map 6) however a different alignment is shown when data is acquired through EPA's online wetland mapping system. The SHMR is located more than 100 metres from EPA mapped coastal wetlands under the draft Regional Coastal Plan comprising of mangroves and salt couch however seagrasses, which can also be considered as coastal wetlands, are shown in Map 6 of the draft Regional Coastal Plan the SHMR site. Figure 15 provides an illustration of the Coastal Wetlands following the receipt of coastal wetlands mapping data online.

Current and accurate distributions of mangroves and seagrass communities have been mapped as part of the SHMR proposal with the location and extent of ground truthed mapped mangroves and seagrasses distributions (and over time) presented in Figures 16 to 17 respectively.

Coastal wetlands comprising of mangroves and seagrasses cover approximately 16 hectares of the SHMR site. The SHMR will result in the loss of such coastal wetlands, specifically loss of mangroves and seagrass, in addition to macroalgae and coral. However the SHMR is considered to offset this loss of coastal wetland as discussed in Section 4.9 'Nature Conservation' where an assessment is made against the relevant DPI&F operational policy.

Indirect impacts from construction on coastal wetlands as identified in the FRC assessment on aquatic ecology attached as Appendix P1 will potentially result from increased suspended solids concentration and sediment deposition temporarily increasing turbidity and light attenuation. The key impacts from marina operations are linked to human activity.

The potential construction and operational impacts on aquatic ecology are discussed in greater detail in section 4.9 'Nature Conservation' of this EIS. A risk matrix has been provided as part of the marine megafauna impact assessment (refer to Appendix P2 of the EIS) showing the likelihood and severity of impacts on aquatic flora and fauna, and measures identified in the CEMP and Marina SBMP have considered such risks and attributed risk levels.

Provided the development complies with current best practice, as specified in the CEMP and Marina SBMP, the marina is not likely to significantly impact on any key features of coastal wetlands associated with the GBRWHA and GBR Coast Marine Park. The loss of coastal wetlands within the SHMR site represents approximately 10% of that recorded in Shute Bay and 0.00028% of that recorded in the GBRWHA.

Current best practice assessment and engineering practice offers significant opportunities to minimise impacts associated with development. In particular the SHMR proposal entails:

- code compliant prescribed tidal works;
- minimal loss of natural habitat through refinement of the marina design and orientation following coastal processes studies to avoid changes to coastal processes;
- creation of habitat (artificial structures);
- replacement of swing moorings with moorings encouraging seagrass regrowth;
- foraging and habitat potential on reclaimed land on the isthmus through replanting mangrove communities;
- conservation of habitat through a reef funding model;
- ASS management (in accordance with the ASSMP, existing as Appendix I3 to the EIS);
- effective 'isolation' of the development footprint during construction using the breakwater and double silt curtains;
- management strategies for human activity as detailed in the Marina SBMP;
- maintenance of water quality; and
- long term ecological monitoring.

A State net benefit has been shown to justify the loss of coastal wetlands associated with the construction of the SHMR. A State net benefit was shown by AEC where the positive (beneficial) impacts of the development outweighed the negative (costs) impacts. The net benefit assessment is contained in Appendix G.

A net benefit for the State, in addition to the 'net gain in coastal resources and values' through various mitigation strategies ensures the proposed development aligns with the principles of this policy.

### **Policy 2.8.3 Biodiversity**

This policy seeks to safeguard biodiversity through conserving and appropriately managing a diverse range of habitats by:

- maintaining and re-establishing ecosystem connectivity;
- ensuring viable populations of protected native species through protecting significant wildlife habitats;
- retaining native vegetation;

- retaining and managing riparian vegetation of a sufficient width to provide a self-sustainable linked network; and
- valuing of Indigenous Traditional Owner ways of managing biological diversity.

### Response

Shute Bay has been assessed as having coastal habitat with varying ecological attributes supporting a diverse assemblage of fauna. A complete list of flora and fauna species surveyed in Shute Bay is provided as part of the aquatic ecology investigations contained in Appendix P1 of the EIS.

The SHMR proposal as discussed in response to policy 2.8.2 *Coastal Wetlands* involves the loss of mangrove, seagrass, macroalgae and coral communities but it has been demonstrated by FRC that this is to some extent offset by the addition of a significant degree of physical complexity to the intertidal and shallow subtidal habitat in the north of Shute Bay, and to the local diversity of habitat and productivity of associated flora and fauna by artificial structures associated with the marina. Habitats that provide structural and topographical relief such as woody debris, rock and oyster reefs and rubble play an important role in the recruitment and survival of many commercially important species. Each habitat provides a characteristic combination of hard surfaces, voids and shading, and may alter both the water quality and sediment characteristics in its immediate vicinity improving ecological values.

The construction of the proposed development will result in the creation of pontoons, piles and other intertidal and subtidal structures. These hard surfaces will provide substrate for many species of algae, hard and soft corals, and a variety of other invertebrate fauna. In turn, this hard-substrate benthic community will provide shelter and food for a variety of fishes and other fauna. The waters of the marina basin are likely to have a relatively low ecological value with water depths too great to support seagrasses.

The SHMR will ensure the biological diversity of the marina footprint is encouraged and avoid adverse impacts on the biological diversity of the surrounding sensitive environments by:

- eradicating and/or controlling pest plant and animals species above and below mean high water springs;
- implementing management strategies to protect marine megafauna as recommended by Natural Solutions, seen in Appendix P2 to the EIS);
- supporting community conservation and rehabilitation programs; and
- monitoring the ecosystem health within the marina.

The construction of the SHMR will also result in loss of remnant “not of concern” terrestrial vegetation as mapped by Place Environmental in the terrestrial ecology assessment attached as Appendix Q. The development of the site will result in the removal of 0.15 ha of woodland/open forest and 1.65 ha of mangrove shrubland habitat from the site, totalling 2.59 ha of woody (remnant and regrowth) vegetation that would be affected, of which 1.8 hectares is ‘remnant’ vegetation.

The attributes of the existing terrestrial vegetation were assessed and the impacts of the proposed development on fauna groups are determined to be minimal.

Field surveys and the habitat assessment indicated that the optimal location for any development at the site would be in the low lying areas, particularly south of the existing road. This would result in minimal impacts on fauna habitat along slopes and ridges, which connects with more extensive habitat areas in the adjacent Conway NP. The redesign of the SHMR does not result in development north of the Proserpine-Shute Harbour Road with existing vegetation north of the road to be returned to public ownership as a community benefit.

The SHMR construction will occur through the season (May - August) when wading birds migrate to the area, primarily as a result of the potential impacts expected if works were to commence in the off season but which coincides with the wet season in North Queensland. Works shall be undertaken to ensure no adverse impact to benthic fauna external to the development footprint which are their staple diet.

The proposed marina is likely to result in a loss of a small area of potential forage and roosting habitat for a number of wading birds protected under JAMBA, CAMBA and Queensland's NC Act. However given the extent of similar shoreline habitat protected within Conway National Park and offshore islands it is highly unlikely that the loss of this habitat will result in significant impacts on migratory waders in the region. Minor deposition near the western isthmus is expected to create suitable habitat and existing marinas in Queensland have not been shown to adversely impact on waders occupying nearby forage and roosting habitat (eg Manly, Shorncliffe and Raby Bay in Southeast Queensland).

#### **Policy 2.8.4 Rehabilitation of Coastal Resources**

This policy states that *"the rehabilitation and enhancement of coastal resources will improve values and functioning of the coastal zone in the future."* This policy encourages the rehabilitation of degraded coastal areas and resources, with the priority being the restoration of degraded coastal ecosystems to their natural ecological, physical and aesthetic condition.

#### Response

Existing development within the Mackay Whitsunday region has had significant impacts on coastal resources and their values in urban and rural areas (EPA, 2006). Shute Bay is not specifically identified as a priority area for rehabilitation under the draft Regional Coastal Plan. The proposal, however, includes financial support for the conservation and rehabilitation of coastal resources with the objective of improving the values of the natural habitat on which the tourism-orientated development is dependent.

#### **Policy 2.8.5 Pest Species Management**

This Policy states that *"coastal and marine environments are under pressure from pest species which have been introduced intentionally (e.g. for ornamental or agricultural purposes) or accidentally (e.g. through ballast water or on the hulls of boats)."*

The focus of pest management activities is on minimising the risk of introducing new pest species and reducing or at least controlling the impact of pest species infestations.

#### Response

The objectives of policy 2.8.5 will be achieved through raising the level of awareness of pest species within the marina community, and the implementation of appropriate management measures during the operation of the marina to prevent the introduction of pest species from ballast waters and/or hull cleaning.



Management of pest species has regard to:

- preventing the introduction, establishment and spread of pest species in the coastal zone; and
- managing the impacts of existing and new pest species.

The Proponent will encourage pest species management by:

- carrying out baseline marine surveys for exotic organisms to detect presence of any pest species;
- where required, proposing to develop weed management strategies for identified weed species based on current best practice as specified on the pest fact sheets produced by the DNRW;
- cleaning equipment, boots, vehicles and machinery when leaving known weed-infested areas to minimise the potential for the spread of weeds (including the use of a shake down facility during construction);
- designing and maintaining stormwater run-off structures in a manner that prevents the extended ponding of water which can subsequently provide breeding habitat for mosquitoes;
- promoting existing pest species education programs are undertaken by WRC and DNRW;
- planting native species as part of landscape master planning (possibly including mangrove juveniles);
- promoting a nil release policy within the marina; and
- educating boaters on the sensitivity of the natural environment and the threat to the natural environment by pest species from ballast waters and hull cleaning (this includes GBRMPA relevant fact sheets and brochures on display at the marina office).

The controlling provisions regarding pest species management included within Section 5 'Environmental Management' and plans therein were generated in consort with the *Whitsunday Shire Pest Management Plan* (WSC, 2006).

## **4.6 Air**

### **4.6.1 Description of Environmental Values**

The SHMR site is primarily sea-bound, with a steep, east-west trending rocky hill-slope to the north of the site boundary within Conway NP. This hill-slope acts as a barrier, preventing any emissions from the Airlie Beach/Cannonvale areas from dispersing northwards.

The site is in a region of minimal development. A small residential population, Shute Haven, exists 1km from the site, and the SHTF is located in the adjacent bay to the east of the SHMR site. Vehicle emissions from the Transit Facility are currently the main source of air pollutants for the local area. Transport types visiting the terminal include ferries, trucks and cars.

The settlements of Airlie Beach and Cannonvale are located approximately 7 and 8 km north-west of Shute Harbour respectively. Industry in the Whitsunday region is limited and the main commercial activities are tourism, sugar cane, marine, and retail.

Due to coastal sea breezes (high level of air mixing), the lack of industry, the small scale nature of the residential development in the locality and the low number of heavy vehicles that use Proserpine-Shute Harbour Road, the air quality within the Shute Harbour area is unlikely to contain elevated levels of air quality pollutants (eg NO<sub>x</sub>, SO<sub>x</sub>) or particulate matter.

#### **4.6.1.1 Background Data**

Detailed background air quality data is not currently available for the local or regional area. In the absence of local data, available data for the Mackay region, situated adjacent to Whitsunday region, is provided below. The Mackay monitoring station is located in a light industrial area of West Mackay, established to determine the impact on visibility from agricultural burning and industrial activities in the region. Historical data regarding air quality monitored at the Mackay station was sourced from the EPA's Ambient Air Quality in Queensland 2005 Annual Summary and Trend report. All air quality trends reported in this document extend over the period of 1997 – 2005.

#### **Particulate Matter and Visibility**

The annual average PM<sub>10</sub> value at the Mackay site was recorded as 21.9 µg/m<sup>3</sup> (Neale, 2005). It is noted the recorded annual average PM<sub>10</sub> value complies with the EPP (Air) PM<sub>10</sub> goal of 50 µg/m<sup>3</sup>. During 2005, a total of eight hours low visibility at the West Mackay site was caused by agricultural activities over three days during the sugar cane crushing season. Smoke from bushfires was responsible for four periods of low visibility over two days in December.

It is noted that the Mackay region is the major sugar-producing area of Queensland. Although most cane is harvested green throughout the region (95%), some pre-harvest and post-harvest burning still occurs, resulting in elevated particulate matter levels during crushing season (June – November) (Neale, 2005). The same can likewise be applied to the Whitsunday region.

## Dust Monitoring

Dust monitoring (PM<sub>10</sub>) was undertaken by CW in August 2004 to gain a snapshot of existing dust levels around the proposed site for preparation of the previous EIS. The 24-hour monitoring was undertaken during the cane crushing season, commencing at 0:01am on 20 August and ceasing at midnight on 28 August 2004. A TSI Dustrak data-logging aerosol monitor with PM10 attachment was used. Monitoring was undertaken at the Shute Harbour motel, situated adjacent to the proposed SHMR site. A summary of the results of dust monitoring is presented in Table 32.

**Table 32 Summary of Ambient Dust Monitoring (PM10) at Shute Harbour Motel**

24 hours Ending Midnight	Maximum (µg/m <sup>3</sup> )	Minimum (µg/m <sup>3</sup> )	24 hour Average (µg/m <sup>3</sup> )
20 August 2004	119	3	9
21 August 2004	54	2	8
22 August 2004	21	4	8
23 August 2004	72	3	9
24 August 2004	83	7	15
25 August 2004	69	9	14
26 August 2004	57	7	13
27 August 2004	37	8	13
28 August 2004	40	5	9

Recorded dust levels were well below the EPP (Air) guideline for PM<sub>10</sub> of 150 µg/m<sup>3</sup> (24 hour average).

### 4.6.1.2 Greenhouse Gas Emissions

Development in the vicinity of Shute Harbour is minor, and generates only low volumes of traffic. Consequently, the area is likely to generate minimal Greenhouse Gas (GHG) emissions. The primary existing source of GHGs are emissions from vehicles travelling along Proserpine-Shute Harbour Road and vessel emissions from the SHTF. Residential and commercial uses in the area generate indirect emissions through the use of electricity.

The SHMR will release greenhouse gases both indirectly and directly as a result of activities such as fuel use by vehicles and electricity use during both the construction and operational phases.

### 4.6.2 Potential Impacts and Mitigation Measures

The construction and operation of the SHMR has potential to cause relatively minor impacts to air quality of the surrounding area.

Potential impacts anticipated during the construction phase include:

- dust generated by the removal and transport of sediment and earth;
- emissions of SO<sub>x</sub> and NO<sub>x</sub> from construction vehicles; and
- greenhouse gas emissions from construction vehicles and from the production and transport of construction materials.

Potential impacts anticipated during the operation phase include:

- odour emissions caused by:
  - the pump-out of raw sewage from vessels, and
  - the refuelling of vessels; and
- greenhouse gas emissions from the production and transport of materials required for operation of the facility.

### Air Quality Goals

Schedule 1 of the EPP (Air) specifies air quality goals and indicators to protect environmental values – those conducive to suitability for the life, health and wellbeing of humans. The air quality goals do not apply to the inside of a residential marina, and as such, air quality objectives are applicable to those areas surrounding the proposal site.

Table 33 provides the relevant air quality objectives in relation to dust emissions from the proposal site.

**Table 33 Air Quality Criteria for Dust Emission as per EPP (Air)**

Parameter	Maximum Acceptable Concentration
24 hour average dust concentration, as PM <sub>10</sub>	150 µg/m <sup>3</sup>
Average dust deposition rate	120 mg/m <sup>2</sup> /day

Note: PM<sub>10</sub> is suspended particulate matter less than 10 microns in aerodynamic diameter.

#### 4.6.2.1 Mitigation Measures

The construction of the SHMR infrastructure and buildings has the potential to cause elevated levels of dust nuisance if not appropriately managed. The construction phase of the SHMR will require the implementation of appropriate mitigation and management strategies to ensure that dust emissions from the construction works will not unduly impact surrounding sensitive receptors.

A CEMP has been developed to manage and control potential impacts from construction activities on the site. The CEMP is attached as Appendix U1. The CEMP incorporates mitigation measures which shall be implemented during the construction phase to address potential adverse air quality and dust emissions. These strategies include but are not limited to the following.

- Any dust generating activities, such as earthworks, shall cease during excessively windy conditions if airborne dust is causing a nuisance.
- The area of open ground exposed at any one time shall be minimised as far as practicable.
- Activities resulting in the introduction of excessive dust and fumes to the local atmosphere shall be minimised as far as practicable.
- The size of stockpiles shall be minimised as far as practicable and long-term earthen stockpiles will be compacted and revegetated. Stockpiles shall be regularly monitored to ensure no material loss to surrounding areas and the atmosphere. During windy conditions, stockpiles shall be watered if and where necessary.
- Physical barriers shall be erected where practicable to prevent the excessive movement of dust.

- A vehicle speed limit of 40km/h shall be maintained within the site. All employees, contractors and visitors shall be advised of the speed limits in the site induction.
- Haul vehicles carrying loose materials shall be covered prior to exiting the site. Any spillage of wastes, contaminants or other materials from the haul vehicles shall be cleaned up as quickly as practicable.
- Machinery and vehicle tyres will be regularly cleaned to prevent track-out of dust to public roads.
- A water truck shall be used during earth moving and vegetation clearing works to provide dust suppression. Water trucks are to be deployed when dust is visible for longer than 15 minutes.
- Burning or incineration of waste materials, including green waste, will not be conducted onsite at any time. Green waste shall be transported offsite by a licensed contractor for appropriate disposal.

The issue of dust nuisance is subjective and typically complaint driven. In the event of an air quality complaint, an investigation will commence in the effort to resolve the complaint and ameliorate the excessive emission, if and where applicable. The appropriate procedures to be employed following a complaint are described in the CEMP.

#### **Operational Mitigation Measures**

The operational phase of the SHMR is unlikely to cause elevated levels of dust or other air emissions. The following measures will be undertaken to minimise any risk or air quality impacts.

- Landscaped areas will be vegetated as soon as practicable and areas of bare earth shall not be left exposed.
- Any earth movement associated with the management or disposal of maintenance dredging spoil is managed to minimise dust, including the use of water trucks where required and prompt revegetation.
- Air conditioning intakes on buildings shall be located where truck movement or idling engine emissions cannot adversely affect the indoor air quality.
- A suitable separation distance will be maintained between internal roadways and buildings.

#### **4.6.2.2 Greenhouse Gas Abatement**

##### **Methodology for Assessment**

The Australian Greenhouse Office (AGO) of the DEWHA monitors and compiles databases on anthropogenic activities that produce greenhouse gases in Australia. The AGO methodology for calculating greenhouse gas emissions is published in the *AGO Factors and Methods Works* (AGO, 2006) which defines three scopes of emission categories, as follows.

- Scope 1: this covers the direct emission sources within the boundary of an organisation such as the emissions from fuel combustion of vehicles.
- Scope 2: this covers indirect emissions from consuming purchased electricity, steam or heat that is produced by another organisation.
- Scope 3: this covers all other indirect emissions from sources that are not owned or controlled by an organisation but occur as a consequence of the organisations

activities (e.g. off-site waste disposal, emissions associated with production of fuels and emissions from transmission, distribution and generation of electricity).

The major activities of the proposed SHMR that produce greenhouse gas emissions have been identified as follows.

- Scope 1: petrol, diesel and fuel oil combustion in vehicular and marine traffic.
- Scope 2: electricity consumption.
- Scope 3: production, transport and distribution of fuel and electricity.

Table 34 below summarises the greenhouse gas emission factors used to quantify greenhouse gas emissions of each scope from the proposed SHMR.

**Table 34 Greenhouse Gas Emission Factors (AGO, 2006)**

Activity/Source	Units	Scope 1	Scope 2	Scope 3	Full fuel cycle
Petrol combustion	t CO <sub>2</sub> -e/kL	2.4	-	0.3	2.7
Diesel combustion	t CO <sub>2</sub> -e/kL	2.7	-	0.3	3.0
Electricity consumption	kg CO <sub>2</sub> -e/GL	-	251	40	291

### Greenhouse Gas Emission Calculations

The greenhouse gas emissions generated during the construction and operational phases of the proposed SHMR have been calculated by Cardno, using the methodology prescribed by the AGO.

The greenhouse gas emissions resulting from construction activities have been calculated based on the following assumptions.

- Haul trucks travelled at total of 837,025 kilometres per year.
- Other vehicles travelled a total of 2,538,455 kilometres per year.
- All supplies are to be sourced from Proserpine, a round-trip distance of 70km.
- The round-trip distance between the SHMR site and Airlie Beach is 24km.
- Marina construction will occur for approximately 313 days per year over two years.
- During a standard day of construction, 78 full-time workers will be based at the SHMR site. Assuming car-pooling is undertaken with an occupancy rate of 4 people per vehicle, approximately 20 vehicles will travel to the site each day during construction.
- At peak construction, there will be approximately 2 bus-loads of construction workers per day during the first year of construction and 4 bus-loads per day during the second year of construction, travelling between Airlie Beach and the SHMR site.

As specific information regarding the construction of the development (necessary machinery and equipment e.g. excavators, dredge barge), emissions related to the site's construction could not yet be determined. As such, only emissions from the vehicle travel of construction workers have been determined; involving both vehicles conveying construction workers to the site, as well as those vehicles associated with the delivery of construction materials. Only approximate quantities of construction workers were used in the calculations as definitive information was unavailable.

The greenhouse gas emissions resulting from the operation of the SHMR have been calculated based on the expected vehicular traffic accessing the site. The emissions were calculated using the following assumptions.

- The number of vehicles accessing the SHMR per day is 1,591 vehicles.
- The percentage of commercial/heavy vehicles is 3%.
- Distance travelled from Bruce Highway at Proserpine and back is 70 km.
- Passenger vehicles were fuelled by petroleum and heavy vehicles by diesel.
- The fuel efficiencies of a passenger car and a heavy vehicle are 0.113 L/km and 0.546 L/km, respectively (AGO, 2006).
- Dwellings will involve one car, no heating, air-conditioning, low voltage lighting, and some waste recycling.

The emissions for the residential aspects of the site during its operation were determined through use of The Australian Greenhouse Calculator, an online tool developed for this purpose by the Victorian Environmental Protection Agency<sup>2</sup>. As specific details regarding the final quantity and occupancy of dwellings with the SHMR, only approximate greenhouse emissions could be calculated. To this end, a total of 9.684 t CO<sub>2</sub>-e annually is likely to be generated through residential occupancy of the site.

Table 35 and Table 36 provide an inventory of projected annual emissions for the greenhouse gases generated as a result of vehicle use (passenger and heavy vehicles) during both construction and operational phases, respectively, with total emissions expressed in 'CO<sub>2</sub> equivalent' terms.

**Table 35 Greenhouse Gas Emissions during Construction of the SHMR**

Activity/Source	Units	Scope 1	Scope 2	Scope 3	Full fuel cycle
Haul Vehicles	t CO <sub>2</sub> -e	1,125	125	-	1,250
Passenger Vehicles	t CO <sub>2</sub> -e	688	86	-	746
Total					<b>1,294</b>

**Table 36 Greenhouse Gas Emissions during Operation of the SHMR**

Activity/Source	Units	Scope 1	Scope 2	Scope 3	Full fuel cycle
Haul Vehicles	t CO <sub>2</sub> -e	1,020	113	-	1,133
Passenger Vehicles	t CO <sub>2</sub> -e	6,065	758	-	6,570
Total					<b>7,703</b>

It is expected that 1,294t CO<sub>2</sub>-e greenhouse gas emissions will be generated per year during the construction of the SHMR, whilst approximately 7,703t CO<sub>2</sub>-e greenhouse gas emissions will be generated per year from the operation of the SHMR.

Table 37 provides mitigation measures which could be implemented to avoid and/or minimise direct GHG emissions.

<sup>2</sup> The Australian Greenhouse Calculator – EPA Victoria  
<http://www.epa.vic.gov.au/GreenhouseCalculator/calculator/default.asp>

**Table 37 Greenhouse Gas Mitigation Measures**

Mitigation Measure	Control Method
The architectural design of the development will be such that energy requirements are minimised	Natural ventilation will minimise the need for air-conditioning. Strategic positioning of windows and eaves will minimise heat into dwellings and thus the need for air-conditioning. Light-weight construction will allow for effective heat convection.
Energy-efficient fittings will be required for use throughout the development by the Body Corporate. This includes light bulbs and white goods.	Lower overall energy usage.
No vegetation clearing to occur on the northern side of Shute Harbour Road.	This vegetation will be available for natural carbon absorption processes.
A proportion of the energy supplies sourced for the construction and operation of the development will consist of renewable energy.	The utilisation of renewable energy systems utilises clean energy that has minimal emissions and do not place demand on non-renewable resources.
The use of solar cells in the operation of the development may be considered by the Proponent.	The utilisation of renewable energy systems utilises clean energy that has minimal emissions and do not place demand on non-renewable resources.

#### 4.6.2.3 Climate Change Adaptation

The potential for climate change has been considered in the design of the SHMR. The majority of the development is dependant on being located in close proximity to the coast and therefore has the potential to be affected by increases in sea level and increases in the frequency or severity of storm events.

Predictions of global sea level rise vary considerably. It is impossible to state conclusively by how much the sea may rise, and no policy yet exists regarding the appropriate provision that should be made for the design of new coastal developments.

Based on a number of global greenhouse models, a guide to future ocean level rises is presented in the coastal processes investigations appended as Appendix O. In relation to climate change the most likely impacts at this site will be an increase in the intensity and frequency of cyclonic events and the potential increases in the storm tide level and wave conditions. The potential impacts of climate change have been accommodated in the design of the development, by incorporating an allowance for sea level rise in relation to the existing sea level.

The design levels include an allowance of 0.3m above the 100 year ARI storm tide level to accommodate sea level rise associated with climate change. The components of the marina, including breakwaters and berths, have also been design to accommodate sea level rise associated with climate change in addition to the 100 year ARI storm tide level.

A comprehensive response was given in Section 4.5 'Coastal Environment' in response to policy 2.2.1 *Adaptation to climate change* with the design of the SHMR development proposal presented in the schedule of drawings.



## 4.7 Waste

### 4.7.1 Description of the Environmental Values

The SHMR site is located within Shute Harbour, a part of the GBRWHA and GBR Coast Marine Park and is adjacent to the Conway NP and the GBRMP. Risks to the environment may occur as a result of waste management activities associated with the construction and operation of the SHMR. The environmental risks range from potential environmental harm, such as pollution of waterways, to environmental nuisance, such as odour complaints.

The WMP prepared to inform Section 4.7 'Waste' is presented as Appendix U2 of the EIS.

### 4.7.2 Potential Impacts and Mitigation Measures

The potential impacts of the proposed development on the receiving environment are listed below.

- Waste spills and loss of containment of waste resulting from impacts to soils, surface water, groundwater, terrestrial and marine fauna, and human health.
- Flooding of temporary waste storage areas causing dispersal of waste (i.e. litter can kill aquatic life through ingestion or choking).
- Litter reduce the visual amenity of a place.
- Plastic waste causing mortality to marine fauna.
- Waste spills and related incidents arising from transportation of waste on and off the site.
- Cross contamination of wastes making wastes unsuitable for reuse and/or recycling, thus increasing the quantity of waste being disposed of to landfill.
- Generation of wastes increasing pressure on regional landfills, requiring early closure and replacement.
- Odour and noise generation from waste handling and storage.
- Propagation of pests, vermin and disease vectors.

To minimise the impacts outlined above, the following mitigation measures will be implemented during construction and operation of the proposed development.

- Wastes to be managed in accordance with the *Environmental Protection (Waste Management) Regulation 2000*.
- Waste avoidance, minimisation, reuse and recycling principles to be utilised wherever possible, especially those provided in Section 2 of the WMP, presented as Appendix U2 of the EIS.
- Wastes to be segregated to assist in recovery and recycling.
- Construction wastes to be reused and recycled, wherever possible.
- No disposal of solid or hazardous wastes on site.
- Construction materials fabricated offsite where possible to minimise the generation of waste (eg pre-cast concrete panelling).
- In order to reduce waste volumes, where possible, all wastes generated from construction and operational activities will be reused on site or sent to recyclers. Disposal to appropriately licensed waste facilities will only be undertaken where reuse or recycling is not possible or feasible.

- Waste generators have been encouraged to segregate wastes at the source to minimise cross contamination of waste streams.
- Waste to be transported by appropriately licensed waste transporters.
- Colour-coded and/or labelled bins provided for each waste stream to assist in the segregation of wastes and maximise waste recovery and recycling.
- Alternatives to plastic bags are to be provided at retail outlets.
- Design of marina waste facilities is to be in accordance with 'Best Practice Guidelines for Waste Reception Facilities at Ports, Marinas and Boat Harbours in Australia and New Zealand'.
- The marina is to be operated with regard to the Marina Industries Association of Australia 'Clean Marinas' accreditation programme.
- Records of waste quantities removed from the site will be maintained.
- A waste audit is to be conducted when the development is operational and when each new stage of development becomes operational. The purpose of the waste audit is to identify:
  - types and volumes of wastes generated;
  - further opportunities for waste avoidance, reuse and recycling;
  - waste storage and segregation methods;
  - waste treatment and disposal techniques; and
  - destination of waste materials.
- A Waste Management Plan must be implemented. A WMP was prepared as part of the SHMR EIS and is presented as Appendix U2.

A summary of the wastes generated during construction and operation of the development and their proposed waste management technique is provided in Table 38.

**Table 38 Waste Management Summary**

Waste Source	Waste Type	Waste Management Technique
Construction	Fill and soil (not contaminated)	Reuse, as fill
Construction	Dredge spoil	Reuse, as fill
Construction	Tailwaters from dredge spoil disposal.	Treatment and discharge or disposal
Construction	Acid Sulphate Soils	Treatment and reuse as fill
Construction	Timber	Reuse
Construction	Vegetation	Disposal
Construction	Scrap metal	Recycle
Construction	Cable and wire	Recycle or disposal
Construction	Concrete, bricks, tiles and rubble	Reuse as crushed aggregate, where feasible
Construction	Plasterboard	Reuse or disposal
Construction	Packaging wastes, plastic, glass and timber	Recycle

Waste Source	Waste Type	Waste Management Technique
Construction	Domestic and general waste	Disposal
Construction	Domestic wastewater	Disposal
Construction	Contaminated stormwater runoff	Treatment and discharge, or disposal
Construction	Diesel and other fuels	Recycle
Construction	Paint and other chemicals	Disposal
Construction	Water collected in waste storage and bunded areas	Treatment and discharge, or disposal
Operation	Domestic waste	Disposal
Operation	Organic and food waste	Compost, where practicable
Operation	Maintenance dredge spoil	Treatment
Operation	Green waste	Compost/mulch, where practicable
Operation	Domestic wastewater	Disposal
Operation	Metals	Recycle
Operation	Plastics	Recycle
Operation	Glass	Recycle
Operation	Paper and cardboard	Recycle
Operation	Diesel and other fuels	Recycle
Operation	Hazardous and other chemicals	Disposal, through approved technology
Operation	Marina sewage pump out	Disposal
Operation	Contaminated stormwater runoff	Treatment and discharge, or disposal
Operation	Water collected in waste storage and bunded areas	Treatment and discharge, or disposal
Operation	Quarantine waste	Disposal in accordance with AQIS guidelines.

The WMP emphasises the waste management hierarchy, statutory obligations of those involved in generating, receiving or transporting waste & the prevention of any adverse impacts on the receiving environment during the construction and operation of the SHMR. The overall focus of the WMP is to maintain or enhance the values of the receiving environment & adopt the principles of Best Practice Environmental Management for waste wherever possible.

## 4.8 Noise and Vibration

### 4.8.1 Description of Environmental Values

The proposed SHMR site contains coastal foreshore and tidal waters which form part of Shute Bay. The site is undeveloped however noise sensitive places exist adjacent to the SHMR site which can potentially be impacted on by an increase in noise and vibration associated with the site's development.

#### *Existing Environment*

The most significant existing noise and vibration source in the locality of the proposed SHMR site is the Proserpine-Shute Harbour Road which is directly parallel and above the proposed site and SHTF to the east.

Existing noise sensitive receptors with the potential to be impacted on by the proposed construction and operation of the SHMR include the following.

1. A single dwelling directly opposite the site approximately 50m to the west.
2. The Shute Harbour Motel approximately 100m east of the site and overlooking the proposed marina.
3. Small residential development on Coral Point, approximately 1.6km east of the proposed development site, however this development is protected in part by the Shute Harbour Headland and other existing facilities.
4. Mount Rooper National Park camping ground approximately 1.6km west from the site.
5. Moored boats within Shute Harbour.
6. Conway NP protected under the NC Act.
7. GBRWHA including the GBR Coast Marine Park, protected under the *Marine Parks Act 2004*.

The environmental values to be enhanced or protected during the construction and operation of the SHMR are identified in the EPP (Noise) as being the qualities of the acoustic environment that are conducive to—

- a) the wellbeing of the community or a part of the community, including its social and economic amenity; or
- b) the wellbeing of an individual, including the individual's opportunity to have sleep, relaxation and conversation without unreasonable interference from intrusive noise.

Noise monitoring was undertaken at the site on two occasions to determine the acoustic environment requiring protection through establishment of a baseline dataset. Vibration monitoring was undertaken at the site in 2004.

The methodologies used to assess both noise and vibration was in accordance with the Queensland *Noise Measurement Guidelines* (EPA, 3<sup>rd</sup> Edition, March 2000), the EPP (Noise) (Part 5) and Australian Standards.

Ambient noise was monitored at two noise sensitive receptors (1 and 2 as denoted above) to record the existing background noise environment from 20 August to 25 August 2004, between 1 and 2 September 2004, updated and verified on 24 to 29 August 2007 to determine trends in noise levels.

Vibration monitoring was carried out over a 24 hour period, commencing at 15:30 on Wednesday 18 August 2004. A Texcel vibration logger with external triaxial geophone was used in accordance with the guideline *Noise and vibration from blasting* (EPA, June 2004). The geophone was located in the ground on the eastern side of the Shute Harbour Motel and was approximately six metres from the road and 0.5 metres from the eastern wall of the motel.

A weather station was also set up onsite to enable the continuous monitoring of wind and rainfall during the monitoring period. The weather data was used to exclude noise data affected by high winds or rain.

The climatic conditions at the time of monitoring are described as follows.

- Minimum temperature = 13.3°C, maximum temperature = 26.1°C, average temperature = 20.7°C.
- Minimum wind speed = 0.2m/s, maximum wind speed = 9m/s, average wind speed = 2.2m/s.
- Wind direction south to south-easterly.
- Total rainfall = 17.8mm (25 and 31 August 2004).

Ambient noise levels measured in August/September 2004 are presented in Table 39 and Table 40 for adjacent noise sensitive places. Noise level measured at both places are representative of the background acoustic environment at the SHMR site (i.e. the term used to describe the noise measured in the absence of the noise under investigation). Noise levels are generally consistent with a rural coastal area dominated by a significant roadway.

The results of the noise monitoring at the Shute Harbour Motel indicate traffic noise and wave action are the most likely significant sources of noise with relatively consistent noise levels across the week and short term peaks during the day. The noise levels at the western residence are also affected by traffic noise and wave action but are generally higher than those at the motel reflecting the location of the monitor being closer to Proserpine-Shute Harbour Road.

Traffic data received from DMR for October 2004 indicated that 2,966 vehicles per day travel along this road.

**Table 39 Summary of 2004 Ambient Noise Levels Site 1 – Western Residence**

Date	Day 6:00am to 6:00pm				Evening 6:00pm to 10:00pm				Night 10:00pm to 6:00am			
	Ambient Sound in dB(A)											
	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>
Friday 20 August	43	53	62	51	31	42	51	39	27	35	46	35
Saturday 21 August	44	53	62	52	32	40	49	38	28	33	43	33
Sunday 22 August	44	52	60	50	31	41	50	39	27	31	40	31
Monday 23 August	42	52	59	50	35	41	51	40	27	33	43	33
Tuesday 24 August	45	54	60	52	43	47	51	45	45	49	51	47
Wednesday 1 September	36	51	60	49	29	41	52	40	27	33	45	34
Thursday 2 September	48	55	61	53	44	49	52	46	42	46	51	45

**Table 40 Summary of 2004 Ambient Noise Levels Site 2 - Shute Harbour Motel**

Date	Day 6:00am to 6:00pm				Evening 6:00pm to 10:00pm				Night 10:00pm to 6:00am			
	Ambient Sound in dB(A)											
	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>
Friday 20 August	42	51	59	49	36	41	45	39	30	31	42	30
Saturday 21 August	41	50	57	48	33	39	44	37	26	32	39	31
Sunday 22 August	41	49	56	47	36	41	47	40	27	33	40	32
Monday 23 August	39	49	56	46	33	39	44	37	28	36	42	34
Tuesday 24 August	42	50	57	48	38	42	47	40	36	41	45	39
Wednesday 1 September	42	49	56	48	28	38	45	36	28	38	46	36
Thursday 2 September	44	51	57	49	37	42	46	40	35	42	47	40

Noise monitoring in 2007 was undertaken to confirm measured noise levels in 2004 and subsequently to inform mitigation measures for the construction and operation of the development by seeking to minimise change to the existing acoustic environment. Noise measurements for the 2007 monitoring period are compiled in Table 41. The location at which noise was monitored during this period was uphill of Proserpine-Shute Harbour Road in the north western portion of the SHMR site.

The location at which noise was monitored during this period was uphill of Proserpine-Shute Harbour Road in the north western portion of the SHMR site.

The measured noise levels are significantly higher than levels measured in August 2004. Road traffic noise has entirely influenced measured noise levels which are relatively consistent across the week and peak for short times during the day. In terms of traffic noise however, DMR traffic counts along Proserpine-Shute Harbour Road east of Jasinique Drive for 2006 indicated that approximately 2,671 vehicles per day travel along Proserpine-Shute Harbour Road. This is a slight reduction from traffic volumes obtained in 2004 however the percent of heavy vehicles increased to 10%. The increase in noise levels can therefore be attributed to an increase in the percentage of heavy vehicles utilising Proserpine-Shute Harbour Road to access the SHTF, which has become the leading gateway to the Whitsunday Islands.

Traffic counting was also undertaken by CEO in 2007 as part of a traffic impact assessment for the SHMR, presented as Appendix K1 of the EIS. Traffic counts recorded an AADT of 2,178 continuing the downward trend in AADT recorded by DMR from the previous year, but with a further increase in percent of heavy vehicles usage (i.e. 11.9%).

Continuous noise results for monitoring in the year 2007 are presented graphically in the traffic noise assessment presented in Appendix R of the EIS. To determine noise trends at actual noise sensitive receptors, hand held monitoring was undertaken at the Shute Harbour Motel and the existing residence to enable a comparison of noise levels over time. Validation monitoring at sensitive places is presented in Table 42. As seen in 2004, noise levels were significantly higher at the existing residence, due to its proximity to Proserpine-Shute Harbour Road, in addition to being slightly higher due to increased vehicular movements related to tourism-orientated development of the Whitsunday Islands.

**Table 41 Summary of 2007 Ambient Noise Levels**

Date (2004)	Day 7:00am to 6:00pm				Evening 6:00pm to 10:00pm				Night 10:00pm to 7:00am			
	Ambient Sound in dB(A)											
	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>
Friday 24 August	36	68	80	67	28	52	74	60	31	41	60	51
Saturday 25 August	39	68	80	67	36	51	70	58	36	45	60	52
Sunday 26 August	43	66	79	66	42	52	70	59	36	48	60	53
Monday 27 August	45	69	81	68	46	54	70	60	43	53	63	56
Tuesday 28 August	42	68	81	68	44	55	75	61	41	50	63	55
Wednesday 29 August	44	68	73	63	45	55	72	61	46	56	64	57

**Table 42 Validation Monitoring at Sensitive Places (2007)**

Monitoring Location	Sample Number	Time Period	Sound Pressure Level in dB(A)			
			L <sub>Aeq(15min)</sub>	L <sub>Amax(15min)</sub>	L <sub>A10(15min)</sub>	L <sub>A90(15min)</sub>
Existing Residence	1	12.15 - 12.30pm	56	75	60	42
Existing Residence	2	12.30 - 12.45pm	58	75	62	44
Shute Harbour Motel	1	11.15 - 11.30am	56	79	58	35
Shute Harbour Motel	2	11.30 - 11.45am	56	75	59	34

The climatic conditions at the time of monitoring were fine sunny days, with variable winds up to 25 knots but generally between 10-15 knots. From local observations weather conditions were representative of the month.

#### Vibration Levels

The results of vibration monitoring over a 24 hour period were very low, with an average vibration level of 0.1mm/s. However, the results of the monitoring contain some anomalies and should only be considered indicative. As a comparison, walking is equivalent to a blast vibration level of 0.8mm/s, and a door slam equivalent 12.7mm/s.

The major source of vibration within the SHMR site is traffic on Proserpine-Shute Harbour Road.

### **4.8.2 Potential Impacts and Mitigation Measures**

#### **Potential Environmental Impacts**

##### Marina Construction Phases – Noise from Plant and Equipment

Potential noise and vibration sources during the construction of the marina phases will include:

- vehicle movements, including delivery trucks;

- sheet pile driving using vibratory hammer and conventional hammer;
- breakwater construction pile driving using conventional hammer;
- barge operation;
- dredging and excavation of marine mud;
- importation and spreading of fill material and land reclamation;
- building works; and
- plant noise.

Adverse noise impacts are expected to be variable considering the staged construction and lack of built up areas surrounding the SHMR site. Some loss of acoustic amenity, particularly at the Shute Harbour Motel is expected in terms of dredging the access channel. Sound power levels of typical construction equipment as realised by AS 2436 – 1981 are provided in Table 43.

**Table 43 Typical Construction Equipment and Activity Noise Levels**

Type of Equipment	Sound Power Level (SWL) dB (A)
1. Silenced pile driver	100
2. Silenced truck scraper, grader	95
3. Silenced pneumatic drill	108
4. Silenced compressor	100
5. Diesel Hammer	147
6. 2 t drop hammer (precast concrete piles)	128
7. Concrete mixer	112
8. Compactor	124
9. Crane	106
10. Crane	115
11. Excavators	118
12. Rock Breakers (Pneumatic)	124
13. Saws	115
14. Winches (Pneumatic)	108
15. Oxy-acetylene Welders	96
16. Generators	112
17. Trucks (20t)	108

The sound pressure level (SPL) in dB(A) at a sensitive receptor can be derived from the following equation (AS2436-1981):

$$L_{P(A)} = L_{W(A)} - 20\log_{10}R - 8$$

Where:

$L_{W(A)}$  = A - weighted sound power level of the source, in dB ref. 10-12 W

$L_{P(A)}$  = A - weighted sound pressure level (SPL) at the distance R from the source, in dB(A)

R = Distance from the source in metres.

Based on this data, noise from the construction site has the potential to adversely impact the residential property (Site 1) 50m from the nearest SHMR site boundary and site 930m from the furthest SHMR site boundary, and the Shute Harbour Motel (Site 2) 100m from the nearest SHMR site boundary and 820m from the furthest SHMR site boundary. Predicted SPL are presented in Table 44.



The predicted range of SPL for each phase has been calculated assuming all plant and equipment operate at the nearest and furthest of the SHMR site to the noise sensitive place to deliver a worst case and best case scenario.

**Table 44 Typical Construction Equipment Sound Pressure Levels at Sensitive Places**

Equipment	Residence SPL dB(A)		Shute Harbour Motel SPL dB(A)	
	Worst Case ( )	Best Case	Worst Case	Best Case
1. Silenced pile driver	58	33	52	34
2. Silenced truck scraper, grader	53	28	47	29
3. Silenced pneumatic drill	66	41	60	42
4. Silenced compressor	58	33	52	34
5. Diesel hammer	105	80	99	81
6. 2-t Drop hammer (precast concrete piles)	86	61	80	62
7. Concrete mixer	70	45	64	46
8. Compactor	82	57	76	58
9. Crane	64	39	58	40
10. Crane	73	48	67	49
11. Excavators	76	51	70	52
12. Rock Breakers (Pneumatic)	82	57	76	58
13. Saws	73	48	67	49
14. Winches (Pneumatic)	66	41	60	42
15. Oxy-acetylene Welders	54	29	48	30
16. Generators	70	45	64	46
17. Trucks (20t)	66	41	60	42

Predicted SPL in Table 44 for typical construction equipment at each noise sensitive place adjoining the SHMR site would not be a true representation of actual experienced noise levels as various plant and equipment will be used concurrently in the construction of the SHMR which will result in noise from difference sources audible simultaneously. The total A-weighted SPL from the sources acting together can be obtained by combining separate levels two at a time for various phases of the construction.

For the purposes of this acoustic assessment, construction phases are described as the following to account for dominant periods of noise:

- Phase 1 – Site Establishment;
- Phase 2 – Wall Piling and Dry Excavation; and
- Phase 3 – Dredging and Reclamation.

Phases 1, with use of plant denoted as 11 and 17, will cause a combined predicted SPL range at the Site 1 of approximately 51 to 76 dB(A) SPL and for Site 2 approximately 52 to 70 dB(A) SPL depending on prevailing meteorological conditions.

Phases 2, with use of plant denoted as 1 - 4, 6, 10 – 12 and 17 (being the plant and equipment dominating noise sources during the construction of the marina sheet pile walls), will result in a combined predicted SPL range at the Site 1 of approximately 57 to 87 dB(A) SPL and for Site 2 approximately 58 to 81 dB(A) SPL depending on prevailing meteorological conditions.

Piling works will result in occurrences of repeated and loud impacts whilst the pile is being driven. The characteristic of such noise is unlikely to influence the noise source (generally described as  $L_{A10,T}$ ) at the SHMR site (i.e. the term which defines the noise which a listener does not wish to hear).

Calm periods of pile handling and clutching will separate noisy periods of pile driving. The inconvenience caused by the piling rig at sensitive receptors is likely to be minimal with piling progressively set back from the noise sensitive place and dominant winds tending to push the sound away from this area.

In assessing the noise from pile driving activities, it should be noted that piling activities may encompass a wide range of operations, piling equipment, substrate types, and water depths, for example, giving a wide range of possible noise source levels and radiated noise levels.

During Phase 3 of the construction of the marina, a cutter suction dredge will be employed including numerous plant associated with dry excavation and has the potential to effect the western residence, Shute Harbour Motel and aquatic fauna of the GBRWHA.

Dredgers can be a source of continuous noise with both broadband and tonal characteristics with the highest noise levels usually occurring during loading. The dominant noise sources associated with dredging are usually described as:

- dredge engine and exhaust noise; and
- crane engine and exhaust noise.

Reported source levels for dredging operations range from 160 to 180 dB *re.* 1  $\mu$ Pa at 1 metre for 1/3 octave bands with peak intensity between 50Hz and 500Hz (Greene and Moore, 1995).

In Moreton Bay where marine-based sand extraction occurs, WBM Oceanics Australia found the highest recorded noise level ( $L_{Amax}$ ) during dredging at a distance of 65m was 80 dB(A) and potential noise intrusiveness (expressed as the noise level exceeded for 10% of the time;  $L_{A10}$ ) ranging from 60 dB(A) to 72 dB(A). Effectively at a distance of 180 - 200m, from the dredges, the noise levels are likely to be less than 50 dB(A). These monitoring results are consistent with other noise measurements of dredges employed in South East Queensland waterways, including for a suction dredge at 30m on the Tweed River where the SPL  $L_{A10}$  of 72 dB(A) was recorded (1991).

Although dredging has been shown to be a source of underwater noise emissions, no quantitative impact assessment on marine mammals has been found, and the effect of dredging and other construction operations on most type of marine mammals has received little or no study. Dredging will occur following construction of solid breakwaters which will attenuate underwater noise travelling to surrounding areas likely to provide suitable habitat for marine megafauna.

Phase 3 will ultimately cause the most significant noise impact particularly when a series of repeated and loud impacts whilst the pile is being driven is expected to combine with dredging. With regard to background noise, the intrusiveness of combined noise levels would significantly exceed background noise levels at noise sensitive places requiring effective mitigation strategies to maintain existing environmental values where possible.

At commencement of each phase of construction, an analysis of sound produced by construction equipment is recommended. Such analyses will determine the noise impact resulting from the construction of the SHMR and inform appropriate site specific management protocols. In accordance with the precautionary principle, mitigation measures are nonetheless proposed to limit impacts at the western residence and Shute Harbour Motel based on the calculated provided herein.

The potential environmental harm of noise from use of plant and equipment on terrestrial and marine animals and avifauna, particularly migratory species, is generally concluded to be insignificant. The magnitude of noise required to disturb shorebirds and sea mammals, especially dugongs, is unlikely to be exceeded because they would be accustomed to certain levels of noise within the Bay from existing boating (and dredging) activities. More so, dredging in soft sediment is also likely to generate reduced noise levels than dredging in coarse sediment. Pile driving through soft sediment is likely to muffle what would be high levels of noise if those soft sediments were not present.

Marine fauna such as dugong and turtles are expected to avoid the area during periods of significant noise generation such as piling and dredging.

#### Marina Construction Phases - Vibration

While vibration from plant and equipment is expected during the construction phase of the SHMR, the geological profile of the site and the limited number and reasonable distance of sensitive receptors from the site, it is not expected to cause a significant impact.

#### Operational Phase

Potential noise and/or vibration sources during operation of the proposed development will include:

- road traffic;
- motor boats, including ferries;
- boat rigging (generally on windy days);
- entertainment noise (crowds and music);
- refrigeration units;
- air-conditioners and ventilation fans;
- on-site vehicular movements in the car parking areas;
- delivery vehicles to the resort tourism and commercial mixed use precincts; and
- noise associated with transferring boats, lowering/raising boats to/from Shute Bay.

Noise from the operation of the SHMR has the potential to negatively impact the residential property approximately 50m from the SHMR site and the Shute Harbour Motel approximately 100m from the SHMR site during the daytime with night time noise restricted to entertainment noise controlled under the *Liquor Regulation 2002*.

Due to building orientation and siting the most significant impacts from the operation of the marina will be experienced by the Shute Harbour Motel which will not be acoustically attenuated physically or spatially as with the western residence where residential dwellings will reflect noise and the distance is more than 500m to potential noise sources.

It is noted that other than the operation of the development, additional noise sources affect both the Shute Harbour Motel and residence, specifically those indicated as dominating the existing acoustic environment, including operations of the SHTF to the east and road traffic noise.

Control measures will be implemented during the operation of the marina to minimise noise levels experienced at sensitive receptors within the locality.

### Road Traffic

An acoustic assessment is required to be undertaken in accordance with the DMR *Road Traffic Noise Management – Code of Practice* for new residential developments (i.e. sensitive land uses) associated with the new SHMR when they are adjacent to a State-controlled road (i.e. Proserpine-Shute Harbour Road). An acoustic assessment on road traffic noise by Cardno has been undertaken and is attached as Appendix R of this EIS. The acoustic assessment on road traffic noise predicted noise levels in the year 2022 (predicted date of occupancy) for:

- all floors of proposed residential development; and
- formal open spaces including recreational areas, for example boardwalk and parkland.

The predicted noise levels when compared against relevant acoustic quality objectives specified in the Code of practice were excessive at proposed dwelling footprints located on lots directly backing onto Proserpine-Shute Harbour Road with other parts of the tourism precinct (including hotel) protected by building reflection and the 3 storey car park.

The potential haulage route for heavy vehicles accessing the SHMR from the Proserpine-Shute Harbour Road has also been identified with the potential noise impacts from heavy vehicles emissions qualified based on the estimated number of trucks and delivery frequencies required for construction works. The impact is difficult to quantify considering existing heavy vehicles utilising the road network. However road traffic noise is expected to impact on sensitive places located less than 30m from the road carriageway.

### **Mitigation Measures**

Mitigation measures to be implemented to address potential noise and vibration impacts include the following.

#### Design Phase

- Suitable design of entertainment venues to minimise external noise and vibration.
- Noise mitigating design and materials in construction of the residential and resort accommodation in accordance with the requirements of the road traffic noise assessment results.

#### Construction Phase

- Staged construction.
- Where practicable noisy plant or processes shall be replaced by less noisy alternatives.
- All plant and equipment shall be used in accordance with manufacturer's instructions.
- Care will be taken to site and orientate noisy equipment away from noise sensitive places.
- Machines used intermittently, such as cranes, dozers, graders, back hoes, loaders shall be shut down in the intervening periods between works.
- Where machines are fitted with engine covers, these shall be kept closed when the machine is in use.
- Materials shall not be dropped from a height onto either trucks/barge/hardstand.
- All plant and machinery to be in good working order with operational mufflers where required.

- Regular and effective maintenance of stationary and mobile plant and equipment including off-site vehicles shall be undertaken.
- A builder or building contractor must not carry out building work on a building site in a way that makes or causes audible noise to be made from the building work:
  - on a Sunday or public holiday, at any time; or
  - on a Saturday or business day, before 6.30am or after 6.30pm.
- Undertake community consultation or notify the potentially affected residents of noisy construction periods prior to commencing the works.
- Comply with noise conditions of relevant approvals.
- Use of temporary barricades/screens to remove line of sight to noisy plant/equipment.
- The proposed haulage route is utilised during normal operating times as much as practicable by heavy vehicles supplying material for the construction of the SHMR.

#### Operational Phase

- Apply boat speed limits within the marina precinct.
- Apply road traffic speed limits within the precinct.
- Limit operational hours of commercial and business facilities.
- Acoustically attenuate air conditioning units and refrigeration equipment.
- Provision of acoustic treatments (such as noise barriers) with regard to land area, the character of the use relative to its setting and to prominent views to mitigate road traffic noise impacts internal of proposed dwellings.
- Comply with noise conditions of relevant approvals.

The issue of nuisance from noise is subjective and complaint driven and, in the event of a noise complaint being received by the Operator, an investigation will commence to resolve the complaint as specified in the CEMP, existing as Appendix U1, and/or Marina SBMP, existing as Appendix U3, where relevant. This allows development of specific mitigation strategies, including ongoing monitoring if required to address complaints and promote successful resolution.

## 4.9 Nature Conservation

### 4.9.1 Description of Environmental Values

The SHMR site is located within Shute Bay which is part of the GBRWHA and GBR Coast Marine Park.

Environmental values for Shute Bay waters have been identified and presented in Table 23 in Section 4.5 'Coastal Environment'.

The GBRWHA is one of Australia's first World Heritage Areas. It is the world's largest World Heritage Area extending 2,000km and covers an area of 35 million hectares. It was inscribed in 1981 for the following outstanding natural universal values.

- An outstanding example representing the major stages in the earth's evolutionary history;
- An outstanding example representing significant ongoing ecological and biological processes;
- An example of superlative natural phenomena; and
- As containing important and significant habitats for in situ conservation of biological diversity.

The GBRWHA contains coral reefs, seagrass meadows, mangroves, soft bottom communities and island communities. It provides nesting grounds for the endangered green and loggerhead turtles and is a breeding ground for humpback whales. The islands and cays support several hundred bird species and breeding colonies. The World Heritage Area is also culturally significant containing numerous important archaeological sites of Aboriginal and Torres Strait Islander origin. The area contains numerous shipwrecks and historic ruins and lighthouses. Approximately 98% of the WHA is within the GBRMP with the remainder being Queensland waters and islands (DEH, 2004).

The GBRMP is protected under the GBRMP Act and which was also used to establish the GBRMPA.

The GBR Coast Marine Park is protected under the MP Act, extends 3 nautical miles seaward from HAT and is the jurisdiction of the EPA (incorporating the QPWS).

The site is surrounded by the following areas of conservation value.

- Habitat Protection Zone of the GBRMP.
- Significant Coastal Wetlands including seagrass communities and coral reefs pursuant to draft Regional Coastal Plan.
- Significant Coastal Dunes pursuant to the draft Regional Coastal Plan.
- National Park pursuant to the NC Act.
- Areas of state significance (social and economic importance).

The GBRMP is the world's largest marine protected area (344,400m<sup>2</sup>; more than 2,000km in length and several hundred kilometres wide in some parts) and because of its size incorporates a large number of different habitats (eg. more than 2,900 reefs and about 900 islands and coral cays comprising 30 reef and 40 non-reef bioregions) (Stokes *et al.* 2004).

The GBRMP has an estimated 1,500 species of fish and more than 300 species of hard, reef-building corals with more than 4,000 mollusc species and over 400 species of sponges having been identified (Stokes *et al.* 2004). Other well-represented animal groups include:

- anemones;
- marine worms;
- crustaceans (e.g. prawns, crabs); and
- echinoderms (e.g. starfish, sea urchins).

The GBRMP is also as an important wetland because it meets all of the six criteria which define a wetland as being of national importance. The six criteria are as follows.

- A good example of a wetland type occurring within a biogeographic region in Australia.
- A wetland which plays an important ecological role or hydrological role in the natural functioning of a major wetland system/complex.
- A wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail.
- Supporting 1% or more of the national populations of any native plant or animal taxa.
- Supporting native plant or animal taxa or communities which are considered endangered or vulnerable at the national level.
- A wetland of outstanding historical or cultural significance.

Significant coastal wetlands (including seagrass and coral reefs) and significant coastal dunes have been mapped by the EPA in the draft Regional Coastal Plan prepared pursuant to the CPM Act at the SHMR site. Significant coastal wetlands and dunes play a critical role in maintaining a healthy functioning coast and are key elements of coastal resources that the State government is seeking to protect and manage.

The SHMR site has been mapped also as containing remnant (not of concern) RE.

Conway NP is located north of the site and is protected area under the NC Act, in order to provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally compatible. Conway NP is an undeveloped vegetated peninsula, providing a signature green backdrop to the Whitsunday Coast. The Park, a 22,500 ha area, encompasses the largest area of protected lowland tropical rainforest in Queensland, south of the wet tropics. A diverse range of vegetation within the Park exists including rainforest, mangroves, open forest and lowland rainforest.

The SHTF to the east of the site has been identified as an area of state significance (social and economic) being one of five strategic port land areas of social and economic importance in the Mackay-Whitsunday region (EPA, 2006).

The above areas of State significance have been illustrated in Figures 15-18.

It is noted that there are none of the following conservation areas in the vicinity of Shute Bay.

- FHA. The closest FHA to Shute Bay is located in Repulse Bay, approximately 40km south.
- Ramsar wetlands. The closest Ramsar wetland is the Bowling Green Bay Area, approximately 180km north.
- No significant Aboriginal or non-indigenous (historical) cultural heritage sites (or materials).

Technical reports appended to this EIS specifically prepared to address this section as listed below have been expanded on in the following sub sections to satisfactorily address the ToR.

- FRC Environmental (2008) *Aquatic Ecology*, presented as Appendix P1 of the EIS.
- Natural Solutions (2008) *Marine Megafauna Impact Assessment and Management Plan*, presented as Appendix P2 of the EIS.
- PLACE Design (2008) *Terrestrial Ecological Assessment*, presented as Appendix Q of the EIS.

#### 4.9.1.1 Terrestrial Flora

A terrestrial flora assessment was undertaken by Place Environmental (Place) to address the requirements of the ToR in relation to terrestrial flora present on the proposed SHMR site (both north and south of the Proserpine-Shute Harbour Road). The terrestrial ecology assessment is presented as Appendix Q of the EIS.

The Shute Harbour area lies within the Central Queensland Coast Bioregion. This region around Mackay contains flora found nowhere else in Australia because of the high rainfall. The diverse vegetation located within this bioregion represents the diverse landscapes found within it. The Central Queensland Coast Bioregion, covering an area of about 1.5 million ha, is centred upon the high rainfall coastal lowlands, hills and ranges around Proserpine, Mackay and Carmilla and includes the wet coastal areas around Shoalwater Bay to the south.

Although the SHMR site comprises 33.5 ha, 26.05 ha consists of sub-tidal (marina basin) area, the majority of the remaining 7.45 ha lies between Proserpine-Shute Harbour Road and Conway NP. The vegetation within this area varies according to topography; however it mainly consists of low open woodland with a grassy ground storey or an open eucalypt forest with some rainforest species contained within the understorey.

The purpose of the terrestrial ecology assessment was to identify the floral species and vegetation communities that are present or are likely to be present on the SHMR site. Vegetation communities were assessed to determine whether they could be considered:

- to be 'remnant' woody vegetation communities with respect to the provisions of the VM Act; and/or
- to contain species and vegetation communities that are protected in relation to state NC Act and EPBC Act.

Prior to undertaking the field survey component of the flora assessment, identification of the currently mapped REs for the SHMR site was carried out. The RE Description Database (REDD) assigns each RE a category; either '*Endangered*', '*Of Concern*' or '*Not of Concern*' (Sattler and Williams 1999).

Table 45 and Figure 21 indicate the results from the RE map search.



**Table 45 Regional Ecosystems of the Site as Identified by RE Mapping**

RE	Description	Vegetation Management Status	Biodiversity Status	Significant Flora
8.1.1	Open-shrubland to closed forest of mangrove species forming a variety of associations, depending on their position in relation to tidal channels and the amount of freshwater input they receive.	Not of Concern	No Concern at Present	None listed
8.12.5	Pink bloodwood <i>Corymbia intermedia</i> , Shute Harbour white mahogany <i>E. portuensis</i> ± brush box <i>Lophostemon</i> spp. ± turpentine <i>Syncarpia glomulifera</i> ± coast banksia <i>Banksia integrifolia</i> , open forest.	Not of Concern	No Concern at Present	Habitat for the threatened species <i>Ozothamnus eriocephalus</i>
8.12.14	Variable eucalypt dominated associations, often with grey ironbark <i>Eucalyptus drepanophylla</i> , narrow leaved ironbark <i>E. crebra</i> , <i>Acacia spirorbis</i> subsp. <i>solandri</i> , brush box <i>Lophostemon confertus</i> and Queensland peppermint <i>E. exserta</i> , on islands and rocky headlands, on Mesozoic to Proterozoic igneous rocks, and Tertiary acid	Not of Concern	No Concern at Present	Habitat for the threatened species <i>Berrya rotundifolia</i> and <i>Bonamia dietrichiana</i>

EPA's (WildNet) online and DEWHA (Protected Matters Search Tool) were also used to identify nationally threatened species which might be present on the SHMR site if suitable habitat was available. The search covered an area much larger than the SHMR site to maximise identification of regional flora species with the potential to occur on site.

268 flora species were identified by the databases consulted. Of those species, 9 threatened species were identified; as listed in Table 46 below.

**Table 46 Threatened Plant Species Results from Database Searches**

Species	Common Name	Conservation Status		Sited During Field Survey
		NC Act	EPBC ACT	
<i>Atalaya rigida</i>	No common name	R	-	No
<i>Macropteranthes fitzalanii</i>	Northern bonewood	R	-	No
<i>Rourea brachyandra</i>	No common name	R	-	No
<i>Solanum sporadotrichum</i>	No common name	R	-	No
<i>Leucopogon cuspidatus</i>	No common name	-	V	No
<i>Ozothamnus eriocephalus</i>	No common name	V	V	No
<i>Berrya rotundifolia</i>	No common name	R	-	No
<i>Bonamia dietrichiana</i>	No common name	R	-	No
<i>Ozothamnus eriocephalus</i>	No common name	V	V	No

**Conservation Status:** Nature Conservation Act (Qld) 1992 (NC Act) - endangered (E), vulnerable (V), rare (R); Environment Protection and Biodiversity Conservation Act (C'wth) 1999 (EPBC) – endangered (E), vulnerable (V)

RE mapping is based on aerial photography, satellite images and occasionally is supplemented by field data and canopy cover derived from desk-top analysis of data sets. As a result, the vegetation association component of mapping can occasionally be incorrect. Site specific surveys allow verification of the RE mapping and also allow finer resolution at a local or site scale.

The land based components of the proposed SHMR site were inspected by an experienced and qualified ecologist and an environmental team in August 2007. Detailed list of species found during the field surveys are contained an appendix of the terrestrial ecology report presented as Appendix Q.

Although the region was found to contain habitat for the threatened species listed above, detailed searches were conducted throughout the entire site but did not reveal the presence of any species of threatened flora.

A detailed floral inventory of the site recorded a total of:

- 64 families of native Australian and exotic flora;
- 145 genera of native Australian flora and 22 genera of exotic flora (with 4 genera across both distinctions); and
- 172 species of native Australian flora and 24 exotic species of flora.

Field surveys indicated that approximately 60% of the terrestrial portion of the SHMR site is vegetated with remnant or near remnant low eucalypt woodland, and 30% with remnant mangrove shrub land to low closed forest. The remaining portion supports regrowth eucalypt woodland, remnants of a former quarry, degraded roadside batters and power-line and road easements.

Most of the vegetation communities of the site, with the exception of terrestrial vegetation closest to Proserpine-Shute Harbour Road and the former quarry site are relatively undisturbed and have good ecological value and function.

Of the terrestrial flora species identified on the site none are:

- threatened species subject to the provisions of State or Commonwealth legislation;
- at the extent of their geographic range; or
- represent an extralimital extension to a previously known geographic range.

The following 5 communities were identified on the site. Vegetation management status of all 5 communities is listed as '*Not of Concern*' and the biodiversity management status is listed as '*No Concern at Present*'.

#### **Community 1: Grey ironbark *Eucalyptus drepanophylla* low woodland to open forest**

This community is generally comprised of and dominated by mature remnant wind sheared grey ironbark and white mahogany with blood wood occurring in lower densities. The canopy layer possesses a median height of 10 to 12m and a canopy cover of between 40 - 70%. The shrub layer is generally dominated by grass tree *Xanthorrhoea johnsonii*.

The groundcover layer is dominated by saw sedge, mat rush, blueberry lily and grasses. This community possesses a high ecological value and landscape amenity and would greatly benefit from assisted rehabilitation.

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### **Community 2: Queensland Blue Gum *Eucalyptus tereticornis* open forest**

This community tends to represent wetter vegetation and occurs on the lower slopes and/or alluvial flats of coastal granite hills. The canopy layer is generally comprised of and dominated by mature Queensland blue gum and/or grey ironbark. The community occurs along two major arid drainage lines that occur in the central parts of the site, north of the Proserpine-Shute Harbour Road. The canopy layer possesses a median height of 14m and a canopy cover of between 20% - 70%

The groundcover is dominated by sedges, grasses, native millet, Guinea grass and vines (*Jasminum didymium*) and mangrove wax-flower vine. The area was found to be moderately to heavily degraded with a cover of corky passion vine and a variety of herbaceous roadside weeds.

This community possesses a moderate ecological value and landscape amenity and would greatly benefit from assisted rehabilitation.

Communities 1 and 2 will not be affected by development and will be returned to public ownership, possibly managed as part of Conway NP.

### **Community 3: Shute Harbour white mahogany *Eucalyptus portuensis* low woodland to open forest**

This community is represented by Shute Harbour white mahogany wind-sheared low woodland to open forest on granite coastal hills occurring on south and east facing slopes. The canopy layer possesses a median height of 6 to 8m and a canopy cover of between 40 - 60%.

The mid-stratum is densely vegetated and comprised of predominantly forest grass tree. The groundcover layer is dominated by juvenile grass tree *Xanthorrhoea johnsonii* and other coastal grass species.

### **Community 4: Mangrove shrub land to low closed forest**

This community is represented by dense low closed mangrove forest to shrub land. The community dominates all land within the intertidal zone, south of Proserpine-Shute Harbour Road. This vegetation type is further discussed in section on aquatic flora. A small grove of this vegetation type was identified centrally within the site on the northern side of the road in association with a culvert necessary to collect and disperse flows from drainage lines.

The canopy layer possessed a variable median height, ranging from 1.5 to 4.5m and a variable canopy cover of between 40 - 90%. This community possesses a high ecological value and landscape amenity.

### **Community 5: Degraded disturbance areas**

This association is represented by fragmented groves of mid-mature regrowth along the seaward side of Proserpine-Shute Harbour Road. The composition of these associations is variable and in places the vegetation appears to have been planted. Tree species present include Queensland peppermint and grey ironbark. Small trees and tall shrubs included cottonwood *Hibiscus tilaceous*, *Thespesia populnoides*, *Acacia multisiliqua*, *Caesalpinia bonduc* and hoop pine *Araucaria cunninghamii*.

A large amount of organic garden refuse was recorded at the eastern extent of the association. The community, as a whole, presents in poor health with marked weed incursion.

## Weeds

Coastal and marine environments are under pressure from pest species which have been introduced intentionally (eg for ornamental or agricultural purposes) or accidentally (eg through ballast water or on the hulls of boats).

Management of pest species at the SHMR site will need to have regard to:

- preventing the introduction, establishment and spread of pest species in the coastal zone; and
- managing the impacts of existing and new pest species.

Pest management is a key issue in the Whitsunday Region. The magnitude of the pest problem has required the development of a pest management plan for the Whitsunday Region. The ranges of pests that are specific to the area include weeds wild dogs and dingoes, feral pigs, foxes and rabbits. The WRC and other stakeholders in the Region have the obligation under the *Land Protection (Pest and Stock Control Route Management) Act 2002* (LP Act) to either eradicate, control or reduce the occurrences of pests depending on their classification.

The LP Act lists the declared plant and animals and their management class. The class allocated to the pests reflects the potential severity of its impact and measures needed for their control. In addition to this legislation, the WRC has adopted a local law to deal with the management of weed species that are not declared by State legislation (WRC 2006).

Weeds can have significant adverse impact on land resources by reducing the amount of land available for agriculture, competing with native flora and reducing habitat values for native animals. The Whitsunday Region is the host to a range of declared and environmental weeds. Within the Whitsunday Region (formerly Whitsunday Shire) there are 16 weed species declared under the LP Act. Local Law 13 WRC (Control of Pests) lists an additional 9 species that are considered to be pests within the local area.

Field surveys conducted by Place identified 25 weeds species at the SHMR site. Of these one is a declared weed (Captain Cook tree) listed as Class 3 under the LP Act. All other weeds on the site can be considered environmental weeds.

Majority of the weeds were found in the disturbed vegetation community 5, although corky passion vine and Guinea grass have expanded also into adjacent remnant vegetation and as such should be considered the most invasive species on the site.

## Bushfire

Native vegetation on the north side of Proserpine-Shute Harbour Road is unlikely to pose a bushfire hazard to the SHMR because of the distances between the vegetation and the nearest proposed bushfire sensitive place. Although some steep slopes occur to the north of the site the hazard is low, because the greatest hazard is posed by fires starting on lower slopes and quickly progressing upslope on account of convective forces associated with the fire.

The risk of bushfires starting from the SHMR is reduced by the fire break imposed by Proserpine-Shute Harbour Road. The most likely ignition sources for bushfire will be as a result of unauthorised use of the buffer lands by motorbike riders, bushwalkers and from the dumping of rubbish, although there is currently little evidence of these activities. Management of this buffer area will revert to QPWS (as part of Conway NP) once the proposed grant of this part of the site to the State is formally accepted.

#### 4.9.1.2 Terrestrial fauna

A terrestrial ecology assessment was undertaken by Place to address the requirements of the ToR in relation to terrestrial fauna that are likely to inhabit the proposed SHMR site (both north and south of the Proserpine-Shute Harbour Road).

The terrestrial ecology assessment is presented as Appendix Q of the .

The purpose of the assessment was to consider the terrestrial ecological attributes of the region (biodiversity, ecological communities and habitats, processes and integrity), and determine their pest/conservation significance subject to State and Commonwealth legislation.

A desktop review of the region was undertaken to identify the range of species which given suitable habitat and seasonal conditions, could utilise habitat types on the site. The desk top review included the use of the EPA database (Wildlife online) and DEWHA (Protected Matters Search Tool) search tools.

The search area used for the databases was larger than the study area, this maximises the identification of regional species with the potential to occur on site. Particular emphasis was placed on identifying state and nationally threatened species that may be present if suitable habitat was identified.

Field surveys were also conducted on the site (on both sides of the Proserpine-Shute Harbour Road) to identify habitats and species that are present on the site.

Qualified and experienced staff members from Place carried out the fauna habitat assessments to determine broad habitat values present on the site. In particular surveys were conducted for the following types of habitat features.

- Areas with a dense understorey which are favoured by small terrestrial mammals.
- Caves, culverts, trees containing large and small hollows and other similar structures as such features are used as roost or nest sites by a range of species.
- Waterways and wetlands.
- Rocky outcrops.
- Typically prominent nests of raptors.
- Insect and blossom producing habitats.
- Rainforest habitats.

The quality of the fauna habitat was assessed as a low, moderate or high in regards to habitat components being present and whether it was large enough to support species.

Surveys were carried out to determine the likelihood of the occurrence of terrestrial fauna species listed as threatened under Commonwealth and Queensland legislation. The fauna field surveys were conducted in August 2006. The purpose of the surveys was to encounter as many fauna species (mammals, birds, reptiles and amphibians) as possible, as well as to record all observations of fauna habitat and indication of their presence (eg. scat collection, trunk scratching).

Three trap lines were set across ecological gradients on the site, to sample all major habitat variants present. Two were included on northern side of the Proserpine-Shute Harbour Road, and a third was placed on the southern side of the road within and behind the mangrove zone. Outside of these trap lines, unusual sites or sites containing special habitat features were also searched.

Assessment techniques that were used during the field surveys are listed below.

- Elliott Type A traps.
- Cage traps.
- Pitfall traps.
- Ground hair tubes.
- Anabat Surveys (bat call detection).
- Nocturnal arboreal and ground spotlighting.
- Diurnal bird searches.
- Active diurnal reptile ground searches.
- Nocturnal call playback.
- Scat (faecal) /bone identification.
- Tracks, scratches and signs of feeding.

Results from the desktop review shown in Table 47 identified:

- 8 species listed as threatened under the *Nature Conservation (Wildlife) Regulation 2006*; and
- 11 species listed as threatened under the Commonwealth EPBC Act.

**Table 47 Threatened Fauna Species Results of Wildlife Online Searches**

Species	Common Name	Conservation Status		Wildlife or Protected Matters Database
		NC Act	EPBC Act	
<b>Reptiles</b>				
<i>Delma labialis</i>	Striped-tailed delma	V	V	Pro. Mat
<i>Eulamprus amplus</i>	Orange-sided skink	R	-	Wildlife
<i>Egernia rugosa</i>	Yakka skink	V	V	Pro. Mat
<b>Birds</b>				
<i>Accipiter novaehollandiae</i>	Grey goshawk	R	-	Wildlife
<i>Erythrotriorchis radiatus</i>	Red goshawk	E	V	Pro. Mat
<i>Esacus neglectus</i>	Beach-stone curlew	V	-	Wildlife
<i>Ephippiorhynchus asiaticus</i>	Black-necked stork	R	-	Wildlife
<i>Geophaps scripta scripta</i>	Squatter pigeon (southern)	V	V	Pro. Mat
<i>Haematopus fuliginosus</i>	Sooty oystercatcher	R	-	Wildlife
<i>Macronectes giganteus</i>	Southern giant-petrel	E	E	
<i>Numenius madagascariensis</i>	Eastern curlew	R	-	Wildlife
<i>Ninox rufa queenslandica</i>	Rufous owl (southern)	V	-	Wildlife
<i>Pterodroma neglecta neglecta</i>	Kermadec petrel (western)	-	V	Pro. Mat
<i>Rostratula australis</i>	Australian painted snipe	R	V	Pro. Mat
<b>Mammals</b>				
<i>Dasyurus hallucatus</i>	Northern quoll	-	E	Wildlife/ Pro. Mat
<i>Petrogale persephone</i>	Proserpine rock wallaby	E	E	Wildlife/ Pro. Mat
<i>Pteropus conspicillatus</i>	Spectacled flying-fox	-	V	Pro. Mat
<i>Xeromys myoides</i>	Water mouse/ false water rat	R	V	Pro. Mat

**Conservation Status:** *Nature Conservation Act (Qld) 1992 (NC Act)* - endangered (E), vulnerable (V), rare (R); *Environment Protection and Biodiversity Conservation Act (C'wlth) 1999 (EPBC)* – endangered (E), vulnerable (V)

The field survey identified a total of 41 species of terrestrial fauna that can be confirmed or tentatively confirmed as being present based on remote observation or detection of non-specific signs comprising of:

- 7 species (3 families) of reptiles;
- 25 species (14 families) of birds; and
- 9 species (8 families) of mammals.

Despite targeted surveys for species of conservation significance (threatened, rare or migratory) there were no species listed above recorded during the field survey assessment.

Surveyed species were researched and cross referenced with the suitable habitat areas found on the site. The habitat assessment for each terrestrial fauna likely to be present on the site is discussed below.

### **Amphibians**

Database searches indicate records for 10 amphibian species in the locality of the SHMR site, none of which are listed as threatened under Commonwealth or Queensland legislation. No amphibians were recorded during the survey period, however small feeder creeks to the north of the road may provide suitable breeding and foraging habitats for a range of common amphibian species known to the region. It is unlikely that the site provides any significant values as a wildlife corridor for amphibian species.

### **Reptiles**

Database searches indicate records for 32 reptile species in the locality of the site, including one Rare (NC Act) species (refer to Table 47).

7 reptile species were recorded during the field surveys however based on the diversity of habitats at the site, combined with the site's proximity to Conway NP it is likely that a wider range of reptile species occurs within the region.

Suitable habitat for the orange-sided skink listed as *rare* pursuant to the NC Act occurs along the rainforest gullies, particularly in the northern (uphill) areas of the site. It is possible therefore that this species occurs at the site, despite the absence of records during the survey period.

The striped-tailed delma listed as *vulnerable* pursuant to the NC Act and EPBC Act occupies open vegetation types on rocky slopes (Low, 1978). Suitable habitat for this species occurs along the slopes of ridges at the site (northern side of the road) and, despite the absence of records during the survey period, this species may occur within the region.

### **Birds**

Database searches indicate records for 137 bird species in the region, including 5 threatened species (Table 47). During the survey period, 25 bird species were recorded at the site. Given the combination of habitat diversity (closed forest, open forest, mangrove communities) and the proximity of the site to a protected area it is likely to support a much larger number of bird species than were recorded during the survey. In particular, many migratory and nomadic species would occupy the site during the summer months.

The site does not provide any suitable habitat for oceanic bird species.

Database searches indicate that the *vulnerable* rufous owl (NC Act) and *rare* grey goshawk (NC Act) are known to occur in the vicinity of the site. In addition Protected Matters Database Search Tool indicates the potential occurrence or suitable habitat for the *endangered* (*vulnerable*) red goshawk (NC Act and EPBC Act respectively) in the area. The habitat assessment supports this search finding indicating that the site may provide suitable forage, roosting or breeding habitat for these species.

It is acknowledged that all raptor species have large home ranges, encompassing a matrix of forage, roosting and breeding habitats. It is therefore possible that the site may form a component of the much larger home ranges of any of the threatened raptor and owl species known from the wider locality.

Although searches for wader birds were undertaken few were observed due to the time of year. Visitations are likely to be random as a result of nomadic dispersal throughout suitable coastal habitat.

### **Mammals**

Database searches indicate records for 23 terrestrial mammal species in the locality of the SHMR site, including 2 endangered species (refer to Table 47). The Commonwealth Protected Matters Database Search Tool indicates the potential occurrence of, or suitable habitat for, 2 additional threatened mammal species (refer to Table 47).

During the survey period, nine mammal species were recorded at the site.

The *endangered* northern quoll (EPBC Act) has been recorded in the locality is most abundant in rocky eucalypt woodland but is also known to occur in a range of vegetation types, mostly within 200km of the coast. It makes its den in rock crevices, tree holes or occasionally termite mounds. Although there were no signs of the species there was suitable forage and den habitat found along the northern slopes and ridges of the site, and this species may therefore occur at the SHMR site despite the absence of records during the survey period.

The water mouse was identified by database searches as having the potential to occur at the site. The water mouse occurs in tidal mangrove and adjacent saltmarsh communities. The habitat assessment indicates that suitable high-tide nesting habitat for the water mouse does not occur at the site. However, tidal mangrove communities found on the southern side of the road may provide suitable low-tide forage habitat for the water mouse. It is therefore possible that the water mouse may occur in the wider locality, albeit at very low density although no record was found during the field survey of its presence.

The Proserpine Rock-wallaby, has high local prominence, and is listed as a threatened species pursuant to the NC Act and EPBC Act, is unlikely occur within the bounds of the SHMR footprint as there is no suitable habitat located south of the Proserpine-Shute Harbour Road. The 'Review of the Recovery Plan for the Proserpine Rock-wallaby *Petrogale Persephone* 2000-2004 (Nolan and Johnson 2001) to determine likely corridors based on identified attributes indicates that the existing Proserpine-Shute Harbour Road bisects a large area of suitable habitat approximately 2-4 km to the west of the site.

### **Mosquitos**

Mangroves and saltmarshes located on the southern side of the road provide breeding grounds for mosquitos. Saltmarsh mosquitos are able to develop to adults within six days if pools of water remain stagnant.



WRC has provided a summary of the existing mosquito species in the area as sampling was not undertaken for the presence of mosquito species onsite. Within the Shire there are a number of mosquito species, some of which are disease carriers. Shute Bay is a known breeding area for four species.

- *Ochlerotatus vigilax*.
- *Coquillettidia xanthogaster*.
- *Culex annulirostris*.
- *Ochlerotatus notoscriptus*.

Although these species have never been collected in abnormal numbers compared to other areas within the Shire, they are still present in the Shute Bay area (WRC, 2004).

Mosquitoes are the vectors of a number of diseases such as Barmah Forest Virus, Dengue fever, Japanese encephalitis, Murray Valley encephalitis and Ross River virus. Not all of these diseases have vaccines available, therefore, mosquito control plays an important role in preventing the spread of these diseases (LGAQ, 2002).

### **Feral Animals**

Humans are responsible for feral animals being in Australia. For example, rabbits and foxes were imported and released to provide hunting opportunities for gentleman farmers. Some animals escape from captivity, but others are abandoned when they are no longer wanted. Feral animals have a direct and indirect impact upon local native animal populations and have detrimental impacts on soil resources by causing erosion.

#### **4.9.1.3 Aquatic Ecology**

An assessment of the aquatic flora and fauna was undertaken for the proposed SHMR by FRC. The aquatic ecology assessment is provided in Appendix P1 of the EIS

The FRC assessment presents the findings of field surveys and associated studies within Shute Bay aquatic environment providing the following information.

- Description of the intertidal and subtidal communities within the SHMR footprint.
- Description of the intertidal and subtidal communities adjacent to the SHMR footprint.
- Description of potential impacts of the proposed SHMR on intertidal and subtidal communities.
- Opportunity for impact mitigation.

Specifically this report considers:

- seagrass communities;
- macroalgal communities;
- mangrove communities;
- saltmarsh communities;
- benthic infaunal communities;
- coral communities;
- fish communities;
- fisheries;
- flora and fauna associated with existing marine structures; and

- conservationally significant habitat and species.

The aquatic ecology methodology including sampling techniques and results are described in appendices A to G of the aquatic ecology report, presented as Appendix P1 of the EIS.

The distribution and characteristics of the bay's communities are provided below. No exotic (pest) species were found.

## **Seagrass**

### Distribution

#### *Shute Bay*

The distribution, density and community structure of seagrasses within the bay has varied significantly over the past two decades.

On five previous occasions the seagrasses of Shute Bay have been surveyed with seagrass distributions and composition within Shute Bay having significantly changed. Historically *Halodule ovalis* (*H. ovalis*) and *Halodule univervis* (*H. uninervis*) dominated with *Cymodocea serrulate* and *Zostera Muelleri* (*Z. muelleri*) less commonly distributed. *Halophila spinulosa* and *Syringodium isoetifolium* have only been recorded in the entrance of the bay. Overall surveys have shown the cover of seagrass in Shute Bay as having increased since 1987.

In June 2004, patches of sparse seagrass covered approximately 80 ha of the subtidal sediment within Shute Bay. Seagrass distribution in 2004 represented less than 5% of the area within Shute Bay compared to seagrass in 2007 which covered approximately 147 ha. The composition of seagrass communities was highly variable consisting of *H. uninervis*, *H. ovalis* and *Z. muelleri* growing to a maximum height of 1.46 m above LAT. The 2007 distribution in Shute Bay is presented in Figure 19. Seagrass species within Shute Bay are common within the Whitsunday region, and more generally within shallow, sheltered, inshore environments of Australia's tropical east coast.

The current extent of seagrass in Shute Bay represents a near maximal extent of cover. The survey conducted in 2007 is considered to be the most comprehensive, in terms of area of seabed covered and time spent underwater, and is therefore the most accurate in determining the extent of seagrass distribution. Earlier estimates have been limited by a lesser number of transects and spot dives and by extrapolations from helicopter surveys and aerial photographs.

Factors affecting seagrass distribution and abundance in Shute Bay have also been assessed. Within the Whitsunday region, the variation in seagrass communities is likely a result of physical disturbance (eg. wave action) above the low tide mark and light availability. The following factors have been identified as important factors limiting the distribution of seagrasses in the water column and sediment (CW, 2005).

- water clarity.
- salinity.
- temperature.
- currents.
- exposure.
- sediment characteristics.
- nutrients.

Seagrasses have biological strategies to cope with factors affecting distribution with the currently dominant seagrasses within Shute Bay well adapted for life in unstable environments and can rapidly recolonise when conditions become suitable.

On a regional scale, seagrass meadows of the Whitsunday coast are some of the largest on the eastern Australian coast supporting marine and estuarine food webs and providing extensive habitat for prawns, fish, turtles and dugong. The aerial extent of seagrass communities for 14 locations within the Whitsunday Region is presented in table format in the aquatic ecology investigation in Appendix P1. The difference in seagrass distribution between the various bays is likely due to turbidity levels, which are related to hydrodynamics and sedimentation characteristics.

#### *SHMR Site*

Within and directly adjacent to the proposed marina footprint (including the access channel), there was predominantly bare substrate with patches of sparse to moderate seagrass. Approximately 14.59 ha of sparse to moderately dense seagrass was recorded within the marina footprint in the 2007 survey. The biomass of such communities was low.

Within the predicted dredge plume as per coastal modelling (refer to section 4.5 'Coastal Environment'), a small amount of sparse to moderate *H. uninervis* community occurs.

Seagrass communities within the development footprint and immediately surrounding this area are indicative of a frequently disturbed environment (i.e. predominantly from wind and wave action).

#### Ecological Values of Seagrasses

As significant primary producers (Hillman *et al.* 1989) seagrasses have been recognised as playing a critical role in coastal marine ecosystems. They provide shelter and refuge for resident and transient adult and juvenile finfish, crustacean and cephalopods, many of which are of commercial and recreational importance, other of which are the preferred foods of these species (Coles *et al.* 1993; Connolly, 1997; Dredge *et al.* 1977; Edgar and Shaw 1995; Grey *et al.* 1996; Howard *et al.* 1989; Hutchings 1982; McNeill *et al.* 1992).

Seagrass meadows, like mangroves, provide important nursery habitat, particularly for a range of crustacean species. In Eastern Australia, seagrasses support both a greater diversity and abundance of fishes on bare substrate (Gray *et al.* 1996; Middleton *et al.* 1984; Ramm, 1986). Seagrasses also provide a direct source of food for dugong, some turtle species (Lanton *et al.* 1989), and some species of fish and crustacea.

The distribution of juvenile tiger prawns (*Penaeus semisulcatus* and *P. esculentus*), eastern king prawns and endeavour prawns is strongly correlated with inshore seagrass meadows (Staples *et al.* 1985). Each of the species in Queensland's east coast commercial prawn catch are dependant upon seagrass meadows as nurseries where juveniles may shelter and feed before recruiting to deepwater fishing grounds (Zeller, 1998). Seagrass leaves provide physical cover for young prawns and provides a substrate for both epiphytic algae and minute grazing animals, which form a major component of the prawns' diet.

The distribution of juveniles of commercially important species such as bream, tarwhine, sea mullet, flat-tail mullet, luderick and sand whiting are also positively correlated with the occurrence of seagrass (West & King, 1996).

Seagrasses also trap, stabilise and hold bottom sediments (Fonseca & Kenworthy, 1987; Poiner & Peterken, 1995); slow and retard water movement promoting sedimentation of particulate matter and inhibiting resuspension of organic and inorganic matter (Phillips & Menez, 1988); produce and trap detritus and secrete dissolved organic matter that tends to internalise nutrient cycles within the system (Moriarty *et al.* 1984); and provide large amounts of substrate for encrusting animals and plants (Harlin 1975; Klumpp *et al.* 1989).

#### Fisheries Values of Seagrasses within Shute Bay

The fisheries value of seagrass within Shute Bay has been assessed in the aquatic ecology report presented as Appendix P1 of the EIS. Little difference was observed in the relative value of fisheries of the seagrass communities in the north, west and south of Shute Bay. Seagrasses where they are connected to other seagrass meadows or mangrove stands have a high fisheries value however seagrasses within the development footprint are fragmented. A full account of the assessment of the fisheries values of the bay's seagrass communities is presented in the aquatic ecology investigation presented as Appendix P1 of the EIS.

#### Ecological Values of Unvegetated Substrate

Unvegetated sandy and muddy sediment, whilst commonly considered to not be as productive as areas supporting seagrass, are also important to the ecosystem. 'Bare' substrate is rarely seen. Where sediments are stable, benthic microalgal communities become established within both the intertidal and shallow subtidal, predominantly in the top 3cm of sediment. Benthic micro-algae are a major food source for benthic feeders such as prawns and other crustacea, bivalves, and polychaete and nematode worms, which in turn are an important source of food for fishes including juvenile mullet (Hollaway & Tibbetts, 1995), bream and whiting (Weng, 1983).

Productivity rates of benthic micro-algae are highest in shallow coastal regions, with biomass greatest at water depths of less than 5m. In these shallow regions benthic micro-algae may form the basis of the coastal food web (Dennison & Abal, 1999).

Mudflat habitats may be transitional zones between juvenile and adult habitats (Laegdsgaard & Johnson, 1995). Bare substrates in shallow waters may also provide shelter from larger predators and the opportunity to employ camouflage: whiting, flathead and flounder are each examples of species positively associated with bare substrate habitat.

Intertidal and shallow subtidal sand flats support a variety of fish species. Fish such as whiting and flathead feed in sandy areas, whereas other such as bream and mullet prefer the fauna associated with muddy areas.

Bream and other important species including juvenile sand whiting feed over and along the edges of sand banks (Morton *et al.* 1987). Female sand crabs are associated with sand banks, whilst males are likely to be found in adjacent gutters (Smith & Sumpton, 1987). Bait species important to both commercial and recreational fishers inhabit intertidal and shallow subtidal banks of sheltered bays (e.g. worms) and estuaries (e.g. yabbies) (Zeller, 1998).

The fauna associated with soft sediment habitats is typically determined by the character of the sediment: its grain size and stability; and with the presence or absence (Humphries *et al.* 1992; Poiner, 1980), or proximity (Ferrell & Bell 1991) of seagrass. Grain size influences the ability of organisms to burrow, and the stability of 'permanent' burrows. Unstable sediment support less diverse benthic communities than those that are relatively stable. For example, bare sediments within 10m of seagrass meadows were shown to support a similar total abundance of fishes, but a reduced diversity of species when compared with nearby *Zostera* seagrass meadows, whereas a bare substrate 100m distant from the seagrass meadows supported significantly fewer individuals and species (Ferrell & Bell, 1991). In partial contrast, studies of bare substrate and nearby *Ruppia* meadows showed finfish diversity to be higher over bare substrate, but abundance and biomass highest in the seagrass meadows (Humphries *et al.* 1992).

Shallow water bare sediment communities are characterised by widely fluctuating abundances, species richness and diversity. These fluctuations are correlated with severe abiotic disturbances (such as wind and wave activity). During calmer months, shallow bare sand may develop similar communities to deep water bare sand habitats (Poiner, 1980).

## **Mangroves and Saltmarsh**

### Distribution

#### *Shute Bay*

Historically construction of the Proserpine-Shute Harbour Road has led to the loss of several hectares of mangroves and saltmarsh in Shute Bay, west of the SHMR. Since this disturbance mangrove distribution and density in Shute Bay has generally increased. Recently, no significant disturbance of mangroves in Shute Bay has occurred with a 1991 survey recording approximately 35 ha of mangroves in Shute Bay, which reflects a similar status to the present distribution.

Mangrove communities within Shute Bay are dominated by the red mangrove (*Rhizophora stylosa*) with lower abundances of:

- grey mangrove (*Avicennia marina*);
- river mangrove (*Aegiceras corniculatum*);
- myrtle mangrove (*Osbornia octodonta*);
- blind-your-eye mangrove (*Excoecaria agallocha*);
- mangrove apple (*Sonneratia alba*); and
- yellow mangrove (*Ceriops tagal*).

The mangroves on the western and southern sides of Shute Bay cover a significantly greater area than those within the east of the proposed development area.

Regionally Shute Bay supports a relatively small area of mangroves which are typical of, and common within the region.

#### *SHMR Site*

Within the development footprint approximately 1.84 ha of mangroves currently occurs. *Rhizophora stylosa* dominated mangrove communities dominate the seaward fringe of the SHMR site, forming a band approximately 15m wide and an open canopy of approximately 4m wide, and is intermixed with grey and river mangrove. Further landward, the community changes with an open canopy approximately 2.5m high.

Mangroves give way to patches of saltmarsh on mostly rocky ground which then rises in a relatively steep bank to Proserpine-Shute Harbour Road.

Within the predicted dredge plume, approximately 0.19 ha of mangroves occur.

### Ecological Values of Mangroves

The term 'mangroves' refers to a vegetation type, essentially comprised of trees able to withstand regular inundation by both fresh and salt water. Typically, mangroves are restricted to sheltered shorelines occupying the intertidal shallows between the sea and land. The 'soil' or sediment upon which mangroves grow may be clean coarse sand, but is more commonly fine silt and mud, high in nutrients but essentially anaerobic (lacking in oxygen).

Mangroves are an important component of the estuarine habitat for the following reasons.

- Input significant amounts of vegetable matter into the food chain. Leaves, fruits and bark fragments fall either directly into the water or to the ground where they are carried into the water on the next tide. As these components decompose, they provide both soluble nutrients and detrital fragments that are eaten by crustacea such as prawns and crabs and some fish. Bacteria and fungi also feed on the decomposing matter and in turn are eaten by larger organisms (West, 1985).
- Trap, accumulate and release nutrients (and in some cases pollutants) and particulate matter (silt) from surrounding land, thus acting as a buffer to the direct effects of runoff (West, 1985).
- Provide a habitat or shelter to a range of fauna and flora (e.g. Morton *et al.* 1987). Mangroves are recognised as important roosting sites for birds and macro-bats (e.g. Driscoll, 1992), and the sediment in which they typically grow supports both a high diversity and abundance of fauna. Many species of algae and 'terrestrial' epiphytes are commonly found in association with mangrove communities. The creeks which wind through large mangrove forests are also important as fish and crustacean habitats (Blaber, 2000; Robertson & Blaber, 1992; Robertson & Duke, 1990; Vance *et al.* 1990).
- Protect the shoreline from erosion emanating from the water (waves, boat wash) or the land (runoff) and contribute to the establishment of islands and the extension of shorelines (Blamey, 1992).

Estuarine mangrove forests are important nursery grounds for many species of juvenile fishes (Blaber, 1997; Halliday and Young, 1996; Laegdsgaard and Johnson, 1995; Robertson & Duke, 1990) and by comparison characteristically support greater abundances of fish than either seagrass areas or unvegetated tidal flats (Blaber *et al.* 1992; Laegdsgaard and Johnson, 1995; Robertson & Duke, 1987). Sub-tidal habitats characterised by mangrove-lined channels support a variety of fish species, which appear to have habitat-specific distributions according to individual species requirements for food and shelter from predation (Zeller, 1998). For example, mangrove prop roots and fallen timber snags are influential in the distribution of estuarine snappers (such as *Lutjanus argentimaculatus*) rabbit fishes and bream, supporting a higher abundance of these species than unvegetated banks and mid-channel habitat. These latter habitats also support a smaller diversity of species, but are none the less positively correlated with the distribution of gopros and ariid catfishes (Sheaves, 1996).

The branches, twigs and leaves of mangroves and other coastal plants, fallen into the sea and moved about by tidal action, also form temporary habitats for juvenile fishes (Conacher *et al.* 1996), often remote from the mangrove forests themselves (Daniel & Robertson 1990). Decaying organic matter of both plant and animal origins is consumed by both juvenile and adult greasy back prawn, and juvenile banana prawns – obligate residents of mud banks adjacent to mangroves (Staples *et al.* 1985). Adult banana prawns eat both small benthic invertebrates feeding on detritus in channels draining mangroves, and benthic algae on adjacent mud flats (Newell *et al.* 1995). Fisheries Values of Mangroves within Shute Bay

#### Fisheries Values of Mangroves within Shute Bay

Mangroves were assessed for fisheries values by FRC. The mangroves on the western and southern shores of Shute Bay have been assessed as having a relatively high value to fisheries however communities within the development footprint exhibit low value to fisheries resulting in a lower total abundance and species richness of fish and crustaceans. This is due to their fragmentation with other mangroves stands and seagrass communities.

A full account of the assessment of the fisheries values of the bay's mangrove communities is presented in aquatic ecology report contained in Appendix P1 of the EIS.

#### Ecological Values of Saltmarsh

Coastal saltmarshes are found in saline areas and are dominated by herbs, grasses or low shrubs (Adam, 1990). Saltmarshes are frequently found in upper intertidal, landward of the mangrove forests on areas which are infrequently inundated by tidal or fresh water, and that consequently have very high soil water salinities. Where soil salinity exceeds the ability of even saltmarsh plants to grow, bare claypans may form. The mosaic of saltmarsh and claypan elements may result in a high quantity of eco-tonal habitat.

The ecological role of saltmarsh communities is perhaps the least well understood of the intertidal communities (saltmarsh, mangroves and seagrasses), particularly in Australia. However they are thought to have the following important roles.

- Stabilisation of bare mud flats. Algae frequently colonise first forming mats over the bare mud. The mucilaginous nature of the algae stabilises the sediment surface, enabling colonisation by other (saltmarsh) plants. Sediment is then trapped by the leaves of these plants, causing a gradual build up of sediment. The binding of sediment by plant roots also probably confers some resistance to erosion (van Erdt 1985, cited in Adam 1990);
- Provide habitat for fish and invertebrates.
- Remineralisation of terrestrial and marine debris: saltmarshes contribute to nutrient cycling, and may buffer the water bodies from excess nutrients from the land (Adam 1990).
- Provide a direct food source for terrestrial, avian and marine fauna.

Current understanding of the direct use of saltmarshes by finfish and nektonic crustaceans is comparatively poor. Early seasonal studies indicated that fish of importance to commercial (and recreational) fisheries rarely utilise upper littoral saltmarsh habitat (Connolly *et al.* 1997; Morton *et al.* 1988); whilst more recent studies indicate that some Queensland saltmarsh / claypan areas are commonly frequented by fish species of significance to commercial and recreational fishers (Connolly, 1999).

Slatmarshes may support dense mats of algae, which are important contributors to local fisheries productivity through providing an alternative source of food to detritus (Adam, 1995). Further, the shallow pools topped up intermittently by rainfall support a variety of invertebrates (including crabs, other small crustaceans and insects) that are consumed by fishes following the rising tide. In particular, juvenile bream are known to enter tidal drains into saltmarsh habitat on the rising tide to feed, moving back into deeper water as the tide recedes (Morton *et al.* 1987).

## **Macroalgae**

### Distribution

#### *Shute Bay*

Macroalgal communities respond to a variety of physical and biological parameters. In 1991 macroalgae (especially *Sargassum sp.*, *Padina sp.* and *Turbinaria sp.*) occupied 28% of the substrate of the fringing reef on the spit in the southern part of the bay which is similar to the proportion to that occupied by macroalgae in the 2004 and 2007 surveys by FRC.

Mixed macroalgae communities were found throughout much of subtidal sections of Shute Bay significantly overlapping seagrass distribution. Large areas of *Laurencia majuscula* dominate communities in the middle of the bay. The northern side of the bay generally supports more abundant macroalgae communities than the southern side, where the SHMR is proposed. Approximately 133 ha of macroalgae were recorded from Shute Bay in the 2007 surveys.

Algal species recorded within Shute Bay are common within the Whitsunday region, and more generally within shallow, sheltered, inshore environments of Australia's tropical east coast.

#### *SHMR Site*

Within the development footprint approximately 34 ha of mixed macroalgae communities were surveyed. Mixed communities (of low cover) were typically dominated by the:

- brown algae *Padina sp.*;
- *Sargassum sp.*;
- red algae *L. majuscula*;
- *Hypnea valentiae*; and
- *Asparagopsis taxiformis*.

Within the predicted dredge plume approximately 9.06 ha of low cover (<20%) mixed macroalgae communities and 3.41 ha of *Hypnea sp.* dominated communities.

Cyanobacteria *lyngbya* (*Lyngbya majuscula*) is naturally occurring, however the historical distribution and frequency of blooms is unknown within the Whitsundays. No *Lyngbya* was recorded in the 2007 aquatic ecology field surveys.

### Ecological Values of Macroalgae

Macroalgae are a commonly overlooked component of the marine environment, which may significantly contribute to the ability of a locality to support marine life, particularly fish and crustacea. The macroalgal component of estuarine floral communities may consist of several elements: loose lying or drift algae, rhizophytic or benthic macroalgae, and epiphytic algae on seagrass or other algae (den Hartog, 1979).



The ecological significance of macroalgae and its role in nurturing and feeding fish and crustacea of importance to commercial and recreational fisheries has only recently been investigated. Macroalgal communities can play a role similar to other macrobenthic plants, providing oxygen, food and habitat for small fauna.

Macroalgae are likely to:

- provide shelter and refuge for resident and transient adult and juvenile animals, many of which are of commercial and recreational importance trap, stabilise and hold bottom sediments;
- slow and retard water movement promoting sedimentation of particulate matter and inhibiting resuspension of organic and inorganic matter;
- supply and fix biogenic calcium carbonate;
- produce and trap detritus and secrete dissolved organic matter that tends to internalise nutrient cycles within the system; and
- provide food for many species including the green turtle (*Chelonia mydas*), an endangered species.

Algae and invertebrates attached to rocky shores and reefs are grazed by fishes such as luderick, drummer, rabbit fish and bream.

Drifting macroalgae increase habitat complexity of coastal waters and substrates, and may also server to 'redistribute' small fish and invertebrates.

## **Coral**

### Distribution

#### *Shute Bay*

The distribution of rocky reef flora and fauna is determined by physical characteristics such as exposure to wave action and water quality (especially turbidity), and biological characteristics such as competition, predation, recruitment and proximity to larval sources.

Coral communities form an extensive spit that partially encloses the bay's southern entrance, this spit is located 800m away from the foot print of the SHMR site. Coral cover on the spit is highest on the seaward side, where tidal flushing is greatest bringing food and clear water to the community.

Coral communities occurring within Shute Bay spit are likely to be the extant expression of a community that has existed for centuries or longer. However with the recent increase in incidences of coral bleaching throughout tropical waters, there has been significant impacts on inshore coral communities in the Whitsunday region and throughout the Great Barrier Reef, which may have reduced, at least in the short term, live hard and soft coral cover within communities of Shute Bay.

#### *SHMR site*

Within the development footprint approximately 10 coral colonies were recorded covering less than 2% of the substrate. The hard and soft coral genera and other sessile invertebrates recorded on the spit, and their relative abundances, are presented as part of the aquatic ecology investigations.

The relative abundance of each hard coral genus is typical of inshore coral communities in the Whitsunday region, with sediment tolerant genera such as *Goniopora*, *Porites* and *Turbinaria* dominating.

Regionally a discontinuous fringe of coral communities occur along the rocky shores of the Whitsunday coast, whilst the Whitsunday Islands support more extensive coral communities. In comparison with these communities, corals of Shute Bay at the spit are relatively small.

### Ecological Values of Coral

Rocky substrates such as emergent platform reefs and boulders support a diversity of flora and faunal communities, such as hard and soft corals, sea urchins, sea stars, crustaceans, polychaetes and many other invertebrates, as well as fishes, reptiles (such as turtles and sea snakes), seagrasses and macroalgae. The high habitat diversity (including rock pools, gullies and ledges) found in these environments may support a high species diversity. These habitat types are of importance to many species that require hard substrate for colonisation. Whilst the most diverse hard coral communities occur in clear, tropical offshore waters, extensive inshore coral communities are found along much of Australia's northern coastline, and within the Indo-Pacific region.

### **Benthic Invertebrates**

Benthic invertebrates were largely distributed based on the sediment characteristics within the bay.

The macro-invertebrate infaunal communities of Shute Bay are characterised by a diverse and moderately abundant fauna, characteristic of intertidal communities in the Whitsunday region.

Benthic infaunal communities are dominated by lucinid bivalves and polychaete worms from the families of Capitellidae, Eunicidae, Glyceridae, Lumberinidae, Maldanidae, Nereidae and Terebellidae. Foraminifera are highly abundant within the sediments and anemones and sea pens are common components of epibenthic fauna.

A complete list of invertebrates recorded at Shute Bay during the present study is provided as part of the aquatic ecology investigations (Appendix P1).

Regionally, the shallow water, coarse reefal and fine terrigenous sediments in Shute Bay support a moderate abundance of benthic epi- and infauna, including bivalve molluscs, worms, borrowing crustacean, abundant foraminifera, and occasional small sponges and sea pens; typical of shallow water, mobile sediment substrates along the north Queensland coast. Within the suite of habitats presented in the Shute Bay region, this benthic faunal community is not of outstanding ecological significance.

### **Fish and Crustacea**

The coral, mangrove and seagrass communities of Shute Bay support a diverse assemblage of fishes. Surveys of fishes were undertaken using a range of sampling techniques including netting, trapping and Underwater Visual Census (UVC), via SCUBA and free dives, and in accordance with a General Fisheries Permit.

Fish species observed over the seagrass communities included a total of 12 families of finfish and 1 family of commercially important crustaceans.

Fish species observed over the mangrove communities included 15 families of finfish and 2 families of commercially important crustacean.

Fish species observed over the coral community included:

- angelfish;

- damselfish;
- emperor;
- wrasse;
- butterfly fish;
- seaperch;
- cod;
- rabbitfish; and
- surgeonfish.

A full list of the fish (including crustacean) species recorded from the mangrove, seagrass and coral communities of Shute Bay during the 2004 and 2007 field surveys is presented in the aquatic ecology report contained in Appendix P1 of the EIS.

### Marine Megafauna

An assessment of marine megafauna was undertaken by Natural Solutions with report findings contained in Appendix P2 of the EIS. The objective of the report is to:

- provide background information on megafauna ecology likely to occur in the Shute Harbour area;
- highlight conservation threats to these species;
- provide available baseline data for the subject site and surrounds;
- undertake a risk assessment of potential impacts;
- discuss priority impacts on the proposed development on marine megafauna species likely to occur in the area; and
- provide a management and monitoring program to guide implementation of the Marine Megafauna Management Plan.

The distribution of marine megafauna associated with the North Queensland coast was analysed using distribution maps to determine the likelihood of their presence within the Whitsunday Region. As a result of the assessment it was determined that marine megafauna including whales, dugong, dolphins, marine turtles and crocodiles all have a presence within the Whitsunday region. A summary of each of these marine megafauna is given in Appendix P2 including their description, distribution, population, habitat, diet, breeding, threats and conservation status. The summary of each marine species likely to occur in Shute Bay is presented in Table 48.

**Table 48 Marine Megafauna likely to occur in Shute Bay and Whitsunday Region, their Preferred Habitat and Conservation Status**

Common Name	Scientific Name	Preferred Habitat	Likelihood of occurring in Shute Bay (Low, Med, High)	Likelihood of occurring in Whitsunday Region (Low, Med, High)	Conservation Status: IUCN Commonwealth Queensland
Humpback Whale	<i>Megaptera novaeangliae</i>	Pelagic	Low	High	Vulnerable Vulnerable Vulnerable
Dugong	<i>Dugong dugon</i>	Wide shallow protected coastal bays and channels, especially where seagrass occurs	Moderate	High	Vulnerable Migratory Vulnerable

Common Name	Scientific Name	Preferred Habitat	Likelihood of occurring in Shute Bay (Low, Med, High)	Likelihood of occurring in Whitsunday Region (Low, Med, High)	Conservation Status: IUCN Commonwealth Queensland
Indo-Pacific Humpback Dolphins	<i>Sousa chinensis</i>	Coastal and estuarine waters	Low	Moderate	Data deficient Listed Rare
Snubfin Dolphin	<i>Orcaella heinsohni</i>	Coastal and estuarine waters	Low	Moderate	Insufficiently known Listed Rare
Flatback Turtle	<i>Natator depressus</i>	Turbid, soft bottom habitats	High	High	Vulnerable Vulnerable Vulnerable
Green Turtle	<i>Chelonia mydas</i>	Sub-tidal and tidal reefs and seagrass meadows, in Coastal protected waters	High	High	Endangered Vulnerable Vulnerable
Loggerhead Turtle	<i>Caretta caretta</i>	Coral and rocky reefs, muddy bays, sandflats, estuaries and seagrass meadows.	High	High	Endangered Endangered Endangered
Hawksbill Turtle	<i>Eretmochelys imbricata</i>	Coastal reefs, rocky areas, estuaries and lagoons	High	High	Critically Endangered Endangered Vulnerable Vulnerable
Leatherback Turtle	<i>Dermochelys coriacea</i>	Pelagic	Low	Moderate	Endangered Vulnerable Endangered
Olive Ridley Turtle	<i>Lepidochelys olivacea</i>	Pelagic juveniles Adults pelagic, but forage in soft bottomed, shallow protected waters.	Low	Moderate	Endangered Endangered Endangered

In addition to the above mammals and turtles, the Saltwater Crocodile is recorded as having a distribution encompassing Shute Bay. Sightings of saltwater crocodiles have occurred at the Laguna Quay marina near Proserpine, south of the SHMR site.

An EPBC Protected Matters search was performed for the area. Table 49 below lists these species, their EPBC listing and likelihood of occurring within the SHMR site and surrounding waters of Shute Bay (the study area).

**Table 49 Marine Megafauna Results of EPBC Protected Matters Search in the SHMR Study Area**

Type	Species	EPBC Act Listing	Likelihood of Presence within the Study Area
Mammal	Humpback Whale	Vulnerable, Migratory, Cetacean	Not likely
	Blue Whale	Endangered, Migratory, Cetacean	Not likely
	Bryde's Whale	Migratory, Cetacean	Not likely
	Killer Whale, Orca	Migratory, Cetacean	Not likely
	Minke Whale	Cetacean	Not likely
	Indo-specific Humpback Dolphin	Migratory, Cetacean	Potential to occur
	Snubfin Dolphin	Migratory, Cetacean	Potential to occur
	Common Dolphin	Cetacean	Not likely
	Risso's Dolphin, Grampus	Cetacean	Not likely
	Pantropical Spotted Dolphin	Cetacean	Not likely
	Spotted Bottlenose Dolphin	Cetacean	Likely
	Bottlenose Dolphin	Cetacean	Not likely
Dugong	Migratory, marine	Likely	

Sharks	Whale Shark	Vulnerable	Not likely
	Grey Nurse Shark	Critically endangered	Not likely
	Sawfish	Critically endangered	Not likely
Reptiles	Flatback Turtle	Vulnerable, Migratory, Marine	Potential to occur
	Green Turtle	Vulnerable, Migratory, Marine	Potential to occur
	Loggerhead Turtle	Endangered, Migratory, Marine	Potential to occur
	Hawksbill Turtle	Vulnerable, Migratory, Marine	Potential to occur
	Leatherback Turtle	Vulnerable, Migratory, Marine	Potential to occur
	Olive Ridley Turtle	Endangered, Migratory, Marine	Potential to occur
	Estuarine crocodile (saltwater)	Migratory	Potential to occur

#### 4.9.2 Potential Impacts and Mitigation Measures

This section describes the potential impacts of the SHMR and mitigation measures proposed to protect EVs described in Section 4.9.1 and Section 4.5 'Coastal Environment'.

The recognised conservational significant habitat and fauna is protected under various Queensland laws and the Proponent requires approval for the SHMR as discussed in Section 1.6 of this EIS. To ensure regulating bodies have sufficient information to inform decision making, this section covers all the direct, indirect and cumulative environmental harm to flora and fauna that has the potential to result from the proposal. Specific emphasis is paid to environmentally sensitive areas and species that have a local, state, national and international significance such as species listed under the NC (Wildlife) Regulation as Rare, Vulnerable or Endangered and species listed under the EPBC Act.

Overall the SHMR is unlikely to have a significant impact on the terrestrial fauna and habitats. The majority of potential impacts are expected in the marine environment of the SHMR site.

##### 4.9.2.1 Terrestrial Fauna and Flora

Field surveys and the habitat assessment indicated that the optimal location for any development at the site would be in the low lying areas south of the existing road. This would result in negligible impacts on fauna habitat along slopes and ridges, which continues into more extensive habitat areas in the adjacent Conway NP. The design of the SHMR does not result in development north of the Proserpine-Shute Harbour Road, and existing vegetation north of the road will be returned to public ownership as a community benefit. Riparian buffers, in the form of the grassed stormwater diversion swale, will provide protection for amphibians and reptiles that may occur on the site.

The terrestrial ecology assessment provides an analysis of the vegetation within the total site. Approximately 2.59 ha of woody (remnant and regrowth) vegetation will be affected, of which 1.8ha is remnant RE. It is noted that the remnant RE have a vegetation management/biodiversity status *Not of Concern/No Concern at Present*. The majority of the remnant vegetation comprises mangrove RE 8.1.1 (1.65 ha) and smaller areas of RE8.12.5 (0.05 ha) and RE8.12.14 (0.1 ha), the latter two which lie within the road reserve and may be affected by road works undertaken for improved traffic safety and site access.

The mangrove habitat is well represented within Shute Harbour and the broader Whitsunday region however marine vegetation habitats fringing the northern shore of Shute Harbour are discontinuous and are not developed compared to the continuous bank of mangrove communities that lines the southern side of Shute Harbour.

An assessment against part S of the Coastal Bioregions Regional Vegetation Management Code has been undertaken by Place and presented as part of the terrestrial ecological assessment in Appendix Q of the EIS, with the performance requirements met by the following strategies.

- Clearing limited to the extent necessary for the SHMR.
- Consideration given to bushfire management principles.
- Offset habitat proposed on the reclaimed isthmus.
- Sediment and erosion control to be implemented.
- Amelioration measures investigated for the Proserpine Rock-wallaby.
- No clearing of remnant RE being at a Conservation Status Threshold.
- Development of plans for water quality and acid sulfate soil management.

Road mortality has been identified as a significant threatening process to the Proserpine Rock-wallaby (Nolan and Johnson 2001), a threaten species with high local prominence. It is unlikely that the Rock-wallaby will cross within the boundaries of the SHMR site, as there is no suitable habitat for this species located on the southern side of the road. However the Place report identifies the increase in traffic resulting from the SHMR will have an indirect impact on the Proserpine Rock-wallaby known crossing point located 4km to the west of the site.

The ridge known as Flametree Hill situated to the west of the site is a known “hot-spot” for vehicle strikes for this species. Actions have already been undertaken jointly by QPWS and DMR to reduce road kills in this area. These have included revegetation of road verges and a trial of roadside wildlife reflectors (*pers. comm.* Barry Nolan, Senior Ranger Airlie Beach Central Region).

As development of the marina site has the potential to increase the volume of traffic along Proserpine-Shute Harbour Road, thus resulting in the potential for increased road mortality of Proserpine Rock-wallabies that may cross the road to the west of the site, it is necessary to monitor additional impacts and or crossing points based on strike data and further nocturnal surveys, in conjunction with QPWS.

Should impacts be identified, amelioration in the form of a night time reduction in speed limits, wildlife crossing signs and reflective devices has been proposed by Nolan and Johnson (2001). In addition audible rumble strips or introduction of traffic calming devices (raised traffic platforms, series of speed humps) at the approaches to identified crossing points may have the effect of reducing potential road mortalities.

Implementation of reduced speed limits may also reduce the potential road mortalities of the rufous owl.

The Place assessment demonstrates that the SHMR is unlikely to result in any significant impacts on the spectacled flying fox, northern quoll or water mouse.

The SHMR proposes the following strategies as part of construction and operational works.

- No development north of the Proserpine-Shute Harbour Road.
- Contributing to monitoring of the Rock-wallaby mortality rates to the west, and contributing to mitigation measures (within the first five years of the development).
- Pest species management.
- Community awareness and participation.

## Weeds

The SHMR as part of the construction and operational works will manage weeds by:

- ensuring all fill is obtained from approved locations and is bare of all vegetative and seed matter reducing the chance of the introduction of any other weeds to the area;
- minimising clearing of vegetation by ensuring the Contractor clearly marks the limits of clearing and trees to be removed/retained this is particularly important where the site abuts the National Park; and
- landscaping using native plant species.

In particular to prevent the spread and incursion and reduce the infestation of the priority weed, Captain Cook Tree (*Thevetia peruviana*), the Proponent proposes the following.

- Promoting awareness of the weed in the area.
- Monitoring the infestation of the weeds.
- Clearing and managing of the spread of the weed by manual removal using as a cut stump treatment Razor (Glyphosate) mixed with water at 1:2 ratio to prevent stump from re sprouting.
- Conducting spray campaigns of disturbed area when required.

## Mosquitos

The mangrove and saltmarsh flats removed as a result of the development will reduce that area in which the mosquitos can breed. The retention ponds proposed as part of the Stormwater Management Plan shall be monitored for mosquito infestations and management shall be consistent with the relevant Queensland State Government documents relating to mosquito management and in accordance with WRC advice.

WRC uses a variety of techniques to control the outbreak of mosquitoes including the following.

- Adulticiding – a process to control adult mosquitoes through the use of spraying pesticides.
- Larvaciding – controlling the larval stage by the use of growth regulators which stop the larvae reaching adulthood. This is the most common method used in the Whitsunday Shire.
- Habitat modification – modifying the natural habitat of mosquitoes. This can simply be by emptying out water containers or adding chlorine to a pool. This is the most effective mosquito control; and
- Biological control – the introduction of organisms to destroy larvae (such as native fish).

Proposed initiatives for mosquito management for the SHMR include:

- earthwork design to avoid creation of artificial ponds which may be likely to provide opportunities for mosquito breeding onsite (apart from those required in the stormwater treatment train and dredge tailwater treatment system);
- ensuring the site is free draining to minimise surface ponding of water which may provide for opportunistic breeding;
- control of potential mosquito breeding through habitat modification and minimised opportunities for onsite breeding in preference on reliance to chemical control; and

- avoiding the creation of large heavy areas of vegetation which may provide mosquito harbourage and movement corridors from identified breeding areas near the development site.

### Feral Animals

The Proponent proposes to become involved in the community operations to control feral animals in the area. The Proponent will also investigate covenants to control the potential for pets such as cats and dogs from becoming pests within the adjacent protected area.

The Site Operator shall also ensure that the site is kept and maintained in a clean manner so as to not encourage feral animals into the area. All rubbish and disposal areas shall be covered with lids and a regular rubbish disposal routine shall be maintained.

#### 4.9.2.2 Aquatic Ecology

Potential impacts may be direct (eg. removal of habitat) or indirect (eg. through influences on water quality) with impacts being permanent, temporary or reversible. The potential impacts of the SHMR are related to the sensitivities of floral and faunal communities in the area. The distribution and characteristics of aquatic species are discussed in the FRC aquatic ecology, attached as Appendix P1 to this EIS.

The SHMR will inevitably result in some detrimental ecological impacts, however ecological benefits will also arise from the proposal.

### Habitat Loss

The direct loss of habitat as a result of the SHMR is compiled in Table 50.

**Table 50 Direct Habitat Loss**

Habitat Type	Area
Seagrass	14.59 ha
Mangroves	1.84 ha
Macroalgae	34.0 ha
Corals	10 small colonies

The loss of seagrass within the SHMR site represents approximately 10% of that recorded in Shute Bay and 0.00028% of that recorded in the GBRWHA.

The loss of mangroves with the SHMR site represents approximately 1.34% and 0.00001% of that recorded in Shute Bay and the GBRWHA respectively.

As discussed in response to Section 4.9.1 the marine habitat of Shute Bay supports a diverse assemblage of fauna species including invertebrates, crustacea, fish and megafauna.

The SHMR construction will also affect wading birds migrating to the area. The proposed marina is likely to result in a loss of a small area of potential forage and roosting habitat for a number of wading birds protected under JAMBA, CAMBA and NC Act. However given the extent of similar shoreline habitat protected within Conway NP and offshore islands it is highly unlikely that the loss of this habitat will result in significant impacts on migratory waders in the region. Minor deposition near the western isthmus is expected to create suitable habitat and existing marinas in Queensland have not been shown to adversely impact on waders occupying nearby forage and roosting habitat (eg Manly, Shorncliffe and Raby Bay in Southeast Queensland).



No other habitat or species of conservation significance are expected to be affected by the SHMR proposal.

The SHMR proposes to offset direct fish habitat loss in accordance with the DPI&F policy *Mitigation and compensation for activities causing marine fish habitat loss* by:

- marine colonisation of the marina;
- installation of fish friendly structures which create habitat complexity and free movement;
- seagrass loss compensation;
- developing a reef funding model (incorporating education and awareness initiatives) known as the “Reef Conservation Fund” which will be initially funded by the Proponent with \$1M and sustained by annual contributions of \$150,000 through boating levies in perpetuity.

More specifically this policy assists and guides decision-making and negotiation of proposals to achieve mitigation of impacts through avoidance and minimisation of impacts (on-site), and compensation for marine fish habitat losses (off-site), which are likely to result from authorities granted under the *Fisheries Act 1994*.

This policy applies to all works proposed for approval under Section 51 of the *Fisheries Act 1994*, where marine fish habitats (including marine plants and lands within declared FHA) are to be permanently or temporarily lost, or otherwise modified, causing loss of fisheries resources and fish habitats.

The policy principles from PP1 to PP8 as listed in the policy document are responded to below.

*PP1 - QFS supports the proper management, use and protection of Queensland’s fisheries resources. The granting of approvals and/or provision of comments for disturbance of habitat used by marine fisheries resources is to be in accordance with the principles of Ecologically Sustainable Development (ESD).*

The proposed SHMR development is consistent with the principles of ESD as shown generally in the documentation of this EIS and particularly in terms of the net benefit assessment presented as Appendix G. It should be noted that the methodology adopted in undertaking the net benefit assessment was developed in consultation with the EPA and clearly shows a positive environmental net benefit.

*PP2 - QFS decisions made in relation to mitigation and compensation are to have regard to other marine fish habitat management and protection policies.*

There is no declared FHA to be disturbed at or adjacent to the site. From Section 2.5 of the EIS relating to Project Alternatives and the Planning Report shown in Appendix C, the principle of mitigation of impacts through avoidance and then minimisation has been observed with compensation considered after other alternatives have been exhausted.

*PP3 - QFS decisions made in relation to authorisation of medium and large losses of marine fish habitat, where options for on-site mitigation of those losses do not exist, are to consider alternative off-site compensation.*

This policy principle commits QFS to considering the offsite benefits of the proposal provided by such aspects as the “Reef Conservation Fund”, the financial contribution toward to a new public boat ramp and the marine interpretive centre.

*PP4 - In circumstances where either mitigation or compensation (or a combination of both) is considered an acceptable component of an approved application, formal mitigation or compensation agreements will be a requirement of authorities issued. Authorities will be extended to apply to mitigation/compensation agreements accepted for off-site locations.*

The EIS makes a Statement of Commitments on the part of the Proponent as detailed in the Section 6 'Conclusions and Recommendations'. It is considered that these commitments will be reflected in the development and lease conditions for the proposal.

*PP5 - Where mitigation or compensation programs have been accepted, any performance indicators to be met within a specified time frame will be outlined within the granted authority.*

As with the previous policy principle it is expected that the requirements of QFS will be reflected in the development and lease conditions ultimately provided by the relevant agencies.

*PP6 - Land exchange proposals may be considered where permanent loss of marine fish habitat is proposed.*

The EIS does not propose any land exchange proposal to offset any fish habitat loss, however, it should be noted in a broader sense that the proposal does involve returning some 4 hectares of land north of Proserpine-Shute Harbour Road and adjacent to Conway NP to public ownership.

*PP7 - QFS does not support replacement of existing (naturally occurring) marine fish habitats with different communities.*

The proposal has no objective to change the values of existing habitats. All maintenance dredge spoil will be disposed of on land.

*PP8 - Funding for research, as a form of compensation for loss of marine fish habitats, is to be dedicated to fisheries related projects agreed to by QFS and the proponent, in consultation with other stakeholders (local government, other relevant management agencies, industry representatives or associations and research organisations).*

The proposal does not seek to fund research. The additional environmental benefits of the "Reef Conservation Fund" will be used directly to provide funding for the construction of environmentally sensitive public moorings as well as education through a marine interpretative and cultural centre.

## **Habitat Gain**

### Marine Colonisation of Artificial Structures

FRC in the aquatic ecology assessment, attached as Appendix P1, assessed the potential habitat gain which will be achieved from the installation of artificial structures associated with the marina and removal of existing swing moorings.

Construction of the SHMR will result in a mosaic of habitats associated with pontoons, piles and other intertidal and subtidal structures (and of course boats) which may provide substrate for many species of algae, hard and soft corals, sponges, ascidians and a variety of other invertebrate fauna. This in turn is expected to provide shelter and food for a variety of fishes and other fauna and a degree of shade important in attracting fish species. FRC has presented evidence from studies showing that the total abundance of fishes increases with an increase in rugosity (structural complexity) and degree of fouling from water users.

In fact studies of natural and artificial habitat have shown that each may support a fish fauna of similar species richness – yet different (but often overlapping) assemblages.

There are a number of fish species that are frequently found in association with ferry and wharf structures along the Queensland coast including the following.

- Bream (*Acanthopagrus australis*).
- Whiting (*Sillago spp.*).
- Flathead (*Platycephalus* and *Neoplatycephalus spp.*).
- Rabbitfish (*Siganus spp.*).
- Butter Bream (*Monodactylus argenteus*).
- Sweetlips (*Diagramma* and *Plectorhinchus spp.*).
- Hardyheads (*Atherinomorous spp.*).
- Silver biddies (*Gerres spp.*).
- Gar (*Hyporhamphus spp.*).
- Mullet (*Mugil, Liza* and *Valamugil spp.*).
- Mackerel (*Scomberomorous spp.*).
- Emperors (*Lethrinus* and *Gymnocranius spp.*).
- Dart (*Trachnotus spp.*).
- Snappers (*Lutjanus spp.*).
- Cods (*Epinephelus spp.*).
- Tusk fish (*Choerodon spp.*).

At a local scale the existing structures at Shute Harbour support a diverse flora and fauna community with pilings and sheltered rock groyne supporting an abundance of soft coral and macroalgae communities (see Appendix P1), approaching 100% cover on available substrate.

The existing SHTF complex provides artificial habitat to a number of recreational species. Recreational fishers regularly take excellent catches of queenfish (*Scomberoides spp.*), cobia (*Rachycentron canadus*), and trevally (*Caranx spp.*; *Carangoides spp.*), and by boat in adjoining waters (B. Humphreys [Harbour Side Boat Hire] 1999 *pers. comm*). Cast netting for baitfish (*Nematalosa spp.* and other Clupeids) is conducted in the shallow waters of Shute Harbour, adjacent to boat ramps and the jetty complex. Anglers fishing the fringing reefs of the area target coral trout (*Plectropomus leopardus*) and report good catches over the winter months. Barramundi (*Lates calcarifer*), salmon (*Eleutheronema spp.*) and grunter (*Pelates spp.*) are taken in small numbers within Shute Bay over the summer months.

FRC surveyed the marine structures of SHTF recording a total of 17 species from 13 families, whereas the rock groyne supported no less than 12 species from 11 families. A full list of species recorded can be found in the aquatic ecology report. Shute Bay is not considered a 'prime' fishing location by local anglers, and the creeks that run to Shute Bay are regarded as being too small to provide significant nursery sites (B. Humphreys [Harbour Side Boat Hire] 1999, *pers. comm*). Similarly, the rock groyne outside Abel Point Marina supports a comparable fish assemblage to that of Shute Harbour. A total of 10 families were represented, with no less than 15 species sighted. A full list of species recorded can be found in the aquatic ecology report contained in Appendix P1 of the EIS.

While the waters of the marina basin are likely to have a relatively low ecological value with water depths likely to be too great to support seagrasses, the productivity supported by the structures of the proposed marina is likely to be significant. A similar cover and diversity to that of SHTF is expected.

### Fish Friendly Structures

The SHMR design incorporates fish friendly structures to increase the habitat complexity within the marina footprint, including:

- sloping sides on structures to increase surface area;
- irregular submerged surfaces (rough, textured, etc) to provide more habitats than homogenous structures such as solid vertical steel and concrete sheets;
- sinuous, or meandering, structures (preferable to straight lines, which provide less surface area and fewer habitats); and
- floating, moored fish-attracting devices.

The DPI Guideline for Fish Friendly Structures (Derbyshire, 2006) has been considered in the design, construction and operational stages of the SHMR proposal.

### Seagrass Gain

The SHMR will necessitate that a number of swing-moorings be relocated. These moorings currently impact on the seabed through chronic physical disturbance as the vessel responds to changing winds and tides. The removal (or decommissioning) of swing moorings and their replacement with an low impact to seagrass and coral “ezyrider” moorings as shown on Figure 16, or equivalent, will enable seagrass to re-establish (at these moorings beyond the development footprint) and a more stable and productive benthic community to develop.

A gain of approximately 950 m<sup>2</sup> of seagrass and macroalgal community is predicted following the replacement of 57 swing moorings with more environmentally friendly versions.

A financial compensation for the loss of marine plants as a result of the SHMR will be determined in the approval stage prior to works commencing and in consultation with DPIF.

### “Reef Conservation Fund”

The SHMR is proposing a “Reef Conservation Fund” model, through an annual levy on berths and initial developer contributions, to support management strategies for the protection and conservation of the wider region, specifically the GBRMP.

Indirectly the SHMR construction may have adverse impacts including:

- increased total suspended solids (TSS) concentrations;
- sediment deposition;
- spills of hydrocarbons and other contaminants;
- disturbance of ASS and PASS;
- increased human activity, including changes in light and noise levels;
- altered hydrodynamics and consequently altered patterns of sediment deposition and erosion; and
- disturbance of contaminated sediments.

This model will also fund education and awareness initiatives, being a Marine Interpretive and Cultural Centre.

### Impacts and Mitigation Measures

The impact on aquatic ecology during construction is discussed in the aquatic ecology report. Generally the described impacts have the effect of:

- decreasing euphotic depth (light penetration);
- reducing water quality due to increased pollutant loads (including nutrients, sediment and attached pollutants) thereby impacting upon flora and fauna; and
- reducing the aesthetics and amenity of the area.

The SHMR has been designed to minimise direct and indirect ecological impacts as discussed in Section 3 'Description of the Project' by adhering to the precautionary principle of ecologically sustainable development models.

The SHMR proposes to manage any indirect impacts of construction works by implementing environmental management plans developed to avoid indirect impacts. Environmental Management Plans have been prepared as listed below.

- CEMP - attached as Appendix U1;
- ASSMP - attached as Appendix I3;
- WMP - attached as Appendix U2; and
- Marine Megafauna Management Plan- attached as Appendix P2.

The CEMP, ASSMP and WMP encompass implementation strategies to meet performance objectives, specify monitoring requirements and corrective action. In particular the following strategies have been included.

- Water quality monitoring to meet long term WQOs.
- Appropriate waste management.
- Best practice fuel storage facilities and handling procedures.
- Installation of low lux lighting.
- Noise amelioration measures.
- Erosion and sediment control.

The MMMP prepared by Natural Solutions for both the construction and operational stages of the development proposal identifies potential impacts and has assessed the risk posed by each of these potential impacts in relation to the SHMR on marine megafauna.

Table 51 below presents the risk assessment results. A process and methodology of the risk assessment was in accordance with a modified version of Australian and New Zealand Standard for Risk Management (AS/NZS 4360:2004) undertaken by Stocklosa (2001) for assessing impacts from coastal and marine activities as part of planning for South East Region Marine Plan for the National Oceans Office.

In the context of the SHMR, specialists on megafauna and their conservation, and stakeholders from relevant Government agencies have been consulted to determine the potential impacts and the severity of the consequences. This consultation was undertaken as a workshop exercise (19 December 2006) and individual discussion with megafauna experts within universities and government agencies.

**Table 51 Marine Megafauna Risk Assessment Results**

Potential Impact of Project	Risk
Artificial lighting	Moderate
Water quality degradation (stormwater)	Moderate
Water quality degradation (sewage)	Significant
Habitat loss	Significant
Food source loss (local)	Significant
Food source loss (local)	Moderate
Food source loss (local invertebrates)	Significant
Four wheel driving on turtle nesting beaches	Negligible
Coastal development	Moderate
Beach armouring	Negligible
Beach nourishment	Negligible
Sand mining	Negligible
Marine construction	Moderate
Boat strike	Significant
Boat disturbance	Significant
Dredging	Moderate
Underwater explosions	Negligible
Oil spill (infrequent major)	Significant
Oil spills (frequent minor)	Significant
Marine debris (through entanglement and ingestion)	Significant
Chemical pollution	Significant
Fisheries and incidental capture	Negligible
Indigenous hunting	Negligible
Direct take of adults and turtle eggs by 'poachers'	Negligible
Predation by domestic and feral animals.	Negligible

In total there were no Intolerable risks, 8 *Significant* risks, 6 *Moderate* risk and 11 *Negligible* risks. Potential impacts rated as having a *Negligible* risk are not considered further in the MMP.

If the above impacts listed as *Significant* are not mitigated they may be detrimental to their survival of mega fauna in the region. The impacts listed as 'moderate' will effect the frequency with which mega fauna might visit the area. Both significant and moderate impacts are not desirable and as such the management recommendations for the construction stage have been considered and the mitigation measures proposed by SHMR construction stage are as follows.

- Construction works will not extend beyond the lease land.
- An Oil Spill Management Plan has been prepared as part of the CEMP presented as Appendix U1.
- Waste mitigation strategies have been proposed as part of the WMP presented as Appendix U2.
- Temporary amenity facilities will be provided construction workers.
- Ecological monitoring of seagrass during construction and ongoing implementation strategies shall be undertaken.
- Silt curtains shall be used during dredging works to contain turbidity plumes.

- Marina megafauna shall be relocated from the enclosed marina prior to dredging works.
- The appointed contractor must watch for marine animals every half hour. Works shall cease in the event marine megafauna is observed within 200m of the dredge apparatus.
- A water quality monitoring plan has been preliminary agreed to by EPA and GRBMPA for construction works and is specified in the CEMP.

Operational adverse impacts within the marina are likely to be principally linked to human activity including:

- boat traffic;
- refuelling and sewage pump-out;
- waste disposal;
- introduction of pests via ballast waters and hull cleaning; and
- marina maintenance.

The SHMR proposes to manage operational impacts by developing environmental management plans to address the above impacts. The minimum strategies to protect aquatic ecology values of the GBRWHA are contained within the Marina SBMP presented as Appendix U3.

The purpose of the Marina SBMP is to demonstrate the environmental commitment by the Proponent to carry out their activities in accordance with a structured program that:

- sets the environmental objectives or standards to be achieved over time;
- identifies the potential environmental harm and extraordinary factors that may cause environmental harm resulting from routine operations and establishes and documents measures to avoid and/or manage this harm as far as practicable;
- ensure all persons carrying out the activity are aware of environmental risks, and are trained in the measures and contingency plans to deal with them;
- implements monitoring of environmental performance to ensure the effectiveness of the measures and contingency plans;
- assists the communication of environmental information throughout the organisation and to the administering authorities; and
- provides for continual improvement.

The key elements of the Marina SBMP addressing operational impacts to aquatic ecology are as follows.

- General Amenity.
- Water Quality.
- Dredge Spoil Disposal.
- Waste Management.
- Dangerous and Hazardous Substances (handling and storage).
- Flora and Fauna Management (encompassing boat traffic).

The Marina SBMP includes the following key components for each element.

- *Rationale*: identification of the element to be managed and the environmental impact of activities associated with each element.
- *Objective / Target*: identification of the environmental objectives to be achieved in compliance with applicable legislation.
- *Implementation Strategy*: management measures to be implemented in order to achieve the stated objectives and to ensure impact mitigation.
- *Performance Indicators*: measurable indicators and standards set to assess the efficiency of management measures and determine compliance with the SBMP.
- *Monitoring*: monitoring requirements to measure compliance with the performance indicators and frequency of monitoring.
- *Reporting and Review*: the requirements for reporting of monitoring results and review of management measures where required.
- *Corrective Action*: measures to be undertaken should monitoring indicate non-compliance with performance indicators.

Provided the development complies with current best practice, as specified in the Marina SBMP, the marina is not likely to have a cumulative (and significant) impact on any key features of habitat associated with the GBRWHA and GBR Coast Marine Park.

The sites' SWMS has also been aimed at minimising point discharge of nutrient enriched water into Shute Bay improving the quality of receiving waters.

The GRBMPA has developed an operating guide for boaters listing best practice environmental management, including actions to reduce the risk level of potential impacts to marine megafauna to minimise impacts from increased visitation to the GBRMP. This plan in combination with other educational material published by the GRBMPA will be available to recreational boat operators at the marina site office to encourage improved environmental performance. Commercial operators offering recreational activities including fishing, snorkelling and scuba diving require a permit from regulating authorities.

The impacts of increased visitation to the GRBMP will also be addressed through the proposal for 'Vessel Transit Lanes'. In some cases strategies for visitor management have been developed, for example the Whitsunday and Mackay Islands Visitor Management Strategy (EPA, 2006).

The management recommendations by Natural Solutions for mitigating operational impacts to marine megafauna are encompassed within the Marina SBMP where feasible, where the detailed management recommendations for the operational stage are attached as Appendix P2.

In summary current best practice assessment and engineering design offers significant opportunities to minimise direct, indirect and cumulative impacts (temporary and permanent) associated with the SHMR. In particular the SHMR proposal entails:

- minimal loss of natural habitat through refinement of the marina design and orientation following coastal processes studies to avoid changes to coastal processes (i.e. hydrodynamics);
- code compliant prescribed tidal works;
- creation of habitat;
- conservation of habitat;
- effective 'isolation' of the development footprint during construction using the breakwater and silt curtains;



- 
- constructing the marina in accordance with best practice standards detailed in the CEMP;
  - management strategies for human activity as detailed in the Marina SBMP;
  - monitoring, maintenance and enhancement of environmental values of Shute Bay.

## **4.10 Cultural Heritage**

The assessment of cultural heritage impacts is based on a number of past and current cultural heritage assessments and studies. Most of these naturally focussed on Aboriginal cultural heritage, however, non- Aboriginal cultural heritage has also been addressed in this EIS, insofar as it is relevant to the site.

An indigenous cultural heritage study as specified under the ACH Act was conducted by Northern Archaeology Consultancies Pty Ltd and in conjunction with the Gia and Ngaro/Gia Aboriginal Parties. The cultural heritage study is presented as Appendix S1.

Under the provisions of the ACH Act, a Cultural Heritage Management Plan (CHMP) is a mandatory requirement of projects subject to an EIS, and a CHMP has therefore been prepared between all parties, and presented as Appendix S2 to the EIS.

The consultation undertaken in the formulation of the CHMP is presented in a report attached as Appendix S3 by the Hornery Institute.

### **4.10.1 Description of Environmental Values**

#### **4.10.1.1 Indigenous Cultural Heritage**

##### **Desktop Assessment**

A search of the Queensland DNRW Cultural Heritage Register and Database was conducted in June 2007 and included several parcels of land within and adjacent to the project area including: Lot 2 SP 117289, Lot 273 HR 1757, Lot 252 HR 1717 and Lot 301 1717.

It was advised by DNRW that one (1) Aboriginal cultural heritage site, a shell midden is listed on the DNRW cultural heritage database (site HJ:A37, refer to Appendix S1).

Searches were also conducted of the Federal cultural heritage registers and databases, including the Australian Heritage Database and the Register of National Estate. There were no listings on the Australian Heritage Database for significant indigenous cultural heritage sites or places, specifically at Shute Harbour or Shute Bay.

A broader search for the Whitsunday Shire indicates that there are five 'Indigenous Places' listed on the Register of the National Estate. However, all of these sites are outside the development area of SHMR and would not be impacted on by the development or any indirect impacts of the development.

##### **Existing Archaeological and Cultural Heritage Investigations**

Much of the information relating to Aboriginal cultural heritage of the wider Whitsunday region can be found in unpublished consultancy reports for previous EIS works for this site and other developmental impact assessment projects such as roads, power lines, pipelines and residential, industrial and tourists developments. This is coupled with a large amount of academic archaeological research which has been undertaken in the Whitsunday Region over the past two decades. These studies and assessments have identified a substantial number of Aboriginal cultural heritage sites in the wider Whitsunday region.

The SHMR site and adjacent area has been the subject of several EIS investigations over a prolonged period.

In 1991, an 'Archaeological Assessment of the Proposed Resort and Marina Development at Shute Bay' report was published on behalf of Scotex Pty Ltd. Two cultural sites were recorded within the confines of the development area, however neither of these sites was considered to be culturally significant and both sites were found within the 'littoral fringe'.

Site 1 is discussed in Section 4.10.2 below. Site 2 as it was recorded in the aforementioned report consisted of small quantities of shells located within the eroding road bank of the Proserpine-Shute Harbour Road along the shoreline. It was noted that the type of shells founds suggested that it might be the remains of a highly disturbed Aboriginal shell midden. The shell deposit was exposed along an erosion face approximately 4m in length and 3m in depth. It was suggested in the Report that the possible midden site may have been re-deposited in the course of constructing the Proserpine-Shute Harbour Road.

In 2003-2004 cultural heritage investigations of the SHMR site were carried out for an earlier development proposal by the current Proponent. Further cultural surveys along the coastal fringe and to the north of Proserpine-Shute Harbour Road failed to locate any evidence of significant Aboriginal cultural sites. This is mainly attributed to the very high level of previous landscape disturbance and modification.

The area to the north of Proserpine- Shute Harbour Road was the subject of a 2002 cultural heritage investigation for a proposed Ergon Energy substation. While this investigation did not locate any definite archaeological sites, the Traditional Owners did identify some culturally sensitive vegetation on the hill slopes. The area to the north of Proserpine-Shute Harbour Road is not proposed to be disturbed as part of the current SHMR proposal.

### **Public Notification, Consultation and Liaison**

Twelve Aboriginal respondents representing the Gia People and the Ngaro/Gia People replied to the Public Notice for the SHMR project. One of these respondents subsequently withdrew their response. Thus, the consultation program for the cultural heritage component of this EIS proceeded with eleven respondents. Respondents and/or their representatives became the 'endorsed parties' under the ACH Act for the cultural heritage study and the subsequent development and endorsement of the CHMP.

Consultation with the Aboriginal Parties for the SHMR project was coordinated directly by the Proponent's representative with support and assistance from the Hornery Institute.

The consultation program consisted of a number of project meetings, site inspections and subsequent negotiations relating to the CHMP. The cultural heritage consultation process commenced in November/December 2007 (after the public notification process), and continued until April 2008, with details presented as the cultural heritage consultation report, presented as S3 to this EIS.

A project archaeologist was commissioned to assist in the coordination of cultural site inspections, project meetings and workshops pertaining to cultural issues relating to SHMR and its surrounding area.

On 7th March 2008, a cultural site inspection followed by a number of meetings was conducted with the Aboriginal Parties, the project archaeologist and SHMR representatives. Two site visits were coordinated, the first being with the Gia group respondents and the second visit being with the Ngaro/Gia respondents. Each site visit was followed with a meeting/workshop with each of the groups to discuss the issues relating to the cultural values of the project area, cultural heritage concerns, issues or constraints relating to the development project, and any other issues relevant to the Traditional Owners and the cultural heritage assessment process.

Following these site inspections and meetings, a combined meeting was then held in the evening with all Aboriginal respondents to 'workshop' the feedback, ideas, issues and resolutions of the day's site visits and discussions. The outcome of these discussions was a comprehensive list of project recommendations relating to cultural heritage management and other wide-ranging cultural aspirations for the project.

Further meetings and consultation occurred in the weeks following these site inspections and workshops to finalise the list of recommendations. These recommendations have formed the basis for the CHMP and where appropriate have been incorporated into the design or operation of the SHMR by the Proponents. It should be noted that Traditional Owners and the Proponent have agreed to all processes, procedures and recommendations described in the CHMP.

### **Current Cultural Heritage Investigation**

The methodology and approach to the cultural fieldwork was significantly influenced by the sub-tidal nature of the SHMR area and is detailed in the cultural heritage survey contained in Appendix S1 of the EIS. A detailed and systematic cultural survey of the entire site was not practical, and as a result, the methodology was for the experienced cultural study team to conduct field assessments from various vantage points along the Proserpine - Shute Harbour Road with the endorsed representatives of the Traditional Owners, these being the Gia and Ngaro/Gia peoples.

These inspections were followed by a meetings and workshop to discuss cultural heritage values and management issues identified during the field investigations. During the field investigations, it was indicated by the Traditional Owners that a cultural survey of the land on the northern side of Proserpine-Shute Harbour Road was unwarranted, as this area is not to be disturbed, but is to be surrendered to the Crown for addition to the Conway NP.

The cultural heritage site inspections found no archaeological evidence for significant Aboriginal cultural heritage sites or materials along the coastal fringe of the SHMR. This was not unexpected for two key reasons.

- The intertidal and sub-tidal nature of the area.
- The high level of surface and subsurface ground disturbance and landscape modification that has occurred in the development site area and its surrounds.

Despite these outcomes of the survey, the Traditional Owners have demonstrated that this area of coastline retains a high level of cultural significance to them.

### **Cultural Heritage Values**

Consultation and desktop assessment of the wider Shute Harbour area has indicated that the SHMR site is located within a broad area that retains significant Aboriginal cultural heritage values. This evidence comes from various sources including ethnohistory, oral history, the Aboriginal archaeological record, and most importantly, from the Aboriginal Traditional Owners themselves. These values include the following.

- Coastal values associated with coastal fishing and hunting grounds in pre-contact and post contact times.
- Flora and fauna of the development area and its value as bush tucker, including shellfish, food plants and medicines. Mangroves, reef habitat, seagrasses and dugongs were also viewed as important to traditional owners.

The Gia and Ngaro Traditional Owners have confirmed that the Shute Harbour coastal area (including the SHMR site) remains culturally significant to them for the following reasons.

- The land is part of the Traditional Owners homelands (land and sea country).
- The wider Shute Harbour area was traditionally used for fishing, foraging, camping and for other cultural purposes and has been used in contemporary times for fishing and the collection of shellfish, bush tucker and medicines.
- Areas in the vicinity of the SHMR on the mainland and on offshore islands contain archaeological evidence of Aboriginal use and occupation in the form of shell middens, stone artefacts, scarred trees, rock shelters, ceremonial sites and burial places.
- Intact Aboriginal cultural sites, artefacts of material might remain in the intertidal and subtidal zones of the SHMR area.
- The Traditional Owners have retained an enduring 'connection to country'. This 'connection' has not diminished despite the historical dispossession of land and the numerous alterations to the physical and cultural environment since European settlement.

Traditional Owners are actively involved in 'caring for country' along the Whitsunday coastline. This has been achieved through continued involvement in turtle conservation and monitoring programs, Coast Care and native plant re-vegetation programs. The Traditional Owners have maintained an active interest in the management of the land and sea and have worked with the Proponent to develop mitigation strategies to ensure the cultural significance of this site is not only maintained but enhanced.

#### **4.10.1.2 Non Indigenous Cultural Heritage**

In 1991 Barker undertook a field survey of the development site as part of the initial EIS investigations (on behalf of Scotex Pty Ltd). While two sites within the confines of the development area were recorded in this field survey neither sites were assessed as culturally significant (Barker, 1991). Both sites were found within the "littoral fringe" of the development area.

Site 1 as it was recorded in the report was a European historical site consisting of two twisted railway lines and remnants of concrete slabs. It was noted that these remains were likely to be from an old slipway for boats and it was suggested in the report that the remains might predate the development of the Proserpine-Shute Harbour Road but is unlikely to be of any great antiquity. It was concluded that the state of the site is such that it is no longer viable to preserve the remains even if they had been historically significant.

Site 2 is discussed in Section 4.10.1 above.

Under the *Historic Shipwrecks Act 1976* it is necessary to conserve, protect and preserve Australia's shipwrecks and relics. Australia has rich maritime history which can be traced back 60,000 or more years to the arrival of the aboriginal people. They were later followed by the Macassans and then in the seventeenth century by the Dutch, English and French (DEH 2004). Australia's coastline was the focus for many ships and some of these ships never made their destination. These shipwrecks are a part of Australia's history and are important to protect. To protect these shipwrecks the Commonwealth DEWHA administers the *Historic Shipwrecks Act 1976* and the Australian National Shipwreck Database.

The database includes all known shipwrecks in Australian waters and allows users to search for those historic shipwrecks protected by Commonwealth or State/Territory legislation.

A search was undertaken on the database and no shipwrecks were found in Shute Bay or nearby areas.

#### **4.10.2 Potential Impacts and Mitigation Measures**

It was concluded that the state of the site is such that it is no longer viable to preserve the remains even if they had been historically significant.

##### **4.10.2.1 Indigenous Cultural Heritage**

The cultural heritage investigations have provided clear evidence that the SHMR site is located within a broad area that retains significant Aboriginal cultural heritage values. An impact assessment of the proposed SHMR development on identified cultural heritage values is provided below.

##### **Impacts to Aboriginal Cultural Heritage Values**

During the consultation process it was indicated that the Traditional Owner representatives had no major cultural heritage objection to the development. This is despite the fact that the development will significantly alter the current configuration of the coastline with reclamation of land, construction of breakwaters and residential areas.

Despite the relatively rapid development of the wider Shute Harbour and Airlie Beach area, Aboriginal people maintain their 'connection to country', and the development of the SHMR will not diminish the enduring cultural significance of the area to the Traditional Owners.

##### **Impacts to the Aboriginal Archaeological Record**

There was some concern expressed by Traditional Owners regarding impacts of the development on any Aboriginal archaeological sites that might remain in intertidal and subtidal deposits. It was concluded in the Report that the potential for intact archaeological sites or materials to occur in the sub-tidal zone within the boundaries of the project area was extremely low. The reasons for this assessment are outlined below.

- The shores of Shute Bay and (fringing) intertidal and sub-tidal areas in the bay have been subjected to prolonged disturbance and modifications since European settlement of the region. The land area has undergone significant modification through the reclamation of land, construction of the existing SHTF, car parks and buildings, other dwellings and industries along the coastline. Due to the regular deposition and build up of sediments in the bay means that some parts of the bay are periodically dredged to maintain a navigable access channel for vessels.
- Long-term preservation of inorganic archaeological materials in sub-tidal areas is difficult, especially given the susceptibility of the area to cyclones and storm surges.
- It is also difficult to detect archaeological remains or deposits in sub-tidal areas, even if the remains have survived seal level fluctuations over the previous 6,000 years. In addition, previous documented evidence of Aboriginal occupation has been located in a well elevated coastal rock shelters with dry floor deposits, protected from the elements.
- Since relative seal level stabilization some 6,000 years ago, the areas known to have been frequented by Aboriginal people were the immediate coastal fringe, the mouth of watercourses and associated sand bars, mangrove forests, dunes and beach ridges. All of these areas have been subjected to dramatic changes over time.

In conclusion, it is predicted that it is highly unlikely that the proposed SHMR will have any major detrimental impacts to the Aboriginal archaeological record of Shute Bay and Shute Harbour, either along the coastal fringe, or within the intertidal and sub-tidal marine areas.

### **Mitigation Measures**

The Cultural Heritage Investigation concluded that from an archaeological perspective it is highly unlikely that the proposed SHMR will have any major detrimental impacts to the Aboriginal archaeological record of Shute Bay and Shute Harbour either along the coastal fringe or within the intertidal and sub-tidal marine areas.

The Traditional Owners and the Proponent have prepared and submitted a CHMP which addresses the cultural values of the area and proposes a range of mitigation strategies to protect, maintain and enhance these values for the Aboriginal people, the local community and those visiting the development site in the future. The CHMP is presented in Appendix S2.

The CHMP, attached as Appendix S2, is the non commercial in confidence version of the agreed CHMP between all parties. It identifies the aspirations Gia and Ngaro/Gia people in relation to cultural heritage and traditions, which are inherited from past generations, maintained in the present and bestowed for the benefit of future generations which are to be protected through out the development and operation of the SHMR.

As the Traditional Owners are concerned about the possibility for archaeological sites and remains being found during the construction of the SHMR, the Proponent and the Aboriginal Parties have agreed to implement a cultural monitoring program. This program is outlined in the CHMP. It is also a requirement as part of an EIS to prepare a CHMP.

The CHMP sets out procedures for mitigating any negative impacts from the construction of the proposed SHMR and associated activities on areas of cultural significance to the Aboriginal Parties.

Thus, the CHMP facilitates the active involvement of the Traditional Owners in managing the cultural heritage and environmental values of the project area. This includes being involved in re-vegetation programs, pollution management programs and cultural induction programs for site staff.

The CHMP includes:

- an outline of cultural heritage management principles;
- identification of the roles and responsibilities of the Aboriginal Parties, SHMD Pty Ltd and the construction contractor/s;
- outlines management plans to protect identified cultural places during the construction phase;
- defines strategies for limiting the impact of the development on possible cultural artefacts located during construction;
- identifies that Aspirations for a Social Enterprise model to be implement both during construction and operation; and
- identifies the channels of communication; and
- identifies procedures and processes for dispute resolution.

The CHMP will only be implemented once the environmental impact assessment process has been completed and when the SHMR has been approved for development.

## **4.11 Social**

### **4.11.1 Description of Environmental Values**

AEC (2008) was engaged by the Proponent to undertake a *Socio-Economic Impact Assessment* (SEIA) of the proposed SHMR, and this is attached as Appendix T.

The SEIA describes and examines the social and economic values of the local Shute Harbour region and the broader region that may be affected by the proposed SHMR project and considers the potential impacts of the project (both beneficial and adverse) on the local and regional community.

#### **4.11.1.1 Demographics**

##### **Population**

The Whitsunday LGA currently comprises 11.4% of the total population of the Mackay SD, and has been growing faster than the Mackay SD and Queensland for the past five years. It is expected that this growth will continue over the next 20 years, driven by national trends towards 'sea and tree change' destinations, as well as strong and developing tourism and marine industries providing considerable employment opportunities and entertainment options in the Shire.

When compared to the Mackay SD and Queensland as a whole, the Whitsunday LGA (ABS, 2007; QDLGP, 2006a):

- has a higher projected level of population growth over the next 20 years (averaging 2.1% annually, compared to 1.6% for Mackay and Queensland);
- has a slightly higher level of population mobility;
- has a higher proportion of people changing address within the same catchment and migrating to the region from interstate;
- has a slightly higher average age, although this is decreasing, with the proportion of persons aged 24 years and younger increasing and the proportion of persons aged 55 and over declining since 2001;
- has a high proportion of overseas born persons; and
- has a lower proportion of indigenous persons.

##### **Household Structure**

There were 7,073 households recorded as being in the Whitsunday LGA in 2006, 385 more than recorded in 2001. The growth in total households was 5.8% between the 2001 and 2006, below the growth of Mackay North Coast (7.4%), Mackay SD (9.9%) and Queensland (11.3%).

The number of persons per household in the Whitsunday LGA declined from 2.7 persons in 2001 to 2.5 persons in 2006. This decline is in line with a decreasing trend of household size across all catchments. The proportions of household types are summarised in Table 52 below (ABS, 2007; QDLGP, 2006b).



**Table 52 Household Structure 2006**

Household type	Whitsunday LGA	Mackay North Coast	Mackay SD	Queensland
Total number of households- growth rate 2001-2006	5.8%	7.4%	9.9%	11.3%
Persons per household	2.5	2.6	2.7	2.6
Families with children	22.0%	30.5%	31.6%	29.4%
Couples with no dependant children	22.0%	26.1%	25.9%	26%
Lone Person households	15.7%	18.6%	18.1%	21%
Group households	4.3%	3.0%	3.0%	4.2%
Other household types	27.1%	12.7%	12.6%	7.7%

### Income

Average weekly household income in the Whitsunday LGA was \$1,174.24 in 2006, representing average annual growth of 7.5% since 2001. Table 53 below summarises average income levels in the region and State (ABS, 2007b).

**Table 53 Household Income**

Area	Average Weekly Household Income (\$)		Avg. Ann. Growth (% 2001-06)
	2001	2006	
Whitsunday LGA	\$821.72	\$1,174.24	7.5%
Mackay North Coast	\$835.29	\$1,262.89	8.8%
Mackay SD	\$889.19	\$1,331.60	8.6%
Queensland	\$887.31	\$1,192.53	6.2%

### Education

Between the years 2001 and 2006, the Whitsunday LGA recorded growth in educational attendance at secondary and tertiary/university institutions of 19.7% and 10.5% respectively. Conversely, technical education has declined across all study areas with the Whitsunday LGA recording the most significant decline in technical education attendance of 15.1% when compared with Mackay North Coast (-8.2%), Mackay SD (-7.0%) and Queensland (-6.9%).

#### 4.11.1.2 Housing

##### Private Dwellings

There were 82 private dwellings in the Shute Harbour / Shutehaven Collection District (the immediate area) at the time of the 2006 Census, 22.4% more than in 2001. Growth in private dwellings has been more pronounced in Shute Harbour and the surrounding service centre than in Whitsunday LGA (17.2%), Mackay North Coast (10.2%), Mackay SD (9.2%) and Queensland (12.0%). The majority of occupied private dwellings in the immediate area are separate houses, which is in contrast to surrounding areas, which are characterised by considerably higher proportions of semi-detached, flat / unit and other dwelling structures, probably as a result of the significance of the tourism sector in the local region.

## Property Sales and Values

The Whitsunday LGA recorded an increase in total number of house sales of 22.8% over the year to June 2007. Unit sales increased in the Whitsunday LGA by 84.8% within this period. Median house sales price over the same period experienced growth of 9.3% for the Whitsunday LGA.

Unit sales increased in the Whitsunday LGA by 84.8% with 231 sales in the year to June 2007, in contrast to the Mackay North Coast, which experienced a decline in the number of units sold of 2.0% over the year. Despite the declines in sales numbers, the Mackay North Coast experienced growth in the median unit price of 20.0% (to \$292,259), while Whitsunday LGA recorded growth in the median unit price of 6.5% to \$320,328.

## Rental Accommodation

The immediate area and surrounding service centre have a low level of rental accommodation managed by the State Housing Authority or housing cooperatives / community church groups, indicating that the availability of public housing in the area is relatively low.

Average weekly rents in Whitsunday LGA were \$261.50 in 2006, approximately twice that of the Regional and State average rents. The high cost of purchasing or renting accommodation in the Whitsunday LGA places emphasis on the need for affordable housing in the region to cater to low income families.

### 4.11.1.3 Social Infrastructure

There are four state primary schools in the Whitsunday LGA and 25 in the Mackay City LGA. Additionally, there are 2 private primary schools in the Whitsunday LGA and nine in the Mackay City LGA.

There are a total of five state secondary school options, including one in the Whitsunday LGA and four in the Mackay City LGA. There are a further seven private secondary school facilities in the area, including one in the Whitsunday LGA.

Tertiary education opportunities also exist in the region. Within the Mackay City LGA, tertiary institutions include Central Queensland University (including the Central Queensland Conservatorium of Music), James Cook University, and the Central Queensland Institute of TAFE. Additionally, in the Whitsunday LGA, The Barrier Reef Institute of TAFE, located on Shute Harbour Road in Cannonvale, provides residents with further education and vocational training options.

The Mackay International Education and Training Consortium (Edmac) is located in the region and aims provide support services to select export markets and to provide increased services to international students within primary, secondary, and tertiary studies.

## Child Care Facilities

There are four child care facilities currently operating in the area around Shute Harbour. However, these centres do not have sufficient capacity to cater to existing demand for child care, reporting no vacancies with waiting lists of up to six months (Director, Whitsunday Child Care Centre, pers. comm. 8/10/2007). Two new long day care facilities are scheduled to open in Cannonvale in late 2007, which will increase child care capacity in the area. Demand for these facilities is already high, with both facilities having received a large number of applications for places (121 Childcare, 2007; Cannonvale Kidz Early Learning Centre, 2007).

## **Community and Cultural Facilities**

There are two libraries in the Whitsunday LGA, located in Proserpine and at the TAFE campus in Cannonvale providing services to residents free of charge. Additionally, a mobile library stops in most locations within the LGA for residents who do not have easy access to the aforementioned locations.

The Proserpine Entertainment Centre, located on Main Street in Proserpine, serves as the major entertainment venue in the Whitsunday LGA. Besides serving as a venue for local and travelling performers, the centre also screens movies and hosts cultural events. There is also another ten other community halls within the LGA, which are generally associated with local sporting and social organisations such as the Proserpine Cricket Association, the Airlie Beach Bowls Club, and the Country Women's Association.

There are also two museums in Whitsunday LGA – the Proserpine Historical Museum Society and the Proserpine Sugar Mill, which are both open to the public.

## **Health Facilities and Services**

There are three hospitals in the Mackay City LGA, including one public and two private hospitals, all of which are within the vicinity of the city centre. The Mackay Base Hospital has a capacity of 120 beds, and is proposed to expand to 200 beds by 2013. The Mater Misericordiae Hospital includes 105 beds, with additional day surgery and special unit facilities. The Pioneer Valley Private Hospital is a 38 bed facility also servicing the city centre region.

The main hospital in the Whitsunday LGA is the Proserpine Hospital, with capacity of 35 beds and providing a range of specialist health services including nursing care, general care services, hearing aid and substance abuse recovery. The closest referral hospital is the Mackay Base Hospital (128km away).

In addition, Mackay City has over 50 specialised health services, extending to care for pre and post natal health, mental health, cardiac rehabilitation, sexual health, Aboriginal and Torres Strait Islander health, and clinics for specific injuries and diseases (e.g. multiple sclerosis and sleep disorders).

## **Aged Care Facilities and Services**

A number of non-profit aged care facilities and services are located in the Whitsunday area including:

- accommodation and services for independent aged care living (low care, medium and high care facilities and homes);
- nursing and care service providers (e.g. Blue Nurses);
- 24 hour high care and nursing facilities for aged persons (post-op, respite care and nursing home, etc.); and
- aged care association and hostel steering committee.

The majority of these facilities and services are located in Proserpine.

## **Family and Community Support Services**

A number of non-government organisations in Whitsunday Shire are funded by the Department of Communities and provide a range of services in the area, such as community centres, family, disability and health support services, respite services, and meals on wheels.

## **Police and Other Emergency Services**

The Whitsunday LGA contains two police stations, two fire stations, and two ambulance stations in addition to rural fire services.

The nearest police station to the SHMR is the Whitsunday Police Station in Cannonvale, which services the surrounding service area of the development site (Shute Harbour, Airlie Beach, Cannonvale, Jubilee Pocket and Flametree). The Whitsunday police station includes a water patrol service.

The Queensland Ambulance Service Whitsunday Station is located approximately 12 kilometres from the SHTF, and services the surrounding service area of the development site). The geographical location of Shute Harbour in relation to the Station results in response times being greater than 10 minutes. Consultation with the QAS indicates that the existing population base located at Shute Harbour/ Shutehaven only impacts minimally on ambulance service demand at the Whitsunday Station. Upgrading of the QAS station and a subsequent increase in staff has been approved for 2008.

### **4.11.1.4 Recreational and Leisure Infrastructure**

Shute Harbour and the surrounding service centre provide the following recreational and leisure facilities and services (GHD, 2005).

#### **Organised Sports**

- A seven hectare multi-purpose sport and recreation hub (Whitsunday Sportspark), comprising two playing fields, netball courts and an indoor sports centre.
- Lawn bowls club.
- Four public tennis facilities.
- An outdoor 25 metre swimming pool on school grounds at Cannonvale.

The following additional regional level facilities are provided in Proserpine and service the Shute Harbour area.

- Two multi-purpose sportsground precincts.
- An outdoor 50 metre public swimming pool, with separate infant learn to swim pool.
- Specialised facilities including a hack and pony club, shooting range, BMX area, and motor bike track.
- Tennis and lawn bowls clubs.
- A showground reserve.
- An 18 hole golf course.

The Airlie Beach Sports and Entertainment Centre (Whitsunday PCYC), located at the Sportspark, provides a multi-purpose indoor sport and recreation venue incorporating sports hall, function hall with stage, youth café, canteen, meeting rooms and games room, as well as an outdoor skate facility.

Parks and natural settings such as beaches, waterways and environmental reserves are an important focus for informal recreation in the surrounding service centre. Whitsunday's climate and coastal location supports a range of water-based recreation activities, which are popular amongst residents and tourists. These are supported by three boat ramps, as well as jetties and a marina. Many water-based activities are also supplied by commercial operators.

The surrounding service centre has 14 parks, including:

- six (6) small recreation parks serving neighbourhood catchments and equipped with picnic and play facilities; and
- eight (8) foreshore parks adjacent to beaches in Cannonvale and Airlie Beach.

Foreshore parks are popular destinations for both residents and tourists. The larger parks cater for water-based activities, children's play, picnicking, informal games, special events, ocean viewing, cycling, walking and youth recreation activities.

The redevelopment of the Airlie Beach foreshore has provided a major attraction to the surrounding service centre, including park areas, playgrounds, picnic facilities, a 4,300m<sup>2</sup> sculptured swimming lagoon, extensive pathways and boardwalks.

Ocean swimming is constrained by the presence of Irikangji marine stingers. Beach swimming enclosures/ stinger nets have been established at Cannonvale, while all year swimming is available at the Airlie Beach swimming lagoon.

The Conway National Park and Conway State Forest system extends through the Whitsunday Shire, including Shute Harbour and the surrounding service centre. The reserve offers visitors with a range of nature-based recreation and tourism opportunities, including walking tracks, picnic areas, lookouts and camping.

#### **4.11.1.5 Access and Mobility**

##### **Road Access**

The majority of services to the SHMR site are provided by the surrounding service centres of Airlie Beach, Cannonvale, Jubilee Pocket and Flametree. Vehicle access into Shute Harbour is currently dependant on Proserpine-Shute Harbour Road. The Queensland DMR has progressively been upgrading the road from Proserpine / Cannonvale / Airlie Beach towards Shute Harbour to a wider formation with sealed shoulders.

##### **Public Transport**

Scheduled bus services are provided by Whitsunday Transit, and operate between Airlie Beach, Shute Harbour and Proserpine, with services travelling along the site frontage along Shute Harbour Road approximately every 15 to 30 minutes between 6:00 AM and 6:30 PM. Whitsunday Transit is contracted by Queensland Transport to provide school services throughout the area, and also operates services connecting Shute Harbour to Proserpine and the Whitsunday Coast Airport.

## **Water Access**

Shute Harbour is the closest harbour to the offshore islands and as such is the base of operations for a number of commercial vessel activities. These activities, including barge, tourism (ferry) and charter boat operations as well as private vessel launching are concentrated around the four jetties located to the west side of Shutehaven.

Marine access in the immediate Shute Harbour area is currently provided via jetties and boat ramps located off Proserpine-Shute Harbour Road. The jetties are used by ferry, barge and charter boat operators, while the boat ramp is primarily used for recreational boating access. However, the limited parking at the boat ramp can restrict access for recreational users during high demand periods such as weekends as described in Appendices F and K2.

Daily passenger ferry services, tourist vessels and vehicular barges operate from a number of privately and publicly owned wharves, resulting in an average of about 80 vessel movements a day as seen in the marine traffic study contained in Appendix K2 of the EIS. Recreational traffic includes trailer launched boats and a large number of yachts and power boats moored at the more than 300 swing moorings in Shute Bay and off the inner harbour islands.

The facilities at Shute Harbour support a large number of users, both commercial and recreational. Commercial operators include Fantasea Cruises, Hamilton Island Barge Services, Hayman Island Barge Services, Whitsunday Rent a Yacht, a passenger transfer service to/ from Pepper's Resort on Long Island, as well as a number of other small commercial operators.

### **4.11.1.6 Local Values, Vitality and Lifestyle**

The Whitsunday Shire offers a relaxed, low-key, leisure based coastal lifestyle, with a range of natural assets that enhance the region's appeal for both residents and visitors (WSC 2005).

Within the Shute Harbour community, consultation results from both the planning study, presented as Appendix C, and the community consultation report, existing as Appendix F, indicate that the Shute Harbour community values the following aspects of their community and lifestyle.

- Accessibility to waterways and moorings for recreational boating.
- Preservation/protection of the area's environmental values and biodiversity.
- Restrictions on development activity in Shute Harbour– including limitations on height, scale and further expansion of the urban footprint.
- The importance of the 'iconic view' to community members.
- Management of waterways for recreational and commercial marine activities.
- Safety – including road and water safety.
- The importance of Shute Harbour as a transit terminal and port.
- Connection to place and custodianship over the environment.
- Identification with a 'tropical' lifestyle that was distinct from a 'southern' lifestyle and influenced the design of the township.

Within the broader context of the Whitsunday local government area, the following characteristics are also considered likely to exist in the Shute Harbour community.

- Identification of clearly delineated nodes of activity within the Shire, particularly Airlie Beach, Proserpine and Cannonvale.
- A focus on sustainable development at a local and regional level.
- Centrality of the Whitsunday Islands to the region's economic prosperity.
- Recognition of the unique environmental values of the region and a desire to protect these values.
- Sense of a coastal 'retreat' or 'hideaway' associated with the less densely populated areas of the Whitsunday Shire (including Shutehaven) as opposed to the busier character of Airlie Beach.
- Laidback and casual lifestyle focusing on the outdoors, in particular recreational use of waterways and beaches.
- A desire to manage growth pressure in the community in accordance with social justice and ecological sustainability principles.

Further details regarding these characteristics can be found in the appendix of the SEIA.

### **Social Amenity**

Given the limited facilities and infrastructure within the Shute Harbour area, it is anticipated that residents of SHMR would utilise the community, retail and commercial services in neighbouring townships for their day-to-day needs. The primary service sites are anticipated to be Airlie Beach, Proserpine and Cannonvale.

The consultation also suggests that Shute Harbour is viewed as having a distinct and separate character and identity from Airlie Beach.

#### **4.11.1.7 Summary of the Existing Social Environment**

A complete description of the existing social environment is presented in the SEIA contained in Appendix T of the EIS. In conclusion, the following key points regarding the existing regional social environment can be noted.

- The population in the Whitsunday LGA has grown rapidly in the past five years, above that of the Mackay SD and Queensland.
- Whitsunday LGA has a relatively more transient population than the Mackay SD and Queensland average, recording a relatively higher proportion of people changing address within the same catchment and migrating to the region from interstate between 2001 and 2006.
- The Whitsunday LGA has a higher average age when compared to the Mackay SD and the State, although the average age for the Whitsunday LGA has declined over the past five years. This is likely due to young adults migrating to the region in search of job opportunities and coastal lifestyle, while older persons may be migrating to other regions to avoid increasing cost of living.
- The Whitsunday LGA is a culturally diverse area, recording a high percentage of overseas born persons when compared to the Mackay North Coast, Mackay SD and Queensland. However, the Whitsunday LGA records a lower proportion of persons of Indigenous heritage.

- The Whitsunday LGA has a low proportion of 'families with children' and a high proportion of 'other family', 'group' and 'other' household types compared to the Mackay SD and Queensland.
- Average household incomes are lower in Whitsunday LGA than in the Mackay SD or Queensland, although have grown at a faster rate in the past five years than the Queensland average.
- Post-school qualifications are relatively low in Whitsunday LGA when compared to the Mackay SD and Queensland.
- The Whitsunday LGA regional economy has been growing strongly over the past five years, in line with the State.
- The Whitsunday LGA economy is highly reliant on the accommodation, cafés and restaurants sector and the transport and storage sector, largely attributable to the Whitsunday's position as a key leisure tourism destination and significant air and sea transport infrastructure in the region.
- Demand for house rental properties in the surrounding service centre has increased by over 20% in the past year, while demand for unit rentals has remained relatively constant.
- The availability of public and community housing in the Whitsunday LGA is relatively low, with sizable waiting lists for both State Government managed public housing and housing cooperative managed community housing.
- The average cost of housing (both home loans and rents) is higher in the immediate area and the surrounding service centre than in broader regional centres and the State, placing greater emphasis on the need for affordable housing for low income earning households in the region.
- The immediate area and surrounding service centre has considerable social, community and recreational infrastructure capable of servicing the majority of the local population's needs, while regional level services are primarily provided in Proserpine and Mackay.

Further discussion of economic impacts, which are necessarily linked to social impacts, is provided in Section 4.13.

#### **4.11.2 Potential Impacts and Mitigation Measures**

##### **4.11.2.1 Labour Force Impacts**

The proposed SHMR is expected to impact on the labour market of the immediate Shute Harbour area and the surrounding service centre during both the construction and operational phases, in terms of labour and skill requirements.

#### **Construction**

Consultation with the proposed SHMR primary construction companies (Jetty Specialist & Lucy Construction) identified a strong likelihood and opportunity for continuity of construction workforce from the Port of Airlie development (currently being constructed) to the proposed SHMR. As the Port of Airlie development and SHMR have relatively similar anticipated work crews – in annual estimated FTE terms 160 FTEs for Port of Airlie (Queensland Department of State Development, 2003), compared to the average 78 FTE and a peak of 192 FTE for SHMR – the impacts associated with the presence of the SHMR construction crew in the region are likely to be a continuation of those currently associated with the Port of Airlie construction crew. However, to ensure a conservative assessment, the Socio-Economic Impact Assessment considers the SHMR in isolation.



Current skill availability in the surrounding and broader service areas and the implementation of education, training and skills development programs is expected to enable approximately 50% (39 average, 96 peak) of the construction labour requirement to be sourced from within the surrounding service centre, with the remainder needing to be attracted from elsewhere to meet labour requirements.

The secondary construction phase (e.g. dwelling construction, contracted by individual allotment owners) is anticipated to require 89 FTE employees on average, with a peak of 107 FTEs. The majority of the labour requirement for the secondary construction phase is expected to be sourced from existing local residential and accommodation construction companies and represent a continuation of work for these companies and employees. As such, it is not anticipated that the secondary construction phase will result in any significant change in the overall level of employment in the surrounding service centre.

## **Operation**

During the operational phase of the development a daily workforce of approximately 142 people is expected to be required (SHMR, 2006) with 75% (106) of these anticipated to be filled using local labour. The remaining 36 employment positions are anticipated to be filled from outside the surrounding service centre. The total workforce equates to approximately 58.4% of those individuals actively looking for work in the Whitsunday Shire and approximately 9.4% of those persons actively looking for work in the Mackay North Coast region, suggesting that there may be potential to attract staff from the regional unemployment pool.

### **4.11.2.2 Population Impacts**

Population impacts from the SHMR could result from the attraction of labour, visitors and residents that would not otherwise come to the region, and can have significant flow on impacts on demand for social infrastructure and services.

## **Construction**

Approximately 50% of the primary construction labour requirement is expected to be sourced from the existing labour pool in the surrounding service centre, with the residual anticipated to relocate to the region during their period of employment and require accommodation. Up to 10% of workers moving to the region may also choose to relocate their families for the period of construction, with the residual effectively choosing to live as singles.

It is estimated that the construction of the SHMR would result in an increase of population levels in the surrounding service centre (and Whitsunday LGA) during the construction period averaging 46 persons (39 workers and 7 additional family members), peaking at 112 persons (96 workers and 16 additional family members).

As the second stage development is anticipated to be sourced primarily from the local construction labour force it is not expected that the secondary stage construction phase of the development will result in any significant population impacts.

## **Operation**

The operational phase of the development is likely to see an increase in the number of persons in the Shute Harbour precinct, including employees of the marina, commercial and retail precincts, tourists staying in the hotel and MRA and visitors accessing the area by sea.

It is expected that approximately 25% of the operational workforce (36 workers) will be sourced from outside the region and relocate to the surrounding service centre, with 30% of these relocating their family with them (18 family members). This equates to an estimated total additional persons in the region of approximately 54 persons. It is anticipated that less than 5% of the 142 operational workforce will reside in the immediate area (Shutehaven and Shute Harbour).

#### Tourism Precinct Visitors/ Tenants

It is anticipated that a total of 316 units/ suites will be included in the SHMR, including the Resort and MRA. Based on prevailing average and peak demand in the Whitsunday Mainland for similar types of accommodation, an average of 220 units/suites can be expected to be occupied throughout the course of the year, peaking at approximately 276. This equates to between 493 and 623 additional persons staying in the immediate area at any one time.

#### Marina Precinct Visitors

The marina precinct is expected to attract additional persons to the immediate area, although the majority of these are likely to be visitors/ tenants of the tourist precinct and so are already included in the assessment above. It is estimated that at a maximum the marina would average an additional 100 people on any one day for the sole purpose of using the marina facilities. However, these people would not be staying overnight and as such have not been included in the population estimates.

#### Total Additional Operational Population

Once fully operational the development is estimated to result in an average population staying in the immediate area of 493 people, with a peak of 623. The surrounding service centre and Whitsunday LGA are estimated to have a slightly higher population staying in the area of 574 people on average (677 peak) with approximately 25% of the operational labour force anticipated to reside in these areas, with some bringing their families. It should be noted that these estimates do not include people working on site or using marina facilities that do not stay in the area overnight.

On any given day throughout the course of the year, it is estimated that there is the potential for the SHMR to contribute an estimated 1,128 persons in the immediate area, with a peak of 1,258 persons per day (this includes persons working in or utilising the marina and supporting facilities that do not reside in the area).

The number of daily additional persons in the surrounding service centres of the development site is expected to be lower than in the immediate area, with the majority of the operational workforce anticipated to already reside in the surrounding service centre. Based on available statistics, the additional persons on any given day in the surrounding service centres and the Whitsunday LGA is estimated to average approximately 1,047 persons throughout the year, with a peak of 1,177 persons.

#### **Summary of Population Impacts**

The analysis above indicates that the SHMR is expected to result in the following population impacts in terms of additional people residing or temporarily staying in the three catchment areas during the construction and operational phases as presented in Table 54 and Table 55 below.

**Table 54 Total Construction Population Impact**

	Immediate Area	Surrounding Service Area	Whitsunday LGA
Average	0	46	46
Peak	0	112	112

**Table 55 Total Operational Population Impact**

	Immediate Area	Surrounding Service Area	Whitsunday LGA
Average	493	547	547
Peak	623	677	677

#### 4.11.2.3 Demographic Impacts

The size and scope of the proposed development has the potential to generate impacts on the existing demographics, lifestyle and values of the local community, access to requisite social, community and recreational facilities and services, accessibility of property, and cultural heritage. These impacts can be related to physical changes in the environment from the development itself as well as increases in population flowing from the development. A number of impacts were identified following a detailed assessment of the demographic, social and cultural implications of the SHMR, and are summarised below.

#### Demographic Impacts

##### Construction

Construction workers are expected to only be on-site during the day and the construction site will not be open for public access. There will be few opportunities for the residents of the immediate area to interact with construction workers. Further, it is not expected that any non-resident construction workers will reside in the immediate area during the term of their contract, with the majority of the non-resident construction workforce anticipated to stay in the surrounding service centre.

No significant demographic impacts are expected to be experienced in the immediate area or surrounding service centre as a result of the development and the associated increase in population.

##### Operation

The operational phase of the development is likely to see a long-term increase in the average number of persons present (e.g. staying in the hotel or MRA, visiting for the day and/ or conducting business) each day of 1,128 persons on average (peaking at 1,258). While this is a significant increase on the 232 people counted as staying in the immediate area in 2006, almost half of this increase (43.7% on average, 49.5% peak) is expected to be tourists staying in the tourist precinct or MRA, with the remainder being day visitors travelling to the area to work or utilise the marina facilities (and residing elsewhere).

Given the existing strong tourism profile of the immediate area, as well as the somewhat secluded nature of the main residential area of Shutehaven from the SHMR site, the development is not expected to have a significant influence on the nature of the immediate area's demographic characteristics.

#### **4.11.2.4 Community Values and Lifestyle Impacts**

The proposed development has the potential to impact on elements of the community values and lifestyle of the immediate area. Potential community values and lifestyle impacts are primarily due to the size and scope of the proposed development in comparison to the current characteristics of the Shute Harbour community. Of the issues identified through consultation and research, the potential impacts on the values and lifestyle of residents in the area include the following.

- Potential impacts (both negative and positive) on accessibility to and enjoyment of recreational boating activities in the area.
- Potential for changes to the level of community cohesiveness and the identity of the Shute Harbour community.
- Enhancement of recreational, leisure and employment options in the longer term.

#### **Recreation & Access**

The marine traffic study, existing as Appendix K2 of the EIS, estimates that approximately 57 of the 300 swing moorings are located within or in close proximity to the proposed development site. These swing moorings will be relocated to an area outside the marina footprint. In addition, the 669 new proposed marina berths in Shute Harbour and the new boat ramp which will be constructed by Council with a financial contribution from the Proponent of \$2.5 million will serve to significantly increase water access in the area.

#### **Visual Amenity & Community Character**

The landscape character and visual amenity assessment, presented in Appendix J of the EIS, indicates that the proposal “is expected to maintain or enhance the amenity of adjacent land uses via provision of view corridors through the proposed development and by screening existing incompatible uses”. The lifestyle impacts of this development as a result of the potential loss of views are therefore considered to be able to be mitigated against through the adherence of the Proponent to these suggestions, with some of the rehabilitation programs undertaken as part of the proposal providing the opportunity to increase visual amenity in certain localities.

The potential impact of the proposed development on community cohesion and sense of identity are difficult to quantify due to the potential for competing interests to be present in the area. Any change to the community as a result of the development has the potential to increase a sense of community cohesiveness for residents of Shutehaven due to the geographical separation of this community from those visiting or temporarily staying at the proposed development.

#### **Local Economy & Tourism**

The proposed development is expected to provide further opportunities for economic growth in the region with local employment opportunities available in the construction, accommodation, hospitality, water transport, and retail industries. It is expected that the majority of these benefits will be gained by those in the broader surrounding area as at present there are no unemployed persons identified as living within the Shute Harbour immediate area. Positive economic benefits may be generated through increased demand for the services provided by local businesses.

The construction of a significant tourist accommodation facility within the proposed development is expected to increase the number of visitors to the area, with an average of 1,128 additional persons in the community on any given day. The presence of the marina also suggests the potential for increased day-trip travel to the area for boating purposes.

The increased tourism flows are anticipated to generate some impacts on the local community, with increased demand for services and facilities, greater traffic volumes on Proserpine-Shute Harbour Road and increases in water traffic expected as a result of the development. While changes to the Shute Harbour foreshore are planned it is not anticipated that these will detract from the tourist experience of the Whitsundays or the Whitsunday eco-tourism brand for the majority of individuals, as the SHMR will be constrained to a area not extending into the GBRMP or Conway NP.

#### **4.11.2.5 Access and Availability of Social and Community Infrastructure and Services**

Population impacts from the SHMR are likely to place some additional demand on social and community facilities and services during both the construction and operational phases. However, many workers during the construction phase, and tourist visitors during the operational phase are likely to source family and community support services such as health care and other services from their “home base”, rather than from within the region they are working/visiting, except in emergency circumstances.

Population-based benchmarks indicate that the current level of social and community infrastructure and services will have capacity to cater for the increase in population expected as a result of the SHMR. Some health and child care service levels appear to be currently under stress, but the predicted increase in population would not significantly influence the expansion of these facilities or the provision of new facilities. As the population increases in general within the Whitsunday LGA, investment in these areas over the coming years may be warranted.

#### **Access & Availability of Recreational Activities**

During construction, increased demand for recreation and leisure infrastructure in the surrounding service centre, as well as Proserpine, is expected to be generated by the non-resident construction workforce moving to the region. Increased demand during operation is expected to be generated primarily by additional tourists visiting and staying in the hotel and MRA precincts, as well as people moving to the region due to work opportunities in the SHMR.

Benchmark analysis indicates that current levels of provision for opens space are well above benchmarks and will not need to be supplemented as a result of the development of the SHMR. However, it is noted that the SHMR will result in additional parkland areas and pedestrian boardwalks between the land and marina facilities, linking parkland areas to the car park. The boardwalk and pathway network has been designed to ensure that the general public and marina users have the opportunity to access the foreshore area that is currently effectively inaccessible to the general public due to a steep bank and mangroves. It is expected that the additional open space areas provided by the development will be sufficient to meet the requirements of the additional population during operation (peak of 677 people).

Assessment of existing sporting facility provision in the surrounding service centre against population based benchmarks suggests that the existing supply of most sporting facilities is sufficient to cater to an increase in population of over 4,000 people. Sporting fields and tennis court provision is below recommended levels and may be experiencing demand pressures. The addition of 112 people during construction and 677 people during operation has the potential to exacerbate current demand pressures on these facilities.

### **Marine Access**

The SHMR will provide for an increase the level of marine access with a new four lane public access boat ramp with parking for approximately 100 vehicles with trailers (this is to be developed separately to the marina with the Proponent providing a financial contribution of \$2.5 million) and the opportunity to safely berth a boat within the marina complex.

The marina development is expected to provide additional berth capacity to cater to the rapidly growing number of boat registrations in the Mackay region.

It is anticipated that the additional marine access provided by the development will be sufficient to meet the requirements of the additional population during operation (peak of 677 people), and will serve as an outlet for increased recreational water based activities in the surrounding service centre.

#### **4.11.2.6 Property Access and Location**

Based on observed trends, the majority of the construction workforce that are not currently residing in the region are anticipated to seek rental accommodation where available, with relatively less expensive short stay accommodation such as caravan parks and motels a secondary option. The supply of rental properties in the surrounding service centre has increased in recent years, however, rental prices have also increased and rental properties do not stay available for long due to the current high demand. Rapid growth in accommodation costs may place increasing financial burden on low income families in the region. However, the impact of the SHMR on this will be minimal as a result of the majority of construction workers already residing in the area.

During operation, it is expected that some of the operational workforce will need to be sourced from outside the region. These workers are expected to relocate and seek a residence within an appropriate travel time to their place of work, placing increased demand on the property and rental markets. However, given the relatively low number of workers (some with family members) anticipated to move to the region (36), the highly mobile nature of the surrounding service centre population (i.e. low proportion of residents in the same address as the previous year) and the considerable amount of property development currently being undertaken in the region, it is not expected that the attraction of workers to the region will have any significant impact on the property market during operation.

### **Traditional Owner Impacts**

Consultation with traditional owners for the site (the Gia and Ngaro/Gia people) indicated that there were initially concerns regarding the impact of the development on the region's cultural heritage. These concerns primarily related to the potential impact of the proposed development on culturally significant flora and fauna, the potential to uncover archaeological findings and the involvement of cultural representatives in the construction phase of the development. Through a consultative process a CHMP was developed that addresses these issues and demonstrates the high level of support for the project by the respondent parties.

The CHMP and the associated consultation report that details the process by which it was achieved is a component of the EIS and has used the guiding principles and rationale of Council of Australian Government's *Overcoming Indigenous Disadvantage, Key Indicators Report 2007* (Council of Australian Government, 2007) to explore the determinants of net social benefit, which are aligned to the proposed SHMR and the aspirations initiatives agreed to in the CHMP. The key indicators report provides a robust 'roadmap' for actioning change to address disadvantage and contribute to 'closing the social, economic, environmental and wellbeing gap' between Indigenous and non-Indigenous Australians. While the SHMR does not address all indicators of disadvantage for Gia and Ngaro/Gia communities, it is closely aligned to three of the four headline indicators. This alignment is demonstrated through the potential positive impact on Gia and Ngaro peoples through the opportunity to:

- participate in and share economic prosperity and cultural tourism opportunities;
- support the intrinsic benefits of governance and culture in community capacity building;
- maintain generational celebration and learning of cultural heritage traditions, language and expression;
- contribute to functional and resilient families and communities; and
- provide generational 'care for country', while showcasing Indigenous pride and knowledge to local, regional and international tourists.

The CHMP will contribute to positive long term outcomes for at least two Indigenous peoples – the Gia and Ngaro communities – at a local community level. The CHMP has been signed by the Gia and Ngaro/Gia people and the proponents. The CHMP has been approved and registered by the DNRW in April 2008.

#### **4.11.2.7 Transport Accessibility and Safety Impacts**

The SHMR has the potential to impact on the accessibility and safety of transport networks in the local area. Impacts have been assessed for road, water, public, pedestrian, disabled and emergency access and safety, with the following impacts identified.

##### **Road Access, Mobility and Safety**

Construction and operation of the marina development is anticipated to result in a total increase in traffic in peak hour of 168 vehicles during construction (increase of approximately 50%) and 338 vehicles during operation (increase of approximately 100%). This increase in traffic has the potential to reduce access and mobility through increased congestion, travel times and safety risks on Proserpine-Shute Harbour Road, described in the traffic impact assessment presented as Appendix K1 of the EIS.

##### **Water Access, Mobility and Safety**

During construction, access to the development site will be limited for health and safety reasons. However, while the site area will be inaccessible for recreational and commercial use this is not anticipated to significantly impact on water access to the surrounding area as current foreshore access from the development site is effectively non-existent and the nearby SHTF and boat ramps will remain operational.

During operation, water access is expected to be enhanced through the provision of 669 marina berths and associated facilities, as well as a new boat ramp to be developed as a separate project which is to be partly funded by the Proponent. Water access from the existing SHTF and boat ramps is not expected to be impeded with the marina designed to allow sufficient manoeuvrability and access from and to the site and includes the provision of separating recreational and commercial marine traffic as detailed in the marine traffic study appended as K2 to the EIS.

While it is anticipated that the marina development will result in the displacement of approximately 57 swing moorings, these moorings will be replaced within the existing mooring pattern and using low impact seagrass moorings, and is not anticipated to impact on access to the area.

### **Public Transport**

Scheduled bus services operate between Airlie Beach, Shute Harbour and Proserpine, with services travelling along the site frontage along Proserpine-Shute Harbour Road approximately every 15 to 30 minutes between 6:00 AM and 6:30 PM. There is currently no bus stop at the site, however a bus lay-by is to be provided within the commercial precinct near the roundabout to cater for bus services provided by Whitsunday Transit (if required). The Proponent proposes to provide a minibus service to supplement any gaps in scheduled public transport services and ensure links to the major support service centres are provided in the interim whilst agreement is reached with existing public transport suppliers in the Region. The provision of courtesy bus services to/from the development site would be expected to reduce traffic loads on Proserpine-Shute Harbour Road.

### **Bicycle and Pedestrian Access**

Pedestrian access will be provided throughout the SHMR site using a network of pathways including a pedestrian boardwalk along the water edge. This will result in significant improvement in pedestrian access to, within the site and along the foreshore.

Current pedestrian access from the development site to the SHTF is limited. Strategies to be developed to improve connectivity between the marina development site and the SHTF.

### **Equality of Access**

Design of the SHMR will satisfy Whitsunday Shire Council's Universal Equity Access policy requirements for equitable access.

### **Emergency Access**

Emergency service access is primarily provided via Proserpine-Shute Harbour Road which has adequate response times of just over 10 minutes. Mitigation measures to minimise road and traffic impacts are expected to minimise impacts on emergency service response times. Additional emergency service access to the site will be available via water transport or helicopter if required.

#### **4.11.2.8 Impacts on Current Land Use**

The proposed development site will not have a direct impact on private land as it is wholly contained within Lot 2 on Plan SP 117389, Lot 273 on Plan HR1757, which is currently managed by SHMD Pty Ltd. Some of the planned development area is currently occupied by swing moorings, however the swing moorings within the SHMR site and potential impact area will be removed and relocated prior to the commencement of construction.



Concerns have been raised by the Hamilton Island Barge operation relating to the impact of the development on the safety and operation of barges as a result of increased traffic in the Shute Harbour area. This risk has been mitigated through the preparation of a management plan for traffic in the area, which has been approved by the Regional Harbour Master.

The owners of the motel adjacent to the development site expressed some concerns regarding their ability to attract visitors during construction due to noise and dust issues. Mitigation strategies to minimise noise and dust impacts have been outlined in the 'Noise and Dust' sections of the EIS to mitigate temporary construction issues.

Concerns have also been raised regarding the impact of the development on property values for adjacent properties, particularly from decreased visual amenity. Mitigation strategies have been developed by Yurrah Pty Ltd (2007) and reported on in the landscape character and visual amenity assessment presented as Appendix J. Visual amenity of adjacent lands is expected to be maintained or enhanced via the provision of view corridors through the proposed development and by screening existing incompatible land uses.

#### **4.11.2.9 Potential Environmental Harm on Adjacent Areas**

The SHMR is not anticipated to generate any significant environmental impacts on the amenity of adjacent areas. While the marina is expected to have some impacts on the near field aquatic environment, these impacts are anticipated to be mitigated as outlined in Section 5 of the EIS 'Environmental Management'. Further, the Proponent has developed a "Reef Conservation Fund" to fund offsets to impacts within the SHMR site which includes the replacement of 57 standard swing moorings with low impact seagrass moorings in the close vicinity and operation of a Marine and Cultural Centre to educate the resident and tourism community on environmental values of the reef and the Region's cultural heritage.

#### **4.11.2.10 Implications for Future Development in the Local Area**

Outside the footprint of the site itself (precluding alternative future developments), it is not anticipated that the SHMR will constrain land use in the surrounding area. The development will provide opportunities for existing business growth and expansion due to enhanced local access to the marina and associated facilities, particularly for businesses in related upstream and downstream industries. Additional detail regarding the implications for future development in the local area is provided in Section 4.13 'Economy' of the EIS and SEIA, presented as Appendix T of the EIS.

#### **4.11.2.11 Social Impact Mitigation Strategies**

Section 8.1 of the SEIA report outlines the mitigation measures have been recommended as appropriate to minimise any potential negative impacts of the SHMR to the social environments, and facilitate potential positive impacts.

Strategies have been developed for both the construction and operational phases of the project and strategies have been prepared for the following identified impacts.

1. Addressing labour force impacts; encouraging the use of the local labour pool by:
  - a. target local skilled labour where possible when recruiting;
  - b. develop specialised education, training and skills development programs in consultation with education and training providers to develop the requisite skills in the local labour force, particularly in unemployed, youth and school leaver groups;

- c. undertake consultation with local businesses and industry groups to assist their preparation for supply of goods and services to the project; and
    - d. reducing population impacts from the second stage of construction.
  2. Minimising population impacts of second stage construction by:
    - a. developing labour force skills capacity during stage one construction of the marina;
    - b. encouraging developers to utilise local construction labour where possible; and
    - c. consulting with adjacent property owners, Department of Communities and Whitsunday Regional Council to monitor project impacts (demand) on local social infrastructure, and any concern about impacts on local community values, and take action to redress impacts where possible.
  3. Reducing the potential impacts on access to water for recreational boating by providing financial contribution for construction of an all-tide public boat ramp and support infrastructure.
  4. Integrating the values of the existing community and their lifestyle into the development by:
    - a. engaging and consulting with the community during the planning, construction and operational stages of the development to enhance community acceptance of the marina and minimise potential negative impacts on community cohesiveness and identity; and
    - b. incorporating covenants to ensure second stage development is in accordance with the vernacular of the region and expressed local values.
  5. Monitoring and addressing demand for recreational facilities in the region and enhance recreational, leisure and employment options in the longer term by:
    - a. promoting the use of local labour at the marina and associated facilities during the operation phase; and
    - b. engaging and consulting with the community during the planning, construction and operational stages of the development to promote and maximise the community benefits from the use and visitation of the marina and associated recreational and leisure facilities.
    - c. source labour from the local labour pool where possible to reduce number of workers/ families needing to relocate to the region during both construction and operation;
    - d. consult with local sporting bodies/ organisations/ facility providers and Whitsunday Shire Council to identify any reduction in access; and
    - e. encourage the use of marina recreational facilities by local community members.
  6. Improving access to health care services and reduce impacts arising from additional population demand by:
    - a. sourcing labour from the local labour pool where possible to reduce number of workers/ families needing to relocate to the region during both construction and operation;
    - b. consulting with local GPs, medical centres, hospitals and other affiliated health practitioners on an ongoing basis to identify any changes in access (e.g. increased waiting lists/ times); and
    - c. considering on-site provision of medical services if demand from workforce is causing stress on local health service access.
  7. Improving local community access to recreational facilities provided by the project by:

- a. sourcing labour from the local labour pool where possible to reduce number of workers/ families needing to relocate to the region during both construction and operation;
  - b. consulting with local sporting bodies/ organisations/ facility providers and WRC to identify any reduction in access;
  - c. engaging and consulting with the community during the planning, construction and operational stages of the development to inform the community of the recreational facilities and activities to be provided by the development;
  - d. enabling future public transport access to/ from the marina;
  - e. providing sufficient car parking at the marina and associated facilities to accommodate visitors;
  - f. undertaking local educational and marketing campaign to disseminate the facilities and activities on offer at SHMR; and
  - g. encouraging the use of Marina recreational facilities by local community members.
8. Improving accessibility by:
- a. improving public transport access to and from the SHMR;
  - b. improving connectivity between the SHMR and SHTF; and
  - c. ensuring equitable access within the Marina and associated facilities for all persons.
9. Reducing potential impacts on short stay accommodation availability, rental prices and the accessibility to traditional low-cost housing options by:
- a. sourcing labour from the local labour pool where possible to reduce number of workers needing to relocate to the region during both construction and operation;
  - b. consulting with accommodation providers, real estate agents and relevant Government departments to identify sufficient, suitable accommodation for the construction workforce;
  - c. assisting construction workers in locating suitable accommodation;
  - d. monitoring the effect of workforce demand on housing in consultation with real estate agents, local community housing providers and the Department of Housing; and
  - e. If required, provision of accommodation for construction workers, which could add to the supply of affordable housing in the area after the construction phase is completed.

## 4.12 Health and Safety

### 4.12.1 Description of Environmental Values

The Proponent is committed to creating a development free of workplace incidents and injuries, where all stakeholders actively create safe and healthy environments.

There are no hospitals, child care centres, schools or other sensitive land uses in close proximity to the development. The only impact that the SHMR may have on neighbouring populations is from the increase in road traffic on Proserpine-Shute Harbour Road, installation of fixed structures in Shute Harbour and an increase in boat traffic in Shute Harbour and surrounds.

The relevant legislation that needs to be complied with in relation to health and safety for the development is described in Table 56 below.

**Table 56 Health and Safety Legislation**

Relevant Legislation	Legislative Requirement
<i>Workplace Health and Safety Act 1995</i> , and associated regulation.	Sets obligations for the employer, employees, designer and contractors for workplace health and safety.
<i>Dangerous Goods Safety Management Act 2001</i> , and associated regulation.	Outlines the requirements for premises and operators containing Dangerous Goods.
<i>Building Act 1975</i>	Sets out requirements for building and structural stability.

The development will involve the storage of flammable and combustible liquids, therefore, AS 1940-2004 also applies to the development.

The inventory of flammable and combustible liquids is outlined in Table 57.

**Table 57 Details of Hazardous Substances and Dangerous Goods Proposed on Site**

Product Name	Proper Shipping Name	UN Number (if a Dangerous Goods)	Class	Packing Group (if a Dangerous Goods)	Quantity (Litres)
Unleaded petrol	Motor spirit	1203	Class 3 Flammable liquid	II	20,000
Diesel	Diesel Fuel	1202	Combustible liquid C1	N/A	50,000

It is likely that other dangerous goods or combustible liquids will be stored within the development for other ancillary activities, such as open space management and tidal works maintenance. However, no information on the quantities of other materials is available. However, it is anticipated that the quantities of these materials will not significantly contribute to the hazardous substance inventory.

Other hazardous substances likely to be stored and used on the site in small quantities are as follows.

- Solvents.
- Coolants.

- Paints and anti-fouling paints.
- Fibreglass resins.
- Acids and alkalis.
- Cleaning chemicals.
- Pesticides (e.g. open space maintenance).

#### **4.12.2 Potential impacts and mitigation measures**

##### Construction

A Workplace Management Plan will be prepared prior to the commencement of work by the construction contractor. The Workplace Management Plan will contain procedures to ensure that workplaces are managed in such a way that safety hazards are continually identified and reviewed. In turn control actions can be implemented to ensure workplaces are safe and without risk to the health of workers, the general public and the environment.

All potential hazards/risks in the workplace will be broken down into activities, which follow the sequence of construction. These activities are provided for in Safe Work Method Statements which will identify the potential hazards of all proposed work, assess the risks involved with the work and will develop controls to eliminate, or minimise, the risk.

No hazardous substances are to be brought onto the site without a Material Safety Data Sheet (MSDS) being lodged and the substances details recorded in the Hazardous Substance Register.

##### Air

Construction and dredging activities involves earthwork movement which has the potential to generate dust. The primary methods for reducing airborne dust levels to acceptable levels will be through:

- minimising the volume of material stored on site;
- reducing stockpile heights;
- watering of high traffic areas (if required);
- considering weather conditions when scheduling certain construction activities;
- wet dredging using a cutter suction dredge;
- cleaning up spills as soon as practicable; and
- committing to workplace housekeeping.

It is not anticipated the development will generate dust during operation.

A sewage and bilge pump out facility will be provided within the marina. All boat operators will be made aware of the “no discharge” policy into Shute Harbour and will be required to utilise the sewage pump out system provided. The sewage and bilge storage tank will be placed away from sensitive environments and will be regularly emptied to minimise odours.

### Noise

Potential noise impacts were reported in Section 4.8 'Noise' of the EIS with an additional independent report commissioned on determining impacts from road traffic noise on proposed sensitive places associated with the SHMR (and presented as Appendix R).

Potential impacts from construction noise at noise sensitive places close to the development are expected from the use of heavy plant and equipment used for:

- site establishment;
- bulk earthworks;
- dredging;
- piling and construction of the revetment walls, breakwater and other solid structures; and
- road upgrade activities.

Mitigation measures have been proposed to reduce potential noise impacts from construction works, in particular standard noise control strategies. Noise mitigation measures such as restricting delivery times and work hours during construction phases are expected to protect the existing acoustic environment.

Road traffic noise is considered the main noise source during operation of the development. Noise impacts and mitigation measures are provided in further detail in Section 4.8 Noise and Vibration.

Noise generated by off-site impacts from road traffic accessing the SHMR from the major access point, Proserpine-Shute Harbour Road, was found to not significantly affect existing residents of Shute Harbour

### Mosquito and Biting Midges

Mangroves and saltmarshes located on the southern side of the road provide breeding grounds for mosquitos. Saltmarsh mosquitos are able to develop to adults within six days if pools of water remain stagnant.

The mangrove and saltmarsh flats removed as a result of the development will reduce that area in which the mosquitos can breed. The retention ponds proposed as part of the Stormwater Management Plan shall be monitored for mosquito infestations and management shall be consistent with the relevant Queensland State Government documents relating to mosquito management and in accordance with WRC advice.

WRC uses a variety of techniques to control the outbreak of mosquitoes including adulticiding, larvaciding, habitat modification and biological control.

Proposed initiatives for mosquito management for the SHMR are outlined in Table 58.

**Table 58 Possible Consequences and Preventative Measures for Vector-borne Diseases**

Function / Operation	Possible Consequences	Preventative / Protective Measures
Construction	Water stagnation and mosquito breeding, bacterial and viral growth.	Earthwork design to avoid creation of artificial ponds which may be likely to provide opportunities for mosquito breeding onsite (apart from those required in the stormwater treatment

Function / Operation	Possible Consequences	Preventative / Protective Measures
		train and dredge tailwater treatment system.
Managed Tourism	Residents and employees impacted by mosquito-borne disease such as Barmah Forest Virus, Dengue fever, Japanese encephalitis, Murray Valley encephalitis and Ross River virus.	Ensuring the site is free draining to minimise surface ponding of water which may provide for opportunistic breeding.
Marina	Boat owners and marina employees impacted by mosquito-borne disease such as Barmah Forest Virus, Dengue fever, Japanese encephalitis, Murray Valley encephalitis and Ross River virus.  Stagnation and concentration of pollutants from the marina facility and boats, including microbiological contamination.	Control of potential mosquito breeding habitats through habitat modification and minimised opportunities for onsite breeding in preference on reliance to chemical control.  Provision of suitable sewage pump out facilities and control actions in the event of spills.

### Vehicle Accidents

A CTMP will be prepared by the appointed Contractor (in consultation with the Consultant) prior to commencement of construction. Construction road safety will be addressed by speed limiting and controlling access to the construction site through a dedicated site entry and exit point. Any contractors will be inducted before commencing work on site.

As excavated material is not proposed to be transported offsite, movement of plant on and off the site will be largely the result of import of construction materials such as pre-cast concrete panels for breakwater construction and rock boulders. Time restrictions for construction vehicle may be considered if noise and/or safety concerns are raised by individuals/residents or employees during construction of the SHMR, in particular along dedicated haulage routes throughout the township of Airlie.

Road upgrades associated with the SHMR will improve the safety of the Proserpine-Shute Harbour Road, for example through the introduction of a signalised intersection from the existing case which includes a narrow two-lane road. Such upgrades include the provision of slip lanes into the site which will ensure traffic entering and exiting can do so safely and without impacting on through traffic.

### Boating Accidents

According to Maritime Safety Queensland the majority of historical marine incidents were associated with activities occurring while vessels were traversing calm, clear and open water. Very few incidents were reported when vessels were in the marina. However, the occasional collision has been known to happen for vessels navigating into port.

In Queensland the majority of marine vessels registered are for recreational use (97%), with 2.8% registered as commercial fishing or commercial passenger vessels. The majority of incidents reported involved recreational vessels (MSQ, 2007). Motorboats, sail boats and speedboats were the top three vessel types involved in incidents with 600-650 incidents occurring, on average, each year (2000-2005) in Queensland waters.

The marina entrance and the relationship between the marina and the nearby public jetty has been designed to minimise the potential for boat collisions. The safety of marine traffic movement is further enhanced by directing recreational boaters away from commercial vessel operations using signage and a marked approach channel to the marina as well as introducing a traffic separation scheme illustrated in Figure 12.

Monitoring of the potential increased traffic movement and regulatory compliance by the relevant authority will minimise risk and provide for safe navigation by all users in the Shute Harbour area.

### Zone Substation

A new zone substation (66/11kV) will be required by Ergon to supply the energy requirements of the SHMR.

Information on zone substation incidents reported by Energy Australia was obtained, including additional information from TransGrid (2005), that operate 82 substations in NSW. Transformer incidents outlined in TransGrid's 2004/2005 Annual Report indicate that transformer explosion and fire could be expected in a substation at about 1-2% on a yearly basis.

TransGrid list 6,147 units among its assets. The capacities of these units range from 11 kV to 500kV (3,961 current transformers and 1,478 capacitor voltage transformers). If a failure rate of 0.005 per transformer year is applied, this would be equivalent to 30 units. Across all of TransGrid's facilities throughout NSW, in any year, three or less units are expected to suffer fire depending upon oil or gas filled when a frequency of 1 in 10 failures is adopted.

### Dangerous Goods

A hazardous material is a material which, in sufficient quantities, has the potential to cause harm to people, property or the environment because of its chemical, physical or biological qualities. Dangerous goods are chemicals that have the potential to present an immediate threat to people, property or the environment if not properly controlled. They are classified according to the nature of the hazard into nine classes, some of which are divided into subclasses.

The DGSM Act was developed by the Department of Emergency Services' Chemical Hazards and Emergency Management CHEM Services in consultation with stakeholders from industry, State government departments, the Local Government Association of Queensland and community groups.

Storage of dangerous goods will be in accordance with the *Dangerous Goods Safety Management Act 2001*, *Dangerous Goods Safety Management Regulation 2001* and relevant Australian Standards, such as AS 1940:2004 *The storage and handling of flammable and combustible liquids*.

During operation, an inventory of flammable and combustible liquids will be stored at the marina office. A listing of liquids on this inventory is provided in Table 57.

### Transport of Dangerous Goods

Fuel will be transported to the site by an approved road tanker, which would comply with the Australian Code for the Transportation of Dangerous Goods by Road and Rail (6<sup>th</sup> Edition, 1998).

The design intent for the internal road network is to direct delivery vehicles and commercial vehicles away from highly populated areas.

### Security

Strategies for site security and access during construction will be developed. During construction one entry/exit point will be provided onto site and the entry/exit will be managed to prevent unauthorised access.



All visitors and contractors to the site will be inducted prior to commencing any construction activities.

**Natural Events**

*Bushfire*

Native vegetation north of Proserpine-Shute Harbour Road is unlikely to pose a bushfire hazard to the development because of the distances between the vegetation and the SHMR site, which extends at minimum the breadth of the current roadway.

The risk of bushfires starting from the SHMR site is reduced by the fire break imposed by Proserpine-Shute Harbour Road. The most likely ignition sources for bushfire will be as a result of unauthorised use of the buffer lands by motorbike riders, bushwalkers and from the dumping of rubbish, although there is little evidence of these activities occurring in this location. Management of the buffer area will likely revert to QPWS once the proposed grant to relinquish part of Lot 2 to the State is formerly accepted.

Although, bushfire management actions will need to focus on limiting fire ignition sources (i.e. restricting illegal access to the site) and managing fuel loads through controlled fuel reduction burning which is to be coordinated by QPWS.

*Cyclone*

A Cyclone Evacuation Plan has been developed for the site and is presented in Appendix U4.

**Marina Site Based Management Plan**

A Marina SBMP has been developed for the SHMR operations, and presented as Appendix U3 of the EIS. The Marina SBMP has incorporated safety aspects and integrated risk management principles during the determination of its elements.

The Marina SBMP shall be the primary means of ensuring risk from activities conducted at a facility is maintained at an acceptable level.

The main safety components of a SBMP are to:

- commit and lead;
- plan;
- implement;
- monitor, measure and evaluate including risk assessment; and
- hazard auditing and review.

The major safety components of the Marina SBMP are detailed in Table 59.

**Table 59 Major Safety Components of the Marina SBMP**

<b>Commitment and Leadership</b>	<b>Planning</b>	<b>Implementation</b>	<b>Monitoring, Measurement and Evaluation</b>	<b>Auditing and Review</b>
Policy	Objectives and targets	Hazard identification and risk assessment	Performance criteria	Formal auditing arrangement

<b>Commitment and Leadership</b>	<b>Planning</b>	<b>Implementation</b>	<b>Monitoring, Measurement and Evaluation</b>	<b>Auditing and Review</b>
Provision of sufficient resources	Information requirements	Safety assurance	Inspection, monitoring and testing	Review of performance and effectiveness
Responsibility and accountability	Safety plans	System of work / Safe Work Procedures	Incident reporting and investigation	
Communication		Training		
		Emergency preparedness		
		Change management		

Hazards associated with the proposed SHMR during both construction and operation have been assessed to determine from a qualitative perspective, respective likelihood and consequences of the identified hazard occurring. The results of the hazard and risk assessment are provided in Section 4.14 Hazards and Risk.

Of the hazards identified, most were considered to be of low to medium risk following the implementation of risk mitigation measures. Therefore, risks associated with the SHMR during both the construction and operational phases are considered to be manageable through the implementation of the strategies and risk treatment measures identified in Section 4.14 'Hazards and Risk'.

Training and Education

The operation of the facilities within the SHMR will depend on a preventative and quality assurance approach to reduce and maintain low risks. Key training components for all staff and operators include the following.

- Induction training for all staff.
- Quality assurance training.
- Safety and emergency response procedures and training.
- Site management and supervision training to ensure risk management and quality standards are met.

Workplace training programs including the various inductions programs required for different professionals will be prepared in consultation with an occupational health and safety specialist. All training programs should be delivered by a person competent in training both construction and administration workers. Appropriate procedures will ensure all staff are sufficiently trained and aware of the requirements in the case of an emergency to protect human health and property and the environment. Records of all training undertaken by staff should be kept on site.

Supervisors and process operators should hold appropriate qualifications and specialist training in automated and manual procedures needed to ensure efficient and safe operation of all plant and equipment (this is particularly relevant to construction and marina operation). Any maintenance work should be performed by qualified persons with specialist training and knowledge of process hazards.

Audits

Internal workplace health and safety audits of the management system, hazard information and records, shift processes, safety measures and staff personal protective equipment should be conducted annually. The audit should include a review of all complaints and incidents for the audit period.

Records of all audits should be maintained for review purposes.

### Emergency Services and Response

Emergency response procedures prepared in accordance with the relevant Australian Standards and the Queensland Fire and Rescue Service (QFRS) 'Fire and Evacuation Guidelines' has been incorporated into the SBMP. A copy of the Marina SBMP is included in Appendix U3.

Emergency plans are to coordinate the alarm, notification, response, management and rehabilitation requirements in the events of a major accident. Key components in the formulation of emergency procedures include:

- ensuring that all persons on-site have appropriate training in the implementation of the emergency plans and actions that need to happen during an emergency;
- consultation with emergency services to formulate and agree to on-site and off-site emergency plan for action; and
- public consultation with local residents and community during preparation of off-site emergency plans.

The major factors in terms of fire fighting response are as follows.

- Type and quantity of chemicals present.
- Storage practices and process activities.
- Absence of fire detection/suppression systems.
- Accessibility for the fire service.
- Containment capability.
- Proximity to other premises storing dangerous goods.

DES and MSQ will be afforded complete access to the site during both construction and operation. The design of the SHMR will be such that emergency vehicles will be able to access most areas of the site. Details of access and egress arrangement will be developed in consultation with DES during the detailed design phase of the project.

The Charter Base will comprise the Sea Rescue and Emergency Services Centre. At ground level, facilities associated with the marina will include a first aid station and a marina ambulance bay. The Sea Rescue and Emergency Services Centre will include a training room, radio and communications facility and a second floor observation tower.

Construction and operational staff will be trained to respond to certain events. Initial responses may include direct intervention, evacuation of potentially impacted persons, contact with emergency response units (eg police, ambulance and/or fire services) and monitoring of the event until the arrival of emergency response services. The type of events in which staff will be trained to respond to will include, but not be limited to:

- small fire situations which may be suppressed with onsite fire fighting equipment (eg fire extinguishers and/or fire hose equipment);

- fuel or oil spills using onsite containment and clean up equipment;
- adverse weather conditions (eg cyclonic conditions) which require the securing of vessel and other structures, and the evacuation of marina tenants; and
- accidents or emergencies involving persons which require immediate medical assistance prior to ambulance arrival.

A Cyclone Evacuation Management Plan has also been prepared, and is provided as Appendix U4.

Emergency response facilities (including police, ambulance and fire brigade) are all located in the Airlie Beach/Cannonvale area and are within a 15km distance of the proposed marina facilities. Support emergency services are located within Proserpine, with additional emergency support services located in Mackay. Specifically, the distance between the emergency service providers and the proposed marina facilities are summarised in Table 60.

**Table 60 Distance to Emergency Service Providers**

<b>Emergency Service</b>	<b>Location</b>	<b>Approximate Distance to Proposed Marina</b>
Police	Altmann Avenue, Airlie Beach Mill Street, Proserpine	12km 38km
Ambulance	Schnapper Street, Cannonvale Chapman Street, Proserpine	13km 38km
Fire	Shute Harbour Road, Airlie Beach Main Street, Proserpine	8.5km 38km
State Emergency Services	Shute Harbour Road, Cannonvale Proserpine	13km 38km
Medical Facilities	Proserpine Hospital	38km

## 4.13 Economy

A *Socio-Economic Impact Assessment* (SEIA) has been undertaken of the SHMR and presented as Appendix T of the EIS.

The SEIA describes and examines the social and economic values of the local Shute Harbour region and the broader region that may be affected by the proposed SHMR project and considers the potential impacts of the project (both beneficial and adverse) on the local and regional community.

The terms of reference require the economic analysis to include the consideration of a number of factors including:

- the significance of this project on the local and regional economic context;
- the long and short-term beneficial and adverse impacts such as job creations, competition with local businesses which may result from the proposed development;
- the potential, if any, for direct equity investment in the Proposal by local businesses or communities;
- the cost of all levels of government of any additional infrastructure provisions;
- implications for the future development in the locality (including constraints on surrounding land uses and existing industry);
- impacts of the proposal on adjoining sites and activities and the outcomes of any applicable land use study;
- impact on the economic diversity of the area;
- the potential economic impact of any hazard identification;
- the distributional effects of the Project including projects to mitigate negative impact on disadvantage groups;
- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future; and
- impacts on local property values.

These requirements were examined using three methods.

- A CBA examining the overall returns from the development.
- An economic impact assessment (EIA) of the likely direct and flow on impacts of the development.
- A qualitative discussion surrounding any associated potential economic and business impacts.

The economic impact assessment examines the anticipated impacts generated by the proposed development in the context of the Whitsunday LGA and the Mackay SD regional economies. Few economic impacts are anticipated to be captured by the broader Queensland economy that is not captured by the Mackay SD economy.

The following is a summary of the findings of these three assessments. Details of the assessments, outcomes and discussions are provided in the SEIA. The assessment also recommended a number of mitigation strategies and monitoring regimes to ensure that the economic values of the region are enhanced or, at least maintained by the project and these strategies are outlined in Section 8 of the SEIA.

#### **4.13.1 Description of Environmental Values**

##### **4.13.1.1 Economic Overview**

The Whitsunday LGA regional economy has been growing strongly over the past five years, in line with the State, although below the experience of other areas of Mackay, which have been boosted by significant growth in the mining sector.

The Whitsunday LGA economy is highly reliant on the transport and storage sector, largely attributable to the significant air and sea transport infrastructure in the region and Whitsunday's position as a key leisure tourism destination. The strong tourism sector is also the primary driver to a relatively higher contribution from the accommodation, cafés and restaurants industry in the Whitsunday LGA economy than in Mackay SD or Queensland economies.

The size of the Whitsunday LGA regional economy is estimated to have been \$845.2 million in 2005-06, accounting for 6.4% of the total Mackay Statistical Division's GRP at Factor Cost of \$13.3 billion. Mining accounts for over 60% of the Mackay Statistical divisions GRP.

When compared to the structure of the Queensland economy, Whitsunday LGA is approximately four times more reliant on the transport and storage industry (18.7% versus 4.6%). This can largely be attributed to the significant air and sea transport in the region, driven by a buoyant tourism industry and links with coal exports.

The regional economy is also more reliant than Queensland as a whole on personal and other services industries (4.2% versus 2.1%), cafés and restaurants (5.3% versus 2.9%), agriculture (6.0% versus 4.1%), and general government (2.8% versus 2.2%) and property and business services industry (12.0% versus 9.9%) contribute comparatively more to the Whitsunday LGA regional economy than the state economy.

The regional economy is significantly less reliant on communications (0.9% versus 2.2%), government administration and defence (2.0% versus 4.0%), manufacturing (4.9% versus 9.0%), construction (4.3% versus 8.0%), mining (8.3% versus 12.4%), retail trade (4.8% versus 7.2%) and wholesale trade (3.2% versus 4.6%) when compared to the State.

##### **4.13.1.2 Business Numbers**

There were 2,469 businesses operating in the Whitsunday LGA as at June 2006, accounting for 16.4% of all businesses operating in the Mackay SD in that year. The majority of businesses in the Whitsunday LGA operate in the industries of property and business services (20.3%), construction (18.2%), agriculture, forestry and fishing (16.0%) and transport and storage (10.0%) (Source: Australian Bureau of Statistics (2007c)).

##### **4.13.1.3 Labour Market**

###### **Labour Force Participation**

Whitsunday LGA is currently experiencing a relatively 'tight' labour market, with historically low levels of unemployment (currently 2.4% unemployment). This is similar to the experience of the entire Mackay SD (currently 2.5% unemployment), as well as the Queensland labour market (currently 4.0% unemployment).

Whitsunday LGA currently accounts for approximately 16.7% of the Mackay North Coast's total labour force and 12.7% of the Mackay SD's total labour force (Source: Federal Department of Employment and Workplace Relations (2007)).

Whitsunday LGA's unemployment rate has been trending lower for the past decade, in line with the Mackay North Coast, Mackay SD and Queensland experiences.

### **Employment by Industry**

The major industries of employment in the Whitsunday LGA are accommodation, cafes and restaurants (19.3%), retail trade (15.0%) and construction (11.7%).

In line with their relative importance to the regional economy, Whitsunday LGA employs a relatively larger proportion of persons compared to the Mackay North Coast in the industries of:

- accommodation, cafes and restaurants (19.3% compared to 7.3%);
- construction (11.7% compared to 10.1%); and
- transport and storage (9.0% compared to 5.9%).

### **Employment by Occupation**

Whitsunday LGA has a relatively larger proportion of persons employed in the occupations of managers, labourers and community and personal service workers than the Mackay North Coast and Queensland, and a relatively lower proportion of persons employed in the occupations of clerical and administrative workers and professionals.

### **Income by Industry**

The average weekly individual income in the Whitsunday LGA in 2006 was \$742.65, which was below the Mackay North Coast (\$838.71), Mackay SD (\$882.40) and Queensland (\$795.78) averages.

Breaking income down by industry shows that employees in the mining industry had the highest average weekly income (\$1,629.65), significantly higher than any other industry. Incomes in the electricity, gas, water and waste services (\$1,069.23) and construction (\$945.13) industries were the next highest in Whitsunday LGA.

When compared to the Mackay North Coast, Whitsunday LGA had higher average weekly incomes in the industries of:

- information, media and telecommunications (\$878.64 compared to \$805.83);
- education and training (\$837.98 compared to \$826.86);
- agriculture, forestry and fishing (\$731.63 compared to \$680.35);
- arts and recreation services (\$659.01 compared to \$525.49); and
- accommodation and food services (\$651.17 compared to \$531.58).

Source: Australian Bureau of Statistics (2003).

#### **4.13.1.4 Major Industry Assessments**

##### **Tourism**

There were over 978,235 visitors to the Whitsunday Tourism Region (WTR), which includes the LGAs of Whitsunday and Bowen, in the year ended June 2007, 12.1% more than in the year ended June 2006 and 27.0% more than in the year ended June 2002.

This growth is primarily due to a significant increase in the in domestic overnight visitors of 24.1%. Domestic overnight visitors to the WTR have generally increased year on year since 2005, while international visitors have remained relatively steady and domestic day visitors have declined in recent years (Tourism Queensland, 2007). However, 80% of international tourists are visiting the WTR rather than the Mackay Tourist Region.

##### **Accommodation Supply and Demand**

The WTR had 37 accommodation establishments recorded as having five or more rooms operating in the region in the year ended June 2007, offering 2,731 guest rooms and 9,640 bed spaces and attracting 446,630 guests in the year ended 2007. Accommodation supply in the WTR has increased when compared to the previous year, with two more establishments operating in the region.

Guests stayed a total of 1,441,597 nights and spent over approximately \$120 million in accommodation expenses. Demand for accommodation has been relatively steady over the past two years.

##### **Tourism Expenditure in the Whitsunday Tourism Region**

The Office of Economic and Statistical Research (2006) estimate that international and domestic visitor expenditure in Queensland, totalled approximately \$18.0 billion in 2003-04. The majority of visitor expenditure over this period was generated by domestic overnight visitors, who accounted for 62.3% of total visitor expenditure in the State (\$11.2 billion), while international visitors accounted for 23.1% (\$4.2 billion) and domestic day visitors accounted for 14.6% of total visitor expenditure (\$2.6 billion).

Based on visitor numbers for the year ended June 2004 as recorded by Tourism Queensland, this equates to an average expenditure per visitor, for each visitor type, of:

- \$681.66 for domestic overnight visitors;
- \$85.09 for domestic day visitors; and
- \$2,127.37 for international visitors.

In 2006/07 dollar terms this equates to an average expenditure per visitor, for each visitor type, of:

- \$752.13 for domestic overnight visitors;
- \$98.86 for domestic day visitors; and
- \$2,451.33 for international visitors.

When indexed to current prices and applied to visitation for the year ended June 2007 in the WTR, total expenditure by visitors to the WTR in 2007 is estimated to have been approximately \$952.4 million (approximately 4.5% of total Queensland tourism expenditure). This was comprised of:

- \$451.4 million for domestic overnight visitors;
- \$15.3 million for domestic day visitors; and



- \$485.7 million for international visitors.

## Marine

The Boating Industry Association of Queensland (2007) estimate that the Queensland marine industry, including manufacture, servicing, retail, distribution, brokerage and marinas, has an annual turnover of \$2.6 billion and employs approximately 11,000 people. Further, it is estimated that the Queensland marine industry contributed \$1.4 billion to State's economy in 2002-03, or approximately 1.2% of total Queensland Gross State Product (GSP) for the year (as seen in Appendix H1).

The marine industry and boatbuilding sector is one of the largest manufacturing and value added sectors in Queensland, and has a significant presence in the Mackay SD.

Queensland boat registrations reached 200,000 in January 2006 (Collins PRD, 2007), and have continued to grow since, with 223,425 boats registered as of July 2007. Over the past decade, boat registrations have recorded an average annual growth of 5.3% (Boating Industry Association of Queensland, 2007), which is approximately double the Queensland population growth rate.

Of the 223,425 boats registered in Queensland, 11,602 (or 5.2%) of these are greater than 8 metres in length, as described by PSSG in the marina demand studies presented as Appendix H1 of the EIS. Boats larger than 8 metres typically require a mooring or berth for storage for a variety of reasons (URS, 2005), including:

- larger boats are difficult to handle on a trailer as towing and launching larger boats can be difficult;
- larger boats tend to be more valuable, with owners who tend to prefer and can afford alternate storage options; and
- with trends toward medium and higher density living, there are fewer suburban storage options.

Since 2002, registrations for boats greater than 8 metres in length have been growing at a faster rate than smaller boats (7.1% per annum on average compared to 6.0%), reflecting the current trend towards larger and more luxurious watercraft (Appendix H1; Collins PRD, 2007).

In the Mackay SD there were over 17,000 recreational boats registered as at April 2006, accounting for approximately 8.5% of total Queensland recreational boat registrations. Since 2000-01, recreational boat registrations have averaged annual growth of 6.7% in the region, above the Queensland growth rate of 5.1% over the same period.

There are six marinas operating in the Mackay SD in 2006, with a total capacity of 1,384 wet berths. The Whitsundays has three marinas currently operating, Abel Point Marina, Hamilton Island Marina and Hayman Island Marina. Mackay City has two operating marinas (Mackay Marina Village and Laguna Quays Marina) and Bowen Shire has one marina (Bowen Marina).

Occupancy rates for these marinas are high, with a total of 1,384 wet berths and over 80% of berths occupied. Existing wet berth capacity at the six marinas is outlined in the marina demand assessments presented as Appendix H1 and H2 of the EIS.

In addition to these wet berths there are a number of moorings available (413 moorings identified in 2001) and dry berths (75 identified in 2006).

The proposed SHMR will result in an increase in capacity in the region of 669 wet berths upon completion.

There was a total waiting list of 1,480 for marina berths in Queensland in 2005 (PSSG), consisting of 795 waiting to purchase and 685 wanting to lease. Assuming that the waiting list for berths in the Mackay SD constitutes a similar proportion of the Queensland total as boat registrations (8.5%), this equates to a waiting list of approximately 121 marina berths in the Mackay SD.

In total, PSSG in Appendix H1 estimate that the current demand for berths in the Mackay SD (including current wet berth capacity, moorings, dry berths and waiting list) is 1,993, or 11.7% of current boat registrations in the region. Wet berth demand is estimated to increase to 2,730 by 2010, and 5,122 by 2020. This is above the total existing and proposed additional wet berth capacity for the region (3,809), including the SHMR, which implies that the current planned developments are insufficient to meet anticipated demand.

### **Major Regional Projects**

The Whitsunday LGA has an estimated \$2.4 billion worth of investment either under construction, committed or under study, covering a range of infrastructure, tourism, recreation, retail and marine based developments. Project developments include:

- a number of five star hotel developments (e.g. Peppers Coral Coast Resort and North Point);
- marina facilities (e.g. Port of Airlie Marina Development); and
- a variety of recreational facilities (e.g. Jagabara Championship Golf Course and Whitsunday Springs Golf Course).

### **Summary of Economic Conditions**

A complete description of the existing socio-economic environment is presented in the SEIA contained in Appendix T of the EIS. In conclusion, the following key points regarding the existing regional economic environment can be noted.

- The Whitsunday LGA regional economy has been growing strongly over the past five years, in line with the State.
- The Whitsunday LGA economy is highly reliant on the transport and storage sector in terms of both contribution GRP and employment, largely attributable to the significant air and sea transport infrastructure in the region and Whitsunday's position as a key leisure tourism destination.
- The strong tourism sector is also the primary driver to a relatively higher contribution to GRP and employment from the accommodation, cafés and restaurants industry in the Whitsunday LGA economy than in Mackay SD or Queensland economies.
- In line with the Mackay and State experiences, Whitsunday LGA is currently experiencing a 'tight' labour market, with historically low levels of unemployment.
- Whitsunday LGA has a relatively high proportion of persons employed in the occupations of managers, labourers and community and personal service workers, and a relatively lower proportion of persons employed in the occupations of clerical and administrative workers and professionals.
- Whitsunday LGA has experienced a strong level of dwelling investment in the past three years, with the number and value of dwelling approvals growing at a faster rate than the Mackay SD and Queensland.
- The majority of private dwellings in the Shute Harbour area are owned outright by the occupants, while the surrounding service centre (including Cannonvale, Airlie Beach, Flametree and Jubilee Pocket) is characterised by high levels of rental properties.

- Over the past year, Whitsunday LGA has experienced strong growth in the number and value of sales for house and unit properties, particularly in the suburbs of Cannonvale, Airlie Beach and Jubilee Pocket.
- Demand for house rental properties in the surrounding service centre has increased by over 20% in the past year, while demand for unit rentals has remained relatively constant.
- The availability of public and community housing in the Whitsunday LGA is relatively low, with sizable waiting lists for both State Government managed public housing and housing cooperative managed community housing.
- The average cost of housing (both home loans and rents) is higher in the immediate area and the surrounding service centre than in broader regional centres and the State, placing greater emphasis on the need for affordable housing for low income earning households in the region.

#### 4.13.2 Potential Impacts and Mitigation Measures

##### 4.13.2.1 Quantitative Assessment of Economic Impacts

###### Construction

Table 61 below shows the forecast costs associated with the primary (SHMD Pty Ltd expenditure) and secondary (secondary developer expenditure) construction phases of the development and the proportion of that expenditure that is expected to be retained within the regional and state economies. These forecasts include sales commissions from brokerage services provided by local real estate agents for those buying and selling the MRA.

**Table 61: Construction Phase Expenditure**

Element	Development Cost (\$M)	Retained in Region (\$M)	Retained in State (\$M)
SHMD Pty Expenditure	253.4	158.1	213.7
Secondary Developer Expenditure	104.5	83.6	94.0
Sales Commissions	5.4	4.3	4.8
<b>Total (c)</b>	<b>363.2</b>	<b>245.9</b>	<b>312.5</b>

Notes: Regional economy is defined as the Mackay SD. Development Costs do not include the costs of purchasing the lots from SHMD Pty Ltd as this is a transfer payment. (c) Some totals may not add up due to rounding. Source: AECgroup

Table 62 below summarises the economic impact of the \$363.2 million expenditure during the construction phase including the direct and flow on elements for the regional and state economies. The figures represent the total impact of the combined primary and secondary construction phases.

**Table 62: Economic Impacts of the Construction Phase**

	Mackay SD				Queensland			
	Output (\$M)	Value Added (\$M)	Income (\$M)	Emp (FTE)	Output (\$M)	Value Added (\$M)	Income (\$M)	Emp (FTE)
Direct	\$245.9	\$105.3	\$44.9	552	\$312.5	\$133.5	\$57.4	781
Flow on	\$91.4	\$42.3	\$13.6	269	\$140.0	\$62.2	\$19.1	393
<b>Total<sup>(a)</sup></b>	<b>\$322.9</b>	<b>\$137.2</b>	<b>\$51.6</b>	<b>821</b>	<b>\$452.5</b>	<b>\$195.7</b>	<b>\$76.5</b>	<b>1,174</b>

Notes: (a) Some totals may not add up due to rounding.

Source: AECgroup

### Operation

Table 63 illustrates the anticipated annual operating output from each element of the development. The assessment examines anticipated expenditure both within the SHMR itself as well as within the wider region (all expenditure is assumed to be retained within Mackay SD). This analysis only includes expenditure from visitors that would not come to the region if the SHMR did not exist as this represents the additional expenditure in the region as a result of the development.

**Table 63: SHMR Operating Phase Expenditure (2007)**

Element	% of Expenditure Included in EIA	Annual Output (\$M)	% of Total SHMR Output
Hotel Accommodation	80%	\$9.4	21.4%
Managed Resort Accommodation	80%	\$21.0	47.9%
Marina	90%	\$3.1	7.0%
Charter Boat Base	80%	\$3.4	7.9%
Commercial	80%	\$4.7	10.8%
Retail	80%	\$2.2	5.0%
<b>Expenditure within SHMR</b>	<b>82%<sup>(a)</sup></b>	<b>\$43.8</b>	<b>100%</b>
<b>Expenditure outside SHMR</b>	<b>82%<sup>(a)</sup></b>	<b>\$12.4</b>	
<b>Total Expenditure</b>	<b>82%</b>	<b>\$56.2</b>	

This analysis is only concerned with the attraction of visitors and their expenditure that would not come to the region if the SHMR did not exist. With current occupancy rates at comparable hotel, motel and serviced apartment style accommodation in the Whitsundays about 80% on average, it is expected that with out additional accommodation developed in the Whitsunday Shire that visitors would be constrained over the medium and long term. It is reasonable to assume that a large proportion of expenditure by visitors to the SHMR would not otherwise occur in the Mackay SD or Queensland without the development.

Similarly, with the high level of occupancy and demand for existing marina facilities in the Mackay SD and Queensland, it can be expected that most expenditure by visitors using the marina facilities would not otherwise occur in the Mackay SD or Queensland without the development.

Visitors to the SHMR would also purchase goods and services in the wider region resulting in approximately \$31.4 million being spent by visitors to the SHMR outside of accommodation expenditure. Some of this expenditure is expected to be spent within the facilities offered at SHMR, however approximately \$51.1 million will contribute to the annual output in the wider region.

Consultation with business operators undertaken for the development of the economic impact assessment indicates that they do not anticipate any loss of earnings as a result of the proposed development.

Table 64 below shows the expected annual economic impact of:

- SHMR resident visitor expenditure within SHMR (\$43.8 million);
- SHMR resident visitor expenditure within the region (excluding SHMR) (\$12.4 million); and
- SHMR resident visitor expenditure within the region (including SHMR) (\$56.2 million).

**Table 64: Economic Impacts of the Operational Phase**

	Mackay SD				Queensland			
	Output (\$M)	Value Added (\$M)	Income (\$M)	Emp (FTE)	Output (\$M)	Value Added (\$M)	Income (\$M)	Emp (FTE)
<b>SHMR resident visitor expenditure undertaken at the SHMR</b>								
Direct	\$43.8	\$20.6	\$7.0	117	\$33.7	\$15.9	\$5.4	95
Flow on	\$18.0	\$8.0	\$2.4	54	\$13.9	\$6.2	\$1.9	43
<b>Total<sup>(a)</sup></b>	<b>\$61.8</b>	<b>\$28.6</b>	<b>\$9.4</b>	<b>171</b>	<b>\$47.6</b>	<b>\$22.1</b>	<b>\$7.3</b>	<b>138</b>
<b>SHMR resident visitor expenditure undertaken outside of SHMR</b>								
Direct	\$12.4	\$6.3	\$3.1	78	\$10.1	\$5.1	\$2.5	64
Flow on	\$4.5	\$2.1	\$1.0	22	\$3.7	\$1.7	\$0.8	18
<b>Total<sup>(a)</sup></b>	<b>\$17.0</b>	<b>\$8.4</b>	<b>\$4.0</b>	<b>100</b>	<b>\$13.8</b>	<b>\$6.8</b>	<b>\$3.3</b>	<b>82</b>
<b>Total SHMR resident visitor expenditure (including at SHMR and outside of SHMR)</b>								
Direct	\$56.2	\$26.9	\$10.0	195	\$43.8	\$21.0	\$7.9	159
Flow on	\$22.5	\$10.1	\$3.4	76	\$17.6	\$7.9	\$2.7	61
<b>Total<sup>(a)</sup></b>	<b>\$78.8</b>	<b>\$37.0</b>	<b>\$13.4</b>	<b>271</b>	<b>\$61.4</b>	<b>\$28.9</b>	<b>\$10.6</b>	<b>220</b>

Notes: (a) Some totals may not add up due to rounding.

Source: AECgroup

Over the operating phase of the development, the EIA concluded that the total anticipated annual economic contribution of the development to the Mackay SD regional economy is estimated to be approximately an additional:

- \$78.8 million of direct and indirect output;
- \$37.0 million of direct and indirect value added;
- \$13.4 million of direct and indirect as income; and
- 271 direct and indirect FTEs.

It is anticipated that the impact on the Queensland economy will be approximately:

- \$61.4 million of direct and indirect output;
- \$28.9 million of direct and indirect value added;
- \$10.6 million as direct and indirect income; and
- 220 direct and indirect FTEs.

Although the magnitude of the impact of the operational phase is smaller than that of the construction phase, it must be noted that the operational impacts are annual and would be expected to continue to accrue each year over the operational life of the development.

### CBA Summary

The CBA identified a range of cost benefits of this project for the Region and the broader community. This section provides a summary of the key findings of the CBA assessment. Detailed analysis of the methodology used, impacts of the SHMR, analysis and outcomes of the CBA is provided in an appendix of the SEIA.

The CBA assessment found that the SHMR is expected to deliver a total net benefit of \$299.4 million in NPV terms at a discount rate of 10% for direct impacts (i.e. incurred by the proponent), and 6% for indirect impact (i.e. to stakeholders other than the proponent), with present value of benefits of \$984.5 million and a present value of costs of \$685.3 million. Overall, the development provides a BCR of 1.44 (i.e. returns \$1.44 for every dollar spent in delivery of the project).

The project provides a positive direct net benefit (i.e. to the Proponent) in NPV terms of \$93.6 million with BCR of 1.46. The project delivers a positive indirect net benefit (i.e. to stakeholders other than the Proponent) in present value terms of \$205.6 million with BCR of 1.43.

The CBA is summarised in Table 65 below.

**Table 65: Cost Benefit Assessment Summary**

Impact	PV of Benefits (\$M)	PV of Costs (\$M)	Net Present Value (\$M)	BCR
Direct Impacts	\$295.8	\$202.2	\$93.6	1.46
Indirect Impacts	\$688.7	\$483.1	\$205.6	1.43
<b>Total Impacts</b>	<b>\$984.5</b>	<b>\$685.3</b>	<b>\$299.2</b>	<b>1.44</b>

The outcomes of the CBA demonstrate that the direct, indirect and overall impacts of the project result in a net benefit to the community.

#### **4.13.2.2 Qualitative Assessment of the Economic Impact of SHMR**

In addition to the economic impacts that can be measured quantitatively, there are others, which are as important but which are best assessed on a qualitative basis and this section discusses these impacts in detail. Below is a summary of the key qualitative economic impacts identified in this assessment. Further details can be obtained from Section 7 of the SEIA.

##### **Distributional Effects of the SHMR**

Distributional effects refer to the way in which the economic impacts of the development are expected to accrue to individuals and groups.

##### Construction Phase Distributional Effects

The construction phase will generate demand for construction workers and materials as well as other construction support services such as plant and equipment supplies. This demand is expected to be greatest in the region with any additional needs being met by the state economy, although some specialist services (for example design and architectural services) may need to be brought in from outside of the region.

This additional activity would be expected during both the primary and secondary construction phases. Beyond the commitment to use local suppliers where possible, there are significant flow on benefits resulting from both the construction and operational phases of the development. These benefits are expected to be felt throughout the entire Mackay regional economy and are discussed below.

##### Operating Phase Distributional Effects

During the operational phase of the development, the distributional effects are likely to be determined by the ability of local businesses to meet the needs of the additional visitors to the area, which would appear strong given the prevailing economic driver in the region is tourism. Any increase in the number of visitor stays and the duration of those stays is likely to drive increased demand for services throughout the region (for example, vessels using the harbour would be expected to take on various stores and provisions, which would be purchased either in the SHMR or in the immediate vicinity).

Visitor demand would increase revenues for business owners and create additional local employment opportunities across a range of sectors including:

- land and marine based tourism operators;
- maritime support industries;
- marine supply companies; and
- cafés, restaurants and bars.

##### Distributional Effects of Flow on Impacts

Beyond the benefits to businesses directly involved in either the construction or retail/commercial sectors, the additional activity associated with the construction and operation of SHMR is also likely to have a flow on economic impact on other sectors of the regional economy. These flow on effects that have been identified in the quantitative sections, allows income to flow into the region. This revenue is recirculated between individuals and businesses across the whole economy as consumers buy goods and services.

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## **Direct Equity Investment Potential**

There is limited scope for direct equity investment by local businesses during the construction phase. The proponent has a commitment to engage local and regional construction firms and suppliers, however this is likely to be limited to work carried out on a contractual basis rather than an equity basis. All marina developments are capital intensive by their nature with extensive capital works like dredging, the construction of the breakwater, berths and pontoons that must be completed before any revenue can be realised.

Opportunities exist for direct equity investment during the operating phase and the marina and tourist precincts appear to offer the greatest potential for equity partners to become involved in the development. The hotel and MRA are expected to be owned and operated by investors.

## **Capacity Building in the Labour Force**

On completion of the construction phase of the development, although some workers may have had the opportunity to broaden their skill sets, it is likely that there will have been a relatively small impact on capacity in the regional construction sector. The employee skills required during the operational phase of the marina, tourist and other precincts are thought to be a close match to the existing competencies of the area's resident workforce and so it is likely that there will be limited opportunities for capacity building from the operational phase of SHMR.

However, the proponent has SHMR engaged the Great Barrier Reef Institute of TAFE as a training partner to facilitate the skilling of local labour during both the construction and operational phases of the development and improve the capacity of the existing labour force.

## **Impacts on Local Property Prices**

An analysis of house sales at Shute Harbour between September 2005 and June 2007 found that nine houses had been sold in that period and that the median sale price was \$1,100,000 with an average sale price of \$922,778. Five of the nine sales completed were over \$1M with a highest sale price of \$1,425,000 (RP Data 2007). This is thought to be indicative of the majority of the existing housing stock in the Shute Harbour area.

The construction phase is likely to bring some disruption to the area. Whilst quantification of these potential impacts is difficult it is considered unlikely there would be any reduction in property values as a result of the SHMR proposal and it is likely with improvements in amenity and facilities, that house and land prices will increase.

## **Additional Local Government Services**

The anticipated increase in the visitor population during the operational phase of the development may require additional local government services. The services that may be impacted include:

### Infrastructure

The requirements for additional infrastructure costs are currently under discussion with the WRC (then WSC). The electricity and telecommunications assessment provided as Appendix L of the EIS suggests that there will be no requirement for system capacity increases resulting from the SHMR development proposal. It is assumed that developer contributions will be made as required and negotiated.



### Car Parks

Consultation identified that car parking is already over subscribed in Shute Harbour and Queensland Transport have informed the WRC that they will only contribute to the a new boat ramp when an additional 90 car and boat trailer spaces are provided for users. Council has prepared preliminary plans to create some additional parking at Shute Harbour although no decision will be taken before the SHMR is considered.

### Boat Ramp

The Proponent has committed a contribution of \$2.5 million to the WRC to upgrade the existing boat ramp and associated facilities at Shute Harbour should the proposed marina proceed. As well as adding to the local amenity, this would reduce the current overcrowding at the existing facility and provide some capacity to accommodate predicted growth in community demand for this facility. Funding support would also save WSC from having to fund all of this expenditure from its capital budget.

### Waste Management Services

Additional waste collection and disposal services will be required to service the development. It is understood that WRC currently operates its waste collection services on a full cost recovery basis (DLGPSR, 2007). As a result, it would be anticipated that any additional cost of these services would be recovered from users, with no net cost to WRC or other ratepayers (DLGPSR, 2007).

### Public Transport Services

It is likely that on completion of the SHMR there will be increased demand for a public transport service linking Shute Harbour and surrounding service centres. Although there will be some retail development at Shute Haven it is likely that visitors will want to access the wider range of goods and services available at Airlie Beach, Cannonvale and other larger service centres. Initially the Proponent will provide a courtesy shuttle service, which may also provide some community benefit. Once demand reaches a point where the operation of the route becomes commercially viable, it is anticipated an appropriate service provider will be selected to take over the service. See section 6.5.3 within the SEIA for additional discussion on public transport services in the region.

### Cultural and Education Services

SHMD Pty Ltd has committed to developing a "Reef Conservation Fund" to be operated as a charitable fund by the GBRMPA. The fund will be funded from the sale of the marina berths, with an initial contribution provided by the proponent upon the settlement of each marina berth that would contribute approximately \$1.0 million in total, with an ongoing contribution of approximately \$150,000 per annum from leaseholders as part of the lease agreement.

This fund will contribute to the ongoing sustainability of the marine habitat by providing low impact seagrass moorings on the reef. Part of this funding is anticipated to be directed to ongoing public education and awareness campaigns, as well as a traditional owner and marina environment interpretive centre.

### **Impact of SHMR on Existing Businesses**

Economic and business activities currently occurring at or near the development site that may be impacted, either positively or negatively, include:

- the SHTF including 'Fantasea' tourist services establishment and tourist café in the wharf complex;

- charter boat operations;
- Engwirda Marine;
- the service station and car park;
- the Shute Harbour Motel; and
- the Coral Sea Motel/Café.

The following section reviews the concerns and potential beneficial and detrimental impacts identified on the existing businesses during the construction and operating phases of the CHMD with existing business owners/ operators.

### SHTF

There may be some disruption to visitors travelling to and from the transit building during the construction phase, although given that most construction will be site based with little impact on access roads it is anticipated that this will not have a significant impact on passenger numbers or the operation of the terminal. Mitigation strategies are outlined in Section 4.2 'Transport' of the EIS. The operational phase of the development may see a small increase in terminal user numbers as awareness of the area increases along with visitor numbers.

Consultation with Port Binnli Pty Ltd, that own the lease over the SHTF, identified no concerns relating to the construction or operation of the proposed development. Discussions with Fantasea (ferry and tour operator) indicate that the construction phase presents few, if any, concerns and that the operational phase may actually slightly increase its business.

Currently some private boat owners use the SHTF as a temporary mooring point whilst they replenish their supplies on the mainland. They are charged a fee for this service, a proportion of which is paid to Council, which has a financial interest in the facility.

There are also five commercial operators that access the terminal by dinghy. Where it can be demonstrated that commercial operators have a legitimate commercial need, operators are granted access to the terminal and the only charge levied on these users is the cost of having an additional key cut for the gate to the premises. These uses are not anticipated to be impacted by SHMR.

On completion of SHMR it would be anticipated that the majority of boat users would use the new facilities and the revenue stream to the SHTF would be reduced. Consultation with the local government suggests that this revenue stream is not material in its day to day operations (pers. comm. S. Hunt, Business Services Manager, Whitsunday Shire Council, 1st October 2007).

Hamilton Island Enterprises barge: Hamilton Island Enterprises use Shute Harbour as the base for its barge operations, which are used to re-supply the island resort. There are no identified economic impacts from the construction or operational phases of the development, with the marina designed to ensure barge operations are not impeded.

### Charter Boat Operations

There may be some potential for increased business activity from visitors to the SHMR precinct chartering bare boats. However, consultation with the Whitsunday Bareboat Association identified the main benefit of SHMR as being the competition brought to what is perceived to be a current monopoly in the marina market with the Port of Airlie and Able Point marinas currently owned by Meridian.

### Engwirda Marine

No negative impacts were identified for the salvage operator who thought that once operational, the proposed development may present some business development opportunities.

### Service Station and Carparks

The SHMR includes car parking facilities but these will be provided for the use of guests only. Consultation with WRC suggests that during peak periods at Shute Harbour demand for car parking spaces often significantly outstrips supply placing significant pressure on the available car parking especially from visitors with boat trailers. There are currently three off-street car parks at Shute Harbour, all of which charge for use.

There are also 15 on-street car and boat trailer parking spaces in a specially zoned area, and these are currently available free of charge. Consultation with WRC identified significant shortages of car parking spaces, especially during busy periods, which can lead to problems associated with incorrectly parked vehicles. Council also identified the potential to fill in the bay between motel and SHTF to provide additional parking. Although the plans for this project have been developed it will not be progressed before the decision on the SHMR is made. The Proponent has committed a \$2.5 million contribution to this development if SHMR proceeds.

The commercial carpark and service station are some few hundred metres from the proposed development site. It is also expected that the service station would see an increase in business levels during the construction phase with additional vehicle movements in the area associated with construction workers.

Consultation with the owners of the service station and carpark identified the operational phase of the development as a significant opportunity to grow both the carparking and service station businesses (pers. comm. Rob Turner, Partner, Sabre Parking Services, 1st October 2007).

Based on consultation with the operators of the existing Shute Harbour car parks and the forecast growth in visitor numbers it does not appear that the development would have a negative impact on the income of the existing car parks, in fact the business owners identify the SHMR as a business development opportunity.

### Motel and other accommodation providers

The owners of the motel adjacent to the proposed development site expressed concerns about the impact of the construction phase on their business through a reduction in visitor numbers due to a potential noise impacts (pers. comm. David McInerney, motel owner, 13th August 2007). However, the work will be carefully managed to reduce impacts, and at the same time any decrease in demand due to noise impacts could be offset by accommodation demand from construction workers.

Concerns were also raised by some motel owners in the surrounding area during the consultation process regarding potential loss of turnover should any of their current customers stop using the accommodation in Shute Harbour and Shutehaven and instead use accommodation at SHMR. It is considered that this scenario is unlikely as the hotel and MRA will offer a highly differentiated product from the accommodation that is currently available in the Shute Harbour precinct.

The specific market sector that the Proponent is seeking to target are high net worth individuals, in particular those with a strong interest in marine based leisure pursuits. Existing accommodation providers at Shute Harbour and Shutehaven do not specifically cater for this market segment (the motel adjacent to the proposed development site, for example, caters for backpackers, some workers and sales representatives).

### **Impacts on Other Maritime Sector Businesses**

During the consultation stage, two chandlery stores in Airlie Beach were consulted regarding the potential impacts of the development on their business. Neither business considered the development to be a threat. Both considered there to be little opportunity to service boat owners outside their immediate proximity, and thereby considered there to be little risk of any loss of business.

### **Implications for Future Developments in the Local Area**

#### Finite Use of Land and Alternative Development Opportunities

The proposed site has no identified current productive agricultural or aquaculture value, and opportunities for this into the future would appear limited. The site has been identified by State Government as a safe natural harbour with potential as a marina site, and the establishment of a term lease for the investigation of this purpose provides further evidence of the State Government's position in this regard. In addition, the WDMA (Brown & Root, 2001) indicated that Shute Harbour is ideally suited for development of a marina.

#### Future Economic Development

If the SHMR is approved, the marina and associated land based developments have the potential to encourage additional economic development at Shute Harbour into the future, largely related to the potential upgrade of the existing SHTF and expansion of the marine services industry. The upgrade would be expected to improve facilities and increase the size and number of vessels that could be accommodated. Any upgrade is likely to be driven by demand for these services from the islands and resorts that the ferries currently service and fits in with the proposed development.

The anticipated increase in private vessels described in the marina demand study in Appendix H1 of the EIS supports further expansion of the marine service sector. By accessing advantages from clustering, facilitated and supported by the SHMR, it may be possible for the marine service sector to access greater value adding opportunities. Potential advantages of clustering in the marine sector as reproduced in the SEIA include:

- facilitating the creation of business to business networks and co-operation;
- enhanced business and industry productivity through increased access to specialised suppliers, skills, and information;
- improved targeting and impact of marketing activities;
- increased industry efficiency through improved industry coordination and
- collaboration; and
- other supply chain synergies between companies (for example between a boat builder and a boat sales dealer).

### **4.13.2.3 Summary of Economic Impacts**

#### Economic Impacts on Employment and Households

The SHMR would be expected to directly generate 552 FTE positions during the construction phase and a further 171 FTE positions in the operational phase within the Mackay SD. Further, indirect impacts of the development would be expected to create 269 FTE positions during the construction phase and 100 FTE positions in the operational phase in the Mackay SD. At the State level, it would be anticipated that 1,174 FTE positions would be created during the construction phase and 220 FTE positions during the operational phase.

Household incomes in the Mackay SD would be expected to increase by \$51.6 million during the construction phase and \$13.4 million per annum in the operating phase.

#### Economic Impacts on Existing Businesses

During the construction phase, it is estimated that Mackay SD regional output would increase by \$322.9 million and \$452.5 million at the State level. This would include an increase in value added production of approximately \$137.2 million and \$195.7 million at the regional and State levels respectively.

During the operating phase, it is estimated that Mackay SD regional output would increase by \$78.8 million per annum and \$61.4 million at the State level. This would include an increase in value added of \$37.0 million and \$28.9 million at the regional and State levels respectively.

Consultation identified the majority of businesses in the Shute Harbour area to be in favour of the development, anticipating additional business opportunities that may flow on to them associated with the demand for goods and services from the growth in visitor numbers especially given the characteristics of the SHMR target market. There were some concerns regarding the impact of the construction phase and any associated increase in marine traffic in the Shute Harbour area, however, these are addressed through mitigation strategies proposed in the SEIA.

#### Economic Diversity

It is likely that employment created during the construction phase will help to provide employment for the existing construction sector employees rather than driving any significant change in the proportion of workers in the region or state that are employed in this sector. Thereby contributing to the maintenance rather than an increase in economic diversity.

The operational phase is not identified to have any significant impact given the relatively small number of employees involved relative to the labour force as a whole.

#### Economic Impacts on Non-Business Groups

Although infrastructure costs are still subject to negotiation, no requirement for extensive expansion or improvements to the existing local government services has been identified. There may be potential for the local government to improve existing facilities at Shute Harbour as a result of the SHMR, such as car parking and the boat ramp. The Proponent has committed to a contribution of \$2.5 million to upgrade the existing boat ramp and associated facilities at Shute Harbour should the proposed marina proceed.

The economic loss to WRC from no longer charging for the use of the SHTF appears to be minimal and the potential contribution towards the costs of the new boat ramp represents a considerable saving. Assuming an appropriate agreement is reached regarding infrastructure costs and that the full costs of providing services to the development are recovered through an appropriate charging regime, there should not be a net cost to Council from the SHMR.

Some residents have expressed concerns about the impact of the development on property values. However, it is considered more likely that the development may contribute to an increase in property values resulting from increased services in the region.

#### Economic Impacts on Current Land Use

Outside the footprint of the site itself, it is not anticipated that the SHMR will constrain land use in the surrounding area. The development will provide opportunities for existing business growth and expansion due to enhanced local access to the marina and associated facilities, particularly for businesses in related upstream and downstream industries.

#### **4.13.2.4 Economic Impact Mitigation Strategies**

Section 8 of the SEIA outlines a number of mitigations strategies to manage economic impacts. Those identified strategies include the following.

1. Retaining as much construction expenditure as possible in the regional economy by:
  - a. facilitation of discussion with local businesses to establish which services are available in the region;
  - b. encouraging local suppliers to tailor their services to better meet the requirements of the developer;
  - c. encouraging the primary contractor to utilise local suppliers, where possible in the development of the facility; and
  - d. retaining as much visitor expenditure as possible in the regional economy by ensuring the availability of visitor information regarding facilities and attractions in the region.
2. Facilitating opportunities for local businesses to capitalise on the benefits of the project by:
  - a. encouraging the use of locally produced products for required construction materials where possible;
  - b. enhancing links between the marina, associated facilities and local business, in particular businesses in related industries such as marine and tourism through a local skills/ capability marketing campaign;
  - c. sourcing of labour from the local labour pool during the construction phase to maximise the retention of income and expenditure in the local region; and
  - d. engaging and consulting with local business during the planning, construction and operational stages of the development to inform businesses of the opportunities available for supply of goods and business linkages.
3. Reducing the potential impacts on short stay accommodation availability for tourists during the construction phases of the project by:
  - a. sourcing labour from the local labour pool where possible to reduce number of workers needing to relocate to the region during construction;

- 
- b. consulting with accommodation providers, real estate agents and relevant Government departments to identify sufficient, suitable accommodation for construction workforce;
  - c. assisting construction workers in locating suitable accommodation; and
  - d. if required, providing accommodation for construction workers, which could add to the supply of affordable housing in the area after the construction phase is completed.

## 4.14 Hazard and Risk

Realised hazards and risks have the potential to impact upon the environment, property and individuals, in this section the potential hazards and risk which may originate from the construction and operation of the SHMR are:

- identified;
- analysed/evaluated based on the likelihood of the occurrence (frequency) and consequence of such hazards and risks; and
- treated to minimise or eliminate the hazard and risk.

### 4.14.1 Description of Environmental Values

The construction and operation of the proposed SHMR has the potential to introduce hazards and risks to the surrounding environment which require appropriate mitigation measures.

The environments of high conservation value that may be affected by the SHMR include:

- GBRWHA;
- GBRMP;
- Conway NP; and
- significant coastal wetlands (i.e. important wetlands), remnant vegetation, mangroves, seagrass and coral reef communities and coastal dunes.

The risk analysis of the SHMR considered impacts as identified in previous EIS sections.

The possible hazards from the SHMR have been categorised into the following groups:

- construction;
- marina operation;
- hazardous substances and Dangerous Goods;
- marine traffic;
- road traffic; and
- natural hazards.

This risk assessment has been prepared in addition to the marine megafauna risk assessment and workshop conducted by Natural Solutions in January 2007 which is provided in Appendix P2, and identifies and mitigates impacts from the SHMR on marine megafauna.

#### *Hazardous Substances and Dangerous Goods*

A hazardous substance is a material which in sufficient quantities has the potential to cause harm to people, environment or property because of its chemical, physical or biological qualities. Dangerous Goods are chemicals that have the potential to present an immediate threat to people, environment or property if not properly controlled. Dangerous Goods are classified according to the nature of the hazard into nine classes, some of which are divided into subclasses. A summary of these classes is provided in Table 66.



**Table 66 Dangerous Goods Classes**

Class	Dangerous Goods
1	Explosives
2.1	Flammable gas
2.2	Non-flammable gas
2.2 (Sub-risk 5.1)	Oxidising gas
2.3	Toxic gas
3	Flammable liquid
4.1	Flammable solid
4.2	Spontaneously combustible
4.3	Dangerous when wet
5.1	Oxidizing agent
5.2	Hydrogen peroxide
6.1	Toxic
6.2	Infectious
7	Radioactive
8	Corrosive
9	Miscellaneous

Dangerous Goods with a fire risk are those in Classes 2.1, 3, 4.1, 4.2, 4.3, 5.1 or 5.2. These materials may contribute to the risk of fire either by adding to the fuel load or by increasing the ease and rate of combustion.

Flammable liquids produce vapours that can ignite in air on contact with a source of ignition. Combustible liquids are liquids that burn, but are more difficult to ignite than flammable liquids. Flammable liquids have a flashpoint greater than 60.5°C and are not classified as Dangerous Goods (whereas liquids with a lower flashpoint are dangerous goods Class 3 – Flammable Liquids). Flammable and Combustible liquids proposed for the SHMR construction and operational phases are detailed in Table 67.

**Table 67 Flammable and Combustible Liquids**

Fuel Type	Classification
Unleaded Petrol	Dangerous Goods Class 3 Flammable liquid
Kerosene	Dangerous Goods Class 3 Flammable liquid
Diesel	Combustible Liquid C1 (flashpoint not greater than 150°C)
Motor Oil	Combustible Liquid C2 (flashpoint greater than 150°C)
Liquefied Petroleum Gas (LPG)	Dangerous Goods Class 2.1 Flammable gas

Fuel will be transported to the site by an approved road tanker, which must comply with the Australian Code for the *Transportation of Dangerous Goods by Road and Rail*. It is estimated that there will be one tanker delivering fuel per month with the exception of public holiday times, when the number of deliveries may increase to two per month.

The regulatory provisions for storage of flammable and combustible liquids such as commonly used fuels are as specified in the DGSM Act and DGSM Regulation. AS 1940-2004 also specifies requirements for the storage and handling of flammable and combustible liquids.

In addition premises that exceed the thresholds storage for Fuel Storage (ERA 11(a)) (undefined) needs relevant statutory approval.

It is proposed that diesel fuel will be stored within the marina for boat refuelling as detailed in Table 57. The quantity of diesel to be stored at the marina is above the threshold quantity for a Large Dangerous Goods Location (LDGL) of 100,000L. The quantity of unleaded petrol to be stored at the marina is below the threshold quantity for a LDGL 2,500L but does not exceed the prescribed quantity for a Major Hazard Facility (50,000 tonnes). Therefore, the marina development is classified as a LDGL.

It is likely that other Dangerous Goods or combustible liquids will be stored within the development for other ancillary activities, such as Dangerous Goods and/or combustible liquids required to maintain the marina (for example, revetment walls, pontoons and pylons). No boat maintenance is proposed at the SHMR site having been excised from the current proposal. Appropriate controls are proposed as part of the Marina SBMP to prevent boat maintenance activities within the marina.

No specific information on the types or quantities of other materials stored during operation is available at this stage, but materials are likely to include small quantities of:

- solvents;
- coolants;
- paints;
- fibreglass resins;
- acids and alkalis;
- cleaning chemicals; and
- pesticides (e.g. open space management).

Storage and use of the above materials has not been included in the risk assessment process due to the lack of certainty regarding their presence or volumes. However, it is anticipated that the quantities of these materials will not significantly contribute to the hazardous substance inventory.

### **Hazard and Risk Assessment Methodology**

The hazard and risk assessment has been carried out in general accordance with the following standards and guidelines.

- AS/NZS 4360: 2004 *Risk Management* (AS/NZS 4360).
- HB436:2004 *Risk Management Guidelines* (HB436).
- HB203:2004 *Environmental Risk Management: Principles and Process* (HB203).

- Department of Urban Affairs and Planning (1997) *Hazardous Industry Planning Advisory Paper: No 6* (HIPAP No 6) *Guidelines for Hazard Analysis*.

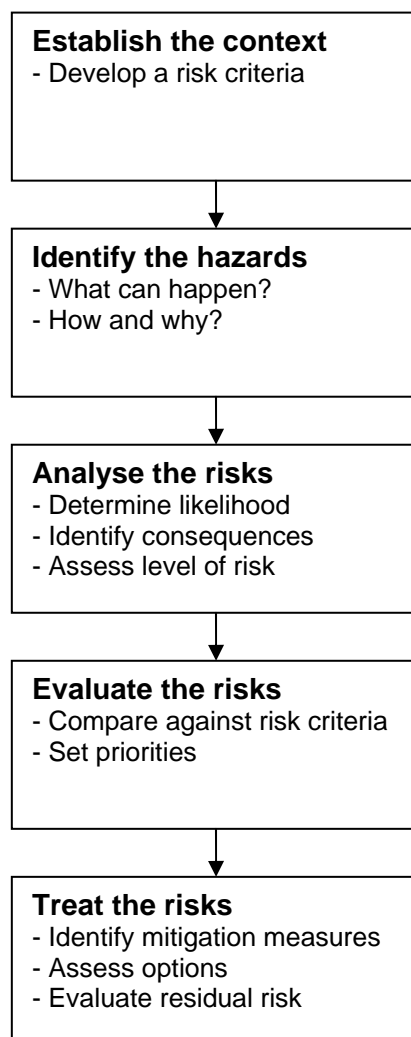
The qualitative risk assessment and hazard analysis was conducted in accordance with AS 4360 and HIPAP No 6, as these are the most relevant guidelines for the development.

In accordance with HIPAP No 6, the hazard assessment process was generally as follows.

- Identify all possible sources and causes of hazardous incidents.
- Detail all operational and organisational safety controls.
- Identify the likely consequences and frequency of incidents and quantify the risks for the most relevant hazards identified.
- Compare expected risks against the risk criteria.
- Assess the adequacy of proposed mitigation measures and controls.

Hazard identification followed a systematic process to identify all credible hazards for the SHMR. Hazard identification involved all activities undertaken as part of the development including any hazardous substances or Dangerous Goods associated with marina maintenance. Hazards were identified through discussions with the Proponent, use of relevant checklists, experience with similar operations and assessment of the development layout and an understanding of the sensitivity of the receiving environment.

A conservative qualitative risk assessment of the hazards identified generally followed the principles outlined in AS/NZS 4360 and the accompanying handbook HB436, in particular, the following process.



Establishing the context involved understanding the background of the development and the proponent, in particular specifying the scope and objectives for risk management.

Hazard identification is determining what incidents may occur that lead to an impact, and determining the cause of the incident. The objective of hazard identification is to identify the hazards associated with the development and provide the framework for risk assessment based on available information.

The risk assessment considered sources of risk, their consequence and the likelihood of the defined incident occurring. Likelihood and consequences are combined to determine the level of risk. Where no reliable data is available, risk assessment is based on subjective estimates of the outcome of the event. Consequence is the outcome of an event which impacts on people, the environment and property.

Consistent with AS/NZS 4360, risk criteria were developed to evaluate the risks, by differentiating between the likelihood of the risk and the consequence of the event / incident and reproduced in Table 68. HB203 defines likelihood as a qualitative description of probability and frequency and reproduced in Table 69. Consequence is defined in HB203 as the outcome of the event expressed in terms of death, injury, loss or some form of disadvantage.

**Table 68 Hazard and Risk Likelihood Levels**

Level	Descriptor	Qualitative Description
A	Almost certain	The event is expected to occur; event will occur on an annual basis (or more frequent).
B	Likely	Probable that it will occur; event has occurred several times before at similar developments.
C	Possible	May or may not occur; event may occur once during the development.
D	Unlikely	The event may at some time but is unlikely; heard of happening from time to time at similar developments.
E	Rare	The event may occur in exceptional circumstances; not heard of at similar developments.

**Table 69 Hazard and Risk Consequence Levels**

Level	Descriptor	Qualitative Description
1	Insignificant	People: Event does not result in injury (i.e. no medical treatment required). Environment: No damaged detected. Property: No damage to property.
2	Minor	People: Reversible injury or illness. Environment: Minor impact of short duration or short term damage. Property: Minor damage to property (<\$5,000 to repair).
3	Moderate	People: Irreversible disability or impairment (30%) to one or more persons. Environment: Short term damage resulting in complaints, localised impact. Property: Moderate damage to property (<\$50,000 to repair).
4	Major	People: Severe injuries to one or more persons, single fatality. Environment: Significant impact locally and potential for off site impacts. Property: Major damage to property (<\$500,000 to repair).
5	Catastrophic	People: Multiple fatalities, or irreversible injuries. Environment: Significant impacts to regional ecosystems and threatened species, potential for widespread off site impacts. Property: Significant loss to property (>\$1,000,000 to repair).

Likelihood and consequence is combined to determine the level of risk as seen in Table 70. This subjective quality risk criteria is used to assess the hazards associated with the SHMR.

**Table 70 Hazard and Risk Criteria**

Likelihood	Consequence				
	1 (Insignificant)	2 (Minor)	3 (Moderate)	4 (Major)	5 (Catastrophic)
<b>A (Almost certain)</b>	Medium	High	High	Extreme	Extreme
<b>B (Likely)</b>	Medium	Medium	High	High	Extreme
<b>C (Possible)</b>	Low	Medium	High	High	High
<b>D (Unlikely)</b>	Low	Low	Medium	Medium	High
<b>E (Rare)</b>	Low	Low	Medium	Medium	High

Risk evaluation uses the level of risk to determine whether a hazard and risk needs treatment and priorities of treatment. Therefore, the level of risk acts as the risk criteria.

Risk treatment involves identifying the options for mitigation or management of the risk, the proposed actions, resource requirements, responsibilities, timing, identifying performance indicators and developing reporting and monitoring procedures.

#### 4.14.2 Potential Impacts and Mitigation Measures

The results of the risk assessment, including the potential consequences and impacts from a hazardous event are outlined in Table 71 and Table 72 for construction and operational phases of the SHMR respectively. Specifically, Table 73 provides the hazard identification and risk mitigation for Hazardous Substances and Dangerous Goods Storage, Table 74 – Marine Traffic, Table 75 – Road Traffic and Table 76 – Natural Hazards.

The principal methods by which risk might be reduced for the operation include:

- elimination or reduction of dangerous activities or materials;
- substitution of dangerous activities and materials;
- separation of hazardous activities with other parts of the operation or protected environments;
- engineering controls;
- management plans; and
- regular hazard audits.

The principles of an Integrated Risk Management Plan have been incorporated into the Marina SBMP by the creation of elements with specific objectives, implementation strategies, performance standards and monitoring requirements.

Proposed methodologies for the mitigation of risk associated with the hazardous events identified are also outlined in the below tables.

**Table 71 Hazard Identification and Risk Mitigation – Construction**

Hazard Event	Cause	Consequence	Likelihood	Level of Risk	Mitigation Measure	Residual Level of Risk
Siltation and degradation of water quality.	Plant or equipment failure during dredging and construction.	Moderate (Environment)	Possible	High	<ul style="list-style-type: none"> <li>Plant and equipment to be properly maintained.</li> <li>Maximise area excavated in the dry.</li> <li>Implementation of the CEMP.</li> <li>Training of dredge operator and construction workers.</li> <li>Monitoring of turbidity, pH and nutrient changes.</li> <li>Enclosed dredge area.</li> </ul>	Low
Marine fauna injury or fatality.	Incorrect dredging practices and not following the CEMP.	Moderate (Environment)	Unlikely	Medium	<ul style="list-style-type: none"> <li>Removal of marine fauna before dredging.</li> <li>Consideration of breeding patterns and cycles during dredging.</li> <li>Implementation of the CEMP.</li> <li>Training of dredge operator and construction workers.</li> <li>Monitoring of megafauna.</li> </ul>	Low
Stormwater contamination from dredge spoil handling.	Procedural failure during dredge spoil treatment activities.	Minor (Environment)	Possible	Medium	<ul style="list-style-type: none"> <li>Engineered sedimentation ponds and filter systems to treat slurry runoff.</li> <li>Bunds and sluices of adequate capacity to cope with expected slurry volume and sediment type (e.g. clays).</li> </ul>	Minor
Fuel spill.	Leak from plant and equipment.	Minor	Unlikely	Low	<ul style="list-style-type: none"> <li>Emergency response and spill absorbent material to be provided and easily accessible.</li> <li>Oil/water separators to be installed at stormwater release points.</li> </ul>	Low
Dust emissions.	Dry weather.	Moderate (Environment)	Possible	Medium	<ul style="list-style-type: none"> <li>Construction activities to consider weather conditions.</li> </ul>	Minor
	Inadequate construction	Minor	Unlikely	Low	<ul style="list-style-type: none"> <li>Implementation of the CEMP.</li> </ul>	Low

Hazard Event	Cause	Consequence	Likelihood	Level of Risk	Mitigation Measure	Residual Level of Risk
	supervision.					
Noise emissions.	Inadequate noise attenuation.	Minor	Possible	Medium	<ul style="list-style-type: none"> <li>Plant and equipment to be installed with noise attenuation.</li> <li>Noisy construction activities to be scheduled where they will have less impact on the surrounding environment.</li> </ul>	Low
	Operating plant and equipment outside nominated construction hours.	Minor	Unlikely	Low	<ul style="list-style-type: none"> <li>Implementation of the CEMP.</li> </ul>	Low
Fire.	Inadequate construction supervision during high risk activities such as welding.	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> <li>Emergency and fire fighting equipment to be provided in accordance with Australian Standards.</li> <li>Storage and handling of flammable and combustible liquids in accordance with AS 1940.</li> <li>Implementation of the CEMP.</li> <li>Emergency services will be provided full access to the site.</li> <li>Fire response training provided to employees.</li> <li>Containment of fire fighting water.</li> </ul>	Low

**Table 72 Hazard Identification and Risk Mitigation – Marina Operation**

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
Fuel spill from boats.	Leaking from fuel tank and lines.	Moderate (Environment)	Possible	High	<ul style="list-style-type: none"> <li>Implementation of the Marina SBMP.</li> <li>Emergency response and spill absorbent material to be provided and easily accessible.</li> <li>Marina Manager to ensure that all boats moored within the Marina are in good condition.</li> </ul>	Medium
Fuel spill during boat refuelling.	Inadequate fuel transfer equipment.	Moderate	Possible	High	<ul style="list-style-type: none"> <li>Emergency response and spill absorbent material to be provided and easily accessible.</li> </ul>	Medium



Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
					<ul style="list-style-type: none"> <li>Procedure for boat refuelling.</li> </ul>	
Oil spill from Pad Mounted Transformer (PMT) in marina.	PMT failure.	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> <li>PMT to be designed and installed in accordance with Australian Standards.</li> <li>PMT to be properly maintained.</li> </ul>	Low
Boat fire.	Inadequate safety and fire systems.	Major	Possible	Medium	<ul style="list-style-type: none"> <li>Emergency and fire fighting equipment to be provided in accordance with Australian Standards.</li> <li>Each boat to have an onboard fire extinguisher.</li> <li>Fire protection and alarm system to be installed.</li> <li>Implementation of the Marina SBMP.</li> <li>Emergency services will be provided full access to the site.</li> <li>Fire response training provided to employees.</li> <li>Containment of fire fighting water.</li> <li>Adequate buffer distance between marina and residences.</li> <li>Boat operators to ensure they have vented the fuel within the boat prior to starting the engine.</li> </ul>	Low
Failure of power supply.	Zone substation failure.	Minor	Possible	Low	<ul style="list-style-type: none"> <li>Installation of safety systems in accordance with Australian Standards.</li> <li>Regular maintenance of zone substations.</li> </ul>	Insignificant
Sewage spill.	Sewage and bilge storage and pumping equipment failure.	Moderate (Environment)	Possible	High	<ul style="list-style-type: none"> <li>Regular maintenance of sewage and bilge infrastructure.</li> <li>All boat operators to be advised that there is no discharge into Shute Harbour.</li> <li>Bunding to be provided around storage tank.</li> <li>Regular removal of tank contents.</li> <li>Implementation of the Marina SBMP.</li> </ul>	Medium

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
					<ul style="list-style-type: none"> <li>Emergency response and spill absorbent material to be provided and easily accessible.</li> </ul>	

**Table 73 Hazard Identification and Risk Mitigation – Hazardous Substances and Dangerous Goods Storage**

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
Fuel spill.	Inadequate design of fuel storage facilities.	Moderate (Environment)	Possible	High	<ul style="list-style-type: none"> <li>Fuel storage has been positioned to minimise the impact to people, environment and property.</li> <li>Design and storage of fuel storage facility to be in accordance with AS 1940.</li> <li>Implementation of emergency and safety systems in accordance with DGSM legislation.</li> <li>Provision of bunding around storage tank.</li> <li>Emergency response and spill absorbent material to be provided and easily accessible.</li> <li>Staff training in emergency response procedures.</li> <li>Implement and follow emergency response procedures of the Marina SBMP.</li> </ul>	Medium
	Inadequate fuel transfer equipment.	Moderate (Environment)	Possible	High	<ul style="list-style-type: none"> <li>Provision of high level alarms and overflow protection on the storage tank in accordance with AS 1940.</li> <li>Fill point incorporates a spill containment system that drains into the tank.</li> <li>Dispensers to be fitted with an automatic lock off and dry couplings.</li> <li>Provision of bunding around bowser.</li> <li>Emergency stop button to be easily accessible.</li> <li>Regular maintenance of fuel transfer piping.</li> <li>Emergency response and spill absorbent material to be provided and easily accessible.</li> </ul>	Low

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
					<ul style="list-style-type: none"> <li>• Fire extinguishers are located close to the fill points.</li> <li>• Fill line vapour recovery for Class 3 fuels.</li> <li>• Staff training in emergency response procedures.</li> <li>• Implement and follow emergency response procedures of the Marina SBMP.</li> </ul>	
	Inadequate emergency and safety systems.	Moderate (Environment)	Possible	High	<ul style="list-style-type: none"> <li>• Emergency response and spill absorbent material to be provided and easily accessible.</li> <li>• Provision and access to fire fighting equipment at fuel berths.</li> <li>• Staff training in emergency response procedures.</li> <li>• Implement and follow emergency response procedures of the Marina SBMP.</li> <li>• Security against unauthorised use or vandalism.</li> </ul>	Low
	Inadequate supervision.	Moderate (Environment)	Possible	High	<ul style="list-style-type: none"> <li>• Staff training in emergency response procedures.</li> <li>• Implement and follow emergency response procedures of the Marina SBMP.</li> </ul>	Medium
Fuel fire.	Inadequate emergency and safety systems.	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>• Emergency and fire fighting equipment to be provided in accordance with Australian Standards.</li> <li>• Storage and handling of flammable and combustible liquids in accordance with AS 1940.</li> <li>• Implementation of emergency and safety systems in accordance with DGSM legislation.</li> <li>• Incompatible substances to be separated.</li> <li>• Implementation of the Marina SBMP.</li> </ul>	Low

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
					<ul style="list-style-type: none"> <li>Emergency services will be provided full access to the site.</li> <li>Fire response training provided to employees.</li> <li>Containment of fire fighting water.</li> <li>Adequate buffer distance between fuel storage and residences.</li> </ul>	

**Table 74 Hazard Identification and Risk Mitigation – Marine Traffic**

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
Collision with dredging equipment.	Navigation hazard.	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Dredging barge to be equipped with onboard marine navigation hazard flags.</li> </ul>	Low
Boating collision (with other boats).	Inadequate boating supervision / human error.	Major	Possible	High	<ul style="list-style-type: none"> <li>Implementation of speed limits within the Marina.</li> <li>Person in control of boats to be experienced and licensed to operate the class of vessel they are controlling.</li> </ul>	Medium
	Poor visibility.	Major	Possible	High	<ul style="list-style-type: none"> <li>Navigation signs to be clearly visible in all weather conditions.</li> </ul>	Medium
	Inadequate navigational design or mooring structures.	Major	Possible	High	<ul style="list-style-type: none"> <li>Marina designed to prevent boating collisions, with specific regard to AS 3962 <i>Guidelines for design of Marina Structures</i>.</li> <li>Marina entrance and public jetty have been designed to minimise impacts between private and commercial boats.</li> <li>Marina access to be marked with navigational structures in accordance with Queensland Transport and the Harbour Master requirements.</li> </ul>	Medium
Boating Collision (with solid structures)	Boat unfamiliar driver with	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Emergency services access to be provided</li> </ul>	Low

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
i.e. breakwater)	newly constructed breakwater.				along breakwater.	
	Poor visibility.	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Breakwater to be marked with navigational structures in accordance with the Regional Harbour Master's requirements.</li> <li>Navigation signs to be clearly visible in all weather conditions.</li> <li>After hours emergency contact to be available.</li> </ul>	Low
	Inadequate boating supervision.	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Person in control of boats to be experienced and licensed to operate the class of vessel they are controlling.</li> </ul>	Low
Boat grounding.	Navigational channel and marina basin not deep enough.	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> <li>Marina has been designed and constructed to minimise the potential for groundings.</li> <li>Marina access channel and basin to be dredged every 2-3 years or as required by monitoring of siltation boxes.</li> </ul>	Low

**Table 75 Hazard Identification and Risk Mitigation – Road Traffic**

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
Impact with vehicles (Construction)	Slow moving trucks turning on to Proserpine-Shute Harbour Road.	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Intersection design developed considering anticipated traffic generation.</li> <li>Bus for construction workers from the town centre to Shute Harbour to minimise volume of traffic.</li> </ul>	Low
Impact with vehicles (Operation)	Increase in traffic generation.	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Intersection design developed considering anticipated traffic generation.</li> <li>Public transport to be provided with a dedicated bus stop within the development.</li> </ul>	Low
Impact with	Increase in visitors to	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Provision of a pedestrian boardwalk from the</li> </ul>	Low

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
pedestrians	the development and public jetty.				public jetty to the development.	

**Table 76 Hazard Identification and Risk Mitigation – Natural Hazards**

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
Cyclone (Construction).	Weather event.	Major	Possible	High	<ul style="list-style-type: none"> <li>Weather forecasts to be monitored.</li> <li>Safe mooring of dredge equipment.</li> <li>In the event of a cyclone construction work will cease and equipment removed from the site or secured on site.</li> <li>Implement Cyclone Evacuation Plan.</li> </ul>	Medium
Cyclone (Operation).	Weather event.	Catastrophic	Possible	High	<ul style="list-style-type: none"> <li>Development designed to minimise potential damage.</li> <li>Marina designed and constructed to appropriate standards.</li> <li>The marina will be available to other vessels.</li> <li>Isthmus will provide shelter for other vessels.</li> <li>Implementation of the Cyclone Evacuation Plan.</li> <li>Ensure all occupants are aware of the contents of the Cyclone Evacuation Plan, in particular the cyclone evacuation point.</li> </ul>	Medium
Tidal surge.	Inadequate design on isthmus.	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Wave protection attenuator, bund and channel to be installed.</li> <li>Isthmus designed after considering tidal surge, wave heights and climate change influences.</li> </ul>	Low
Bushfire.	Bushfire of adjacent Conway National Park.	Major	Unlikely	Medium	<ul style="list-style-type: none"> <li>Design of the development considered bushfire risks from Conway NP.</li> <li>No development on the north side of</li> </ul>	Low

Hazard Event	Cause	Consequence	Frequency	Level of Risk	Mitigation Measure	Residual Level of Risk
					Proserpine-Shute Harbour Road. <ul style="list-style-type: none"> <li>Proserpine-Shute Harbour Road acts as a fire break from Conway NP.</li> </ul>	
Mosquitos and biting midge	Increase in mosquito breeding habitat.	Minor	Possible	Medium	<ul style="list-style-type: none"> <li>Implementation of mosquito control programs such as spraying, removing mosquito habitat.</li> <li>Use of low impact insecticides.</li> <li>Monitoring of mosquito types and populations.</li> </ul>	Low

## 4.15 Cross Reference with ToR

Table 77 provides a cross reference (following the ToR format) of the structure of the EIS, with the corresponding sections of the ToR, and in particular identifies related Appendices used to response to sections of the ToR.

**Table 77 Cross Reference with ToR**

Terms of Reference	SHMR EIS	Related Appendices
<b>1. Introduction</b>	<b>1. Introduction</b>	
1.1 Project proponent	1.1 Project proponent	A, B1, B2, C
1.2 Project description	1.2 Project description	A, B1, B2, C, D, E, G
1.3 Project objectives and scope	1.3 Project objectives and scope	C, G
1.4 The EIS process	1.4 The EIS process	
1.4.1 Methodology of the EIS	1.4.1 Methodology of the EIS	C
1.4.2 Objectives of the EIS	1.4.2 Objectives of the EIS	
1.4.3 Submissions	1.4.3 Submissions	F
1.5 Public Consultation Process	1.5 Public Consultation Process	F
1.6 Project approvals	1.6 Project approvals	
1.6.1 Relevant legislation and policy requirements	1.6.1 Relevant legislation and policy requirements	C
	1.6.1.1 Summary of applicable legislation	
	1.6.1.2 Relevance to the development	
	1.6.1.3 Assessment Manager for approvals	
	1.6.1.4 Required Approvals	
	1.6.2 Program of approvals	
1.6.2 Planning processes and standards	1.6.3 Planning processes and standards	
	1.6.3.1 The SHMR Development Code	
1.7 Accredited process for controlled actions under Commonwealth legislation	1.7 Accredited process for controlled actions under Commonwealth legislation	F
<b>2. Project Need and Alternatives</b>	<b>2. Project Need and Alternatives</b>	
2.1 Project justification	2.1 Project Need	H1, H2, H3
	2.1.1 Marina Demand	
	2.1.1.1 Community Support	
	2.1.2 Accommodation	
	2.2 Location Suitability	C, G, H1, H2
	2.3 Alignment with Policy and Regional planning	
	2.3.1 State Policy	C, G
	2.3.2 Whitsunday Hinterland and Mackay Regional Plan (WHAM)	
	2.3.3 Regional Planning	
	2.3.3.1 Whitsunday Growth Management Initiative	
	2.3.3.2 Draft Mackay-Whitsunday Regional	



Terms of Reference	SHMR EIS	Related Appendices
	Coastal Management Plan	
	2.4 The Benefits	
	2.4.1 Social benefits	G
	2.4.2 Economic benefits	
	2.4.3 Environmental benefits	
2.2 Alternatives to the project	2.5 Alternatives to the project	C
<b>3. Description of the Project</b>	<b>3. Description of the Project</b>	
3.1 Overview of the project	3.1 Overview of the project	C
	3.1.1 The Opportunity	G
	3.1.2 Expected Project Cost	G
	3.1.3 Project duration and timing	C
3.2 Ecological Sustainable Development	3.2 Ecological Sustainable Development	
	3.2.1 Design	
	3.2.2 Construction	
	3.2.3 Operation	
3.3 Location	3.3 Location	
3.3.1 Regional Context	3.3.1 Regional Context	Figures
3.3.2 Local Context	3.3.2 Local Context	
	3.3.3 Site Description	
3.4 Construction	3.4 Construction	
3.4.1 General construction methods and program	3.4.1 General construction methods and program	Drawings, O
3.4.2 Dredging	3.4.1 General construction methods and program 4.1.2.4 Maintenance Dredging Spoil Disposal	
3.5 Infrastructure Requirements	3.5 Infrastructure Requirements	
3.5.1 Road	3.5.1 Road	K1
3.5.2 Shipping/Waterborne Transport	3.5.2 Shipping/Waterborne Transport	K2
3.5.3 Energy	3.5.3 Energy	L
3.5.4 Water supply and storage	3.5.4 Water supply and storage	M
3.5.5 Stormwater Drainage	3.5.5 Stormwater Drainage	M
3.5.6 Telecommunications	3.5.6 Telecommunications	L
3.5.7 Accommodation and other infrastructure	3.5.7 Accommodation and other infrastructure	K1, K2
3.5.8 Transport Infrastructure Demand	3.5.8 Transport Infrastructure Demand	K1, K2
3.6 Waste Management	3.6 Waste Management	U2
3.6.1 Character and quantities of waste materials	3.6.1 Character and quantities of waste materials	
	3.6.1.2 Construction 3.6.1.3 Operation	
3.7 Financial feasibility	3.7 Financial feasibility	
<b>4. Environmental Values and Management of Impacts</b>	<b>4. Environmental Values and Management of Impacts</b>	
<b>4.1 Land</b>	<b>4.1 Land</b>	
4.1.1 Description of environmental	4.1.1 Description of environmental	

<b>Terms of Reference</b>	<b>SHMR EIS</b>	<b>Related Appendices</b>
<i>values</i>	<i>values</i>	
	4.1.1.1 Topography/ Geomorphology/Bathymetry	I1, I2
	4.1.1.2 Geology	I1, I2
	4.1.1.3 Soils	I1, I2
	4.1.1.4 Contaminated Land	I1, I2
	4.1.1.5 Acid Sulfate Soils	I1, I2, I3
	4.1.1.6 Land Use	I1, I2
	4.1.1.7 Infrastructure	I1, I2
	4.1.1.8 Sensitive Environmental areas	I1, I2
	4.1.1.9 Landscape Character	J
	4.1.1.10 Visual Amenity	J
<b>4.1.2 Potential impacts and mitigation measures</b>	<b>4.1.2 Potential impacts and mitigation measures</b>	
	4.1.2.1 Land Use Suitability	I1, I2, U1
	4.1.2.2 Soil Suitability	I1, I2, U1
	4.1.2.3 Land Disturbance	I1, I2, I3, U1
	4.1.2.4 Maintenance Dredging Spoil Disposal	I1, I2, O, U3
	4.1.2.5 Acid Sulfate Soils	I1, I2, I3
	4.1.2.6 Soil Contamination	I1, I2, I3, U1, U2, U3
	4.1.2.7 Landscape Character and Visual Amenity	J, U1, U3
	4.1.2.8 Lighting	J, P1, P2
<b>4.2 Transport</b>	<b>4.2 Transport</b>	
4.2.1 Road	4.2.1 Road	K1
4.2.2 Water/Air based	4.2.2 Water/Air based	K2
<b>4.3 Climate</b>	<b>4.3 Climate</b>	
	4.3.1 Rainfall	N, O
	4.3.2 Temperature and Humidity	O
	4.3.3 Wind	O
	4.3.4 Climatic Extremes	
	4.3.4.1 Tropical Cyclones	O, U4
	4.3.4.2 Storm Surge	
	4.3.4.3 Landslip	
	4.3.4.4 Vulnerability to Hazards	
<b>4.4 Water resources</b>	<b>4.4 Water resources</b>	
<b>4.4.1 Description of environmental values</b>	<b>4.4.1 Description of environmental values</b>	
	4.4.1.1 Surface Waterways	N
	4.4.1.2 Groundwater	
<b>4.4.2 Potential impacts and mitigation measures</b>	<b>4.4.2 Potential impacts and mitigation measures</b>	
	4.4.2.1 Surface Waterways	N, U1, U3
	4.4.2.2 Groundwater	

<b>Terms of Reference</b>	<b>SHMR EIS</b>	<b>Related Appendices</b>
<b>4.5 Coastal environment</b>	<b>4.5 Coastal environment</b>	
<i>4.5.1 Description of environmental values</i>	<i>4.5.1 Description of environmental values</i>	
	4.5.1.1 Water Quality	N, O
	4.5.1.2 Sediment Quality	I1, I2, O
	4.5.1.3 Coastal Processes	O
	4.5.1.4 Biological Diversity	P1, P2
<i>4.5.2 Potential impacts and mitigation measures</i>	<i>4.5.2 Potential impacts and mitigation measures</i>	
	4.5.2.1 Coastal Processes (other than ecological processes)	N, O
	4.5.2.2 Coastal Resources and Values	All
<b>4.6 Air</b>	<b>4.6 Air</b>	
<i>4.6.1 Description of environmental values</i>	<i>4.6.1 Description of environmental values</i>	
	4.6.1.1 Background Data	
	4.6.1.2 Greenhouse Emissions	
<i>4.6.2 Potential impacts and mitigation measures</i>	<i>4.6.2 Potential impacts and mitigation measures</i>	
	4.6.2.1 Mitigation Measures	
	4.6.2.2 Greenhouse Abatement	
	4.6.2.3 Climate Change Adaptation	
<b>4.7 Waste</b>	<b>4.7 Waste</b>	
<i>4.7.1 Description of environmental values</i>	<i>4.7.1 Description of environmental values</i>	U2
<i>4.7.2 Potential impacts and mitigation measures</i>	<i>4.7.2 Potential impacts and mitigation measures</i>	
<b>4.8 Noise and Vibration</b>	<b>4.8 Noise and Vibration</b>	
<i>4.8.1 Description of environmental values</i>	<i>4.8.1 Description of environmental values</i>	R
<i>4.8.2 Potential impacts and mitigation measures</i>	<i>4.8.2 Potential impacts and mitigation measures</i>	
<b>4.9 Nature Conservation</b>	<b>4.9 Nature Conservation</b>	
<i>4.9.1 Description of environmental values</i>	<i>4.9.1 Description of environmental values</i>	
	4.9.1.1 Terrestrial Flora	Q, E
	4.9.1.2 Terrestrial Fauna	Q, E
	4.9.1.3 Aquatic Ecology	P1, P2, E
<i>4.9.2 Potential impacts and mitigation measures</i>	<i>4.9.2 Potential impacts and mitigation measures</i>	
	4.9.2.1 Terrestrial Flora and Fauna	Q, E, U1, U2, U3
	4.9.2.2 Aquatic Ecology	P1, P2, E, U1, U2, U3
<b>4.10 Cultural Heritage</b>	<b>4.10 Cultural Heritage</b>	
<i>4.10.1 Description of environmental</i>	<i>4.10.1 Description of environmental</i>	

<b>Terms of Reference</b>	<b>SHMR EIS</b>	<b>Related Appendices</b>
<i>values</i>	<i>values</i>	
	4.10.1.1 Indigenous Cultural Heritage	S1, S2
	4.10.1.2 Non Indigenous Cultural Heritage	
<i>4.10.2 Potential impacts and mitigation measures</i>	<i>4.10.2 Potential impacts and mitigation measures</i>	
	4.10.1.1 Indigenous Cultural Heritage	S1, S2, S3, U1, U3
	4.10.1.2 Non Indigenous Cultural Heritage	
<b>4.11 Social</b>	<b>4.11 Social</b>	
<i>4.11.1 Description of environmental values</i>	<i>4.11.1 Description of environmental values</i>	
	4.11.1.1 Demographics	T
	4.11.1.2 Housing	
	4.11.1.3 Social Infrastructure	
	4.11.1.4 Recreational and Leisure Infrastructure	
	4.11.1.5 Access and Mobility	
	4.11.1.6 Local Values, Vitality and Lifestyle	
	4.11.1.7 Summary of the Existing Social Environment	
<i>4.11.2 Potential impacts and mitigation measures</i>	<i>4.11.2 Potential impacts and mitigation measures</i>	
	4.11.2.1 Labour Force Impacts	T
	4.11.2.2 Population Impacts	
	4.11.2.3 Demographic Impacts	
	4.11.2.4 Community Values and Lifestyle Impacts	
	4.11.2.5 Access and Availability of Social and Community Infrastructure and Services	
	4.11.2.6 Property Access and Location	
	4.11.2.7 Transport Accessibility and Safety Impacts	
	4.11.2.8 Impacts on Current Land Use	
	4.11.2.9 Potential Environmental Harm on Adjacent Areas	
	4.11.2.10 Implications for Future Development in the Local Area	
	4.11.2.11 Social Impact Mitigation Strategies	

<b>Terms of Reference</b>	<b>SHMR EIS</b>	<b>Related Appendices</b>
<b>4.12 Health and Safety</b>	<b>4.12 Health and Safety</b>	
<i>4.12.1 Description of environmental values</i>	<i>4.12.1 Description of environmental values</i>	
<i>4.12.2 Potential impacts and mitigation measures</i>	<i>4.12.2 Potential impacts and mitigation measures</i>	
<b>4.13 Economy</b>	<b>4.13 Economy</b>	
<i>4.13.1 Description of environmental values</i>	<i>4.13.1 Description of environmental values</i>	
	4.13.1.1 Economic Overview	T
	4.13.1.2 Business Numbers	
	4.13.1.3 Labour Market	
<i>4.13.2 Potential impacts and mitigation measures</i>	<i>4.13.2 Potential impacts and mitigation measures</i>	
	4.13.2.1 Quantitative Assessment of Economic Impacts	T
	4.13.2.2 Qualitative Assessment of the Economic Impact of SHMR	
	4.13.2.3 Summary of Economic Impacts	
	4.13.2.4 Economic Impact Mitigation Strategies	
<b>4.14 Hazard and risk</b>	<b>4.14 Hazard and risk</b>	
<i>4.14.1 Description of environmental values</i>	<i>4.14.1 Description of environmental values</i>	O
<i>4.14.2 Potential impacts and mitigation measures</i>	<i>4.14.2 Potential impacts and mitigation measures</i>	U1, U3, U4
4.15 Cross-reference with Terms of Reference		
<b>5. Environmental Management Plan</b>	<b>5. Environmental Management Plan</b>	U1, U2, U3, U4
<b>6. Conclusions and Recommendations</b>	<b>6. Conclusions and Recommendations</b>	All
<b>7. References</b>	<b>7. References</b>	

## 5. ENVIRONMENTAL MANAGEMENT

Environmental management plans have been prepared in line with the values and vision of the SHMR development and to reduce the risk of and potential environmental harm as part of the Proponent's strategy to environmental management.

The environmental management plans that have been prepared to support the development are as follows.

- ASSMP (presented as Appendix I3 of the EIS).
- SWMS (presented as Appendix N of the EIS).
- MMMP (presented as Appendix P2 of the EIS).
- CHMP (presented as Appendix S2 of the EIS).
- CEMP (presented as Appendix U1 of the EIS).
- WMP (presented as Appendix U2 of the EIS).
- Marina SBMP (presented as Appendix U3 of the EIS).
- Cyclone Evacuation Plan (presented as Appendix U4 of the EIS).

The aforementioned plans have been developed based upon the findings and outcomes identified in Section 4 'Environmental Values and Management of Impacts' of the EIS. The management plans have also been developed to address the following items.

- Achieve the levels of environmental performance required by legislation, relevant guidelines and company policies.
- Prevent, minimise and control environmental impacts to the environment and surrounding community by providing environmental management strategies and mitigation measures.
- Provide opportunities for continual improvement by setting measurable targets and objectives.
- Identify responsible parties.
- Outline procedures for complaint handling and incident investigation, including corrective action and reporting procedures.
- Provide emergency response procedures.
- Establish performance indicators.
- Develop a monitoring program.

Environmental audits are highly recommended during construction and operation of the development. The construction and operational environmental management plans are to be reviewed not less than annually, or as required following an audit.

Environmental training, including site inductions will be provided to ensure best practice and due diligence is achieved by construction staff and contractors, and operational staff.

Such environmental management plans have addressed relevant guidelines available to the public and certainly provides sufficient detailed information for ruling Agencies to make recommendations relevant to the preliminary approval for which the EIS relates. In fact, it is contented that the aforementioned plans provide detail sufficient to satisfactorily address operational works applications.

## 6. CONCLUSIONS AND RECOMMENDATIONS

The EIS has been based on technical reports which have thoroughly assessed the potential environmental, social and economic impacts of every aspect of the proposed SHMR. The findings of the technical reporting have informed the design of the SHMR and have driven the final form of the SHMR Master Plan.

Where potential adverse impacts have been identified, appropriate mitigation measures have been proposed to manage and control the impacts. Mitigation measures that have been proposed within the EIS take the form of physical infrastructure works, rehabilitation works, financial contributions and ongoing environmental management strategies and commitments.

In addition, the proposal has been assessed as provided a number of significant social, economic and environmental benefits, in particular a net benefit in environmental, social and economic terms.

Commitments have been made to mitigate against potential environmental, social and economic impacts and protect and enhance (where applicable) the existing values of the SHMR site and surrounds.

Key commitments and mitigation measures are listed below. In conjunction with the list provided below, the various environmental management plans listed in Section 5 'Environmental Management' also document the commitments and mitigation measures to be implemented during the construction and operation of the SHMR development proposal. It is thus concluded that the project is suitable for approval subject to reasonable and relevant conditions.

### Statement of Key Commitments

The Proponent makes the following commitments as documented within this EIS.

- Align SHMR with State and regional policies and priorities ensuring compliance with relevant regulatory provisions.
- Obtain the relevant planning approvals for the construction and operation of the SHMR and comply with any reasonable and relevant development conditions.
- Continue stakeholder consultation through construction, ongoing operation and maintenance of the SHMR.
- Construct and operate the development in accordance with engineering plans and range of environmental management plans designed to prevent environmental harm.
- Implement the SHMR Development Code which specifies appropriate standards of built form, amenity, and energy efficiency and minimizes environmental impact.
- Relinquish land north of Proserpine-Shute Harbour Road back to public ownership improving the buffer between Conway National Park and the SHMR site.
- Provide power, water, sewer, stormwater drainage and telecommunications, and upgrade power supply. The Proponent will provide a financial contribution for these services.
- Upgrade the Proserpine-Shute Harbour Road to improve road safety, congestion and travel times, including a new intersection to access the SHMR site.
- Provision of additional car parking within the SHMR site and financially contribute to offsite car parking facilities to alleviate the deficiency in car parking at Shute Harbour.

- Facilitate enhanced public transport linkages between Shute Harbour and Airlie Beach by designing a potential bus lay-by area.
- Facilitate coastal access by designing a pedestrian boardwalk along the water frontage and pedestrian pathways along the two main internal collector roads to improve public access to coastal waters.
- Financially contribute to a new public boat ramp and trailer boat parking to enhance the Shute Harbour precinct as a memorable gateway to the Whitsunday Islands and Great Barrier Reef.
- Provision of a solution to separating recreational and commercial marine traffic to enhance safety by minimising the risk of collision by vessels on reciprocal courses entering and leaving Shute Harbour simultaneously, including locating navigational aids.
- Relocate 57 standard swing moorings and replace these with low impact to seagrass moorings.
- Divert stormwater runoff from upper catchments via construction of a grassed drainage drain to reduce flood hazard at the SHMR site.
- Install water efficient devices with the development to reduce demand on potable water.
- Manage potential impacts on water quality from stormwater by the design, construction and operation of a development which involves: water sensitive urban design; sediment and erosion controls; and a water quality monitoring program.
- Design of the development such that minimal impact to coastal processes results.
- Provide future residents protection from severe to extreme wave climate, currents and coincident storm tide events through the design of the SHMR development, as well as allowing for sea level rise.
- Provide emergency services and facilities by way of shelter for cyclones (car-park) and water based emergency service access (marina) to increase the safety standards for the community.
- Protect the water quality of Shute Harbour by providing appropriate sewage pump-out and refuelling facilities and polishing of current stormwater runoff from Proserpine-Shute Harbour Road.
- Educate recreational boaters through an interpretative centre and education extension programs to assist in reducing potential detrimental impacts of recreational boaters on the reef by assisting locals, visitors and the recreational and commercial boating community to understand coastal processes and the marine environment and appropriate boating best practice.
- Operate the marina with regard to the Marina Industries Association of Australia 'Clean Marinas' accreditation programme.
- Use structures in the design of the SHMR that will encourage colonisation of marine fauna and fish passage.
- Create a "Reef Conservation Fund" that will contribute to the ongoing sustainability of the coral reef including providing low impact to seagrass and coral moorings on the reef as well as education and awareness initiatives.
- Provide generational 'care for country', while showcasing Indigenous pride and knowledge to local, regional and international tourists by providing for an Indigenous Cultural Heritage Centre and performance space as well as meeting the provisions of the CHMP for the proposal.
- Source labour from the local labour pool.



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- Integrate the values of the existing community and their lifestyle in to the proposed development.
  - Enhance recreational, leisure and employment options in the longer term.
  - Reduce impacts on access to health services from additional population.
  - Reduce impacts on provision and access to sporting facilities from additional population.
  - Facilitate local community access to recreational facilities provided by the SHMR.
  - Reduce potential impacts on short stay accommodation availability, rental prices and the accessibility to traditional low-cost housing options.
  - Ensure equitable access within the marina and associated facilities for all persons.
  - Retain as much construction expenditure as possible in the regional economy.
  - Retain as much visitor expenditure as possible in the regional economy.
  - Facilitate benefits to and opportunities for local business.
  - Reduce potential impacts on short stay accommodation availability for tourists.

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## FIGURES

- Figure 1    Locality Plan**
- Figure 2    Master Plan**
- Figure 3    Precinct Plan**
- Figure 4    Development Approval Process**
- Figure 5    Zoning Plan**
- Figure 6    Cadastral Boundaries**
- Figure 7    Existing Contours**
- Figure 8    Design Contours**
- Figure 9    Environmentally Sensitive Areas**
- Figure 10   Coordinated Site Plan**
- Figure 11   3D Modelling Still Images**
- Figure 12   Road and Water Based Transport**
- Figure 13   Conceptual Stormwater Strategy**
- Figure 14   Geological Investigation Representations**
- Figure 15   State Significant Areas**
- Figure 16   State Significant Areas with Coral Communities**
- Figure 17   State Significant Areas with Mangrove Distributions**
- Figure 18   State Significant Areas with Seagrass Distributions in 1999 and 2000**
- Figure 19   State Significant Areas with Seagrass Distributions in 2007**
- Figure 20   Coastal Siltation Processes**
- Figure 21   Overlay of Regional Ecosystem Mapping**

## DRAWINGS

Drawing No.	Description
7900/48/01-100	Cover Sheet
<b>GENERAL</b>	
7900/48/01-101	Locality Plan, Notes and Schedule of Drawings
7900/48/01-102	Master Layout Plan
7900/48/01-103	Boundary and wall location plan
7900/48/01-104	Proposed future works
<b>BULK EARTHWORKS</b>	
7900/48/01-105	Design surface
7900/48/01-106	Cut and fill volumes layout plan
7900/48/01-107	Cut and fill site sections – Sheet 1 of 4
7900/48/01-108	Cut and fill site sections – Sheet 2 of 4
7900/48/01-109	Cut and fill site sections – Sheet 3 of 4
7900/48/01-110	Cut and fill site sections – Sheet 4 of 4
7900/48/01-111	Boreholes and marine clay contours layout plan
7900/48/01-112	Boreholes and residual clay contours layout plan
<b>SHUTE HARBOUR ROAD</b>	
7900/48/01-200	Road layout plan
7900/48/01-201	Typical road cross sections
7900/48/01-202	Shute Harbour Road longitudinal section
7900/48/01-203	Shute Harbour Road proposed two lane cross sections – Sheet 1 of 5
7900/48/01-204	Shute Harbour Road proposed two lane cross sections – Sheet 2 of 5
7900/48/01-205	Shute Harbour Road proposed two lane cross sections – Sheet 3 of 5
7900/48/01-206	Shute Harbour Road proposed two lane cross sections – Sheet 4 of 5
7900/48/01-207	Shute Harbour Road proposed two lane cross sections – Sheet 5 of 5
7900/48/01-208	Drainage layout plan
7900/48/01-209	Drainage culvert section – Sheet 1 of 3
7900/48/01-210	Drainage culvert section – Sheet 2 of 3
7900/48/01-211	Drainage culvert section – Sheet 3 of 3
<b>MARINA</b>	
7900/48/01-300	Revetment wall and breakwater layout plan
7900/48/01-301	Wall 1 - Sheetpile revetment longitudinal section – Sheet 1 of 2
7900/48/01-302	Wall 1 - Sheetpile revetment longitudinal section – Sheet 2 of 2
7900/48/01-303	Wall 6 – Temporary sheetpile longitudinal section
7900/48/01-304	Wall 3 – Bund wall longitudinal section

7900/48/01-305	Walls 4 and 5 - Breakwater longitudinal section – Sheet 1 of 2
7900/48/01-306	Walls 4 and 5 - Breakwater longitudinal section – Sheet 2 of 2
7900/48/01-307	Revetment wall details – Wall 1
7900/48/01-308	Wall details – Walls 3 and 6
7900/48/01-309	Typical road cross sections
7900/48/01-310	Typical cross sections
7900/48/01-311	Drainage layout plan
7900/48/01-312	Dredge Spoil Treatment Area Section
7900/48/01-350	Walls 4 and 5 breakwater – Typical elevation
7900/48/01-351	Walls 4 and 5 breakwater – Option using concrete blocks – Typical elevation
<b>CONSTRUCTION</b>	
7900/48/01-400	Construction Master Plan
7900/48/01-401	Construction Phase 1
7900/48/01-402	Construction Phase 2
7900/48/01-403	Construction Phase 3
7900/48/01-404	Construction Phase 4
7900/48/01-405	Construction Phase 5
7900/48/01-406	Sediment and erosion control plan – Standard notes and details
7900/48/01-407	Sediment and erosion control plan – Phase 1
7900/48/01-408	Sediment and erosion control plan – Phase 2
7900/48/01-409	Sediment and erosion control plan – Phase 3
7900/48/01-410	Sediment and erosion control plan – Phase 4
7900/48/01-411	Sediment and erosion control plan – Phase 5