Annie-2 Development Drilling Environment Plan

Role	Position	Signature
Document Originator:	Principal Environment and Approvals Advisor	
Document Reviewer:	Environment & Sustainability Manager	
Document Approver:	Chief Corporate Services Manager	

Document Properties
Doc No. VOB-EN-EMP-0007
Rev: 2
Rev date: 17/12/2025

Contents

1.0 Introduction 27
1.1 Activity Overview 27
1.1.1 Context with other Activities in the Otway Region 27
1.2 Summary 27
1.3 Background 28
1.3.1 Activity Approvals 29
1.4 Purpose 29
1.5 Scope 29
1.6 Titleholder Details 29
2.0 Requirements 31
3.0 Activity Description 32
3.1 Activity Location 32
3.1.1 Operational Area and Petroleum Safety Zone 32
3.1.2 Existing Infrastructure 32
3.2 Activity Duration and Timing 35
3.3 Production and Field Characteristics 36
3.4 Description of Activities 37
3.4.1 Mooring Operations 38
3.4.2 MODU Positioning 39
3.4.3 Well Construction Activities 39
3.4.4 Well Integrity Monitoring 47
3.4.5 Support Activities 47
3.4.6 Decommissioning 53
4.0 Description of the Environment 54
4.1 Regulatory Context 54
4.2 Environment that May Be Affected 55
4.3 Regional Setting 58
4.3.1 Existing Environment – East Coast Supply Project area and Annie 2 Operational Area 58
4.4 Physical, Biological and Social Receptors 62
4.4.1 Physical Receptors 63
4.4.2 Ecological Receptors 71

4.4.3 Social Receptors 97
4.4.4 Cultural Receptors 145
4.4.5 Seasonality of Key Sensitivities 162
5.0 Impact and Risk Assessment 165
5.1 Definitions 165
5.2 Risk Management Process Steps 166
5.2.1 Step 1: Establish the Context 166
5.2.2 Step 2: Risk Identification 166
5.2.3 Step 3: Risk Analysis 167
5.2.4 Risk Evaluation 171
5.2.5 Risk Monitoring, Review and Record 175
6.0 Risk and Impact Evaluation 176
6.1 Impact and Risk Scoping 176
6.2 Lower Order Impact and risk Evaluation 179
6.2.1 Planned Aspects 179
6.2.2 Unplanned Aspects 207
6.3 Seabed Disturbance 214
6.3.1 Cause of Aspect 214
6.3.2 Aspect Characterisation 214
6.3.3 Predicted Environmental Impacts and Risks 215
6.3.4 Impact and Risk Evaluation 216
6.3.5 Control Measures, ALARP, and Acceptability Assessment 222
6.4 GHG Emissions 226
6.4.1 Cause of Aspect 226
6.4.2 Aspect Characterisation 226
6.4.3 Predicted Environmental Impacts and Risks 230
6.4.4 Impact and Risk Evaluation 230
6.4.5 Control Measures, ALARP, and Acceptability Assessment 238
6.5 Underwater Sound Emissions - Impulsive 241
6.5.1 Cause of Aspect 241
6.5.2 Aspect Characterisation 241
6.5.3 Underwater Sound Modelling 243
6.5.4 Predicted Environmental Impacts and Risks 248

6.5.5 Impact and Risk Evaluation 248
6.5.6 Control Measures, ALARP, and Acceptability Assessment 261
6.6 Underwater Sound Emissions - Continuous 266
6.6.1 Cause of Aspect 266
6.6.2 Aspect Characterisation 266
6.6.3 Predicted Environmental Impacts and Risks 269
6.6.4 Impact and Risk Evaluation 269
6.6.5 Control Measures, ALARP, and Acceptability Assessment 309
6.7 Introduction, Establishment and Spread of IMS 330
6.7.1 Cause of Aspect 330
6.7.2 Aspect Characterisation 331
6.7.3 Predicted Environmental Impacts and Risks 334
6.7.4 Impact and Risk Evaluation 334
6.7.5 Control Measures, ALARP, and Acceptability Assessment 337
6.8 Accidental Hydrocarbon Release 340
6.8.1 Cause of Aspect 340
6.8.2 Aspect Characterisation 340
6.8.3 Quantitative Hydrocarbon Spill Modelling 341
6.8.4 Predicted Environmental Impacts and Risks 362
6.8.5 Impact and Risk Evaluation 362
6.8.6 Control Measures, ALARP, and Acceptability Assessment 409
7.0 Oil Spill Response 415
7.1 Oil Spill Response Strategies 415
7.1.1 Response Option Selection 415
7.1.2 Response Priority Areas 415
7.1.3 Pre-spill Net Environmental Benefit Assessment 415
7.2 Source Control 422
7.2.1 Vessel LOC 422
7.2.2 Subsea LOWC 422
7.2.3 Cause of Aspect 438
7.2.4 Aspect Characterisation 438
7.2.5 Predicted Environmental Impact and Risks 438
7.2.6 Impact and Risk Evaluation 439

7.3 Monitor and Evaluate 446
7.3.1 Cause of Aspect 446
7.3.2 Aspect Characterisation 446
7.3.3 Predicted Environmental Impact and Risks 446
7.4 Protection and Deflection 447
7.4.1 Cause of Aspect 447
7.4.2 Aspect Characterisation 447
7.4.3 Predicted Environmental Impact and Risks 447
7.4.4 Impact and Risk Evaluation 448
7.5 Shoreline Assessment and Clean-up 449
7.5.1 Cause of Aspect 449
7.5.2 Aspect Characterisation 449
7.5.3 Predicted Environmental Impact and Risks 449
7.5.4 Impact and Risk Evaluation 449
7.6 Oiled Wildlife Response 451
7.6.1 Cause of Aspect 451
7.6.2 Aspect Characterisation 451
7.6.3 Predicted Environmental Impact and Risks 452
7.6.4 Impact and Risk Evaluation 452
7.7 Control Measures, ALARP, and Acceptability Assessment 453
8.0 First Nations Cultural Heritage Values and Sensitivities 475
8.1 Summary of Potential Impacts to Cultural Features 476
8.2 Activity Aspect Interactions with Cultural Features 483
8.3 Impact and Risk Evaluation 489
8.3.1 Tangible and Heritage Sites 489
8.3.2 Intangible Heritage Sites and Values 491
8.3.3 Ecosystems and Species 496
8.4 Control Measures, ALARP, and Acceptability 503
9.0 Cumulative Impact Assessment 512
9.1 Identify reasonably foreseeable future projects and activities 513
9.2 Scoping assessment to identify relevant key environmental matters 536
9.3 Detailed cumulative impact assessment 536
10.0 Environmental Performance Outcomes, Standards, and Measurement Criteria 537

11.0 Consultation 551
11.1 Summary 551
11.2 Regulatory Compliance – Summary of Requirements 551
11.3 Consultation with Relevant Authorities, Persons and Organisations - Regulation 25 OPGGS(E)R 560
11.3.1 Identifying Relevant Persons – 25(1) 560
11.3.2 Providing Relevant Persons Sufficient Information – 25(2) 573
11.3.3 Providing Relevant Persons Reasonable Period – 25(3) 576
11.3.4 Sensitive Information – 25(4) 578
11.4 Consultation Approach with Traditional Owners 578
11.4.1 Consultation Approach with Traditional Owners Representative Groups 579
11.4.2 Consultation Approach with Individual Traditional Owners 581
11.5 Reasonable Opportunity 582
11.6 Assessment of Merits of Claims or Objections 582
11.7 Compliance with Consultation Requirements 583
11.8 Report on Consultation – Regulation 24(b) OPGGS(E)R 584
12.0 Implementation 585
12.1 Amplitude Energy Management System (AEMS) 585
12.2 Asset Integrity Management 588
12.3 Activity Planning 588
12.3.1 Decommissioning Planning 589
12.4 Contractor Management 590
12.5 Organisational Structure, Roles and Responsibilities 590
12.6 Training and Awareness 594
12.6.1 Amplitude Energy Personnel 595
12.6.2 Contractor Personnel 595
12.6.3 Environmental Induction 595
12.7 Emergency Response 595
12.7.1 General Response 596
12.7.2 Oil Pollution Emergency Plan 596
12.7.3 Source Control Emergency Plan 596
12.8 Chemical Assessment and Selection 597
12.9 Invasive Marine Species Risk Assessment 599

12.10 Marine Mammal Risk Review and Management 600
12.11 Inventory Management 604
12.12 Ongoing Consultation – Regulation 22(15) 606
12.13 Management of Change 606
12.13.1 Identifying Change 607
12.13.2 Changes to Titleholders and Nominated Liaison Person 608
12.13.3 Revisions to the EP 608
12.14 Incident Reporting and Recording 608
12.15 Environmental Performance Monitoring and Reporting 613
12.15.1 Emissions and Discharges 613
12.15.2 Activity Commencement and Cessation Notifications 615
12.15.3 Annual Performance Report 615
12.15.4 Fauna Reporting 615
12.15.5 Audit and Inspection 615
12.15.6 Management of Non-Conformance 616
12.16 Records Management 617
13.0 References 618
14.0 Appendices 645
Appendix 1 - Concordance with the OPP 645
Appendix 2 - EP Change Register 695
Appendix 3 - Environment Regulations Requirements 696
Appendix 4 - Description of the Environment 697
Appendix 5 - EPBC Database Protected Matters Search 698
Appendix 5a - Operational Area EMBA PMST 699
Appendix 5b – Ecological LOWC EMBA PMST 700
Appendix 5c – Light EMBA PMST 701
Appendix 5d – MDO EMBA PMST 702
Appendix 5e – Monitoring Area PMST 703
Appendix 5f – Noise EMBA PMST 704
Appendix 5g – Social EMBA PMST 705
Appendix 6 - Oil Spill Trajectory Modelling 706
Appendix 7 - Subsea Noise Modelling 707
Appendix 8 - Relevant Persons Consultation Report 708

List of Figures

Figure 3-1: Operational Area 33

Figure 3-2: Existing Infrastructure and proposed Activities Illustration 34

Figure 3-3: Activity Duration 35

Figure 4-1: Annie-2 Development Drilling Monitoring Area and EMBA 57

Figure 4-2: Overview of the bathymetry from the Annie-2 survey 60

Figure 4-3: Drop Camera Images from June 2025 seabed survey within Annie-2 development well operational area. 60

Figure 4-4: IMCRA regions within the Monitoring Area 61

Figure 4-5: Benthic Substrate Within the Monitoring Area 69

Figure 4-6: Benthic Habitats Within the Monitoring Area 70

Figure 4-7: Grey Nurse Shark and White Shark BIAs Within the Monitoring Area 87

Figure 4-8: Antipodean Albatross, Black-browed Albatross, Bullers Albatross, and Campbell Albatross BIAs Within the Monitoring Area 88

Figure 4-9: Shy Albatross, Wandering Albatross, and White-capped Albatross BIAs Within the Monitoring Area 89

Figure 4-10: Australian Gannet, Black-faced Cormorant, Crested Tern, and Little Penguin BIAs Within the Monitoring Area 90

Figure 4-11: Flesh-footed Shearwater, Short-tailed Shearwater, Sooty Shearwater, and Wedge-tailed Shearwater BIAs Within the Monitoring Area 91

Figure 4-12: Black Petrel, Common Diving-Petrel, Great-winged Petrel, and Northern Giant Petrel BIAs Within the Monitoring Area 92

Figure 4-13: Southern Giant Petrel, White-faced Storm-petrel, and Wilsons Storm Petrel BIAs Within the Monitoring Area 93

Figure 4-14: Orange-bellied Parrot Presence Within the Monitoring Area 94

Figure 4-15: Australian Sea Lion BIAs Within the Monitoring Area 95

Figure 4-16: Humpback Whale, Indo-Pacific/ Spotted Bottlenose Dolphine, Pygmy Blue Whale, and Southern Right Whale BIAs Within the Monitoring Area 96

Figure 4-17:KEFs Within the Monitoring Area 115

Figure 4-18: Australian Marine Parks (AMPs) Within the Monitoring Area 116

Figure 4-19: Threatened Ecological Communities (TECs) Within the Monitoring Area 117

Figure 4-20: State Marine Parks and Terrestrial Protected Areas Within the Monitoring Area 118

Figure 4-21: RAMSAR Wetlands and Wetlands of National Importance Within the Monitoring Area 119

Figure 4-22: Underwater Protected Areas (Wrecks and Aircraft) Within the Monitoring Area 120

Figure 4-23: Commonwealth Heritage Areas Within the Monitoring Area 121

Figure 4-24: National Heritage Areas Within the Monitoring Area 122

Figure 4-25: Commonwealth Managed Southern Tuna and Billfish Fishery, Western Skipjack Fishery, Eastern Skipjack Fishery, and Small Pelagic Fishery Within the Monitoring Area 123

Figure 4-26: Commonwealth Managed Bass Strait Central Zone Scallop Fishery, Eastern Tuna and Billfish Fishery, Southern Bluefin Tuna Fishery, and SESSF Trawl Sector Danish-sein sub-sector Fishery Within the Monitoring Area 124

Figure 4-27: Commonwealth Managed SESSF Trawl Sector Squid Catch Fishery, SESSF Trawl Sector trawl sub-sector, Southern Squid Jig Fishery, and SESSF Gillnet Hook and Trap Sector Shark Hook Sub-sector Fishery Within the Monitoring Area 125

Figure 4-28: Commonwealth Managed SESSF Gillnet Hook and Trap Sector Shark Gillnet Sub-sector Fishery Within the Monitoring Area 126

Figure 4-29: Victorian Managed Giant Crab Fishery, Inshore Trawl Fishery, and Multispecies Fishery Within the Monitoring Area 127

Figure 4-30: Victorian Managed Southern Rock Lobster Fishery, Ocean Wrasse Fishery, and Octopus Fishery Within the Monitoring Area 128

Figure 4-31: Victorian Managed Ocean Scallop Fishery, Pipi Fishery, and Ocean General Fishery Within the Monitoring Area 129

Figure 4-32: Victorian Managed Abalone Fishery Within the Monitoring Area 130

Figure 4-33: Tasmanian Managed Rock Lobster Fishery Within the Monitoring Area 131

Figure 4-34: Tasmanian Managed Giant Crab Fishery Within the Monitoring Area 132

Figure 4-35: Tasmanian Managed Abalone Fishery Within the Monitoring Area 133

Figure 4-36: Tasmanian Managed Scalefish Fishery Within the Monitoring Area 134

Figure 4-37: South Australian Managed Charter Boat Fishery, Marine Scalefish Fishery, and Rock Lobster Fishery Within the Monitoring Area 135

Figure 4-38: NSW Managed Abalone Fishery, Estuary General, and Lobster Fishery Within the Monitoring Area 136

Figure 4-39: NSW Managed Ocean Hauling Fishery, Ocean Trap and Line Fishery, and Ocean Trawl Fishery Within the Monitoring Area 137

Figure 4-40: NSW Managed s37 Permit Fishery, Sea Urchin and Turban Shell Fishery, and Southern Fish Trawl Fishery Within the Monitoring Area 138

Figure 4-41: Coastal Settlements Within the Monitoring Area 139

Figure 4-42: Vessel Traffic Within the Monitoring Area 140

Figure 4-43: Offshore Declared Windfarms Within the Monitoring Area 141

Figure 4-44: Domestic Gas and Oil Pipelines Within the Monitoring Area 142

Figure 4-45: UXO Potential and Defence Areas Within the Monitoring Area 143

Figure 4-46: Subsea Cables Within the Monitoring Area 144

Figure 4-47: Native Title Determinations Within the Monitoring Area 148

Figure 4-48: Exposed Area of Continental Bassian Land Bridge Within the Monitoring Area 161

Figure 5-1: CEMS Risk Management Protocol (six-step process) 165

Figure 5-2: Impact and Risk Uncertainty Decision Making Framework 172

Figure 6-1: Common Vessel Types Offshore and their Relative (Approximate) Dimensions 181

Figure 6-2: Illustration of Dispersion of Bulk Materials 190

Figure 6-3: Operational Light EMBA and Flaring Light EMBA Within the Monitoring Area 200

Figure 6-4: Antipodean Albatross, Black-browed Albatross, Buller's Albatross, and Campbell Albatross BIAs overlapping the Operational Light EMBA Within the Monitoring Area 201

Figure 6-5: Shy Albatross, Wandering Albatross, and Indian, Yellow-nosed Albatross BIAs overlapping the Operational Light EMBA Within the Monitoring Area 202

Figure 6-6: Orange-bellied Parrot, Common Diving-petrel, and Wedge-tailed Shearwater BIAs overlapping the Operational Light EMBA Within the Monitoring Area 203

Figure 6-7: Short-tailed Shearwater BIAs overlapping the Operational Light and Flaring EMBAs 204

Figure 6-8: Newer Volcanic Complexes in the Otway Region (Boyce 2015) 222

Figure 6-9: Emissions Estimation, Monitoring and Reporting Workflow 229

Figure 6-10: Illustrative Example of Blue Whale Foraging Behaviour 278

Figure 6-11: Pygmy Blue Whale BIAs and Noise EMBAs 281

Figure 6-12: Upwelling Frequency in the Bass Strait 282

Figure 6-13: Illustrative example of Southern Right Whale Movement Patterns in the Otway 284

Figure 6-14 : Southern Right Whale BIAs and Noise EMBAs 287

Figure 6-15 Example southern right whale movements from sightings data 299

Figure 6-16: Proportional Mass Balance Plot Representing the Weathering of MDO Spilled onto the Water Surface over 1 hour and Subject to a Constant 5 knots Wind Speed at 15 °C Water Temperature (RPS 2023). 351

Figure 6-17: Proportional Mass Balance Plot Representing the Weathering of MDO Spilled onto the Water Surface over 1 hour and Subject to a Variable Wind Speeds (1-23 knots) at 15 °C Water Temperature (RPS 2023). 352

Figure 6-18: Proportional Mass Balance Plot Representing the Weathering of Annie-1 Condensate Spilled onto the Water Surface over 1 hour and Subject to a Variable Wind Speeds (1-23 knots) at 15 °C Water Temperature (RPS 2024). 353

Figure 6-19: Proportional Mass Balance Plot Representing the Weathering of Annie-1 Condensate Spilled onto the Water Surface over 1 hour and Subject to a Variable Wind Speeds (1-23 knots) at 15 °C Water Temperature (RPS 2024). 354

Figure 6-20: EMBA, Monitoring Area and Extent of Potential Socio-Economic (SE) Impacts for the Vessel LOC - MDO Spill Scenario (Note: The Monitoring Area and Extent of Possible SEI threshold spill scenarios overlap in this figure. While they appear similar, they represent separate scenarios and are considered independently). 360

Figure 6-21: EMBA, Monitoring Area and Extent of Potential Socio-Economic (SE) Impacts for the LOWC Spill Scenario 361

Figure 8-1: Receptors, and links to Cultural Features and Practices 475
Figure 11-1: Process Steps 560
Figure 11-2: Consultation Focus Area LGAs 562
Figure 11-3: Torquay Surf Coast Times (2 May 2025) 567
Figure 11-4: Koori Mail - Drop-in Sessions (21 May 2025) 568
Figure 11-5 Bay Post/Moruya Examiner – Consultation Closing (9 August 2025) 569
Figure 11-6 Distribution of Advertisements in Regional Press 570
Figure 11-7: Indicative Timeline 577
Figure 12-1: AEMS Document Hierarchy 586
Figure 12-2: Amplitude Energy's Health, Safety and Environment Policy 587
Figure 12-3: Activity Workflow 588
Figure 12-4: Amplitude Energy Offshore Operational Organisational Structure 591
Figure 12-5: Amplitude Energy IMS Risk Management Flow 600
Figure 12-6: Campaign Risk Review Framework 601
Figure 12-7: Marine Mammal Monitoring Network 602
Figure 12-8: Marine Mammal Monitoring and Action Flow Chart 603
Figure 12-9: Process for Management of Residual Bulk Materials 605

List of Tables

Table 1-1: EP Summary of Materials Requirements 28
Table 1-2: Titleholder and Liaison Person 30
Table 3-1: Approximate Coordinates of the Annie-2 Well 32
Table 3-2: Indicative Activity Timing and Duration 35
Table 3-3: Annie Field Conditions and Gas Compositions 36
Table 3-4: Key Activities of Annie-2 Development 37
Table 3-5: Impact Assessment Technical Input – MODU Positioning 39
Table 3-6: Impact Assessment Technical Input – Drilling Operations 40
Table 3-7: Impact Assessment Technical Input - Drill Cuttings and Fluids 41
Table 3-8: Impact Assessment Technical Input - Cementing Operations 42
Table 3-9: Impact Assessment Technical Input - BOP Installation and Testing 43
Table 3-10: Impact Assessment Technical Input - Well Completions 43
Table 3-11: Impact Assessment Technical Input - Well Clean-up / Flowback 44
Table 3-12: Impact Assessment Technical Input – Well Shut-in and Suspension 44
Table 3-13: Impact Assessment Technical Input - Environmental Surveys 46

Table 3-14: Impact Assessment Technical Input – Well Abandonment 47
Table 3-15: Support Activities for each Phase 47
Table 3-16: MODU Specifications and Capacities 49
Table 3-17: Impact Assessment Technical Input - MODU Operations 50
Table 3-18: Vessel Operations Specifications and Capacities 51
Table 3-19: Impact Assessment Technical Input - Vessel Operations 52
Table 3-20: Impact Assessment Technical Input: Helicopter Operations 52
Table 3-21: Impact Assessment Technical Input - ROV / AUV Operations 53
Table 4-1: Description of Operational Area, Monitoring Area and EMBA 55
Table 4-2: Seabed Survey Anomaly Features that are not to be disturbed 59
Table 4-3: Presence of Physical Receptors within the Operational Area and Monitoring Area 63
Table 4-4: Presence of Ecological Receptors within the Operational Area and Monitoring Area 71
Table 4-5: Presence of Social Receptors within the Operational Area and Monitoring Area 97
Table 4-6: Guidance Documents used to Identify Cultural Features of the Environment Relating to First Nations People's Heritage Sites and Values 145
Table 4-7: Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values proximal to Amplitude Energy Offshore Title Areas 149
Table 4-8: Seasonality of Key Sensitivities within the Otway Basin 162
Table 5-1: Environmental Consequence Assessment Criteria 167
Table 5-2: Amplitude Energy Qualitative Risk Matrix 169
Table 5-3: Amplitude Energy Acceptability Evaluation 173
Table 5-4: Principles of Ecologically Sustainable Development (ESD) 174
Table 6-1: Aspect-Activity Interactions 177
Table 6-2: Lower Order Planned Impact and Risk Evaluation 179
Table 6-3: Additional Control Measures Considered to Manage Drilling and Cementing Discharges 205
Table 6-4: Lower Order Unplanned Impact and Risk Evaluation 207
Table 6-5: Activities that will result in Seabed Disturbance 214
Table 6-6: Seabed Disturbance Estimated Spatial Extent 214
Table 6-7: Seabed Disturbance ALARP, Control Measures and Acceptability Assessment 222
Table 6-8: Activities that will Generate GHG Emissions 226
Table 6-9: Total GHG emissions for the Activity 228
Table 6-10: Overview of Impacts of Climate Change to the Future Vulnerability of Particular Taxa (modified after Steffen et al., 2009) 234
Table 6-11: Projected Impacts of CO_2 Rise and Climate Change on Australian Ecosystems (modified after Steffen et al. 2009) 235
Table 6-12: Summary of SoE Report Conclusions on Climate Change Impacts 236

Table 6-13: GHG Emissions ALARP, Control Measures and Acceptability Assessment 238

Table 6-14: Activities that will Generate Impulsive Underwater Sound Emissions 241

Table 6-15: Positioning and Survey Equipment Source Frequencies and Sound Levels (Welch et al. 2023) 243

Table 6-16: Description of the Scenarios Modelled for Impulsive Sound Relevant to the Activity 244

Table 6-17: Noise effect criteria for Impulsive Sound 246

Table 6-18: Inherent Consequence Levels - Impulsive Sound - Behavioural Changes to Marine Mammals 250

Table 6-19: Inherent Risk Severity – Impulsive Sound – Behavioural Changes to Marine Mammals 253

Table 6-20: Impulsive underwater sound PTS and TTS onset thresholds for 24-hour sound exposure level (SEL24h) and peak (PK) (Southall et al. 2019) 254

Table 6-21: Inherent Consequence Levels - Impulsive Sound - Behavioural Changes to Marine Turtles 255

Table 6-22: Inherent Risk Severity - Impulsive Sound - Behavioural Change to Marine turtles 256

Table 6-23: Inherent Consequence Levels - Impulsive Sound - Behavioural Changes to Fish 259

Table 6-24: Inherent Risk Severity - Impulsive Sound - Behavioural Changes to Fish 261

Table 6-25: Underwater Sound Emissions – Impulsive ALARP, Control Measures and Acceptability Assessment 261

Table 6-26: Activities that will Generate Continuous Underwater Sound Emissions 266

Table 6-27: Description of Scenarios Modelled for Continuous Sound Modelled at Annie-2 (Connell and Koessler 2025) 268

Table 6-28: Distance to the Behavioural Threshold for Marine Mammals 270

Table 6-29: Inherent Consequence Levels - Continuous Sound - Behavioural Changes to Marine Mammals 272

Table 6-30: Low-frequency cetacean presence and biological important behaviours 277

Table 6-31: Inherent Likelihood Levels - Continuous Sound - Behavioural Changes to Marine Mammals 290

Table 6-32: Inherent Risk Severity – Continuous Sound – Behavioural Changes to Marine Mammals 293

Table 6-33: Distance to TTS and PTS Thresholds for Marine Mammals 294

Table 6-34: Inherent Consequence Levels – Continuous Sound – Auditory Impairment or Injury to Marine Mammals 295

Table 6-35: Inherent Consequence Levels - Continuous Sound - Behavioural Changes to Marine Turtles 300

Table 6-36: Inherent Risk Severity - Continuous Sound - Behavioural Change to Marine turtles 302

Table 6-37: Distance to TTS and PTS Threshold for Marine Turtles 302

Table 6-38: Inherent Consequence Levels - Continuous Sound - Behavioural Changes to Fish 304

Table 6-39: Inherent Likelihood Levels - Continuous Sound - Behavioural Changes to Fish 306

Table 6-40: Inherent Risk Severity – Continuous Sound - Behavioural Changes to Fish 308

Table 6-41: Continuous Sound - Distance to TTS and Recoverable Injury Thresholds for Fish 309

Table 6-42: Underwater Sound Emissions – Continuous ALARP, Control Measures and Acceptability Assessment 310

Table 6-43: Underwater Sound Emissions – Continuous - extended ALARP Assessment 315

Table 6-44: Activities that may result in the Introduction of IMS 330

Table 6-45: Pathways for the Introduction, Establishment and Spread of IMS 330

Table 6-46: High-Risk Marine Species of Concern to Australia (Australian Government, 2019; Parks Victoria, 2025) 331

Table 6-47: Introduction, Establishment and Spread of IMS ALARP, Control Measures and Acceptability Assessment 337

Table 6-48: Activities that may result in an Accidental Release of Hydrocarbons 340

Table 6-49: Spill Modelling Parameters for the LOWC and Vessel LOC scenarios 343

Table 6-50: Hydrocarbon Impact Thresholds 343

Table 6-51: Physical Characteristics of Annie-1 Condensate and MDO 350

Table 6-52: Stochastic Modelling Output Summary for Vessel LOC - MDO 354

Table 6-53: Stochastic Modelling Output Summary for LOWC 356

Table 6-54: Summary of Deterministic Modelling Outcomes for the Spill Scenarios 358

Table 6-55: Consequence Evaluation for Hydrocarbon Exposure – Ecological Receptors - Habitats 364

Table 6-56: Inherent Risk Severity – Condensate Exposure – Ecological Receptors – Habitats 375

Table 6-57: Consequence Evaluation for Hydrocarbon Exposure – Ecological Receptors – Marine Fauna 376

Table 6-58: Inherent Risk Severity – Condensate Exposure – Ecological Receptors – Marine Fauna 389

Table 6-59: Consequence Evaluation for Hydrocarbon Exposure – Social Receptors – Natural Systems 391

Table 6-60: Inherent Risk Severity – Condensate Exposure – Social Receptors – Natural Systems 401

Table 6-61: Consequence Evaluation for Hydrocarbon Exposure – Social Receptors – Human Systems 403

Table 6-62: Inherent Risk Severity – Condensate Exposure – Social Receptors – Human Systems 409

Table 6-63: Accidental Hydrocarbon Release ALARP, Control Measures and Acceptability Assessment 409

Table 7-1: Suitability of Response Options for MDO and LOWC Condensate Spills 416

Table 7-2: Overview of Level 3 Source Control Options Applicable to the Activity 423

Table 7-3: Indicative Survey and Debris Clearance Equipment 426

Table 7-4: RTM Subsea First Response Tools 427

Table 7-5: Analysis of Dispersant Required vs. Availability 428

Table 7-6: Capping System Installation Timeline 430

Table 7-7: Relief Well Complexity Assessment (after APPEA 2021) 432
Table 7-8: Relief Well RTMs 435
Table 7-9: Safety Case Revision Preparation and Approval Time 437
Table 7-10: Source Control Activities that may Impact the Environment 438
Table 7-11: Consequence Evaluation for Potential Dispersant Exposure – Ecological Receptors – Habitats and Marine Fauna 441
Table 7-12: Inherent Risk Severity – Dispersant Application – Social Receptors – Human Systems 444
Table 7-13: Consequence Evaluation for Dispersant Application – Social Receptors – Human Systems 445
Table 7-14: Inherent Risk Severity – Dispersant Application – Social Receptors – Human Systems 446
Table 7-15: Monitor and Evaluate Activities that may Impact the Environment 446
Table 7-16: Protection and Deflection Activities that may Impact the Environment 447
Table 7-17: Shoreline Assessment and Clean-up Activities that may Impact the Environment 449
Table 7-18: Oiled Wildlife Response Activities that may Impact the Environment 451
Table 7-19: Spill Response ALARP, Control Measures and Acceptability Assessment 453
Table 7-20: Source Control ALARP Evaluation 457
Table 8-1: Potential impacts to cultural features 477
Table 8-2: Potential Interaction between Activity Planned and Unplanned Aspects and Cultural Features of the Environment relating to First Nations People Cultural Heritage Sites and Values 484
Table 8-3: First Nations Heritage Values and Sensitivities ALARP, Control Measures and Acceptability Assessment 503
Table 8-4: Potential Impacts to Cultural Features - extended ALARP Assessment 508
Table 9-1: Reasonably foreseeable future projects or activities in the offshore Otway Basin. 514
Table 10-1: Environmental Performance Outcomes 537
Table 10-2: Environmental Performance Outcomes, Standards and Measurement Criteria 540
Table 11-1: OPGGS(E) Regulation Consultation Requirements 553
Table 11-2: Aspects, and Groups of Relevant Persons 564
Table 11-3 Levels of Effort Examples 566
Table 11-4 Levels of Effort 566
Table 11-5: Summary of Advertisements Run 571
Table 11-6 Community Drop-in Sessions 572
Table 11-7: Webinars 573
Table 11-8 Information Provided 574
Table 12-1: Amplitude Energy's Management System Core Concepts 585
Table 12-2: CEMS Standards 586
Table 12-3: Amplitude Energy Environmental Roles and Responsibilities 592

Table 12-4: Environmental Components to be included in Environmental Inductions 595

Table 12-5: SCERP Content 596

Table 12-6: Amplitude Energy Offshore Chemical Assessment Procedure Steps to Propose a New Chemical 597

Table 12-7: External Incident Reporting Requirements 610

Table 12-8: Summary of Assurance Processes 613

Table 12-9: Emissions and Discharge Monitoring 613

Table 14-1: Comparison of Annie-2 Development Drilling EP EPOs and those of the East Coast Supply Project OPP 646

Table 14-2: Comparison of Annie-2 Development Drilling EP Control Measures and those of the East Coast Supply Project OPP 655

Table 14-3: Concordance of East Coast Supply Project OPP Activity Description and Annie-2 Development Drilling EP Activity Description 693

Acronyms and Abbreviations

Acronym	Definition
AAD	Australian Antarctic Division
ABN	Australian Business Number
ACN	Australian Company Number
AEL	Amplitude Energy Ltd
AEMS	Amplitude Energy Management System
AEP	Australian Energy Producers
AFFF	Aqueous Film forming Foam
AFMA	Australian Fisheries Management Authority
AGP	Athena Gas Plant
AHO	Australian Hydrographic office
AHS	Australian Hydrological Service
AHT	Anchor Handling Tug
AHTS	Anchor handling and tow support vessels
AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
ALA	Atlas of Living Australia
ALARP	As Low as Reasonably Practicable
ALs	Acceptable Levels
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMPs	Australian Marine Parks
AMSA	Australian Maritime Safety Authority
ANZG	Australian and New Zealand Guidelines
AOF	Absolute Open Flow
API	American Petroleum Institute
APPEA	Australian Petroleum Production and Exploration association
APSC	Australian Public Service Commission
AR6	Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report
ARS	Area Restricted Searches
ASOG	Activity Specific Operation Guideline
ASP	Athena Supply Project

ASTM	American Society for Testing and Materials
AU	Australia
AUD	Australian Dollar
AUSCOAST	Coastal Navigational Warnings
AUV	Autonomous Underwater Vehicle
AVG	Abalone Viral Ganglioneuritis
AZTECH	Aztech Well Construction Services
BHST	Bottomhole Static Temperature
BIA	Biologically Important Area
BIAs	Biologically Important Areas
BMG	Basker-Manta-Gummy
BoM	Bureau of Meteorology
BOP	Blow-Out Preventer
BP	British Petroleum
BRS	Bureau of Rural Sciences
BWMC	Ballast Water Management Convention
CAS	Chemical Abstracts Service
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEMS	Cooper Energy Management System
CEO	Chief Executive Officer
CFA	Commonwealth Fisheries association
CFCs	chlorofluorocarbons
CFSR	Climate Forecast System Reanalysis
CH4	Methane
CHARM	Chemical Hazard assessment and Risk Management
CHIRP	Compressed High-Intensity Radar Pulse
CHN	Casino-Henry-Netherby
CIA	Cumulative Impact Assessment
CM	Control Measure
CMA	Commonwealth Marine Area
CMP	Conservation Management Plan
CMS	Cooper Energy Management System
CO2	Carbon Dioxide

CoA	Commonwealth of Australia
COLREGs	Convention on the International Regulations for Preventing Collisions At Sea 1972
CP	Cathodic potential
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSV	Construction Support Vessel
CTD	Conductivity, Temperature and Depth
DAFF	Department of Agriculture, Fisheries and Forestry (Cwth)
DAWE	Department of Agriculture, Water and the Environment
DAWR	Department of Agriculture Water and Resources, superseded by Department of Agriculture Water and the Environment (DAWE)
DCCEEW	Department of Climate Change, Energy, the Environment and Wate
DEECA	Department of Energy, Environment and Climate Action
DELWP	Victorian Department of Environment, Land, Water and Planning
DEWHA	Department of the Environment, Heritage, Water and the Arts
DGV	Default Guideline Value
DISC	Australian Drilling Industry Steering Committee
DJSIR	Department of Jobs, Skills, Industries and Regions
DLS	Dogleg Severity
DMS	Degrees-Minutes-Seconds
DOA	Department of Agriculture
DoE	Department of the Environment
DoEE	Department of the Environment and Energy
DP	Dynamic Positioning
DPC	Department of Premier and Cabinet
DPI	Department of Primary Industries
DPIRD	Department of Primary Industries and Regional Development
DSV	Dive support and survey vessels
DWH	Deep Water Horizon
EAC	East Australian Current
ECSP	East Coast Supply Project
ELT	Executive Leadership Team
EMAC	Eastern Maar Aboriginal Corporation
EMBA	Environment that May Be Affected

EMP	Emergency Management Plan
EP	Environment Plan
EPBC	Environment Protection and Biodiversity Conservation Act 1999
EPO	# Environment Protection Order or Environment Performance Outcome
EPS	Environment Performance Standard
ER	Emergency Response
ERP	Emergency Response Plan
ESD	Ecologically Sustainable Development
EST	Eastern Standard Time
EWS	Endangered Whale Species
FCAFC	Federal Circuit and Family Court of Australia.
FLNG	Floating Liquefied Natural Gas
FM	Frequency Modulation
FPSO	Floating Production, Storage and offloading
FWRAM	Full Waveform Range-dependent Acoustic Model
GHG	Greenhouse Gases
GMP	Garbage Management Plan
GMTOAC	Gunditj Mirring Traditional Owners Aboriginal Corporation
GOMO	Guidelines for Offshore Marine Operations
GV	Guideline Value
HAZID	Hazard Identification
HAZOP	Hazard and Operability Analysis
HCTS	Habitat Critical to the Survival
HFO	Heavy Fuel Oil
HP	High Pressure
HQ	Hazard Quotient
HSE	Health, Safety and Environment
HSEC	Health, Safety, Environmental and Community
HSEQ	Health, Safety, Environment, and Quality
HCTS	Habitat Critical to the Survival
IAPP	International Air Pollution Prevention
ICE	Inventory of Carbon and Energy
ID	Internal Diameter

IM	Incident Management
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMO	International Maritime Organisation
IMP	Cooper Energy Incident Management Plan
IMR	Inspection Maintenance & Repair
IMS	Invasive Marine Species
IMT	Incident Management Team
INJ	Injury
IOGP	International association of Oil and Gas Producers
IOPP	International Oil Pollution Prevention
IPA	Indigenous Protected Area
IPCC	Intergovernmental Panel on Climate Change
IPIECA	International Petroleum Industry Environmental Conservation Association
IR	Infrared
ISO	International Standards Organisation
ISPP	International Sewage Pollution Prevention
ITOPF	International Tank Owners Pollution Federation
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
JASCO	Jasco Applied Sciences
JRCC	Joint Rescue Coordination Centre
KBOS	Kinetic Blow-out Stopper
KCl	potassium chloride
KEF	Key Ecological Feature
KEFS	Key Ecological Features
LDADs	low-density artefact distribution
LEL	Lower Explosive Limit
LELs	Lower Explosive Limits
LGA	Local Government Area
LGAs	Local Government Areas
LOC	Loss of Containment
LOWC	Loss of Well Control
LTD	Limited

LWD	Logging While Drilling
MAE	Major Accident Event
MAEs	Major Accident Events
MARPOL	International Convention for the Prevention of Pollution from Ships
MASP	Maximum Anticipated Surface Pressure
MBES	Multi-Beam Echo Sounder
MCD	Mudline Closure Device
MDO	Marine Diesel Oil
MEG	Monoethylene Glycol
MESA	Marine Education Society of Australasia
MGO	Marine gas oil
MM	millimeter
MMO	Marine Mammal Observer
MMOs	Marine Mammal Observers
MNES	Matters of National Environmental Significance
MNP	Marine National Park
MNPs	Marine National Parks
MO	# Species of Species Habitat May Occur Within Area or Marine Orders
MOC	Management of Change
MODU	Mobile offshore Drilling Unit
MODUs	Mobile Offshore Drilling Units
MOU	Mobile Offshore Unit
MPs	Marine Parks
MRU	Marine Response Unit
MS	Management System
MSS	Marine Seismic Survey
NA	Not Applicable
NB	Nota bene
NCEP	National Centre for Environmental Prediction
NDC	Nationally Determined Contribution
NDCs	Nationally Determined Contributions
NEBA	Net Environmental Benefit Analysis
NERA	National Energy Resources Australia

NGER	National Greenhouse and Energy Reporting
NGOs	non-governmental organisations
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOO	National Oceans Office
NOPSEMA	National offshore Petroleum Safety and Environmental Management Authority
NOPTA	National offshore Petroleum Titles Administrator
NORMS	Naturally Occurring Radioactive Materials
NO_x	Nitrogen Oxides
NPS4	National Parks Act Schedule 4 park or reserve
NPS6	National Parks Act Schedule 6 park or reserve
NRDA	National Resource Damage Assessment
NRE	Department of Natural Resources and Environment (Tas)
NSW	New South Wales
NTM	Notice to Mariners
NWS	North-west Shelf
NZ	New Zealand
OCNS	Offshore Chemical Notification Scheme
OECEA	Offshore Environment Chemical Environment Assessment (Database)
OGUK	Oil and Gas UK
OIM	Offshore Installation Manager
OPEP	Oil Pollution Emergency Plan
OPGGS	Offshore Petroleum and Greenhouse Gas Storage (Act 2006)
OPP	Offshore Project Proposal
OSCA	Oil Spill Control Agents
OSMP	Operational and Scientific Monitoring Plan
OSPAR	Oslo/Paris convention (for the Protection of the Marine Environment of the North-East Atlantic)
OSTM	Oil Spill Trajectory Modelling
OSV	Offshore Support Vessel
OWR	Oiled Wildlife Response
OWF	Offshore Wind Farm
P&A	Plug and Abandon

PAM	Passive Acoustic Monitoring
PBW	Pygmy Blue Whale
PFOA	perfluorooctanoic acid
PFOS	Perfluorooctane Sulfonic Acid
PIC	Person in Charge
PK	Peak Sound Level
PLONOR	Pose Little or No Risk to the Environment
PMS	Planned Maintenance System
PMST	EPBC Act Protected Matters Search Tool
PNEC	Potential No Effects Concentration
POB	Persons on Board
PSZ	Petroleum Safety Zone
PSZs	Petroleum Safety Zones
PTS	Permanent Threshold Shift
PTY	Proprietary company
RAMSAR	Importance especially as Waterfowl Habitat 1971
RAP	Reconciliation Action Plan
RAPs	Reconciliation Action Plans
RMR	Riserless Mud Recovery (System)
RMS	Root Mean Square
RO	Reverse Osmosis
ROV	Remote Observation Vehicle
ROVs	Remote Observation Vehicles
RPAs	Response Priority Areas
RTM	Response Time Model
RTMs	Response Time Models
RW	Relief Well
SA	South Australia
SBDF	Synthetic Based Drilling Fluid
SBM	Synthetic Based Mud
SBP	Sub Bottom Profiler
SCAT	Shoreline Cleanup and Assessment Technique
SCERP	Source Control Emergency Response Plan

SCR	Safety Case Revision
SDS	Safety Data Sheet
SE	South-East
SEEMP	Ship Energy Efficiency Management Plan
SEI	Socio-economic Impact
SEL	Sound Exposure Level
SEL_{ss}	Sound Exposure Level Single Strike
SEMR	South-East Marine Region
SESS	Southern and Eastern Scalefish and Shark
SESSF	Southern and Eastern Scalefish and Shark Fishery
SETFIA	South East Trawl Fishing Industry association
SFRT	Subsea First Response Toolkit
SIMAP	Spill Impact Mapping Analysis Program
SIMOPS	Simultaneous Operations
SIV	Seafood Industry Victoria
SMPEP	Shipboard Marine Pollution Emergency Plan
SoE	State of the Environment
SOLAS	Safety of Life At Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SoV	Scope of Validation
SO_x	Sulphur Oxides
SPL	Sound Pressure Level
SFRT	Subsea First Response Toolkit
SRW	Sound Transmission Loss Modelling
SS	Steam Ship
SSD	Subsea Dispersant
SSS	Side-Scan Sonar
SST	Sea Surface Temperature
SVP	Sound Velocity Profiler
TA	# Tuna Australia or Tasmania
TD	Total Depth
TEC	Threatened Ecological Community
TPCs	Third Party Contractors

TSS	Total Suspended Solid
TSSC	Threatened Species Scientific Committee
TTS	Temporary Hearing Threshold Shift
UCH	Underwater Cultural Heritage
UK	United Kingdom
US	United States
USBL	Ultra-short Baseline
UWCH	Underwater Cultural Heritage
UXO	Unexploded ordnance
VBA	Victorian Biodiversity Atlas
VFA	Victorian Fisheries Authority
VIC	Victoria
VOCs	Volatile Organic Compound
VSC	Vessel Safety Case
VSP	Vertical Seismic Profiling
WA	Western Australia
WAN	Well Activity Notice
WBDF	Water-based Drilling Fluid
WBM	Water Based Mud
WBMs	Water Based Muds
WCD	Worst case discharge
WDCS	Whale and Dolphin Conservation Society
WOMP	Well Operations Management Plan
WTOAC	Wadawurrung Traditional Owners Aboriginal Corporation

1.0 Introduction

1.1 Activity Overview

Cooper Energy (CH) Pty Ltd proposes to undertake development drilling within Commonwealth waters of the Otway Basin. Cooper Energy (CH) Pty Ltd is a subsidiary company of the parent company Cooper Energy which was rebranded as Amplitude Energy in November 2024. Amplitude Energy will be used throughout this EP to represent company ownership and title operation.

The proposed scope of the Annie-2 development drilling activity (hereafter referred to as 'the Activity') covered by this Environment Plan (EP) consists of the following activities:

- Survey, inspection and maintenance activities.
- Well construction activities (using a mobile offshore drilling unit), including development drilling, subsea tree (SST) installation, well-test, completions, and shut-in campaign, as well as contingency for plug and abandonment.

All planned activities will occur within an operational area which is defined by a 3 km radius around the well site. The 3 km radius encompasses the outer extent of mooring equipment from the well site on the seabed. A 500 m temporary exclusion zone around the mobile offshore drilling unit (MODU), and a 500 m petroleum safety zone (PSZ) around the well will be applied.

Each activity will be conducted on a 24 hour, 7 days per week basis, with the activity proposed to commence as early as 1 April 2026, subject to rig availability, weather and regulatory approvals. The development well will remain shut-in from completion of drilling until connection via new flowline to existing CHN facilities currently proposed in Q2 2028. The estimated duration for each discrete activity within this timeframe is described in Section 3.2.

This EP identifies and evaluates credible environmental impacts and risks associated with the Activity and ongoing management of the suspended well until Q1 2031.

The tie-in of the well and future production from the well will be subject to future regulatory approvals and licencing and is not within the scope of this EP.

Refer to Section 2.0 for further details on the description of the proposed activities.

1.1.1 Context with other Activities in the Otway Region

Amplitude Energy is part of a drilling rig consortium who collectively are mobilising a single MODU to the Otway region. Each individual operator's drilling activities will be undertaken sequentially using the same MODU. This reduces the increased environmental impacts and risks that would exist if all the activities were being undertaken at the same time using different MODU's. Each operator consults separately on the activities that each are undertaking in the Otway. As part of the rig consortium, Amplitude Energy has been assigned rig slots (ie allocation of specific time period on the MODU program), given the pre planning and mobilisation of equipment by each operator to undertake the drilling activities, the slots are not interchangeable.

1.2 Summary

The activity summary has been prepared from material provided in this EP.

The summary consists of the following table (Table 1-1) as required by Section 35 of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (OPGGS) (Environment) Regulations 2023 (OPGGS(E)R).

Regulation 35(7)(a) of the OPGGS(E)R (2023) requires the items described in Table 1-1 be provided as a summary of the EP to NOPSEMA for public disclosure upon acceptance of the EP.

Amplitude Energy provides NOPSEMA the full EP for public disclosure.

Table 1-1: EP Summary of Materials Requirements

EP Summary Material Requirement	**Relevant Section of EP Containing EP Summary Material**
The location of the activity	Section 3.1
A description of the receiving environment	Section 4.0
A description of the activity	Section 3.0
Details of the environmental impacts and risks of the activity	Section 6.0
A summary of the control measures for the activity	Section 10.0
A summary of the arrangements for ongoing monitoring of the titleholder's environmental performance	Section 12.13
A summary of the response arrangements in the oil pollution emergency plan	Section 12.7.2
Details of consultation already undertaken and plans for ongoing consultation	Section 11.0
Details of the titleholders nominated liaison person for the activity	Section 1.6

1.3 Background

Exploration in the offshore Otway Basin has been undertaken for over 50 years, with hydrocarbons first discovered via drilling of the Pecten-1A well in 1969. Over the following decades, numerous other hydrocarbon discoveries have been made.

Existing offshore facilities include the Amplitude Energy operated Casino-Henry-Netherby (CHN) development which produces gas and condensate from Production Licence Areas VIC/L24 (Casino) and VIC/L30 (Netherby and Henry) (

Figure 3-2). The CHN development has included the drilling of 4 wells which have been producing gas for over a decade. Products from these wells are transported through a subsea pipeline to the onshore Athena Gas Plant (AGP) on Victoria's southwest coast for processing. Processed gas is directed to third-party pipelines, where it is transported domestically for use within the southern and eastern states.

The development wells drilled and tied into the CHN development are:

- Casino-4 and Casino-5 wells (located in VIC/L24) were installed in 2005 and have been producing since.
- Henry-2 and Netherby-1 development wells were drilled in 2008 and began producing in 2010. Netherby-1 was an exploration prospect with high geological certainty; the Netherby well was completed upon confirming successful intersect of commercially viable gas quantities.

All wells are currently producing gas back to the AGP.

1.3.1 Activity Approvals

To meet continued demand as existing fields decline Amplitude Energy proposes to continue the incremental development of adjacent fields and utilise existing CHN infrastructure to backfill and maintain supply. This is referred to as the East Coast Supply Project (ECSP). The ECSP is described within the ECSP Offshore Project Proposal (**ECSP OPP**) (AEL 2025) which was approved by NOPSEMA on 7 July 2025 (Cooper Energy 2025). The Activity is a phase of the ECSP.

In accordance with Regulation 56 of the OPGGS(E)R, references to the **ECSP OPP** have been made throughout this EP. Concordance with the **ECSP OPP** is addressed in Appendix 1 - .

1.4 Purpose

This EP provides an identification and assessment of the environmental impacts and risks associated with the proposed exploration drilling activities and provides a demonstration that impacts and risks are reduced to 'As Low As Reasonably Practicable' (ALARP) and will be of an 'acceptable' level. Definitions for these terms are provided in Section 5.0. The activities proposed under this EP occur entirely within Commonwealth waters. Therefore, this EP has been prepared to satisfy the requirements of Commonwealth legislation and relevant regulations, namely:

- The Commonwealth OPGGS Act 2006 (OPGGS Act) administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).
- The Commonwealth OPGGS(E)R 2023, administered by NOPSEMA.

1.5 Scope

This EP relates to the activities within exploration permit area VIC/P44. Associated activities assessed within the scope of the EP include:

- Pre-lay moorings and mooring removal, mooring operations.
- Well construction - development drilling, well test, completion and shut-in.
- Support activities - MODU, vessels, helicopters, ROVs.
- Surveys – well integrity monitoring.
- Contingent activities – environmental surveys during drilling operations and P&A in event well is not commercially viable (at the end of exploration / appraisal drilling), or the shut-in well is not tied back to the CHN pipeline.

Further details on the activities covered by the EP are provided in Section 3.0. Activities specifically excluded from the scope of this EP are:

- Connection of the development well to the existing CHN pipeline will be covered under a separate EP.
- Vessels transiting to or from respective operational areas. These vessels are deemed operating under the Commonwealth Navigation Act 2012 and not performing petroleum activities.

1.6 Titleholder Details

Amplitude Energy is the proponents for the Activity. In accordance with (OPGGS(E)R) Section 23, the details of the titleholder and liaison person are provided in Table 1-2.

Further information about Amplitude Energy is available at: **www.amplitudeenergy.com.au**

Table 1-2: Titleholder and Liaison Person

Title Details	Titleholder Details	Liaison Person
VIC/P44	Name: Cooper Energy (CH) PTY. LTD: ABN: 70 615 355 023 ACN: 615 355 023	Nathan Childs Chief Corporate Services Officer Amplitude Energy Limited Level 11, 55 Currie Street Adelaide SA 5000 Phone: (08) 8100 4900 Email: **customerservice@cooperenergy.com.au**

2.0 Requirements

The Activity is located entirely within Commonwealth waters and therefore fall under Commonwealth jurisdiction. Activities located within Commonwealth jurisdiction must comply with two keys acts:

- OPGGS Act; and
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

In accordance with Regulation 21(4) of the Environment Regulations the relevant requirements that are applicable to drilling Annie-2 Development well are presented in Appendix 3 - . Requirements include relevant laws, legislations, codes, other approvals and conditions, standards, agreements, treaties, conventions, or practices (in whole or part) that apply to the jurisdiction that the activity takes place in. Australia is also a signatory to international conventions and agreements that oblige the Commonwealth government to prevent pollution and protect specified habitats, flora and fauna. These have also been addressed within Appendix 3 - . Appendix 3 - also summarises the relevant EP sections where a legislation may prescribe or control how an activity is undertaken. In accordance with Regulation 56 of the OPGGS(E)R, references to the **ECSP OPP** have been made throughout this EP. Appendix 1 - provides the concordance with the **ECSP OPP**.

3.0 Activity Description

This section provides a description of the Activity, including:

- location
- outline of the prospective field characteristics
- description of the activities which will occur and their timing.

3.1 Activity Location

The development activities will be undertaken in Commonwealth waters, off Victoria's southwest coast in the Otway Basin.

The approximate water depth and coordinates are provided in Table 3-1. Approximate coordinates are provided pending the completion of site surveys and finalising the well design.

Table 3-1: Approximate Coordinates of the Annie-2 Well

Location	Title Area	Water Depth	Latitude	Longitude
			DMS GDA94	
Annie-2	VIC/P44	56 m	38°41'1.50" S	142°49'29.38" E

3.1.1 Operational Area and Petroleum Safety Zone

The Annie-2 well is in proximity to the existing Otway offshore facilities (Section 3.1.2). The operational area is defined by a 3 km radius around the well location as shown in Figure 3-1. All activities described in the EP will occur in the operational area.

Petroleum safety zones (PSZs) (gazetted by NOPSEMA) will be in place around the MODU (temporary during the Activity) and the completed wells (ongoing). These PSZs are defined as a circular zone with a 500 m radius around the MODU surface location and the completed subsea well location.

During the Activity, a conservative 3.5 km exclusion / cautionary zone (communicated via Notice to Mariners) will be in place around the MODU and anchors (as the anchors may extend up to 2.5 km from the MODU, with allowance of a 1km buffer). Vessels not involved with the operations of the offshore facility are advised to avoid navigating, anchoring, stopping or fishing within the limits of any charted cautionary area.

All MODU, vessel and helicopter activities within the operational area are considered part of the petroleum activity. Activities outside of the operational area will be managed in accordance with applicable jurisdictional legislation.

3.1.2 Existing Infrastructure

A range of infrastructure exists and operates under existing Otway Offshore Operations – Casino, Netherby and Henry (Environment Plan approved by NOPSEMA on 11 December 2024) and the proposed drilling activities for the Athena Supply Project (Environment Plan approved by NOPSEMA on 8 May 2025) for Amplitude Energy (Figure 3-2).

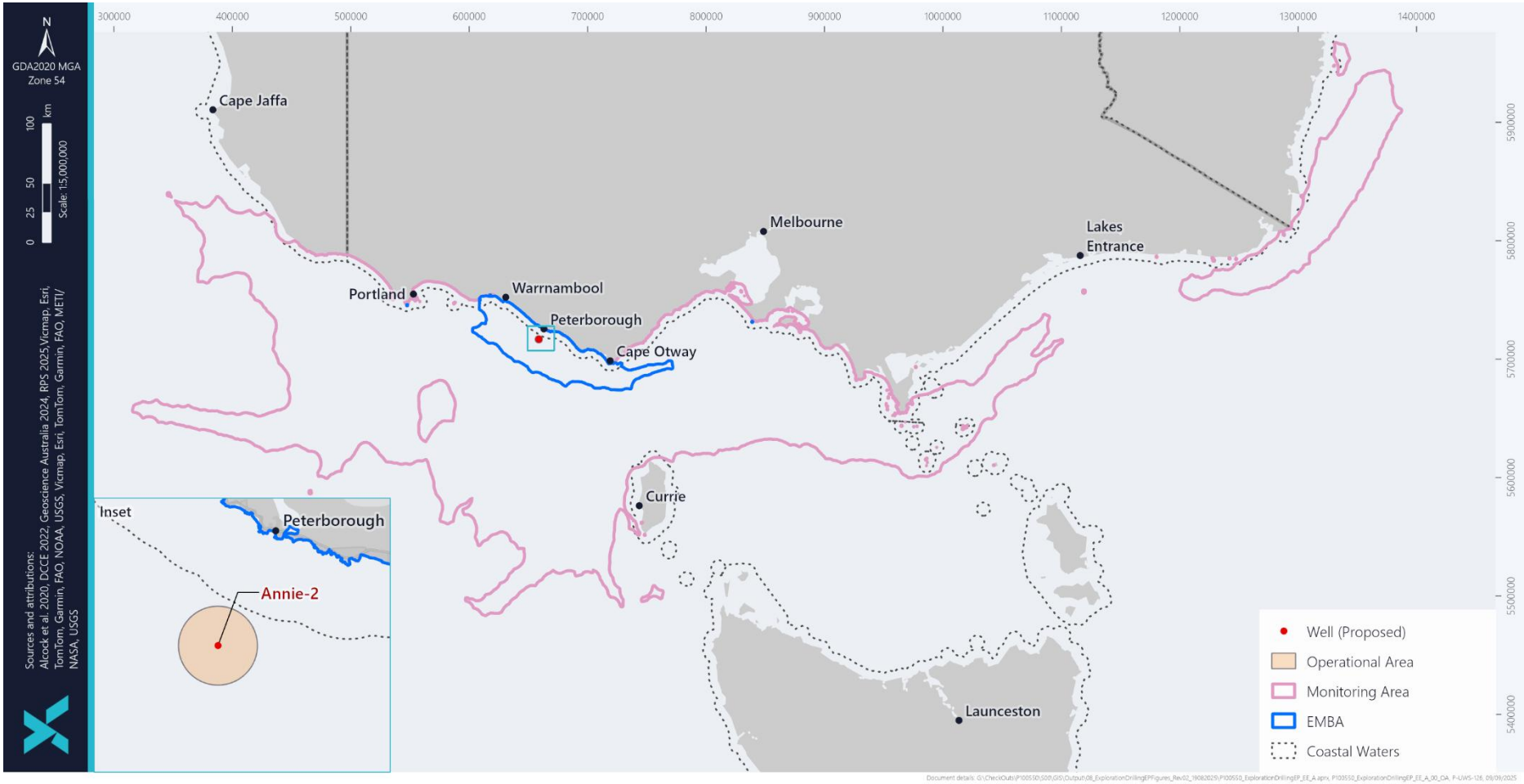


Figure 3-1: Operational Area

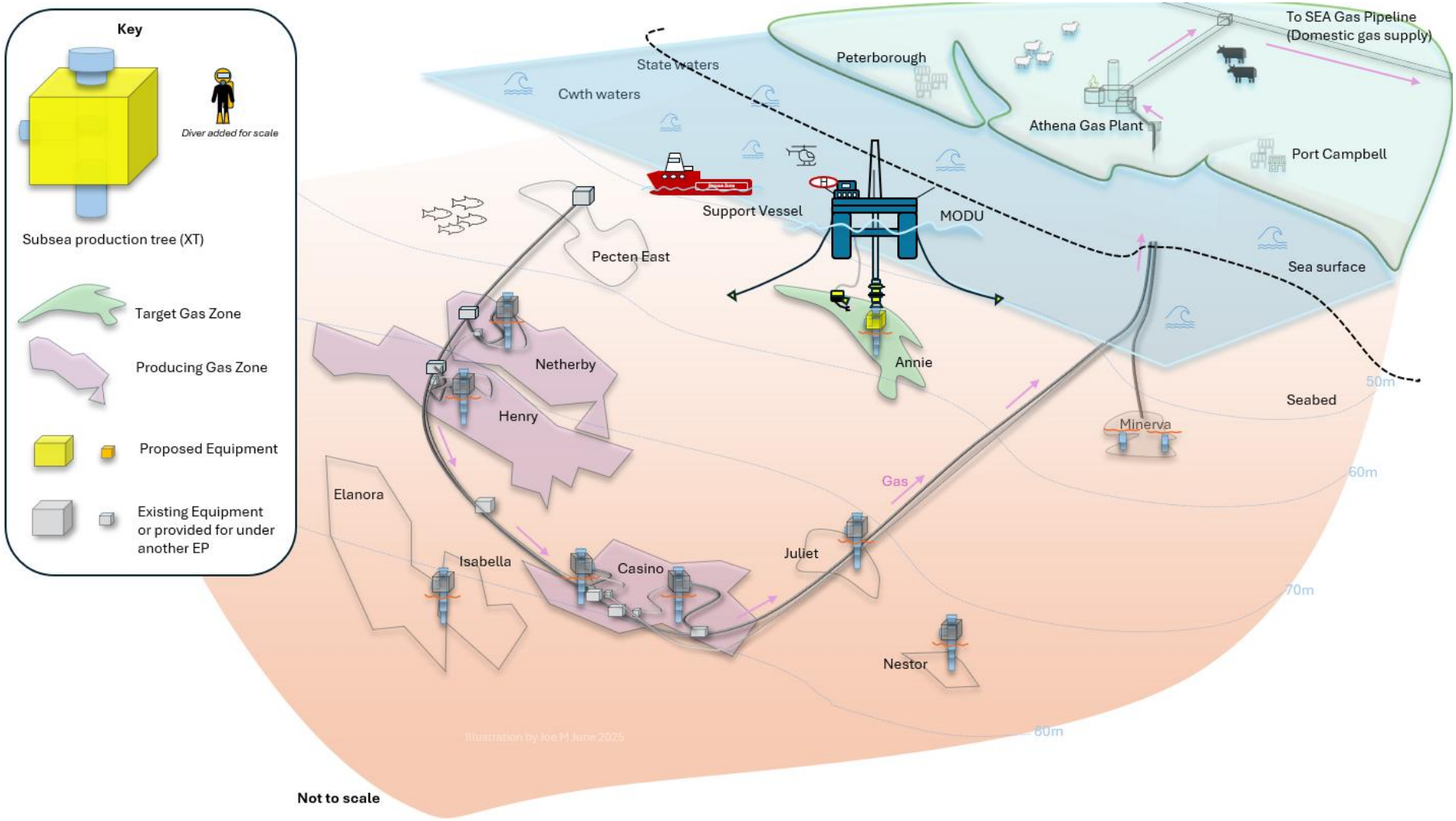


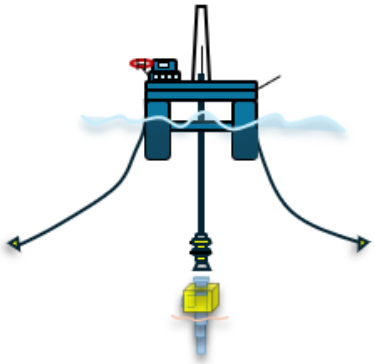
Figure 3-2: Existing Infrastructure and proposed Activities Illustration

3.2 Activity Duration and Timing

This EP covers a period of 5-years from acceptance, with the earliest start for any activity under this plan being Q2 2026. Well construction is expected to occur within the first 2 years from acceptance of the EP. Well integrity monitoring will be provided for the suspended well until tie-in and commissioning activities are completed. The well tie-in of the Annie-2 development well via flowline to the CHN pipeline and commissioning activities are not within the scope of this EP and will be managed subject to the ECSP Installation EP, planned for submission in Q4 2025.

All activities will operate on a 24 hour, 7 days per week basis.

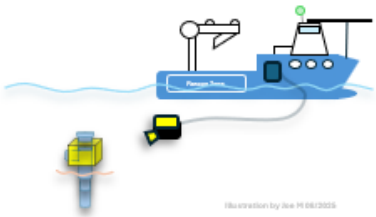
Figure 3-3 describes the estimated duration for each activity. Table 3-2 shows the indicative activity schedule. The timing of each activity will vary due to factors such as MODU and vessel availability and operational windows.



Well Construction, Maintenance or Abandonment (contingency)	
Duration	~7-14 days to set up moorings for the MODU ~60 days to drill and complete a well ~30 days for well maintenance or abandonment



Site Survey (contingency during drilling activity)	
Duration	~1-7 days per survey



Inspections during well suspension	
Duration	<7 days per inspection

Figure 3-3: Activity Duration

Table 3-2: Indicative Activity Timing and Duration

Activity	Timing	Duration
Well construction	As early as Q2 2026.	60 days

Activity	Timing	Duration
Well integrity monitoring	Annually after drilling, until tie-in, hook-up and commissioning. Q3 2027 and Q3 2028.	~2 days per inspection
Environmental surveys*	Contingency in event surveys for environmental or cultural sensitivities are required during drilling operations	1 - 7 days
P&A*	If Annie-2 development well does not access a commercially viable resource following well testing, it will be abandoned at the time of well evaluation – Q2 2026. Annie-2 development well will be permanently abandoned within 3 years of well completion activities in the event the well is not tied into the existing CHN pipeline, or as accepted in the governing WOMP.	30 days

*Contingent activities as defined in Section 3.4.3.9.

3.3 Production and Field Characteristics

The Waarre C reservoir is the primary target for the development drilling program at the Annie Field (Figure 3-2). The Annie reservoir formation has been identified as a viable reservoir target, with extensive production history from adjacent fields. Reservoir data obtained from the drilling of Annie-1 has been used to understand the reservoir characteristics that will be intersected by the Annie-2 well. The hydrocarbon targeted within the reservoir is gas-condensate and is expected to be Group II (light persistent) oil.

The reservoir conditions and gas components for the Annie field and proposed Annie-2 well have been detailed within Table 3-3.

Table 3-3: Annie Field Conditions and Gas Compositions

Parameter	Annie Field
Reservoir	Waarre C
Analogue condensate	Annie-1
Gas Specific Gravity	0.66
Condensate to Gas Ratio	Average of 2 bbl/MMscf
Gas Component	Mole (%)
Hydrogen sulphide	0.00
Nitrogen	0.88
Carbon Dioxide	7.60
Methane	88.29
Ethane	2.11
Propane	0.64
i-Butane	0.03

Parameter	Annie Field
n-Butane	0.07
i-Pentane	0.04
n-Pentane	0.04
Hexane	0.11
Heptane	0.08
Octane	0.03
Nonane	0.02
Decane	0.01
Undecane	0.01
Dodecane+	0.03
TOTAL	99.99
Mercury	1-4 µg/m^3
Naturally Occurring Radioactive Material (NORMS)	-

3.4 Description of Activities

The scope of this EP covers the development drilling of the Annie-2 well (Figure 3-2). A summary of key activities is provided in Table 3-4.

Table 3-4: Key Activities of Annie-2 Development

Key Activities	Description
General Details	
Activity Window	5 years or until tie-in to CHN pipeline and commissioning.
Pre-lay mooring operations	14 – 20 days, as early as Q2 2026 (ahead of MODU arrival)
Mooring Connection	5-7 days
Well Construction: • well drilling and well completions • subsea tree installation • BOP installation and testing • cementing operations • well clean-up and flowback • well shut-in and suspension.	60 days. As early as Q2 2026.
Mooring Disconnect and mooring removal	5 – 7 days (MODU disconnect) 14 - 20 days mooring removal

Key Activities	Description
Ongoing well management (shut in)	3 years or until tie into CHN pipeline and commissioning
Abandonment (contingent)	30 days
Operational Activities	
MODU type	Semi-submersible MODU (MODU)
Vessel Type	Offshore multi-purpose Anchor handling
No of vessels in field	One to four vessels at any one time
ROV	Yes
Helicopters	Yes
Drilling & Completion Activities	
Number of wells	Single well
Estimated drilling activity duration	60 days
Drilling Fluid Type	Water based drilling fluids
Well flowback	Yes
Well re-spud/ sidetrack	Operational Contingency
Well abandonment	Operational Contingency in event resource is not commercially viable
Environmental survey	Operational Contingency
Ongoing Well Management	
Vessel-based activities	Short-term duration (2-7 days) Planned for annual inspection
Well Abandonment	Contingency in event shut-in Annie-2 development well is not tied into the CHN pipeline. Well abandonment will be undertaken using a MODU.

Note: MODUs operate across a global market and are contracted depending on the levels of work available. The MODU for this activity will either sail under its own power or be towed by support vessels to the Otway region. The metocean conditions and unique seabed in the operational area necessitates the use of a moored semi-submersible MODU.

3.4.1 Mooring Operations

Semi-submersible MODUs (MODU) will typically require between 8 and 12 anchors to maintain position during development drilling. Anchors are spread in a radial pattern extending from the MODU. The anchors may be pre-laid on the seabed several weeks in advance of the MODU arriving at the well location. Anchor pre-lays will be located within the near vicinity of the planned well location. These anchors and associated mooring wires / chains are deployed to the seabed by the AHTSs.

Transponders may be attached to temporary subsea equipment or placed on the seabed. On completion of the positioning operations, transponders and associated equipment will be removed.

The size of the anchor spread will be dependent on the MODU and the MODU specific mooring analysis conducted during the well planning stage. Typically, mooring lines extend ~1,500 – 2,500 m from the MODU, with ~1,200 m of grounded chain. Each anchor itself typically occupies a total

seabed of ~60 m^2. The method for retrieval of anchors is the reverse of the deployment procedures. The potential area of seabed disturbance is described in Table 3-5. Typically mooring pre-lay and retrieval activities are undertaken using a single vessel, and will each take between 14 to 20 days pending metocean conditions. The vessel will resupply mooring equipment periodically in this period given deck space availability.

The 'wet storage' of mooring chains may occur within the operational area for the duration of the activities. The planning of the placement considering seabed relief, substrate and hazards is informed by the geophysical seabed survey.

3.4.2 MODU Positioning

Once in the region, the MODU may move into position under its own propulsion or be towed by one anchor handler tug supply vessel (AHTS) before being moored. An additional 2 AHTS vessels may be within the operational area (3 km from the MODU over well centre) to provide assistance with MODU mooring activities.

Once the MODU is in position, the AHTSs will connect the mooring lines from pre-lay moorings (anchors on the seabed), to the MODU, and the lines are tensioned by winches to a pre-determined tension value. MODU positioning takes between 3 to 7 days pending metocean conditions.

Table 3-5 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-5: Impact Assessment Technical Input – MODU Positioning

Requirements for Impact Assessment	Technical Input
Exclusion / cautionary zone	3.5 km radius around the MODU
Seabed disturbance footprint (temporary)	<2 m^2 of transponders
	~60 m^2 per anchor
	~1,200 m of grounded chain
	<1 km^2 of 'wet storage'
Noise emissions	MODU and up to 3 AHTS vessels within the operational area. Duration of positional activities between 3 to 7 days pending metocean conditions.

3.4.3 Well Construction Activities

Well construction activities, including development drilling, running completions, and shut-in could range between 45 to 60 days. For the purposes of impact assessment, a conservative value of 60 days for development drilling has been used to account for unexpected delays and extreme weather events.

Well construction is planned to be undertaken at any time of year. Timing flexibility is necessary due to a myriad of factors that can influence MODU availability and operational progress. The MODU for this activity is expected to undertake a series of sequential well activities for multiple operators in the region, including decommissioning and drilling.

The final well design for this activity is subject to detailed well engineering. The Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 requires that detailed well design and management is approved by NOPSEMA before drilling can commence.

This is completed through the development and assessment of a detailed Well Operations Management Plan (WOMP) submitted to NOPSEMA.

3.4.3.1 Drilling Operations

Once the MODU is positioned over the well location, drilling equipment is lowered to the seabed and drilling commences with the top-hole section. The top-hole sections of the well (conductor and surface hole) are drilled without a riser system to the MODU which this is standard practice prior to BOP installation.

As each section of the well is progressively drilled, steel casing is installed into the hole. The well may be suspended to allow for evaluation of the field, as described in Section 3.4.3.8.

Once the conductor (with the low-pressure wellhead housing) and surface casing (with high-pressure wellhead housing) are installed, a drill-through SST will be installed and tested on the well (required for barrier purposes and regulation of flow). The SST is a set of valves, spools, and fittings connected to the top of a well. Whilst the well is in a suspended state, the SST acts as barrier to the flow of formation fluids from the well.

A temporary 3.5 km exclusion / cautionary zone will be requested around the MODU during drilling activities; mariners will be notified via a Notice to Mariners issued fortnightly by the Australian Hydrographic Service.

Table 3-6 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-6: Impact Assessment Technical Input – Drilling Operations

Requirements for Impact Assessment	Technical Input
Exclusion / cautionary zone	3.5 km radius around the MODU.
Petroleum Safety Zone (PSZ)	500 m radius around well gazetted by NOPSEMA.
Seabed disturbance footprint	Approximately 1 m^2 for top-hole.
Underwater sound emissions from drilling (i.e., rotating pipe)	Continuous; relatively low noise levels which may vary with environmental conditions, drilling depth, and operating requirements. See scenarios outlined in Section 6.6.

3.4.3.2 Drilling Cuttings and Fluids

Drilling fluids, sometimes called drilling muds, are a specialist mix of seawater, clay (or gel) and weighting additives such as barite, salt and chalk. Drilling fluids perform several functions, including cooling and lubricating the drill bit, transporting drill cuttings to the surface, and maintaining hydrostatic pressure greater than formation pressure, thereby preventing the influx of hydrocarbons from the formation into the wellbore.

Standard additives to the drilling fluids include polymer and polyamine to control fluid loss, viscosity and stabilise shales during the drilling process. The specific type and mix of drilling fluids will depend on the final proposed design and drilling requirements encountered on site. No synthetic based mud (SBM) will be used for drilling Annie-2.

During drilling of the conductor and top-hole sections, a combination of seawater and high-viscosity gel sweeps are typically used as drilling fluid. Subsequent intermediate and reservoir hole sections

will typically be drilled with water-based mud (WBM), with specific formulations dependent on the technical requirements of the well. The cuttings (rock chips) and drilling fluids from the surface sections of the well are released at the seabed.

During drilling of the lower sections of the well, including reservoir sections, a riser system is installed on top of the well. The riser is a conduit between the well and the MODU. The drilling equipment is re-run into the well through the riser and the drilling process continues. The riser system helps to maintain drilling fluid balance within the well as pressures increase with well depth. Integrated into the riser system are a series of barrier elements which can seal the well if required (Section 3.4.3.8).

When the riser is in place, drilling fluids pumped into the well, and cuttings from the well are circulated up the riser to the MODU where the cuttings are separated from the drilling fluids. The solids control equipment comprises of shale shakers that remove coarse cuttings from drilling fluids. The recovered fluids that are separated from the cuttings may be directed to centrifuges to remove the finer solids. The cuttings are usually discharged back to seabed below the water line and the reconditioned fluids are recirculated into the fluid system. The drilling fluids are ultimately discharged once they have reached the end of their operational life.

Drilling fluids, bulk dry products, brine and drill water are transferred to the MODU from supply vessels and stored in tanks and pits. Dry and liquid additives are mixed into the fluid system from sacks or containers. The specific type and mix of drilling fluid will depend on the final proposed design and drilling requirements encountered on site.

Table 3-7 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-7: Impact Assessment Technical Input - Drill Cuttings and Fluids

Requirements for Impact Assessment	Technical Input
Discharge of drill cuttings and fluids at seabed (top-hole drilling).	• 150 m^3 of drill cuttings. • 1,500 m^3 of associated drill fluids. Typical discharges in batches of between 10-100 m^3.
Discharge of drill cuttings and fluids at surface (bottom-hole drilling).	• 180 m^3 of drill cuttings. • 2,000 m^3 of associated drill fluids. Typical discharges in batches of between 10-100 m^3.
Seabed disturbance footprint of drilling cuttings	~ 200 m radius around the well (based on analogue studies detailed in Section 6.0).

3.4.3.3 Cementing Operations

Cement is used throughout the well construction process during installation of each well section to seal the casing into place. Cement can also be used in the form of a cement plug within the well to provide a permanent or temporary well barrier.

Bulk dry cement is transported to the MODU via supply vessels and transferred to dry bulk storage tanks. During the transfer process, to avoid over-pressuring the holding tanks, the tanks are vented to the atmosphere, resulting in residual dry cement being discharged from venting pipes located under the MODU.

After a string of casing or liner has been installed into the well, a cementing spacer is pumped to flush drilling fluids from the well. Cement slurry is pumped down the inside of the well, and into the

annulus (space between the casing and surrounding rock). The cement is pushed into the well by fluid and a wiper plug which displaces the cement out of the bottom of the casing and up into the annular space between the pipe and the borehole wall. Cement volume excess will depend on the cement job design requirements, drilled hole size and size of casing; typically for the conductor and surface casing strings the bulk of the excess will be discharged to the seabed.

If there are mixed batches of cement spoil within the cementing unit, or if there is a problem during the cementing operation, cement slurry will be either flushed from the cement unit or circulated out of the well and discharged to sea.

The cementing unit is tested prior to the commencement of cementing operations, resulting in a discharge of cement slurry to sea. Upon completion of each cementing activity, the cementing head and blending tanks are cleaned which also results in a release of cement washings to sea.

Table 3-8 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-8: Impact Assessment Technical Input - Cementing Operations

Requirements for Impact Assessment	Technical Input
Discharge volumes of cement on testing	2.4 to 8 m^3 at surface
Discharge volumes of cement on disposal of slurry job excess	Up to 40 m^3
Discharge volumes of cement due to job excess	Up to 50 m^3 pumped to seabed
Discharge volume of spacer displaced	~8 m^3 to seabed
Unused bulk discharge of cement (disposed as a slurry)	Up to 50 m^3 at surface
Discharge volumes of cement during cleaning	<1 m^3 per cement job at surface
Direct seabed disturbance footprint of 'overflow' cement	10 m – 50 m around the well

3.4.3.4 BOP Installation and Testing

The riser and blowout preventer (BOP) are installed to facilitate the drilling of the deeper well sections once the surface casing is cemented in place. The riser and BOP can also be installed on top of the SST depending on activity sequencing. The BOP is comprised of a series of hydraulically operated valves and sealing mechanisms (annular preventers, pipe rams and blind shear rams) that are normally open to allow the drill fluid to circulate up the marine riser to the MODU during drilling.

The BOP acts as a secondary barrier and is used to "close in the well" in the event of an unwanted influx into the wellbore. Once closed, the MODU's high-pressure circulating system is used to remove the influx from the well and regain hydrostatic overbalance. The annular and ram preventers are used to shut in around various tubulars in the well, while the blind shear rams are designed to shear the pipe and seal the well.

When the BOP is installed, regular function and pressure tests are undertaken as per relevant standards, described in the WOMP. Function testing is undertaken by activating the hydraulic control system onboard the MODU to confirm functionality of the BOP systems, whilst a pressure test is undertaken to verify seals on the BOP stack. Both tests result in the discharge of control / test fluid.

Once well construction is complete, the BOP is replaced by long-term barriers integrated into the well and the BOP is recovered to the MODU.

Table 3-9 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-9: Impact Assessment Technical Input - BOP Installation and Testing

Requirements for Impact Assessment	Technical Input
Frequency of BOP function testing	Function tests every 7 days (typically). Pressure tests every 21 days (typically).
Discharge volume from function testing.	Total ~2.5 m^3 control fluid and test fluid to seabed.

3.4.3.5 Well Completions

Completions will be installed as part of the well. This will enable future use of the well pending regulatory approvals and licencing for production activities.

Completions involve running components into the well, optimising the flow path and minimising the ingress of sand from the reservoir. Displacing spent drilling fluids to filtered brine is also necessary as part of the completion's installation.

The well bore will be cleaned and displaced to filtered brine when installing completions to minimise solids within the wellbore. Returned fluids will be re-used where they are assessed as suitable for future use. Fluids that are not suitable for reuse are directed overboard to sea.

Prior to setting the packers, the tubing annulus is displaced to corrosion inhibited completion brine (e.g., sodium chloride) which will remain in the well. The tubing contents may be displaced to a base oil (~40 m^3) ready for well clean-up and testing. Note, base oil is only introduced to the well after the well is circulated to completion brine and the completion is installed. The base oil does not form a component of the drilling mud (which is water-based) but is used to underbalance the well to initiate flowback and is flared in its entirety during the well clean-up and test.

Completion brines may be sodium chloride (NaCl), or potassium chloride (KCl) treated with biocide and oxygen scavenger components and will be released during this activity.

Table 3-10 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-10: Impact Assessment Technical Input - Well Completions

Requirements for Impact Assessment	Technical Input
Discharge volume of solids free drilling fluids (water-based)	120 m^3 to surface.
Discharge volume of viscous cleaning fluids (water-based) to the surface	10 m^3 to surface.
Discharge volume of filtered inhibited completion brine (e.g., sodium chloride)	220 m^3 to surface.
Displaced volume of base oil (e.g., Saraline 185V).	40 m^3 burned at the flare during well clean-up.
Note: inhibitors typically include biocide, oxygen scavenger, corrosion inhibitor. Fluid displacements are discharged in the order of 10-50 m^3 per batch.	

3.4.3.6 Well Clean-up / Flowback

Following completion of the well, well testing and clean-up will be undertaken to ensure the well is cleared of drilling fluids and brines and to then enable capture of data on the pressure, flow and composition of the reservoir. Base oil acts to underbalance the well and initiate flow from the well to the MODU, controlled via valves within the well, SST, and BOP stack-up. The base oil and reservoir fluids are directed to a flare boom, via a surface well test package. Flow from the well continues until the well clean-up criteria are met (e.g., completion fluids have been removed and residual solids are nominally <2%).

Whilst the well is flowing through the separator, samples of gas and /or liquid will be captured for laboratory analysis. Onsite analysis is also performed for non-hydrocarbons such as H_2S, CO_2, radon and mercury.

Table 3-11 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-11: Impact Assessment Technical Input - Well Clean-up / Flowback

Requirements for Impact Assessment	**Technical Input**
Duration of flaring	36 hours
Maximum flowrate	60 MMscf
Flare boom height	11-15 m above sea level
Volume of base oil	40 m^3 flared
Volume of completion brine / liquids in test separator	1 m^3 flared
Volume of methanol (for hydrate inhibition)	3 L / min injected / flared
Volume of viscous cleaning fluids (water-based)	10 m^3
Volume of gas (during sampling)	20 L vented per sample
Approx. volume of CO^2 emissions	6.7 kt CO_2-e

3.4.3.7 Logging

During well construction, it is necessary to gather formation information for ongoing drilling operations to inform the effective recovery of hydrocarbons from the reservoir. This information is gathered real-time from Logging Whilst Drilling (LWD) tools.

Wireline logs may be considered as a contingency to gather data if deemed necessary.

Table 3-12 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-12: Impact Assessment Technical Input – Well Shut-in and Suspension

Requirements for Impact Assessment	**Technical Input**
Underwater sound emission from logging	Noise from logging activities is not anticipated to be audible within the overlying ocean.

3.4.3.8 Well Shut-in and Suspension

Following completion and well-test activities. The BOP and riser will be removed, and the well will be left with the SSTs installed and the well shut-in. To be 'shut-in' means the well barriers are closed, preventing the flow of hydrocarbons out of the well. Prior to this well shut-in, the well and SST barriers will be tested, and test fluids may be flushed to sea (e.g., MEG treated with corrosion inhibitor).

An internal tree cap, crown plugs and debris cap are run, and a small volume of treated fluid is typically pumped beneath the debris cap.

3.4.3.9 Contingencies

Environmental Surveys

Environmental surveys may be required within the operational area to support the Activity, for example during drilling operations to support the identification of an object in accordance with unexpected finds processes(CM30) or in response to an unplanned event such as supporting recovery of a dropped object.

Techniques that may be used include:

- visual data collection with ROV or drop camera.
- seabed sampling with Van Veen Grab or alternative
- water sampling
- acoustic monitoring

Surveys would be expected to occur within the operational area. Each survey could take up between 1 and 7 days to complete. These surveys may employ a variety of techniques and activities, including:

- Multi-beam echo sounder (MBES) - detailed measurements of bathymetry in the operational area.
- Side Scan Sonar (SSS) - detects hazards such as existing pipelines, lost shipping containers, boulders, debris, unmarked wrecks, reefs and craters. Also used to help detect possible cultural heritage.
- Sub-bottom Profiler (SBP) – used to investigate the layering and thickness of the uppermost seabed sediments to check for shallow hazards and anomalies.
- Ultra-Short Baseline (USB) - sends / receives and interprets signals in real time to establish precise locations of equipment and vessels.
- Magnetometer - detects metallic objects on or below the seabed (e.g. buried pipelines, petroleum wellheads, shipwreck debris and dropped objects such as un-exploded ordinance, cables, anchors, chains) that may not be identifiable only by acoustic means.
- Sound Velocity Profiler (SVP) and Conductivity, Temperature and Depth (CTD) sensors – used to calibrate survey and environmental monitoring equipment.

Table 3-13 summarises the technical inputs used in the impact assessments within Section 6.0.

The predicted frequencies included within Table 3-13 are considered appropriate for the Activity as they represent typical and widely used survey equipment model types. See further discussion of the noise level exposures used in Section 6.5.

Table 3-13: Impact Assessment Technical Input - Environmental Surveys

Requirements for Impact Assessment	Technical Input
Exclusion / cautionary zone	3.5 km radius around the MODU.
Petroleum Safety Zone (PSZ)	500 m radius around well gazetted by NOPSEMA.
Seabed disturbance footprint	Approximately 0.20 km^2. Refer Section 6.3.2 for further detail.
Underwater sound emissions	Impulsive; noise levels may vary with environmental conditions and operating requirements, within defined safety parameters. See Section 6.5 for further detail.

Well Abandonment

Well abandonment activities are undertaken to seal off the reservoir section of the well and eliminate the risk of a potential release of reservoir fluids to sea. In the unlikely event the Annie-2 well does not intersect commercial columns of gas following drilling and evaluation then it will be permanently P&A'd at well Total Depth (TD), prior to the rig departing the location.

Similarly in the unlikely event the shut in Annie-2 development well is not tied-in for future production, the well will commence permanent abandonment within 3 years of well completion or as per the accepted governing WOMP.

In the event that either of these well abandonment operations are required, they will occur within the term of this EP. Well abandonment operations will be undertaken using a semi-submersible MODU. Sections 3.4.1 and 3.4.2 describe the Mooring Operations and MODU positioning activities that will occur in event the shut in well is not tied-in for future production. Activities during the well abandonment process may include:

- Install permanent reservoir barriers as required.
- Disconnect and remove SST (where applicable).
- Remove pressure control equipment (BOP).
- Cut and remove wellhead.
- Undertake post operation ROV survey (seabed survey).

Well abandonment operations will be undertaken using a MODU and involve setting a series of cement plugs within the wellbore, including plugs above and between any hydrocarbon bearing intervals, at appropriate depths in the well. These plugs are tested to confirm their integrity.

Cutting and removal of wellheads is common in areas where their presence may be a hazard to other marine users. The base case will be to cut at or below the seabed and recover wellheads to a vessel, however if a wellhead is cemented beyond the cutting tool limits, the wellhead may be left in-situ subject to regulatory approval. The method for installation and appraisal of the barriers for abandonment will be the same regardless of whether the wellhead remains in place or not.

All P&A operations will be conducted in accordance with relevant standards, as detailed within a NOPSEMA-accepted WOMP.

Table 3-14 details the indicative discharges used in the impact assessment.

Table 3-14: Impact Assessment Technical Input – Well Abandonment

Requirements for Impact Assessment	Technical Input
Discharge volumes of cement	Up to 8 m^3 at surface
Fluids	Filtered inhibited completion brine (e.g., sodium chloride) 220 m^3
BOP Tests	Approximately 2.5 m^3 control fluid and test fluid

3.4.4 Well Integrity Monitoring

Once the well has been shut-in and suspended, they will be inspected via well integrity monitoring campaigns in accordance with a NOPSEMA accepted WOMP. Inspections are anticipated to occur annually, or otherwise as informed by review of well data captured during the well construction program.

Typically, a survey vessel will be within the operational area for between 2 to 7 days per year for well integrity monitoring of the shut-in well.

The monitoring will include:

- Visual monitoring – undertaken using an ROV or AUV deployed from a vessel for visual and sonar survey. ROV shall be utilised to obtain visual and instrumental (where applicable) data at the wellhead / SST and immediate surrounding area to confirm well barrier integrity to the environment and to monitor general condition of the well.
- Non-destructive testing – includes ultrasonic testing and electrical resistance testing, which are typically undertaken using an ROV or AUV deployed from a vessel. This type of testing may be performed to validate the results of other inspection techniques.

3.4.5 Support Activities

Support activities associated with the scope of the Activity are likely to include a MODU, vessels, helicopters and ROVs or AUVs, and are specific to each phase (Table 3-15).

Table 3-15: Support Activities for each Phase

Support Activity		Phase		
		Surveys		Well Construction
		Environmental / UCH Surveys	Well Integrity Monitoring	
MODU				✓
Support Vessels	Survey Vessels	✓	✓	
	AHTS	contingency	contingency	✓
Helicopter				✓

Support Activity	Phase		
	Surveys		Well Construction
	Environmental / UCH Surveys	Well Integrity Monitoring	
ROV/AUV	✓	✓	✓

3.4.5.1 MODU Operations

Well construction will be carried out using a semisubmersible rig referred to as a MODU (as described in Section 3.4.3). The MODU may be brought in from overseas or from within Australian waters depending on the levels of well activity elsewhere within the Australian offshore industry.

The metocean conditions within the offshore Otway region have the potential to preclude setting a jack-up MODU on location for up to 90% of the year and have an increased risk of 'punch through' of jack-up legs through the surficial calcarenite rock which is characteristic of the region. Therefore, a moored MODU (or dynamic positioning (DP) assist moored MODU) has been selected as the feasible and proven option for the Activity.

The MODU is fitted with various equipment to support activities including:

- pressure control equipment capable of sealing the well (such as a BOP)
- derrick with rotating equipment and drill pipe
- wireline unit for well logging
- flowback package providing flaring capability
- cement unit
- work class ROV
- mooring system (possible DP assist)
- power generation systems
- cooling water and freshwater systems
- drainage, effluent and waste systems
- bulk storage tanks for cement and weighting agents
- sack room for storage of drilling fluid additives
- mud pits (tanks to store and maintain drilling fluids) – in the order of 1000 m^3 combined capacity
- solids control equipment used in drilling to separate the solids and drilling fluids (this may include shale shakers, centrifuging systems and cuttings driers).

Non-drilling activities occurring on the MODU include:

- bunkering / bulk transfer of fuel, chemicals, and supplies
- transfer of waste to supply vessels
- discharge of:

- sewage and greywater
- cooling water and reverse osmosis (RO) brine
- deck drainage and bilge.

Refuelling of the MODU and bunkering will be required during the activity and will occur offshore. Bunkering and bulk transfer will be managed by the MODU.

The MODU will be temporarily moored to the seabed and may be equipped with DP systems for positioning assistance during harsh weather events and for safe operations. When connected to the seabed (via wellhead/XT and a marine riser above the BOPs), a "watch circle" is implemented, which dictates the amount off offset from well centre (at seabed) is allowable before a risk to well operations and safety (riser angle exceeding a limit off vertical which may induce component failure) is to occur. This watch circle is implemented regardless of the positioning system being used, but for Annie-2 development well it will be maintained under normal operations via the mooring lines connecting the MODU to the anchors. DP positioning may be utilised in an emergency station keeping scenario (i.e. mooring failure) or during approach to location and mooring hook-up, where watch circle criticality is lessened.

Table 3-16 details the anticipated MODU specifications and capacities for the Activity and Table 3-17 outlines the technical input that will be used in the impact assessment within Section 6.0.

Table 3-16: MODU Specifications and Capacities

Technical Specifications	
Vessel type	Typically, semi-submersible
Size	Length 120 m, Width 120 m
Maximum persons on board (POB)	140 to 200
Station keeping	Moored (8-12 anchors) DP assist (transit, emergency prevention)
Helideck	Yes
Flare boom height	11-15 m above sea level
Fuel type	MDO / MGO
Fuel storage capacity	1,100 m^3
Operational Specifications	
Lighting requirements	Standard navigation lighting and safe work
Bilge requirements	Standard bilge requirements
Sewage requirements	MARPOL compliant sewage treatment system
Hazardous materials storage	Yes
Ballast water discharge or exchange within territorial sea boundary?	Yes

	Per IMO and Australian requirements as applicable to age and class

Table 3-17: Impact Assessment Technical Input - MODU Operations

Requirements for impact assessment	Technical input
Safety exclusion zone	Temporary 500 m radius around the MODU establish via a 'Notice to Mariners'
Planned marine discharges from the vessels.	Discharges in accordance with MARPOL and AMSA discharge standards for the duration of activities. Discharges will include sewage and grey water, cooling water, brine and treated ballast, deck drainage and bilge.
Operational light emissions from MODU	~20 km precautionary light buffer.
Underwater Sound emissions from drilling and DP system/thrusters.	Continuous; relatively low noise levels which may vary with environmental conditions, drilling depth, and operating requirements. See scenarios outlined in Section 6.6.
Approximate atmospheric emissions (CO_2-e) from: Fuel use / power generation Embedded materials (steel / concrete).	4.8 kT CO_2-e

3.4.5.2 Vessels Operations

Activities associated with the activities covered within this EP will be supported by various vessels. Vessels may be contracted from international or Australian suppliers and will vary depending on the proposed activity, phase and vessel availability. The expected vessel types include:

- survey vessels
- AHTS
- Activities associated with these vessels include:
- conducting site surveys
- MODU positioning
- mooring installation
- bunkering and bulk transfer of fuel, chemicals and supplies to the MODU
- collection and potentially treatment of waste from the MODU
- assisting in emergency response situations
- monitoring the 500 m safety exclusion zone
- monitoring well integrity.

Operational activities associated with vessels include:

- discharge / management of:

- sewage, greywater and food waste
- cooling water and brine
- deck drainage and bilge
- ballast water discharge or exchange.

All vessels will initially mobilise and demobilise at ports outside of the operational area. Crew changes for the vessels will typically be conducted at local ports outside of the operational area.

Three vessels (AHTSs) wills be used to assist the MODU whilst positioning. The AHTSs are involved in towing the MODU, moorings, material transfers and emergency standby and support. Once the MODU is in position, 2 AHTSs will remain within the operational area to support, whilst the third vessel undertakes resupply. A maximum of 3 AHTSs will be within the operational area at any one time whilst well construction is being undertaken. The support vessels will remain outside of the PSZ, unless undertaking operational activities

Vessels will typically use thrusters or DP to maintain position but may deploy anchors to manage an emergency situation (such as engine failure).

Interim vessel transiting to and from the operational area is managed under the Commonwealth Navigation Act 2012 and this activity is excluded from the scope of the EP.

Table 3-18 details the anticipated vessel specifications and capacities for the activity and Table 3-19 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-18: Vessel Operations Specifications and Capacities

Technical Specifications	
Maximum Persons on Board (POB)	Survey vessel: 20-40 AHTS: 20-60
Will vessels be moving within the operational area?	Yes
Will anchoring be required?	Anchoring may be required where it is too shallow to use vessel's DP mode (e.g., small vessel close to shore in state waters).
Lighting requirements	Standard navigation lighting and safe work.
Bilge requirements	Standard bilge requirements.
Cooling water and brine requirements	Standard cooling water and brine requirements.
Sewage requirements	MARPOL compliant sewage treatment system.
Hazardous waste	Yes
Ballast water discharge or exchange within territorial sea boundary?	Yes
Fuel use type	Marine Diesel Oil (MDO) or Marine Gas Oil (MGO)
Estimated fuel consumption (daily)	15 - 20 m^3 per day.
Is refuelling at sea planned?	No
What is the largest expected MDO tank size?	250 m^3
Ancillary equipment may include	Cranes, A-Frame, ROVs, Positioning and Survey equipment.

Table 3-19: Impact Assessment Technical Input - Vessel Operations

Requirements for impact assessment	Technical input
Seabed disturbance footprint (not planned)	1,300 m^2 during emergency anchoring (accounting for deployment and some drag in heavy weather) (NERA, 2018).
Planned marine discharges from the vessels.	Discharges will be in accordance with MARPOL and AMSA discharge standards. Discharges will include sewage and grey water, cooling water, brine and treated ballast, deck drainage and bilge.
Operational light emissions from vessels	~20 km precautionary light buffer.
Underwater sound emissions (from DP system / thrusters)	Continuous; noise levels may vary with environmental conditions and operating requirements, within defined safety parameters. See scenarios outlined in Section 6.6.
Atmospheric emissions	12.9 kT CO_2-e

3.4.5.3 Helicopter Operations

Helicopters will be used during the drilling activities, primarily for crew change, in the event of medevac, and occasionally equipment and material transfers. Frequency will depend on the progress of the drilling program and logistical constraints.

Table 3-20 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-20: Impact Assessment Technical Input: Helicopter Operations

Requirements for impact assessment	Technical input
Frequency of flights	Approximately 5-8 round trips per week.
Underwater sound emissions	Continuous sound emissions: Level limited to tens of metres from the source when at lower altitudes for landing/take-off at the MODU (Richardson et al. 1995).
Approximate GHG emissions (CO_2-e) from fuel use during offshore crew changes	0.2 kT CO_2-e

3.4.5.4 ROV / AUV Operations

Inspection and / or work-class ROVs are required for well monitoring activities (AUVs may also be used). A ROV is a tethered underwater vehicle operated by a crew aboard the vessel or MODU. They are linked by either a neutrally buoyant tether or often when working in rough conditions, deeper water or with large payloads, a load carrying umbilical cable is used along with a tether management system. An AUV is an untethered underwater vehicle operated in a similar manner to an ROV.

ROVs are equipped with a video camera and lights. ROVs may utilise electric control systems or closed loop hydraulic control systems. Additional equipment may include positioning and survey equipment, and various apparatus to support installation and monitoring activities. ROVs may utilise electric control system or a closed loop hydraulic control system.

ROVs may be required to park temporarily on the seabed as part of execution activities. Any such temporary parking will occur within the operational area.

Table 3-21 summarises the technical inputs used in the impact assessments within Section 6.0.

Table 3-21: Impact Assessment Technical Input - ROV / AUV Operations

Requirements for impact assessment	Technical input
Discharge volume of control fluids (during well integrity testing activities)	~10 L at the seabed.
Discharge volume of calcium wash (citric acid or equivalent) when calcium deposits are required to be cleaned from the ROV interface	50 L at the seabed.
Underwater sound emissions (from USBL)	A USBL system uses transponders to receive the acoustic signal sent out by the system's transceiver. See Section 6.5.
Disturbance footprint	'Wet parking' not planned. ~10 m^2 if it is required (i.e., emergency).

3.4.6 Decommissioning

Amplitude Energy acknowledges the requirement through Section 572 of the OPGGS Act and NOPSEMA Policy Section 572 Maintenance and Removal of Property (N-00500-PL1903, A720369, December 2022) for removal of all property when it is no longer in use, or to be used, and that any deviations from this position will need to be evaluated and accepted by NOPSEMA.

Amplitude Energy acknowledges the targets set in NOPSEMA's Decommissioning Compliance Strategy 2024-2029 for decommissioning planning (NOPSEMA 2024b). Current regulatory expectation is that:

- If Annie-2 development well does not access a commercially viable resource following well testing, it will be abandoned at the time of well evaluation and within the well activity duration of this EP.
- Annie-2 development well will commence permanent abandonment within 3 years of well completion, in the event the well is not tied into the existing CHN pipeline, or as accepted in the governing WOMP.
- Annie-2 will be permanently abandoned within 3 years of permanently ceasing production or as accepted in the governing WOMP where integrity can be demonstrated as per regular inspection and/ or monitoring activities.

This EP has provided for a contingency case to P&A the well, as per Section 3.4.3.9, in the unlikely event that the well is not able to be utilised for development.

Operational monitoring programs described in this EP are suitable to the nature and scale of the activities and the environment and will help to facilitate Section 270 Title relinquishment if required in the future. The Annie-2 development well decommissioning strategy will be outlined and complied with as part of the CHN Development EP, which will be revised to include for production from the Annie-2 development well.

4.0 Description of the Environment

A detailed description of the environment is provided in Appendix 4 - for all physical, ecological, social and cultural receptors. This section provides regulatory context, a description of the environment that relevant to the project activities (and unlikely emergency scenarios), regional setting and a summary of the key ecological and social receptors.

4.1 Regulatory Context

The OPGGS(E)R 2023 defines 'environment' as 'ecosystems and their constituent parts, natural and physical resources, the qualities and the characteristics of locations, places and areas, and the heritage value of places; and includes the social, economic and cultural features of those matters'.

In accordance with Section 21(2) of the OPGGS(E)R, this section (and associated appendices) describes the physical setting, ecological receptors, and social receptors, of the receiving environment relevant to the described activity.

A greater level of detail is provided for certain receptors, as defined by Section 21(3) of the OPGGS(E)R which states that particular relevant values and sensitivities may include any of the following:

- The world heritage values of a declared World Heritage property.
- The National Heritage values of a National Heritage place.
- The ecological character of a declared Ramsar wetland.
- The presence of a listed threatened species or listed threatened ecological community (TEC).
- The presence of a listed migratory species.
- Any values and sensitivities that exist in, or in relation to, part or all of:
  - A Commonwealth Marine Area (CMA); or
  - A Commonwealth land.

With regards to 21(3)(d) and (e) more detail has been provided where threatened or migratory species have a spatially defined biologically important area (BIA) – as they are spatially defined areas where aggregations of individuals of a regionally significant species may display biologically important behaviours such as breeding, foraging, resting or migration (DCCEEW 2024a).

BIAs can be located anywhere within the Australian marine environment and may also be designated over terrestrial areas (i.e., turtle nesting beaches). BIAs are:

- Designed to inform decision making about actions which may impact protected species.
- Described in conservation plans for protected marine species including statutory recovery plans, wildlife conservation plans, and conservation advice documents (DCCEEW 2024a).
- It is important to note that BIAs do not represent the species full range and that areas without BIAs may still support biologically important behaviours (DCCEEW 2024a).

BIAs within this document have been described and defined by using the downloadable DCCEEW BIA shapefile dataset available at this time (DCCEEW 2024a). Further updates to BIA's will be reviewed as they become available and will be integrated into the EP either during or after assessment, in accordance with Amplitude Energy's Management of Change process.

With regards to 21(3)(f) more detail has been provided for:

- Key Ecological Features (KEFs) as they are considered a conservation value under a CMA.
- Australian Marine Parks (AMPs) as they are established under the EPBC Act.
- Important habitat for migratory species is defined within the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DEWHA 2013) as:
  - habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
  - habitat that is of critical importance to the species at particular life-cycle stages, and/or
  - habitat utilised by a migratory species which is at the limit of the species range, and/or
  - habitat within an area where the species is declining.

4.2 Environment that May Be Affected

The spatial extents associated with the operational area, Environment that May be Affected (EMBA), and monitoring area are used to inform the environmental context relevant to the activity and to support the impact and risk assessments (Table 4-1).

Table 4-1: Description of Operational Area, Monitoring Area and EMBA

Activity Area	Description
Operational area	The operational area is: • 3 km buffer around the Annie-2 well location. Planned seabed disturbance, drilling and operational discharges, and physical presence will occur within the operational area. The EPBC PMST report for the operational area is available in Appendix 5 -
EMBA	The EMBA (Figure 4-1) is the largest spatial extent where unplanned events could have an environmental consequence on the surrounding environment. For this EP the EMBA is the combined potential spatial extent of surface and in-water hydrocarbons at concentrations above ecological impact thresholds in the unlikely event of Level 2 or 3 hydrocarbon spill to sea (see Section 6.8 and Table 6-50). The hydrocarbon exposure thresholds that define the outer limits of the EMBA are: • Surface – 10 g/m^2 • Shoreline – 100 g/m^2 • In-water (dissolved) – 50 ppb • In-water (entrained) – 100 ppb The EMBA does not represent the predicted coverage of any one hydrocarbon spill or does it depict a single plume at any given point in time. Rather, the EMBA is a composite of multiple spill scenarios over a large number of theoretical scenarios with differing metocean conditions. The potential impacts and risks within the EMBA are described in Section 6.8 and are not homogenous; they vary in consequence. Generally, the potential consequences would diminish with distance from the spill source, and the probability of an impact, which is highly unlikely in the first instance, becomes less likely still, with distance from the spill source out to the edge of the EMBA.
Extent of socio-	The extent of potential socio-economic impact (SEI) is used to identify receptors which have the potential to be subject to visual or economic impacts associated with an

economic impacts	accidental release of hydrocarbons. Relevant social receptors are detailed between Section 4.4.3 and Section 4.4.4. Social receptors are assessed based on the hydrocarbon exposure threshold that could result in a visual sheen or exceedance of water quality guidelines and are considered an indicator of possible socio-economic impacts within the marine and coastal environment. The boundary of the extent has been defined by an accidental release of condensate. A low threshold exposure value for visible oil types (floating and shoreline) and a moderate threshold exposure value for in-water oil types were used to define the spatial extent. • Floating (1 g/m^2) • Shoreline (10 g/m^2) • In-water: Dissolved (50 ppb) and Entrained (100 ppb). The potential socio-economic impacts of a spill are described and assessed in Section 6.8. Generally, the potential consequences would be expected to diminish with distance from the spill source, and the probability of an impact, which is highly unlikely in the first instance, is remote within the monitoring area beyond the EMBA.
Monitoring area	Hydrocarbons can be monitored to concentrations much lower than the thresholds of ecological effect. It can be important to do this in the event of a spill, even in areas that are remote from the activity, to confirm the presence / absence of hydrocarbons and concentrations relative to water quality parameters which may have socioeconomic implications. The (Low) hydrocarbon exposure thresholds that define the outer limits of the Monitoring Area are described in Table 6-50. The Operational and Scientific Monitoring Plan (OSMP) for the Activity provides for monitoring of low hydrocarbon exposures and areas remote from the activity. The monitoring area is utilised in determining the geospatial extent of the existing environment relevant to the EP, and supports the identification of physical, ecological and social receptors which are de*scri*bed in Section 4.0. Analysis of the stochastic modelling results (Appendix 6 -) shows the monitoring area overlaps 10 IMCRA provincial bioregions: • Western Bass Strait Shelf Transition • West Tasmania Transition • Bass Strait Shelf Province • Southern Province • Spencer Gulf Shelf Province • Tasmanian Shelf Province • Tasmania Province • Central Eastern Province • Southeast Shelf Transition • Southeast Transition. The EPBC Protected Matters Report for the monitoring area is in Appendix 5 - .
Aspect potential impact radii	Other aspects of the activity which may impact on the environment, including subsea noise and artificial light, involve discrete areas that may be affected. These areas are delineated in terms of a contour or potential impact radii around a source and are further described in Section 6.0, and may also be referred to as Activity EMBAs. As an example, the largest of these is the area that represents the furthest extent of observable light (above ambient) from flaring which is expected to be less than 49km from the MODU.

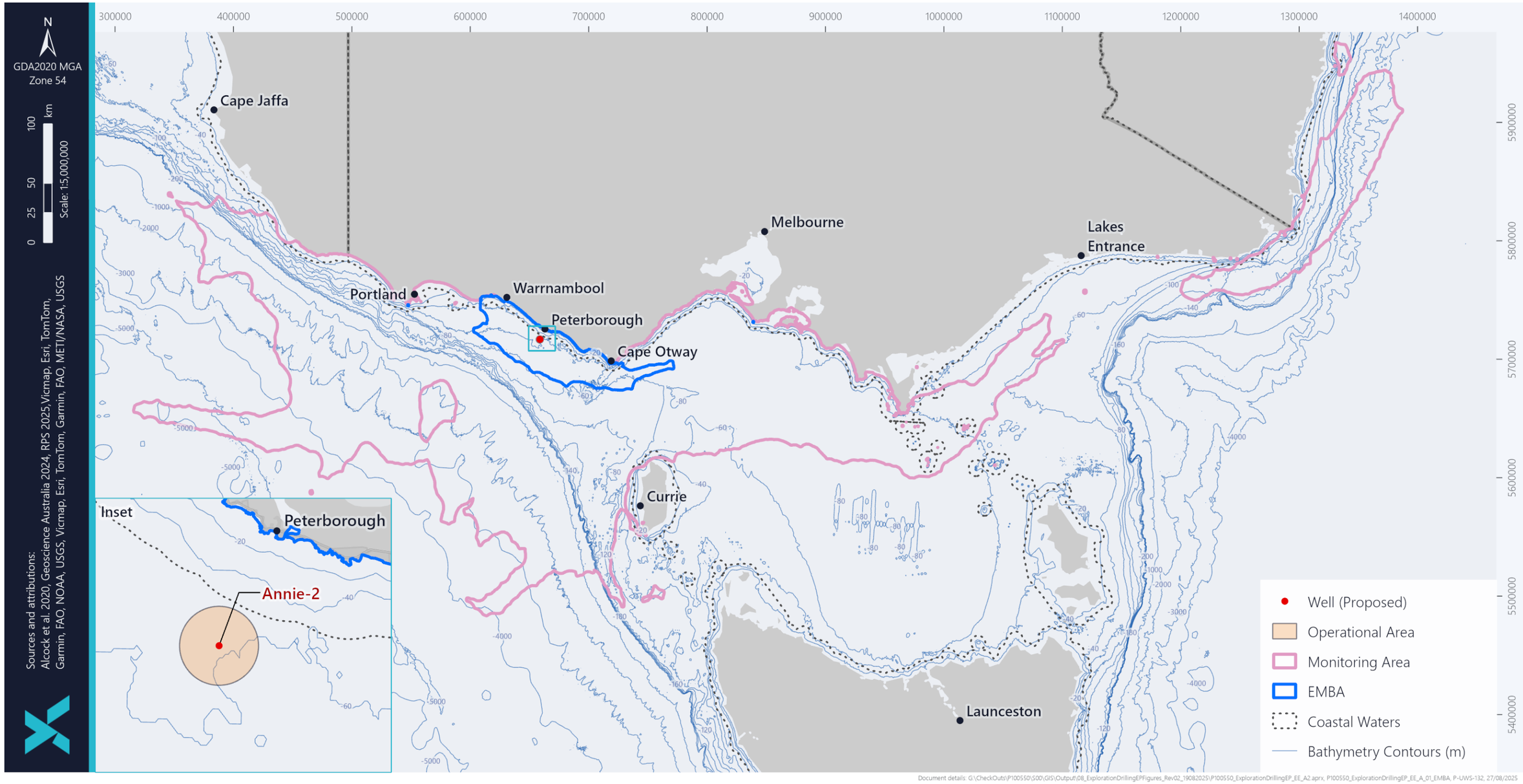


Figure 4-1: Annie-2 Development Drilling Monitoring Area and EMBA

4.3 Regional Setting

The Activity is located in the Otway marine bioregion (National Oceans Office (NOO) 2002) as classified by the Interim Marine and Coastal Regionalisation for Australia (IMCRA) (Figure 4-4). This bioregion extends from Cape Otway (Vic) to Cape Jaffa (South Australia) and includes the western islands of Bass Strait.

The Otway Basin coastline and marine environment is characterised by very steep to moderate offshore gradients, high wave energy and cold temperate waters subject to upwelling events (i.e., the Bonney Upwelling) (IMCRA 1998). The water in the area is well mixed given it is a higher-energy environment exposed to frequent storms and significant waves. Water quality is expected to be good and typical of the offshore marine environment. Upwelling water is nutrient rich and corresponds with increases in the abundance of zooplankton, which attracts baleen whales and other species (including EPBC-listed species) that feed on the plankton swarms (krill). The Bonney upwelling is seasonal, occurring west of Portland, >100 km west of the Activity. Upwelling around the operational area is considered unlikely or occasional (Huang and Wang, 2019).

The seabed on the Otway shelf is comprised of exhumed limestone and is generally rocky with relief that varies substantially including some areas of flat limestone and some of crevices, gutters, pillars and overhanging shelves. Whilst there are some areas of thin overlying sediment (comprising fine-coarse grained sand and calcarenite fragments), the region is starved of terrigenous sediment (Santos 2004, Fugro 2020; 2020a).

The coastline is generally rocky, with tall cliffs and rock outcrops, some sandy beaches, inlets and settlements. Shoreline habitats of the Otway coastline provide for a range of fauna including penguin colonies, fur seal colonies and bird nesting sites.

4.3.1 Existing Environment – East Coast Supply Project area and Annie 2 Operational Area

Site surveys for Annie-2 development well operational area were completed in 2025 (MMA Offshore 2025a). The seabed site surveys collected geophysical, bathymetric, sediment, water, and visual data (including benthic habitat), which were analysed by specialist underwater cultural heritage (UCH specialist) and 3rd party marine ecologists. Amplitude undertook a post-survey well site survey selection review for the Annie 2 well, this considered seabed morphology, and the cultural heritage and ecological analysis.

Side scan sonar data revealed asymmetric ridges, erosional zones, karstic sinkholes, and a submarine fan across the survey area. The seabed comprises outcropping Port Campbell Limestone overlain by thin sands, with mixed reflectivity patterns indicating varied sediment types. The seabed generally slopes from the north to the south across the operational area. The seabed in the north is relatively flat with small ridges and small channels having a height of 1 m, orientated NE to SW causing undulations throughout. Sub-bottom profiling indicated hard limestone with limited reflector continuity due to dipping layers, the sand deposits vary, with maximum penetration of ~5 m.

No seabed anomalies of underwater cultural heritage have been identified in the 3.5 km study area surrounding the centre point for the Annie 2 wellhead. Magnetometer data identified some anomalies, additional video and stills were acquired at the anomaly locations. The anomalies were reviewed by an underwater cultural heritage specialist. Anomalies located ~306 m northeast of the proposed well, were confirmed as debris associated with the existing Annie-1 well. The next closest anomalies ~2.8 km east of the proposed Annie 2 well location were determined to likely be relatively small buried objects, with no visible features in sonar or bathymetry data, therefore the cultural

heritage value is unknown. To mitigate potential impacts to these anomalies (refer Table 4-2), the UCH specialist recommended placing a 20m no anchoring zone around the identified anomalies.

Table 4-2: Seabed Survey Anomaly Features that are not to be disturbed

Contact ID	Easting (GDA2020 / UTMZ 54)	Northing (GDA2020 / UTMZ 54)
ANN02_MAG_0004	661497	5716471
ANN02_MAG_0005	661501	5716473
ANN02_MAG_0006	661505	5716465

Based on the site survey data the original well location for Annie 2 was revised given the seabed morphology. The survey identified that the seabed drops off quickly to a relatively deep channel with several small isolated and detached features (2-3m high) exist which rise quite steeply from the seabed. The Annie-2 well location was shifted approximately 20m to avoid the undulating seabed with small features and steep slopes of 2m to 3m in proximity to the proposed well location (refer Figure 4-2).

The survey was developed and data analysed in collaboration with the marine specialists and included for sediment sampling, water sampling and still/ habitat imaging/ video across the Annie 2 development well operational area (MMA Offshore 2025b). Figure 4-3 shows still images from the Annie-2 operational area. A review undertaken by experienced marine ecologists identified no critical benthic habitats, vulnerable species and the seabed assemblages are typical of the Otway shelf. Across the East Coast Supply Project (ECSP) area benthic epifauna habitat and communities in the Project Area are generally comprised of sand and shell grit substrates with low abundance of sponges and very low abundance of other epifaunal groups such as ascidians, hydroids, soft corals and algae. Taxa identified during the survey aligned with previous records and observations for the area, with the communities generally dominated by malacostracans (amphipods) and to a lesser extent Polychaeta. No benthic infauna that are Protected Matters listed under the EPBC Act were recorded or are expected to occur in the ECSP area.

Infauna - The benthic infauna communities exhibited low diversity overall, with Malacostraca (e.g., amphipods) and Polychaeta (segmented worms) being the dominant taxa, and broadly similar assemblages across the ECSP area. No Matters of National Environmental Significance (MNES) or protected infauna species were identified.

Epifauna –Across the ECSP area epifaunal communities were sparse, with sponges being the most common group. Substrates consisted mainly of sand, shell grit, and rubble, with occasional rock. The survey locations had low densities of hydroids, ascidians, and soft corals. No protected or sensitive epifaunal species were observed.

No contaminants of concern were identified from the sediment and water quality sampling.

Other than the two magnetic anomalies identified via the UCH specialist, there were no sensitive features identified through the survey, analysis and reporting which require avoidance.

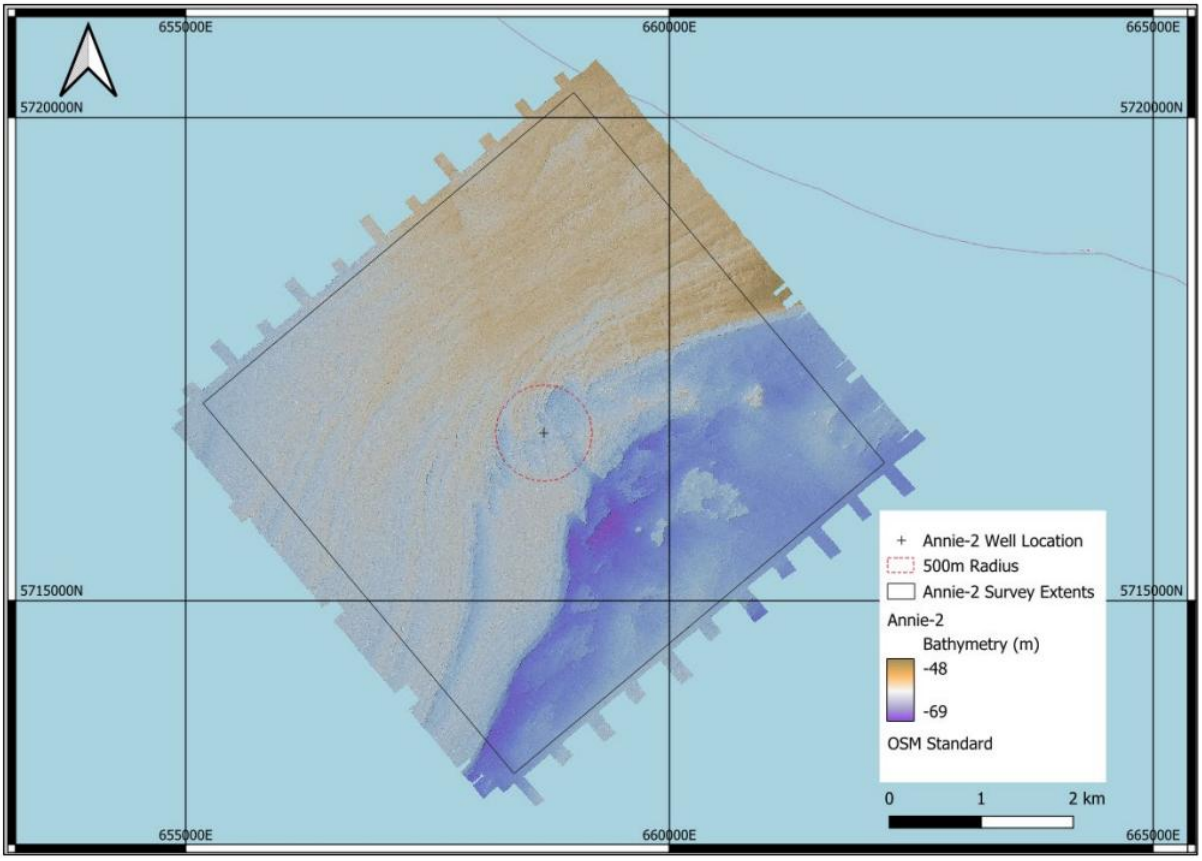


Figure 4-2: Overview of the bathymetry from the Annie-2 survey

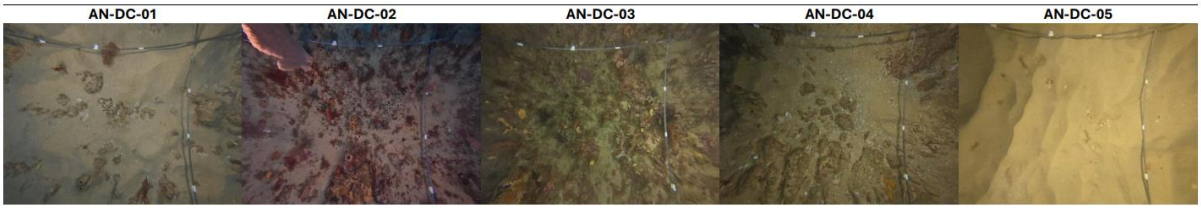


Figure 4-3: Drop Camera Images from June 2025 seabed survey within Annie-2 development well operational area.

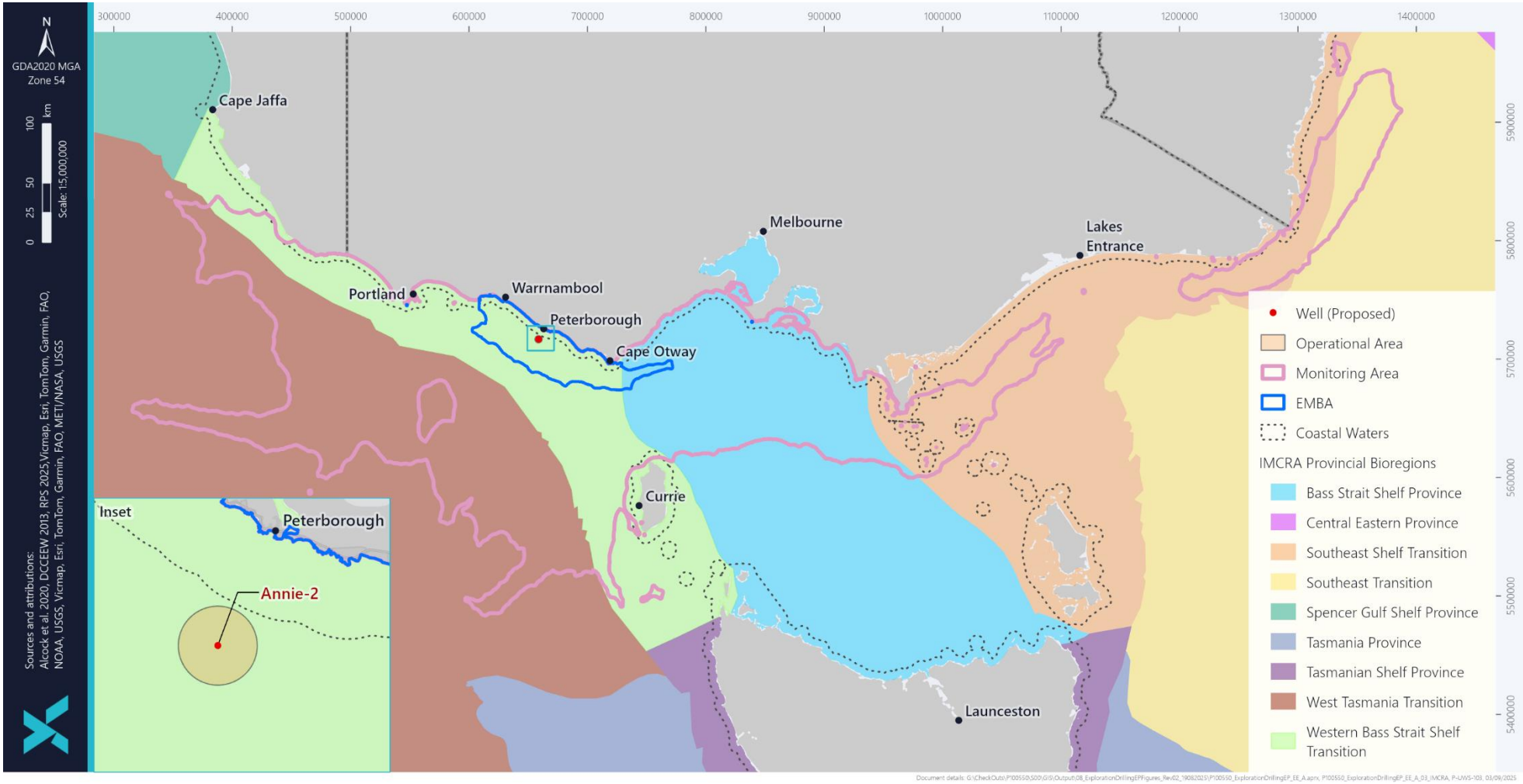


Figure 4-4: IMCRA regions within the Monitoring Area

4.4 Physical, Biological and Social Receptors

The following tables show the presence of receptors that may occur within the operational area and monitoring area. Further descriptions and maps of these physical, ecological, social and cultural receptors are provided in the Master Description of the Environment (Appendix 4 -):

- physical receptors (Table 4-3)
- ecological receptors (Table 4-4)
- social receptors (Table 4-5)
- cultural receptors (Table 4-7).

Examples of values and sensitivities associated with each of the receptors (physical, ecological, social or cultural) have been included in the tables. These values and sensitivities have been identified based on:

- Possible presence of first nations cultural heritage.
- Presence of listed threatened or migratory species or threatened ecological communities that have coastal or marine habitat identified in the EPBC Protected Matter searches (Appendix 5 -).
- Presence of biologically important behaviours (e.g., foraging, roosting or breeding) by fauna, including those identified in the EPBC Protected Matter searches and habitats critical to the survival of the species. (Appendix 5 -).
- Provision of an important link to other receptors (e.g., nursery habitat, food source).
- Provision of an important human benefit (e.g., recreation and tourism, aesthetics, commercial species, economic benefit).

There were species identified in the PMST reports do not have coastal or marine habitats (e.g. terrestrial or freshwater species) and are not discussed further. In determining the overlap with the operational and monitoring area both the conservative PMST tool as well as referenced DCCEEW GIS data have been used.

A summary of the seasonality of the key sensitivities is provided within Table *4-8*.

4.4.1 Physical Receptors

Table 4-3: Presence of Physical Receptors within the Operational Area and Monitoring Area

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
Physical	Climate	Cool temperate region	N/A	✓	Present The operational area is typical of a cool temperate region with cold, wet winters and warm dry summers. The day-to-day variation in weather conditions is caused by the continual movement of the highs from west to east across the Australian continent roughly once every 10 days.	✓	Present The regional climate is dominated by sub-tropical high-pressure systems in summer and sub-polar low-pressure systems in winter. The low-pressure systems are accompanied by strong westerly winds and rain-bearing cold fronts that move from south-west to north-east across the region, producing strong winds from the west, north-west and south-west.
	Winds	Strong westerly winds found in the Southern Hemisphere between latitudes of 40°S and 50°S	• Cold fronts • Sustained west to south-westerly winds	✓	Present The operational area is subject to wind conditions aligned with the Bass Strait with conditions likely to align with those listed within the monitoring area. RPS (2024) acquired high-resolution wind data across their modelling domain from the National Centre for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR). Monthly wind rose distributions from 2010 to 2019 (inclusive) derived from CFSR data for selected nodes nearby each release	✓	Present The monitoring area is located within the Roaring Forties. In winter, when the subtropical ridge moves northwards over the Australian continent, cold fronts generally create sustained west to south-westerly winds and frequent rainfall in the region. In summer, frontal systems are often shallower and occur between two ridges of high pressure (HP), bringing more variable winds and rainfall.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
					location can be found in Appendix 6 - .		
	Tides	Long, slow moving waves created by the gravitational pull of the moon	• Intertidal habitat • Fish aggregation • Fauna reproduction • Flora reproduction • Water quality • Maritime navigation	✓	Present The operational area has semi-diurnal tides with some diurnal inequities, generating tidal currents along a north-east/south-west axis, with speeds generally ranging from 0.1 to 2.5 m/s.	✓	Present The monitoring area and wider Otway region experiences semi-diurnal tides. The maximum range of spring tides in western Bass Strait is approximately 1.2 m. Sea level variation in the area can arise from storm surges and wave set up.
	Current	Directional movement of water driven by gravity, wind and water density	• Controlling climate • Food source • Flora reproduction • Water quality	✓	Present The operational area is subject to current conditions aligned with the Bass Strait with conditions likely to align with those listed within the monitoring area.	✓	Present Average current speeds in the area range between 0.15 m/s to 0.24 m/s, with maximum current speeds in a range between 0.66 m/s (Feb) to 1.10 m/s (Sept) (RPS 2024). Bottom currents can exceed 0.5 m/s in nearshore areas during storms. In the Port Campbell area, the predominant south-westerly swell direction means that there are minimal longshore currents as most waves reach the shore parallel to the coast. Lateral flushing within Bass Strait results from inflows from the South Australian Current, East Australian Current (EAC) and sub-Antarctic surface waters.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
							During winter, the South Australian current moves dense, salty warmer water eastward from the Great Australian Bight into the western margin of the Bass Strait. In winter and spring, waters within the strait are well mixed with no obvious stratification, while during summer the central regions of the strait become stratified.
	Water Quality	Level of contaminants in water, sediments or biota or to changes in the physical or chemical properties of waters and sediments relative to a natural state.	• Ecosystem health • Fishing and aquaculture • Recreation and aesthetics • Industrial water supply • Cultural and spiritual	✓	Present The operational area is expected to have water quality typical of the offshore marine environment of the Otway Basin. Characterised by high water quality with low background concentrations of trace metals and organic chemicals and an undisturbed mid-depth environment.	✓	Present The monitoring area is expected to have the water quality typical of the Bass Strait and Otway Basin which are known for a complex, high energy wave climate and strong ocean currents. Water column turbidity on the Victorian coastline is subject to high natural variability. Weather conditions in the coastal environment around Port Campbell and Port Fairy are known to influence offshore hydrodynamic conditions and are a driver of sediment dynamics, impacting benthic and pelagic habitats and changing water column turbidity. Wave-driven sediment resuspension generates high turbidity levels within coastal zones, commonly exceeding 50 mg/L.
	Sea Water Temperature	Heat present within ocean waters	• Fauna behaviour • Fauna reproduction	✓	Present Sea-surface water temperatures vary seasonally from ~13.3°C (Sept) to ~18.6°C (Jan/Feb/Mar) (RPS 2024).	✓	Present The southwest region of Victorian area has significant upwelling of colder, nutrient rich deep water during summer that can cause

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
			• Fauna distribution and aggregation • Flora community maintenance				sea surface temperatures to decrease by 3°C compared with offshore waters.
	Sediment Quality	Level and toxicity of contaminants within sediment	• Sink of dissolved contaminants • Source of bioavailable contaminants to benthic biota	✓	Present The operational area is located within the 400 km-long Otway Shelf, which lies between 37° and 43.5°S and 139.5°E (Cape Jaffa) and 143.5°E (Cape Otway). Beyond 60 m water depth, the seabed comprises outcrops of hard substrate with very low relief and structural complexity separated by gullies of sand or fine gravel. Surveys investigating the seabed in the vicinity of the existing CHN facilities (at water depths from 60 m to 70 m) found the seabed to be characterised by sand or gravelly / rubble and hard platform substrates (Fugro 2020; 2020a) It is expected that sediment quality within the Otway offshore fields will be typical of the offshore marine environment of the Otway Basin.	✓	Present The monitoring area is expected to have sediment quality typical of the surrounding area (Figure 4-5). Beach Energy conducted an environmental survey of a neighbouring title, located 3 km from the Amplitude Energy Otway offshore facilities, from November 2019 to January 2020. Six samples were taken with the sediment predominantly sand with a range of 95-97% as a proportion of each sample. There was also very little silt and a maximum of 4.7% for the clay fraction.
	Air Quality	The chemical, physical, biological and aesthetic	• Ecosystem health • Human health • Fauna health	✓	Present	✓	Present Historical air quality data from Cape Grim (most reliable point of refence for this

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
		characteristics of air.			The air quality within the operational area will reflect the characteristics of the wider area. There are expected localised and temporary decreases in air quality due to particulate matter from diesel combustion on offshore vessels including fishing and cargo vessels which transit nearby.		Activity, given it is representative of a large area that is unaffected by regional pollution sources (cities or industry) (CSIRO, 2017) shows a continuous increase in most GHGs since the mid-to-late 1970s with carbon dioxide levels increasing by more than 15% since 1976, and concentrations of methane and nitrous oxide (N_2O) increasing by around 20% and 8% respectively since 1978. The increase in methane levels however has slowed recently and chlorofluorocarbons (CFCs) and halons are in decline. Increases have been attributed to anthropogenic causes, for example, fossil fuel consumption and agricultural practices.
	Ambient Light	Light present within an environment	• Fauna behaviour • Fauna breeding • Fauna hunting / predation • Circadian rhythms	✓	Present Ambient light within the operational area will reflect the Otway Basin with artificial emissions associated with offshore activities including vessel activity.	✓	Present Ambient artificial light sources associated with offshore activities exist in the Otway region, including both permanent (e.g., onshore/offshore developments) and temporary (e.g., vessels, road traffic) light sources.
	Ambient Noise	Level of background sound at a given location	• Fauna behaviour • Fauna breeding • Spatial distribution	✓	Present The operational area will reflect the natural sea sounds associated with the Otway Basin in addition to the noise associated with offshore activities including vessel activities.	✓	Present Natural sea sound sources are dominated by wind noise, but also include rain noise, biological noise and the sporadic noise of earthquakes. Anthropogenic underwater sound sources in the region comprise shipping and small vessel traffic, petroleum-

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
							production and exploration-drilling activities and infrequent petroleum seismic surveys.

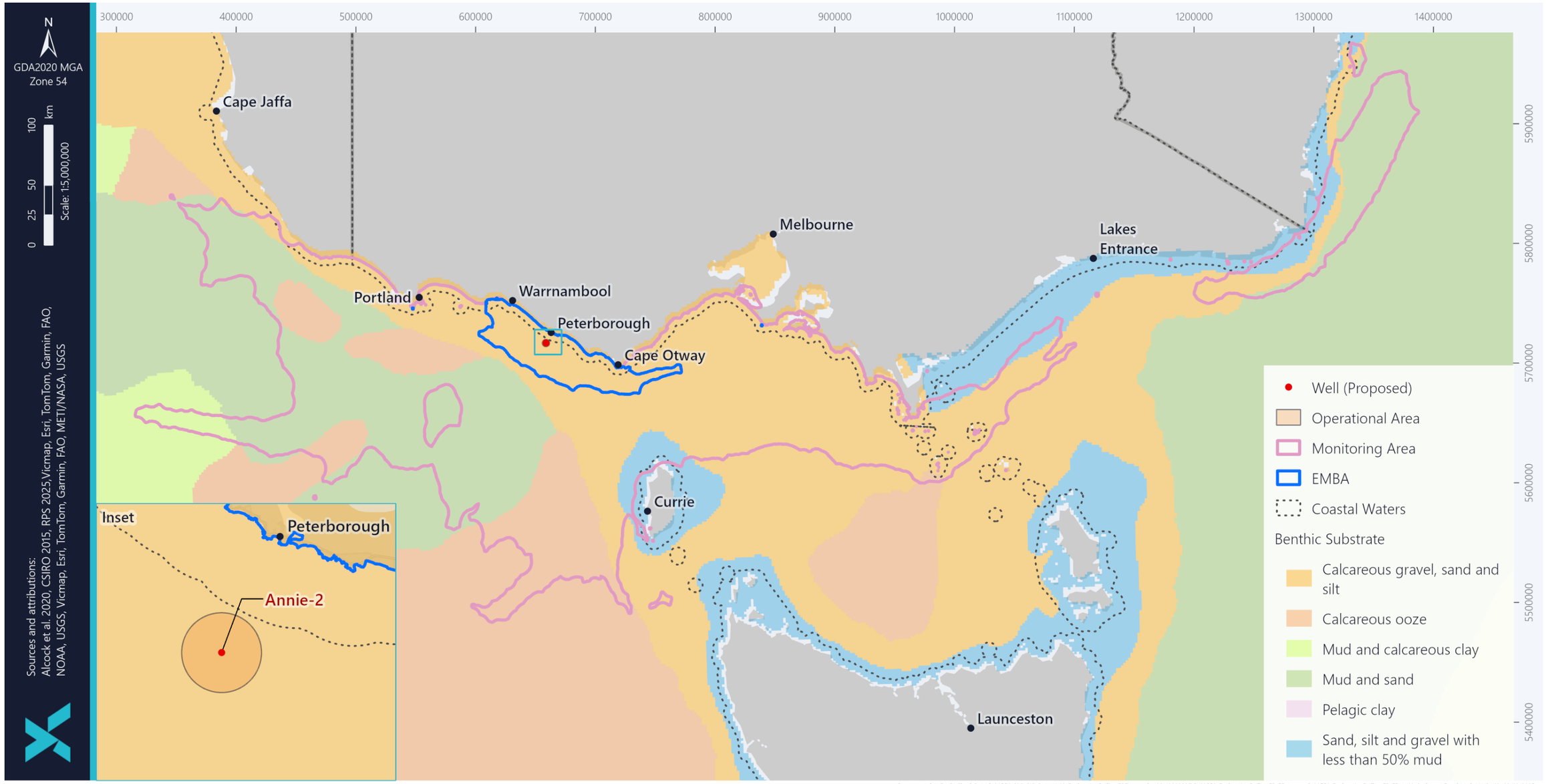


Figure 4-5: Benthic Substrate Within the Monitoring Area

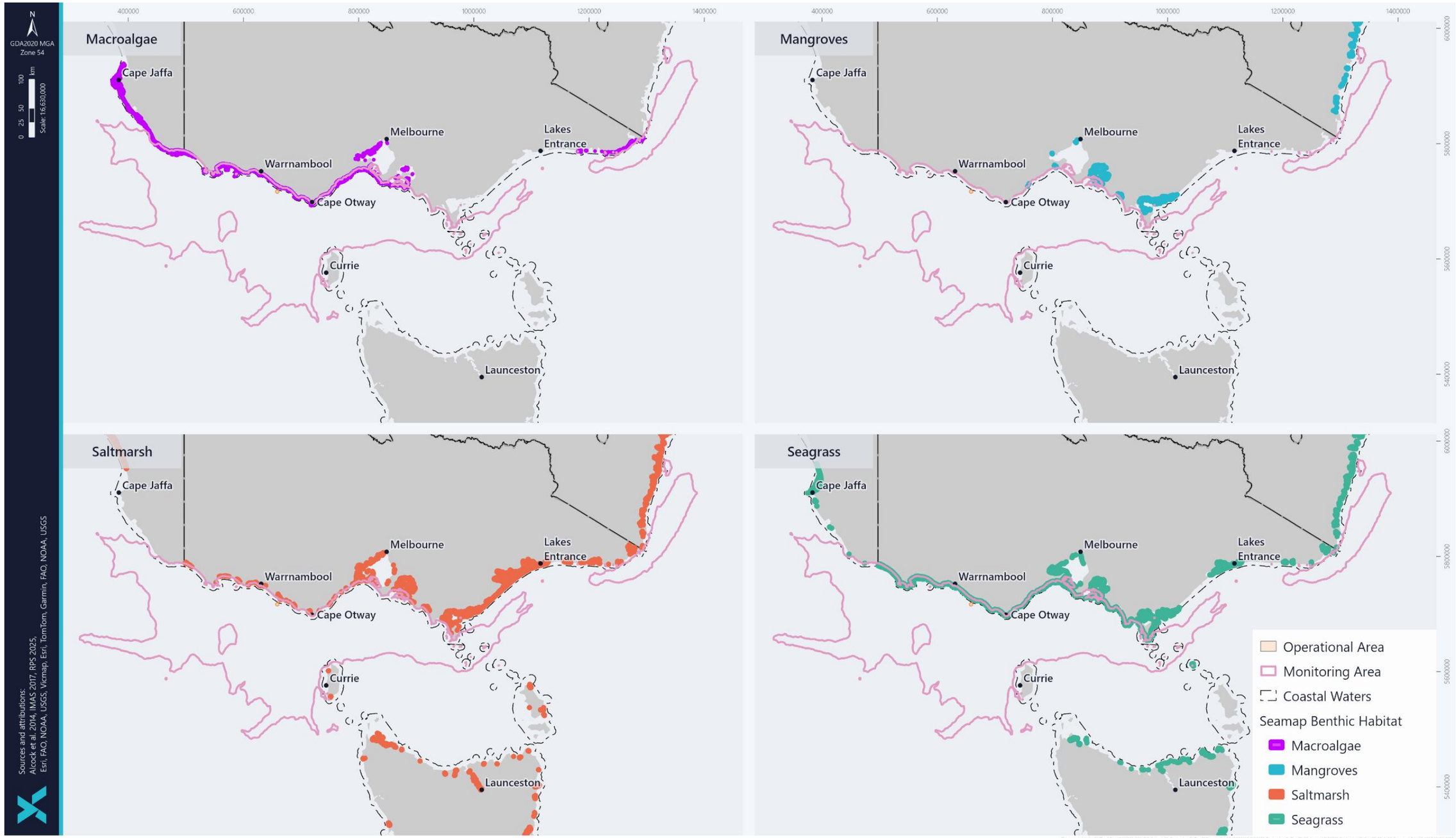


Figure 4-6: Benthic Habitats Within the Monitoring Area

4.4.2 Ecological Receptors

Table 4-4: Presence of Ecological Receptors within the Operational Area and Monitoring Area

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
Benthic Assemblages	Intertidal environment (0-2m)	Comprises rock platform, cliff face and sandy beach	• Foraging habitat • Nesting or Breeding habitat	-	Not present The operational area does not include the intertidal environment.	✓	Present Intertidal environment comprises a sandy cove and tidally submerged rock platforms with invertebrate colonisation.
	Shallow environments (2-8m)	Comprises kelp reef, patchy sandy reefs and sand	• Foraging habitat • Nesting or Breeding habitat	-	Not present The operational area does not include the shallow environment.	✓	Present Shallow environment comprises kelp reef with hard substrate with numerous epifauna and fish associated. Tracts of open shallow reef and give way to sand characteristically devoid of significant epifauna. But with significant infauna communities.
	Mid-depth environment (8–20m)	Comprises Ecklonia-dominated reef and sand	• Foraging habitat • Nesting habitat	-	Not present The operational area does not include the mid-depth environment.	✓	Present Mid depth is relatively uniform through the region dominated by sand with intermittent reef patches.
	Deep environment (20-70m)	Comprises sponge-dominated reef and sand.	• Foraging habitat • Nesting or Breeding habitat	✓	Present Much of the offshore seabed is comprised of hard platform substrates with some patches of thin overlying sand and rubble/calcarenite fragments. The patchy epifauna and presence of hard platform is consistent with the description of a KEF of the South-East bioregion, that is, shelf rocky reefs and hard substrates.	✓	Present Rocky reefs and hard grounds are located in all areas of the south-east marine region continental shelf including Bass Strait, from the sub-tidal zone shore to the continental shelf break. The continental shelf break generally occurs in 50 m to 150–220 m water depth. The shallowest depth at which the rocky reefs occur in Commonwealth waters is approximately 50 m. On the continental shelf, rocky reefs and hard grounds provide attachment sites for macroalgae and sessile

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
					During seabed surveys in proximity to CHN, epifauna was also noted to occur on unconsolidated substrates (sand and gravel) and amongst biogenic rubble. Sponges were also present, forming part of the patchy epifauna (Fugro 2020; 2020a).		invertebrates, increasing the structural diversity of shelf ecosystems. The reefs provide habitat and shelter for fish and are important for aggregations of biodiversity and enhanced productivity (DoE 2015b).
Coastal Habitats	Rocky Shoreline	Hard and soft, rocky shores, including bedrock outcrops, platforms, low cliffs (<5 m), and scarps.	• Depending on exposure, rocky shores can be host to a diverse range of flora and fauna, including barnacles, mussels, sea anemones, sponges, sea snails, starfish and algae.	-	Not present The operational area does not include rocky shorelines.	✓	Present The following areas along the Victorian coastline have known stretches of rocky shore: • The Cape Nelson to Portland coastline. • The section of coast between Warrnambool and Cape Otway (covering a distance of ~100 km). • Intertidal rocky shores stretch east to Marengo. • Interspersed areas between Marengo east to Anglesea.
	Sandy Beaches	Sandy beaches are dynamic environments, naturally fluctuating in response to external forcing factors (e.g. waves, currents etc).	• Sandy beaches can support a variety of infauna and provide nesting habitat to birds and turtles.	-	Not present The operational area does not include sandy beaches.	✓	Present The following areas along the Victorian coastline have known stretches of sandy beach: • Portland to Port Fairy. • Port Fairy to Lady Bay (Warrnambool) coastline. • Small sections of sandy beach between Warrnambool and Cape Otway. • Marengo east to Anglesea.
	Mangroves	Mangroves grow in intertidal mud and sand, with	• Provide for gas exchange during low tide	-	Not present The operational area does not include mangroves.	✓	Present The mangroves in Victoria are the most southerly extent of mangroves found in the world and are located mostly along sheltered sections of the coast

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
		specially adapted aerial roots.	• Important in helping stabilise coastal sediments. • Provide a nursery ground for many species of fish and crustaceans. • Provide shelter or nesting areas for seabirds				within inlets or bays, including Western Port Bay and Corner Inlet (MESA, 2015). There is only one species of mangrove found in Victoria, the white or grey mangrove (*Avicennia marina*) (Figure 4-6).
	Coastal Saltmarsh	Saltmarshes are terrestrial halophytic (salt-adapted) ecosystems that mostly occur in the upper-intertidal zone and are widespread along the coast. Saltmarshes are typically dominated by dense stands of halophytic plants such as herbs, grasses and low shrubs.	• The vegetation in these environments is essential to the stability of the saltmarsh, as they trap and bind sediments. • Provide a habitat for a wide range of both marine and terrestrial fauna, including infauna and epifaunal invertebrates, fish and birds.	-	Not present The operational area does not include coastal saltmarsh.	✓	Present Saltmarsh is found along many parts of the Victorian coast, although is most extensive in western Port Phillip Bay, northern Western Port, within the Corner Inlet-Nooramunga complex which, and behind the sand dunes of Ninety Mile Beach in Gippsland (Figure 4-6)..

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
Marine Fauna	Plankton	Phytoplankton and zooplankton	• Food Source	✓	Present Phytoplankton and zooplankton are widespread throughout oceanic environments and are expected to occur within the operational area. Populations near the operational area are expected to be highly variable both spatially and temporally and are likely to comprise characteristics of tropical, southern Australian, central Bass Strait and Tasman Sea populations.	✓	Present Phytoplankton and zooplankton are widespread throughout oceanic environments and is expected to occur within the monitoring area with a high level of diversity. Coastal krill swarms throughout the water column of continental shelf waters primarily in summer and autumn, feeding on microalgae and providing an important link in the blue whale food chain. Increased abundance and productivity can occur in areas of upwelling. The seasonal Bonney Coast upwelling contributes to locally productive pelagic habitats that exhibit a range of zooplankton. Plankton distribution is dependent upon prevailing ocean currents including the East Australia Current, flows into and from Bass Strait and Southern Ocean water masses.
	Marine Invertebrates	Benthic and pelagic invertebrate communities	• Food Source • Commercial Species	✓	Present Invertebrate species located in the vicinity of the operational area include sponges, annelids, ascidians, hydrozoans, bryozoans, molluscs, krill and crustaceans.	✓	Present A variety of marine invertebrate species may occur within the monitoring area with high diversity with patchy distribution. Invertebrate diversity is high in southern Australian waters with distribution of species patchy, with little evidence of any distinct biogeographic regions.
	Fish	Fish, rays and sharks	• EPBC Act protected species	✓	Present Thirty-two fish shark species are listed as having the potential to occur within the operational area on the EPBC Act PMST (26 of which are pipefish, pipehorses, seadragons or seahorses).	✓	Present Species present in the monitoring area are largely cool temperate species, common within the South Eastern Marine Region. Fifty-four fish, ray and shark species are listed as having the potential to occur within the monitoring

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Monitoring area
				Vulnerable species: • Australian grayling • White shark Conservation Dependent species that may be present within the operational area include: • Blue warehou • Eastern school shark Migratory species: • Grey Nurse Shark • Porbeagle • White shark BIA (DCCEEW 2024a) There are no BIAs or Habitat Critical areas identified for EPBC Act listed fish within the operational area	area on the EPBC Act PMST (36 of which are pipefish, pipehorses and seahorses).Critically Endangered • Grey Nurse Shark Endangered • Eastern dwarf galaxias Vulnerable • Australian grayling • Black rockcod • Variegated pygmy perch • Whale shark • White shark Conservation Dependant • Blue warehou • Eastern gemfish • Eastern school shark • Harrisson's dogfish • Little gulper shark • Orange roughy Migratory species: • Giant manta ray • Grey nurse shark • Oceanic whitetip shark • Porbeagle • Shortfin mako • Whale shark • White shark

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
							BIA (DCCEEW 2024a) (Figure 4-7) • White shark (breeding and foraging) • Grey nurse shark (migration and foraging)
	Avifauna	Birds that live or frequent the coast or ocean	• EPBC Act protected species	✓	Present There are 32 threatened, migratory or listed marine species that may occur within the operational area that are protected under the EPBC Act. <u>Critically Endangered</u> • Eastern curlew • Curlew sandpiper • Orange-bellied parrot* <u>Endangered</u> • Grey-headed albatross • Southern giant-petrel • Northern royal albatross • Shy albatross • Gould's petrel <u>BIA (DCCEEW 2024a)</u> The operational area intersects 9 seabird foraging BIAs (Figure 4-8 to Figure 4-14): • Wedge-tailed shearwater • Wandering albatross • Antipodean albatross • Common diving-petrel • Bullers albatross	✓	Present 114 EPBC Act listed bird species which inhabit coastal or marine habitats may occur within the monitoring area. Of these species, 57 EPBC Act listed threatened bird species may occur within the monitoring area. <u>Critically endangered</u> • Curlew sandpiper • Eastern curlew • Orange-bellied parrot • Swift parrot <u>Endangered species</u> • Australasian Bittern • Australian Painted Snipe • Black-tailed Godwit • Chatham Albatross • Common Greenshank, Greenshank • Gould's Petrel, Australian Gould's Petrel • Grey-headed Albatross • Lesser Sand Plover, Mongolian Plover • Northern Royal Albatross • Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit
			• Biologically Important Areas (BIAs)	✓		✓	
			• Iconic species	✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Monitoring area
				• Shy albatross • Indian Yellow-nosed albatross • Black-browed albatross • Campbell albatross BIAs are displayed in Figure 4-8 to Figure 4-14.	• Shy Albatross • Southern Giant-Petrel, Southern Giant Petrel • Tasmanian Wedge-tailed Eagle, Wedge-tailed Eagle (Tasmanian) <u>Vulnerable</u> • Antipodean Albatross • Australian Fairy Tern • Black Currawong (King Island) • Black-browed Albatross • Blue Petrel • Blue-winged Parrot • Brown Treecreeper (south-eastern) • Buller's Albatross, Pacific Albatross • Campbell Albatross, Campbell Black-browed Albatross • Diamond Firetail • Eastern Hooded Plover, Eastern Hooded Plover • Fairy Prion (southern) • Gibson's Albatross • Great Knot • Greater Sand Plover, Large Sand Plover • Green Rosella (King Island) • Grey Falcon • Grey Plover • Indian Yellow-nosed Albatross • Latham's Snipe, Japanese Snipe

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Monitoring area
					• Little Tern • Northern Buller's Albatross, Pacific Albatross • Northern Giant Petrel • Painted Honeyeater • Pilotbird • Red Knot, Knot • Ruddy Turnstone • Salvin's Albatross • Sharp-tailed Sandpiper • Soft-plumaged Petrel • Sooty Albatross • Sooty Shearwater • South-eastern Glossy Black-Cockatoo • Southern Royal Albatross • Southern Whiteface • Terek Sandpiper • Wandering Albatross • White-bellied Storm-Petrel (Tasman and Australasian) • White-capped Albatross • White-throated Needletail Migratory • Antipodean Albatross • Bar-tailed Godwit • Black-browed Albatross • Black-tailed Godwit

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Monitoring area
					• Broad-billed Sandpiper • Buller's Albatross, Pacific Albatross • Campbell Albatross, Campbell Black-browed Albatross • Caspian Tern • Chatham Albatross • Common Greenshank, Greenshank • Common Noddy • Common Sandpiper • Curlew Sandpiper • Double-banded Plover • Eastern Curlew, Far Eastern Curlew • Flesh-footed Shearwater, Fleshy-footed Shearwater • Fork-tailed Swift • Great Knot • Greater Crested Tern • Greater Sand Plover, Large Sand Plover • Grey Plover • Grey-headed Albatross • Grey-tailed Tattler • Indian Yellow-nosed Albatross • Latham's Snipe, Japanese Snipe • Lesser Sand Plover, Mongolian Plover • Little Curlew, Little Whimbrel • Little Tern

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Monitoring area
					• Marsh Sandpiper, Little Greenshank • Northern Giant Petrel • Northern Royal Albatross • Oriental Cuckoo, Horsfield's Cuckoo • Osprey • Pacific Golden Plover • Pectoral Sandpiper • Pin-tailed Snipe • Red Knot, Knot • Red-necked Phalarope • Red-necked Stint • Red-tailed Tropicbird • Ruddy Turnstone • Ruff • Salvin's Albatross • Sanderling • Sharp-tailed Sandpiper • Short-tailed Shearwater • Shy Albatross • Sooty Albatross • Sooty Shearwater • Southern Giant-Petrel, Southern Giant Petrel • Southern Royal Albatross • Swinhoe's Snipe • Terek Sandpiper • Wandering Albatross

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Monitoring area
					• Wandering Tattler • Wedge-tailed Shearwater • Whimbrel • White-capped Albatross • White-tailed Tropicbird • White-throated Needletail • Wood Sandpiper • Yellow Wagtail BIA (DCCEEW 2024a) (Figure 4-8 to Figure 4-14): • Antipodean Albatross (Foraging) • Australasian Gannet (Aggregation, Foraging) • Black Petrel (Foraging) • Black-browed Albatross (Foraging) • Bullers Albatross (Foraging) • Campbell Albatross (Foraging) • Common Diving Petrel (Foraging, Breeding) • Crested Tern (Foraging, Breeding) • Flesh-Footed Shearwater (Foraging) • Great-winged Petrel (Foraging) • Indian Yellow-nosed Albatross (Foraging) • Little Penguin (Foraging, Breeding) • Northern Giant Petrel (Foraging) • Short-tailed Shearwater (Breeding, Foraging) • Shy Albatross (Foraging likely) • Sooty Albatross (Foraging, Breeding) • Southern Giant Petrel (Foraging)

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
							• Wandering Albatross (Foraging) • Wedge-tailed Shearwater (Foraging) • White-capped Albatross (Foraging) • (White-faced Storm-petrel (Breeding, Foraging) • Wilsons Storm Petrel (Migration) <u>Iconic species</u> Several populations of the little penguin occur within Bass Strait, with nesting sites located on islands within Bass Strait and at various mainland shorelines. Penguin colonies known to occur in the southwest region of Victoria that are within the monitoring area include Deen Maar (Lady Julia Percy Island) (2,000 breeding pairs), Twelve Apostles-London Arch (1,000 breeding pairs), Middle Island (200 breeding pairs) and Merri Island (200 breeding pairs).
	Marine Reptiles	Turtles	• EPBC Act Protected Species • BIAs	✓	Present Three marine turtle species, all of which are listed migratory, and are likely to occur within the operational area: <u>Endangered</u> • Leatherback turtle • Loggerhead turtle <u>Vulnerable</u> • Green turtle <u>BIA (DCCEEW 2024a)</u> No BIAs or Habitat Critical areas are within the operational area.	✓	Present Five species of marine turtle listed as endangered under the EPBC Act may occur within the monitoring area: <u>Endangered</u> • Leatherback turtle • Loggerhead turtle <u>Vulnerable</u> • Flatback turtle • Green turtle • Hawksbill turtle <u>BIA (DCCEEW 2024a)</u>

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
							There are no BIAs or Habitat Critical areas identified for EPBC Act listed turtles within the monitoring area.
	Marine Mammals	Seals and Sealions (Pinnipeds)	• EPBC Act Protected Species	✓	Present Marine • Australian fur-seal • New Zealand fur-seal Important colonies and breeding habitat in proximity to the operational area are displayed in Figure 4-15. BIAs (DCCEEW 2024a) No BIAs or biological important behaviours were identified within the operational area.	✓	Present Three pinniped species (or species habitat) may occur within the monitoring area. Endangered • Australian Sea-lion Marine • Australian Fur-seal • New Zealand fur seal BIA (DCCEEW 2024a) (Figure 4-15) • Australian sea lion (Foraging (male).
		Cetaceans – whales and dolphins	• EPBC Act Protected Species	✓	Present Thirteen cetacean species (7 whales, 6 dolphins) are listed under the EPBC Act PMST as possibly occurring within the operational area. Four whale species are threatened: Endangered • Blue whale • Southern right whale Vulnerable • Fin whale • Sei whale Migratory • Blue Whale	✓	Present Thirty-three cetacean species are listed under the EPBC Act PMST as possibly occurring within the monitoring area. Four whale species are threatened. Endangered Species • Blue whale • Southern right whale Vulnerable Species • Fin whale • Sei whale Migratory • Antarctic Minke Whale, Dark-shoulder Minke Whale • Blue Whale
			• BIA	✓		✓	

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Monitoring area
				• Dusky Dolphin • Fin Whale • Humpback Whale • Killer Whale, Orca • Pygmy Right Whale • Sei Whale • Southern Right Whale Cetacean • Bottlenose Dolphin • Common Dolphin, Short-beaked Common Dolphin • Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin • Minke Whale • Risso's Dolphin, Grampus BIA (DCCEEW 2024a) (Figure 4-16) • Pygmy blue whale (foraging annual high use area) • Southern right whale (migration)	• Bryde's Whale • Dusky Dolphin • Fin Whale • Humpback Whale • Killer Whale, Orca • Pygmy Right Whale • Sei Whale • Southern Right Whale • Sperm Whale Cetacean • Andrew's Beaked Whale • Arnoux's Beaked Whale • Blainville's Beaked Whale, Dense-beaked Whale • Bottlenose Dolphin • Common Dolphin, Short-beaked Common Dolphin • Cuvier's Beaked Whale, Goose-beaked Whale • Dwarf Sperm Whale • False Killer Whale • Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale • Gray's Beaked Whale, Scamperdown Whale • Hector's Beaked Whale • Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin • Long-finned Pilot Whale • Minke Whale

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
							• Pygmy Sperm Whale • Risso's Dolphin, Grampus • Shepherd's Beaked Whale, Tasman Beaked Whale • Short-finned Pilot Whale • Southern Bottlenose Whale • Southern Right Whale Dolphin • Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale True's Beaked Whale BIA (DCCEEW 2024a) (Figure 4-16) The monitoring area intersects: • Humpback whale (Migration (north and south)) • Indo-Pacific / spotted bottlenose dolphin (Breeding) • Pygmy blue whale (Foraging (annual high use area)) • Southern right whale (Migration, Reproduction) Habitat Critical The National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) identifies all reproductive BIAs are habitat critical to the survival of the species as across the species range. The monitoring area intersects with this a reproduction BIA which is indicated as critical habitat (DCCEEW 2024b). Detailed existing environment descriptions of whales within the monitoring area are described in Appendix 4 - .

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring area	
Invasive Species	Marine Pests	Established and Exotic	• Introduced marine species (IMS)	✓	Not identified Marine pests have not been identified within the operational area to date, though the potential exists for marine pests to establish through natural and anthropogenic influences.	✓	Present In the South-east Marine Region, 115 marine species are known to be introduced, and an additional 84 are considered to be possible introductions or 'cryptogenic' species. Eleven species are considered to be invasive marine species (IMS). Key known pest species in the South-East Marine Region include: • Northern pacific sea star (*Asterias amurensis*). • Fan worms (*Sabella spallanzannii* and *Euchone sp*). • Bivalves (*Crassostrea gigas* (Pacific oyster), *Corbula gibba* and *Theora fragilis*). • Crabs (*Carcinus maenas* (European shore crab) and *Pyromaiatuberculata*). • Macroalgae (*Undaria pinnatifida* (Japanese giant kelp) and Codium fragile (*ssp.tormentosoides*); and • The introduced NZ screw shell (*Maoricolpus roseus*), known to form extensive and dense beds on the sandy sea-floor in eastern Bass Strait spreading to the 80 m depth contour off eastern Victoria and NSW (Patil *et al.* 2004).
	Marine Viruses	Infection agent found in marine environments	• Introduced virus species	✓	Present Marine viruses within the operational area are anticipated to reflect the conditions of the south-east marine region.	✓	Present *Abalone Viral Ganglioneuritis* (AVG), has been detected in southwest Victoria and was confirmed as far east as White Cliffs near Johanna, and west as far as Discovery Bay Marine Park (DAFF 2024). More recently in May 2021 wild abalone off the coast of Cape Nelson tested positive to AVG (CSIRO 2021).

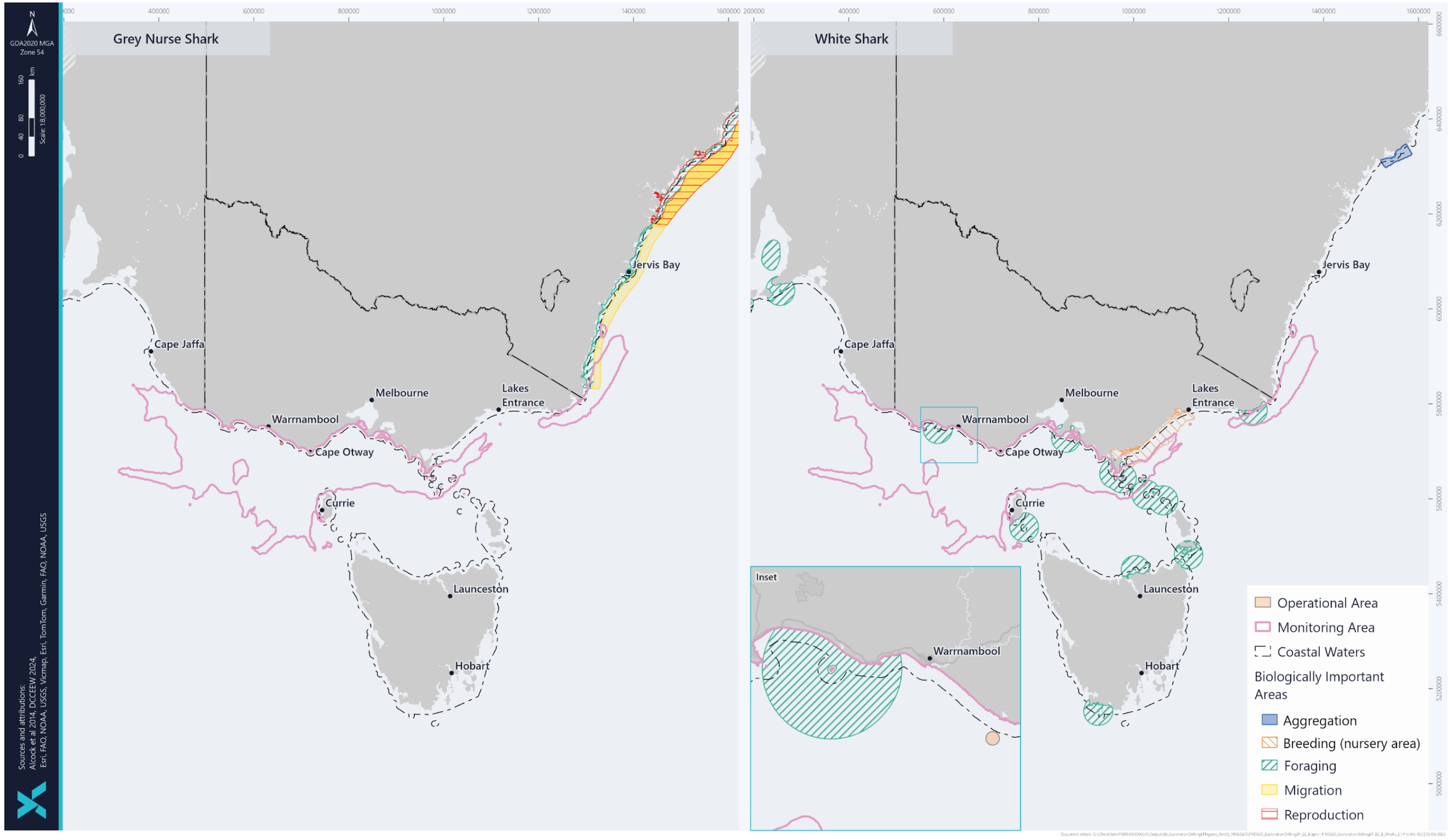


Figure 4-7: Grey Nurse Shark and White Shark BIAs Within the Monitoring Area

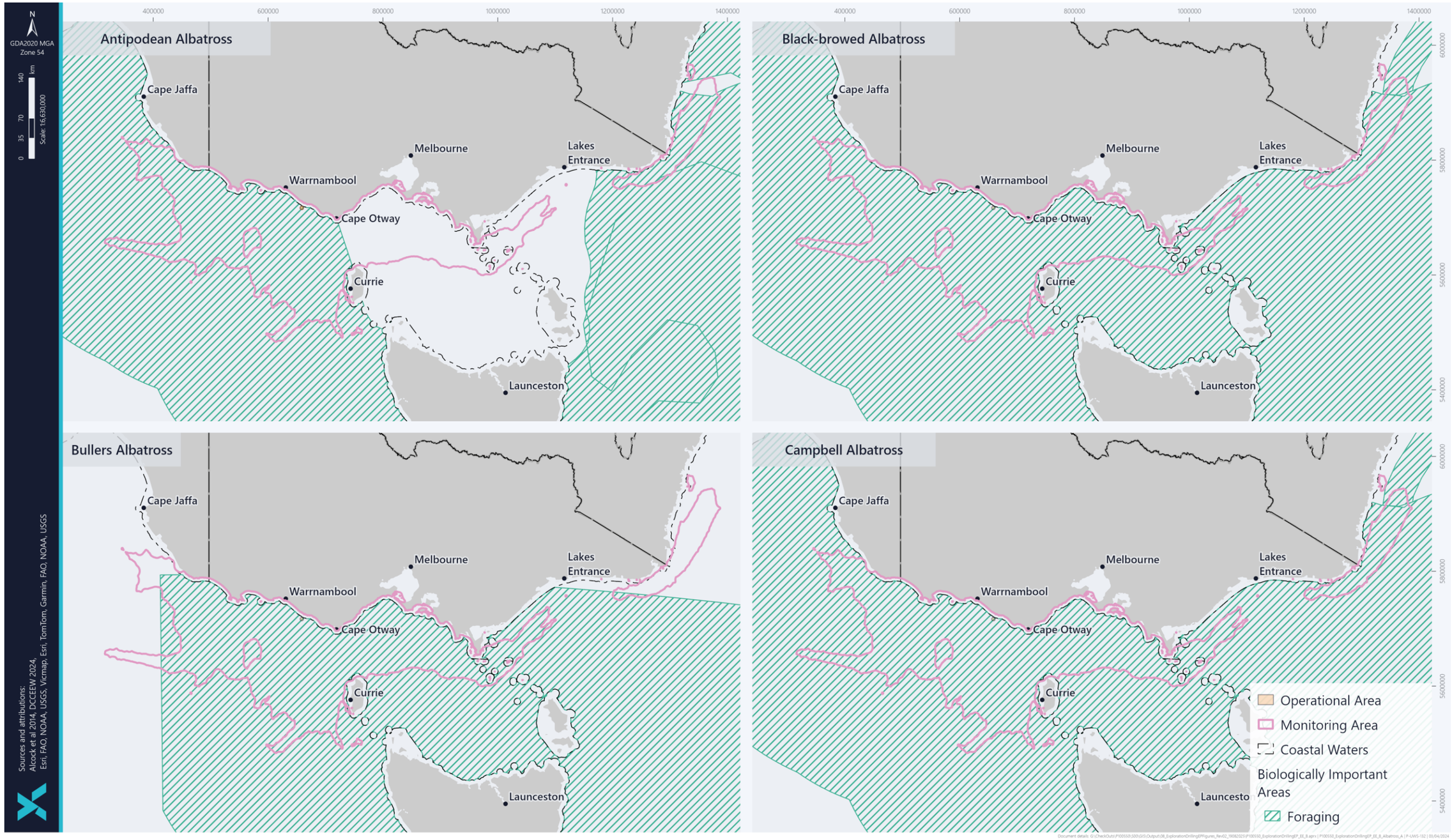


Figure 4-8: Antipodean Albatross, Black-browed Albatross, Bullers Albatross, and Campbell Albatross BIAs Within the Monitoring Area

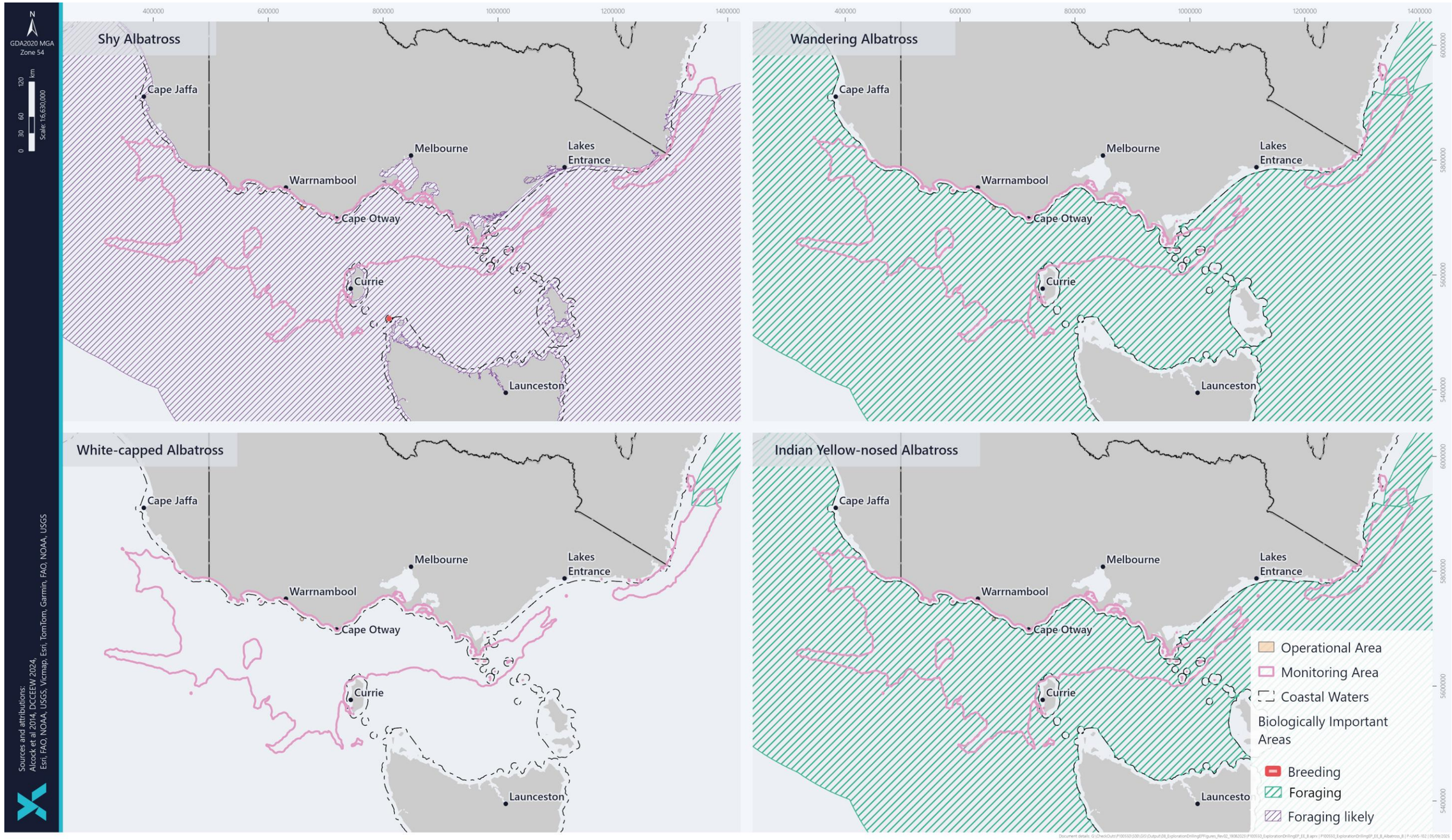


Figure 4-9: Shy Albatross, Wandering Albatross, and White-capped Albatross BIAs Within the Monitoring Area

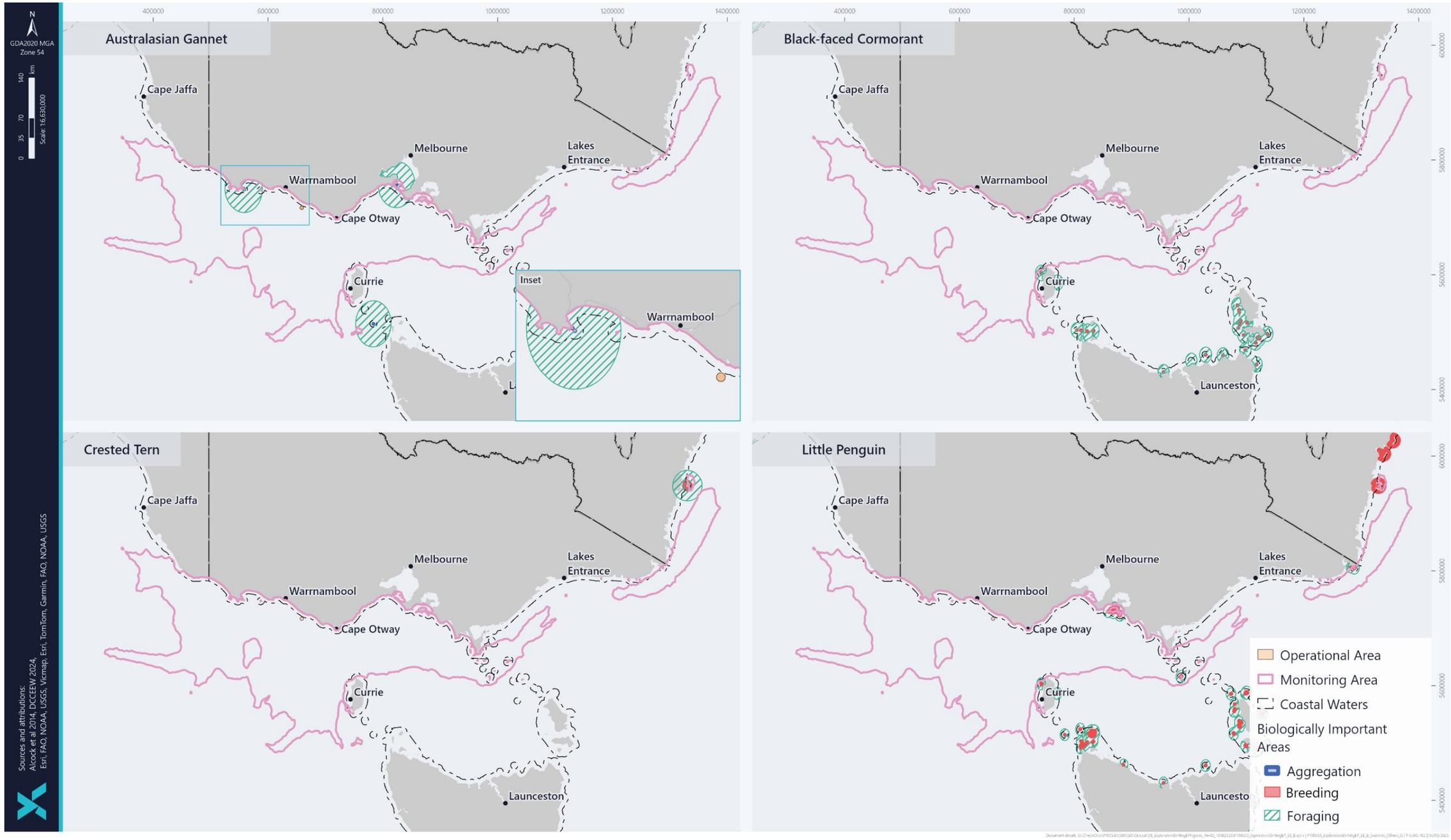


Figure 4-10: Australian Gannet, Black-faced Cormorant, Crested Tern, and Little Penguin BIAs Within the Monitoring Area

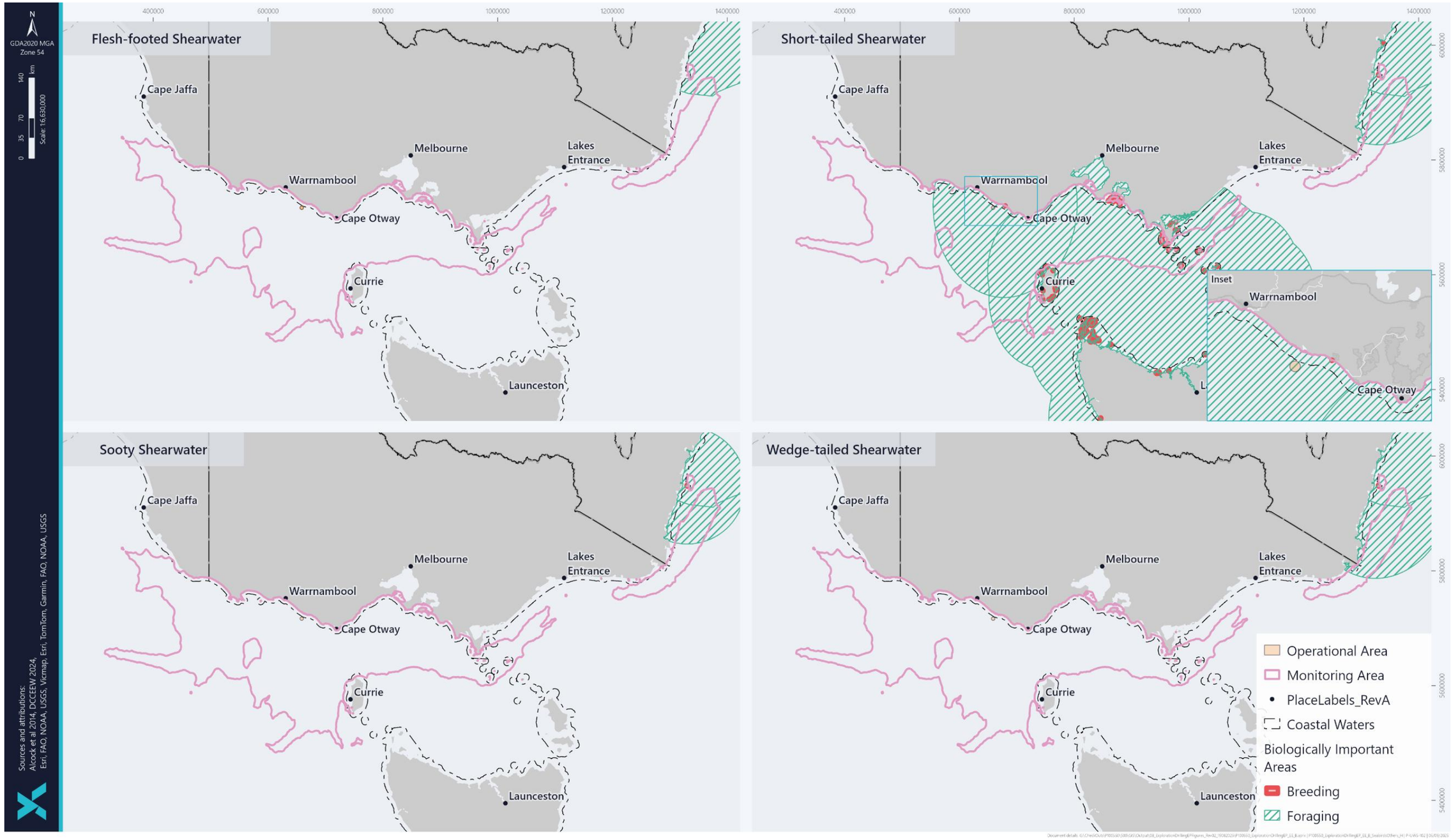


Figure 4-11: Flesh-footed Shearwater, Short-tailed Shearwater, Sooty Shearwater, and Wedge-tailed Shearwater BIAs Within the Monitoring Area

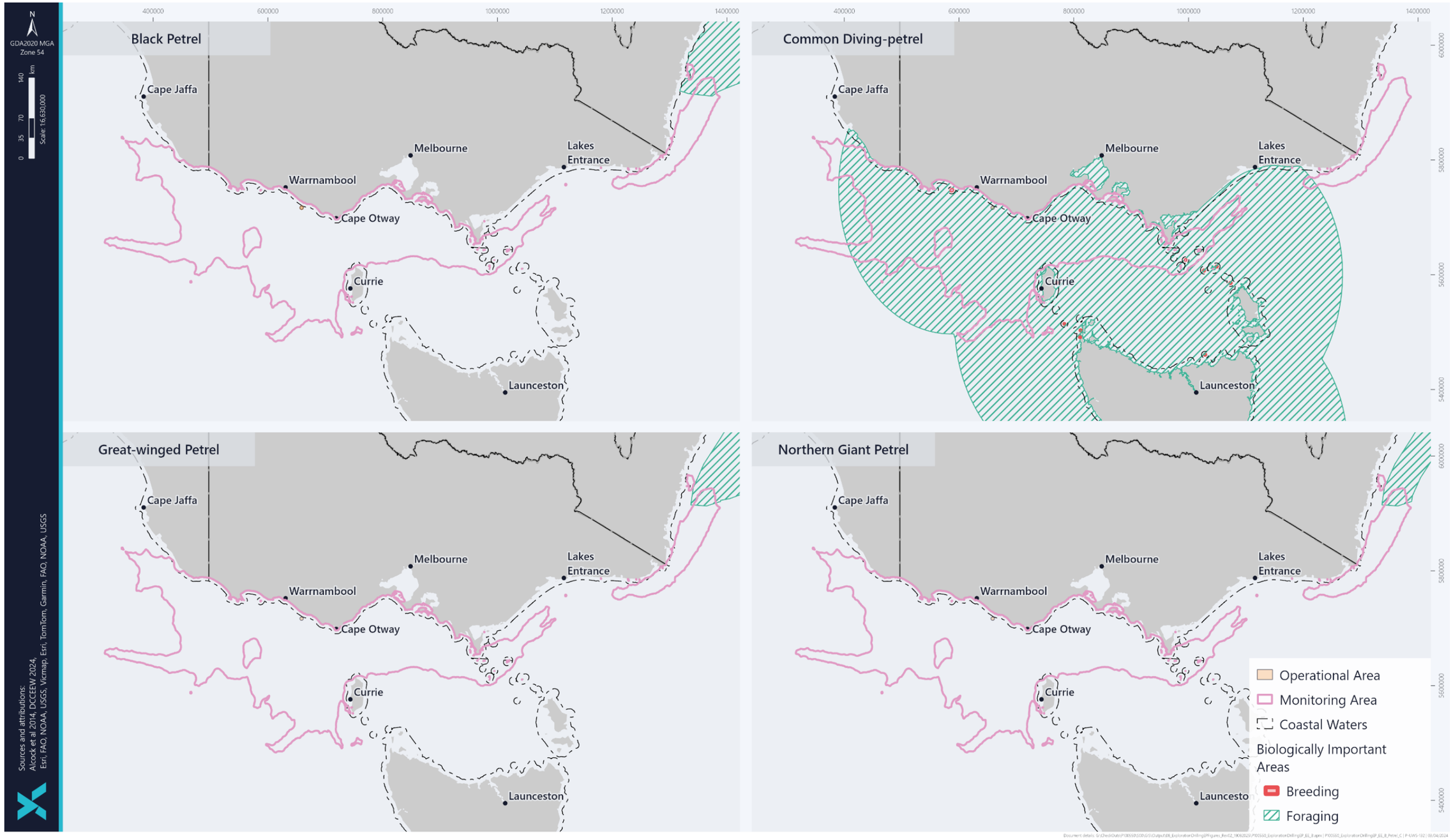


Figure 4-12: Black Petrel, Common Diving-Petrel, Great-winged Petrel, and Northern Giant Petrel BIAs Within the Monitoring Area



Figure 4-13: Southern Giant Petrel, White-faced Storm-petrel, and Wilsons Storm Petrel BIAs Within the Monitoring Area

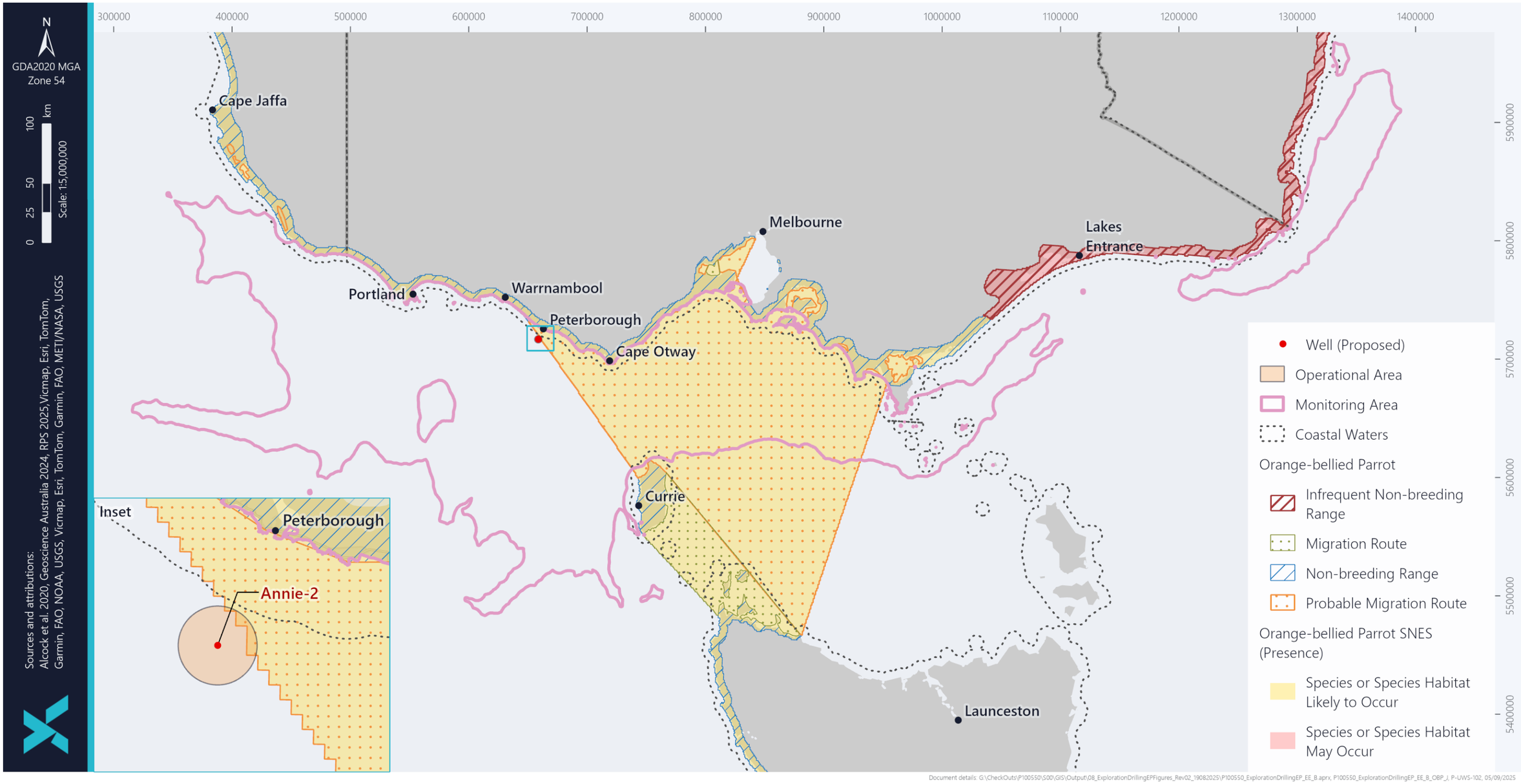


Figure 4-14: Orange-bellied Parrot Presence Within the Monitoring Area



Figure 4-15: Australian Sea Lion BIAs Within the Monitoring Area

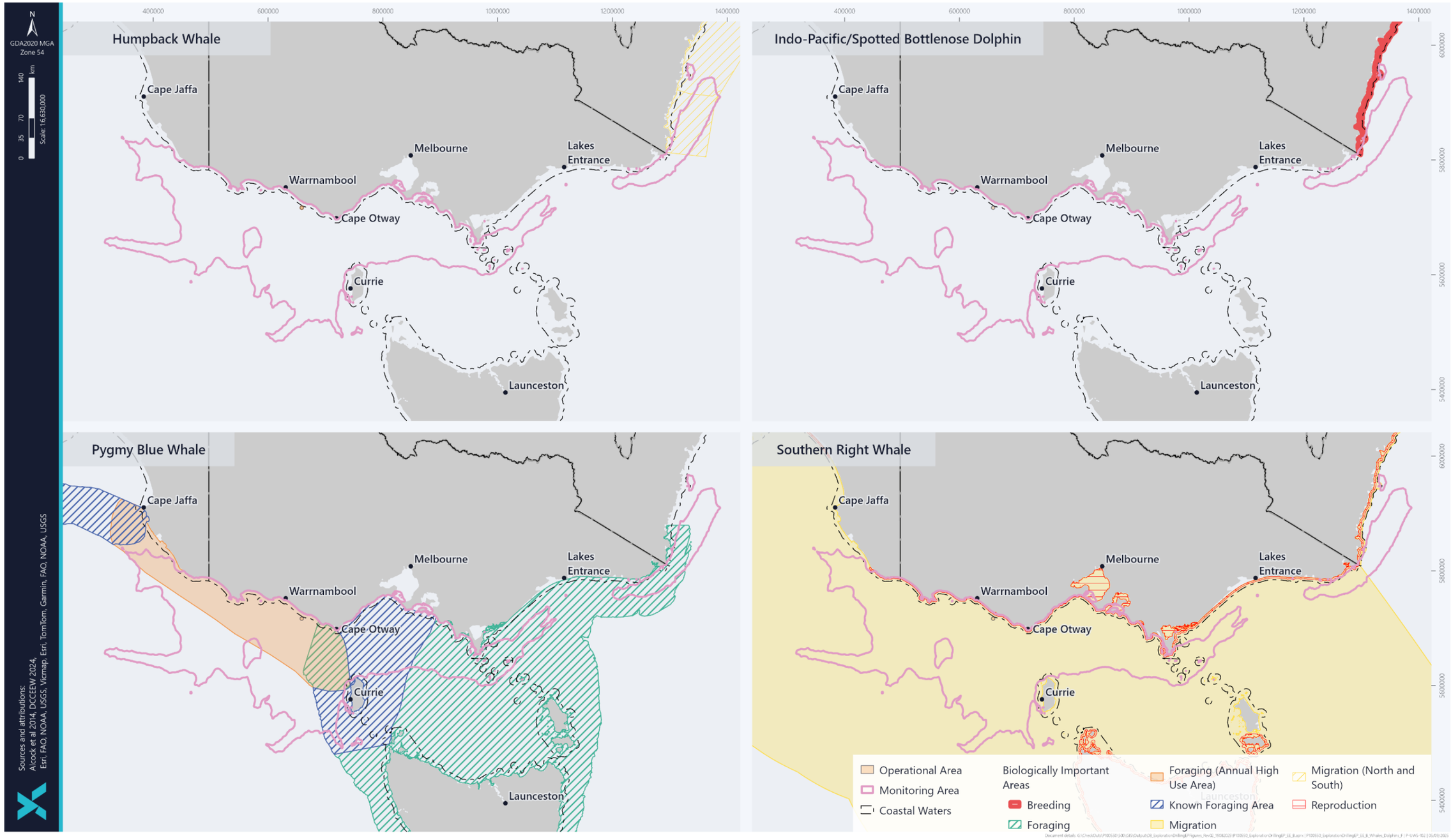


Figure 4-16: Humpback Whale, Indo-Pacific/ Spotted Bottlenose Dolphine, Pygmy Blue Whale, and Southern Right Whale BIAs Within the Monitoring Area

4.4.3 Social Receptors

Table 4-5: Presence of Social Receptors within the Operational Area and Monitoring Area

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
Socio-ecological Systems	Commonwealth Marine Area	KEF	• High productivity (includes episodic productivity) • Aggregations of marine life • High biodiversity • High level of endemism • Unique Habitat	✓	Present The operational area does not intersect with any delineated KEFs (Figure 4-17). Shelf rocky reef and hard grounds are located in all areas of the south-east marine region on the continental shelf, including the operational area (DCCEEW, 2015b).	✓	Present Five Key Ecological Features are intersected by the monitoring area (DCCEEW, 2015b) (Figure 4-17): • Bonney Upwelling KEF • Canyons on the eastern continental slope • Shelf rocky reefs (temperate east marine region) • Upwelling East of Eden • West Tasmanian Canyons KEF Shelf Rocky reefs and hard substrates of the south-east marine region is not a spatially defined KEF. Although, this KEF is known to be well represented within the southeast marine region, on the continental shelf.
		Australian Marine Parks	• Aggregations of marine life • High productivity and biodiversity • Unique habitat	-	Not Present The operational area does not intersect any Australian Marine Parks (Director of National Parks, 2025).	✓	Present Four Australian Marine Parks are intersected by the monitoring area (Director of National Parks, 2025) (Figure 4-18) is: • Apollo AMP (IUCN category (VI), Multiple Use Zone (VI)). • Beagle AMP (IUCN category (VI), Multiple use (VI), National Park Zone (II)).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							• Nelson AMP (IUCN category (II), National Park Zone (II)). • Zeehan AMP (IUCN category (II), Multiple Use Zone (VI), Special purpose (VI). National Park Zone II)).
	Commonwealth Area	Threatened Ecological Communities (TEC)	Support ecosystem services Provide habitat Community at risk of extinction	-	Not Present The operational area does not intersect any TEC (DCCEEW, 2016).	✓	Present Fifteen TECs are likely or may occur within the monitoring area. Eleven of these TECs have coastal areas (DCCEEW, 2016) (Figure 4-19): • Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community (Endangered). • Brogo Vine Forest of the South East Corner Bioregion (Endangered) • Coastal swamp oak (*Casuarina glauca*) forest of New South Wales and south east Queensland ecological community (Endangered) • Giant kelp marine forests of South East Australia (Endangered). • Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Critically Endangered) • Illawarra and south coast lowland forest and woodland ecological community (Critically Endangered)

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							• Karst springs and associated alkaline fens of the Naracoorte coastal plain bioregion (Endangered) • Lowland Grassy Woodland in the South East Corner Bioregion (Critically Endangered) • Natural Damp Grassland of the Victorian Coastal Plains (Critically Endangered) • Natural Temperate Grassland of the Victorian Volcanic Plain (Critically Endangered) • River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Critically Endangered) • Subtropical and Temperate Coastal Saltmarsh (Vulnerable). • Tasmanian Forests and Woodlands dominated by black gum or Brookers gum (*Eucalyptus ovata / E. brookeriana*) (Critically Endangered) • Tasmanian white gum (*Eucalyptus viminalis*) wet forest (Critically Endangered) • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered)
	State Parks and Reserves	Marine Protected Areas	Aggregations of marine life High productivity Biodiversity	-	Not Present The operational area does not intersect any State protected marine areas (DCCEEW, 2025e).	✓	Present Twenty-six state marine protected areas (DCCEEW, 2025e) are located within the monitoring area including:

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							• 9 Victorian Marine National Parks – Bunurong – Cape Howe – Churchill Island – Discovery Bay – Point Addis – Point Hicks – Port Phillip Heads – Twelve Apostles – Wilsons Promontory • 8 Victorian Marine Sanctuaries – Barwon Bluff – Beware Reef – Eagle Rock – Marengo Reefs – Merri – Mushroom Reef – Point Danger – The Arches • 3 Victorian NPS4 – Wilsons Promontory Marine Park – Wilsons Promontory Marine Reserve – Bunurong Marine Park • 1 Tasmanian National Park

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							– Kent Group • 1 South Australian Marine Parks – Lower South East • 1 NSW Marine Park – Batemans.
		Terrestrial Protected Areas	Aggregations of terrestrial life High productivity Biodiversity	-	Not present The operational area does not intersect any State protected terrestrial areas (DCCEEW, 2025e).	✓	Present State Terrestrial Protected Areas with marine or coastal interface (DCCEEW, 2025e) are located within the monitoring area (Figure 4-20) including: • 4 Victorian Conservation Parks – Bay of Islands Coastal Park – Cape Conran Coastal Park – Cape Liptrap Coastal Park – Discovery Bay Coastal Park • 2 Victorian Heritage Rivers – Glenelg River – Aire River • 9 Victorian National Parks – Croajingolong – French Island – Great Otway – Lower Glenelg – Mornington Peninsula – Mount Richmond

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							– Point Nepean – Port Campbell – Wilsons Promontory • 16 Victorian Natural Features Reserve – Aire River W.R. – Aireys Inlet B.R. – Anglesea B.R. – Cape Patterson N.C.R – Edna Bowman N.C.R. – Kilcunda N.C.R. – Lake Connewarre W.R – Lake Gillear W.R – Lily Pond B.R. – Portland H47 B.R. – Princetown W.R – Queenscliff N.F.R – Reef Island and Bass River Mouth N.C.R – Ventnor B.R. – Wild Dog Creek SS.R. – Wonthaggi Heathlands N.C.R • 9 Victorian Nature Conservation Reserve – Breamlea F.F.R. – Lady Julia Percy Island W.R. – Lawrence Rocks W.R.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							– Lonsdale Lakes W.R – Marengo N.C.R. – Seal Islands W.R. – Swan Bay - Edwards Point W.R – Tyrendarra F.R – Yambuk F.F.R.1 Victorian Nature Park • 3 Private Nature Reserves and Other – Phillip Island Nature Park – Unnamed C0293 – Unnamed P0176 • 2 Victorian Reference Area – Anser Island – Stony Creek (Otways) • 3 Victorian Remote and Natural Areas NPS6 – Rame Head – Southern Wilsons Promontory – Wilson Promontory Islands • 1 Victorian State Park – Cape Nelson • 1 Victorian Wilderness Zone – Cape Howe • 8 Tasmanian Conservation Areas – Cape Wickham – Cataraqui Point

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							– Cone Islet – East Moncoeur Island – Hogan Group – Seal Rocks – Stokes Point – Sugarloaf Rock • 5 Tasmanian Nature Reserves – Curtis Island – Devils Tower – North East Islet – Rodondo Island – West Moncoeur Island • 3 South Australian Conservation Parks – Douglas Point – Nene Valley – Piccaninnie Ponds • 2 Heritage agreements – Unnamed (No.HA1404) – Unnamed (No.HA1457) • 2 New South Wales Nature Reserves – Barunguba Montague Island – Nadgee • 1 New South Wales National Park – Beowa

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
	Wetlands of International Importance	Ramsar wetlands (International Importance)	Aggregation, foraging and nursery habitat for marine life	-	Not present The operational area does not intersect any Wetlands of International Importance (DCCEEW, 2024q).	✓	Present There are 5 Wetlands of International Importance with marine or coastal interface (DCCEEW, 2024q) within the monitoring area (Figure 4-21), including: • Corner Inlet • Glenelg Estuary and Discovery Bay Wetlands • Port Phillip Bay (Western Shoreline) and Bellarine Peninsula • Piccaninnie Ponds Karst Wetlands • Western Port
	Wetlands of National Importance	Nationally Important Wetlands	Aggregation, foraging and nursery habitat for marine life	-	Not present The operational area does not intersect any Nationally Important Wetlands.	✓	Present Nationally Important Wetlands with marine or coastal interface were identified in the PMST to be located within the monitoring area (Figure 4-21), including: • 16 Victorian Nationally Important Wetlands: – Aire River – Anderson Inlet – Corner Inlet – – Glenelg Estuary – Glenelg River – Lake Connewarre State Wildlife Reserve – Lower Aire River Wetlands

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							– Lower Merri River Wetlands – Mallacoota Inlet Wetlands – Mud Islands – Powlett River Mouth – Princetown Wetlands – – Shallow Inlet Marine & Coastal Park – Swan Bay & Swan Island – Western Port – Yambuk Wetlands • One South Australian Nationally Important Wetlands: – Piccaninnie Ponds • 1 NSW Nationally Important Wetland – Nadgee Lake and tributary wetlands – • 4 Tasmanian Nationally Important Wetlands: – Pearshape Lagoon 1 – Pearshape Lagoon 2 – Pearshape Lagoon 3 – Pearshape Lagoon 4
	Heritage	Underwater Heritage (wrecks and aircraft)	Historic significance	-	Not present	✓	Present

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
					The operational area does not intersect any known historic shipwrecks or aircraft.		There are a large number of shipwrecks within the monitoring area. Wrecks closest to the operational area (Figure 4-22), including: • Alfred ~0.04 km* from the operational area • Falls of Halladale ~6 km from the operational area. ** The position given for the wreck has been confirmed to be a search area centrepoint; these are provided when the location of a wreck is unknown (pers comm Heritage Victoria 2024). Written records further indicate the Alfred is likely closer to Warrnambool, and not relevant to the operational area of the Activity.* There are protected areas for fragile and significant historic shipwrecks in Victorian waters.
		World Heritage Properties Commonwealth Heritage Places National Heritage Places	Protection of environmental and cultural heritage.	-	Not Present There are no World Heritage Properties in the operational area (DCCEEW 2025f). There are no marine or coastal places on the Commonwealth Heritage list in the operational area (DCCEEW 2025g). There are no National Heritage Places in the operational area (DCCEEW 2025h).	✓	Present There are no World Heritage Properties in the monitoring area (DCCEEW 2025f). There are no e Commonwealth Heritage Places within the monitoring area (DCCEEW 2025g) (Figure 4-23), including: There are 2 listed National Heritage place within the monitoring area (DCCEEW 2025h) (Figure 4-24) including: • Great Ocean Road and Scenic Environments • Point Nepean Defence and Quarantine Station Area.

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
Socio-economic Systems	Commercial Fisheries	Commonwealth managed	Economic benefit Water quality	✓	Present The operational area intersects the management areas for 6 Commonwealth-managed fisheries (Figure 4-25 to Figure 4-28): • Eastern Tuna and Billfish Fishery • Eastern Skipjack Fishery • Small Pelagic (western sub-area) Fishery • Southern and Eastern Scalefish and Shark Fishery (SESSF) • Southern Bluefin Tuna Fishery • Southern Squid Jig Fishery However, possible activity around the operational area is expected for the SESS – Shark Gillnet sub-sector and likely activity in the Southern Jig Squid Fishery per comms Event ID 2025 0520 192039 1043, Appendix 8.	✓	Present The monitoring area intersects the management areas for 9 operating Commonwealth-managed fisheries (Figure 4-25 to Figure 4-28): • Bass Strait Central Zone Scallop Fishery • Eastern Skipjack Fishery • Eastern Tuna and Billfish Fishery • Small Pelagic Fishery • Southern and Eastern Scalefish and Shark Fishery (SESSF) (including sub-sectors) • Southern Bluefin Tuna Fishery • Southern Tuna and Billfish Fishery • Southern Squid Jig Fishery • Western Skipjack Fishery.
		State Managed – Victoria Tasmania South Australia New South Wales	Economic benefit Water quality	✓	Present Victorian fisheries are managed by DJSIR (Fisheries) and may overlap Commonwealth fisheries areas. The operational area intersects the management areas for the following 7 state-managed fisheries (Figure 4-29 to Figure 4-32), including: • Abalone	✓	Present Victorian fisheries are managed by DJSIR (Fisheries) and may overlap Commonwealth fisheries areas. The monitoring area intersect the management areas for the following 8 Victoria state-managed fisheries(Figure 4-29 to Figure 4-32), including:: • Abalone

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Monitoring Area
				• Giant crab • Multi-species Ocean • Octopus • Ocean scallop • Rock lobster • Wrasse However, likely or definite activity around the operational area is only expected for the southern rock lobster (Figure 4-30), giant crab (Figure 4-29), wrasse (Figure 4-30) and multi-species ocean (Figure 4-29).	• Giant crab • Inshore trawl • Ocean general • Octopus • Pipi • Ocean scallop • Rock lobster • Wrasse. Tasmanian fisheries are managed by NRE Tas and may overlap Commonwealth fisheries areas. The monitoring area i intersects the management areas for the following 5 Tasmanian state-managed fisheries (Figure 4-33 to Figure 4-36): • Abalone • Giant crab • Marine plant* • Rock lobster • Scalefish **Spatial data has been requested for this fishery. However, no spatial data is available or has been provided for this fishery at the time of this EP development (July, 2025).* South Australian fisheries are managed by DPIRD and may overlap Commonwealth fisheries areas. The monitoring area is likely to intersect the management areas for the

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							following 3 state-managed fisheries (Figure 4-37): • Charter Boat • Rock lobster • Scalefish NSW fisheries are managed by DPI NSW and may overlap Commonwealth fisheries areas. The monitoring area is likely to intersect the management areas for the following 9 NSW state-managed fisheries (Figure 4-38 to Figure 4-40): • Abalone • Estuary General • Lobster • Ocean Hauling • Ocean Trap and Line • Ocean Trawl • S37 Permit • Sea Urchin and Turban Shell • Southern Fish Trawl.
	Recreational Fisheries	State-managed	• Community • Recreation • Water quality	✓	Present Recreational fishing includes boat fishing, using rod and line. Game fishing can include additional equipment such as fighting belts, gimbals and outriggers (Game Fishing Association Australia 2025a).	✓	Present Recreational fishing includes rock, beach, boat and estuary fishing, using rod and line. Fishing licences are required for inland and ocean fishing. Charter fishing operations were confirmed to occur in the monitoring area including from Port

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area	Monitoring Area
				Common offshore fish species caught by recreational and game fishers include: • Mackerel • Tuna • Groper • Shark. Most recreational fishing typically occurs in nearshore coastal waters (DAFF, 2024) (shore or inshore vessels) and within bays and estuaries. Recreational fishing activity is expected to be minimal in the operational area. Deep dropline fishing occurs in water waters deeper than those found in the operational area e.g. over 250m (AFMA 2023).	Campbell, Apollo Bay and Warrnambool by VRFish consultation for the ECSP OPP. Common nearshore fish species caught by recreational fishers include: • Tiger flathead • Bream • Snapper • Australian Salmon • Lobster Fishing charter operators provide deeper water recreational fishing opportunities (such as tuna fishing). Game fishing occurs across the monitoring area from Port MacDonnell to Portland and Narooma (Game Fishing Association Australia 2025b), 15,287 recreational fishing trips left surveyed Victorian ramps in 2018 – 2019. 26% of these trips targeted Southern Bluefin Tuna. Portland accounted for 82% of the Southern Bluefin Tuna harvest. Five larger Southern Bluefin Tuna were caught from Port Campbell during this period (Institute for Marine and Antarctic Studies, University of Tasmania, 2020). Deep dropline fishing uses electric winches and heavy-duty rods. This fishing occurs within deeper waters e.g. over 250m with target species including (AFMA 2023): • Blue-eye trevalla

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							• Pink ling • Ribaldo • Ocean perch.
	Recreation and Tourism	Victoria	• Economic benefit • Community • Recreation • Water quality	✓	Not present Key activities include sight-seeing, surfing and fishing however, these are generally land-based or near-shore activities not within the deep offshore waters of the operational area.	✓	Present Key activities include sight-seeing, surfing, diving and snorkelling and fishing however, these are generally land-based or near-shore activities and are not impacted by the proposed exploration activities. The activity is located in an area adjacent the Otway coastline, which is located on the Great Ocean Road, a popular tourist drive.
	Coastal Settlements	Victoria	• Economic benefit • Community engagement • Recreation	✓	Not present The operational area does not include coastal and onshore environments. Peterborough is the nearest town to the operational area (Figure 4-41).	✓	Present The monitoring area runs along the Victorian coastline and parts of South Australia and NSW resulting in a large number of coastal settlements being located within the monitoring area. The communities of Princetown, Port Campbell, Peterborough, Warrnambool, Port Fairy and Portland are located closest to the proposed activities.
	Industry	Shipping	• Safe navigation	✓	Present The operational area is located at the northern extremity of areas with high traffic volumes. There are no designated shipping lanes in the vicinity of the operational area,	✓	Present The South-east Marine Region is one of the busiest shipping regions in Australia and Bass Strait is one of Australia's busiest shipping routes (Figure 4-42).

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
					however local commercial fishing vessels utilise the area (Figure 4-42).		
		Offshore Renewable Energies	• Economic benefit	✓	Present No declared areas overlap with the operational area (Figure 4-43). However one proposed offshore wind farm (Barwon OWF) overlaps with a portion of the operational area. This Activity is in the feasibility stages of development and has not yet been awarded a license.	✓	Present Two areas have been declared within the monitoring area as suitable for the development of offshore renewable energy (Figure 4-43): • Southern Ocean, Victoria - ~20 km west of the operational area • Gippsland, Victoria - ~290 km east of the operational area.
		Petroleum Production	• Economic benefit	✓	Present An Amplitude Energy operated gas and condensate pipeline crosses the operational area (Figure 4-44).	✓	Present A number of producing oil and gas wells occur within the monitoring area. Current operators with producing fields in the Otway Basin include Beach Energy (Otway Gas Field Development) and Amplitude Energy (CHN Development). Existing petroleum infrastructure within south-east Australia is displayed in Figure 4-44.
		Petroleum Exploration	• Economic benefit	✓	Present The operational area extends across the existing Petroleum exploration title VIC/P44.	✓	Present Numerous petroleum exploration activities, including seismic surveys and exploration drilling, have been undertaken in the permits of the Otway Basin. The most recent of which was Beach Energy's Artisan-1 exploration well (VIC/P43) in 2021 and Schlumberger Otway Basin 2D Marine Seismic Survey in 2020. Beach Energy production assets including subsea

Receptor Group	Receptor Type	Receptor Description	Values and Sensitivities	Operational Area		Monitoring Area	
							facilities at Geographe and Thylacine Platform are to the southeast of the Amplitude Energy facilities, with the Thylacine export pipeline to shore running parallel. Existing petroleum infrastructure within south-east Australia is displayed in Figure 4-44.
		Defence Activities	• Protection and surveillance	-	Not present There are no defence areas within the operational area.	✓	Present Many training areas, sea dumping sites and UXO sites are located within the monitoring area (Figure 4-45). A number of these are located in and around Port Phillip Bay and Western Port Bay.
	Other Offshore Infrastructure	Subsea Communication Cables	• Economic benefit	-	Not present There are no subsea communication cables within the operational area.	✓	Present Three subsea communications cables are located within the monitoring area (Figure 4-46): • Bass Strait-1 and Bass Strait-2 • Indigo Central • Basslink. • The East Coast cable and Hawaiki Nui have a landing in Melbourne and are expected to be installed by 2025.
		Desalination Plant	• Water quality	-	Not present There are no desalination plant water intakes within the operational area.	✓	Present Victorian Desalination Project water intake is 800 m offshore at approximately 15 m below the surface off Williamson's Beach Victoria, east of Western Port.

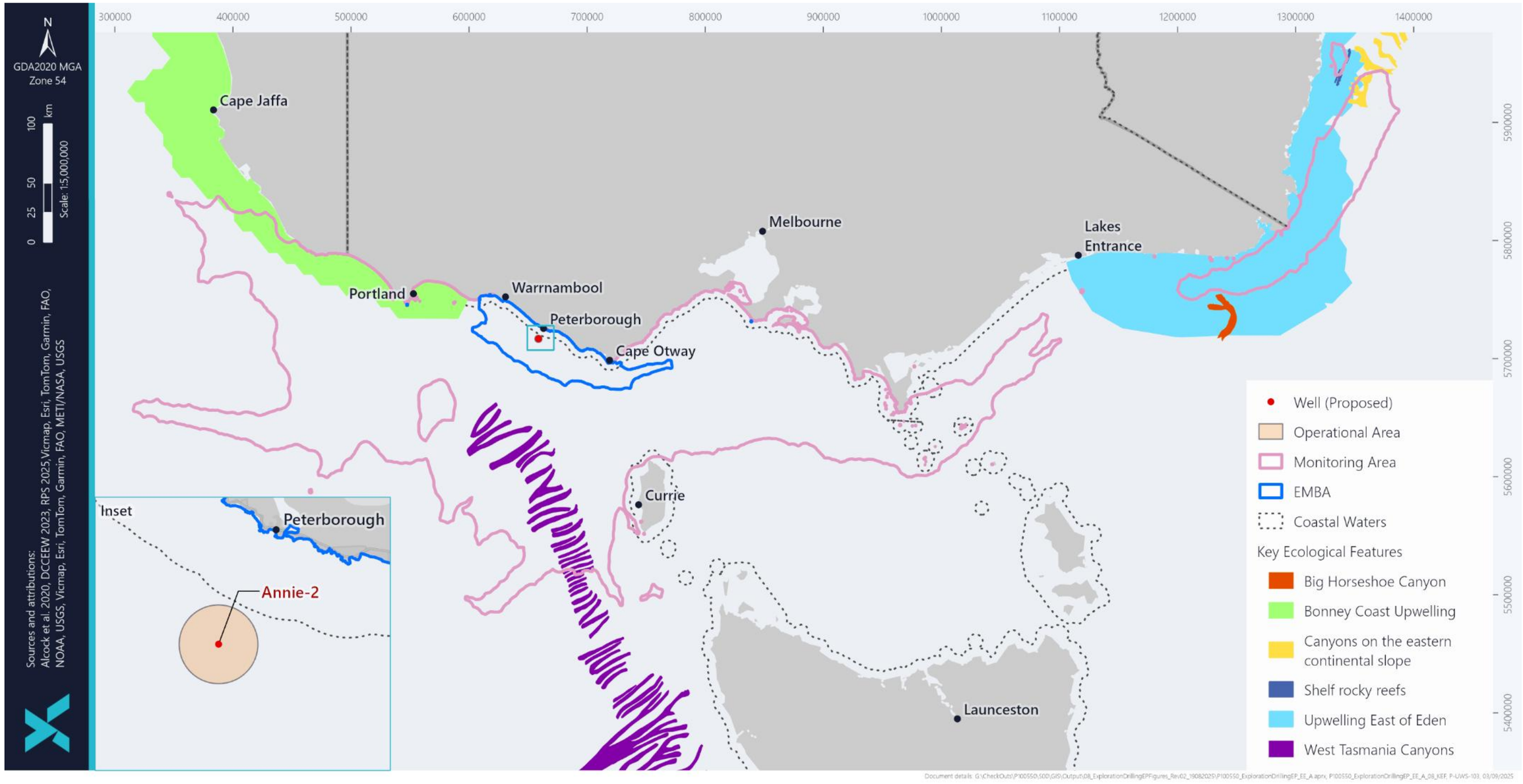


Figure 4-17:KEFs Within the Monitoring Area

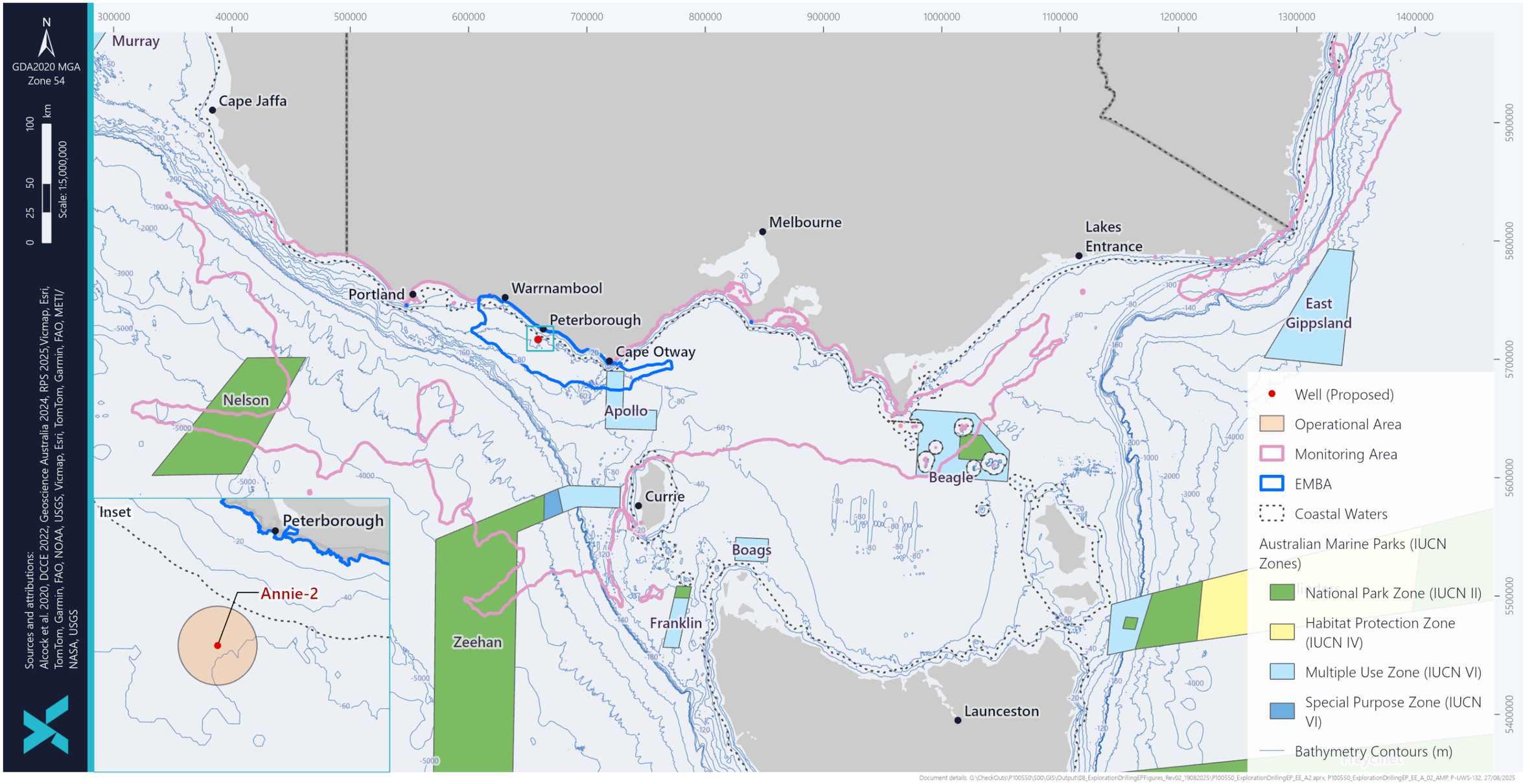


Figure 4-18: Australian Marine Parks (AMPs) Within the Monitoring Area

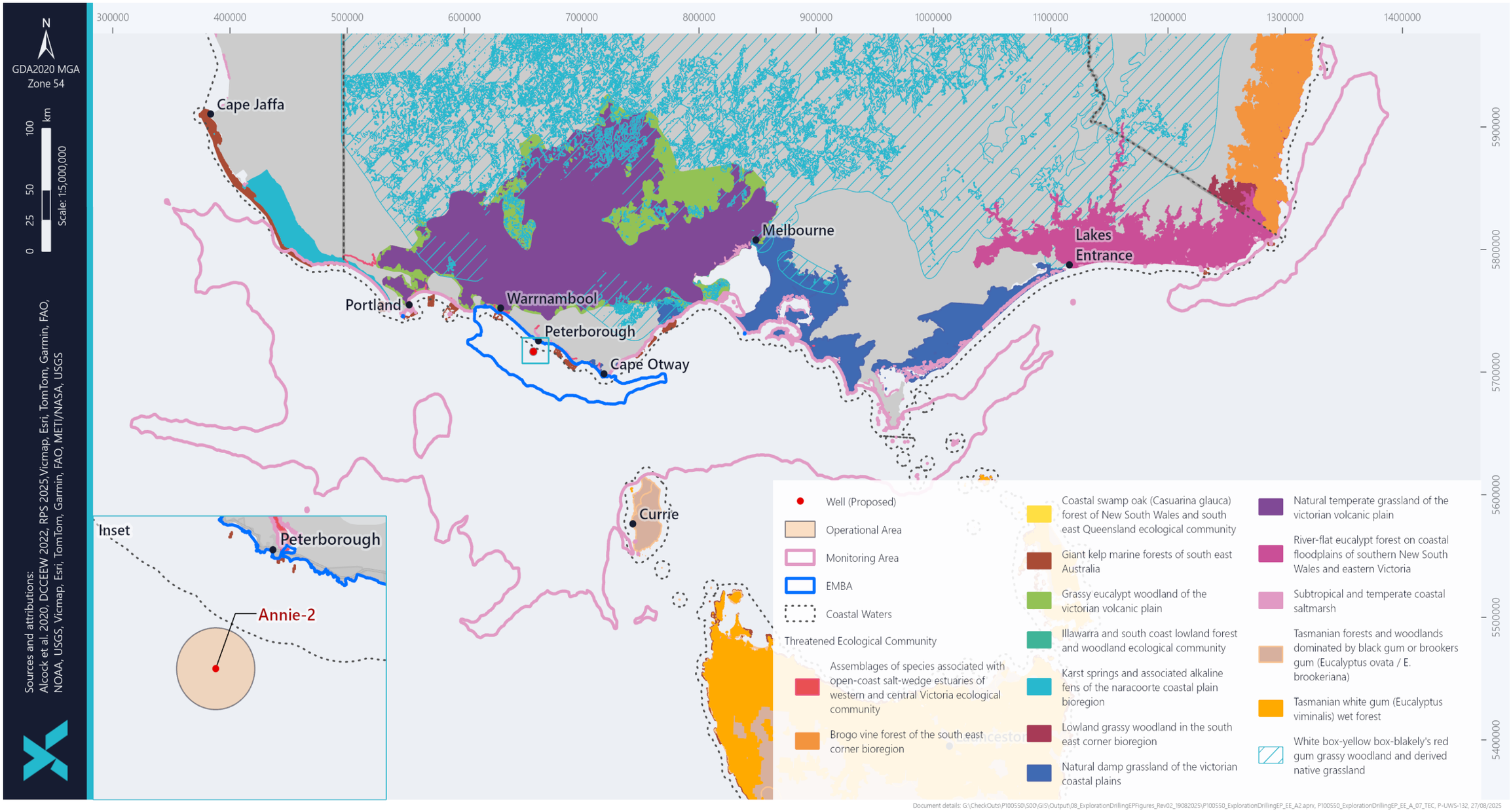


Figure 4-19: Threatened Ecological Communities (TECs) Within the Monitoring Area

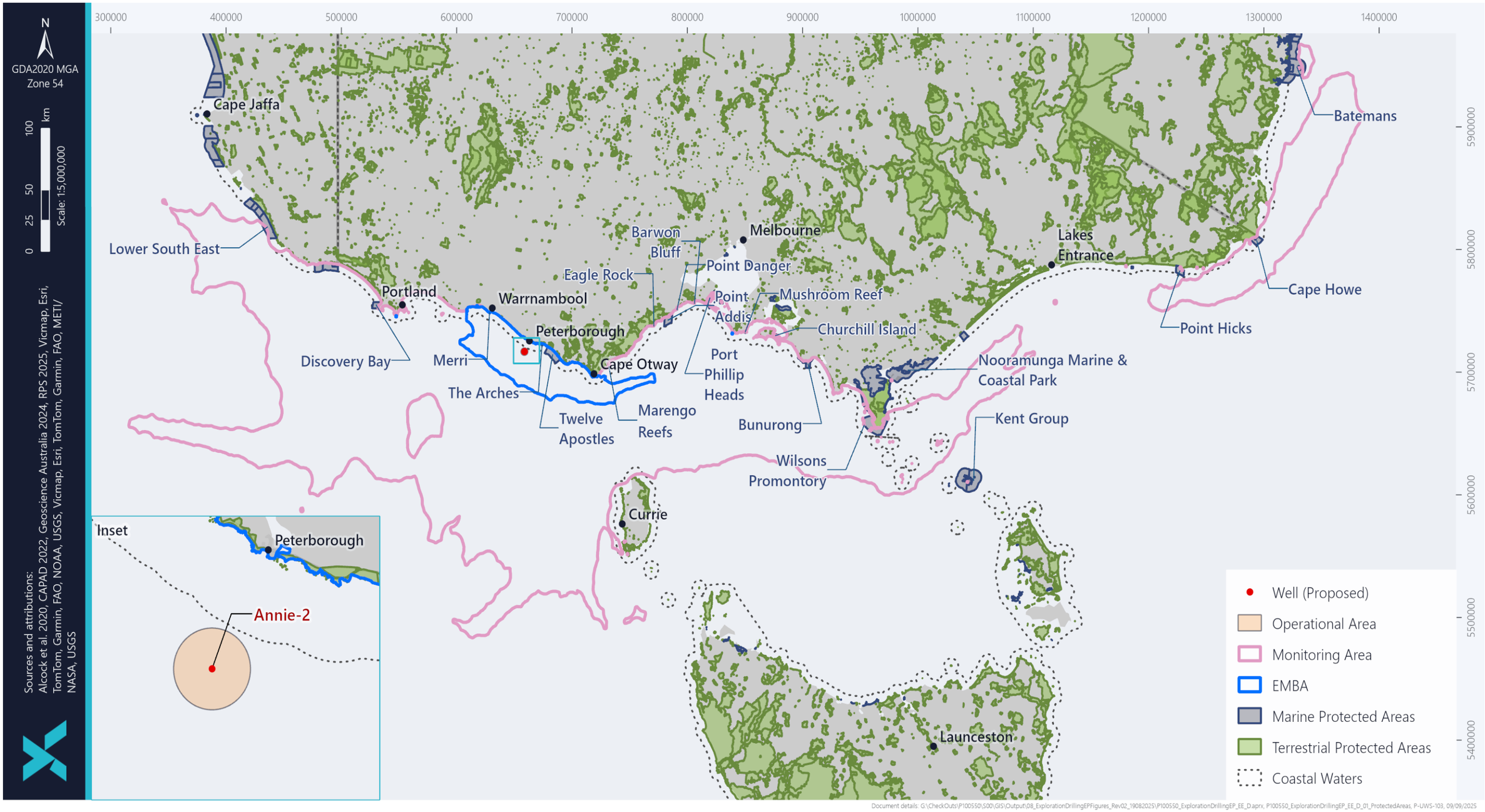


Figure 4-20: State Marine Parks and Terrestrial Protected Areas Within the Monitoring Area

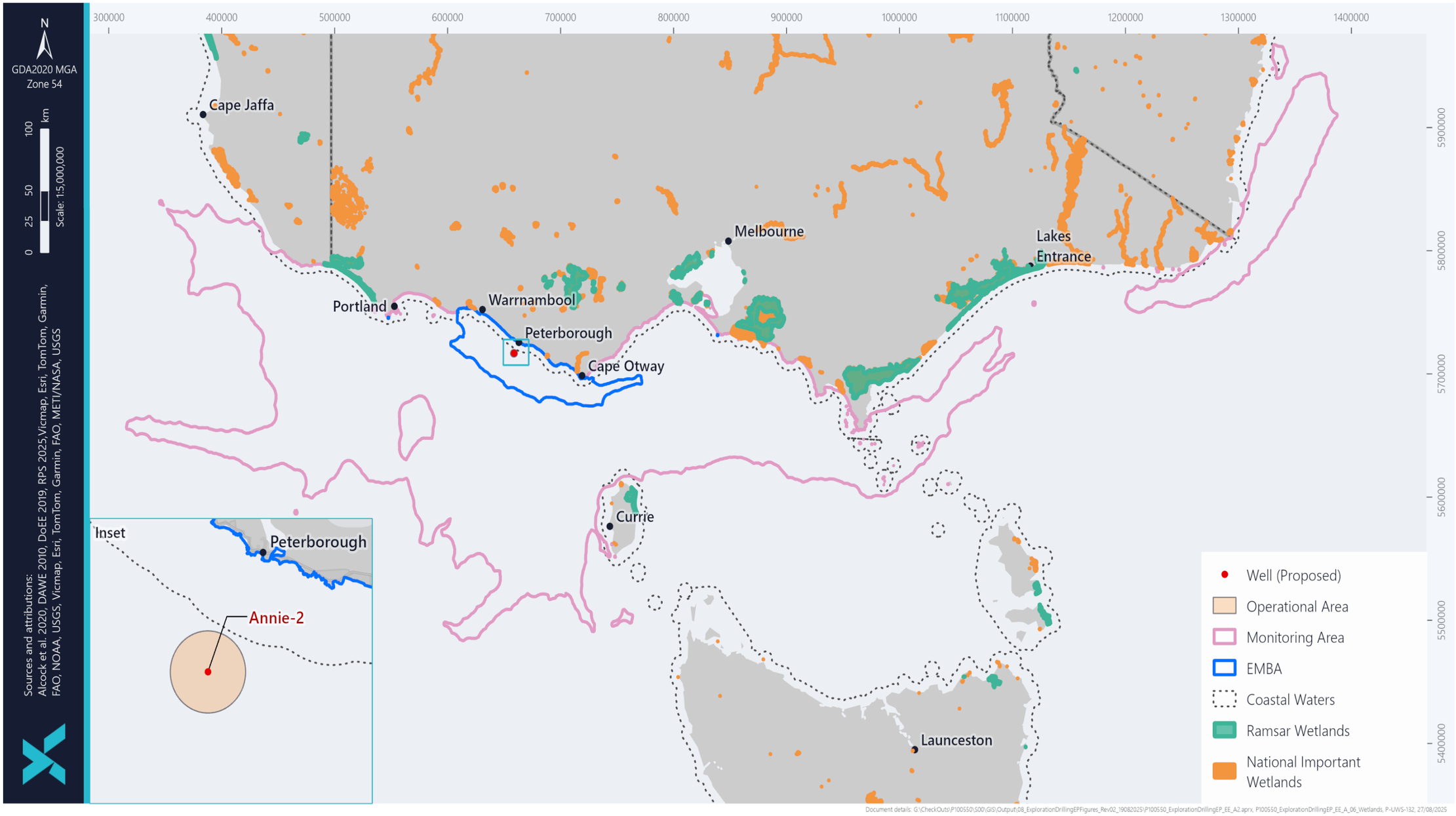


Figure 4-21: RAMSAR Wetlands and Wetlands of National Importance Within the Monitoring Area

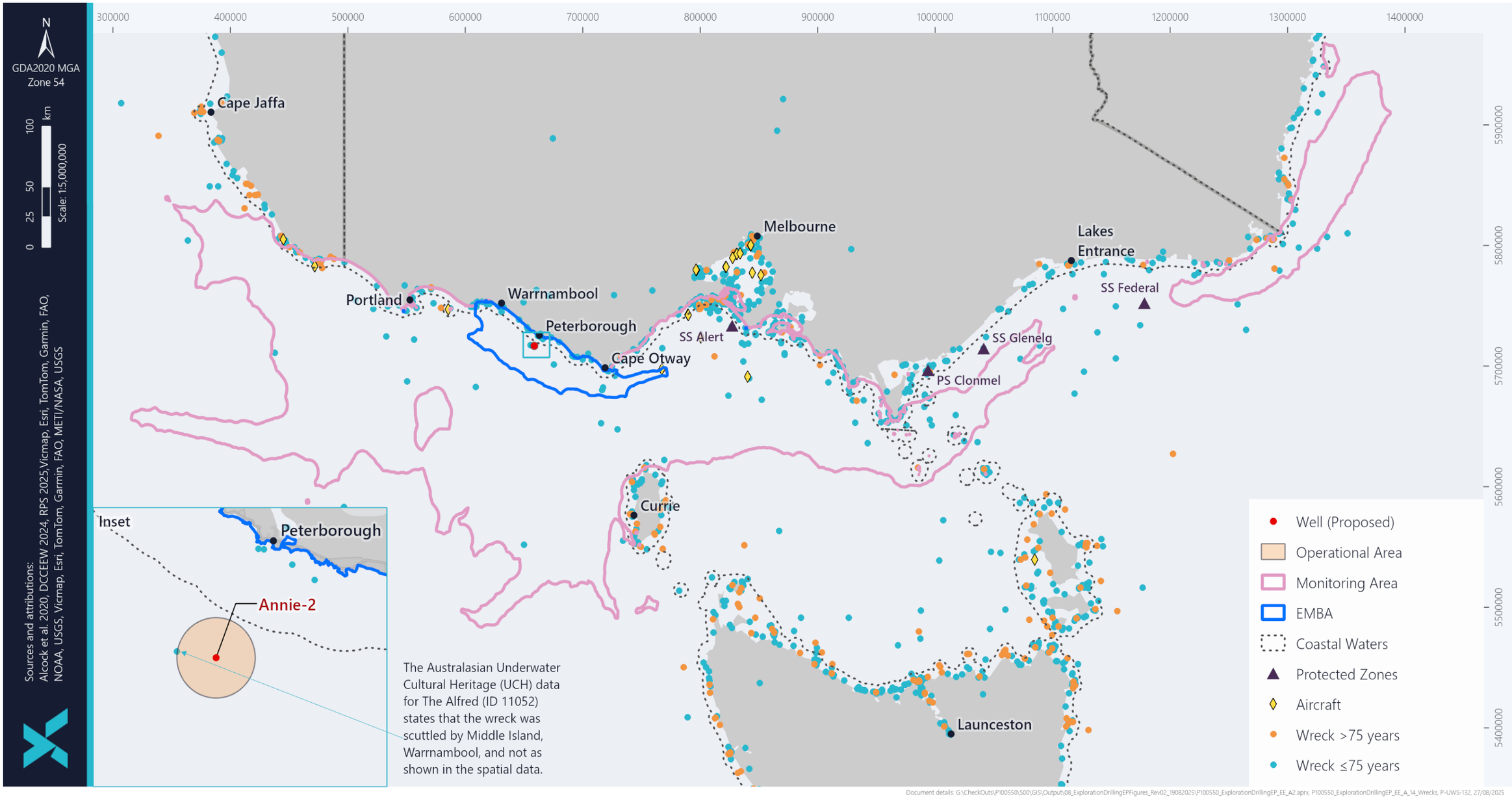


Figure 4-22: Underwater Protected Areas (Wrecks and Aircraft) Within the Monitoring Area

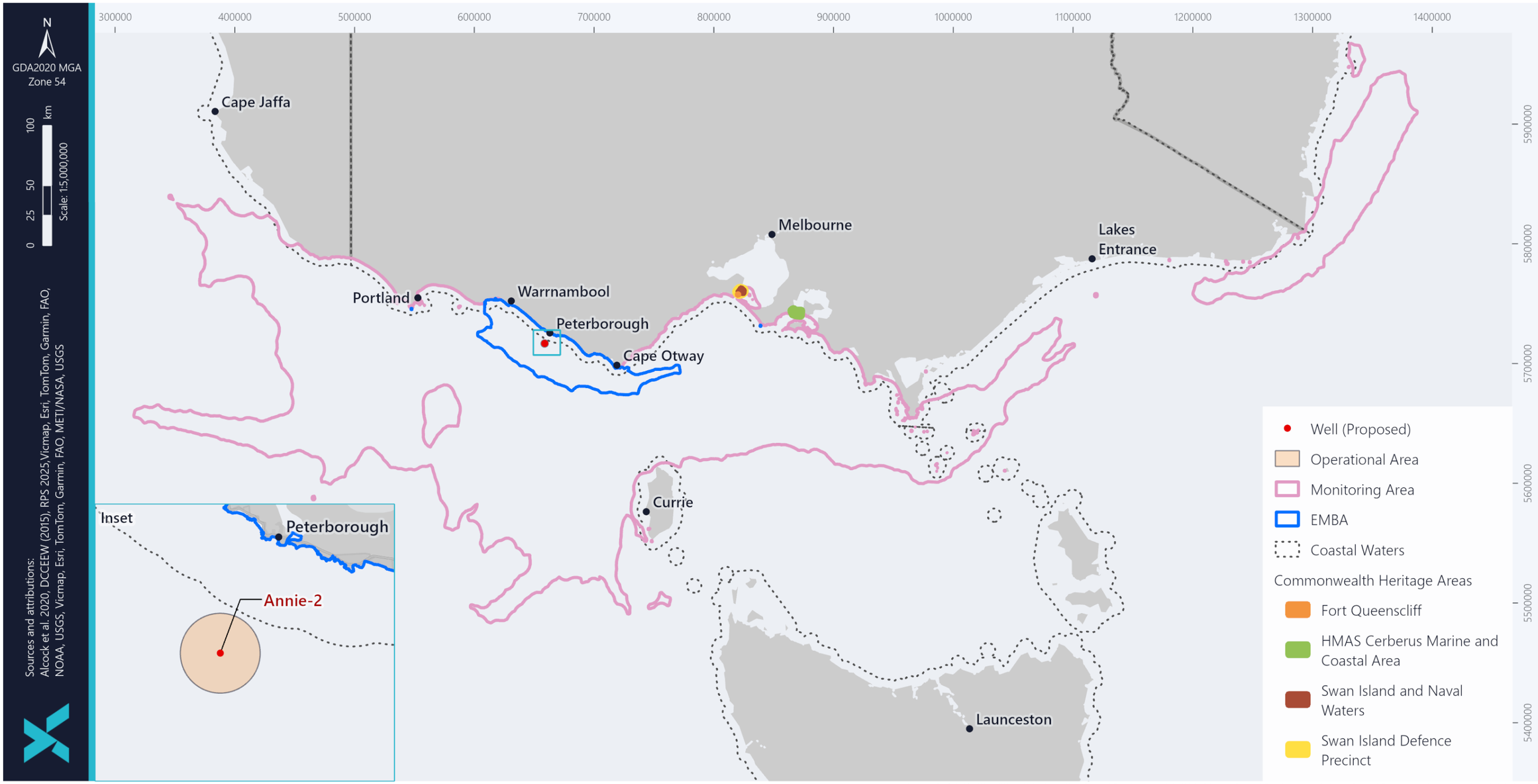


Figure 4-23: Commonwealth Heritage Areas Within the Monitoring Area

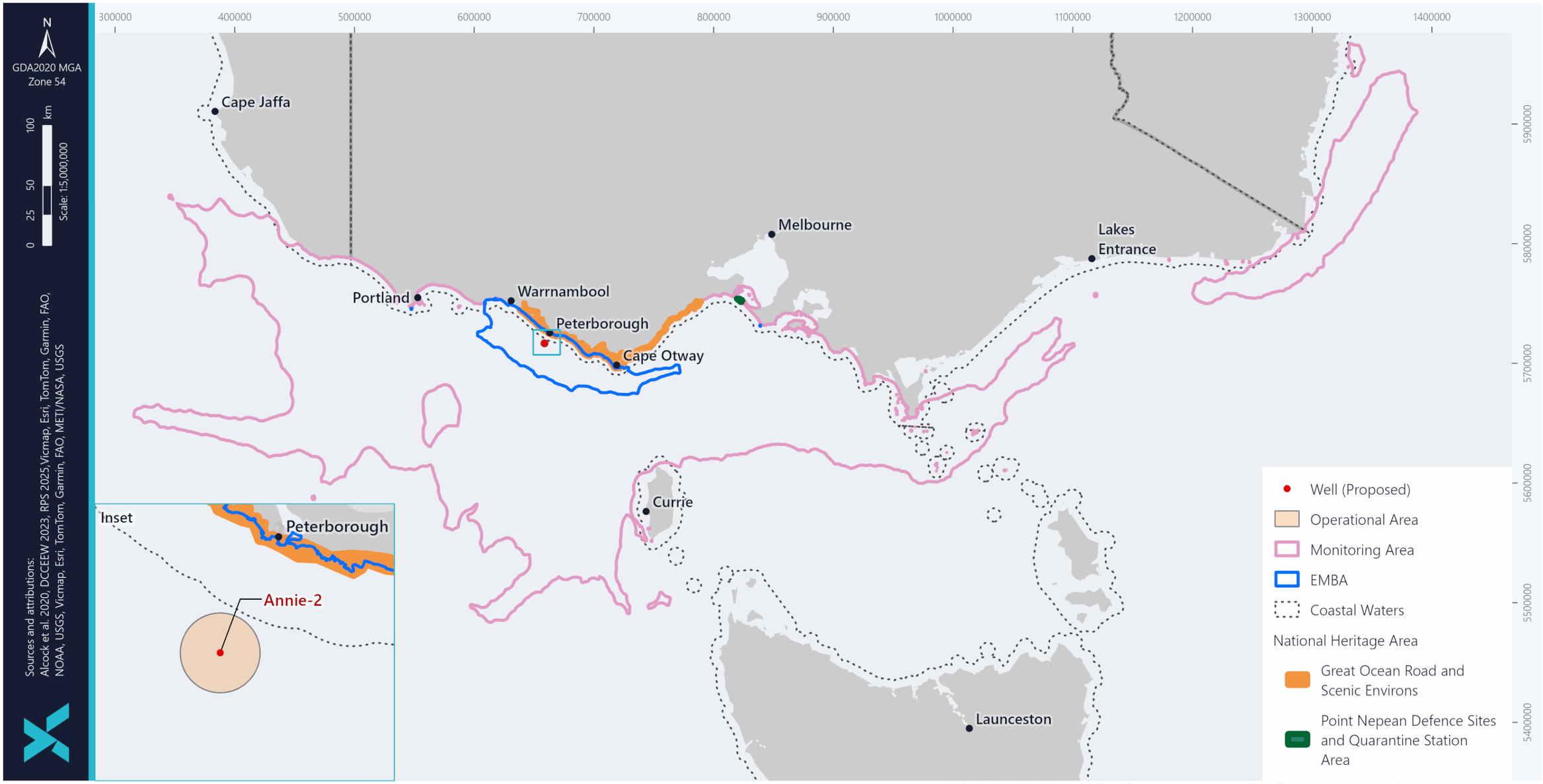


Figure 4-24: National Heritage Areas Within the Monitoring Area

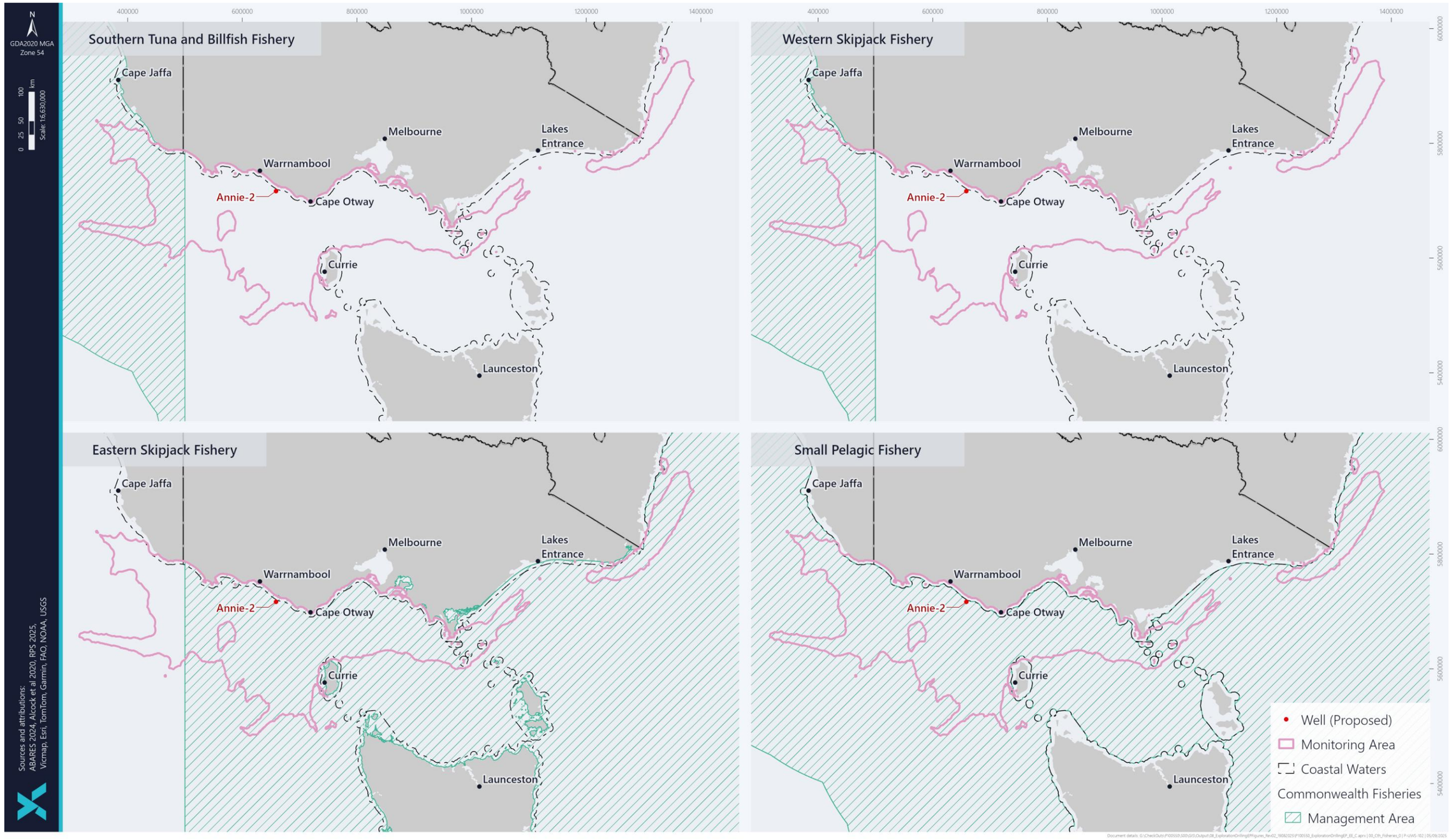


Figure 4-25: Commonwealth Managed Southern Tuna and Billfish Fishery, Western Skipjack Fishery, Eastern Skipjack Fishery, and Small Pelagic Fishery Within the Monitoring Area

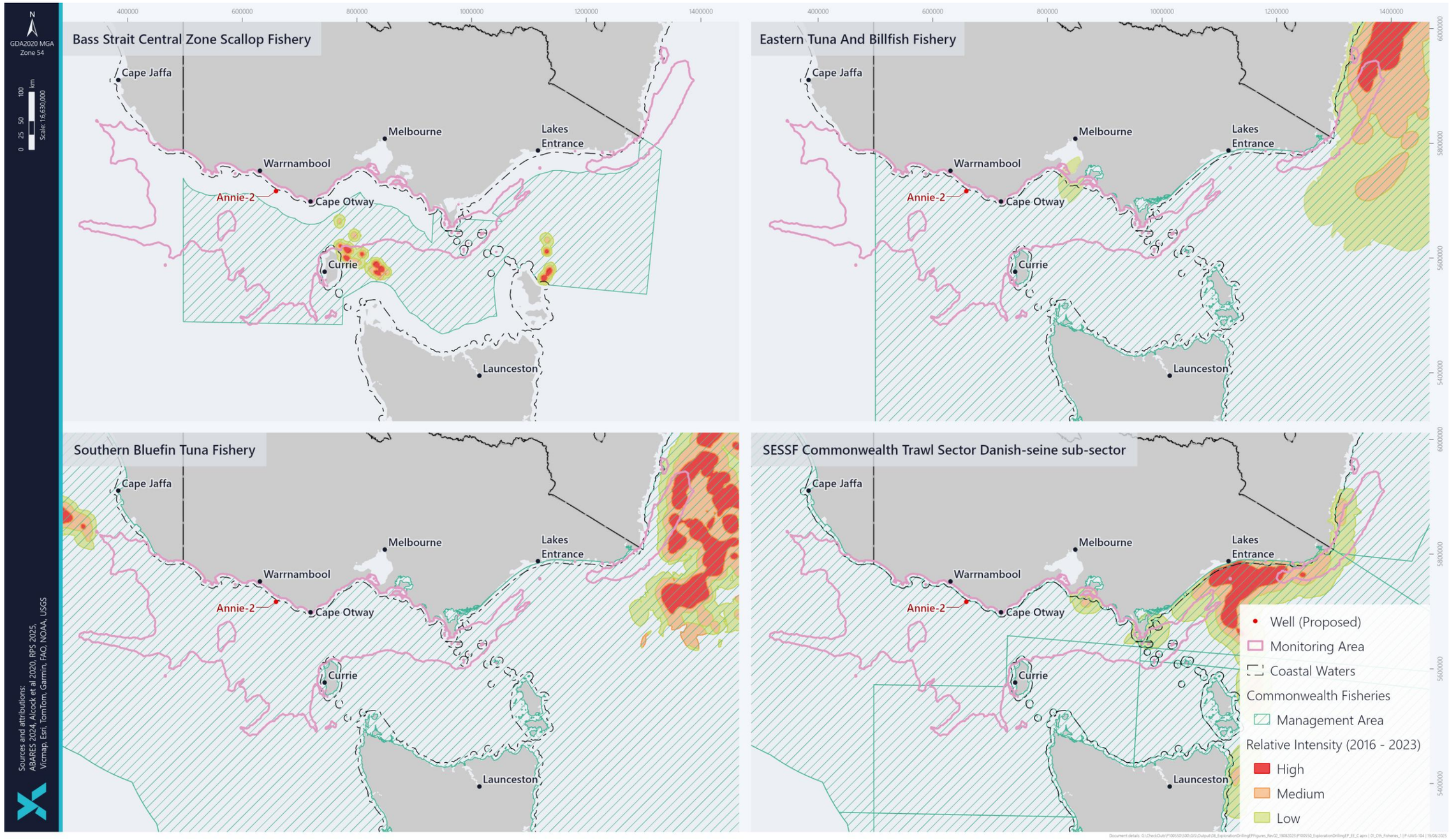


Figure 4-26: Commonwealth Managed Bass Strait Central Zone Scallop Fishery, Eastern Tuna and Billfish Fishery, Southern Bluefin Tuna Fishery, and SESSF Trawl Sector Danish-sein sub-sector Fishery Within the Monitoring Area

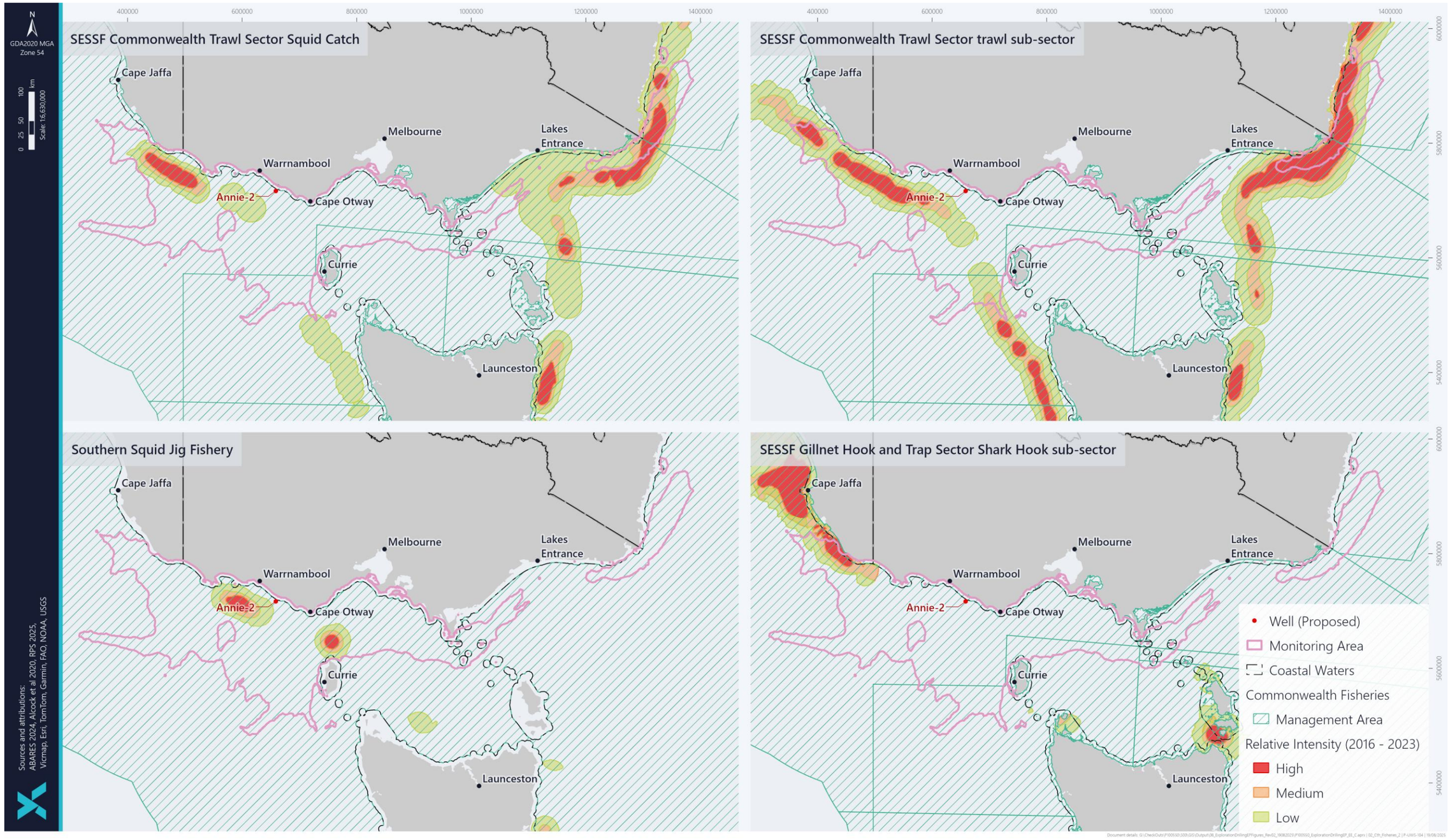


Figure 4-27: Commonwealth Managed SESSF Trawl Sector Squid Catch Fishery, SESSF Trawl Sector trawl sub-sector, Southern Squid Jig Fishery, and SESSF Gillnet Hook and Trap Sector Shark Hook Sub-sector Fishery Within the Monitoring Area

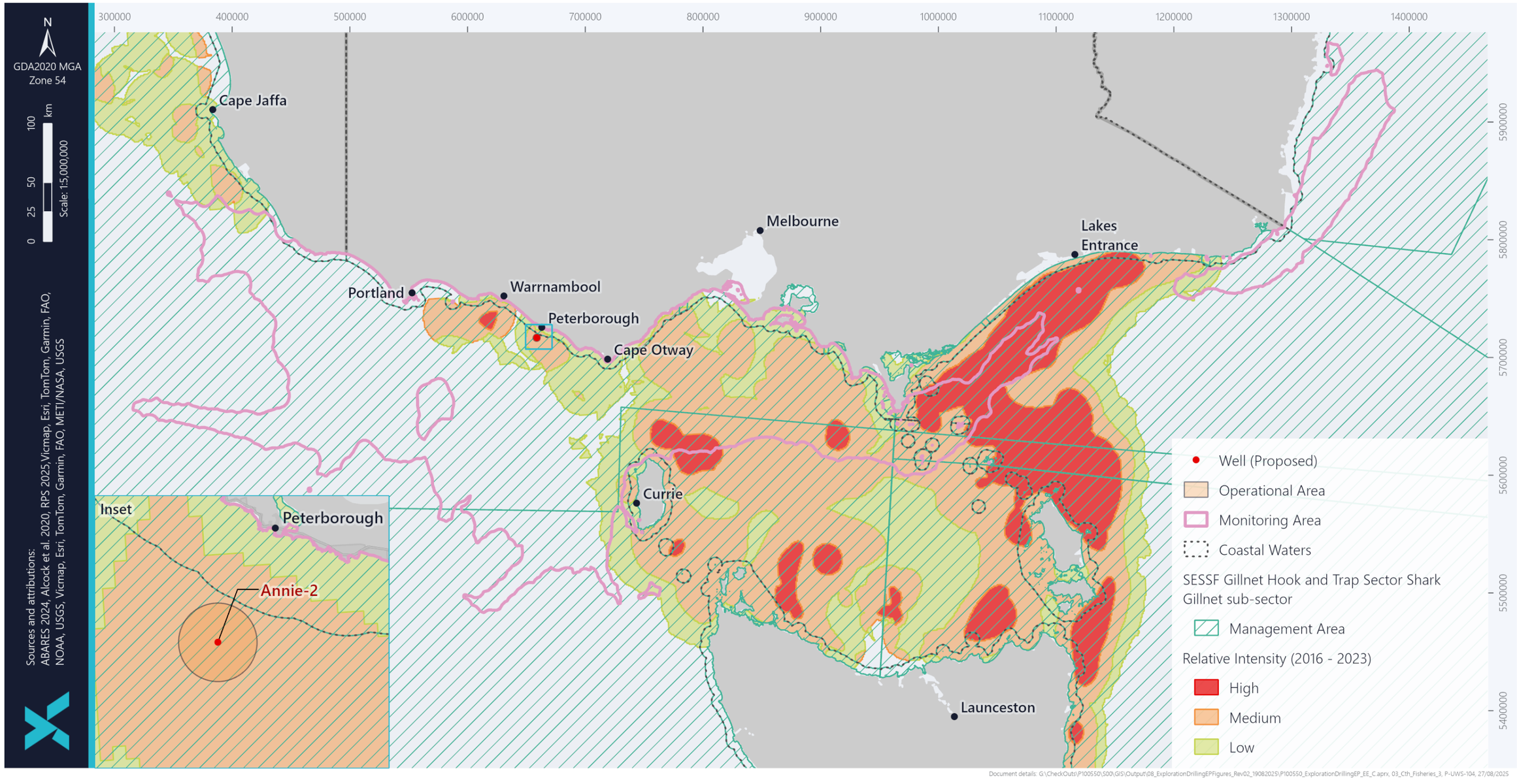


Figure 4-28: Commonwealth Managed SESSF Gillnet Hook and Trap Sector Shark Gillnet Sub-sector Fishery Within the Monitoring Area

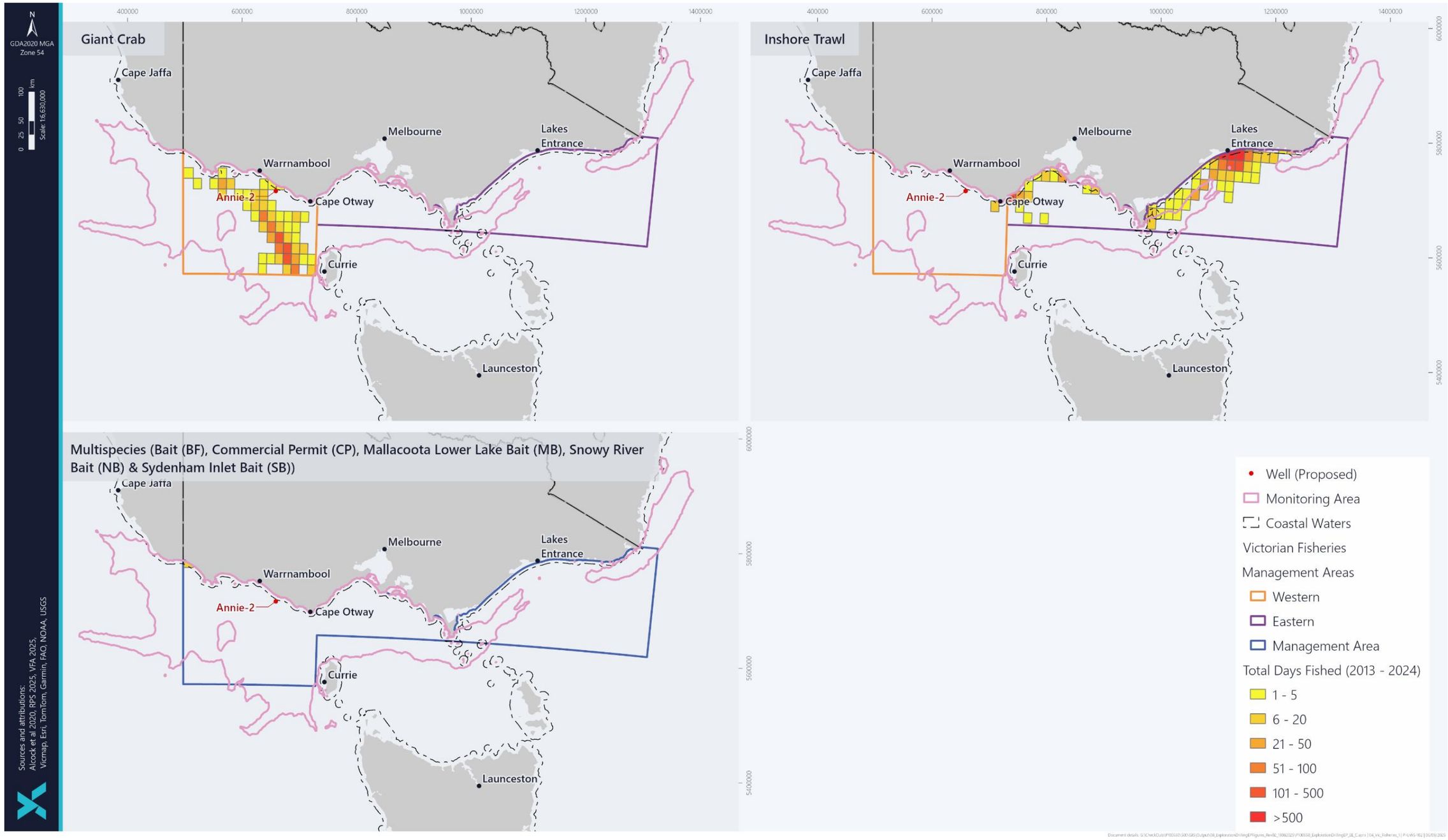


Figure 4-29: Victorian Managed Giant Crab Fishery, Inshore Trawl Fishery, and Multispecies Fishery Within the Monitoring Area

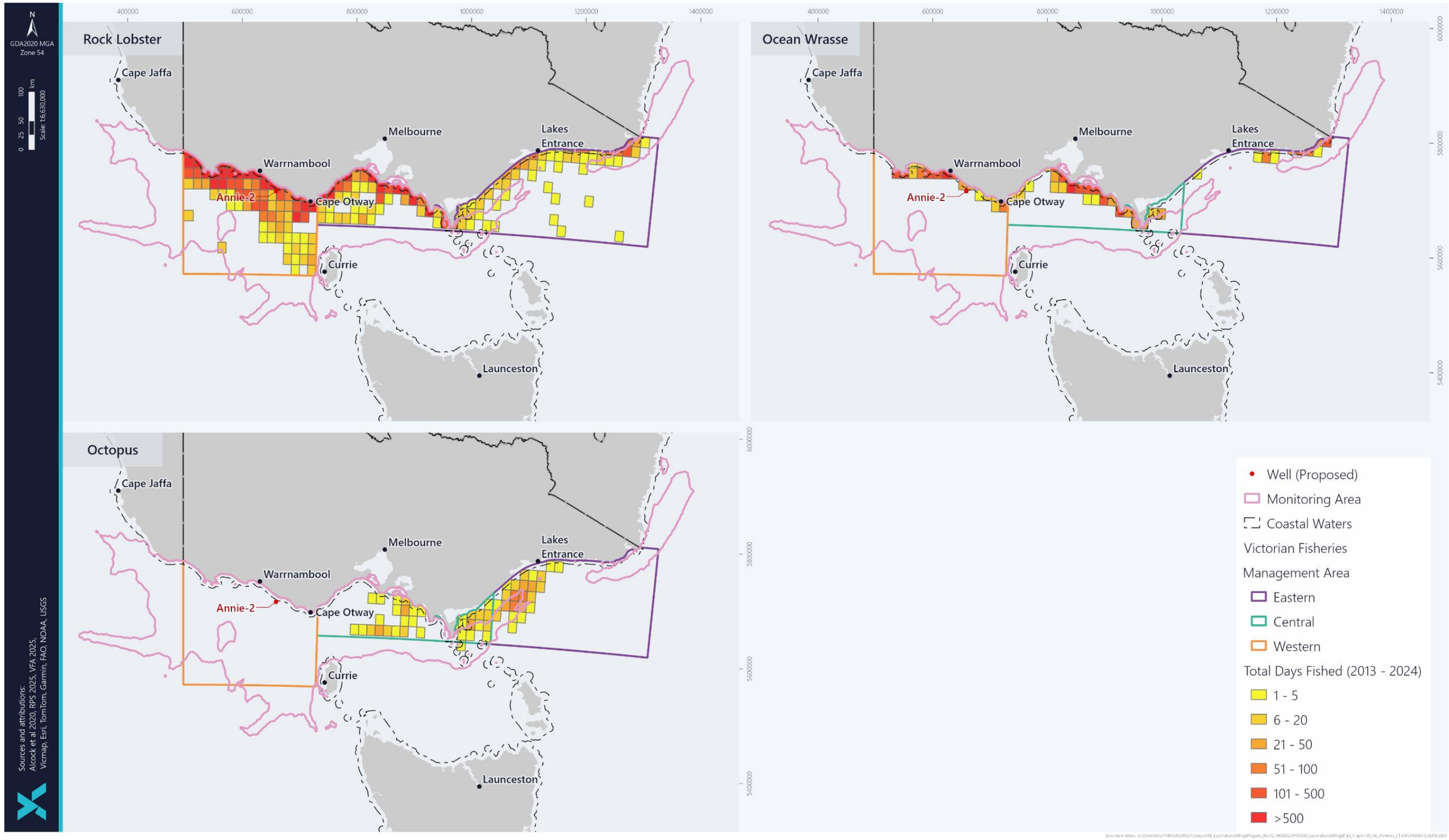


Figure 4-30: Victorian Managed Southern Rock Lobster Fishery, Ocean Wrasse Fishery, and Octopus Fishery Within the Monitoring Area

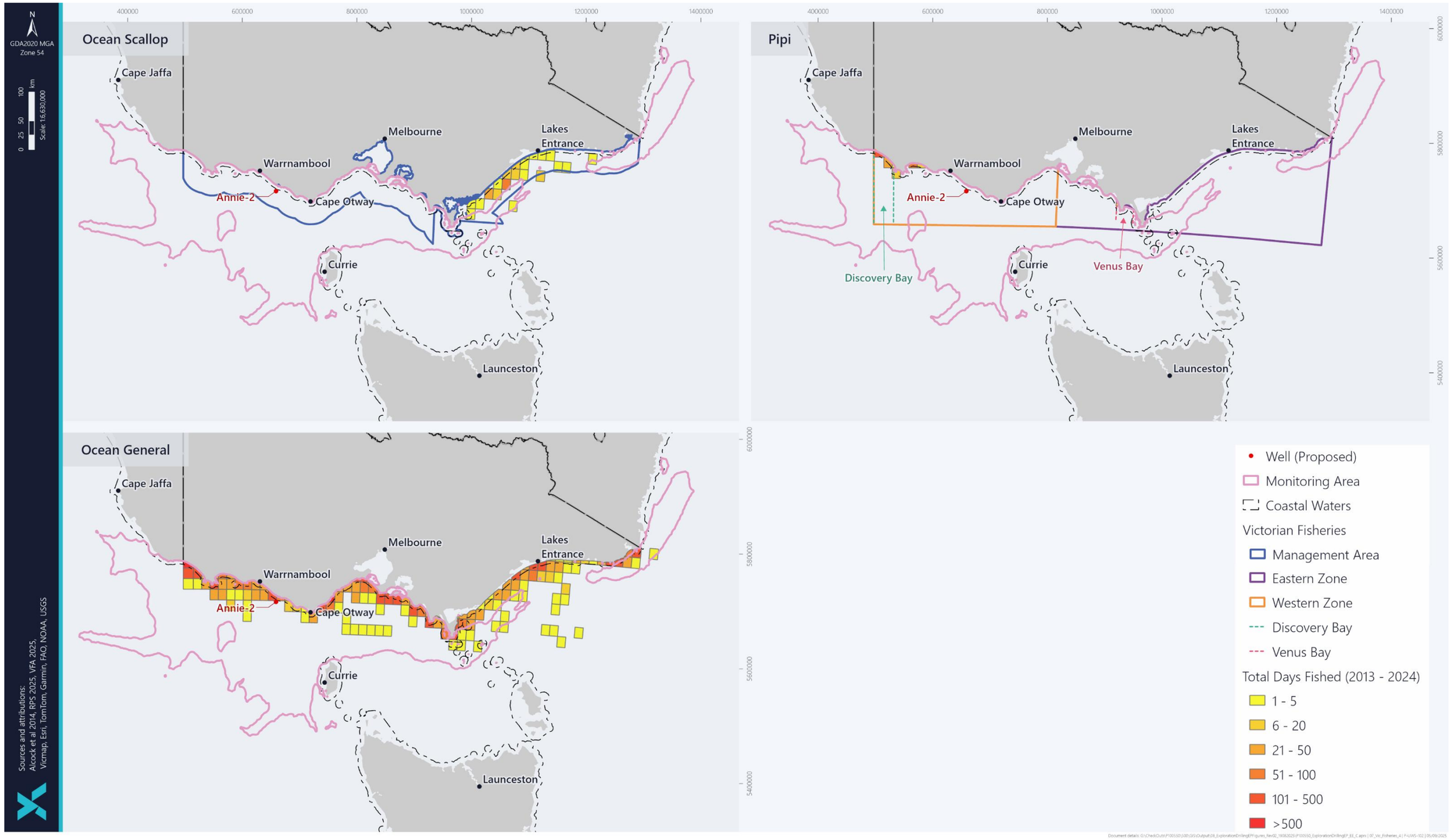


Figure 4-31: Victorian Managed Ocean Scallop Fishery, Pipi Fishery, and Ocean General Fishery Within the Monitoring Area

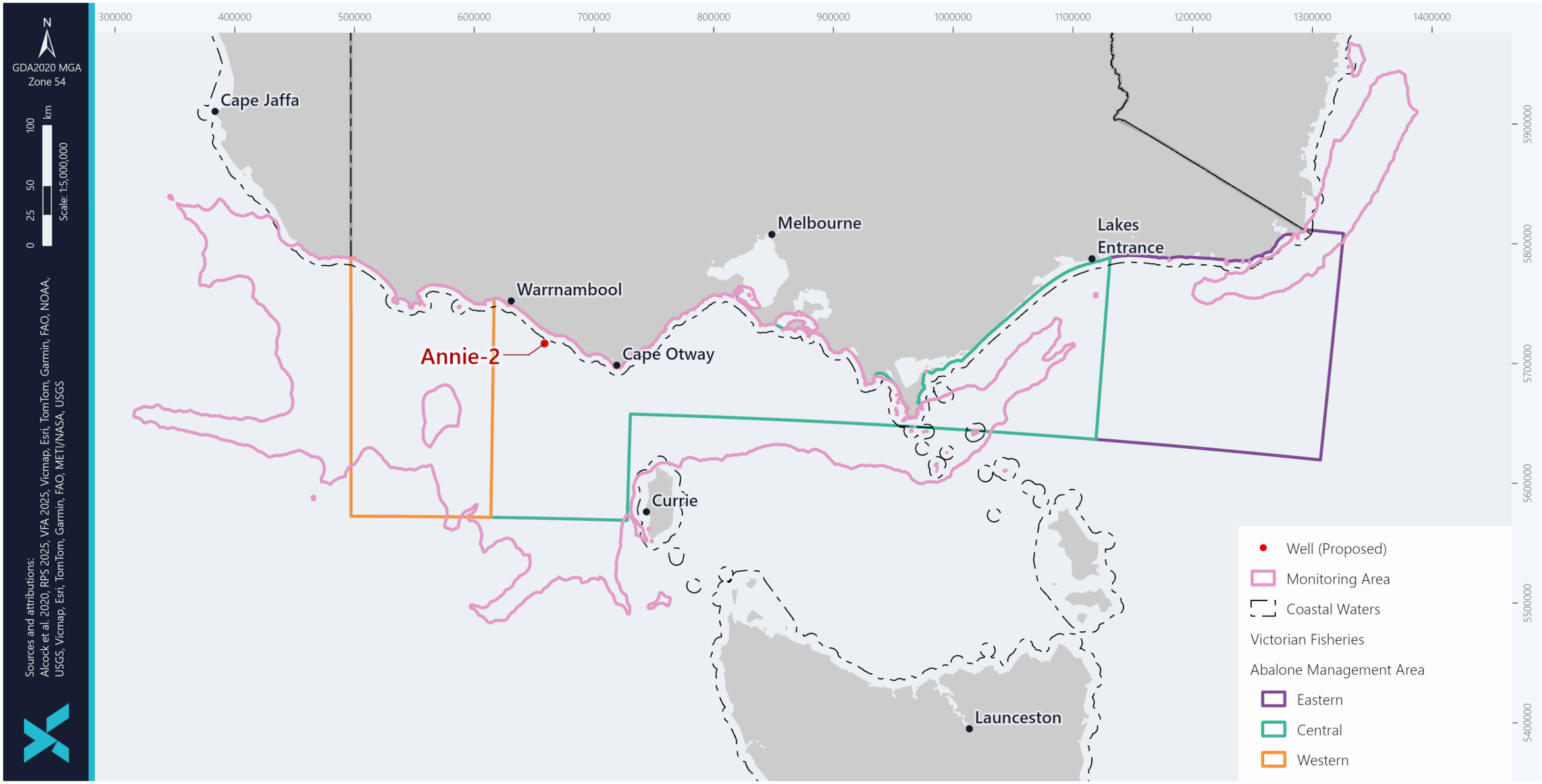


Figure 4-32: Victorian Managed Abalone Fishery Within the Monitoring Area

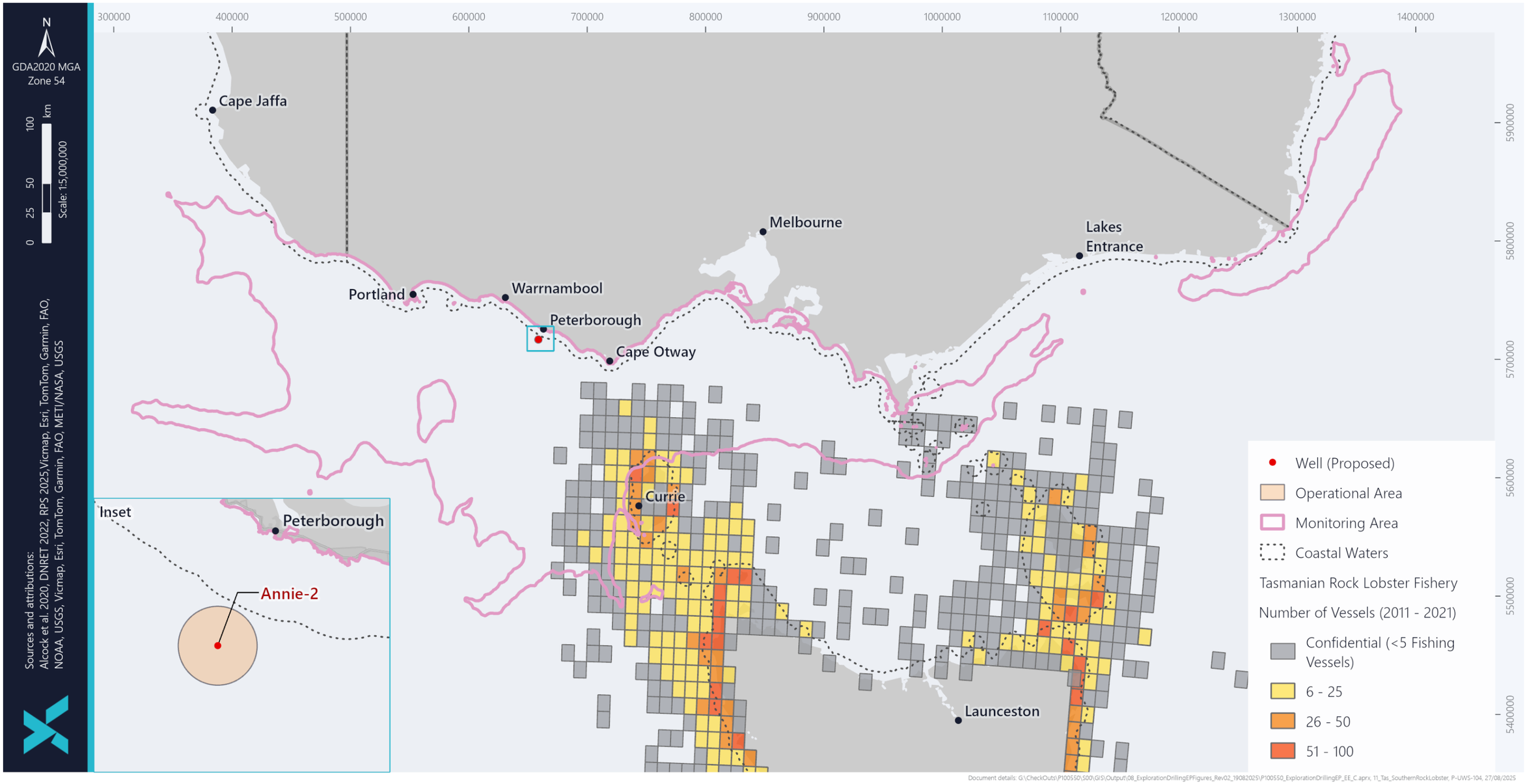


Figure 4-33: Tasmanian Managed Rock Lobster Fishery Within the Monitoring Area

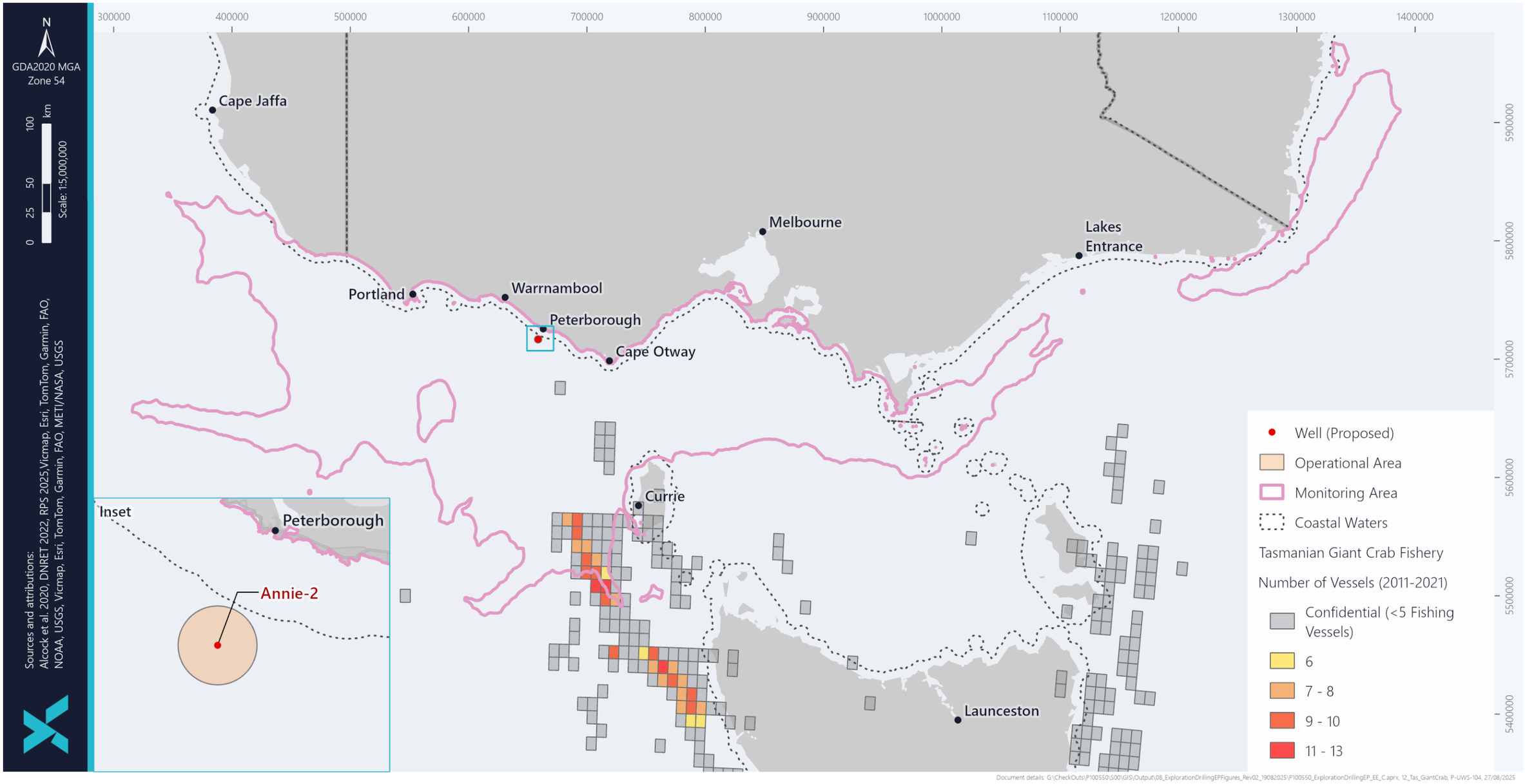


Figure 4-34: Tasmanian Managed Giant Crab Fishery Within the Monitoring Area

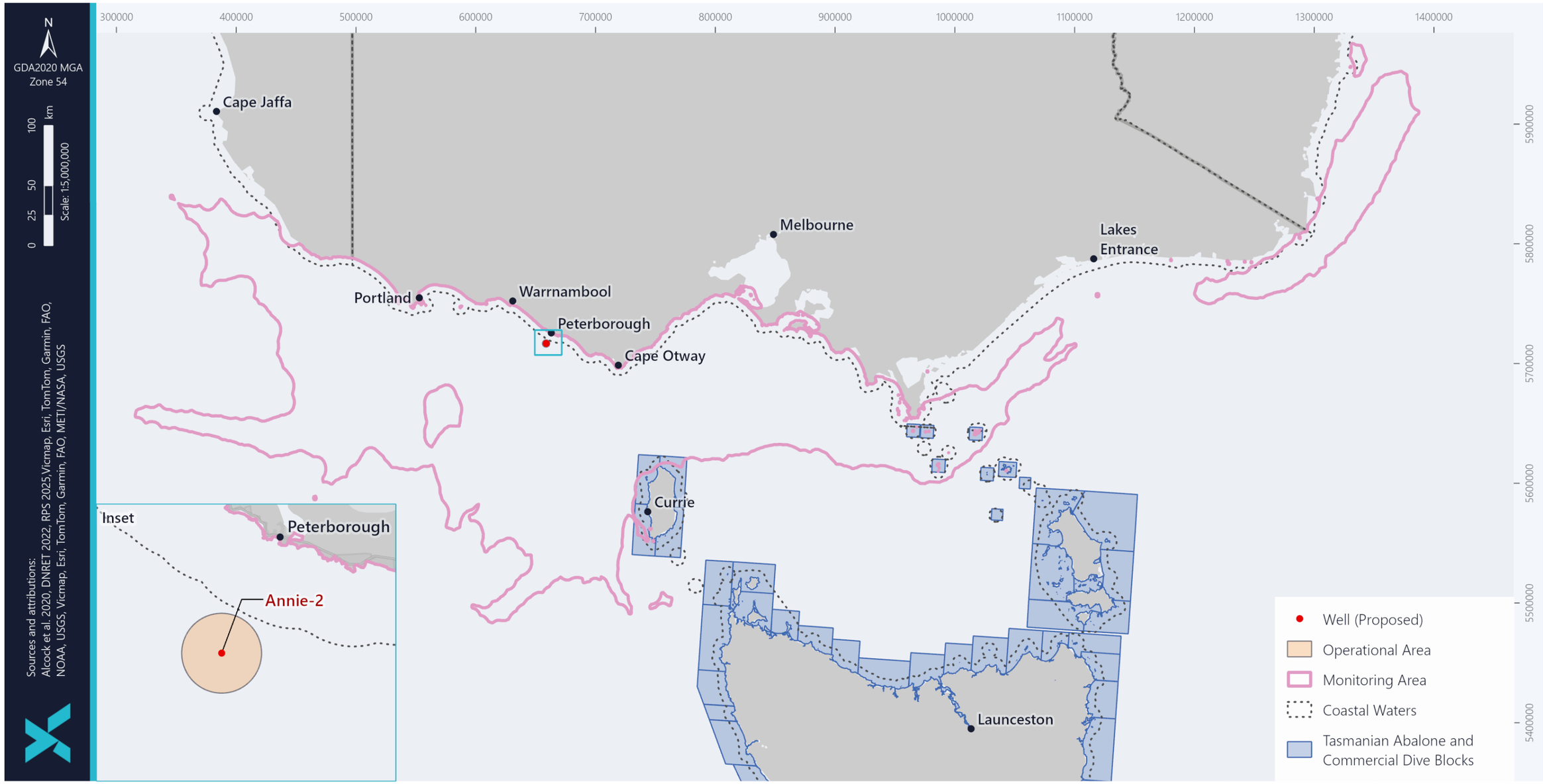


Figure 4-35: Tasmanian Managed Abalone Fishery Within the Monitoring Area

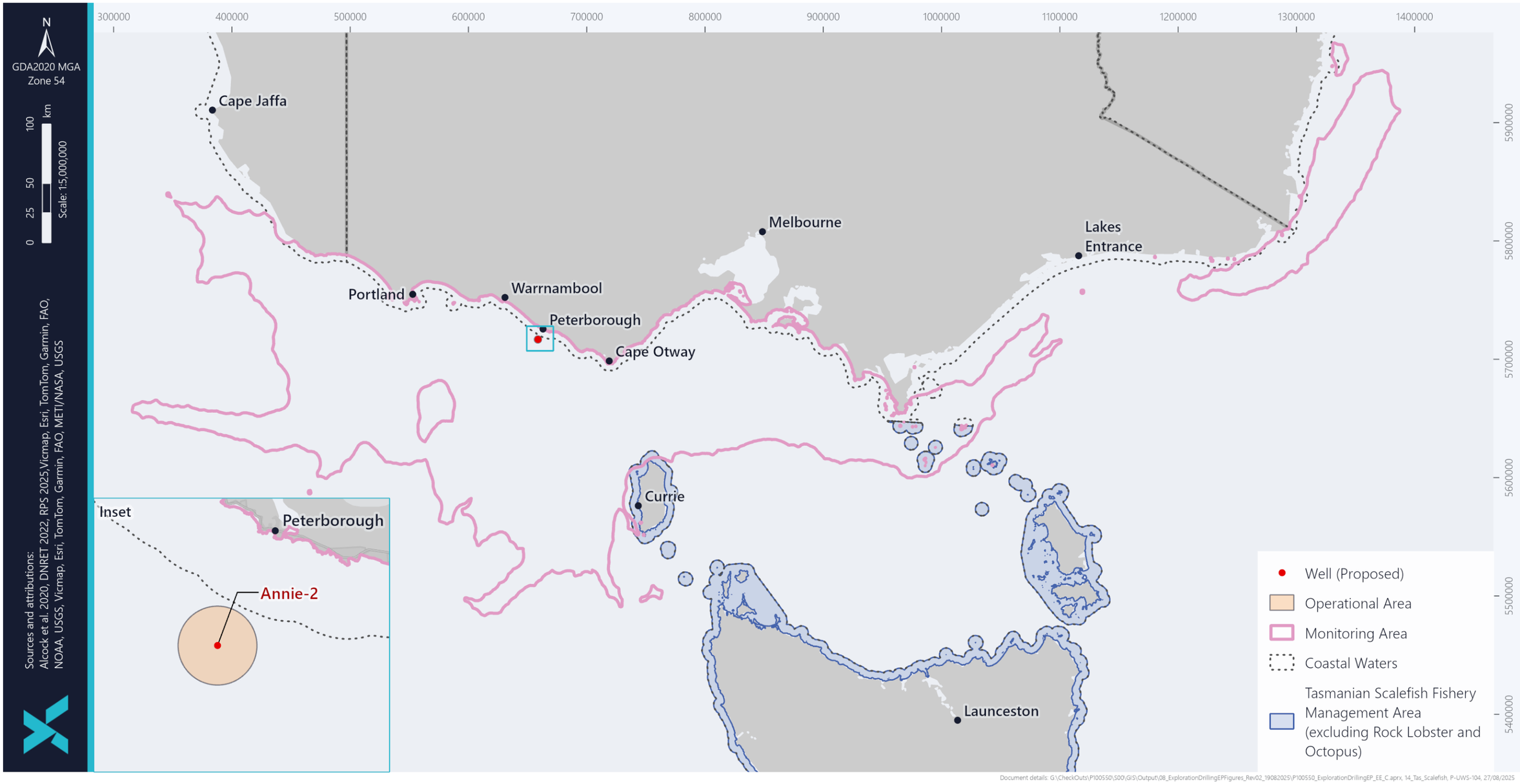


Figure 4-36: Tasmanian Managed Scalefish Fishery Within the Monitoring Area

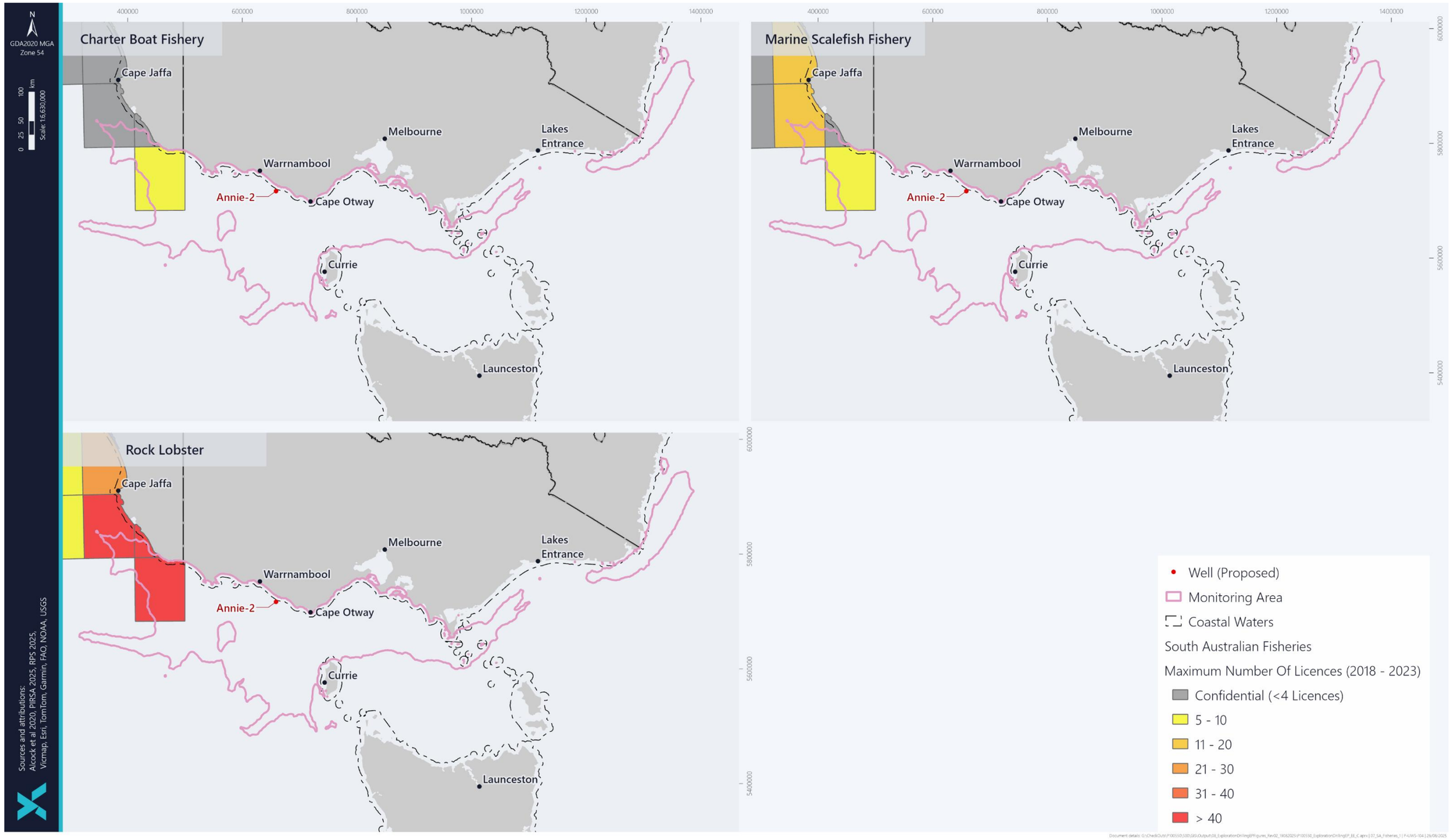


Figure 4-37: South Australian Managed Charter Boat Fishery, Marine Scalefish Fishery, and Rock Lobster Fishery Within the Monitoring Area

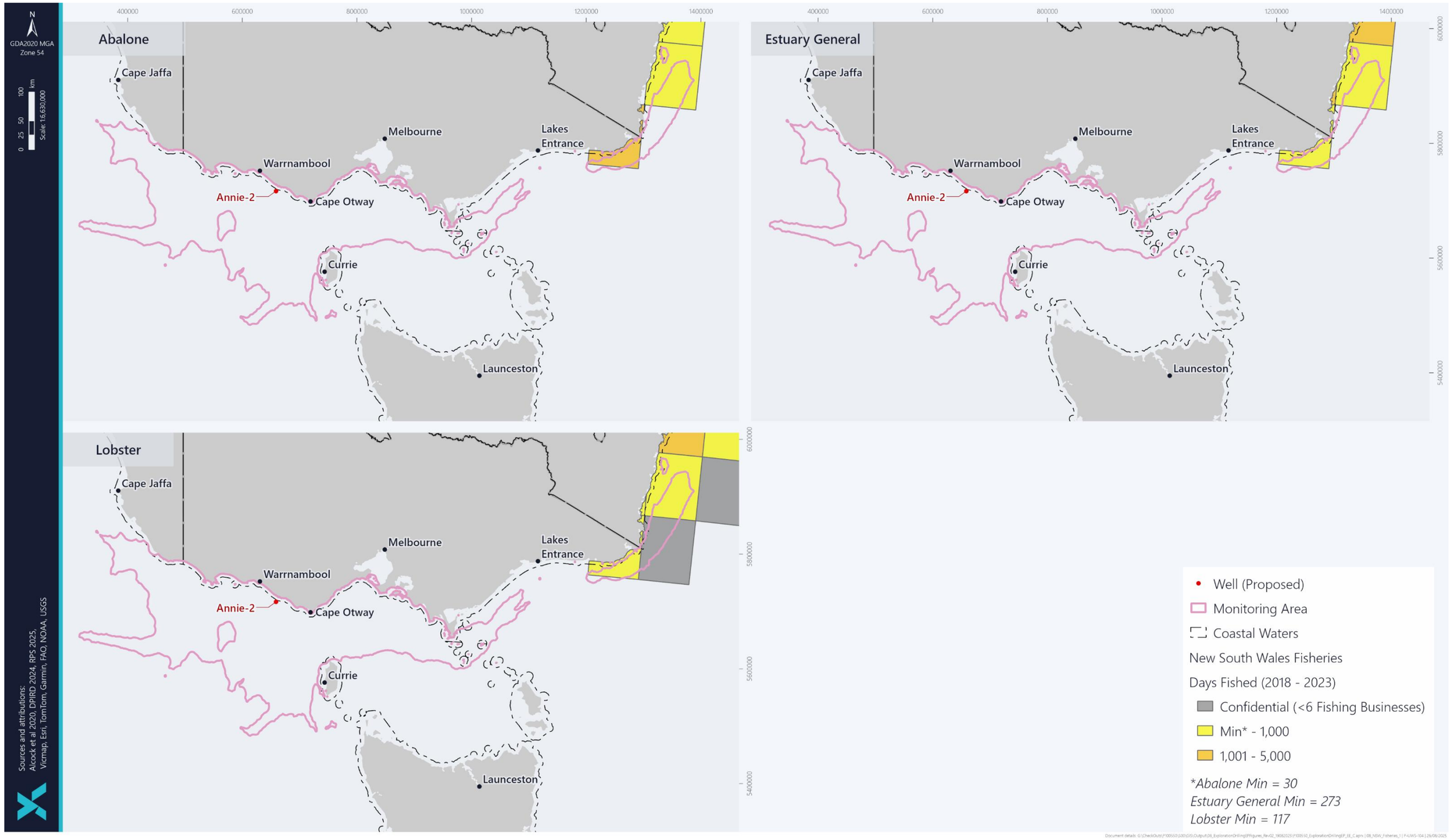


Figure 4-38: NSW Managed Abalone Fishery, Estuary General, and Lobster Fishery Within the Monitoring Area

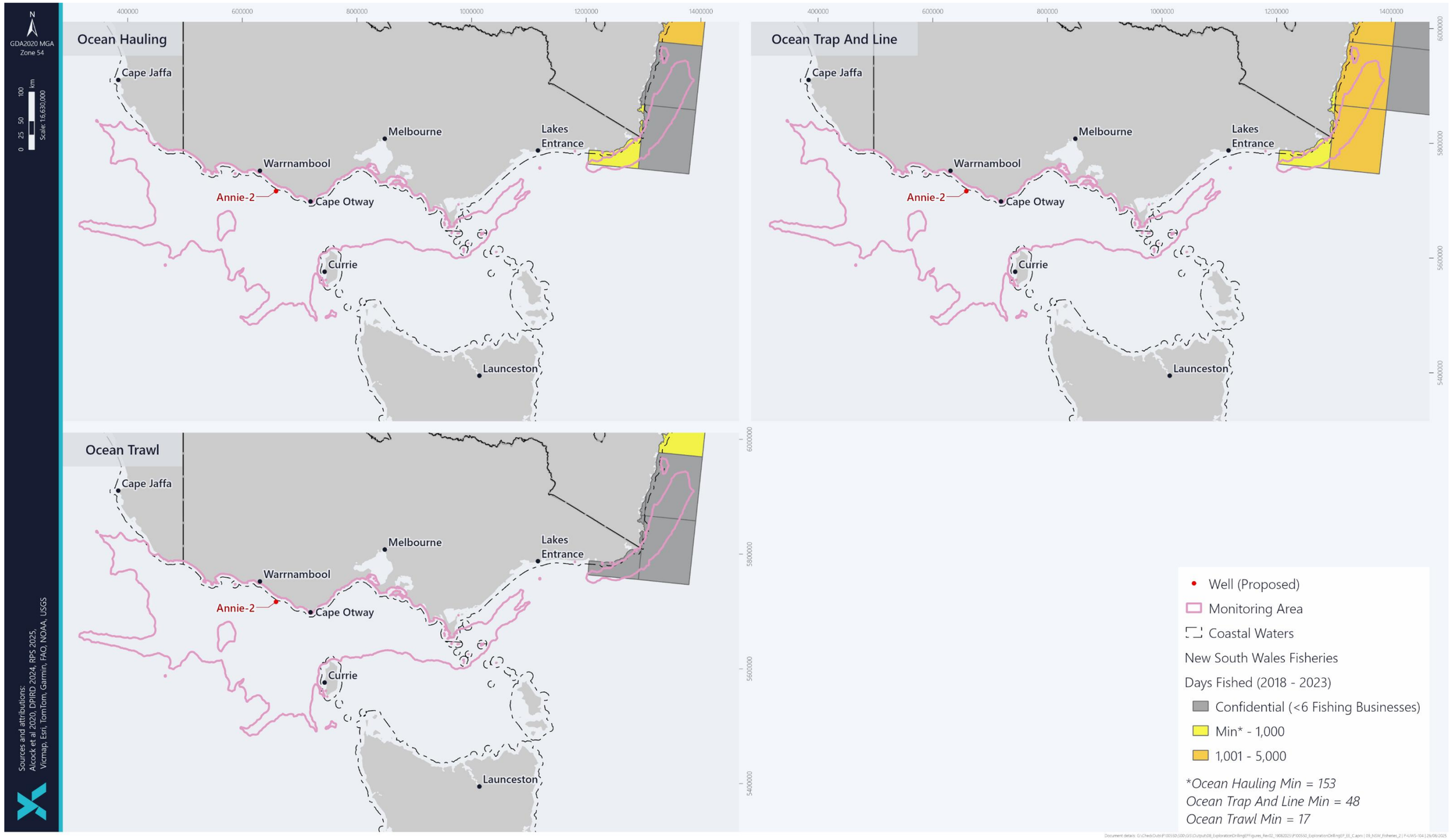


Figure 4-39: NSW Managed Ocean Hauling Fishery, Ocean Trap and Line Fishery, and Ocean Trawl Fishery Within the Monitoring Area

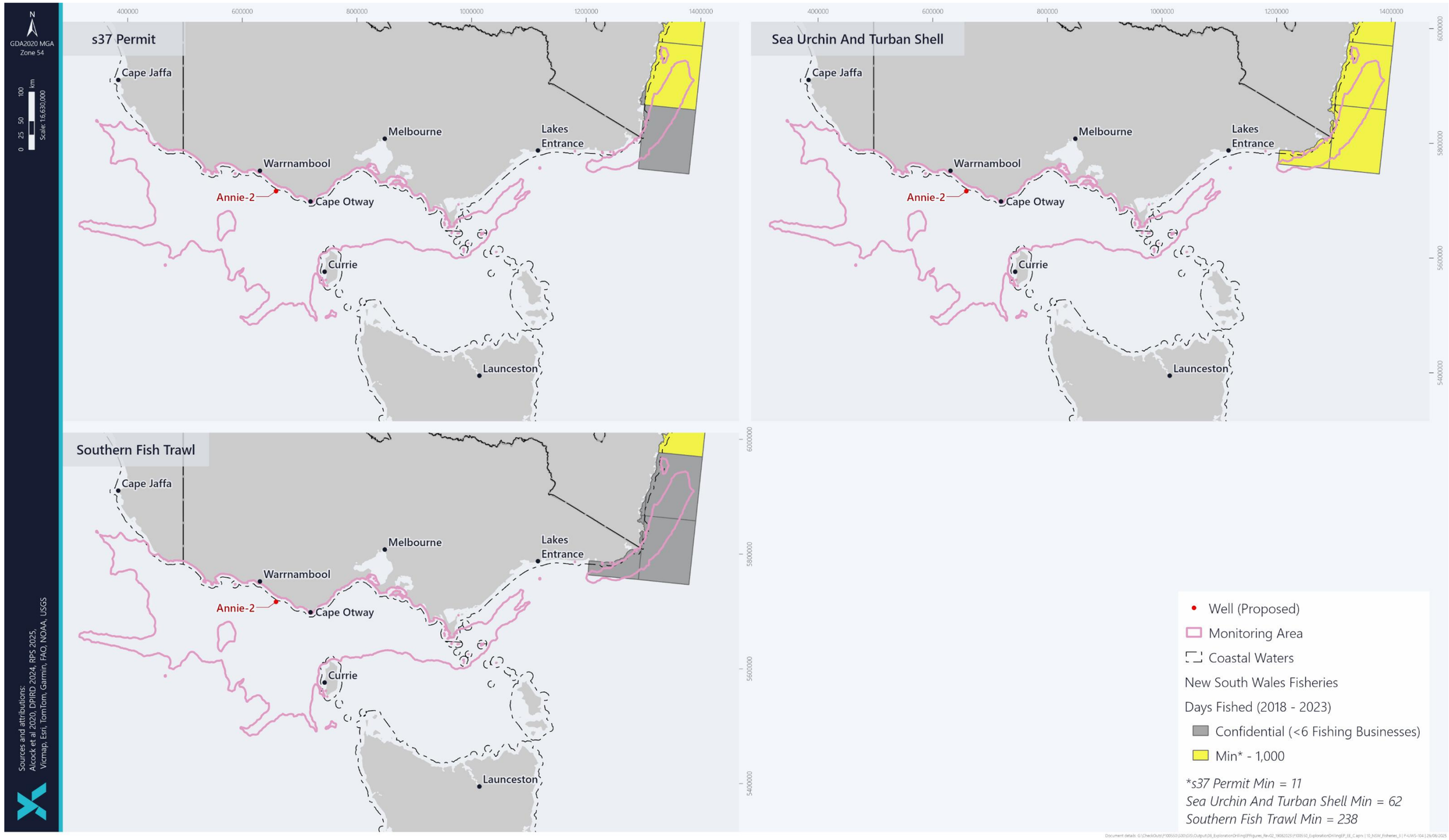


Figure 4-40: NSW Managed s37 Permit Fishery, Sea Urchin and Turban Shell Fishery, and Southern Fish Trawl Fishery Within the Monitoring Area

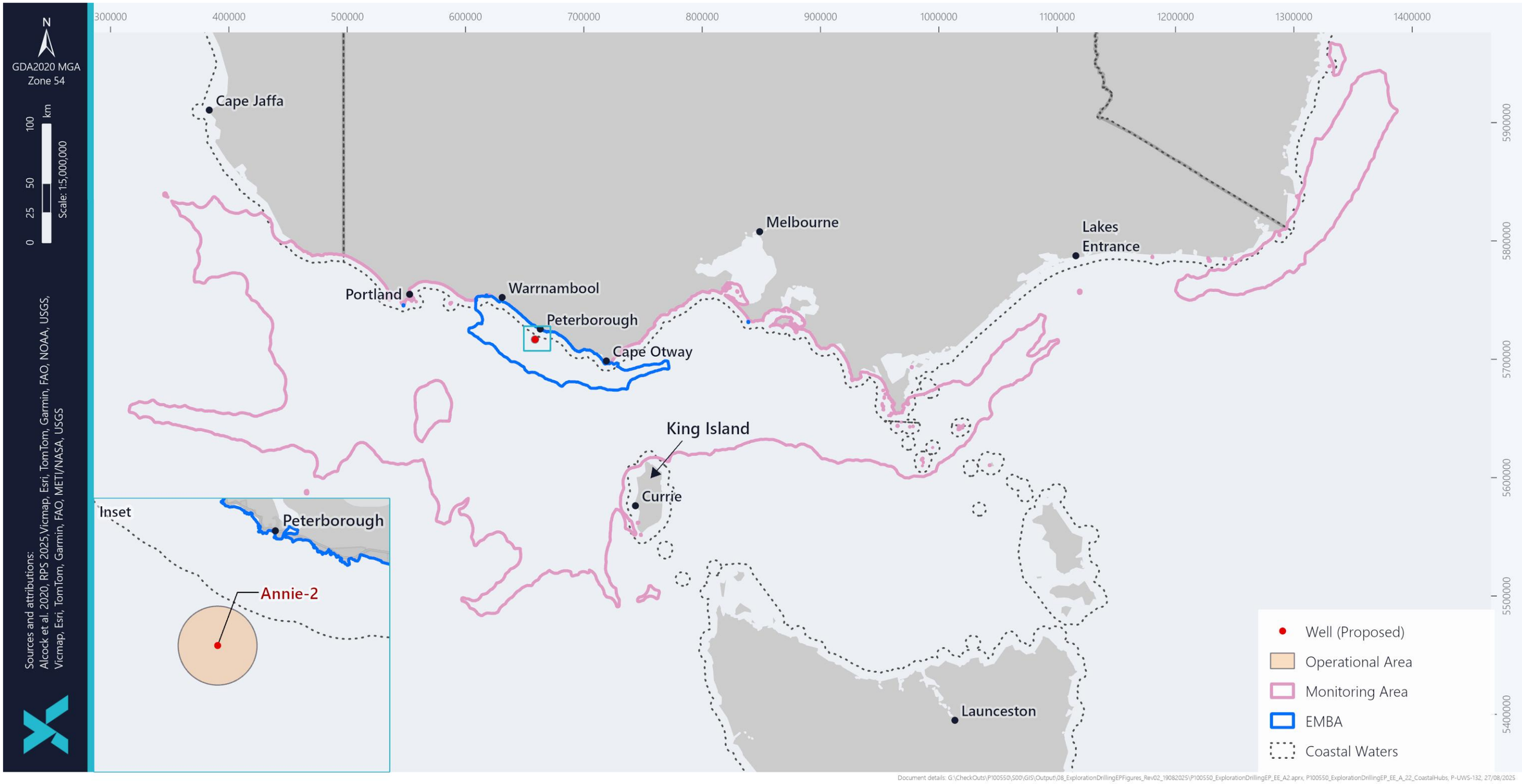


Figure 4-41: Coastal Settlements Within the Monitoring Area

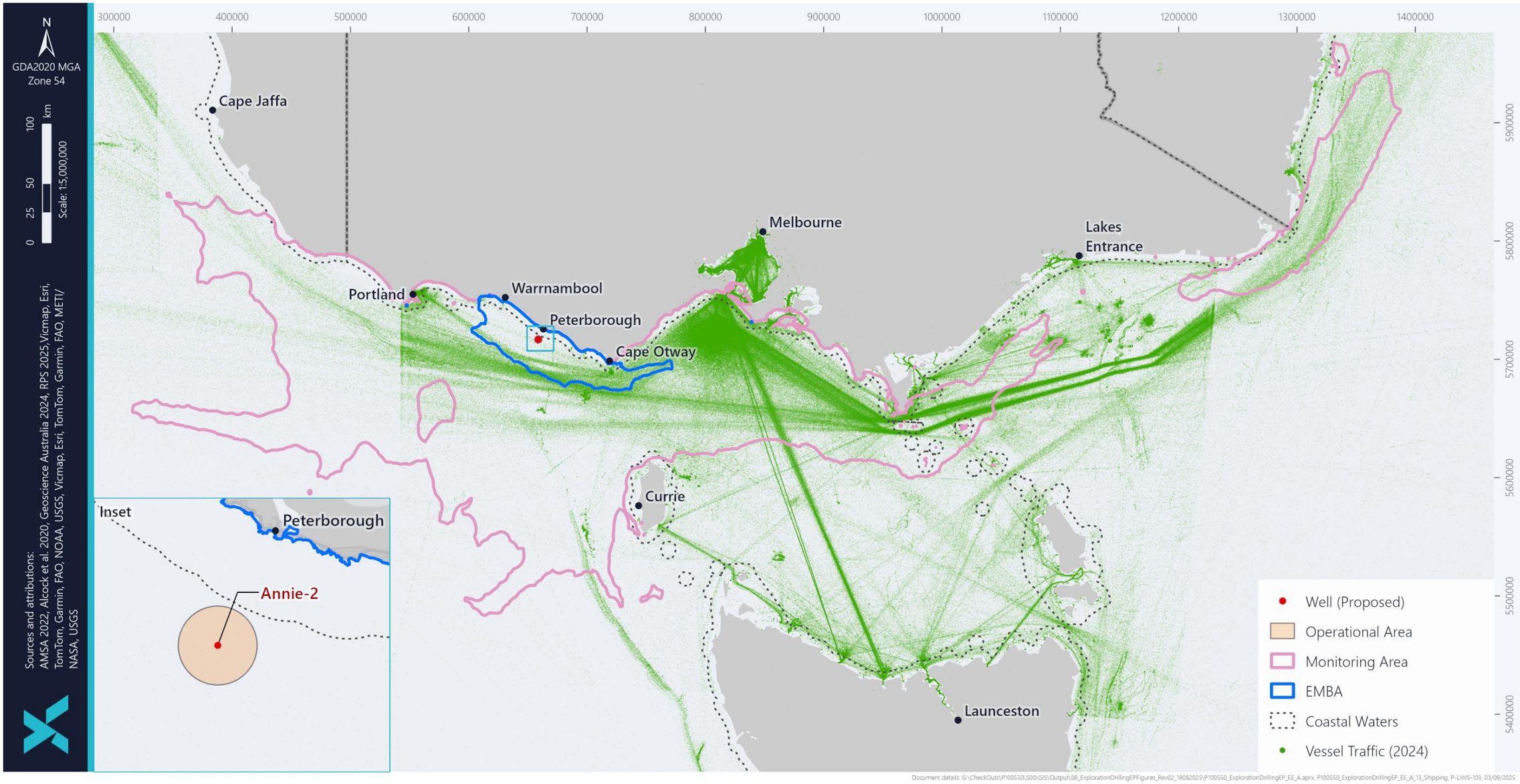


Figure 4-42: Vessel Traffic Within the Monitoring Area

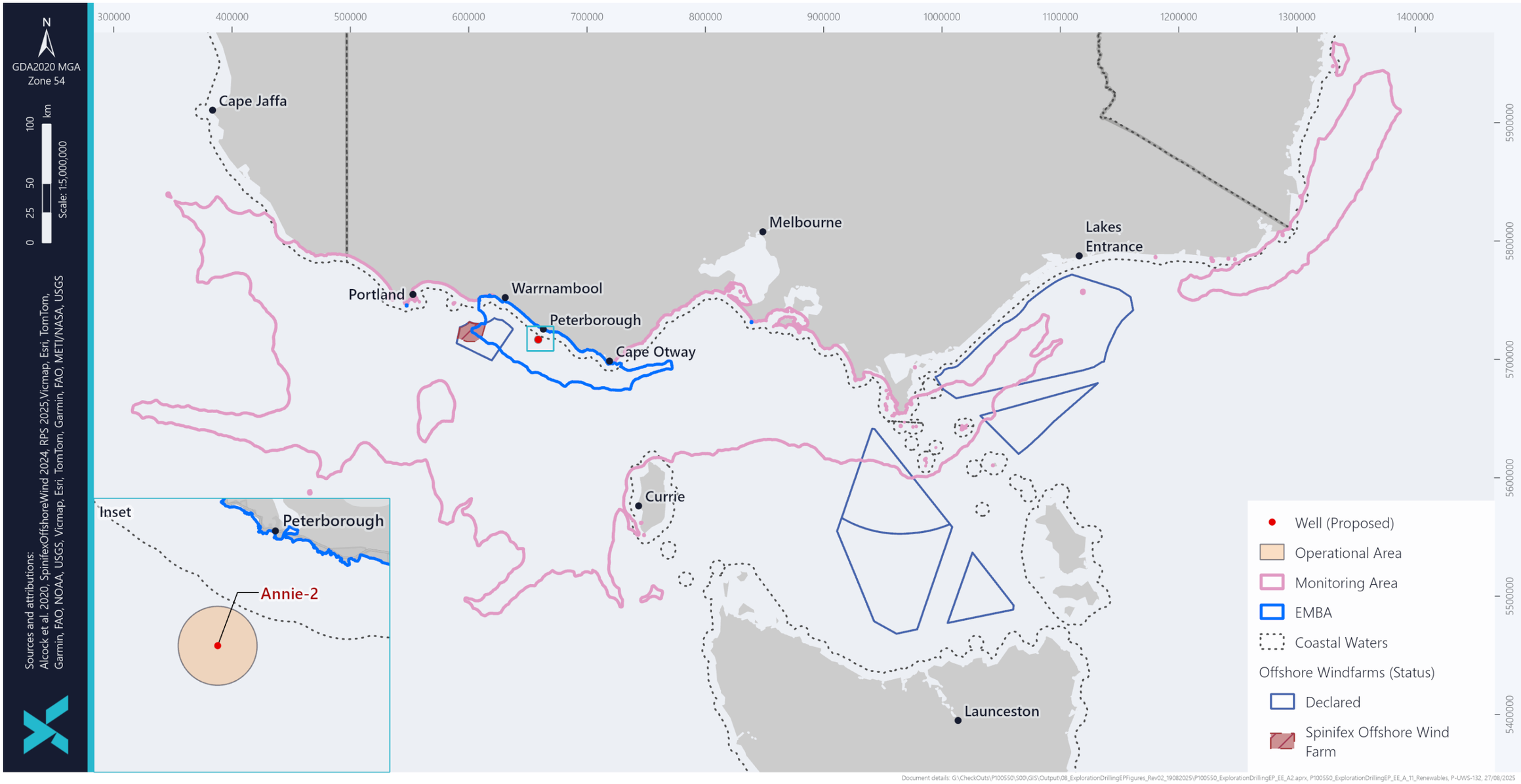


Figure 4-43: Offshore Declared Windfarms Within the Monitoring Area

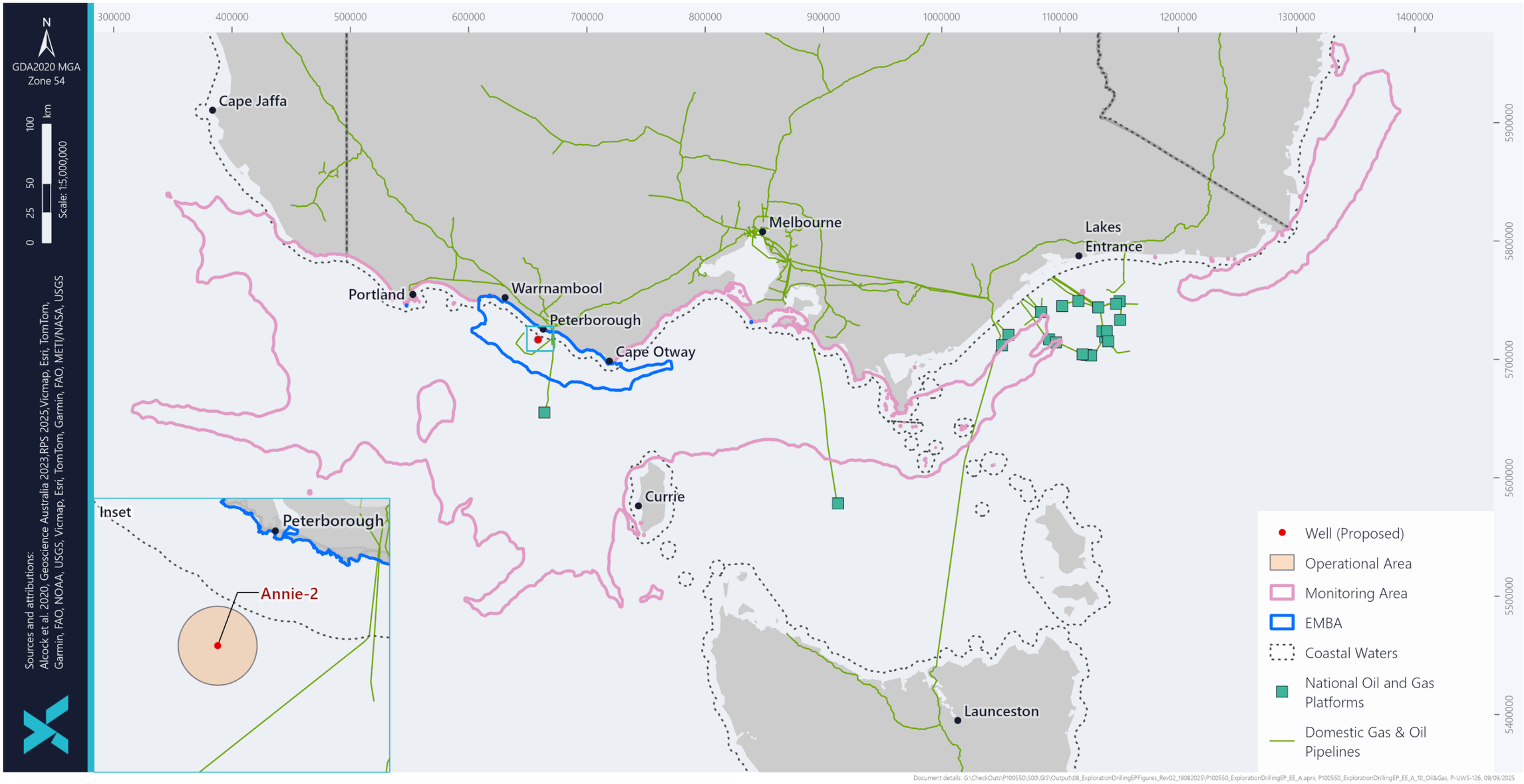


Figure 4-44: Domestic Gas and Oil Pipelines Within the Monitoring Area

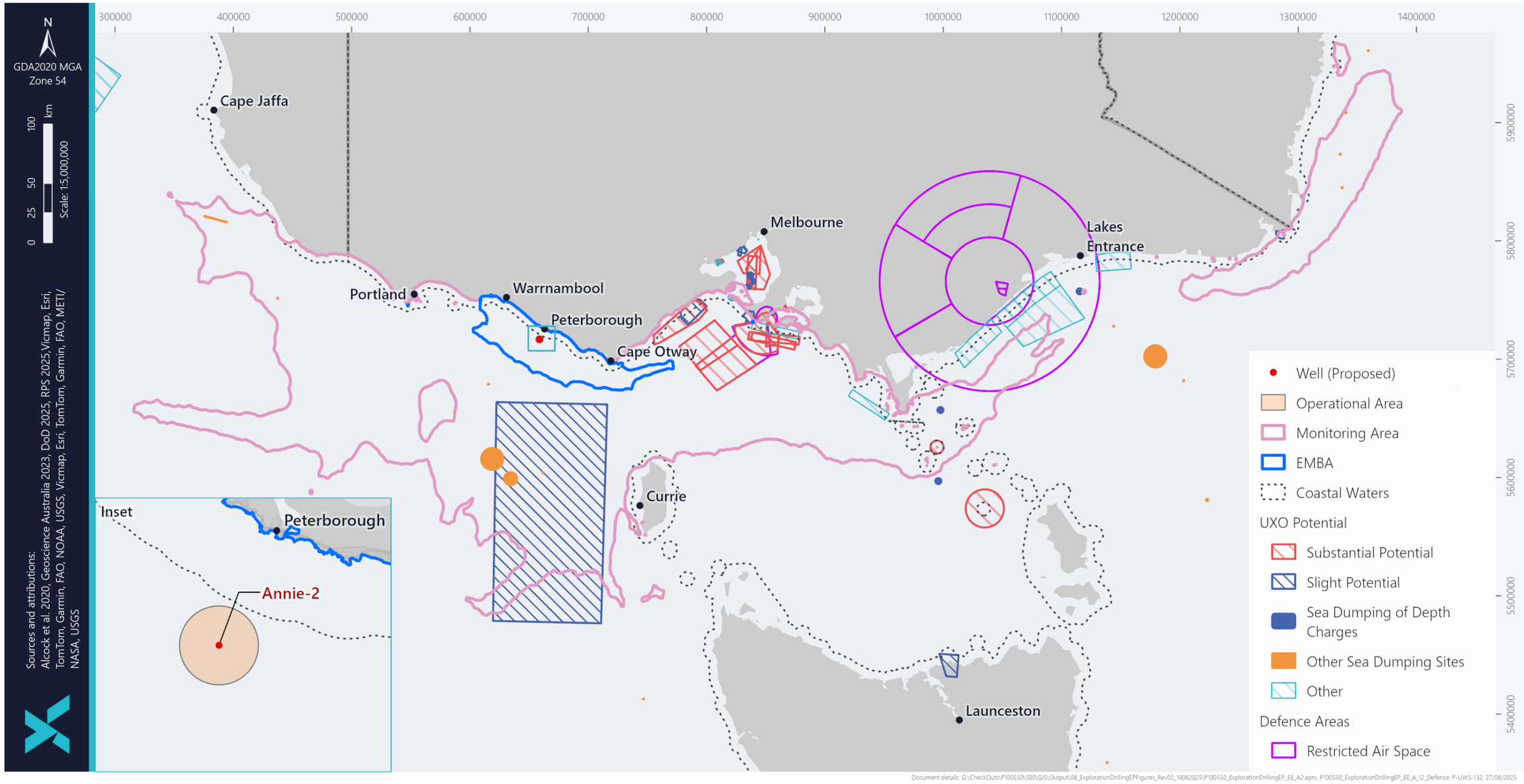


Figure 4-45: UXO Potential and Defence Areas Within the Monitoring Area

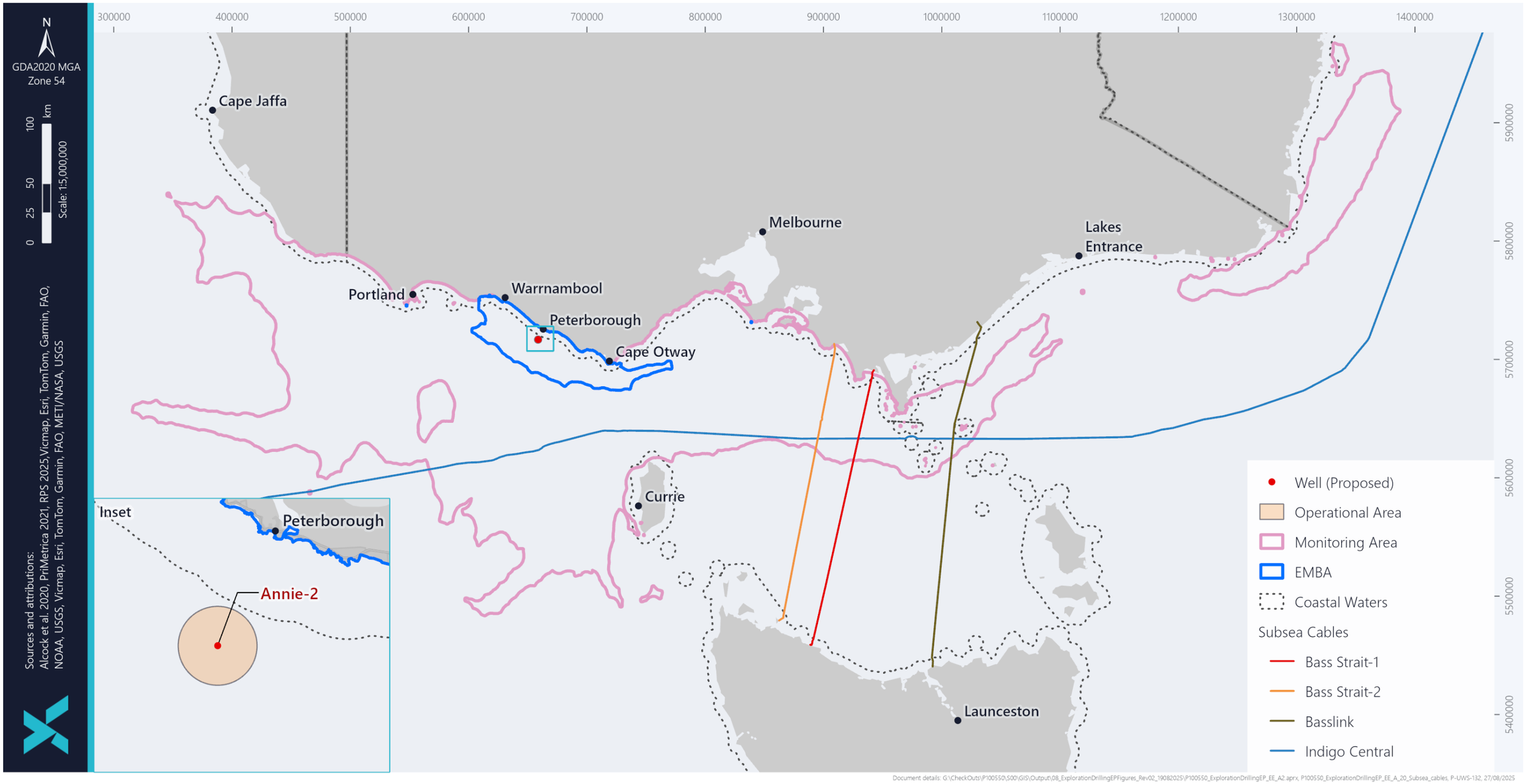


Figure 4-46: Subsea Cables Within the Monitoring Area

4.4.4 Cultural Receptors

The cultural features of the environment may include cultural heritage sites, and values relating to First Nations people's traditional culture and customs (NOPSEMA 2024). Guidance from the documents in Table 4-6 were used to identify tangible and intangible cultural features of the environment relating to First Nations people's heritage sites and values, as well as consultation with First Nations peoples, participation in cultural experiences and training led by Gunditjmara Guide on Gunditjmara Country.

Table 4-6: Guidance Documents used to Identify Cultural Features of the Environment Relating to First Nations People's Heritage Sites and Values

Guidance Document	Document Type	Relevance to the Otway Offshore Operations
Gunditjmara Nyamat Mirring Plan 2023 – 2033 (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023)	Gunditjmara Sea Country Plan	The Gunditjmara Sea Country Plan outlines concerns, and the changes needed to be made for Gunditjmara to fulfil responsibilities to Country. The Plan includes a framework that describes goals and priority actions to achieve those goals that were used to help define First Nations people's heritage sites and values, impacts, and demonstrate acceptability in this EP.
Eastern Maar Meerreengeeye Ngakeeppoorryeeyt (Eastern Maar Aboriginal Corporation 2014)	Eastern Maar Country Plan	The Eastern Maar Country Plan includes details on cultural knowledge, values and perspectives, and ideas and priorities. The Plan defines the Eastern Maar vision for the future with identified goals and objectives that were used to help define First Nations people's heritage sites and values, impacts, and demonstrate acceptability in this EP.
Paleert Tjaara Dja Let's make Country good together 2020 – 2030 – Wadawurrung Country Plan (Wadawurrung Traditional Owners Aboriginal Corporation 2020)	Wadawurrung Country Plan	The Wadawurrung Country Plan consolidates information gathering from many Wadawurrung people including stories about Country. The Plan articulates how Wadawurrung Sea Country is cared for and managed over the next 10 years including listing values and threats to Wadawurrung values that were used to help define First Nations people's heritage sites and values, and impacts in this EP.
Gunaikurnai Whole-of-Country Plan (Gunaikurnai Land and Waters Aboriginal Corporation 2015)	Gunaikurnai Whole-of-Country Plan	The Gunaikurnai Whole-of-Country Plan provides a description of heritage, Country and threats to Country. The Plan provides a strategic framework that contains principles, strategic goals, and success measures that were used to help define First Nations people's heritage sites and values, impacts, and demonstrate acceptability in this EP.
Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) Code of Ethics for Aboriginal	Methodology guide	This AIATSIS code applies to all First Nations people research including planning, collection, analysis and dissemination of information or knowledge which is about or may affect First Nations people collectively or individually.

and Torres Strait Islander Research (AIATSIS 2020)		This AIATSIS code applies to all First Nations people research including planning, collection, analysis and dissemination of information or knowledge which is about or may affect First Nations people collectively or individually. This EP will contain research that concerns First Nations people in the following ways: • Research about First Nations people societies, culture and/or knowledge, and policies. • Impact assessment targeted on populations of First Nations people. • Through consultation, First Nations people have contributed to research. • New or pre-existing data relating to First Nations people is used in the description of environment and impact assessment. • Impact assessment concerns First Nations peoples' lands or waters.
Australian Government Style Manual (CoA 2023)	Terminology and style guide	The Australian Government Style Manual was used to help define culturally appropriate and respectful language when writing about First Nations people. To assist in writing about potential impacts to diverse First Nations people groups, the Style Manual was used to help define respectful naming protocols, including defining the identified relevant First Nations people's heritage sites and values. For example, the term 'Dreaming' is complex and within some First Nations people groups have varied meanings, as a result, this EP refers to 'Dreaming sites' and 'connection to Country' to define dreaming stories, ceremony, song and dance and receptors which connect to traditional activities which may be connected to the term 'Dreaming'.
The Burra Charter	Terminology guide	The Burra Charter outlines the steps in planning for and managing a place of cultural significance. The Burra Charter also defines objects and places of cultural significance relevant to First Nations people's heritage sites and values.

Published Country Plans from RAPs within the monitoring area describe the intrinsic links between cultural features of the environment and First Nations people's heritage sites and values (refer Table 5-5 in Appendix 4 -).

4.4.4.1 Native Title

There are 4 native Title Claims that overlap the Monitoring Area (Figure 4-47):

- VCD2007/001 Gunditjmara - Part A
- VCD2010/001 Gunai/Kurnai People
- VCD2011/001 Gunditjmara & Eastern Maar

- VCD2024/001 Eastern Maar People (No 2)

4.4.4.2 First Nations Cultural Features of the Environment

Table 4-7 lists the identified cultural features of the environment relating to First Nations people's heritage sites and values within the operational area and the monitoring area. The cultural ties and intrinsic link between the identified cultural features and First Nations people's heritage sites and values is also described and is informed by sources mentioned above.

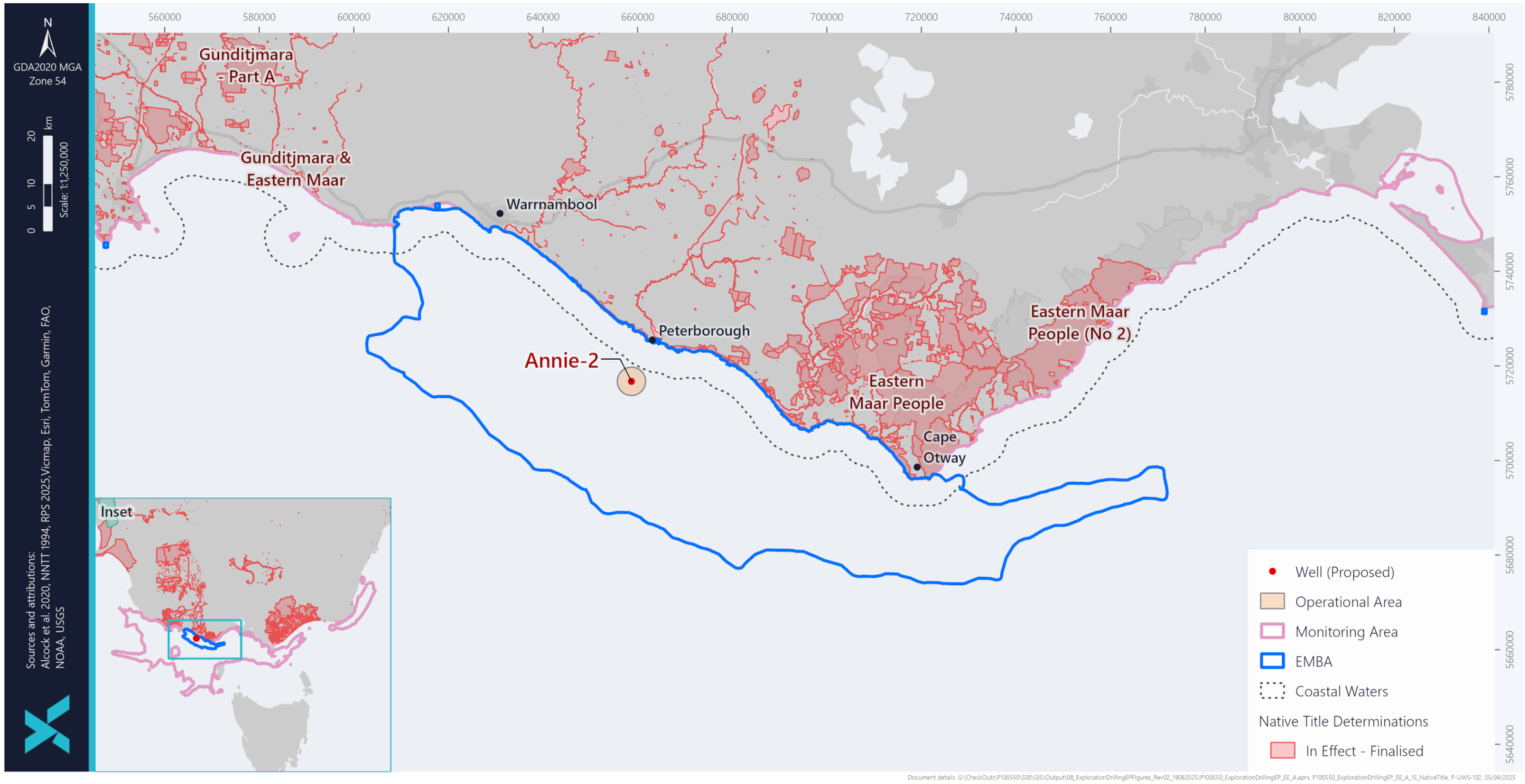


Figure 4-47: Native Title Determinations Within the Monitoring Area

Table 4-7: Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values proximal to Amplitude Energy Offshore Title Areas

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
Tangible Cultural Heritage (e.g. places, objects)						
Gunditj Mirring	Gunditjmara	Coastal/ island places and objects	Victoria-wide A search of the Victorian Aboriginal Heritage Register undertaken by Biosis identified 5,636 recorded Aboriginal places across the entire Victorian coastline (Biosis 2023). The dominant Aboriginal places located in the study area are shell middens (46.82%), artefact scatters (39.21%) and low-density artefact distribution (LDADs) (5.70%). Shell middens, artefact scatters and LDADs are considered cultural heritage objects for the purposes of this EP. Review of relevant Country Plans found 5 coastal/island places within Victoria that are considered significant locations: • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory • Tyrendarra lava flow. Deen Maar Deen Maar includes Deen Maar IPA on mainland Victora, near the town of Yambuk, and Deen Maar Island (Julia Percy Island), approximately 10km off the coast of Yambuk.	1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 14	-	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
			Deen Maar is Central to the creation of Country and has been important in burial rituals for First Nations Peoples (see below 'sacred sites' which Discusses the Intangible values of Deen Maar). Dean Maar Island was formed by volcanic eruptions millions of years ago. The island comprises a grassy plateau above steep rocky shores that are exposed to the ocean. Access to Deen Maar Island requires a permit. A rabbit eradication program is currently planned for the island in a collaboration between Victoria State government, EMAC and GMTOAC (Parks Victoria 2023). There is a large fur seal colony which inhabits the rocky shore, which are identified as a culturally significant species, and little penguins, that access the island via the exposed rocky shore. The land above the shore around Yambuk on the mainland includes natural surface (rainwater collecting) wells used by First Nations Peoples, property run by first nations peoples, and wind turbines which have been developed around existing cultural features (ACMI 2010). Tyrendarra lava flow The Tyrendarra lava flow is related to both the tangible and intangible, in that it is both a physical thing that was and still is used by Gunditjmara, and it is linked to stories of creation.			

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
			Within the GMTOAC` Sea Country Plan, and during consultation, GMTOAC shared stories of the creation of the Tyrendarra lava flow which is associated with the World Heritage listed Budge Bim aquaculture system (GMTOAC 2023). This lava flow begins at Mt Eccles and extends across coastal plains and offshore 5-10 km to the east of Portland at Julia Reef (Builth, 2004). Recent lava flows like Tyrendarra (circa 30,000 y) are linked to stories of creation, and these landforms have been engineered by Gunditjmara for thousands of years into aquaculture systems, enabling the collection, fattening up, harvest and trade of Kooyong (short-finned eel), a culturally significant species (described further below).			
Gunditj Mirring	Gunditjmara	Submerged sites	Review of relevant Country Plans identified potential submerged sites significant to First Nations people including the ancient Land Bridge (Figure 4-48), submerged landscapes (lava flows), and underwater cultural heritage sites. Sea Country is considered to extend beyond the formally defined RAP area to include sea and submerged lands to the edge of the continental shelf which may include submerged landscapes, and extensions to landscape features such as the Tyrendarra lava flow which extends offshore; these young (circa 30,000) lava flows are connected to stories of creation. The potential for lava flows within Cooper Energy's operated offshore Otway acreage was investigated by evaluating high-quality 3D seismic imagery (Cooper Energy internal review, May	1, 2, 3, 4, 5, 6, 9, 10	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
			2024). The review found no geological evidence of volcanic or hydrothermal flow events within the sedimentary record of the past 500,000 years within Cooper Energy's operated offshore Otway acreage. As a result, the presence of young lava flows within the operational area is not expected. The Gunaikurnai community have identified that 10,000 years ago, Victoria was connected to Tasmania by a land bridge. At this time, the marine parks and reserves around Wilsons Promontory were terrestrial habitats, inhabited by Gunaikurnai ancestors. It is estimated that rising sea levels at the end of the Ice Age (~14,000 years ago) flooded most of the Bassian Land Bridge, leaving the shallowest crossing readily passable on foot in an area east of Wilsons Promontory in Victoria and north of Hogan Island (located outside of the Otway Basin, in the Bass Strait). Based on bathymetric and topographic data of the land and seafloor of the Bass Strait, ~12,000 years ago, the Bassian Land Bridge was estimated to be completely submerged. The original surface of the Land Bridge is likely to have been eroded and removed, with any remaining artefacts likely buried beneath sediment deep below the ocean. Rising sea levels following the last glacial maximum and the known sea states of the Otway Coast (water depths and velocities) would make preservation of any "recently" buried anthropogenic structures or sites highly unlikely.			
Intangible Cultural Heritage (e.g. meanings, associations, connections)						

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
Gunditj Mirring	Gunditjmara	Sea Country	RAPs have defined area boundaries which extend to coastal waters. However, Sea Country is considered to extend beyond the formally defined RAP area to include sea and submerged lands to the edge of the continental shelf (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023; Eastern Maar Aboriginal Corporation 2014; Gunaikurnai Land and Waters Aboriginal Corporation 2015). Sea Country is an intrinsic value to First Nations people. It includes parts of open ocean, beaches, land and freshwater on the coast, habitats and encompasses all living things, beliefs, values, creation spirits and cultural obligations connected to an area.	1, 2, 3, 4, 5, 6, 7, 11, 12, 15	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					
Gunditj Mirring	Gunditjmara	Creation/ Dreaming sites, songlines, sacred sites and Ancestral beings	Stories and songlines link First Nations people to ancestors, culture, and Country. Dreaming stories further reinforce the memories and songlines relating to the flooding of Country, and significant connection to Sea Country. Dreaming songlines link tribal kings such as Umbarra or King Merriman to Wallaga Lake, and Borun the pelican who created songlines and storylines as he walked through Gunaikurnai Country. Gunaikurnai creation story, of Borun (the pelican) and Tuk (the musk duck), explains the connection to Country. For Gunditjmara, sites important for Dreaming include Deen Maar where Ancestors leave the earth. Deen Maar Island is believed to be the place where Punjil the creator, left this world	1, 2, 3, 4, 5, 6, 12, 15	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
			(Framlington Aboriginal Trust and Winda Mara Aboriginal Corporation (2004), ACMI (2010). Clark (2007) describes the story of a cave on the mainland, opposite Dean Maar Island, and of a passage between the two. The Cave and Deen Maar are both spiritually and visually connected. Grass found at the mouth of the cave provided proof that a good spirit had transferred the body of a recently buried person through the cave to Deen Maar Island and conveyed their spirit to the clouds. See Coastal / Island / Places for a physical description of Deen Maar Island.			
Gunditj Mirring Wadawurrung Eastern Maar Gunaikurnai Bunurong	Gunditjmara Wadawurrung Eastern Maar Peoples Gunaikurnai Bunurong	Cultural obligations to care for Country Knowledge Systems Connection to Country	First Nations people may maintain strong spiritual ties to Country. Spiritual connection to Country includes how Country provides spiritual life-giving resources for species and landscapes, places where the spirits of Ancestors rest (Deen Maar) or where spirits reside including water bodies; where peace, direction and purpose originates. If First Nations peoples cannot access areas of Sea Country that they typically do access, this may affect Traditional Owners connection to Country. In the case of Deen Maar, access could be visual access or physical access. First Nations People may be culturally obligated and inherently responsible to care, protect and heal Country for present and future generations. The roles held relating to taking care of Country and knowledge holding may vary amongst individuals and within clans and family groups. Roles may include taking	1, 2, 3, 4, 5, 6, 11 12, 13, 14	✓	✓

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
			care of culturally significant species or habitats of significant species known to be important food resources, and culturally significant landscapes and places. First Nations peoples ecological, spiritual, traditional and cultural knowledge may be passed through the generations using cultural practices (dreaming stories, ceremony, song and dance) where knowledge holders (Elders) are the custodians of knowledge. This knowledge may include culturally significant species, and landscape features that hold dreaming and creation stories or are events and ceremonial places critical for intergenerational knowledge sharing and cultural practice. Knowledge holders have responsibility for traditions, observances, customs or beliefs associated with specific areas.			
Habitats and species						
Gunditj Mirring	Gunditjmara	Culturally significant species/ food resources: Fish, sharks, rays, eels, shellfish and crustaceans -collection from coastal and	Fish, sharks, eels, crayfish, yabbies mussels, oyster and rays may be a valued source of food and hold significance for First Nations people. GMTOAC have highlighted short-finned eels (Kooyang) as of particular significance to Gunditjmara people, who developed complex aquaculture systems to trap and store eels. The aquaculture systems were engineered from the volcanic formations associated with the Tyrendarra Lava flow to create Budj Bim. The eels which are a valued source of food, were captured, fattened up, harvested, smoked and traded, and	1, 2, 3, 5, 4, 6, 11, 12, 13	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
		riverine environments.	continue to hold cultural significance for Gunditjmara. Today there are cultural tours at Budj Bim, run by Gunditjmara peoples. The short-finned eel species migrates through State waters and Commonwealth Marine Area of the Otway Region between freshwater systems in Victoria including within Gunditjmara Country, to / from spawning grounds in the Coral Sea, thousands of km to the north. Based on the observed migratory route of short-finned eels, short-finned eels in adult and glass eel forms may pass the operational area during seasonal migrations. During late summer and autumn adult eels will enter the Otway Basin and Bass Strait to commence their migration to the Coral Sea. During mid-winter to late spring, the short-finned eel in larvae and glass eel forms will enter Victorian estuaries to complete the upstream migration. Upon entering the marine environment, eels disperse widely. Individuals' migratory paths are known to diverge widely, and timing of arrival in the Coral Sea is also variable.			
Gunditj Mirring	Gunditjmara	Culturally significant species: Cetaceans	First Nations people around Australia may have a strong connection to whales, which has significance as totemic ancestors to some groups. Karntubul (whales) in Sea Country hold deep cultural significance to the Gunditjmara and feature in Dreaming stories, ceremony, song and dance traditions.	1, 2, 3, 8, 12, 15	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
			Whale migration occurs through the operational area and monitoring area. Whale migration is associated with the belief that whales are ancestors of some First Nations peoples and arrive to the coast, annually. Key whale species which may relate to a practice of 'calling in' the whales back to the coast are the southern right whale, which reproduce close to shore, and are often observable from shore, though other whales can also be observed from shore, including humpback whales. Whale beaching events may be of significance to First Nations people, as parts of deceased whales were, and can still be used as a resource. Multiple whale species have the potential to beach in the region, including, though not limited to the southern right whale, pygmy blue whale, and humpback whale.			
Wadawurrung Gunaikurnai	Wadawurrung Gunaikurnai	Culturally significant species: Pinnipeds	Koorn Moorn (seals) are culturally significant for Gunditjmara people. They feature in song and dance and were collected as a food resource in traditional times by Gunditjmara women along the coast. The Australian sea-lion, southern elephant seal, New-Zealand fur seal, and Australian fur seal are known to occur within the monitoring area, including a large colony of Fur Seals at Deen Maar Island that haul out on the island's rocky shores.	1, 2, 4, 15	✓	✓
Gunditj Mirring Wadawurrung	Gunditjmara Wadawurrung		Different avian species hold deep connections to lore and represent spiritual emblems or totems. Magpie gees and Cape	1, 2, 3, 4, 5, 6, 8	✓	✓

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
Eastern Maar	Eastern Maar Peoples	Culturally significant species: Seabirds	Barren geese were harvested for food from wetland habitats. Wetland habitat loss has reduced numbers of these species and harvesting not permitted in Victoria.			
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					
Gunditj Mirring	Gunditjmara	Culturally significant species: Plankton	The Bonney upwelling system is valued by Gunditjmara for the cold waters and nutrients it brings to the region, which supports plankton growth, providing a food source for culturally significant species (GMTOAC 2023). The Bonney upwelling is a large-scale oceanographic system and key ecological feature that influences the Otway coast (Appendix 4 -) the feature is active in Autumn and Summer depending on the strength and frequency of alongshore winds (Bulter et al. 2002). The area is significant as one of the largest and most predictable upwellings in south-eastern Australia, and most prominent upwelling system driven by prevailing south-easterly winds	1	✓	✓
Gunditj Mirring	Gunditjmara	Water quality	Water including marine and freshwater systems, may be of particular cultural significance to First Nations people as an integral part of songs, ceremonies, hunting and collecting, and other activities that bind people to their Country and each other. First Nations communities in Victoria may maintain strong connections to water and culture. Increased pollution from coastal communities, agriculture and industry, may affect	1, 2, 3, 4, 5, 6	✓	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
			water quality, impact marine species and therefore harms Country.			
Gunditj Mirring	Gunditjmara	Benthic habitats	Nearshore reefs provide habitat for many culturally significant species such as macroalgal communities, fish, sharks and rays. Julia Reef is within sea country adjacent to Gunditj Mirring RAP and is an extension of the volcanic feature connected to Budj Bim. Julia Reef marks the seaward extent of the Tyrendarra lava flow, ending approximately 15 km offshore and 10-15km east of Portland (Builth, 2004). Julia Reef is a preferred fishing spot for recreational fishers (VFA 2022a).	1	-	✓
Gunditj Mirring	Gunditjmara	Intertidal communities and shorelines	Intertidal communities and shorelines include mangroves, macroalgae, seagrass, coastal saltmarsh, rocky and sandy shorelines. Intertidal reefs and sandy shorelines are important cultural heritage sites and are important for marine fauna and culturally significant marine life such as seabirds and migratory shorebirds, fish, sharks, rays, eels, and pinnipeds. Sea Country for Wadawurrung people includes coastal habitats such as seagrass and saltmarsh.	1, 2, 3, 4, 5, 6	-	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					
Gunaikurnai	Gunaikurnai					
Bunurong	Bunurong					
Gunditj Mirring	Gunditjmara	Marine Park/ coastal reserves / wetlands	The First Nations people residing within the monitoring area may have strong cultural associations with Sea Country and may have cultural responsibilities for the waters and Marine Parks and Reserves that are located within Country. Some First	1, 2, 3, 4, 5, 6, 11, 12	-	✓
Wadawurrung	Wadawurrung					
Eastern Maar	Eastern Maar Peoples					

First Nations Group	Representing	Identified Cultural Features of the Environment relating to First Nations People's Heritage Sites and Values	Intrinsic link between Cultural Features and First Nations People's Heritage Sites and Values	Sources	Potential for overlap of Operational Area	Potential for overlap of Monitoring Area
Gunaikurnai Bunurong	Gunaikurnai Bunurong		Nations groups including the Gunaikurnai people have joint management over the Marine Parks and reserves within Country. Marine parks and reserves around Wilsons Promontory and Ninety Mile Beach National Park were inhabited Gunaikurnai ancestors. Marengo Reef Marine Park holds cultural significance for the Eastern Maar people. The marine park includes rocky features with high structural diversity, and provides for numerous filter-feeding organisms, such as tube worms and barnacles, and are surrounded by bull kelp. Islands within the park are known as a haul out site for fur seals. Wadawurrung Country covers the Avalon Coastal reserve.			

Sources:

1. Gunditj Mirring Traditional Owners Aboriginal Corporation 2023
2. Wadawurrung Traditional Owners Aboriginal Corporation 2020
3. Eastern Maar Aboriginal Corporation 2014
4. Gunaikurnai Land and Waters Aboriginal Corporation 2015
5. Biosis 2023
6. Bunurong Land Council Aboriginal Corporation 2024
7. The University of Adelaide 2023.
8. Parks Victoria 2019
9. Adeleye et al. 2021
10. Hamacher et al. 2023
11. Smyth, Egan, & Kennett 2018.
12. Nunn and Reid 2016
13. DoE 2015b
14. Victorian Aboriginal Heritage Council 2021
15. Director of National Parks 2025.

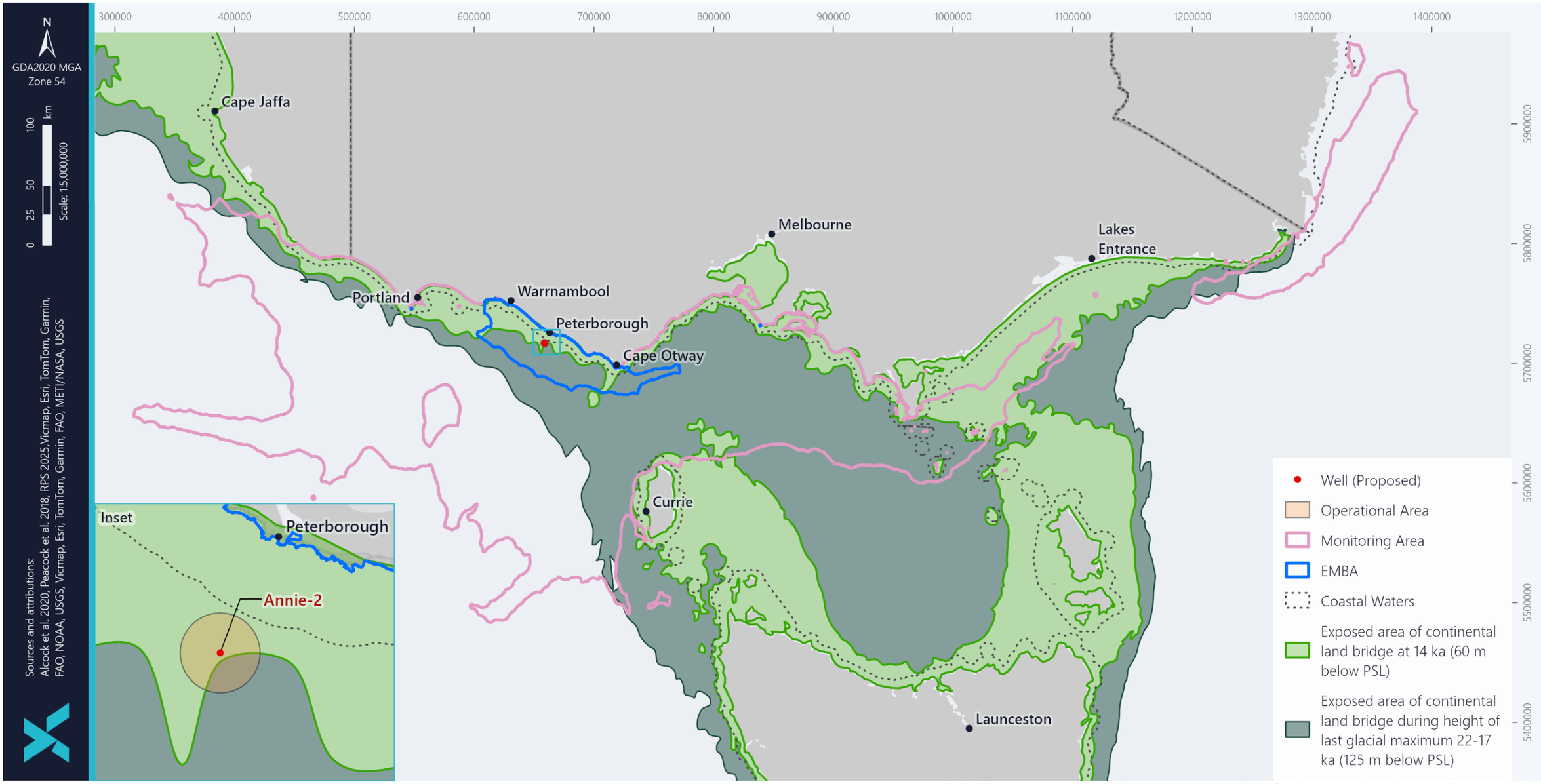


Figure 4-48: Exposed Area of Continental Bassian Land Bridge Within the Monitoring Area

4.4.5 Seasonality of Key Sensitivities

Table 4-8: Seasonality of Key Sensitivities within the Otway Basin

Environmental Sensitivity	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Marine Mammals												
Antarctic minke whale			Likely to occur in the austral summer									
Australian sea lion	Assumed present year-round – South-east marine region (SEMR) is a known range											
Australian fur seal (Koorn Moorn)	Present year-round – Islands of the Bass Strait are known colonies Breeding occurs during summer months (October-December)											
Pygmy blue whale		Foraging occurs during Bonney Upwelling – BIA										
Dusky dolphin	Assumed present year-round – prefers inshore habitats but may also be pelagic at times											
Fin whale	Present during the Bonney Upwelling events											
Humpback whale				Nth Migration through SEMR						Sth Migration through SEMR		
Killer whale	Assumed present year-round – frequent sightings off Vic along the continental slope and shelf											
Pygmy right whale	Uncommon / few or no records available for Vic.											
Sei whale	Sighted during the Bonney Upwelling event											
Southern right whale – migration				Species is regularly present on the Australian coast between early-April to early November								
Southern right whale – reproduction							Peak reproductive behaviours mid-					

Environmental Sensitivity	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
							July through to August					
Sperm Whale	Prefer deep offshore environments >600 m											
Marine Reptiles												
Green turtle	Occurs in limited numbers in Vic and SA											
Leatherback turtle	Foraging in the SEMR is known to occur											
Loggerhead turtle	Uncommon in southern Australia											
Fish, Sharks and Rays												
Kooyang (Short finned eel)		Adult eels begin seasonal migration to the Coral Sea.					Larvae and glass eel forms enter Victorian estuaries to complete upstream migration.					
Australian grayling		Spawning from late Summer to Winter (freshwater)				Assumed present year-round – typically occurs in freshwater but can occur in coastal seas						
White shark	Assumed present year-round with distribution and foraging BIAs identified throughout the region											
Blue warehou	Assumed present year-round											
Eastern school shark	Assumed present year-round											
Orange roughy	Assumed present year-round											
Avifauna												
Antipodean albatross	Foraging known to occur all year											
Australasian gannet						Present year-round – foraging and aggregation BIAs				Breeding occurs Oct – May		
Black-browed albatross				Fledglings (Apr – May)		Present – foraging BIA			Breeding within SEMR on Macquarie Is.			

Environmental Sensitivity	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Black-faced cormorant	Assumed present year-round (endemic to southern Australia)											
Buller's albatross	Foraging BIA – however, records indicate the species is mainly present around Tas when in the SEMR (species endemic to NZ)											
Campbell albatross					Present in the non-breeding season – foraging BIA			Breeds on Campbell Island, south of NZ Aug - May				
Common diving petrel		Present year-round – foraging BIA					Breeding occurs Jul-Jan – breeding BIA					
Indian yellow-nosed albatross			Fledgling Mar-Apr			Non-breeding visitor – foraging BIA			Breeding occurs in South Africa – eggs laid in Sep-Oct			
Little penguin			Present year-round – foraging BIA						Breeding Sept – Feb			
Short-tailed shearwater (mutton bird)	Present Sep-May – foraging BIA					Migrates north for Winter				Breeding Oct – May		
Shy albatross	Assumed present year-round – foraging BIA. Breeding occurs in SEMR with eggs laid in Sept and fledglings in Apr											
Wandering albatross	Assumed present year-round – foraging BIA. Breeding occurs biennially on Macquarie Island with eggs laid in Dec and fledglings between mid-Nov and late-Feb											
White-faced storm petrel	Fledglings mid-Feb – mid-Mar Foraging BIA during breeding season			Migrates to tropical and subtropical locations in non-breeding season					Species arrive at breeding colonies late-Sept – early-Oct with egg laying occurring in early Summer. Foraging BIA during breeding season			
Avifauna – other seabirds (With no BIAs identified)	Various species – assumed present											
Avifauna – shorebirds	Various species – assumed present											
Legend												
	Peak occurrence / activity (reliable and predictable)											
	Low level of occurrence/ activity (may vary from year to year), or otherwise as described above											
	No occurrence											

5.0 Impact and Risk Assessment

The regulations require an EP details the environmental impacts and risks associated with the activity, that the EP comprises an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk, and that those impacts, and risks be reduced to ALARP and are of an acceptable level,

This EP provides the environmental impact and risk evaluation for the Activity activities by adopting the Amplitude Energy Risk Management Protocol (CMS-RM-PRO-0001) and Risk Matrix and Assessment Criteria (CMS-RM-RAS-0001). This Protocol is consistent with the approach outlined in ISO 31000:2018 Risk Management - Guidelines).

Figure 5-1 provides the six-step process adopted for the evaluation of impacts and risks associated with the activity and is integral to the Amplitude Energy risk assessment methodology.



Figure 5-1: CEMS Risk Management Protocol (six-step process)

Further details of the environmental impact and risk assessment methodology are provided in the following sections, including assessment criteria and risk ratings.

A Risk Register is 'the managed repository of key risk information maintained by each Business Area'. It is a living part of risk management that is continually reviewed and updated. In accordance with the Amplitude Energy Management System (CEMS) Risk Management Protocol, each Business Area must maintain a Risk Register and conduct risk management as an integral activity within all business processes to help manage uncertainty in achieving objectives and to aid in decision making. Section 6.0 expands on the Activity Risk Register, showing all identified risks, impacts, preventative and mitigative controls.

5.1 Definitions

In this section, Amplitude Energy has provided a list of terminology and definitions that will be meet the requirements of Section 21(5) of the OPGGS(E)R:

Activity: An activity refers to a component or task within an Activity which results in one or more environmental aspects.

Aspect: An environmental aspect is an element or characteristic of an activity, product, or service that interacts or can interact with the environment. Environmental aspects can cause environmental impacts or may create a risk to one or more environmental receptors.

Consequence: The consequence of an impact (or risk event) is the outcome of the event on affected receptors. Consequence can be positive or negative.

Impact: An environmental impact is a change to one or more environmental receptors that is caused either partly or entirely by one or more environmental aspects. An impact is something which is certain to occur. An environmental aspect can have either a direct impact on the environment or contribute only partially or indirectly to a larger environmental change. An environmental aspect may result in a change which puts one or more receptors at risk of being impacted. The relationship between environmental aspects and environmental impacts is one of cause and effect. The term 'impact' is associated with planned activities and known outcomes.

Likelihood: The likelihood (or probability) of the consequence occurring. Likelihood only applies to risk and risk events.

Residual risk: Residual risk is the risk remaining after additional control measures have been applied (i.e. after impact or risk treatment).

Risk: An environmental risk (or risk event) is a change which could occur to one or more environmental receptors, caused either partly or entirely by one or more environmental aspects. A risk event has a degree of likelihood, it is not certain to occur. The term 'risk' is associated with planned and unplanned activities where the change elicited on or by a particular receptor is uncertain.

Risk severity: The risk severity level is determined from the point on the risk matrix where the consequence intersects the likelihood.

5.2 Risk Management Process Steps

This section provides a detailed overview of the risk management process steps.

5.2.1 Step 1: Establish the Context

All components of the petroleum activity relevant to this scope have been identified and described in Section 3.0 of this EP.

After understanding the petroleum activity, an assessment was carried out to identify relevant aspects. The stakeholder consultation outcomes, undertaken over several years, have also contributed to aspect identification. The environmental aspects identified for this petroleum activity are detailed in Section 4.0.

5.2.2 Step 2: Risk Identification

Risk identification involved the documentation of specific risks as they relate to the context established in Step 1 (Section 5.2.1). An environmental risk assessment was undertaken to identify environmental impacts and risks associated with the petroleum activity. The assessment was attended by Activity personnel spanning operations, well engineering, subsea, HSEC disciplines and may be supported by other specialists.

Cumulative impacts associated with the activity and adjacent activities were also considered. NOPSEMA provide a definition of cumulative impacts within the Environment Plan decision making guideline (NOPSEMA 2024) as:

"In the context of offshore petroleum activities, cumulative environmental impacts are successive, additive or synergistic impacts of collectively significant activities or projects with material impacts on the environment that have the potential to accumulate over temporal and spatial scales".

As described in Section 4.4.3, other oil and gas titleholders are currently operating within Commonwealth waters in the Otway Basin, with additional titleholders also proposing upcoming activities. These activities have been identified and assessed in alignment with the NOPSEMA definition above. The NOPSEMA Environment Plan website was used to identify reasonably foreseeable future projects and activities through approved and under assessment published EPs. Each published EP provided an environmental baseline within the Description of the Environment reflecting the effects of previous and current activities and outlines any threats. The existing Otway offshore facilities and associated activities form part of the current baseline given their ongoing presence for a number of years.

5.2.3 Step 3: Risk Analysis

All impacts and risks identified during the assessment were analysed. Impact and risk analysis requires a level of consequence to be assessed for each impact or risk event. For each risk event, the likelihood of occurrence was determined.

Impacts and risks were evaluated using the Amplitude Energy Risk Matrix, which includes:

- A six-level likelihood table to assess the probability of risk occurrence.
- A five-level consequences table to assess the risk impact against business objectives (Table 5-1).
- A matrix of likelihood versus consequence that defines four levels of risk severity and allows a risk to be assessed and plotted.
  - The outcome of the plotted risks is termed a 'Heat Map' and provides a graphic representation of the risks, their respective severities and likelihood.
- A four-level risk severity table that defines the actions and escalation required for risks at different severity levels.

The Amplitude Energy Risk Matrix is provided in Table 5-2.

Table 5-1: Environmental Consequence Assessment Criteria

Consequence Level	Environmental Consequence Description
1	Minor local impacts or disturbances to flora/fauna, nil to negligible remedial/recovery works on land/ water systems.
2	Localised short-term impacts to species or habitats of recognized conservation value not affecting local ecosystem function; remedial/recovery work to land, or water systems over days/weeks.
3	Localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function; remedial/recovery work to land/water systems over months/year.
4	Extensive medium to long-term impact on highly valued ecosystems, species populations or habitats; remedial/recovery work to land/ water systems over 1 – 10 years.

5	Severe long-term impact on highly valued ecosystems, species, or habitats. Significant remedial/recovery work to land/water systems over decades.

The Risk Severity can be:

- **Extreme (red):** inherent risk at this level is not within the Company's risk appetite. Activity cannot proceed until the Managing Director approves the treatment plans that eliminates or reduces Health Safety and Environment risks to ALARP and reduce risks in other categories in line with the Company's risk appetite. The Board must be informed of the risk and its treatment.
- **High (orange):** inherent risk at this level requires the respective ELT Member to approve the treatment plans before the activity proceeds. Treatment plans are required to eliminate or reduce Health, Safety and Environment risks to ALARP and reduce risks in other categories in line with the Company's risk appetite. the Managing Director and the Board must be informed of the risk and its treatment.
- **Moderate (yellow):** inherent risks at this level may be acceptable if they are in line with the Company's risk appetite. Except for Health, Safety and Environment risks which must be eliminated or demonstrated as reduced ALARP. Appropriate Managers or Functional Leaders must approve treatment plans and risks should be reported during regular reporting.
- **Low (green):** this level of risk is broadly acceptable; however, Health Safety and Environment risks must be eliminated or demonstrated as reduced ALARP with treatment plans approved by assigned persons. For risks in other categories, as a minimum, a review of existing control measures should occur, and the risk should be regularly monitored for deterioration.

Note: Key descriptor words relating to duration, spatial extent and magnitude from these definitions, are used within the risk management process for consideration of all elements of the environment, including ecological, physical and social receptors. These receptors are identified within the existing environment section and integrated into the risk assessment through activity-aspect interaction scoping.

Table 5-2: Amplitude Energy Qualitative Risk Matrix

Likelihood						Consequence				
Qualitative					Quantitative					
Rating	Level	Probability	Time Period	Description		1	2	3	4	5
A	Almost certain	> 80%	More than once a year	Expected to occur in most circumstances and/or more than once a year, or repeatedly during the activity.	$>10^{-2}$	Moderate	Moderate	High	Extreme	Extreme
B	Likely	> 50%	Every 1 – 2 years	Not certain to happen but an additional factor may result in an occurrence. Expected to occur from time to time during the activity.	$>10^{-2}$	Low	Moderate	Moderate	High	Extreme
C	Possible	> 20%	Every 4 – 5 years	Could happen when additional factors are present. Easy to postulate a scenario for the occurrence but considered doubtful. Expected to occur once during the activity.	$>10^{-3}$	Low	Moderate	Moderate	High	High
D	Unlikely	> 5%	Every 5 – 20 years	A rare combination of factors would be required for an occurrence. Conceivable and could occur at some time. Could occur during the activity.	$>10^{-4}$	Low	Low	Moderate	Moderate	High
E	Remote	< 1%	Every 20 – 100 years	A freak combination of factors would be required for an occurrence. Not expected to occur during the activity. Occur in exceptional circumstances.	$>10^{-5}$	Low	Low	Moderate	Moderate	High

Likelihood						Consequence				
Qualitative					Quantitative					
Rating	**Level**	**Probability**	**Time Period**	**Description**		**1**	**2**	**3**	**4**	**5**
F	Hypothetical	< 1%	Not in 100 years	Generally considered hypothetical or non-credible. Black Swan.	$>10^{-6}$	Low	Low	Low	Low	Moderate

5.2.4 Risk Evaluation

5.2.4.1 Identify and Evaluate Controls

Controls are any measures exercised that modify the impact or risk. Controls that act on an impact cause to reduce the consequence of the impact. Controls that act on a risk cause to reduce the likelihood of the risk occurring and are termed preventative controls. Reactive controls are those that modify the consequence once a risk event has occurred.

For the risk evaluation, all controls identified are captured for each risk.

The risk evaluation assessed each control for its effectiveness in managing the risk causes and consequences. This may be different from the effectiveness of the control to deliver its original designed purpose.

5.2.4.2 Determine ALARP Status

The ALARP status of each impact and risk was assessed based on the sufficiency of the controls already established and the opportunity for new controls to be implemented. A cross-functional team was assembled to ensure the risks and controls were assessed from different perspectives and to identify the possibility of additional controls that can reduce the risk. Where no additional realistic and feasible controls were identified for the risk, it is considered ALARP.

In alignment with NOPSEMA's ALARP guidance note (N-04300-GN0166 A138249, 1/8/2022), Amplitude Energy have adapted the approach developed by Oil and Gas UK (OGUK) (formerly UKOOA) (OGUK, 2014) for use in an environmental context to determine the assessment technique required to demonstrate that potential impacts and risks are ALARP (Figure 5-2).

Specifically, the framework considers impact consequence and several guiding factors:

- activity type
- risk and uncertainty
- stakeholder influence.

A **Type A** decision is made if the risk is relatively well understood, the potential impacts are low, activities are well practised, and there are no conflicts with company values, no partner interests and no significant media interests. However, if good practice is not sufficiently well defined, additional assessment may be required.

A **Type B** decision is made if there is greater uncertainty or complexity around the activity and/or risk, the potential impact is moderate, and there are no conflict with company values, although there may be some partner interest, some persons may object, and it may attract local media attention. In this instance, established good practice is not considered sufficient and further assessment is required to support the decision and ensure the risk is ALARP.

A **Type C** decision typically involves sufficient complexity, high potential impact, uncertainty, or stakeholder influence to require a precautionary approach. In this case, relevant good practice still must be met but additional assessment is required, and the precautionary approach is applied for those controls that only have a marginal cost benefit. In accordance with the regulatory requirement to demonstrate that environmental impacts and risks are ALARP, Amplitude Energy has considered the above decision context in determining the level of assessment required. This is applied to each aspect described in Section 6.0.

The assessment techniques considered include:

- good practice
- engineering risk assessment
- precautionary approach.

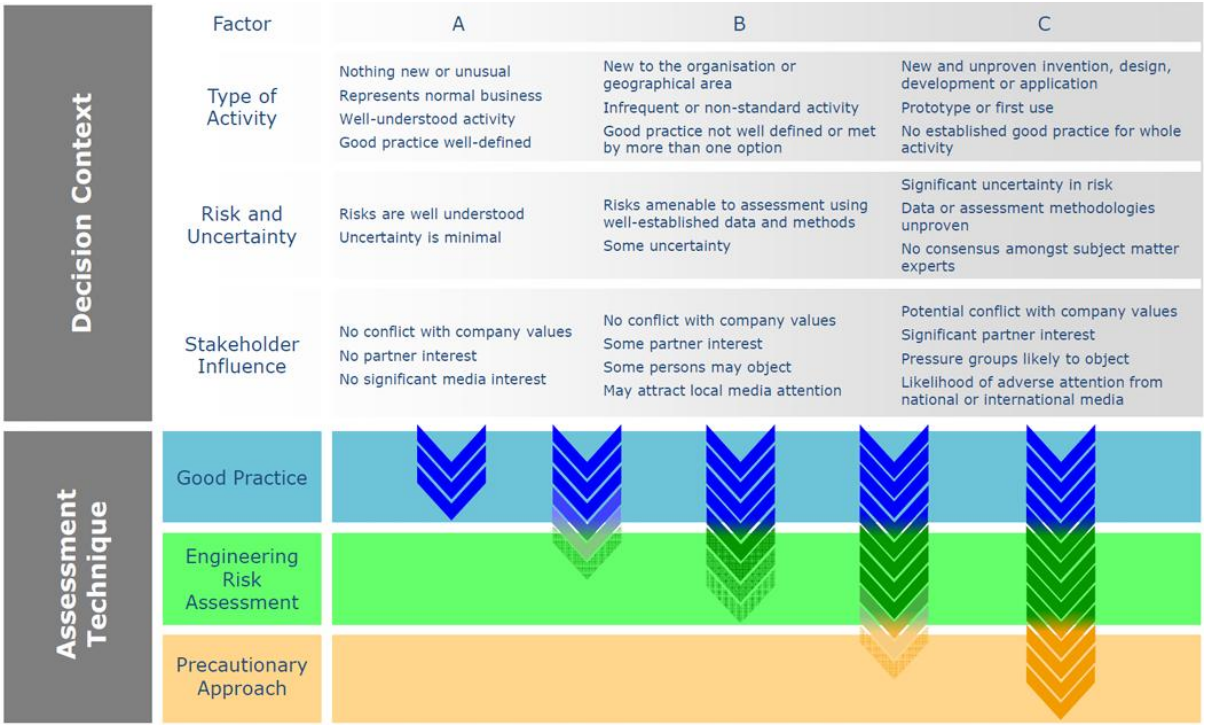


Figure 5-2: Impact and Risk Uncertainty Decision Making Framework

Good Practice

OGUK (2014) defines 'Good Practice' as the recognised risk management practices and measures that are used by competent organisations to manage well-understood hazards arising from their activities.

For this EP, sources of good practice include:

- requirements from Australian legislation and regulations
- relevant Australian policies
- relevant Australian Government guidance
- relevant industry standards
- relevant international conventions
- industry learnings and associated continuous improvement.

If the ALARP technique determines the controls to be 'Good Practice', further assessment ('Engineering Risk Assessment') is not required to identify additional controls. However, additional controls that provide a suitable environmental benefit for an insignificant cost may be identified.

Engineering Risk Assessment

All potential impacts and risks that required further assessment were subject to an 'Engineering Risk Assessment'.

Based on the various approaches recommended in OGUK (2014), Amplitude Energy considers the methodology most suited to this Activity is a comparative assessment of risks, costs, and environmental benefit. A cost–benefit analysis should show the balance between the risk benefit (or environmental benefit) and the cost of implementing the identified measure, with differentiation required such that the benefit of the risk reduction measure can be seen and the reason for the benefit understood.

Precautionary Approach

OGUK (2014) state that if the assessment, considering all available engineering and scientific evidence, is insufficient, inconclusive, or uncertain, then a precautionary approach to hazard management is needed. A precautionary approach will mean that uncertain analysis is replaced by conservative assumptions that will result in control measures being more likely to be implemented. That is, environmental considerations are expected to take precedence over economic considerations, meaning that a control measure that may reduce environmental impact is more likely to be implemented. In this decision context, the decision could have significant economic consequences to an organisation.

5.2.4.3 Evaluate the Acceptability of the Potential Impacts and Risks

The acceptability of the Activity has been demonstrated in the **OPP** as part of the ECSP, in accordance with Regulation 13 of the OPGGS(E)R. The EPOs defined in the OPP for the East Coast Supply Project provides a mechanism to demonstrate potential impacts and risks will be managed to the defined acceptable levels.

In this EP, Amplitude Energy demonstrates the defined acceptable levels in the OPP have been met by providing an acceptability evaluation against the acceptability factors listed in Table 5-3 and the following criteria:

- Using relevant OPP EPOs and control measures or their equivalents (Appendix 1 -)
- Using EP specific control measures (Section 5.2.4.1 and 5.2.4.2)
- Impact and risk rankings in the EP are equal to or less than those defined in the OPP, for the EPOs to be met
- Evaluation of internal and external context to this EP.

Table 5-3: Amplitude Energy Acceptability Evaluation

Factor	Criteria / Test
Amplitude Energy Risk Management Protocol	Is the risk severity extreme (i.e., not within the Company's risk appetite), or High (i.e., requires involvement from the Managing Director to approve the treatment plan)?
Principles of Ecologically Sustainable Development (ESD)	Is there the potential to affect biological diversity and ecological integrity? (Consequence Level 4 and 5). Do activities have the potential to result in serious or irreversible environmental damage? If yes: is there significant scientific uncertainty associated with aspect? If yes: has the precautionary principle been applied to the aspect?
Legislative and Other Requirements	Are there any good practice control measures which have not been adopted, including those identified in relevant EPBC listed species

Factor	Criteria / Test
	recovery plans or approved conservation advice? If not adopted, have alternate control measures been adopted that provide equal or better levels of protection?
Internal Context	Is the impact or risk provided for within CEMS Standards and Processes? If no, what additional provisions will be made?
External Content	Are there any objections and claims regarding this aspect which have not been resolved? If yes, is there anything which precludes reaching a resolution?

5.2.4.4 Principles of ESD and Precautionary Principle

The principles of ESD are considered in Table 5-4 in relation to acceptability evaluations.

Under the EPBC Act, the Minister must also take into account the precautionary principle in determining whether or not to approve the taking of an action. The precautionary principle (Section 391(2) of the EPBC Act) is that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there may be threats of serious or irreversible environmental damage.

Table 5-4: Principles of Ecologically Sustainable Development (ESD)

ESD	Principle	Relevance to Acceptability
A	Decision making processes should effectively integrate both long term and short term economic, environmental, social, and equitable considerations	The Activity is part of the ECSP; therefore, this principle is inherently met through the OPP assessment process. Specifically, through the integration of consultation feedback in the development of defined acceptable levels, impact and risk evaluations and demonstrations of acceptability. Therefore, this principal is not considered separately for each acceptability evaluation in this EP.
B	If 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.	An evaluation is completed to determine if the activity will result in serious or irreversible environmental damage. Where the activity has the potential to result in serious or irreversible environmental damage, an assessment is completed to determine if there is significant uncertainty in the evaluation.
C	The principle of inter-generational equity—that the present generation should ensure that the health, diversity, and productivity of the environment is maintained or enhanced for the benefit of future generations.	Where the potential impacts and risk are determined to be serious or irreversible the precautionary principle is implemented to ensure the environment is maintained for the benefit of future generations.
D	The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.	An assessment is completed to determine if there is the potential to impact biological diversity and ecological integrity.
E	Improved valuation, pricing and incentive mechanisms should be promoted.	This principle is met through identifying the economic, social and ecological value of the existing environment (Section 4.0), and including provisions

ESD	Principle	Relevance to Acceptability
		for Amplitude Energy to bear the full cost of environmental management for the life of the project to ensure environmental impacts and risks are reduced to an acceptable levels. This is reflected in all impact and risk acceptability demonstrations and environmental performance evaluations. Amplitude Energy incorporates market-based mechanisms such as carbon pricing (Section 6.4) where applicable, sets adaptive management frameworks (such as the whale disturbance protocol Section 6.6.5) and is required to hold financial assurance under Section 571(2) of the *OPGGS Act* to ensure the project aligns with the 'polluter pays' principle.

5.2.5 Risk Monitoring, Review and Record

Risks, risk treatments and controls require continual monitoring and review to determine whether assumptions and decisions remain valid. The risk environment and risk continually change, and treatment plans can also alter the risk. Relevant persons (which may be internal and external to the company) need to be consulted and kept informed.

The monitoring, review and recording activities provide assurance that:

- Emerging risks are identified, and existing risks remain relevant and managed.
- Controls continue to be effective and efficient in design and operation.
- Controls required for the risk to be ALARP are effectively implemented and operating as expected.
- Risk management objectives remain appropriate and are supported by effective treatment activities.
- The process for managing risk is operating effectively and efficiently.
- Information on risk changes and treatment activities are documented.

Relevant persons are consulted and where relevant are informed regularly of the risk management progress and performance.

Additional aspects of monitoring and review are described in the Implementation Strategy in Section 11.0 of this EP and include:

- Analysing lessons learnt from events (including near misses), changes, trends, successes and failures.
- Detecting changes in the external and internal context (e.g. new conservation plans issued).
- Chemical selection and discharge process.

6.0 Risk and Impact Evaluation

To meet the requirements of the regulations (evaluation of environmental impacts and risks, environmental performance outcomes and standards), this section evaluates the impacts and risks associated with the Petroleum Activity appropriate to the nature and scale of each impact and risk and details the control measures that are used to reduce the risks to ALARP and an Acceptable level.

Environmental Performance Outcomes (EPO), Environmental Performance Standards (EPS), and Measurement Criteria are described in Section 11.0.

6.1 Impact and Risk Scoping

Interactions between activities and aspects are shown in Table 6-1. Where no disturbance, discharges or emissions are identified in Section 3.0, then no planned interactions are shown. If no planned or unplanned aspects are identified for an activity, then no impacts or risks are identified, and it is not included in the subsequent section.

Within this section, impacts are framed as either a “lower order impact” or a “higher order impact”. Higher order impacts require a higher order of evaluation, as described in the NOPSEMA Environment Plan decision making guideline (N-04750-GL1721 A524696) (NOPSEMA 2024a).

All impacts and risks are evaluated at the lower order until one or more factors trigger the impact to be evaluated at a higher level. These factors are:

- Uncertainty or complexity in the impact or risk assessment which requires further analysis or discussion, for example where modelling is required to understand the nature and scale of an impact.
- ALARP decision context B and above (refer to Section 5.2.4).
- Residual risk severity moderate and above (refer to Section 5.2.4).
- Stakeholder concerns (refer to Section 11.0; Appendix 8 -).

Impacts and risks determined to be lower order (as per Section 5.2.4) are presented in Section 6.2, whilst higher order impacts and risks are evaluated in more detail in Section 6.3 onwards. The differentiation between higher and lower order impacts and risks is colour coded in Table 6-1. In some circumstances, lower order risks have been evaluated in more detail within Section 6.3 onwards, such as seabed disturbance, as the assessment process required further explanation.

All impacts that have the potential to cause cumulative impacts, such as the potential for internal concurrent activities, or cumulative impacts from adjacent external activities, have been assessed in within the ECSP OPP. Refer to Section 9.0 for further details of the cumulative impact assessment process and alignment to the impact evaluation of the identified potential cumulative impacts to EPBC listed species within the ECSP OPP.

Table 6-1: Aspect-Activity Interactions

	ASPECT																	
ACTIVITY	**Physical Presence**		**Planned Emissions**				**Planned Discharges**						**Unplanned Impacts**			**Accidental Release**		
Lower Order Impacts and Risks – blue **Higher Order Impacts and Risks - green**	Interaction with Other Marine Users	Seabed Disturbance	Light Emissions	Underwater Sound Emissions	Atmospheric Emissions	GHG Emissions	Drill Cuttings and Fluids	Cement	Other (subsea testing and cleaning discharges)	Cooling Water and Brine	Deck Drainage, Operational discharges and Bilge	Sewage and Grey Water	Interaction with Marine Fauna	Introduction of IMS	Waste (Hazardous and Non-hazardous)	LOC (Chemicals and Hydrocarbons)	Vessel LOC- MDO	LOWC - Condensate
Mooring Operations																		
Mooring Operations		H																
MODU Positioning																		
MODU Positioning	L	H		H														
Well Construction																		
Drilling Operations		H		H			L	L							L	L	H	H
Drilling Cuttings and Fluids		H					L											
Cementing Operations		H																
BOP Installation and Testing	L								L									

	ASPECT																	
ACTIVITY	**Physical Presence**		**Planned Emissions**				**Planned Discharges**						**Unplanned Impacts**			**Accidental Release**		
Well Completions							L											
Well Clean-up / Flowback			L		L	H												
Logging				H														
Well Shut-in and Suspension									L									
Well Integrity Monitoring																		
Well Integrity Monitoring	L								L									
Support Activities																		
MODU	L		L	H	L	H				L	L	L	L	H	L	L		
Vessels	L	H	L	H	L	H				L	L	L	L	H	L	L	H	H
Helicopter				H	L	H							L			L		
ROV /AUV		H		H					L					H		L		

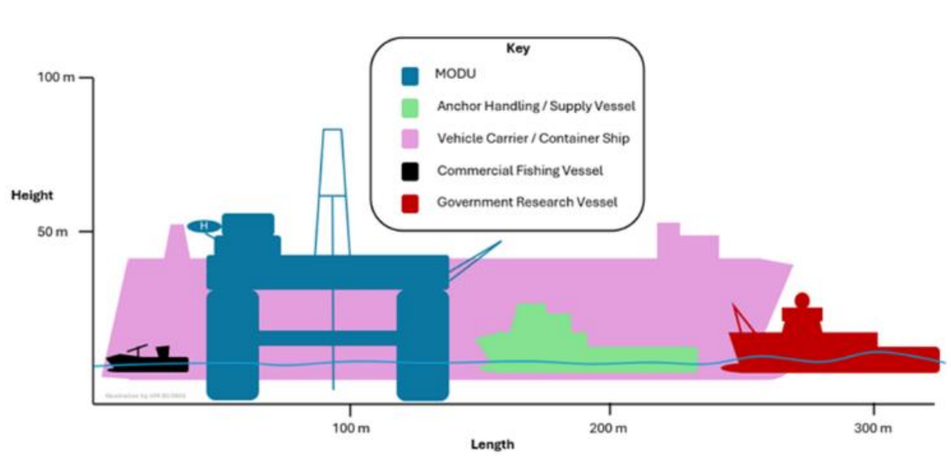
6.2 Lower Order Impact and risk Evaluation

6.2.1 Planned Aspects

Table 6-2: Lower Order Planned Impact and Risk Evaluation

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
Physical Presence								
Physical Presence – Interaction with Other Marine User: • MODU Positioning • BOP / Subsea Tree Installation • Well Integrity Monitoring • MODU operations • Vessel operations	Changes to the functions, interests and activities of other marine users	Impact: Changes to the Functions, Interests and Activities of Other Marine Users Displacement of other marine users may occur due to the presence of exclusion zones and support vessels within the operational area. The following zones will be established: • Exclusion / cautionary zone: communicated via Notice to Mariners, and include: – A temporary 3.5 km radius exclusion / cautionary zone around the MODU during well construction activities to allow for anchors, mooring chains and wires to be placed within the operational area (which may extend up to 2.5 km). • Petroleum Safety Zone (PSZ): these are formal safety exclusion zones and are gazetted by NOPSEMA, including: – A permanent (until revoked) 500 m radius around each subsea well. – A temporary 500 m radius around the MODU surface location during the activity (including contingent plug and abandonment). The potential for interaction with other marine users will be greatest when the 3.5 km radius temporary exclusion / cautionary zone is in place during well construction (for approximately 60 days). The permanent 500 m radius PSZ will occur over a more localised spatial extent over a longer duration. Receptors that may be impacted include: • Commercial fisheries. • Shipping and industry. • Recreational fishers and tourism. **Commercial fisheries (State and Commonwealth)** The operational area overlaps 7 State and 6 Commonwealth-managed fisheries management areas, as described in Section 4.4.3. Catch-effort data indicates that the SESS-Shark Gillnet sub-sector and Southern Jig commonwealth fisheries and the southern rock lobster, giant crab, wrasse and multi-species ocean State fisheries are active in the vicinity of the operational area (Section 4.4.3). Fishing vessels will be required to avoid the temporary exclusion /caution z ones, established around the MODU and other Activity vessels, and the long-term PSZ. The exclusion / cautionary zone and PSZ will occur over a small extent of the larger fishing areas available to the fisheries active at the operational area. Previous consultation for offshore drilling activities (Cooper Energy, 2019) indicates that the proposed activities and associated exclusion/caution zones would not result in objections or claims. This is also reflected in the fact that no claims or objections have been raised for the existing PSZs established for Amplitude Energy's existing Otway offshore facilities. **Shipping and industry** Shipping and industry activities in the vicinity of the operational area are described in Section 4.4.3. Ships will need to physically avoid the temporary exclusion / cautionary zones established around the MODU and other Activity vessels and the long-term PSZs. The MODU exclusion zone is temporary and will be in place for the duration of drilling only and the PSZ around wells will be limited to a 500 m radius around each well.	Level 1	A	CM01: Marine Exclusion and Caution Zones CM02: Pre-start Notifications CM03: Marine Assurance Process CM04: Fisheries Damage Protocol CM05: Ongoing Consultation CM27: Amplitude Energy Decommissioning Protocol	N/A	N/A	Acceptable, based on: • Impacts well understood. • Consequence is Level 1, therefore no potential to affect biological diversity and ecological integrity. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. Legislative and other requirements have been identified and met: • *OPGGS Act* • *Navigation Act 2012* • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as:

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		There are no designated shipping lanes in the vicinity of the operational area (AHO, 2021), although AMSA notes heavy traffic (Event ID 2025 0520 142220 7349 Appendix 8). AMSA, or other relevant persons, have not raised claims or objections to the Activity and have not previously raised claims or objections to previous Amplitude exploration activities (Cooper Energy, 2019). Vessel interactions will be managed in accordance with navigational requirements. ` **Recreation and tourism** Key tourist and recreational activities are described in Section 4.4.3 and typically include land-based or near-shore activities (i.e., sight-seeing, diving, fishing including recreational, game, or charter fishing). Therefore, there is limited overlap with the deep offshore waters of the operational area. The presence of exclusion / cautionary zones and the PSZs may result in the exclusion of tourist and recreational marine users from the operational area. Given the distance from shore and the limited size of exclusion / cautionary zones and PSZs, impacts to tourists and recreational marine users are expected to be minimal. **Summary** Impacts have been assessed as Level 1, based on: • The short-term duration of drilling activities when the temporary exclusion / cautionary zone will be in place around the MODU (~60 days). • The localised spatial extent of the long-term PSZs around each well, noting these exclusion zones are an accepted tool for managing risks to equipment and marine users. • The level of use of the operational area by commercial fisheries is relatively low, with no claims or objections to the existing Otway offshore facility development to date. • The operational area covers a small extent of the identified Commonwealth and State-managed fisheries management areas. • The level of use of the operational area by shipping, industry, recreation and tourism is expected to be low.						• **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
Physical Presence - Visual	Additional vessels observable from the coast	Impact: Additional Vessels Observable from the Coast The physical presence of the MODU and support vessels (including for contingent activities) has the potential to affect the view of the coastline or ocean. The Australian Heritage Database (DCCEEW, 2025) entry assessment against criterion E (aesthetic characteristics) identifies the Great Ocean Road and Scenic Environs as demonstrating outstanding scenic landscape values and a diversity of natural landscapes. The scenic environs include all views from the Great Ocean Road and Great Ocean Walk. Included within the environs and of particular significance are: • The Twelve Apostles - a distinctive and spectacular group of rock formations widely recognised by the Australian community, serving as an inspirational landscape capable of evoking strong emotional responses. • The Bay of Islands and Bay of Martyrs, while less widely known, are similar, but younger, geomorphological formations and are also important aesthetic elements of the coastline. • The coastline from Lorne to Kennett River offers among the world's most dramatic cliff and ocean scenery able to be viewed from a vehicle. Along the length of the Great Ocean Road, the pullover points and lookouts beside or nearby the road provide travellers with spectacular views of the coastline, hinterland, and Bass Strait seascape, framed only by cliffs, lighthouses and unencumbered by intrusive built structures. The Australian Heritage Database (DCCEEW 2025a) assessment against criterion G (social and cultural reasons) describes the landscape as highly valued by many Australians and has obtained iconic status. For many Australians, the Great Ocean Road is synonymous with tourism and holidays, with over 7 million visits by Australians to the Great Ocean Road region annually. Visitors are attracted to the iconic, spectacular scenery experienced on the scenic journey and the accessibility of the historic shipwrecks along the coast, which help deepen the visitor experience by interpreting themes of immigration, shipping and trade.	Level 1	A	CM02: Pre-start Notifications CM:06 Ongoing Consultation	N/A	N/A	Acceptable, based on: • Impacts well understood. • Consequence is Level 1, given the short duration that the MODU and vessels are present, and limited divergence from the values of the Scenic Environs which already features commercial fishing and shipping activity. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented.

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		Criterion G explains how elements of the Great Ocean Road relate to shipping and trade. The lighthouses that are landmarks along the road were established to facilitate shipping and continue to do so today. The Bass Strait has historically been, and remains an important shipping route, with vessels continually transiting the waters off the Otway coast to and from intentional ports that are critical infrastructure including the ports of Portland, Geelong and Melbourne. Given the maritime history, and current maritime activity in the region, it is considered that observing vessels from the Great Ocean Road would not be considered unusual or detracting from the values of the Great Ocean Road. Instead, vessels are in keeping with the historical and current maritime context. It is relevant to consider the existing vessel traffic in the Otway to contextualise the Activity vessels and MODU presence. It is assumed that at least four large merchant ships would usually transit through the Otway on any given day. This is considered conservative given Victorian ports alone have over 4,000 ship visits per year (Bureau of Infrastructure and Transport Research 2023), which would put the average daily ship transits through Victorian waters at over 10. The kinds of vessels (and their approximate dimensions) that occur in the region are illustrated below (Figure 6-1), with fishing vessels and container ships being among the most common types. For the Activity the MODU is on location for approximately 60 days to drill and complete Annie-2 development, and vessels would be offshore to support the MODU as well as for survey or inspection campaigns with shorter durations 1-7 days) over the EP 5-year term. Once the MODU and vessels are gone, all equipment is located subsea and therefore not observable from shore, as is the case with Amplitude's current subsea gas production infrastructure.  *Figure 6-1: Common Vessel Types Offshore and their Relative (Approximate) Dimensions* Summary Overall, it is concluded that the MODU and support will not encumber the view of the coastline or ocean from the Great Ocean Road. The MODU and support vessels will be offshore for ~60-days. There will be visibility of the MODU and vessels offshore for a relatively short period. However, the view of these will not be in complete contrast to daily shipping already present in the region and would therefore be expected to evoke a similar level of emotional response to shipping. There will also be no ongoing visual impacts from the Activity once the MODU and support vessels have completed the scope. Therefore, the impact of the physical presence of the MODU and vessels on the view from the Ocean Road is assessed as being of Level 1 consequence.						• Legislative and other requirements have been identified and met: • OPGGS Act • Navigation Act 2012 • Amplitude Energy MS Standards and Processes have been identified. Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
Emissions								

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
Emissions – Light • Well Clean-Up and Flowback • Vessel Operations • MODU Operations	• Change in ambient light • Change in fauna behaviour	Impact: Change in Ambient Light Ambient light is classified as light which already exists within an environment. Ambient artificial light sources in the Otway region include permanent (e.g. onshore/offshore developments) and intermittent (e.g. vessels, road traffic) sources. During the activity and contingent activities, sources of artificial light (Figure 6-3) will include: • Continuous lighting on the MODU and vessels, required for maritime safety purposes in accordance with requirements of the Navigation Act 2012. • Flaring may introduce localised and temporary light emissions during well clean-up and flowback for an approximate duration of 36 hours. The approximate height of the flare is 45 m above sea level. Once vessels have vacated the region and the well clean-up and flowback activities are complete, these additional light sources will no longer be present. There are no permanent sources of light associated with the Activity. Impacts associated with light emissions from the Activity are defined by Light Exposure Areas (i.e. the area over which light exposure may impact sensitive species): • The Operational Light Exposure Area (i.e. associated with artificial lighting on the MODU and vessels) is defined by the National Light Pollution Guidelines for Wildlife (DCCEEW 2023a) which recommends a 20 km threshold as a precautionary limit to identify species and important habitats potentially impacted by artificial light. This distance is considered conservative and is based on observed effects of sky glow on marine turtle hatchlings demonstrated to occur at 15-18 km and seabird fledglings grounding in response to artificial light 15 km away (DCCEEW 2023a). • The Flaring Light Exposure Area is defined based on a review of comparative light emissions modelling to ensure an appropriate analogue, including: – Light modelling conducted by Xodus Group for ConocoPhillips Australia calculated that ambient light intensity levels are reached beyond 49 km of a flare with a flowrate of 40 MMscf/day located 45 m above sea level (Xodus, 2023). – Light modelling by Pendoley Environmental Pty Ltd for Santos' Dorado Development calculated flaring events of <48 hours in duration, at a rate of ~125 MMscf/d, is no longer visible at 42.4 km, when the flare drops below the horizon. The flare height was conservatively estimated as 110 m above sea level (Pendoley, 2020). – Other modelling studies conducted for production flaring activities produced comparable spatial extents; 51 km for Shell's Prelude Activity (Shell, 2009) and 47.9 km Woodside's Browse FLNG development (Woodside 2014. In both of these instances the flare heights are 150m and 154m respectively. – Light modelling by Xodus Group and Pendoley Environmental Pty Ltd assumes flaring flowrates of 40 and ~125 MMscf/day, respectively. In comparison flaring flowrates for the Activity is expected to be ~60 MMscf/ day. Despite having a lower flowrate, light modelling by Xodus Group predicts the most conservative flaring light emissions spatial extent of 49 km from the source. Further, estimates by Xodus Group were developed based on an appropriate MODU analogue similar to the one that will be conducting the drilling campaign. Light emissions will result in a temporary change in ambient light within the relatively localised Light Exposure Areas. The MODU and support vessels will be present for ~60 days – where the extent of operational light exposure is within 20km of the MODU and support vessels. The light emissions associated with flaring will be of a shorter duration – approximately 36 hours for well clean-up activities and associated flaring and relatively localised (conservatively within 49 km of the MODU). A change in ambient light has been assessed as being of Level 1 consequence.	Level 1	A	CM03: Marine Assurance Process CM05: Ongoing Consultation CM06: Light Management Measures CM07: Well Testing Program CM15: Campaign Risk Review (modelling review)	N/A	N/A	Acceptable, based on: • Impacts well understood. • Consequence level is Level 1, therefore no potential to affect biological diversity and ecological integrity. • Risk level to receptors a result of the change in ambient conditions is low • Activity will not result in serious or irreversible damage. • Legislative and other requirements have been identified and met, and guidelines considered: – National Light Pollution Guidelines for Wildlife (DCCEEW, 2023a) - including marine turtles, seabirds and migratory shorebirds. – EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species.
		Risk: Change in marine fauna - marine turtles Light emissions from the MODU, support vessels and flaring (if required) may result in a localised change in marine turtle behaviour. DCCEEW (2023a) identify marine turtles as being sensitive to light emissions. Light	Level 1	A		Unlikely (D)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		emissions can disrupt behavioural in-water dispersal behaviours of marine turtles by interfering with natural lighting and silhouettes (DCCEEW 2023a; CoA 2017). Critical behaviours for marine turtles are generally carried out within spatial extents defined by marine turtle BIAs and habitat critical to the survival of marine turtle species. PMST reports for the 20 km and 49 km Light Exposure Areas can be found in Appendix 5 - . The PMST report (Appendix 5 -) identified three marine turtle species; loggerhead turtle (endangered), leatherback turtle (endangered) and green turtle (vulnerable), that may / are likely to have a habitat within the Light Exposure Areas. There are no known BIAs or habitats critical to the survival of marine turtle species and no nesting sites or nesting behaviours identified in the area. Nevertheless, the PMST report identified that breeding behaviours are likely to occur within Flaring Operational Area. Behavioural changes to marine turtles from artificial light at night are expected to be localised (49 km) and short term, with light levels returning to existing ambient levels following completion of the activity with no remedial or recovery work required. Therefore, the consequence has been assessed as Level 1. The risk event could happen when additional factors are present, such that individual marine turtles are present within 49 km of flaring operations or within 20 km of MODU and vessel operations. However, as there are no BIAs or habitat critical to the survival of marine turtles within the Light Exposure Areas, the likelihood of the risk is considered to be Unlikely (D), therefore the Risk severity is Low.						• Activity will not impact the recovery of: – Albatrosses and Giant Petrels as per the National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022). – Seabirds as per the Wildlife Conservation Plan for Seabirds – Orange-bellied Parrot as per the National Recovery Plan for the Orange-bellied Parrot (Neophema chrysogaster) (DELWP, 2016). – Recovery plan for marine turtles in Australia 2017–2027 (CoA, 2017). – Recovery Plan for the White Shark (Carcharodon carcharias) 2013 • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in
		Risk: Change in marine fauna - avifauna Light emissions may cause behavioural change to nocturnal seabirds by disrupting vision at night. The potential for disorientation from light emissions is exacerbated with an increase in proximity of nesting sites or migrating sites to artificial light sources (DCCEEW 2023a). There are 9 foraging BIAs for seabirds within the Operational Light Exposure Area (Figure 6-4 to Figure 6-6). Given the large areas typically covered by foraging individuals, the transient nature of the species, and the temporary nature of the light from the activity (Section 3.0); any alterations in offshore foraging behaviour would be expected to be short-term and localised, impacting individuals, and would not be expected to significantly affect foraging success of seabird populations in the region. There are no breeding BIAs for seabirds within the Operational Light Exposure Area. Within the Flaring Light Exposure Area one additional breeding BIA for the short-tailed shearwater (*Adrenna tenuirostris*) exists at Muttonbird Island, with another recognised breeding area at Middle Island (Baker and Hamilton 2013). The breeding areas at Griffiths Island and Deen Maar are situated outside of the Flaring EMBA. Light has not been identified as a threat to this species (DCCEEW 2023a), and when they are present in Australian waters (September to May) the species are known to typically forage during daylight, returning to the colonies after feeding (AAD 2020). Fledglings can become disorientated during their first flight when exposed to artificial light, with some fledglings leaving the nest but becoming attracted towards artificial lighting. It is acknowledged that disorientation of fledglings may be fatal due to fallouts over ocean or groundings (Rodríguez et al. 2017; Marangoni et al. 2022). Fledging typically occurs towards the end of the breeding season and within the first two hours after sunset during the fledging period (Gineste, 2016 cited in Chevillion et al., 2022) which is often associated with the lunar cycle (Chevillion et al., 2022). It is widely accepted that the fledging period of the short-tailed shearwater occurs between the third week of April and the first week of May each year (Skira 1991; Rodríguez et al. 2014; Price 2022). Despite their sensitivity to artificial light, fewer than 1% of fledglings produced annually are thought to be affected by mortality (DCCEEW 2020). Muttonbird Island (situated approximately 22 km from the flare location) is predicted to experience Lux levels of <0.01 - less than a change in ambient light resulting from a quarter moon. The Flaring Light Exposure Area has negligible overlap with the combined short-tailed shearwater breeding BIAs (<0.003%). The recognised breeding area at Middle Island is situated approximately 44 km from the flare location, the Lux levels resulting from flaring activities are predicted to be approximately 0.001 (equivalent to a moonless night sky) with no impact to fledglings expected.	Level 1	A		Unlikely (D)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		The National Light Pollution Guidelines for Wildlife (CoA 2023) radiance value threshold for the response of fledgling shearwaters and other seabirds (Rodríguez et al. 2014) is 27 nW/sr*cm^2 (equates to approximately 0.18 lux). An illuminance value of 0.18 lux modelled from a 40 MMscf/d flare (Xodus 2023) is reached at 3.7 km from the flare source. Based on this light intensity level (which forms the basis of the 20km in the Light Pollution Guidelines) the predicted impact zone is limited, and the adopted 20km operational light area is conservative for assessing impacts to bird species from light emissions. Due to the temporary and short-term nature of any light emissions (Section 3.0) and negligible increases in light intensity levels at breeding areas, these emissions are not expected to cause behavioural impacts (such as disorientation of fledglings or deterrence of breeding birds) or injury/mortality to the species.The PMST report (Appendix 5) identified the critically endangered orange-bellied parrot (*Neophema chrysogaster*) as being known to occur within the Flaring Light Exposure Area. The only relevant risk identified in the National Recovery Plan for the orange-bellied parrot (DELWP, 2016) is the threat of barriers to migration of the species which includes the presence of illuminated structures or vessels which occur within the migration route. Flaring activities, although not within the migration route, may result in light which is visible from within the western portion of the probable migration route near the Victorian coastline. Therefore, only a small number of individuals (if any) have the potential to be behaviourally impacted by the change to ambient light as a result of flaring activities. These activities are expected to be intermittent and short-term (maximum of 36 hours of flaring) with levels returning to existing ambient levels following the completion of the activity. The PMST report also lists the swift parrot (*Lathamus discolor*) and the curlew sandpiper (*Calidris ferruginea*) as being known to be present in the Flaring Light Exposure Area, both are critically endangered migratory species. There are no threats listed in the National Recovery Plan for swift parrot relating to potential disturbance or disruption to migratory pathways (DCCEEW 2024c). Similarly, conservation advice for the curlew sandpiper also does not list any key threats associated with migration (TSSC 2015d). Behavioural changes could increase the risk of birds colliding with infrastructure or vessels, entrapment, stranding, grounding or displacement from usual migration routes (DCCEEW 2023a). Collisions of birds with offshore oil and gas infrastructure has been reported in the North Sea (Hüppop *et al.* 2016). It is predicted that mortality from collision would only impact a small proportion of seabird populations (Hüppop *et al.* 2016). The Activity will not have any topside infrastructure, and artificial lighting will only be present for a short duration during the activity. Therefore, any injury or mortality to seabirds as a result of a behavioural response to light emissions is not expected to cause any impacts at a population level. The flare itself may also present a hazard to birds, as the flare boom can provide a perch for individual birds which may be susceptible to burning. Due to the very short duration of flaring (36 hours) on an intermittent basis, this impact is not expected to occur and can be managed via standard practices such as flare watch and start-up procedures. This Activity will be undertaken as part of a rig consortium campaign (Section 1.1.1 - which has been established to lower environmental impacts and risks over the wider region) under which Amplitude has been allocated rig slots in the schedule which are not interchangeable. Amplitude have assessed the feasibility of undertaking the Activity at different times (within Amplitude Energy's allocated rig slots to reduce the potential risks from light emissions), and identified that there was no appropriate timing that could be avoided which reduced the risk to all sensitive species, based on the following timings identified for listed avifauna that are active at night and may be present within the light EMBAs (Section 4.0; Appendix 4 -): • Common diving-petrel: forage year-round (DoE 2025) • Southern giant petrel (Endangered): forage May to October (DoE 2025) • Short-tailed shearwater (Fledglings): 3rd week of April to the first week of May each year • Orange-bellied parrot: migration to the Mainland late February to early April (Australian Museum 2020), and return to Tasmania in October The accepted control measures have been developed to ensure that light emissions are reduced for safe operations. Given the temporary and short-term nature of the Activity light emissions, especially flaring with the larger light EMBA and a duration of 36 hours, the accepted control measures are considered conservative						the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.

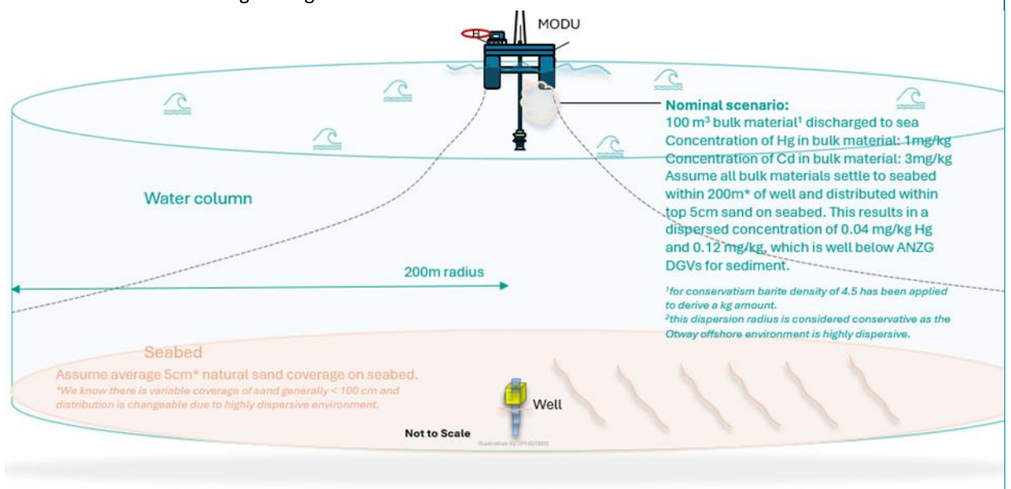
Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		and appropriate. Given the limited presence of sensitive receptors within the Light Exposure Areas, and the temporary nature of light emissions, the impact of light emissions to marine avifauna will be Level 1. The risk event could happen if birds are present within the Light Exposure Areas. Given the wide foraging and migratory ranges of seabirds and shorebirds and the short duration of activities, the likelihood of the risk event is considered to be Unlikely (D) and the Risk severity is Low.						
		Risk: Change in Marine Fauna - Plankton and Fish (including Eggs and Larvae) The National Light Pollution Guidelines for Wildlife (DCCEEW 2023a) also identifies plankton and fish as being sensitive to light emissions. Zooplankton (including fish eggs and larvae) migrate upwards at dusk and downwards at dawn (Nocera et al. 2020). Suppressing or attracting zooplankton to the surface may disrupt zooplankton night feedings and in turn impact the movement and food availability for larger nocturnal fish predators. For example, adult benthopelagic fish display large daily vertical migrations that match pelagic prey availability and movements of zooplankton (Afonso et al. 2014). Artificial light may also bring diurnal fish predators into competition with their nocturnal counterparts and increase predation pressure to nocturnal prey. The Flaring Light Exposure Area overlaps with a BIA for white shark. Exposure to intermittent flaring or navigational lighting during the Activity may disrupt rhythmic behavioural activities of individuals (Carroll and Harvey-Carroll 2023; Colefax et al. 2020). The increased presence of zooplankton and foraging fish at night may attract larger fish species, such as white sharks (Carroll and Harvey-Carroll 2023). Light emission modelling conducted by Xodus (2023) for ConocoPhillips Australia indicated that light emission levels that reflect twilight levels are reached within 500 m of a flare. It is anticipated that the suppression or attraction of plankton will occur within 500 m of flaring or MODU and vessel operations, which in turn impacts the movement and food availability for larger nocturnal fish predators within 500 m. Impacts, if any, would be limited to temporary behavioural changes to small numbers of plankton and fish within proximity of artificial light sources in surface waters of the operational area. Given the temporary, short-term, localised nature of light emissions, impacts would be limited to temporary behavioural changes to plankton and fish in the surface waters near the light source. Therefore, the consequence of impact of light emissions to plankton and fish (including eggs and larvae) is assessed as Level 1. The risk event could occur if plankton and fish are within close proximity of the MODU and support vessels or flaring activities. The highly variable presence of plankton and fish populations in the operational area presents a potential overlap of plankton and fish with the Light Exposure Areas. Therefore, the likelihood of the risk event is considered to be Likely (B) and the Risk severity is Low.	Level 1	A		Likely (B)	Low	
		Risk: Change in Marine Fauna - Marine Invertebrates Light emissions may cause behavioural changes to marine invertebrates, such as cephalopods and lobsters. However, light emissions in the operational area have very limited potential to suppress or change the nocturnal activities of invertebrates at the seabed given the depth of water (>50 m) between the temporary light sources at sea surface and strong light attenuation in the upper 50 m of the water column (McCafferty et al. 2004). Impacts from the operational and intermittent flaring light emissions to marine invertebrates will be limited to incidental behavioural changes, such as the potential for increased attraction to the light source of mobile invertebrates, such as cephalopods, within a smaller spatial extent than the Light Exposure Areas. Arrow squid is a targeted species for the Southern Squid Jig Fishery. Squid are highly attracted to artificial lights at night. This is demonstrated by the use of lights at night while jigging which is an active fishing method used by the Southern Squid Jig Fishery (AFMA, 2022). Light emissions in the operational area are expected to temporarily attract squid and other cephalopods up to the sea surface towards the light source (Imbrahim and Hajisamae, 1999).	Level 1	A		Likely (B)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		Behavioural changes to marine invertebrates from artificial light at night is expected to be localised and short term based on expectations that navigational/operational light emissions sources are short term and highly localised. Therefore, the consequence is assessed as Level 1. The scattered and patchy presence of marine invertebrate communities in the operational area presents a potential overlap of marine invertebrates with the Light Exposure Areas; therefore, it is likely the risk event will occur. The likelihood is assessed as Likely (B) and the Risk severity is Low.						
Emissions – Atmospheric: • Well Clean-Up and Flowback • Vessel Operations • MODU Operations • Helicopter Operations	Change in air quality	Impact: Change in Ambient Air Quality Atmospheric emissions typically include sulphur oxides (SO_X), nitrous oxides (NO_X), particulate matter (PM10 and PM2.5), and Volatile Organic Compounds (VOCs). Impacts and risks associated with the generation of GHGs such as carbon dioxide (CO_2), methane (CH4) and N_2O are evaluated in Section 6.4. Atmospheric emissions will be generated by the combustion of fuel for power generation by the vessel, MODU and helicopters. These emissions will be continuous from the MODU power generation systems during the activity. The vessels and helicopters will not be in field continuously over the duration of the activity. The maximum number of vessels in the operational area at a time is expected to be 3 AHTS plus the MODU during well construction. The MODU will be present for 60 days during well construction. Atmospheric emissions will also be released from well clean-up and flowback activities during the well construction phase and will occur for a duration of 36 hours. Impacts to ecological and social receptors within or beyond the operational area are not predicted, as a reduction in air quality is limited to within the immediate proximity of the release source and is temporary, as pollutants would be rapidly dispersed to the offshore airshed by prevailing winds (Tetra Tech Coffey 2024). Therefore, impacts to marine fauna and social receptors from a change in air quality are not expected and have not been evaluated further. Given the localised and temporary nature of the change in air quality, the consequence of any impacts from atmospheric emissions are assessed as Level 1.	Level 1	A	CM03: Marine Assurance Process CM05: Ongoing Consultation CM08: Planned Maintenance System	N/A	N/A	Acceptable, based on: • Impacts well understood. • Consequence level is Level 1, therefore no potential to affect biological diversity and ecological integrity. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met: – Ozone Protection and Synthetic Greenhouse Gas Management Act 1989. – Marine Order 97 (Marine pollution prevention – air pollution) 2013. • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
								the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
Planned Discharges								
Planned Discharges – Drill Cuttings and Fluids: • Drilling • Completions • Well Abandonment (Contingency)	Change in water quality Change in sediment quality	In Australia, it is standard practice for drill cuttings and fluids to be discharged to surface waters or at the seabed over the course of the activity where there is a low impact / risk to the environment. The Activity will involve the drilling of one top-hole, with well construction activities expected to occur for 60 days. In the unlikely event that the well does not access commercially viable resources well abandonment (P&A) activities will be undertaken to isolate the reservoir section of the well and eliminate the risk of a potential release of reservoir fluids. Annie 2 development well does not require the use, or contingent use of Synthetic Based Drilling Fluids (SBDF). <u>Planned Discharges - Seabed</u> Discharges to the seabed during the planned drilling of the top-hole section on the well will be approximately: • 150 m^3 of drill cuttings. • 1,500 m^3 of water-based drilling fluids. <u>Planned Discharges - Surface</u> Discharges released to the surface during the Activity will be approximately: • 180 m^3 of drill cuttings. • 2,000 m^3 of associated drill fluids. The Amplitude Energy Offshore Chemical Assessment Procedure provides the framework and triggers for the preferential selection of lower toxicity WBMs over synthetic fluids. The process also provides for the preferential selection of specific grades of chemical, being OCNS CHARM rating of GOLD or SILVER, a non-	Level 1	A	CM09: Offshore equipment (solids equipment) CM10: Amplitude Energy Offshore Chemical Assessment Procedure CM11: Titleholder Collaboration C13: Inventory Management CM13: Offshore Operational Procedures (Drilling	N/A	N/A	Acceptable based on: • Impacts well understood. • Consequence level is Level 1, therefore any potential impact to the species and habitat will be localised, short-term and not affect ecosystem function. • Risk level to receptors a result of the change in ambient conditions is low. • Activity will not result in serious or

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		CHARM "E" or "D" classification or PLONOR. Where this is not achievable, further assessment, justification and investigation of alternatives is required to be undertaken. <u>Potential Discharges - Unused Bulk Material Disposal</u> Upon completion of the well activities, residual barite and bentonite will be managed in accordance with Figure 12-9. Amplitude Energy's preference will be to transfer unused bulk products to the next client with the MODU, however, if this is not possible, an unused bulks management process (Figure 12-9) has been developed to allow for consideration of disposal options other than overboard discharge which has been standard practice in industry. Amplitude Energy will continue investigating options to manage bulk materials to avoid overboard discharge of residual bulks; this will be done via industry collaboration and with relevant service partners (cementing / fluid services). If bulks are discharged, they would be mixed with seawater and discharged to sea as a slurry. It is anticipated that in the worst-case scenario a batch volume of ~50 m^3 of barite and ~50 m^3 bentonite (accounting for possible leftover contingency) would be discharged at the end of well construction. Although this aspect is assessed as having a 'low order' impact; Amplitude Energy has reviewed and assessed additional controls to ensure that impacts are managed to ALARP. Table 6-3 identifies and assesses additional controls. <u>(Contingent) Plug and Abandonment Discharges</u> Abandonment activities will be assisted by a MODU, and operations are expected to occur for 30 days per well. Well abandonment operations involve setting a series of cement and mechanical plugs within the wellbore, to ensure isolation of the reservoir and mitigate the risk of reservoir fluid release into the marine environment. Plugs are then tested to confirm integrity. Well abandonment operations may result in the discharge of fluids (treated sea water, completions fluids, drilling fluids – approximately 200m^3) as well as cement discharges (up to 8m^3). These discharges will occur intermittently throughout the well abandonment activities, generally released in batches, typically lasting less than 24 hours. For context, a study conducted on the Northwest Shelf during a drilling campaign surveyed the fate of drill cuttings and fluids for 3 wells in water depths ranging from 19 to 128 m (Jones et al. 2021). The total discharge volume of drill cuttings and fluids was found to be 1,543 m^3. The study is considered an appropriate and conservative comparison to the depths of the Activity (57 m). It should also be considered that lower ocean hydrodynamics are typically found in the Northwest Shelf region compared to the Otway area, and the study was conducted over sensitive areas that have a higher diversity of benthic assemblages than the operational area of the Activity. Impact: Change in water quality Planned discharges of drill cuttings and fluids into the marine environment are expected to result in a change of water quality. As described in Section 3.4.3, a combination of seawater and high-viscosity gel sweeps will be used as drilling fluid for the initial conductor and surface-hole sections. Subsequent intermediate and reservoir-hole sections will be drilled with WBM. Drill cuttings and fluids discharged from the well will occur intermittently during drilling (typical discharges in batches between 10-100 m^3). Drilling fluids (WBM) will be discharged at the seabed which will result in localised increased turbidity in the water column surrounding the well. The cuttings and fluids will settle rapidly within proximity to the well, with finer particles (approximately 10% of the discharge volume) dispersing further within ocean currents (Hinwood et al. 1994). When drill cuttings and drilling fluids are discharged from the MODU at the sea surface, the larger particles (approximately 90%) form a plume which will rapidly drop out of suspension in the water and settle on the seabed. Finer solids of the mass will form another plume in the upper water column, which will be transported by prevailing currents away from the source and will rapidly dilute in the water column (Neff 2005; 2010). Studies have found that in well mixed oceans, comparable to the Otway basin, a drill cuttings and fluid plume is			Discharges Management) CM14: MODU Material Transfer Process See Table 6-3 for an assessment of additional controls.			irreversible damage. • Legislative and other requirements have been identified and are provided for: Minamata Convention Activity will not impact the recovery of: – Blue whale as per the Blue Whale Conservation Management Plan 2015 – 2025 (DoE 2015a) – Southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) – Marine turtles as per the Recovery Plan for Marine Turtles in Australia, 2017 – 2027 (CoA 2017a). • Good practice controls defined and implemented. • Amplitude Energy MS and Processes have been identified. • No claims or objections raised during consultation

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		diluted by more than 100-fold within 10 m of the discharge (Neff 2005), with drilling fluid concentration falling to below acute toxicity threshold of 10,000 ppm within 100 m of the discharge source (Neff 2010). A study conducted in the Northwest Shelf, found sporadic and intermittent Total Suspended Solid (TSS) concentrations up to 10 mg/L ~1 km from the discharge point lasting over a period of minutes for each discharge event (Jones et al. 2021). Metals are present in most WBMs and have been shown to have a low bioavailability as they tend to remain in a non-ionic form, remaining bound to other compounds, presenting a low toxicity risk to marine fauna. Barium is the most abundant metal in most WBM and nearly all the barium in drilling mud is from barite ($BaSO_4$), which is added to the mud to increase its density (Neff 2005). Barite used during the drilling activities will have very low concentrations of mercury (Hg) and cadmium (Cd) (less than 1 mg/kg and 3 mg/kg respectively). A study investigating barite solubility and release of trace metal compounds observed <1% of the mercury and 15% of the cadmium dissolved from the barite after one week of exposure to the marine environment (Crecelius et al. 2007). Other metals present in drilling wastes, mainly as salts, may originate from formation cuttings or from impurities in barite and other mud components. Furthermore, the concentrations of these components within barite are so low (Sadiq et al. 2003) that barite is referred to as inert from a toxicological perspective (Crecelius et al. 2007). As such, these do not contribute to sediment toxicity due to their low bioavailability (Schaanning et al. 2002). The intermittent and temporary turbidity levels generated from drilling discharges are expected to be within the high natural variability of water column turbidity on the Victorian coastline (Section 4.3). The increased turbidity levels will be short-lived and highly localised within close proximity of the source. The south-east marine region, in addition to the north marine region, has the lowest water clarity and least seasonality of the six marine regions around the coast of Australia (Richardson et al. 2020). As a result, it is expected that the short-lived and localised increase in turbidity from drilling discharges would be less significant in the south-east than in marine regions with clearer waters, such as the north-west. Environmental impacts to water quality by drilling mud and cuttings discharges are considered low due to their intermittent nature, short duration during drilling and composition (i.e. rock and water-based fluids) (Neff 2005). Hinwood et al. (1994) considers the main environmental disturbance from discharging drilling cuttings and fluids is associated with the smothering and burial of sessile benthic and epibenthic fauna, discussed below. A 1 km exposure area, acknowledged by Jones et al. (2021), is considered conservative and well within the 3 km radius that comprises the operational area around the well during drilling. Impact: Change in sediment quality Deposition of drill cuttings and fluids during drilling operations are expected to result in a change in sediment quality. WBM and cuttings solids tend to settle and accumulate on the seafloor. If discharged at or near the surface, the cuttings and mud disperse in the water column over a wide area and settle as a thin layer on the seabed (Neff, 2005). Several field studies found that drill cuttings discharged in water depths < 300 – 400 m typically deposit in sediments within about 100 – 200 m of the discharge (Sanzone et al. 2016). In 2016 the International Association of Oil and Gas Producers (IOGP) summarised field, laboratory and modelling studies relating to cuttings discharges. Seafloor discharge of cuttings and adhered WBM was shown to occur within 10–150 m of the discharge source; whereas cuttings discharged near the surface tend to accumulate on the seafloor down-current from the discharge at distances of ~0.1–1 km (Sanzone et al. 2016). Such surface discharges undergo higher levels of dispersion of smaller cuttings within the water column resulting in a thinner layer near the well site. Metals composition of WBM and cuttings resembles that of natural marine sediments, albeit with concentrations of some metals higher than background concentrations in uncontaminated marine sediments (Neff 2005). Water-based drilling fluids have been shown to have little or no toxicity to marine organisms due to the inert / PLONOR (Poses Little or No Risk to the Environment) nature of its components (Jones et al. 1996; Neff 2005). Barite, an insoluble component of WBM discharges, has been widely shown to accumulate in sediments following drilling (reviewed by Hartley, 1996) and is of low bioavailability and toxicity to benthic						Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		organisms. Barium concentrations greater than about 2,000 mg/kg in soils and sediments suspected of being contaminated with drilling wastes may indicate the presence of drilling muds or cuttings. However, it has been recognized that some clean soils and sediments may contain up to 8,000 mg/kg of barium (Neff 2002). A study conducted in the Gulf of Mexico at 3 continental shelf drilling discharge locations (37 to 119 m water depth), where water-based drilling fluids and cuttings were discharged, found barium to accumulate to high concentrations in surface sediments within 100 m of the platforms (4,640 to 121,000 mg/kg). In one year between the first and second post-discharge surveys, seabed barium concentrations were observed to have decreased up to 80% (Sanzone et al., 2016). Based on the field, laboratory and modelling studies discussed above, it is expected that deposited drilling discharges on the seabed will result in a change of sediment quality following the introduction of drilling discharges to seabed sediments within 200 m of the drilling location (Sanzone et al. 2016). It is expected within the first couple of years post-drilling, the concentration to drilling components will decrease by up to 80% from natural dispersive and degradative processes influenced by the high energy environment in the operational area (Sanzone et al., 2016). Therefore, changes to sediment quality due to drilling discharges during the Activity are expected to be temporary in nature and localised within close proximity of the source. To understand the potential distribution and concentration of the heavy metals mercury (Hg) and Cadmium (Cd), a dispersion and dilution estimate was undertaken, factoring in a 200m dispersion radius (Figure 6-20. The estimate indicates residual concentrations of Hg and Cd originating from bulk materials, once dispersed within a 200 m radius of shallow sand around the well, would be well below the applicable ANZG DGVs for sediment, and therefore no discernible ongoing impacts. A 1 km exposure area is considered conservative and well within the 3 km radius that comprises the operational area around the well during drilling.  *Figure 6-2: Illustration of Dispersion of Bulk Materials* Summary Water and sediment quality within the operational area is expected to be representative of the expected quality found in Otway Basin waters. Given the impacts will be temporary, in close proximity of the source, the consequence of any impacts from drill cuttings and fluid discharges are assessed as Level 1.						

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
	Change in benthic habitat	Impact: Change in benthic habitat The deposition of drill cuttings and fluids on the seabed will result in a localised change to benthic assemblages from direct burial of benthic biota and change in benthic substrates. Benthic fauna within the operational area are expected to be limited to patchy epifauna as found in surveys of the adjacent existing Otway offshore development operational area and associated facilities (Fugro, 2020). The epifauna, including sponges, bryozoans and hydroids, though patchy in their distribution, were observed on both hard and unconsolidated substrates. Rock cuttings from drilling will add to the unconsolidated substrates and will redistribute over time influenced by the surrounding morphology, currents, prevailing weather and would not be expected to significantly alter the overall character of the seabed, or its ecological amenity. Benthic assemblages in the operational area are characteristic of the shelf rocky reef and hard substrate KEF that is well represented in the wider Bass Strait region (Table 4-4). Activities occurring within the operational area are likely to result in seabed disturbance to the KEF and impact some of the associated values, such as diversity and productivity of the hard substrate which are often colonised by sponges, sessile invertebrates, soft corals. Results from a 2020 seabed survey adjacent to the operational area observed hard ground and patchy epifauna, consistent with the description of the KEF, however no reef-type structures of high relief were observed (Fugro, 2020). The seabed survey was undertaken in May and June 2025 (refer Section 4.3.1). The Annie-2 development well location avoids sensitive features such as reef structures of high relief, and is considered a suitable location. The operational area does not overlap AMPs, and no ecological communities listed as threatened under the EPBC Act have been observed. The effects of drilling cuttings deposits on bottom living biological communities are caused mainly by burial, changes in sediment texture, and low sediment oxygen concentrations that result from microbial degradation of organic matter (Sanzone et al. 2016). However, the recovery of benthic communities from these effects is expected to occur by the colonisation of new organisms and subsequent migration from adjacent undisturbed sediments. Ecological recovery typically begins shortly after drilling is completed and is often well advanced within a year. Studies have shown that impacts to benthic assemblages from drilling discharges are highly localised (Sanzone et al. 2016) and can recover rapidly to post drilling conditions. Several monitoring studies reviewed by Sanzone et al. (2016) observed a substantial recovery in benthic communities within one to a few years after drilling discharges. Observations within the existing Otway offshore field have also shown high levels of colonisation of disturbed seabed and equipment since it was installed in mid-late 2000's (Fugro 2020a; 2020b). A monitoring study in the Minerva gas field (60 m water depth) off the south coast of Victoria (located 10.7 km east of the proposed Annie-2 development well), observed the benthic impacts of exploration drilling and WBM discharge (Currie and Isaacs 2005). Benthic community structure in sediments collected along transects from the wellhead to 6,400 m away was studied shortly before and for up to 11 months after exploration drilling. Drill cuttings were observed in some grab samples collected four months after drilling but not in any samples collected after 11 months. Immediately after drilling, the abundance of benthic fauna and faunal diversity decreased by 45 to 75% in sediments within about 100 m of the discharge and most faunal changes were no longer detectable after four months. It was noted that modified benthic communities persisted for at least 11 months after completion of drilling at stations closest to the MODU. Findings indicated impacts of WBM and cuttings discharges were localised within approximately 100 m of the source and benthic ecosystem recovery was well advanced in less than one year. Based on the low overall ecotoxicity associated with water-based fluids; no effect concentrations would not be expected to be exceeded beyond the near vicinity of the well and would only be apparent for short durations (Neff, 2010). Any decrease in the abundance and biomass of epifauna would be localised and recoverable, with no threat to EPBC Act listed threatened benthic fauna. Therefore, given the localised and recoverable nature of change in benthic habitat, the consequence is assessed as Level 1.						

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
	Injury / mortality to marine fauna	Risk: Injury/mortality to marine fauna - Plankton and Fish (including eggs and larvae) Pelagic fish (including eggs and larvae) and plankton are receptors with the potential to be exposed and most at risk of injury or mortality to an increase in turbidity levels from the surface discharge of drill cuttings and fluids. Plankton communities typically have a patchy distribution which is directly connected to localised and seasonal productivity that produces sporadic bursts in phytoplankton and zooplankton populations (CoA 2015c). Impacts to fish larvae is expected to be limited due to high natural mortality rates (McGurk 1986), intermittent exposure and the dispersive characteristics of the open water in the operational areas. Hinwood et al. (1994) and Neff (2005) found that turbidity in the water column associated with discharges of cuttings and adhered fluids is expected to be reduced to below 10 mg/L (9 ppm) within 100 m of release. This indicates that suspended sediment concentrations caused by the discharge of drill cuttings will be substantially below the levels required to cause an effect on fish or invertebrate larvae (i.e. predicted levels are well below a 96-hr exposure at 100 mg/L, or instantaneous 500 mg/L exposure) and minimal impact to larvae is expected from the discharge of drill cuttings. Jenkins and McKinnon (2006) reported that levels of suspended sediments greater than 500 mg/L are likely to produce a measurable impact upon larvae of most fish species, and that levels of 100 mg/L will affect the larvae of some species if exposed for periods greater than 96 hours. Jenkins and McKinnon (2006) further indicate that levels of 100 mg/L may affect the larvae of several marine invertebrate species, and that fish eggs and larvae are more vulnerable to suspended sediments than older life stages. High energy oceanographic processes at the well location will result rapid dilution and dispersion of surface discharges of drill cuttings and fluids, reducing the potential for toxic effects to fish larvae. Fish larvae are likely to be transient, therefore exposure to total suspended sediments will short-term and localised. Rapid dispersion of TSS and the transient nature of fish larvae reduces the likelihood of 96-hour exposure of fish larvae to drill cuttings and fluids which is required to illicit potential injury or mortality. The intermittent and brief exposure of adult mobile fish to in-water operational discharge plumes will prevent chronic exposure which leads to mortality. This assessment considers the risk of injury or mortality to plankton and fish from operational discharges. While the impact is conceivable and could occur from this activity, which is short term, it is considered Unlikely (D) and as such the overall risk level is Low. Risk: Injury/mortality to Marine Fauna - Mobile Fish, Marine Reptiles and Marine Mammals The intermittent and brief exposure of mobile fish, marine reptiles and marine mammals to in-water drilling discharges will prevent chronic exposure that could begin to manifest in sublethal physiological and lethal impacts. Therefore, these outcomes are not credible given the nature and scale of the activity. No BIAs or protected habitats for fish species were identified within the operational area. however, a variety of fish species, including commercial species may be present. Impacts are not expected to fish species due to the low toxicity of water-based fluids and rapid dilution. The operational area does not overlap recognised BIAs for marine turtles and therefore low numbers are expected in the area. Marine turtles with the potential to be exposed to drilling discharge plumes in the operational area are therefore limited to transient individuals. Brief exposure to the plumes may result in minor behavioural changes. Although, they are unlikely to lead to sub-lethal injury given the absence of habitats that encourage long-term presence of marine turtles in the operational area (Johnson 2018). A foraging BIA for the pygmy blue whale has been identified within operational area. Pygmy blue whales are expected to aggregate near the operational area and surrounds to feed from November and July (DoE 2015a). Cetaceans are expected to be less sensitive to potential impacts associated with turbidity, compared to fish larvae (described above). Given this adaptation to temporary increases in turbidity, plumes generated by drilling discharges are not expected to have a discernible effect foraging behaviours or movement patterns of individuals, nor at a population level. Therefore, the evaluation of potential impacts to fish larvae provides a conservative evaluation of the level of potential impacts to marine fauna for this discharge.	Level 1	A		Unlikely (D)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		The migration BIA of the southern right whale overlaps with the operational area. Although, marine discharges from a MODU or equivalent are not identified as a threat to the recovery of the pygmy blue whale (DoE 2015a), or to the recovery of the southern right whale (DCCEEW 2024b), marine pollution by acute and chronic chemical discharge is identified in both plans as a threat that has minor consequences to the population by only affecting individuals (DoE 2015a; DCCEEW 2024b). However, due to the low toxicity of planned discharges and their rapid dilution as a result of oceanic conditions, along with the transient nature of these species within the operational area, impacts are not predicted to occur. Marine fauna exposed to field cuttings in sediments in laboratory or field studies indicated that species did not bioaccumulate significant quantities of metals (Hartley et al. 2003). There is some evidence of limited bioavailability of a few metals, such as lead and zinc, which are present in cuttings piles or additives in drilling lubricants and fluids. However, there is uncertainty whether metal bioaccumulation in marine fauna from cuttings piles is sufficient to cause harmful effects in marine fauna living on or near cuttings piles (OSPAR 2019). Neff (2010) concludes that, due to a lack of overall toxicity and low bioaccumulation potential of drilling fluids, the effects of drilling discharges are highly localised and are not expected to spread through the food web. It is expected that any potential minor behavioural impacts from planned operational discharges would be temporary and localised given the transient nature of marine fauna within the operational area. Therefore, the impact is considered Unlikely (D) and as such the overall risk level is Low. Any impacts to megafauna would be negligible.						
Planned Discharges – Cement: • Drilling • Well Abandonment (Contingency)	Change in water quality Change in sediment quality	Drilling activities will generate excess cement slurry and washings which are typically released to the marine environment as a result. One top-hole will be drilled under the Activity with well construction activities expected to occur for up to 60 days. In the unlikely event that the well will not be utilised for future evaluation, appraisal or development, well abandonment activities are expected to occur for ~30 days <u>Planned Discharges – Seabed and Surface</u> Planned cement discharges include releases of: • ~60 m^3 discharged at the seabed, including excess volumes of cement and the spacer displacement to the seabed. • ~50 m^3 discharged at the surface, including discharge volumes on testing. • ~8 m^3 discharged at the surface if P&A activities are required (contingent activity). <u>Potential Discharges - Unused Bulk Material Disposal</u> Unused cement bulk discharges produced following the completion of well construction activities will be managed in accordance with Figure 12-9. It is anticipated that in the worst-case scenario a volume of ~50 m^3 of bulk cement (accounting for possible leftover contingency) would be mixed with water and discharged as a slurry overboard. Although this aspect is assessed as having a 'low order' impact; Amplitude Energy has reviewed and assessed additional controls to ensure that impacts are managed to ALARP. Table 6-3 identifies and assesses additional controls. Impact: Change in Water Quality and Sediment Quality Discharge of cement at the surface can cause increased turbidity in the water column and result in a temporary change in surface water quality. However, cement particles are expected to disperse under the action of metocean conditions and eventually settle out of the water column. The initial discharge will generate a downwards plume, increasing the initial mixing of the receiving waters. Modelling of surface cement discharges of approximately 78 m^3 over one hour, conducted for BP (2013), resulted in a suspended solid concentration between 0.005-0.05 mg/m^3 within the extent of the plume (~150 m horizontal and 10 m vertical) over 2 hours. Four hours post-discharge, concentrations were <0.005 mg/m^3. The volume modelled is greater than the maximum surface discharge volume predicted for the Activity, therefore it is predicted that the concentration of suspended sediments would be lower.	Level 1	A	CM09: Offshore equipment (solids equipment) CM10: Amplitude Energy Offshore Chemical Assessment Procedure CM11: Titleholder Collaboration CM12: Inventory Management CM13: Offshore Operational Procedures (Drilling Discharges Management) See Table 6-3 for an assessment of additional controls.	N/A	N/A	Acceptable based on: • Impacts well understood. • Consequence level is Level 1, therefore no potential to affect biological diversity and ecological integrity. • Risk level to receptors a result of the change in ambient conditions is low. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and are provided for. Minamata Convention

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		Cement discharged at the seabed is not expected to disperse as it is designed to set in a marine environment and will therefore set in-situ. BP (2013) modelled a 200 t (~83 m^3) cement discharge at the seabed and found changes to the benthic environment were limited to 10 m. Cement is inert and is listed as a substance that is considered PLONOR (OSPAR 2021). Given the inert nature, toxic impacts to benthic habitats and ecological receptors such as plankton, fish, marine mammals and turtles are not anticipated. Water and sediment quality within the operational area is expected to be representative of the quality found in the Otway Basin waters. With consideration of the high energy marine environment and given the localised and temporary nature of the change in water and sediment quality, the consequence of any impacts from cement discharges are assessed as Level 1.						Activity will not impact the recovery of: – Blue whale as per the Blue Whale Conservation Management Plan 2015 – 2025 (DoE, 2015) – Southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW, 2024b) – Marine turtles as per the Recovery Plan for Marine Turtles in Australia, 2017 – 2027 (CoA, 2017). • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1).
	Change in benthic habitat	Impact: Change in Benthic Habitat Changes to the physical environment as a result of planned discharges of cement could result in a change to benthic assemblages within the operational area. The volume of cement that will be discharged at the seabed during the Activity has the potential to smother and permanently alter the benthic substrate. Cement overspill on the seabed is expected to change seabed habitat within 10-50 m of the well. Benthic assemblages in the operational area are characteristic of the shelf rocky reef and hard substrate KEF that is well represented in the wider Bass Strait region (Table 4-4). Activities occurring within the operational area are likely to result in seabed disturbance to the KEF and impact some of the associated values, such as diversity and productivity of the hard substrate which are often colonised by sponges, sessile invertebrates, soft corals. Results from a 2020 seabed survey adjacent to the operational area observed hard ground and patchy epifauna, consistent with the description of the KEF, however no reef-type structures of high relief were observed (Fugro, 2020; 2020a). A seabed survey was undertaken in May and June 2025 (refer Section 4.3.1) at the Annie-2 location and operational area. The Annie-2 development well location avoids sensitive features such as reef structures of high relief, and is considered a suitable location. The operational area does not overlap AMPs, and no ecological communities listed as threatened under the EPBC Act have been observed. Observations within the existing Otway offshore field have shown high levels of colonisation of disturbed seabed and equipment since it was installed in mid-late 2000's (Fugro 2020; 2020a). Therefore, the risk of change in habitat from cement overspill are not anticipated to significantly alter the overall character of the seabed, or its ecological amenity, and are expected to be limited to within the near vicinity of the well. Any decrease in the abundance and biomass of epifauna would be highly localised and recoverable, with no threat to EPBC Act listed threatened benthic fauna or the long-term viability of the ecosystem. Given the localised and recoverable nature of change in benthic habitat, the consequence is assessed as Level 1.	Level 1	A		NA	Low	
	Injury / mortality to marine fauna	Risk: Injury/mortality - Plankton and Fish (including Eggs and Larvae) As stated above, cement is listed as a substance that is PLONOR (OSPAR 2021), and together with water forms the majority of cement slurry. Other products are used to adjust the properties of the cement slurry; to ensure the cement sets as intended, accounting for the temperatures, pressures and contents of the well. Surface cement slurry discharges are expected to result in a highly localised and temporary suspended solid plume, preventing long-term exposure to plankton and fish resulting in injury or mortality. The high energy conditions in the operational area will result in a rapid dispersion of the drilling discharges plume, and any concentrations of suspended solid concentrations of cement would become further diluted over time. Early life stages of fish (eggs, larvae) and plankton would be most susceptible to exposure from cement slurry and wash water as they are less mobile and therefore can be more exposed to the plume at the discharge point. Although plankton may be sensitive to aspects of marine discharges, this is typically for prolonged exposure. Considering the naturally high mortality of plankton and the rapid replacement of the species (Richardson et al.	Level 1	A		Unlikely (D)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		2017), any impacts from short term exposure to suspended cement particles are not expected to have lethal effects to plankton that are ecologically significant. Jenkins and McKinnon (2006) reported that levels of suspended sediments greater than 500 mg/L are likely to produce a measurable impact upon larvae of most fish species and levels of 100 mg/L where exposure occurs for greater than 96 hours may also affect the larvae of some species. Jenkins and McKinnon (2006) further indicate that levels of 100 mg/L may affect the larvae of several marine invertebrate species. It is understood that the egg and larval stages are more vulnerable to suspended particles than other life stages. Modelling of surface cement discharges of approximately 78 m^3, conducted by BP (2013), detailed that the particulate concentrations within the extent of the plume (approximately 150 m horizontal and 10 m vertical) were in the 5-50 mg/L range over two hours from the start of discharge. Four hours after the start of the discharge, the modelling indicates that the plume will have completely dispersed to particulate concentrations of less than 5 mg/L. The volume modelled is slightly greater than the maximum surface discharge volume predicted for the Activity activities (60 m^3). Thus, impacts to fish (including eggs and larvae) are not predicted. Within the operational area, planktonic communities will be typical of the offshore environment in the region. Mortality rates for plankton are naturally high with distribution often patchy and linked to localised and seasonal productivity that produces sporadic bursts in phytoplankton and zooplankton populations (CoA 2015c). Considering the high energy marine environment and naturally high variability in presence of plankton and fish eggs and larvae in the Otway Basin; any impacts will be localised and temporary and have been assessed as Level 1. Risk: Injury/mortality - Mobile Fish, Marine Reptiles and Marine Mammals The intermittent and brief exposure of mobile fish, marine reptiles and marine mammals to in-water cement discharges will prevent chronic exposure that could begin to manifest in sublethal physiological and lethal impacts. Therefore, these outcomes are not credible given the nature and scale of the activity. No BIAs or protected habitats for fish species were identified within the operational area. However, a variety of fish species, including commercial species may be present. Impacts are not expected to fish species due to the low toxicity of the suspended cement particles and rapid dilution. A foraging BIA for the pygmy blue whale has been identified within the operational area. Marine discharges from a MODU or equivalent are not identified as a threat to the recovery of pygmy blue whales in the Conservation Management Plan for the Blue Whale (DoE 2015a). A migration BIA of the southern right whale overlaps with the operational area. Marine discharges from a MODU or equivalent are not identified as a threat to recovery in the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b). The operational area does not overlap recognised BIAs for marine turtles and therefore low numbers are expected in the area. Marine turtles with the potential to be exposed to cement discharges in the operational area are therefore limited to transient individuals. Minor behavioural changes may result from brief exposure to the plumes. Although, they are unlikely to lead to sub-lethal injury given the absence of habitats that encourage long-term presence of marine turtles in the operational area (Johnson 2018). It is expected that any potential minor behavioural impacts from planned cement discharges would be temporary and localised given the transient nature of marine fauna within the operational area. Therefore, the impact has been assessed as Level 1 and Unlikely (D) and, as such, the overall risk level is Low. Any impacts to megafauna would be negligible.						• **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
Planned Discharges – Other:	Change in water quality	Discharges to the subsea environment, near the seabed will occur during BOP installation, testing, well integrity, ROV operations, well shut-in and contingent well plug and abandonment. Discharges will include: • ~2.5 m^3 of hydraulic control fluid and test fluid per function / pressure test (function tests are generally undertaken every 7 days with pressure tests occurring every 21 days (see Section 3.4.3.4)). • Minor volumes (~10 L) of hydraulic control fluids during well integrity testing activities.	Level 1	A	CM09: Offshore equipment CM10: Amplitude Energy Offshore Chemical	N/A	N/A	Acceptable based on: • Impacts well understood. • Consequence level is Level 1, therefore

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
• BOP Installation/ Testing • Well Integrity Monitoring • ROV Operations • Well Shut-in		• Minor volumes (~50 L) of calcium wash (citric acid or equivalent) may be discharged if cleaning of the calcium deposits from the ROV interface to the SST is required. Impact: Change in Water Quality Diluted hydraulic control fluids in potable water are water-based, low toxicity and readily biodegradable. Neff (2005) indicates that within well-mixed ocean waters, consistent with the operational area, fluids will have diluted by over 100-fold within 10 m of the discharge point. Modelling undertaken by BP (2013) of discharge plumes associated with BOP function testing indicates that the maximum plume persistence was approximately 77 minutes, based on 51 m and 81 m dimensions. The smallest discharge (20 litres over 0.5 minutes) persisted to a dilution of 3,000-fold, ranging between 3 and 12 minutes, with maximum width and length of 5m and 7m respectively (BP 2013). Calcium wash (citric acid or equivalent such as sulfamic acid) are typical chemicals used to remove marine growth or calcium deposits. Discharge of these chemicals to the subsea environment may result in a localised and temporary reduction in water quality. However, due to the small volumes released, these discharges are anticipated to rapidly disperse into the water column and any changes to the water quality will be localised and short-term. All chemicals, including hydraulic fluids, are selected in accordance with the Amplitude Energy Offshore Chemical Procedure to ensure ecotoxicity profiles are of an acceptable level. Water quality within the operational area is expected to be representative of the quality found in the Otway Basin waters. Given the high energy marine environment, discharges during BOP installation and testing, ROV operations and well shut-in will dissipate rapidly and any change in water quality will be localised and temporary. Impacts are assessed as Level 1.			Assessment Procedure			no potential to affect biological diversity and ecological integrity. • Risk level to receptors as a result of the change in ambient conditions is low. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and are provided for: Minamata Convention Activity will not impact the recovery of: – Blue whale as per the Blue Whale Conservation Management Plan 2015 – 2025 (DoE,2015) – Southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) – Marine turtles as per the Recovery Plan for Marine Turtles in
	Injury / mortality to marine fauna	Risk: Injury/mortality - Plankton and Fish (including Eggs and Larvae) Early life stages of fish (eggs, larvae) and other plankton would be most susceptible to toxic exposure from chemicals in the hydraulic fluid discharges, as they are less mobile and therefore can become entrained in a discharge. However, these fluids are typically soluble or miscible with water and dilute rapidly, limiting overall exposure time and the potential for toxic effects to manifest. As mentioned above, mortality rates for plankton are naturally high with distribution often patchy and linked to localised and seasonal productivity that produces sporadic bursts in phytoplankton and zooplankton populations (CoA 2015c). Plankton are known to accumulate rapidly and are generally not found to be sensitive to the impacts of contaminants within the water column (Hook et al. 2016). Planktonic communities within the operational area will be typical of the offshore marine environment in the region. Given the high energy marine environment, changes to water quality that may impact plankton will be localised to the discharge point with discharges subject to rapid dilution. The potential localised effects to plankton within the operational area are expected to be undetectable at a population level as they are known to have high levels of natural mortality and a rapid replacement rate (Richardson et al. 2017). As such, the impacts have been assessed as Level 1, with the event being considered Remote (E). Therefore, the risk level has been determined as Low. Risk: Injury/mortality - Mobile Fish, Marine Reptiles and Marine Mammals Larger marine fauna are not expected to be impacted by exposure to chemicals in the hydraulic fluid discharges due to the low and localised levels of exposure which have the potential to occur. If contact does occur with any marine fauna, it will be short in duration due to small volumes released to the marine environment and the rapid dispersion of the plume will preclude chronic exposure, sub-lethal impacts and mortality. As a result, mortality and/or injury from operational discharges is not a credible event. Any impacts to megafauna would be negligible.	Level 1	A		Remote (E)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
								Australia, 2017 – 2027 (CoA 2017a). • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
Planned Discharges – Operational: • Vessel Operations	Change in water quality	MODU and vessel operations (during development drilling as well as contingent vessel based activities or plug and abandonment) will result in the routine operational discharges to surface waters. These include: • Sewage and grey water (approximately 144m^3/day). • Cooling water and brine (approximately 8,400m^3/day). • Deck drainage and bilge (approximately 1.5m^3/day). No putrescible waste (i.e., food waste) will be discharged as per AMSA's MARPOL requirements.	Level 1	A	CM03: Marine Assurance Process CM08: Planned Maintenance System	N/A	N/A	Broadly Acceptable, based on: • Impacts well understood. • Consequence level is Level 1, therefore

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
• MODU Operations		Routine operational discharges such as cooling water, deck drainage, and bilge will be treated onboard prior to discharge, as per IMO regulations. Volumes of routine operational discharges are often dictated by the number of people on board the vessel. The following volumes are expected for the Activity. Impact: Change in Water Quality Routine MODU and vessel discharges will result in localised changes to the water quality within the vicinity of the discharge point, and may result in increased temperature, chemicals, nutrients or salinity within the water column. Contaminants in operational discharges are expected to be exposed to prevailing currents which will disperse and dilute the plume in receiving waters or be consumed by microorganisms (bacteria) (NERA 2017; Shell 2020). Changes to water quality from contaminants in operational discharges is expected to be short-term and localised to waters surrounding the discharge point as demonstrated by the following studies: • Modelling by Shell (2009) found that upon discharge, hydrocarbons and other chemical concentrations are rapidly diluted within less than 100 m of the discharge point, over a relatively short period of time. • Intermittently elevated nutrient levels from sewage, putrescible waste, and grey water discharges, which will either dilute in the receiving waters, settle out of the water column, chemically break down or be consumed by microorganisms (bacteria) (NERA 2017). • Monitoring of a 10 m^3 of discharged sewage found in-water concentrations was reduced to 1% of its initial concentration within 50 m of the discharge point (Woodside Energy 2014). • Friligos (1985) observed sewage discharge in deep ocean waters and found no appreciable differences in the inorganic nutrient levels between the outfall area and background concentrations, suggesting rapid uptake of nutrients and/or rapid dispersion in the surrounding waters. • Modelling of continuous wastewater discharges observed that the temperature of discharged water was <1°C above ambient within 100 m (horizontally) of the discharge point, and 10 m vertically (Woodside Energy 2014). Biocides and chemical contaminants in operational discharges are selected in accordance with the Amplitude Energy Offshore Chemical Procedure to ensure ecotoxicity profiles are of an acceptable level. Further, these discharges are subject to IMO regulations so most will undergo treatment prior to discharge. The open ocean environment in the operational area will result in the rapid mixing and dilution of vessel discharges Therefore, in combination with the low volume of discharges, it is expected that any planned operational discharges will be short-term and localised. The consequence of impacts to water quality will be Level 1.			CM10: Amplitude Energy Offshore Chemical Assessment Procedure (project chemicals).			no potential to affect biological diversity and ecological integrity. • Risk level to receptors a result of the change in ambient conditions is low. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and provided for: Activity will not impact on the values and functions of the Bonney Upwelling KEF. Activity will not impact the recovery of: – Blue whale as per the Blue Whale Conservation Management Plan 2015 – 2025 (DoE 2015a) – Southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b)
	Injury / mortality to marine fauna	Risk: Injury / Mortality to Marine Fauna - Plankton Contaminants in operational discharges from MODU and vessel operations have the potential to result in injury/mortality to plankton. Plankton are typically considered more vulnerable to the impacts of routine vessel discharges compared to mobile species due to their inability to move away from the discharge point. As discussed above, mortality rates for plankton are naturally high with distribution often patchy and linked to localised and seasonal productivity that produces sporadic bursts in phytoplankton and zooplankton populations (CoA 2015c). In addition, plankton are known to accumulate rapidly and are generally not found to be sensitive to the impacts of contaminants within the water column (Hook et al. 2016). Therefore, considering the naturally high mortality of plankton and the rapid replacement of the species (Richardson et al. 2017), any impacts from short term exposure to low toxicity discharges are not expected to cause measurable levels of injury or mortality to plankton and will not result in a change in the viability of the population or ecosystem. Therefore, impacts to plankton have been assessed as Level 1, with a likelihood of Remote (E) assigned. The risk to plankton from planned operational discharges have been evaluated as Low. Risk: Injury / Mortality to Marine Fauna - Mobile Fish, Marine Reptiles and Marine Mammals	Level 1	A		Remote (E)	Low	

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		Marine fauna within the operational area is likely to be transient. The intermittent and brief exposure of marine fauna to in-water operational discharges will preclude chronic exposure which leads to mortality. As a result, mortality from operational discharges is not a credible event. No BIAs or protected habitats for fish species were identified within the operational area. However, a variety of fish species, including commercial species may be present. Fish respond to elevated turbidity levels by actively avoiding the plume, which prevents chronic exposure that may lead to sub-lethal impacts relating to minor physiological stress. Observations from numerous studies have identified that adult fish can tolerate relatively high levels of turbidity and TSS for short periods (Johnson 2018). Therefore, fish in the operational area are not expected to stay within the discharge plume for a period of time that would result in sub-lethal injury to occur. A foraging BIA for the pygmy blue whale has been identified within the operational area. Marine discharges from a MODU or equivalent are not identified as a threat to the recovery of pygmy blue whales in the Conservation Management Plan for the Blue Whale (DoE 2015a). The south-east marine region, in addition to the north marine region, has the lowest water clarity and least seasonality of the six marine regions around the coast of Australia (Richardson et al. 2020). As a result, marine mammals that regularly feed here are adapted to high natural variability of in-water turbidity. Given this adaptation to temporary increases in turbidity, plumes generated by operational discharges are not expected to prevent marine mammals from returning to the operational area to feed after discharges have been completed (Johnson 2018). A migration BIA of the southern right whale overlaps with the operational area. Marine discharges from a MODU or equivalent are not identified as a threat to recovery in the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b). Since marine mammals are adapted to temporary sediment disturbances because of their oceanic existence and exposure to large storms, disturbances that generate TSS should not prevent species from returning to the area after the disturbance has passed (Tillin et al. 2011). The operational area does not overlap recognised BIAs for marine turtles and therefore low numbers are expected in the area. Marine turtles with the potential to be exposed to operational discharge plumes in the operational area are therefore limited to transient individuals. Minor behavioural changes may result from brief exposure to the plumes. Although, they are unlikely to lead to sub-lethal injury given the absence of habitats that encourage long-term presence of marine turtles in the operational area (Johnson 2018). It is expected that any potential minor physiological impacts from planned operational discharges to plankton, fish, marine reptiles, and marine mammals would be temporary and localised given the transient nature of marine fauna. Therefore, any impacts to megafauna would be negligible, and have been assessed as Level 1 with a likelihood of Remote (E) assigned. The risk to marine fauna has been determined as Low.						– Marine turtles as per the Recovery Plan for Marine Turtles in Australia, 2017 – 2027 (CoA 2017a). • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Impacts are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence is the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.

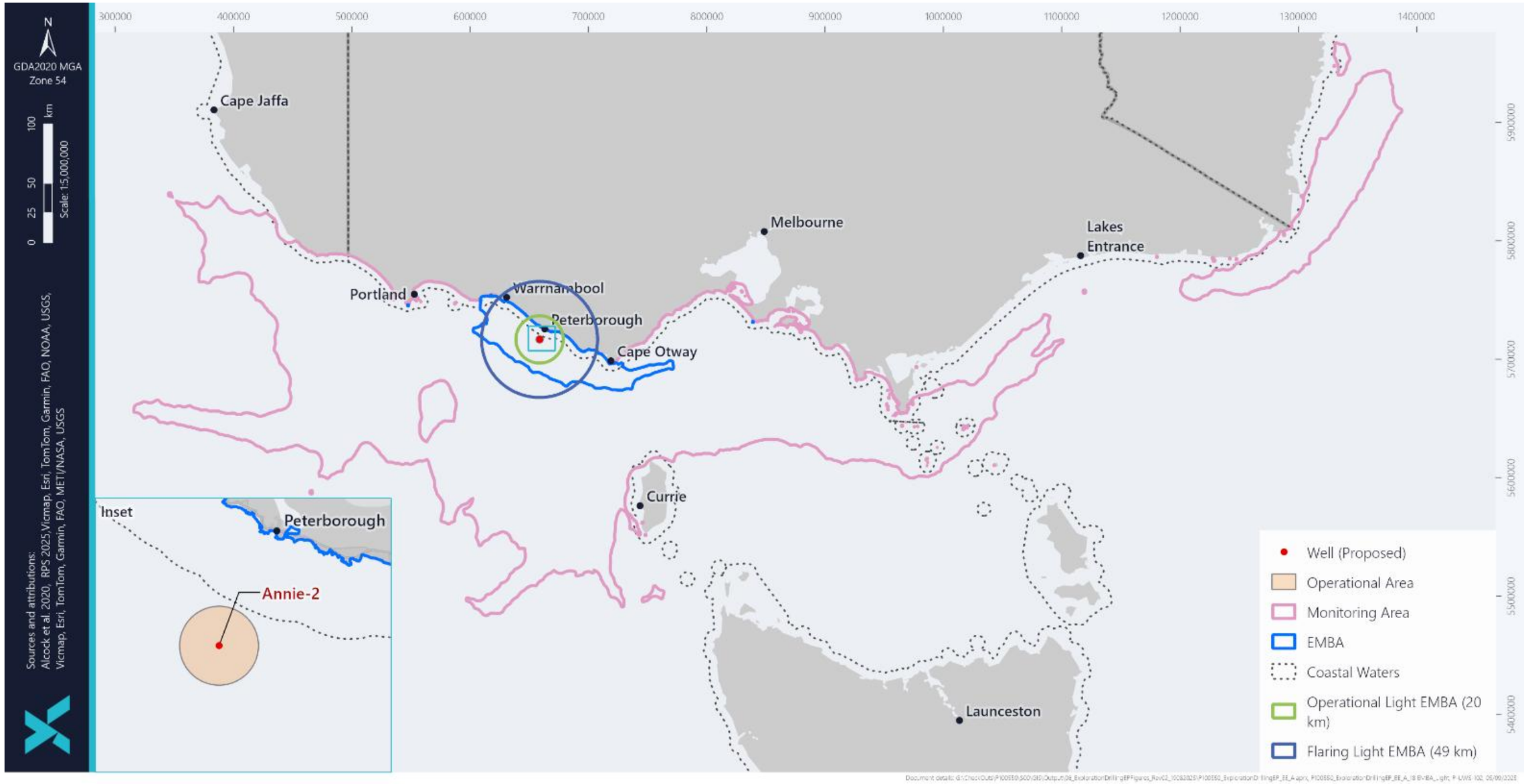


Figure 6-3: Operational Light EMBA and Flaring Light EMBA Within the Monitoring Area

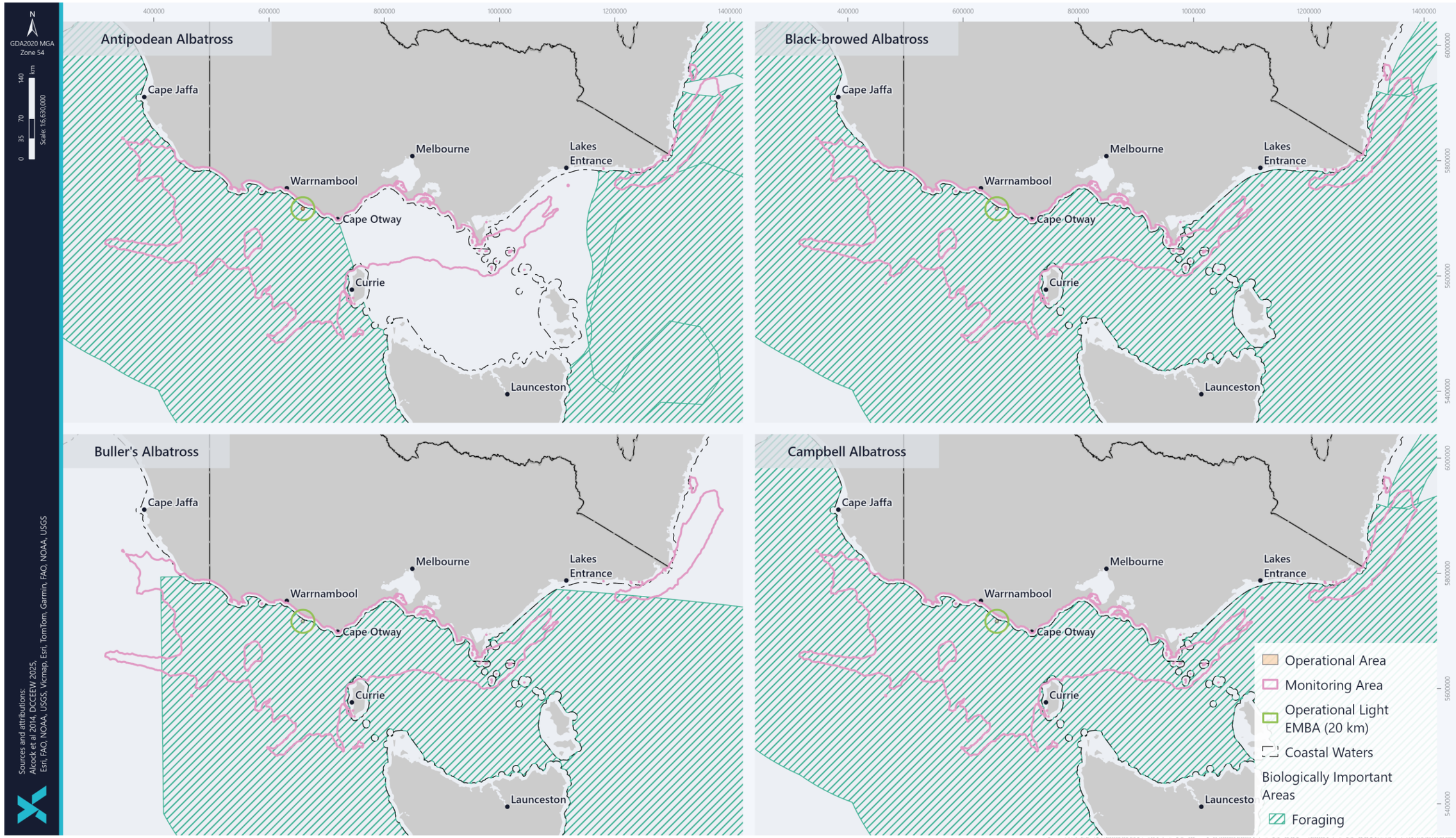


Figure 6-4: Antipodean Albatross, Black-browed Albatross, Buller's Albatross, and Campbell Albatross BIAs overlapping the Operational Light EMBA Within the Monitoring Area



Figure 6-5: Shy Albatross, Wandering Albatross, and Indian, Yellow-nosed Albatross BIAs overlapping the Operational Light EMBA Within the Monitoring Area

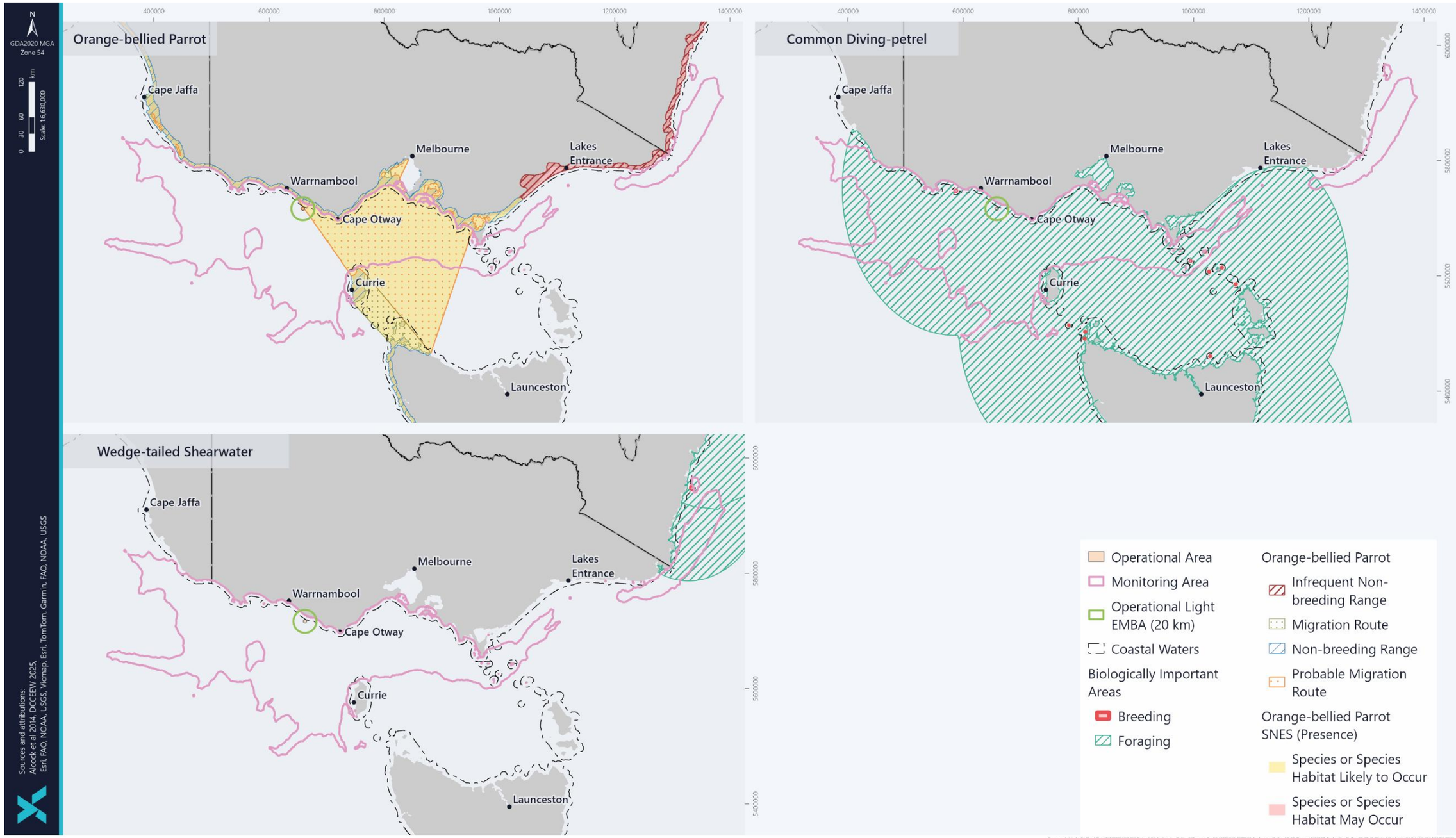


Figure 6-6: Orange-bellied Parrot, Common Diving-petrel, and Wedge-tailed Shearwater BIAs overlapping the Operational Light EMBA Within the Monitoring Area

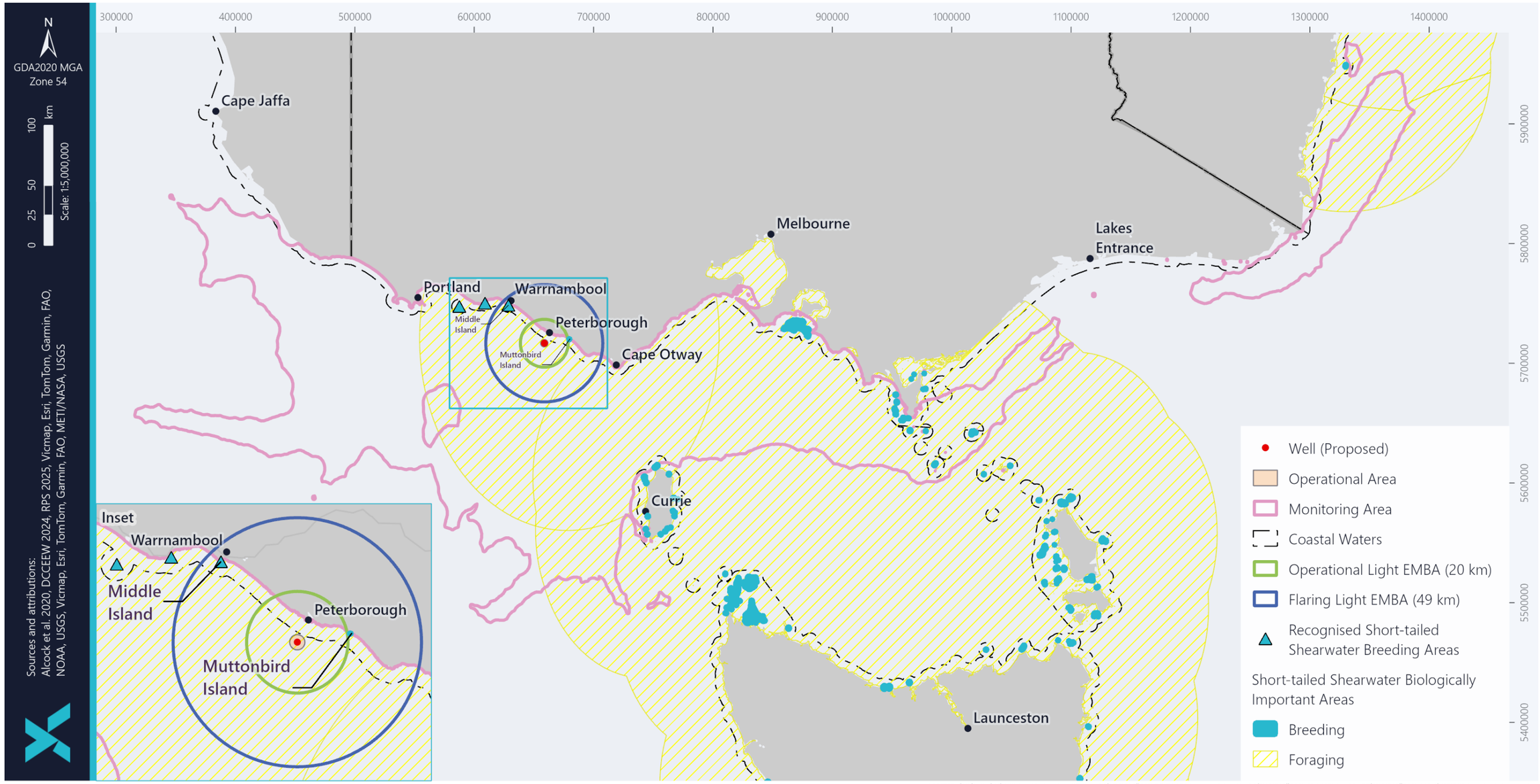


Figure 6-7: Short-tailed Shearwater BIAs overlapping the Operational Light and Flaring EMBAs

Table 6-3: Additional Control Measures Considered to Manage Drilling and Cementing Discharges

Additional Control Measures Considered	Benefit	Sacrifice / Risk	Conclusion (Accept / Reject)
No Discharge of Unused Bulks to Sea	Restricting overboard discharges would result in a reduction of the overall volume of discharge to sea, reducing potential (low level) environmental impacts. However, with controls in place that limit the mercury concentrations in stock barite in combination with the known low solubility of barite in seawater, the implementation of "no discharge of unused bulks to sea" is considered to be of limited environmental benefit. Bulk materials (cement, barite, bentonite) are classified as PLONOR in the offshore environment. OSPAR Commission 2024: '*The (PLONOR) list at Appendix 1 contains substances whose use and discharge offshore are subject to expert judgement by the competent national authority of Contracting Parties. These (PLONOR) substances do not normally need to be strongly regulated as, from assessment of their intrinsic properties, the OSPAR Commission considers that they pose little or no risk to the environment.*' The content of mercury within bulks is <1 mg / kg, which is below the threshold for fill materials onshore, and below GV-high ANZG. The content of Cadmium within bulks <3 mg / kg, which is below the threshold for fill materials onshore, and below GV-high ANZG. Noting the bulks would not be placed as 'fill' but would dissipate through the water column if discharged. Assuming a nominal 100m^3 bulks released and settles to seabed entirely within 500m radius of the MODU then Cd and Hg concentrations would be well below ANZG DGVs. In accordance with Article 9 of the Minamata Convention, the best available techniques and best environmental practices shall be utilised to control releases of mercury from relevant sources, where by "best available techniques" means those techniques that are the most effective to prevent and, where that is not practicable, to reduce releases of mercury to water and the impact of such emissions and releases on the environment as a whole, taking into account economic and technical considerations. In addition, "best environmental practices" means the application of the most appropriate combination of environmental control measures and strategies. Amplitude Energy is undertaking this by using the most appropriate combination of control measures including inventory control to minimise the amount of dry bulk products remaining at the end of the Activity, quality control to minimise the amount of mercury in barite and transferring to subsequent operators for use (where possible). Amplitude Energy have developed an unused bulks management process which is detailed in Figure 12-9. At the end of the drilling campaign, any unused bulks, including barite, bentonite and cement will be left onboard / transferred to the next operator for use. Where this is not possible, Amplitude Energy will have unused bulks transferred to another MODU or if practicable, returned to shore. Discharge to sea (as a slurry) will only occur when there are no other safe, practicable options.	Additional time and cost associated with this option. Estimated 1-day + critical path offshore operations at ~$2M, with increased risk of trouble shooting time required as it is a non-standard operation. There would be additional, potentially significant onshore disposal costs, and use of limited onshore disposal capacity for materials that are PLONOR in the marine environment. Options to re-use bulk materials are expected to be limited once brought onshore as the properties of bulk materials are affected by the transfer process, changes in temperature, pressure and moisture content. There is increased risk of cement damaging equipment and affecting operations as cement actively absorbs moisture from the atmosphere and will ultimately harden with repeated exposure. This process is accelerated in the moisture rich offshore environment. To minimise the risk of this cement is sent offshore in batch quantities, defined by the well program requirements, and held within specialised bulk tanks within the support vessel and then the MODU. Excess volume is maintained to provide for immediate response to unplanned events which may require increased use of bulk materials for the well activity. Cement held offshore for an extended period and returned to shore is regarded as a contaminant, and vessel storage tanks are required to be cleaned prior to new cement being added to those tanks. This is a complex process requiring confined space entry procedures and removes a vessel from service for the period of time in which the tanks take to be cleaned. In the event the cement has absorbed too much water from the atmosphere and the transfer processes, cement may set in place in. The costs and additional risks of implementing this system are considered to outweigh the minimal environmental benefit gained.	Partially accept (covered within CM12: Inventory Management)
Quality Control Limits for Barite	Controls the risk of seabed contamination, ensuring heavy metal concentrations are not above safe limits.	Minor costs associated with selection sourcing of suitable barite and verification of heavy metal levels.	Partially accept (covered within C13: Inventory Management)
Industry Collaboration for Bulks Management	Collaboration in industry efforts to establish an aligned position on the management of unused bulk products, which includes an assessment of feasible onshore disposal solutions, may help to identify feasible improvements to the management of	Minor administrative costs and time associated.	Accept (covered within CM11: Titleholder Collaboration)

Additional Control Measures Considered	Benefit	Sacrifice / Risk	Conclusion (Accept / Reject)
	unused bulk products and eliminate the low-level risks associated with offshore discharge.		
Riserless mud Recovery (RMR) System	A RMR system recirculates drill cuttings and fluids from the top-hole of the well, eliminating discharge to the seabed (when applied in conjunction with onshore disposal), therefore eliminating low level potential impacts.	The top-hole section of the well will be drilled with seawater and pre-hydrated gel sweeps which are primarily PLONOR materials, and thus limited benefit of recovering to surface. A RMR system requires additional equipment on the seabed, increasing the direct Activity footprint from temporary equipment deployed to the seabed. Additional systems require more personnel (specialist equipment representatives) to operate it, putting an additional strain on limited bed space on the MODU. The system would require additional time to deploy and would be a critical path item. Estimated 1-2 days of time at cost of $2 MM - $4 MM to deploy and recover, plus additional costs for rental, integration engineering and operation expected to be $1 MM+. The costs and additional risks of implementing this system are considered to outweigh the minimal environmental benefit gained.	Reject
Additional Solids Control Equipment	Additional equipment such as thermal desorption and thermomechanical cleaning have been used in other regions such as the North-east Atlantic, to reduce the volume of oil on cuttings when synthetic based drill fluids are used thereby reducing the environmental impact.	Water-based drilling fluids are to be used for the Activity activities and therefore this technology is not applicable.	Reject
Extended Cuttings Outlet	Drill cuttings outlet is submerged further below the water line and therefore released deeper into the water column, potentially reducing the spatial extent of cuttings dispersion.	There is significant cost associated with engineering, fabricating and installing a submerged chute and managing the re-injection process resulting in increased operational and HSE risks, with the added potential to cause delays. Further, a submerged chute would result in an increased concentration of cuttings deposition in smaller area which may further inhibit infauna recovery at the seabed. In the Otway offshore environment there would be limited effectiveness and limited benefit of this option, noting that the offshore Otway is a highly dispersive environment with generally hard seabed and mobile sands. As such, cuttings will naturally be dispersed whether deposited close to the seabed, or closer to sea surface. Allowing for increased dispersion also reduces low level risks associated with smothering and increased metal content. Therefore, the costs and additional risks of implementing this option are considered to outweigh the minimal environmental benefit gained.	Reject
Slim Hole Well Design	A slim hole well design would result in a small, direct, reduction of the volumes of drilling cuttings and fluids discharged to sea.	Implementation of a slim hole well design would prevent Amplitude Energy from delivering the required well objectives. The current well design has already been optimised to minimise the size of hole drilled while still being able to reach the targets and meet evaluation objectives safely.	Reject
Onshore Disposal of drilling fluid and cement volumes	Eliminates the discharge of drilling wastes to sea, therefore reducing (low level) impacts to water quality and benthic communities.	There is significant cost associated with engineering, fabricating and installing a submerged chute and managing the re-injection process resulting in increased operational and HSE risks, with the added potential to cause delays. Further, would result in an increased concentration of cuttings deposition in smaller area and therefore may further inhibit infauna recovery at the seabed. In the Otway offshore environment there would be limited effectiveness and limited benefit, noting offshore Otway is a highly dispersive environment with generally hard seabed and mobile sands, such that cuttings will naturally be dispersed whether deposited close to the seabed, or closer to sea surface. Allowing for increased dispersion also reduces low level risks associated with smothering and increased metal content. The costs and additional risks of implementing this option are considered to outweigh the environmental benefit gained.	Reject

Additional Control Measures Considered	Benefit	Sacrifice / Risk	Conclusion (Accept / Reject)
Active Management of Bulks: • Actively look to minimise residual bulks through aligning bulk transfer quantities with program requirements. • For P&A activities (contingency) design cement plugs in a way that minimises residual cement remaining on the MODU.	Active management of bulks is used to minimise leftover stocks offshore, reducing overall quantities of material that may need to be discharged to sea, and reducing the extent and severity of associated low-level impacts.	Moderate costs and time associated with researching, designing, organising and contracting services to execute options to manage bulks.	Partially accept (covered within CM12: Inventory Management)

6.2.2 Unplanned Aspects

Table 6-4: Lower Order Unplanned Impact and Risk Evaluation

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
Planned Discharges								
Physical Presence – Interaction with Marine Fauna: • MODU operations • Vessel operations • Helicopter operations.	Injury / mortality to marine fauna	**Risk : Injury/mortality to marine fauna** Unplanned interactions with marine fauna could occur due to MODU and vessel movements within the operational area, during support activities (and potential contingent activities). These interactions have the potential to cause injury/mortality to marine fauna. As per Section 3.4.5, the maximum duration of these activities include: • Site surveys: ~7 days • MODU operations: ~60 days • Vessel operations (support): ~60 days • Helicopter operations: approximately 5-8 times per week. The receptors that may be impacted include: • Marine Reptiles • Marine Mammals • Fish and Sharks • Avifauna. **Marine Reptiles, Fish and Marine Mammals:** Marine turtles transiting within the operational area are at risk from vessel strike when they periodically return to the surface to breath and rest. Marine turtles spend as little as 3-6 percent of their time at the surface with routine dives that last between 15 to 20 minutes to an hour depending on environmental conditions (NOAA 2021). The Recovery Plan for Marine Turtles in Australia 2017-2027 identifies vessel disturbance as a threat to the species, although the threat is only focused on shallow coastal foraging habitats and internesting areas (CoA 2017a). There are 3 species of marine turtles that may occur within the operational area, the green turtle, loggerhead, and leatherback turtle; however, this occurrence is expected to only be of a transient nature due to the absence of suitable coastal habitat in the south-east marine region. No BIAs or habitat critical to the survival of these marine turtles occurs within the operational area or wider south-east marine region. The risk of collisions between turtles and vessels increases with vessel speed (Hazel et al. 2007). For the majority of time vessels within the operational area will be stationary or	Level 2	A	CM13: Offshore Operational Procedures CM17: Amplitude Energy Offshore Victoria Whale Disturbance Risk Management Procedure	Unlikely (D)	Low	Broadly Acceptable, based on: • Impacts well understood. • Residual risk (severity) is Low. • Consequence level is Level 2, therefore no potential to affect biological diversity and ecological integrity. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met, and guidelines considered: – EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans – National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (CoA, 2017b) • Activity will not impact the recovery of: – Marine turtles as per the Recovery Plan for Marine

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		moving slowly between operational areas, reducing the potential severity and likelihood of collision. Slow moving megafauna that are within the surface waters and breach often are most at risk from the interaction with vessels within the operational area. Marine mammals' surface to breathe periodically and may spend a lot of their time at or near the water's surface. This behaviour makes marine mammals, particularly large mammals such as baleen whales vulnerable to vessel strike. The International Whaling Commission (IWC) (2020) reported around 900 cases of vessel strike with cetaceans globally, inclusive of all historic records; 35 of those interactions were reported within Australian jurisdictions. Cetaceans are naturally inquisitive marine species that are often observed from offshore vessels and facilities, however, the behaviour of whales in response to the approach of a vessel can vary. Some species are curious and will approach ships that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster-moving ships (Richardson et al. 1995). Collisions between larger vessels with reduced manoeuvrability and large, slow-moving cetaceans occur more frequently where vessel traffic is high and cetacean habitat occurs (WDCS 2006). Laist et al. (2001) identified that large vessels with reduced manoeuvrability moving in excess of 10 knots may cause fatal or severe injuries to cetaceans, with the most severe injuries caused by vessels such as tanker travelling faster than 14 knots. Vessels used to support these activities do not have the same limitations on manoeuvrability and would typically travel at economy speeds (or lower) when conducting activities within the scope of this EP, inside of the operational area. Large, slow-moving fish and shark species that bask or feed at the surface are the most vulnerable to vessel collisions. Vessels moving through the operational area have the potential to collide with large fish species that may occur within the operational area. Listed threatened and migratory marine reptiles, fish and marine mammals' presence within the operational area includes: • Four threatened marine mammal species; southern right whale (Endangered), blue whale (Endangered), sei whale (Vulnerable) and fin whale (Vulnerable). • Eight migratory marine mammals; killer whale, dusky dolphin, southern right whale, blue whale, sei whale, fin whale, pygmy right whale and humpback whale. • Two marine mammals with BIAs; pygmy blue whale (Distribution and Foraging) and the southern right whale (Migration). • Three migratory marine species: White Shark, Grey Nurse Shark, Porbeagle Shark. • Three conservational dependent species: Blue Warehou, Eastern School Shark, Australasian Grayling. • Three migratory and threatened marine reptiles, leatherback turtle, loggerhead turtle and green turtle. No BIA's have been identified within the operational area for marine reptiles. The operational area has no threatened species presence of BIAs for pinnipeds, dugongs or dolphins, however Australian fur-seals and long-nosed fur seals may occur within the area. The operational area has no threatened species presence of BIA for fish and sharks. **Avifauna:** Helicopters that are arriving to, or departing from, the MODU or installation vessel have the potential to collide with avifauna and potentially result in injury / mortality. It is recognised that, historically, seabird have been known to aggregate around oil and gas platforms due to night lighting, flaring, food concentrations and other visual cues, increasing the risk of a possible interaction (Wiese et al. 2001). However, considering the short duration of the activity it is considered unlikely that individuals would habituate to the presence of the MODU.						Turtles in Australia (CoA, 2017a) – Blue whale per the CMP for the Blue Whale, 2015-2025 (DoE, 2015) – Southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW, 2024b) – Sei whale as per Conservation Advice for the Sei Whale (TSSC 2015a) – Fin whale as per Conservation Advice for the Fin Whale (TSSC 2015b) • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Risks are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the **OPP**. No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		The operational area does not host a large number of diversity of bird species, mainly due to its offshore location and lack of features suitable for bird roosting and nesting. The absence of these features decreases the chance of high numbers of bird at potentially vulnerable stages within the operational area therefore reducing the chances of a bird strike event. It is expected that any avifauna within the operational area would be foraging, rafting or travelling through. Given the large distance typically covered by marine bird species there is a relatively small overlap between the operational area and each species range further reducing the likelihood of collision. • 35 threatened, migratory or listed marine bird species, 3 of which are critically endangered (eastern curlew, orange-bellied parrot and curlew sandpiper), and 5 of which are endangered (Grey-headed albatross, Southern giant-petrel, Northern royal albatross, Shy albatross and Gould's petrel) • 9 foraging BIAs; antipodean albatross, Buller's albatross, black-browed albatross, Campbell albatross, common-diving albatross, Indian yellow-nosed albatross, shy albatross, wandering albatross and the wedge-tailed shearwater. The Wildlife Conservation Plan on Seabirds (CoA 2020) does not identify aircraft collision as a threat, however the plan does identify that transport, such as aircraft, flying low over breeding colonies may cause excessive disturbance to breeding individuals. Amplitude has documented instances where individual birds have taken refuge on vessels or the MODU, however there has never been a physical interaction with avifauna which occurred during Amplitude activities in the region. There are no nesting or breeding sites within the operational area, that are within the vicinity of where helicopters may land and take-off from the MODU and vessel. **Summary:** Impacts have been assessed as **Level 2**, based one: • The occurrence of interaction with marine fauna, resulting in injury/mortality, is considered low, due to the short time period of vessel operations within the area (~7 days for survey campaign and ~60 days for support vessel and MODU operations) • The consequence of an impact is predicted to be limited to individuals, due to the localised and short-term nature of the activity. The likelihood of the impact is considered **Unlikely (D)**, and the risk is determined as **Low**.						
Unplanned Discharges								
Unplanned Discharge – Loss of Containment LOC (Chemicals and Hydrocarbons): • Drilling • Vessel operations • MODU operations • Helicopter operations • ROV operations	Change in water quality	Scenarios that have the potential to result in a loss of containment (LOC) of chemicals and hydrocarbons include: • Unplanned surface release of drilling muds/ fluids during operations (<25 m^3) • Unplanned surface release of cement during drilling operations, or bulk transfer (<50 m^3) • Spill to deck of other various chemicals stored on the MODU/ vessels (<5 m^3) • MODU refuelling / bunkering line failure of MDO/MGO (~50 m^3). • Drop out of base oil during well clean-up and test (~1-10 L). • Equipment malfunction leading to helicopter ditching into ocean or fuel tank compromised during landing resulting in a release of fuel to sea (3 m^3). • Unplanned discharge from ROV being operated subsea < 30 L of hydraulic fluid. **Risk: Change in water quality** The unplanned release of chemicals or hydrocarbons from a LOC into the marine environment has the potential to cause a localised reduction in water quality. The hydrocarbon characteristics of a diesel or condensate LOC being highly volatile, light and non-persistent are expected to evaporate	Level 2	A	CM01: Marine Exclusion and Caution Zones CM03: Marine Assurance Process CM05: Ongoing Consultation CM07: Well Testing Program CM10: Amplitude Energy Offshore Chemical	Unlikely (D)	Low	Broadly Acceptable, based on: • Impacts well understood. • Residual risk (severity) is Low. • Consequence is Level 2, localised, short-term impacts, not effecting local ecosystem function. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met:

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
• Well abandonment (contingency)		rapidly after being released. Therefore, any change in the water quality following a LOC is anticipated to be highly localised, within the immediate vicinity of the release and result in short-term impacts which rapidly recovers. All Activity chemicals which are planned to be discharged are selected in accordance with the Amplitude Energy Offshore Chemical Procedure to ensure ecotoxicity profiles are of an acceptable level. Hydrocarbons or chemicals from a LOC are unlikely to result in a change in sediment quality due to the small volumes released which would quickly dilute and disperse into the water column. The potential for toxicity to marine fauna will be extremely rare as the temporary exposure will preclude toxic effects if marine fauna pass directly through a release. Given the small discharges, short-potential exposure time due to rapid dilution through metocean conditions, impacts to marine fauna are not expected and therefore have not been assessed further. Further, the energetic offshore environment in the Operational Area would be expected to quickly disperse a release of this nature, resulting in a limited exposure duration and extent to receptors within the marine environment. As such, any exposure to hydrocarbons above background levels would be limited in extent and duration, and any impact is expected to be localised and temporary with rapid recovery to ambient conditions following an accidental release. The potential impacts to water quality are therefore assessed as **Level 2** with localised, short-term impacts, not effecting local ecosystem function. This assessment considers any indirect impacts to species arising from theoretical exposure would be low level and brief given the limited exposure duration and extent due to rapid dispersion and return to ambient conditions post event. While the impact is conceivable and could occur, it would require a rare combination of factors and is therefore considered **Unlikely (D)**. As such the overall risk level is considered **Low**.			Assessment Procedure CM14: MODU Material Transfer Process CM21: Activity Fire Fighting Foam Screening and Quarantine Standards CM23: NOPSEMA Accepted Safety Cases CM25: Oil Pollution Emergency Plan (OPEP)			– Protection of the Sea (Prevention of Pollution from Ships) Act 1983 – Section 26F (implements MARPOL Annex I). – Navigation Act 2012 – Chapter 4 (Prevention of Pollution). – AMSA Marine Orders 91 and 94 (Marine pollution prevention – oil Marine and packaged harmful substance, respectively) – Industrial Chemicals (Notification and Assessment Act) 1989 – Convention for the Safety of Life at Sea 1974 (SOLAS) – specifically prohibition of the use or storage of firefighting foams containing perfluorooctane sulfonic acid (PFOS) in effect in 2026. • Activity will not impact the recovery of EPBC listed species. • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Risks are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2).

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
								• Consequence, likelihood and residual risk are the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.
Unplanned Discharge – Loss of materials or waste overboard (Hazardous / Non-hazardous waste): • Drilling • Vessel operations • MODU operations	• Change in habitat • Injury/mortality to marine fauna • Change in cultural value	Scenarios that have the potential for the unplanned discharge of hazardous/non-hazardous materials and waste include: • The use of small quantities of hazardous/non-hazardous materials (solids and liquids) on board the vessel and MODU. • The creation, handling and storage of wastes onboard until transference to port facilities. • Rough ocean conditions may cause items may be washed off or blown off deck. **Risk: Injury/mortality - Avifauna, Fish, Marine Turtles and Marine Mammals:** Plastic debris adrift in the ocean accumulate a biofilm in a short space of time which attracts albatrosses and petrels, and consequently, seabirds are highly likely to mistake plastic particles for food and ingest them (CoA 2022). Ingestion of plastics can potentially cause impacts such as gut obstruction or reduced stomach volume, resulting in a loss of fitness and starvation (Wilcox et al. 2015). However, there is currently no evidence to suggest that ingestion or entanglement of marine debris are posing a significant threat to any Australian seabird species at the population level (CoA, 2020). Potential injury/mortality to seabirds from entanglement and ingestion from a loss of materials overboard would be expected to be limited to individual foraging seabirds, with no population level effects. Marine turtles indiscriminate feeding habits make them susceptible to ingestion or entanglement of materials lost overboard, particularly plastics (Mrosovsky et al. 2009). Ingestion of debris can cause internal wounds, suffocation, prevent feeding leading to starvation and can create intestinal blockages that increase buoyance and stop a turtle from diving (CoA 2017a). The operational area does not intersect any recognised BIAs or critical habitats for marine turtles and therefore low numbers are expected in the area. Entanglement can harm or kill individual whales and can reduce the fitness of an individual by causing physical damage and restricting mobility and/or impairing breathing, swimming or feeding ability (CoA 2022). CoA (2022) reports that there have been 104 records of cetaceans in Australian waters impacted by plastic debris through entanglement or ingestion since 1998 (humpback whales being the main species impacted). The Threat Abatement Plan (CoA 2018) suggests that most marine plastic debris are associated to shipping fishery and household activities (fishing gear, balloons and plastic bags). The loss of plastic debris through entanglement is also possible during the Activity. No injury of marine fauna has been reported during Amplitude Energy Offshore Operations to date. Any impacts to cetaceans from a loss of material or waste overboard would be expected to be limited to individuals, with no population level effects. The following management plans and conservation advice identify marine debris as a threat: • National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022). • Recovery Plan for Marine Turtles in Australia (CoA 2017a). • Wildlife Conservation Plan for Seabirds (CoA 2020). • Threat Abatement Plan for the impacts of marine debris on vertebrate wildlife of Australia's coasts and oceans (CoA 2018).	2	A	CM03: Marine Assurance Process CM13: Offshore Operational Procedures CM19: Waste Management Practices CM28: Retrieval of dropped objects were practicable	Unlikely (D)	L	Broadly Acceptable, based on: • Impacts well understood. • Residual risk (severity) is Low. • Consequence level is Level 2, therefore no potential to affect biological diversity and ecological integrity. • Activity will not result in serious or irreversible damage. • Good practice controls defined and implemented. • Legislative and other requirements have been identified and met: – Marine Order 95 – Marine pollution prevention – garbage (as appropriate to vessel class) – Protection of the Sea (Prevention of Pollution from Ships) Act 1983 - Section 26F (implements MARPOL Annex I) – Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Threat Abatement Plan for the impacts of marine debris on vertebrate wildlife of Australia's coasts and oceans (CoA 2018). • Activity will not impact the recovery of: – Albatross and Giant Petrel populations breeding and foraging as per the National Recovery Plan for

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		• Blue Whale Conservation Management Plan 2015 - 2025 (DoE 2015a). • National Recovery Plan for the Southern Right Whale (DCCEEW 2024b). • Recovery Plan for the Australian Sea Lion (Neophoca cinerea) (CoA 2013). • Conservation Advice on Dermochelys coriacea (Leatherback Turtle) (DEWHA 2008a). Waste generated on board vessels will be handled in accordance with AMSA Discharge Standards and respective vessel Garbage Management Plans (GMP); these require that particular wastes are managed so that it is not lost or discarded overboard Given this, any loss of materials overboard would be in minimal quantities. The consequence of any impacts from marine debris on marine fauna would be limited and is assessed as **Level 2**. This assessment considers any indirect impacts arising from theoretical exposure to hazardous and non-hazardous wastes. While the impact on marine fauna is conceivable and could occur, from this activity, which is short term, it is considered **Unlikely (D)** and as such the overall risk level is **Low**.						Albatrosses and Petrels 2022 (CoA 2022) – Marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017a). – Wildlife Conservation Plan for Seabirds (CoA 2020) – Blue whales as per Blue Whale Conservation Management Plan 2015 - 2025 (DoE 2015a) – Southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) – Australian sea lions as per Recovery Plan for the Australian Sea Lion (Neophoca cinerea) (CoA 2013) – Leatherback turtle as per Conservation Advice on Dermochelys coriacea (Leatherback Turtle) (DEWHA 2008a) – Recovery Plan for the White Shark (Carcharodon carcharias) • Amplitude Energy MS Standards and Processes have been identified. • No claims or objections raised during consultation. Risks are expected to be below the defined acceptable levels as described in the **OPP** by meeting the additional acceptability criteria described in Section 5.2.4.3, such as: • **OPP** EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • **OPP** control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2).
		Risk: Change in Benthic Habitat: The loss of large materials overboard during drilling operations may result in localised and temporary disturbance to benthic habitats. The impact footprint on benthic habitats would align with the size of the object dropped overboard. Large materials with the potential to be lost overboard include anchors, tubulars, containers, etc. These items are expected to be inert and will not represent a contamination risk to benthic habitats. Once a dropped object has been recovered; the seabed is expected to recover naturally. Benthic assemblages in the operational area are characteristic of the shelf rocky reef and hard substrate KEF that is well represented in the wider Bass Strait region (see Table 4-5). A loss of material or waste overboard occurring within the operational area has the potential to result in seabed disturbance to the KEF and impact some of the associated values, such as diversity and productivity of the hard substrate which are often colonised by sponges, sessile invertebrates, soft corals. Results from a 2020 seabed survey adjacent to the operational area observed hard ground and patchy epifauna, consistent with the description of the KEF, however no reef-type structures of high relief were observed (Fugro 2020a; 2020b). A seabed survey was undertaken in May and June 2025 (refer Section 4.3.1) at the Annie-2 location and operational area. The Annie-2 development well location avoids sensitive features such as reef structures of high relief, and is considered a suitable location. The operational area does not overlap AMPs, and no ecological communities listed as threatened under the EPBC Act were observed. Therefore, the risk of change in habitat from loss of materials or waste overboard would not be expected to significantly alter the overall character of the seabed, or its ecological amenity. Waste generated on board vessels will be handled in accordance with AMSA Discharge Standards and respective vessel Garbage Management Plans (GMP); these require that particular wastes are managed so that it is not lost or discarded overboard. Given this, any loss of materials overboard would be in minimal quantities. The consequence of any impacts from marine debris on benthic habitats would be limited and is assessed as **Level 1.** This assessment considers any indirect impacts arising from theoretical exposure to hazardous and non-hazardous wastes. While the impact on benthic habitats is conceivable and could occur, from this activity, which is short term, it is considered **Unlikely (D)** and as such the overall risk level is **Low**.	1	A		Unlikely (D)	L	
		Risk: Change to Cultural Heritage: The loss of materials or waste overboard may result in changes to cultural heritage, such as, the disturbance of underwater cultural heritage including shipwrecks, aircraft and other artefacts. A search of the Australasian Underwater Cultural Heritage Database found one shipwreck, Alfred (<75 years old ID 11052), located near the border of the operational area. On further investigation						

Aspect	Predicted Impacts and Risks	Consequence Evaluation	Consequence	ALARP Decision Context	Control Measures	Likelihood	Residual Risk Severity	Acceptability Outcome
		the position given for the wreck was confirmed to be a search area centrepoint; these are provided when the location of a wreck is unknown; there are over 300 wrecks like this offshore Victoria (pers comm Heritage Victoria 2024); written records further indicate the wreck is likely closer to Warrnambool, and not relevant to the operational area of the Activity. No shipwrecks have been observed during survey or inspections within and proximal to the operational area to date. Most recent surveys and inspections were in 2020. The predicted level of impact, i.e., the consequence, of change to cultural heritage from a loss of material or waste overboard resulting in seabed disturbance is evaluated to have a consequence of **Level 1** based on: • No expected underwater cultural heritage artefacts within the operational area based on screening assessments, previous inspection and survey and stakeholder engagement. Waste generated on board vessels will be handled in accordance with AMSA Discharge Standards and respective vessel Garbage Management Plans (GMP); these require that particular wastes are managed so they are not lost or discarded overboard. Given this, loss of materials overboard such as plastics to the marine environment is not expected. This assessment considers any indirect impacts to cultural heritage arising from theoretical exposure to materials lost overboard. While the impact is conceivable and could occur, from this activity, which is relatively short term, it is considered **Unlikely (D)**. The inherent risk severity of the change to cultural heritage is considered **Low**.						• Consequence, likelihood and residual risk are the same as those defined in the **OPP**. • No changes to internal or external context as defined in the **OPP** including no additional objections and claims were raised against this aspect.

6.3 Seabed Disturbance

6.3.1 Cause of Aspect

The activities where seabed disturbance will occur as a result of the Activity are identified in Table 6-5 and described in further detail in subsections below.

Table 6-5: Activities that will result in Seabed Disturbance

Aspect / Phase	Activity component
Well construction	MODU positioning (mooring)
	Drilling operations
	Drill cuttings and fluids
	Cementing operations
Support activities	Vessel operations
	ROV / AUV operations
Contingent activities	Environmental survey
	Well abandonment

6.3.2 Aspect Characterisation

Table 6-6 summarises the seabed disturbance extents estimated for the Activity.

Table 6-6: Seabed Disturbance Estimated Spatial Extent

Aspect	Activity Component	Estimated Disturbance Spatial Extent	Total Estimated Disturbance Spatial Extent
Well construction	MODU positioning Pre-lay moorings	Mooring at the well will require between 8 and 12 anchors. Estimated spatial extent of up to: • 60 m^2 per anchor. Typically mooring chains extend from the MODU with 1,200 m of grounded chain. A disturbance of 5 m is applied to account for lateral movement during deployment, use and recovery. Estimated spatial extent per chain: • 6,000 m^2 grounded chain per line (0.006 km^2) Total for each mooring chain and anchor: • 0.0727 km^2 (12 x 0.00606 km^2)	~0.0727 km^2
	Wet storage operations	Wet storage of mooring chains may occur at the well location for the duration of the activities. Estimated spatial extent: • 1.0 km^2 (10 x 1,000 m anchor lines spaced 100 m apart).	1.0 km^2
	Drilling operations	Disturbance radius of 200m at the well location.	0.126 km^2

Aspect	Activity Component	Estimated Disturbance Spatial Extent	Total Estimated Disturbance Spatial Extent
Support activities	Vessel operations	A maximum of 3 AHTSs will be within the operational area at any one time whilst well construction is being undertaken. Vessels will typically use thrusters or DP to maintain position, but in an emergency situation, anchoring may be required. A vessel anchored within water depths greater than 70 m (deeper than the operational area) with a single anchor could result in a total disturbance area of up to 1,300 m^2 (NERA 2018). Estimated spatial extent per vessel: • 1,300 m^2 (0.0013 km^2)	3,900 m^2 (0.0039 km^2)
	ROV / AUV operations	Seabed mooring of ROV is not planned during ROV support operations. ROVs may be required to park or moor on the seabed and may temporarily sit on the seabed as part of execution activities. If parking is required, the disturbance footprint is estimated to be less than 10 m^2.	< 10 m^2 (<0.00001 km^2)
Contingent activities	Environmental survey	An environmental survey is not a planned activity. However, should an unexpected find be encountered, or in event of an unplanned dropped object, an environmental survey including seabed sampling may be conducted. Up to 10 grab samples may be required as a contingent activity (0.1 - 0.2 m^2 per sample).	< 2 m^2 (<0.000002 km^2)
Decommissioning activities	Well abandonment	Contingent well abandonment in event Annie-2 development well is not tied into the CHN pipeline. Well abandonment activities within the disturbance area of 200 m radius (0.126 km^2)	0.126 km^2
Total estimated seabed disturbance for the Activity:			1.32 km^2

**Note: As a conservative approach, a 200 m disturbance radius for the well and manifold locations has been adopted based on the furthest extent that drill cuttings may be deposited during drilling operations.

6.3.3 Predicted Environmental Impacts and Risks

Seabed disturbance from the Activity can result in direct and indirect impacts.

Potential impacts from seabed disturbance are:

- change in benthic habitat
- disturbance to benthic assemblages

Potential risks associated with seabed disturbance are:

- injury / mortality to marine fauna

- change to cultural heritage.

Seabed disturbance will only occur within the operational area. Receptors which may be directly affected include the benthic habitat, benthic assemblages, and marine invertebrates and fish. Indirect effects are possible to commercial fisheries, conservation values of protected areas and First Nations cultural values and sensitivities. Impacts and risks to First Nations cultural heritage are assessed in Section 8.0.

6.3.4 Impact and Risk Evaluation

6.3.4.1 Impact: Change in Benthic Habitat

Inherent Consequence Evaluation

As described in Section 4.0, benthic habitats in the operational area are characteristic of a seabed comprised of hard substrate and reef with patches of sand or gravel / rubble. These substrates are well represented in the wider Bass Strait, particularly in the Otway Region. Benthic assemblages within and proximal to the operational area have been observed during subsea habitat surveys and facility inspections. Fugro (2020; 2020a) identified hard ground and some sand, supporting patchy areas of abundant epibiota, typically bryozoans, gorgonian, cnidarians and sponges. No ecological communities listed as threatened under the EPBC Act were identified and the operational area does not overlap AMPs.

Within the operational area, ~1.32 km^2 of seabed has the potential to be disturbed by the temporary placement of equipment on the seabed during well construction and support activities. Approximately, ~0.0727 km^2 of the 1.32 km^2 has the potential to disturb the seabed during the Activity from mooring of the MODU. Once the MODU has completed the well construction activities, the anchor system will be removed from the seabed, which will allow for benthic habitats to recover. As a result, the planned seabed disturbance from well construction activities will be short-term.

Secondary impacts from scouring may occur. Scouring is a natural feature on the Otway shelf whereby currents may erode sediments around hard calcareous sediments (Fugro 2020a; 2020b). Installation of subsea infrastructure (BOP) will introduce the presence of hard features on the seabed which may encourage scouring processes in areas immediately surrounding seabed infrastructure installed for the Activity.

Wet storage of mooring chains may occur at the well location for the duration of the activities. The estimated extent will be highly localised, within the operational area (<1.0 km^2).

The operational area occurs in the southeast marine region, where the shelf rocky reefs KEF occurs. These are areas of rocky reefs and hard substrates along the continental shelf which provide unique seafloor habitat for diverse assemblages of species (Section 4.4.3). Activities occurring within the operational area are likely to result in seabed disturbance to the KEF and impact some of the associated values, such as diversity and productivity of the hard substrate which are often colonised by sponges, sessile invertebrates, soft corals. The Fugro (2020a; 2020b) survey observed hard ground and patchy epifauna throughout most video transects, consistent with the description of the KEF, though no reef-type structures of high relief were observed. A geophysical seabed survey was undertaken in the Annie field (covered under ASP EP (accepted May 2025), refer Section 4.3.1)

Therefore, seabed disturbance is not anticipated to significantly impact the overall marine ecosystem integrity or functioning of the KEF.

Following the removal of MODU mooring system, recovery of benthic habitats is expected to be within months (e.g., Morrisey et al. 2018). Dernie et al. (2003) demonstrated that the full recovery of

soft sediment assemblages from physical disturbance could take between 64 and 208 days depending on disturbance intensity. During Stage I & II of the CHN development, subsea surveys of the flowlines and umbilicals demonstrate colonisation by sponges, bryozoans, and hydrozoans on the installed infrastructure and within the installation disturbance footprint. Certain benthic species, such as sponges, can undergo a variety in reproductive techniques, allowing them to be efficient colonisers of hard marine surfaces (Butler 2002). Once established, sponges have been shown to be effective competitors in retaining living space through asexual reproduction and by using chemicals to deter competitors and predators (Butler 2002). Therefore, benthic assemblages are expected to recolonise and recover to baseline levels following the installation and also removal of the infrastructure. Based on the nature and scale of the planned activities and the expected seabed characteristics, areas of seabed disturbed by the Activity are expected to recolonise quickly and impacts from seabed disturbance are not expected to cause long-lasting changes to benthic habitats.

The predicted level of impact, i.e., the consequence, as a result of a change in benthic habitat from seabed disturbance is evaluated to have a consequence of **Level 2** based on:

- The planned seabed disturbance area is subject to localised and short-term changes to seabed habitats with no long-term effects to habitat, population characteristics or productivity.
- The total estimated area of impact is predicted to be small (1.32 km^2) compared to the extent and distribution of the benthic habitats and associated fauna identified within the operational area and wider region.
- Shelf rocky reefs KEF is present within the south east marine region with multiple examples in the Otway (Section 4.4.3).
- The operational area includes areas of hard substrate.
- The operational area does not overlap AMPs.
- Seabed survey results have informed the placement of the wet storage of mooring chains, considering seabed relief, substrate and hazards to ensure the most appropriate location with the lowest impact is selected.
- Disturbance is anticipated to be localised and recoverable and not impact ecosystem functioning of benthic habitats.

6.3.4.2 Impact: Disturbance to Benthic Assemblages

Inherent Consequence Evaluation

Activities related to well construction and support operations for the Activity will result in changes to water quality from the suspension and redeposition of sediments. Changes in water quality have the potential to impact benthic assemblages, including benthic invertebrate communities, characteristic of the broader region.

During well construction and well abandonment (if required), drilling cuttings and cement overflow will add to the unconsolidated substrates. These are expected to redistribute over time due to the surrounding geomorphology and hydrodynamics and thus would not be expected to significantly alter the overall character of the seabed. The impact to benthic and demersal communities from suspension of sediments is expected to be minimal given the open-ocean environment in which the hydrodynamics expect to disperse or dilute suspended sediment quickly following disturbance. The substrates present within the area where seabed disturbance is predicted are considered to be primarily mobile due to adjacent surveys recording sand waves and localised burial of equipment (Fugro 2020; 2020a).

Sessile invertebrates are particularly vulnerable to sedimentation because they are generally unable to reorientate themselves to mitigate a build-up of particulates. However, some sessile taxa such as sponges, and bivalves can filter out or physically remove particulates (Roberts et al. 2006; Pineda et al. 2016). Sediment-burrowing infauna and surface epifauna invertebrates (particularly filter feeders) which inhabit the seabed directly around subsea infrastructure locations are expected to be most impacted by seabed disturbance. Although, Kukert (1991) found that approximately 50% of the macrofauna on the bathyal sea floor were able to burrow back to the surface through 4-10 cm of rapidly deposited sediment. The sensitivity of such infauna and epibenthic communities to changes in water quality are expected to be low given their resilience to natural stressors including storm events and associated episodic increases in particulate load. Any disturbance to benthic assemblages from Activity activities is expected to be localised and short-term.

The predicted level of impact, i.e., the consequence, to benthic assemblages from changes to water quality is evaluated to have a consequence of **Level 2** based on:

No threatened benthic species, assemblages or ecological communities were identified within the operational area.

The area of impact is in a deep, open-water environment in which the hydrodynamics allow disturbed soft sediments to disperse and become diluted relatively quickly therefore any decrease in water quality is expected to be localised and temporary, and similar in nature to natural variability in turbidity.

6.3.4.3 Risk: Injury / Mortality to Marine Fauna

Benthic assemblages and invertebrates

Seabed disturbance during the Activity has the potential to result in result in the direct loss of benthic assemblages and invertebrate communities within the predicted seabed disturbance spatial extent.

Benthic assemblages and invertebrates in the operational area may include patchy presence of epifauna such as bryozoans, gorgonian cnidarians and sponges (Fugro 2020; 2020a), molluscs such as the arrow squid (Kailola et al. 1993) and crustaceans such as rock lobsters. The presence of these invertebrate communities is representative of what is expected throughout the Otway Basin.

Injury / mortality to benthic and demersal invertebrate communities from seabed disturbance is expected to be localised given the limited extent of the footprints associated with the Activity. Benthic and demersal invertebrate communities within the predicted disturbance spatial extent are highly represented throughout the region. Disturbed areas are expected to recover through natural dispersion and settlement of planktonic phase invertebrates and asexual regrowth of organisms such as sponges.

Mobile invertebrates, including some molluscs and crustaceans, are generally less vulnerable to seabed disturbance activities given the ability to move away (Fraser et al. 2017). However, sediment burrowing infauna and surface epifauna invertebrates (particularly filter feeders) which inhabit the seabed directly around subsea infrastructure locations are expected to be most impacted by seabed disturbance activities. As a result, direct loss of infauna and epifauna within the planned disturbance areas is expected.

Dernie et al. (2003) conducted a large-scale study that investigated the recovery of marine benthic communities in a variety of soft sediment types (i.e., clean sand, silty sand, muddy-sand and mud) following a physical disturbance. Low intensity activities (i.e., bait digging and hand-raking) up to high intensity activities (i.e., trawling and suction-dredging) were performed in within the

experiment to generate physical disturbance. The study showed that full recovery of soft sediment assemblages from physical disturbance could take between 64 days for low intensity disturbances, and up to 208 days for higher intensity disturbances (Dernie et al. 2003). In-field inspections around existing CHN facilities, during Stage I & II of the CHN development, confirm recovery of benthic assemblages, with colonisation of installed equipment and surrounding seabed. Therefore, the loss of infauna and epibenthic communities is expected to be recoverable whereby surrounding infauna and epibenthic communities will recolonise impacted areas and likely to colonise on the surface of equipment installed, as observed during in-field inspections (Cooper Energy 2022).

Taking into account the above, injury / mortality to benthic assemblages and benthic invertebrate communities from seabed disturbance is expected to be short term / recoverable based on observations of natural regrowth and recovery around existing facilities.

The predicted level of impact, i.e., the consequence, to benthic assemblages and invertebrate communities from seabed disturbance is evaluated to have a consequence of **Level 2** based on:

- Shelf rocky reefs KEF is present within the south-east marine region with multiple examples in the Otway (see Section 4.4.3 and 6.3.3.1). The operational area includes areas of hard substrate.
- Invertebrate communities in the operational area are representative of what is expected throughout the Otway Basin.
- No threatened benthic species, assemblages or ecological communities were identified within the operational area
- The planned seabed disturbance area is subject to localised and short-term changes to benthic habitats with no long-term effects to habitat, population characteristics or productivity.

Fish (including sharks and rays)

Seabed disturbance during the Activity has the potential to impact fish and subsequently commercial fisheries. Impacts are limited to sessile fish species that do not have the ability to avoid seabed disturbance activities, therefore resulting in injury and death.

Slow moving and site-attached fish species are particularly susceptible to habitat modification through physical smothering, and burial as they may not be able to quickly move away and avoid seabed disturbance. These animals could be displaced, injured and individuals may not recover. However, the areas of direct disturbance associated with the Activity are small, and the equipment being placed on the seabed adds to the hard substrate and complexity of the seabed, providing surfaces for site attachment. Within days, and then over the subsequent years, marine growth begins to establish on these structures, adding to the surrounding seabed habitat (McLean et al. 2022).

Sessile and slow-moving fish species including pipefish, pipehorses, seadragons and seahorses are found in a variety of habitats ranging from deep reefs to coastal algae or weed or seagrass habitats (Kuiter 2000). The seabed proximal to the operational area does not include weed or seagrass habitats (Fugro 2020; 2020a). The majority of the area within and proximal to the operational area is hard substrate and patches of sand and rubble. However, according to the PMST report, 26 fish species are said to have the potential to occur within the operational area (all of which are pipefish, pipehorses, seadragons and seahorses) (Appendix 5 -). There are four threatened species that may be present in the operational area including blue warehou, Australian grayling, white shark and eastern school shark. Migratory species include species that may be present within the operational area include white shark, grey nurse shark and mackerel porbeagle. There are no BIAs or Habitat Critical areas for these species intersected by the operational area. Except for pipefish, pipehorses, seadragons and seahorses, all species are highly mobile and are expected to move away and avoid

injury during seabed disturbance activities. Certain seahorse species, such as the big-belly seahorse (Hippocampus abdominalis) have been identified in water depths up to 104 m; attached to sponges and colonial hydroids (DoE 2024).

The majority of the area within and proximal to the operational area is hard substrate and patches of sand and rubble. This seabed type does support benthic fauna including sessile marine invertebrates such as sponges (Fugro 2020; 2020a). Any impacts from direct disturbance are expected to occur within a localised spatial extent (Table 6-6). A seabed survey was undertaken in May and June 2025 (refer Section 4.3.1) at the Annie-2 location and operational area. The Annie-2 development well location avoids sensitive features such as reef structures of high relief, and no sensitive habitats, such as sponge-dominated reefs were identified (MMA Offshore 2025b). The seabed and assemblages are expected to recover naturally, as demonstrated by surveys of existing Otway offshore infrastructure and adjacent seabed showing regrowth over and around equipment on the seabed. Therefore, any impacts to sessile individuals found within the estimated spatial extent are not anticipated to change the viability of the respective populations.

Two State commercially fished benthic invertebrate species are present within the operational area, the giant crab and southern rock lobster, and could be susceptible to indirect impacts from seabed disturbance. This also includes any reef-associated fish that are caught in lobster pots as by-catch and harvested, particularly those with high site fidelity, such as the bluethroat wrasse (Edgar et al. 2004). Commonwealth commercial fish species that may occur within the operational area include elephantfish, gummy shark, sawshark and school shark. These commercial fish and shark species are not known to exhibit site fidelity and are anticipated to be transient through the operational area. Therefore, impacts are predicted to be limited to temporary and localised avoidance behaviours during seabed disturbance activities. Lobster, crab and reef-associated fish species are mobile species and generally considered less vulnerable to seabed disturbance compared to sessile taxa as they are able to move to areas with less sediment accumulation or by more efficiently physically removing particles (Fraser et al. 2017). Seabed disturbance within the operational area is not expected to result in a change in the viability of the population of commercially important fish species.

Fishing records that indicate possible activity of 2 Commonwealth and 4 State fisheries in the vicinity of the operational area (Table 4-5).

Any impact from the seabed disturbance during the Activity are anticipated to be highly localised and limited to within the established temporary and long-term exclusion zones established for the Activity. As discussed previously, the extent of these exclusion zones is insignificant in comparison to the larger area of available fishing grounds for the relevant fisheries (Figure 4-14 to Figure 4-19). Therefore, impacts to commercial fisheries from seabed disturbance are not expected to occur.

The predicted level of impact, i.e., the consequence, to fish from seabed disturbance is evaluated to have a consequence of **Level 1** based on:

- Potential impacts to fish, including sessile species are expected to be localised and recoverable.
- Potential impacts to commercial fish species are expected to be limited to temporary and localised avoidance behaviours.
- Due to the area of seabed which may be disturbed (~1.32 km^2) within the wider extent of fish distribution ranges and available fishing grounds, and the relatively short duration of the activity, impacts to commercially important species are expected to be localised and insignificant at a population level.

Inherent Likelihood

Benthic assemblages adjacent to the operational area have been observed during surveys and inspections of existing Otway offshore facilities. The surveys observed modified (around infrastructure) and unmodified marine environments with scattered areas of hard ground supporting patchy areas of abundant epibiota, typically bryozoans, gorgonian, cnidarians and sponges (Fugro 2020; 2020a). The scattered and patchy presence of benthic and demersal invertebrate communities indicate a potential overlap of communities with the planned disturbance area through the life of the Activity.

The inherent likelihood of a **Level 2** consequence occurring is therefore rated as **Likely (B).**

Inherent Risk Severity

The inherent risk severity of injury / mortality to benthic assemblages, invertebrate communities and fish species is considered **Moderate**.

6.3.4.4 Risk: Change to Cultural Heritage

Inherent Consequence Evaluation

Seabed disturbance may result in changes to cultural heritage such as:

Disturbance of underwater cultural heritage including shipwrecks, aircraft and other artefacts.

A search of the Australasian Underwater Cultural Heritage Database found one shipwreck, Alfred (<75 years old ID 11052), located near the border of the operational area. On further investigation and consultation with Heritage Victoria, the position given for the wreck was confirmed to be a search area centrepoint; these are provided when the location of a wreck is unknown; there are over 300 wrecks like this offshore Victoria (pers comm Heritage Victoria 2024); written records further indicate the Alfred is likely closer to Warrnambool, and not relevant to the operational area of the Activity.

No shipwrecks have been observed during survey or inspections within and proximal to the operational area. Consultation with Heritage Victoria indicated that the risk of the Activity impacting cultural heritage was low, given the limited footprints involved. Landscape scale impacts (submerged landscapes) were also not expected given the limited seabed footprints involved (pers comm Heritage Victoria 2024); these impacts will be limited to the operational area.

Some of the area now offshore was a terrestrial landscape during previous glacial maxima periods out to approximately the 95 m isobath of the present day (De Decker et al. 2020). It is likely that it was inhabited by First Nations peoples and there may be features or artefacts of cultural heritage value in the offshore environment (pers comm DPC 2024). The high energy nature of the ocean within the Otway region has eroded the seabed over the millennia since its inundation; this reduces the likelihood of finding cultural heritage artefacts in the area, though does not discount the possibility, and though features may have eroded over time, they remain features of a cultural landscape.

The Tyrendarra lava flow associated with the significant Budj Bim aquaculture system (Section 8.0) is identified as a landscape feature of particular cultural significance; its historical and current values have been specifically identified as of importance during consultation, and in review of First Nations' Country Plans. Tyrendarra is a newer volcanic province outcrop (~30K years old) located near Portland, and extends from Mount Eccles into the offshore environment, to Julia Reef. Amplitude Energy geologists investigated whether these kinds of landscape features may occur within the operational area for the activity. Analysis of shallow geology and volcanic features within the region,

including review of 3D seismic data, indicates there are no newer volcanic complexes within the operational area (Figure 6-8).

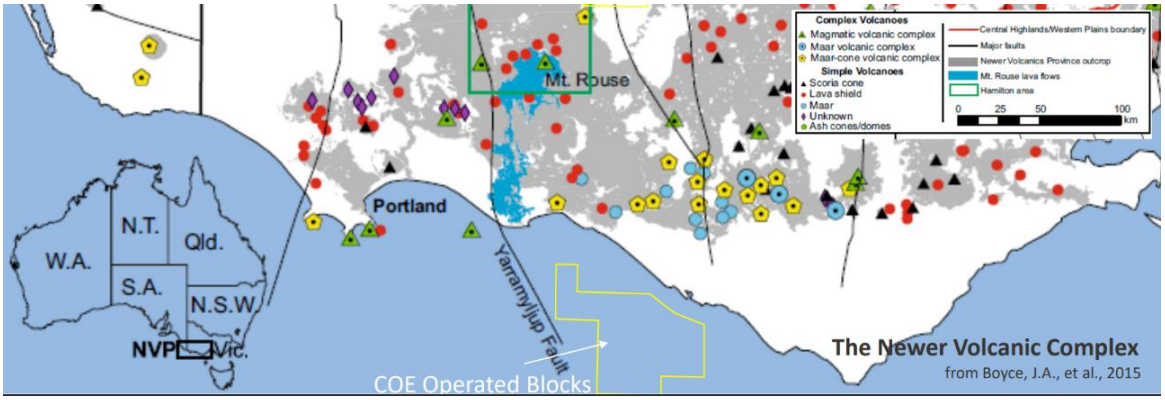


Figure 6-8: Newer Volcanic Complexes in the Otway Region (Boyce 2015)

There is potential for unknown underwater cultural heritage to be disturbed from activities that may cause seabed disturbance. However, the predicted level of impact, i.e., the consequence, of change to cultural heritage from seabed disturbance is evaluated to have a consequence of **Level 1** given the small footprint of the Activity, and that within that footprint, the majority of contact with the seabed is temporary.

Inherent Likelihood

No known underwater cultural heritage such as shipwrecks, aircraft, and other artefacts occur within the operational area however the potential remains. This region was once a terrestrial landscape and is likely to have been inhabited; therefore, there may be features with heritage value. Seabed disturbance from the Activity is not expected to result in damage to UCH. However, in exceptional circumstances there is a remote chance of change to unknown underwater cultural heritage within the planned disturbance area.

As a result, the inherent likelihood of a Level 1 consequence occurring is rated **Remote (E)**.

Inherent Risk Severity

The inherent risk severity of change to cultural heritage is considered Low.

Given the risk of damage to UCH cannot be eliminated at this stage of planning, additional control measures have been designed into the EP, to be implemented before drilling commences, and during the drilling activities. These measures provide assurance that UCH will be protected as required by the UCH Act 2018

6.3.5 Control Measures, ALARP, and Acceptability Assessment

Table 6-7 provides a summary of the control measures and ALARP and acceptability assessment relevant to seabed disturbance.

Table 6-7: Seabed Disturbance ALARP, Control Measures and Acceptability Assessment

Seabed Disturbance	
ALARP Decision Context and Justification	ALARP Decision Context: Type A

	Impacts from seabed disturbance are well understood. The total estimated area of impact is predicted to be small (1.32 km^2) compared to the extent and distribution of the benthic habitats and associated fauna identified within the operational area and wider region (Fugro 2020; 2020a). Activities are well practised, and there are no conflicts with company values, no partner interests, and no significant media interests. Given this, Amplitude Energy applies ALARP Decision Context A.
Control Measure	Source and Description of Control
CM13: Offshore Operational Procedures	Seabed surveys will be undertaken prior to finalising MODU position and location of mooring equipment, and prior to installing or removing the wellhead. Mooring procedures will ensure: • Adequate tensioning of mooring is applied and maintained. • Anchors are located within the designed radius areas of the mooring spread. • Seabed relief and sensitive seabed features are considered. • No equipment to be placed on the seabed within 20m radius of the identified anomalies as identified in Table 4-2. A seabed survey was undertaken in May & June 2025 (refer Section 4.3.1) at the Annie-2 well location and operational area.
CM30: Underwater Cultural Heritage Disturbance Risk Management Measures	Amplitude Energy Cultural Heritage Disturbance Risk Management Measures acknowledge legislative requirements and establishes the methods by which potential disturbance to cultural heritage is identified including via screening, consultation, and expert advice as required. The management measures are applicable to the offshore Activity to ensure impacts and risks throughout the Activity remain within acceptable levels and are managed to ALARP. In accordance with advice from Heritage Victoria and DPC during Activity consultation, and in line with the UCH Guidelines (DCCEEW 2024d), prior to commencement of well construction activities a suitably qualified and experienced cultural heritage team will review geophysical data gathered during seabed surveys for underwater cultural heritage so that it is avoided by the subsequent drilling activities with a suitable buffer. The team will include a marine archaeologist and will also have familiarity with first Nations cultural landscapes and experience in identifying landscape features from geophysical data. Any subsequent management advice (e.g. exclusion zones) will be provided to Heritage Victoria and accounted for within Activity installation procedures. If cultural heritage is identified, it will be mapped, along with suitable buffer and its location integrated into Activity inductions and procedures to ensure it is avoided during Activity.
Additional Control Measures Considered	
No anchoring	Reject Potential to reduce seabed disturbance footprint, however, it is not feasible to have the MODU on DP only in the water depth of the operational area. The use of DP would also result in a worse noise emission profile. Therefore, the potential to reduce the seabed disturbance footprint is grossly disproportionate to the benefits gained.
MODU Mooring Plan	Adopt (CM 14: Offshore Operational Procedures) A MODU mooring plan would locate anchors / mooring design to optimise fatigue and mooring life. The plan will also minimise impact on existing infrastructure.

Minimise impact to 'sensitive benthic habitat' / or emergent features when selecting locations for equipment on the seabed.	Adopted (CM16:Seabed Survey) This will reduce the impact to sensitive benthic habitat or emergent features in the operational area, acknowledging that the rocky reef is widespread throughout the operational area. Seabed survey data is reviewed by experienced benthic ecologist to identify if there are sensitive benthic habitat or emergent features. This information is considered in the final selection of equipment with the aim of minimising impact to sensitive benthic habitat / or emergent features, recognising that optimising the position of moorings and equipment for technical and safety reasons is critical.
Seabed Survey	Adopt (CM16: Seabed Survey) Seabed survey will be undertaken prior finalising MODU position and location of mooring equipment, and prior to installing the wellhead.
Decommissioning Protocol	Adopt (CM27 Amplitude Energy Decommissioning Protocol) Amplitude Energy will meet the requirements of Section 572 ('Maintenance and removal of property etc. by titleholder') of the OPGGS Act.
Impact and Risk Summary	
Residual Impact Consequence	Level 2 - Localised short-term impacts to benthic habitat with no remedial actions or recovery required.
Residual Risk Consequence	Level 2 - Localised short-term impacts to benthic habitat with no remedial actions or recovery required.
Likelihood	Due to the nature and scale of the proposed activities, and considering the proposed controls, the likelihood of impacts to cultural heritage due to seabed disturbance is assessed as: • Remote (E) - A freak combination of factors would be required for occurrence. Not expected to occur during the activity. Occur in exceptional circumstances. In regard to the likelihood that benthic habitats will be impacted by seabed disturbance associated with the localised placement of equipment and materials is assessed as: • Likely (B) - Not certain to happen but an additional factor may result in an occurrence. Expected to occur from time to time during the activity.
Residual Risk	Moderate
Demonstration of Acceptability	
Principles of ESD	Seabed disturbance is evaluated as having Level 2 risk consequence which is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Legislative requirement: Section 572 of the OPGGS Act details the requirements for removal of property will be met for the Activity.
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: Relevant management system processes adopted to implement and manage hazards include: • Risk Management (MS03) • External Affairs, Investor Relations, Community and Stakeholder Management (MS05)

	• Operations Management (MS07) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11). Activities will be undertaken in accordance with the Implementation Strategy (Section 11.0)
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice.
Other requirements	No feedback from stakeholders has been received that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures for seabed disturbance.
Demonstration of meeting the defined acceptable levels in the OPP	Section 8.8.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with seabed disturbance. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for seabed disturbance: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	Acceptable Amplitude Energy has determined that impacts and risks related to seabed disturbance are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advice, and significant impact guidelines for MNES. • No claims or objections were raised during consultation that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures. To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: • EPO6: The selection of the location for wells and associated planned impacts will:

	– avoid areas of high relief outcrops, reefs, and sponge beds, where practicable – not disturb underwater heritage as defined under the Underwater Cultural Heritage Act 2018. • EPO8: Undertake Seabed Surveys to inform the selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts, including potential changes to seabed quality. • EPO9: Seabed disturbance limited to the planned disturbance areas defined in this OPP and limited to within the Operational Area • EPO10: Impacts to commercially targeted species will be limited to temporary [1] and localised1 change in fauna behaviours. • EPO11: Undertake Ongoing Engagement with relevant First Nations groups to ensure identified tangible and intangible cultural heritage and potential risks to cultural heritage values remains current and its protection is provided for within EPs for the activity. • EPO23: No impact to underwater cultural heritage.

6.4 GHG Emissions

6.4.1 Cause of Aspect

Direct GHG emissions that will be generated as a result of the Activity are identified in Table 6-8 and described in further detail in subsections below. GHGs are emitted to the atmosphere when hydrocarbons are burned, flared or vented. The types of GHG emissions that will be generated during the activities, and that account for the vast majority of GHG emissions generated by the activities, include carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4).

Table 6-8: Activities that will Generate GHG Emissions

Aspect / Phase	Activity component
Well construction	Well clean-up and flowback Mud degassing
Support activities	MODU operations
	Vessel operations
	Helicopter operations
Contingent activities	Well abandonment activities
	Environmental surveys

6.4.2 Aspect Characterisation

6.4.2.1 Well Construction

Well construction will be carried out using a MODU and flaring may occur during flowback activities and well clean-up. Throughout well clean-up and flowback activities, the well is flowed to test well flow rates, and remove contaminants including drilling or completions fluids, debris and solids from

[1] Temporary and localised change in fauna behaviours for commercially targeted species limited to activity durations and seabed disturbance footprint defined in Section 6.3.

the formation, which are circulated back to the MODU. For safety purposes, this gas is flared. If required, flaring is estimated to take <36 hours to complete.

During well construction, gas from the well bore may become entrained in the mud. The drilling mud is recirculated and degassed once outside the wellbore to remove the entrained gas. During mud degassing, gases entrained in the mud are separated from the mud and vented directly to the atmosphere.

The durations of the well flowback and associated flaring depend on the complexity of the reservoir and data required to characterise them. Small quantities of condensate may be recovered with the gas and flared; these quantities of condensate are not included within the GHG inventory as they are considered within the total estimate margin provided.

6.4.2.2 Support Activities

Vessels and the MODU use diesel or gas to generate power for operations. The MODU will be present in the operational area during well construction, and for any required contingent activities. Vessels will be used for several activities such as bunkering and bulk transfer, collection and potentially treatment of waste from the MODU, site surveys, vessel positioning, towing the MODU and mooring installation. Vessels are expected to be present in the operational area for all activities of the Activity. The maximum number of vessels in the operational area at a time is expected during drilling activities and is expected to be 3 AHTS or supply vessels, plus the MODU.

Vessels will likely use marine gas oil (MGO) or marine diesel oil (MDO) instead of heavy fuel oil (HFO). Emissions calculations are based on MDO to provide a conservative estimate. Vessels and the MODU may also be a source of fugitive emissions with the presence of fuel storage tanks on board. That is considered immaterial, and it is not included in the GHG inventory.

Helicopters will be used during the activities, primarily for crew change and medevac, and occasionally equipment and material transfers. Helicopter flights are expected to occur 5-8 times a week, dependent on the progress of the Activity, and logistical constraints. Helicopters use aviation fuel.

6.4.2.3 GHG Modelling

Scoping

GHG emissions are described as direct or indirect and relate to emissions that occur as a direct result of the Activity. Figure 6-9 describes the emissions estimation, monitoring and reporting workflow applied to the activities provided for under this EP.

The sources of emissions factors and estimation methods are also described within Figure 6-9.

Direct GHG Emissions

Direct GHG emissions are created as a direct result of the East Coast Project activities within Commonwealth jurisdiction, for all phases (surveys, drilling, installation and commissioning, operations and decommissioning) and support activities. These emissions originate from the use of support activities – MODU and vessels within Commonwealth waters, including flaring and fuel use by vessels.

The direct emissions do not equate to scope 1 emissions (i.e., emissions under operational control of the organisation) under the *National Greenhouse and Energy Reporting Act 2007* (Cwth), as the

direct emissions in this inventory include relevant Support Operations both within and outside of Amplitude Energy's operational control.

To estimate emissions, a range of information sources are used:

- Fuel consumption rates are based on MODU/vessel spec sheets and historical consumption rates.
- Flaring rates are based on the expected duration of well clean-up and testing, and target gas flow rates.

Emissions were estimated using methods and emission factors from the National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008 (NGER Determination) (as updated in 2025).

Indirect GHG Emissions

Indirect emissions associated with the Activity include emissions resulting from the materials (only major contributors - the embodied carbon of cement and steel have been included) and others (including helicopters, flights, car travel and trucking).

Embedded emissions associated with materials were estimated based on the expected quantity of materials consumed during the Activity and emission factors sourced from the Inventory of Carbon and Energy (ICE Database) (Circular Ecology 2023).

Emissions associated with transportation of materials and people were estimated based on the travel distance and expected number of trips. Emission factors for each fuel type were sourced from the NGER (Measurement) Determination 2008 as updated in 2025.

No production of hydrocarbons is proposed as part of this EP. Therefore, there are no indirect emissions associated with the gas processing at the onshore Athena Gas Plant or with the transport or end use of hydrocarbons.

Total GHG Emissions

Table 6-9 summarises the total direct and indirect GHG emissions for the Activity. The direct emissions for the Activity are estimated to be ~10.3 kt CO_2-e over the Activity life, and the indirect emissions attributed to the materials, helicopter, and trucking, are estimated to be 16.2 kt CO_2-e.

NB: GHG emissions from waste are predicted to be immaterial and therefore have not been included in the GHG estimate.

Table 6-9: Total GHG emissions for the Activity

Emissions Source	Emissions Scope	kT CO_2-e
MODU	Direct	2.6
Flaring	Direct	5.6
Vessels[1]	Indirect	15.1
Materials[2]	Indirect	2.2
Others (transport of people and materials)	Indirect	1.1
Total[3]	Direct and Indirect	26.5

Note:

[1] *Includes all phases: Well Construction, Support Activities and Contingent Activities.*

[2] *Accounted for the embodied carbon in the required cement, steel, drill mud and drill fluids only.*

[3] *The emissions calculated for the Activity are expected to be within the range +/- 30%, excluding any substantial changes to emission factors.*

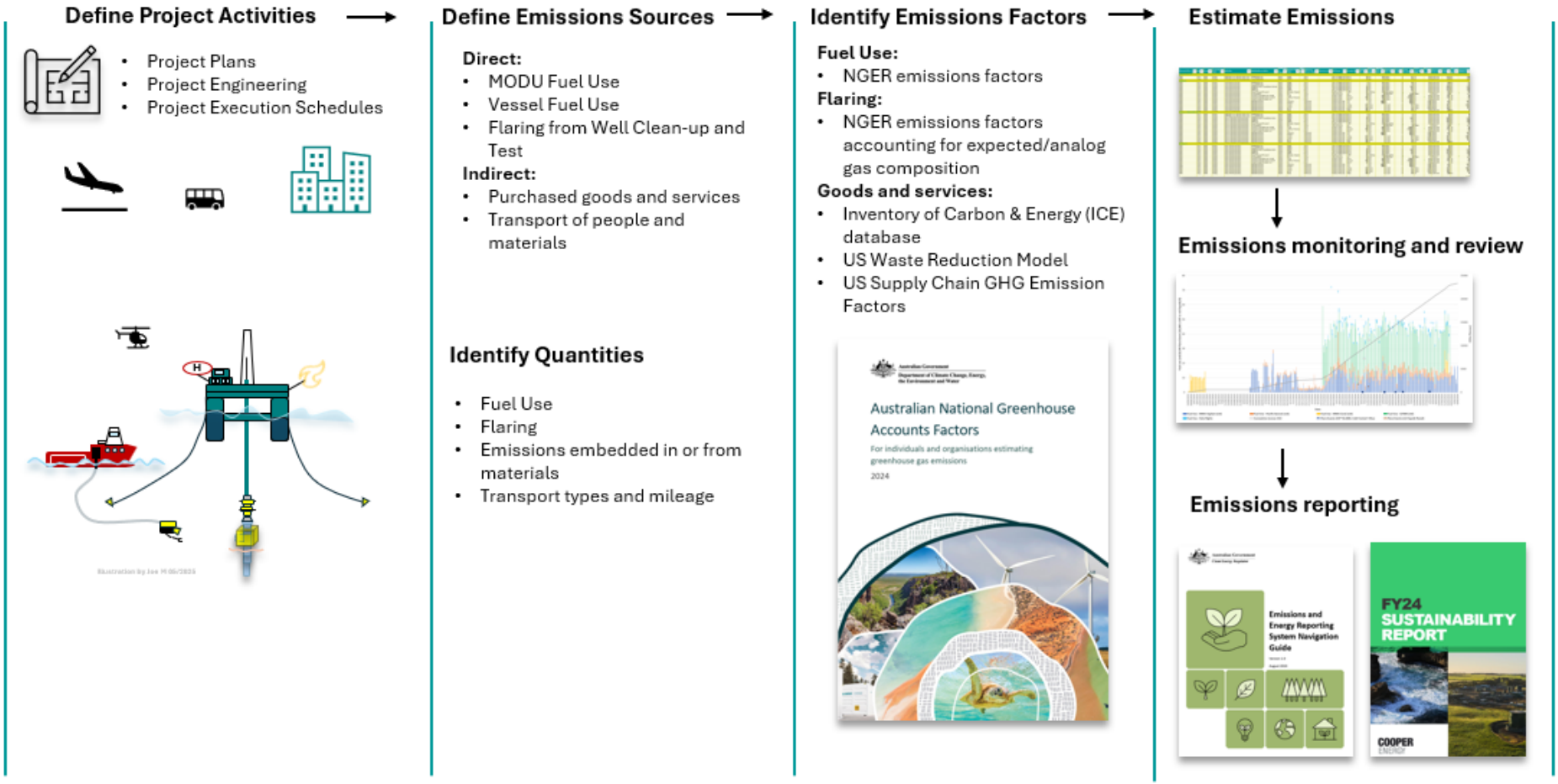


Figure 6-9: Emissions Estimation, Monitoring and Reporting Workflow

6.4.3 Predicted Environmental Impacts and Risks

The predicted environmental impacts from GHG emissions are:

- increase in GHG emissions

Potential risk:

- change in climate systems
- change in ecosystem
- change in socio-economic factors.

6.4.4 Impact and Risk Evaluation

6.4.4.1 Impact: Increase in GHG Emissions

GHGs absorb longwave radiation reflected from the earth's surface thereby trapping heat within the earth's atmosphere and contributing to the greenhouse effect. While the emissions from the Activity add to the GHG load in the atmosphere resulting in global warming potential, they are small on a state and national scale.

Following the updated Nationally Determined Contribution (NDC) in June 2022, Australia committed to reduce GHG emissions to 43% below 2005 levels by 2030 and reaffirmed its target to achieve net zero emissions by 2050. These targets are legislated under the *Climate Change Act 2022* (Cwth).

Based on forecasting conducted by the DCCEEW in 2024, the Commonwealth Government has forecasted the annual carbon budget including a scenario called 'with additional measures' that includes policies and measures in place at the time of publication. This includes the Safeguard Mechanism reforms and the 82% renewable energy target in Australia's electricity grid by 2030 (DCCEEW 2024e).

Carbon budgets under current policy settings can be developed for Australia with the following approach:

- For Australian carbon budget: by summing the annual projected emissions of the 'with additional measures' scenario up to 2030 (DCCEEW 2024e).
- For the duration of the activity (2026-2028), the total direct and indirect GHG emissions from the Activity are estimated to be approximately 0.002% of the Australian carbon budget for the duration of the Activity.

The predicted level of impact, i.e., the consequence, of GHG emissions as a result of the Activity is evaluated to be **Level 1**, based on:

- The low levels of contribution to the Australian carbon budget (0.002%).
- Amplitude Energy having a robust emissions reduction process to monitor and address legislative requirements, and enable a systematic process to identify, assess and implement GHG emissions reduction opportunities, meaning the Activity's direct emissions will continue to be aligned with Australia's GHG emissions commitments.
- Since FY20 Amplitude Energy has been certified carbon neutral by Climate Active in respect of its scope 1, scope 2 and relevant scope 3 emissions on an equity share basis2. This voluntary process includes calculating emissions, developing and implementing an emissions reduction strategy and

[2] See Amplitude Energy's 2023 Sustainability Report for detail.

using carbon offsets to compensate for the remaining emissions. The certification requires independent technical assessment and verification and ultimately gives Amplitude Energy a detailed understanding of its emissions profile and provides a real cost of carbon for its business activities. Evidence of independent verification of Amplitude Energy's calculation, reporting, and surrender of carbon credit units is publicly available through certification provided by Climate Active which is available on the Climate Active website.

6.4.4.2 Risk: Change in Climate Systems

The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) Working Group I was released in August 2021. The IPCC states with high confidence that many extreme heat events and global surface temperature rise would not have occurred without human influence and could be irreversible for several decades to millennia (IPCC 2021).

This is reiterated in the AR6 Synthesis Report released in March 2023, "[H]uman activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 in 2011-2020. Global greenhouse gas emissions have continued to increase over 2010-2019, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and between individuals (high confidence). Human-caused climate change is already affecting many weather and climate extremes in every region across the globe" (IPCC 2023).

According the AR6 Synthesis Report, heat extremes (including heatwaves) have become more frequent and more intense across most land regions since the 1950s while cold extremes have become less frequent and less severe. Marine heatwaves have approximately doubled in frequency since the 1980s. The frequency and intensity of heavy precipitation events have increased since the 1950s over most land areas for which observational data are sufficient for trend analysis. It is likely that the global proportion of major (Category 3–5) tropical cyclone occurrence has increased over the last four decades (IPCC 2023).

The State of the Climate 2024 (BoM and CSIRO 2024) reported that Australia's climate warmed by an average of 1.51 ± 0.23°C between 1910 and 2023[3], reflecting global warming trends. This warming trend has been accompanied by a shift towards drier conditions in southern Australia and wetter conditions in northern Australia. Additionally, the frequency and/or intensity of some extreme weather events, including heat waves and short-term heavy rainfall events are also anticipated to increase with potential consequences to human health and impacts on biodiversity and ecosystems. Conversely, a downward trend in the number of tropical cyclones has been observed since 1982 (BoM and CSIRO 2024). Average sea surface temperature in the Australian region has warmed by 1.08°C since 1900, with nine of the 10 warmest years on record occurring since 2010, associated with longer and more frequent marine heatwaves (BoM and CSIRO 2024). A warming ocean affects the global ocean and atmospheric circulation, the cryosphere, global and regional sea levels, and causes losses in dissolved oxygen, impacts on marine ecosystems (BoM and CSIRO 2024), including changes to species abundance, community structure and increased frequency and intensity of thermally induced coral bleaching events (CSIRO 2017).

The predicted level of impact, i.e., the consequence, of an impact on climate systems from an increase in GHG emissions as a result of the Activity is evaluated to have a consequence of **Level 1**, based on:

[3] It is important to note that this 1.5°C warming above 1910 temperatures does not necessarily reflect that the 1.5°C threshold of the Paris Agreement has been exceeded. The IPCC AR6 Report defines that an exceedance of this threshold should be in relation to a 20-year temperature average.

- The low levels of contribution to Australian carbon budget (0.002%).
- Amplitude Energy having a robust emissions reduction process to monitor and address legislative requirements, and enable a systematic process to identify, assess and implement GHG emissions reduction opportunities across the business, meaning the Activity direct emissions will continue to be aligned with Australia's GHG emissions commitments.

  Since FY20 Amplitude Energy has been certified carbon neutral by Climate Active in respect of its' scope 1, scope 2 and relevant scope 3 emissions on an equity share basis4. This voluntary process includes calculating emissions, developing and implementing an emissions reduction strategy and using carbon offsets to compensate for the remaining emissions. The certification requires independent technical assessment and verification and ultimately gives Amplitude Energy a detailed understanding of its emissions profile and provides a real cost of carbon for its business activities.

6.4.4.3 Risk: Change in Ecosystem Dynamics

Ecosystems that are particularly susceptible to adverse effects of climate change include alpine habitats, coral reefs, wetlands and coastal ecosystems, polar communities, tropical forests, temperate forests and arid and semi-arid environments (DoEE 2019). In Australia, this includes coral reefs, alpine regions, rainforests, arid and semi-arid environments, mangroves, grasslands, temperate forests and sclerophyll forests. Future climate change (increased temperature and decreased, but more variable rainfall) has the potential to have a range of impacts on ecological factors and threaten biodiversity in the Australian Mediterranean ecosystem (CSIRO 2017).

Redistribution and reorganisation of natural systems, driven by climate change is a major threat to biodiversity (Chapman et al. 2020). A report by Australia's Biodiversity and Climate Change Advisory Group summarises the potential impacts of climate change to marine and terrestrial species, habitats, and ecosystems across Australia (Steffen et al. 2009). The impacts to taxa are outlined in Table 6-10 and the impacts to ecosystems in Table 6-11.

Extensive modelling and monitoring studies over the last twenty years provide considerable evidence that climate change is already affecting and will continue to affect species globally (Hoegh-Guldberg et al. 2018) however, these impacts are likely to be highly species-dependent and spatially variable. The most frequently observed and cited ecological responses to climate change include species distributions shifting towards the poles, upwards in elevation and shifts in phenology (Dunlop et al. 2012). Climate change may not only change species distributions but also life-history traits such as migration patterns, reproductive seasonality and sex-ratios (Table 6-10).

Impacts of climate change such as altering temperature, rainfall patterns and fire regimes are likely to lead to changes in vegetation structures across terrestrial ecosystems within Australia (Table 6-11; Dunlop et al. 2012). Increases in fire regimes will impact Australian ecosystems altering composition structure, habitat heterogeneity and ecosystem processes. Changes in climate variability, as well as averages, could also be important drivers of altered species interactions, both native and invasive species (Dunlop et al. 2012). Climate change could result in significant ecosystem shifts, as well as alterations to species ranges and abundances within those ecosystems (Hoegh-Guldberg et al. 2018).

The IPCC Special Report describes impacts of warming above pre-industrial levels to key receptor groups including terrestrial ecosystems, mangroves, warm-water corals, unique and threatened systems, and arctic regions (Hoegh-Guldberg et al. 2018). These receptor groups show varying sensitivity to warming conditions, with a range of responses shown at 1°C warming; from corals suffering moderate impacts, to mangroves not showing any detectable impacts that can be

[4] See Amplitude Energy's 2023 Sustainability Report for detail.

attributed to climate change (Hoegh-Guldberg et al. 2018). Once warming reaching 1.5°C, all receptor groups show impacts attributable to climate change with severity ranging from moderate impacts that are detectable and attributable to climate change (mangroves), to impacts that are severe and widespread (warm-water corals) (Hoegh-Guldberg et al. 2018). At the point where global temperature rise, due to climate change, reaches 2°C, increasing numbers of receptor groups suffer impacts which are high to very high, and likely to be irreversible (terrestrial ecosystems, warm-water corals, unique and threatened systems, and arctic regions) (Hoegh-Guldberg et al. 2018).

The State of the Environment (SoE) report is produced every five years by the Australian Government as a comprehensive review on the state of the Australian environment. The most recent report was released in July 2022 (DCCEEW 2021). The SoE concluded that climate change and extreme weather events were impacting the Australian environment and especially impacting various taxa (DCCEEW 2021). In many cases, the impacts of climate change on biodiversity are exacerbated by other pressures such as land clearing and invasive species, but in some cases, impacts can be unequivocally attributed to climate change. A summary of the SoE impacts from climate change is provided in Table 6-12.

Terrestrial Ecosystems

All terrestrial ecosystems are likely to be impacted by a changing climate Table 6-11, Steffen et al. 2009, Hughes 2011, Dunlop et al. 2012, Hoegh-Guldberg et. al. 2018). The predicted impact of climate change on these ecosystems is highly variable, both between ecosystems and within individual ecosystems (Dunlop et al. 2012). Below is a summary of potential climate change impacts to two key terrestrial ecosystems – tropical rainforests and alpine/montane areas, where other terrestrial ecosystems can be found summarised in Table 6-11.

Tropical Rainforest

Projections of future climate change in the wet tropics of Australia under different scenarios are outlined by McInnes (2015). It is likely that temperatures in the wet tropics will become hotter and potentially fire and cyclones will be more intense. Consequently, there is an increased probability of fires penetrating into rainforest vegetation resulting in a shift from fire-sensitive vegetation to communities dominated by fire-tolerant species; and changing rainforest disturbance regime as cyclones become more intense (Hughes 2011, Steffen et al. 2009). Changes in the timing of seasons (i.e., extended summers) could cause change in the seasonal response of plants, and alterations to species ranges and abundances (Hoegh-Guldberg et al. 2018).

Alpine/Montane Areas

Alpine systems are generally considered to be among the most vulnerable to future climate change (Hughes 2003). The extent of true alpine habitat in Australia is very small (0.15% of Australian land surface) with limited high-altitude refuge (Hughes 2003). Australian alpine regions are home to a variety of alpine vertebrates who rely on snow cover for their survival. There is evidence of a reduction in populations of dusky antechinus, broad-toothed rats, and the mountain pygmy possum. The first two species are active under the snow throughout the winter season and are therefore subject to increased predation by foxes when snow is reduced (Hughes 2003).

Marine Ecosystems

Average sea surface temperature in the Australian region has warmed by 1.05°C since 1900, with eight of the 10 warmest years on record occurring since 2010 (BoM and CSIRO 2022). A warming ocean affects the global ocean and atmospheric circulation, the cryosphere, global and regional sea levels, and causes losses in dissolved oxygen, impacts on marine ecosystems (BoM and CSIRO 2022), including changes to species abundance, community structure and increased frequency and intensity of thermally induced coral bleaching events (CSIRO 2017).

Oceanic warming has also served to alter ocean currents around Australia. In response to both ocean warming and stratospheric ozone depletion, the East Australian Current has increased in strength by about 20% between 1978 and 2005 (Cai and Cowan 2006). Sea surface temperatures are projected to continue to increase, with estimates of warming in the Southern Tasman Sea of between 0.6°C to 0.9°C and between 0.3°C to 0.6°C elsewhere along the Australian coast by 2030 (Church et al. 2006).

Global mean sea level increased by 0.20 m between 1901 and 2018. The average rate of sea level rise was 1.3 mm/year between 1901 and 1971, increasing to 1.9 mm/year between 1971 and 2006, and further increasing to 3.7 mm/ year between 2006 and 2018. Human influence was very likely the main driver of these increases since at least 1971 (IPCC 2023).

Global mean sea level is predicted to rise between 0.18 m and 0.23 m by 2050, and between 0.38 m and 0.77 m by 2100 (IPCC 2021). This global mean sea level rise is primarily caused by thermal expansion and mass loss from glaciers and ice sheets, with minor contributions from changes in land-water storage. Global mean sea level will continue to increase for centuries to millennia due to continuing deep ocean warming and ice sheet melt, and sea levels will remain elevated for thousands of years, at rates dependent on future emissions (IPCC 2023). This will lead to some coastal inundation affecting mangroves, salt marshes and coastal freshwater wetlands. Furthermore, as CO_2 is gradually absorbed by oceans and fresh water, the water becomes more acidic, which increases the solubility of calcium carbonate, the principal component of the skeletal material in aquatic organisms (Steffen et al. 2009).

Below is a summary of potential climate change impacts to two key marine ecosystems - mangroves and coral reefs, other marine ecosystems are summarised in Table 6-11.

Mangroves

Mangrove ecosystems in Australia will face higher temperatures, increased evaporation rates and warmer oceans (McInnes 2015) as well as an associated sea level rise (Hoegh-Guldberg et al., 2018). Modelling indicates an increased likelihood of future severe and extended droughts across parts of Northern Australia (Dai 2013). Consequently, mangrove ecosystems may increase their southern range as a result of warmer temperatures.

However, higher temperatures and evaporation rates, and extended droughts could lead to die-offs in Northern Australia and a change in mangrove distribution and abundance (Duke et al. 2017). Mangrove systems should cope with rising sea levels by accumulating more peat or mud which will give them the opportunity to adjust to a rising sea level (Field 1995).

Coral Reefs

Climate change has emerged as a threat to coral reefs, with temperatures of just 1°C above the long-term summer maximum for an area over 4-6 weeks being enough to cause mass coral bleaching and mortality (Baker et al., 2008, Hughes et al. 2018, Spalding and Brown 2015). Coral mortality or die off following coral bleaching events can stretch across thousands of square kilometres of ocean (Gilmour et al. 2016, Hoegh-Guldberg 1999, Hughes et al. 2018). The impacts associated with a warming ocean, coupled with increasing acidification, are expected to undermine the ability of tropical coral reefs to provide habitat for fish and invertebrates, which together provide a range of ecosystem services such as food, livelihoods and coastal protection (Hoegh-Guldberg et al., 2018). Coral reefs are projected to decline by 70–90% as a result of 1.5°C of global warming (IPCC 2023).

Table 6-10: Overview of Impacts of Climate Change to the Future Vulnerability of Particular Taxa (modified after Steffen et al., 2009)

Taxa	Potential Vulnerability
Mammals	Narrow-ranged endemics susceptible to rapid climate change in-situ; changes in competition between grazing macropods in tropical savannas mediated by changes in fire

Taxa	Potential Vulnerability
	regimes and water availability; herbivores affected by decreasing nutritional quality of foliage as a result of CO_2 fertilisation.
Avifauna	Changes in phenology of migration and egg-laying; increased competition of resident species; breeding of waterbirds susceptible to reduction; top predators vulnerable to changes in food supply; rising sea levels affecting avifauna that nest on sandy and muddy shores, saltmarshes, intertidal zones, coastal wetlands, and low-lying islands; saltwater intrusion into freshwater wetlands affecting breeding habitat.
Reptiles	Warming temperatures may alter sex ratios of species with environmental sex determination to cope with warming in-situ.
Amphibians	Frogs may be the most at-risk terrestrial taxa. Amphibians may experience altered interactions between; pathogens, predators, and fires.
Fish	Freshwater species vulnerable to reduction in water flows and water quality; limited capacity for freshwater species to migrate to new waterways; all species susceptible to flow-on effects of warming on the phytoplankton base of food webs.
Invertebrates	Expected to be more responsive than vertebrates due to short generation times, high reproduction rates and sensitivity to climatic variables.
Plants	Climate change may impact various functional dynamics of plants due to changes in; increasing CO_2, fires, plant phenology and specific environmental characteristics.

Table 6-11: Projected Impacts of CO_2 Rise and Climate Change on Australian Ecosystems (modified after Steffen et al. 2009)

Key Component of Environmental Change	Projected Impacts of Ecosystems
Coral Reefs	
CO_2 increases leading to increased ocean acidity	Reduction in ability of calcifying organisms, such as corals, to build and maintain skeletons.
Sea surface temperature increases, leading to coral bleaching	If frequency of bleaching events exceeds recovery time, reefs will be maintained in an early successional state or be replaced by communities dominated by macroalgae.
Oceanic Systems (including planktonic systems, fisheries, sea mounts and offshore islands)	
Ocean warming	Many marine organisms are highly sensitive to small changes in average temperature (1-2°C), leading to effects on growth rates, survival, dispersal, reproduction and susceptibility to disease.
Changed circulation patterns, including increase in temperature stratification and decrease in mixing depth, and strengthening of the East Australia Current (EAC)	Distribution and productivity of marine ecosystems is heavily influenced by the timing and location of oceanic currents; currents transfer the reproductive phase of many organisms. Climate change may suppress upwelling in some areas and increase it in others, leading to shifts in location and extent of productivity zones.
Changes in ocean chemistry	Increasing CO_2 in the atmosphere is leading to increased ocean acidity and a concomitant decrease in the availability of carbonate ions.
Estuaries and Coastal Fringe (including benthic, mangrove, saltmarsh, rocky shore, and seagrass communities)	
Sea level rise	Landward movement of some species as inundation provides suitable habitat, changes to upstream freshwater habitats will have flow-on effects to species.
Increase in water temperature	Impacts on phytoplankton production will affect secondary production in benthic communities.

Key Component of Environmental Change	Projected Impacts of Ecosystems
Savannas and Grasslands	
Elevated CO2	Shifts in competitive relationships between woody and grass species due to differential responses.
Increased rainfall in north and northwest regions	Increased plant growth will lead to higher fuel loads, in turn leading to fires that are more intense, frequent and occur over larger areas.
Tropical Rainforests	
Potential increases in frequency and intensity of fires	Increased probability of fires penetrating into rainforest vegetation resulting in shift from fire-sensitive vegetation to communities dominated by fire-tolerant species.
Warming and changes in rainfall patterns	Potential increases in productivity in areas where rainfall is not limiting; reduced forest cover associated with soil drying projected for some Australian forests.
Inland Waterways and Wetlands	
Reduction in precipitation, increased frequency and intensity of drought	Reduced river flows and changes in seasonality of flows.
Changes in water quality, including changes in nutrient flows, sediment, oxygen and CO_2 concentration	May affect eutrophication levels, incidence of blue-green algal outbreaks.
Sea level rise	Saltwater intrusion into low-lying floodplains, freshwater swamps and groundwater; replacement of existing riparian vegetation by mangroves.
Arid and Semi-arid Regions	
Increasing CO_2 coupled with drying in some regions	Interaction between CO_2 and water supply critical, as 90% of the variance in primary production can be accounted for by annual precipitation.
Shifts in seasonality of intensity of rainfall events	Any enhanced runoff redistribution will intensify vegetation patterning and erosion cell mosaic structure in degraded areas. Changes in rainfall variability and amount will also impact on fire frequency. Dryland salinity could be affected by changes in the timing and intensity of rainfall.
Warming and drying, leading to increased frequency and intensity of fires	Reduction in patches of fire-sensitive mulga in spinifex grasslands potentially leading to landscape-wide dominance of spinifex.
Alpine and Montane Areas	
Reduction in snow cover depth and duration	Potential loss of species dependent on adequate snow cover for hibernation and protection from predators; increased establishment of plant species at higher elevations as snowpack is reduced.

Table 6-12: Summary of SoE Report Conclusions on Climate Change Impacts

Taxa	Potential Vulnerability
Mammals	Terrestrial mammals are subject to ongoing population declines due to climate change and changes within habitats
Avifauna	There is strong evidence of population declines in threatened avifauna species, waterbirds and migratory birds. Various extensive and persistent impacts contribute to declines, including climate change (particularly drought) and extreme events, habitat degradation, and invasive predators.

Taxa	Potential Vulnerability
Reptiles	Reptile species in all areas of Australia have an increasing risk of extinction. Risk of extinction was recognised as primarily related to ongoing pressure from invasive predators, but compounded by pressure from habitat modification, climate change (particularly drought) and disease. Half of Australian freshwater turtle species are in drastic population decline due to climate change.
Amphibians	Droughts and fires are increasing pressures within habitats that impact amphibian species. The number of known threatened amphibian species, including those that are Critically Endangered in Australia, is increasing. Drought and fire are recognised as increasing pressures contributing to this decline.
Fish	Freshwater fish throughout Australia have more than a 50% risk of extinction in the next 20 years due to climate change and changes within freshwater habitats.
Invertebrates	Most threatened invertebrates are suffering from largescale habitat degradation and loss of biodiversity. Changes in regional temperature, humidity and rainfall impact their distribution, development and reproduction.
Plants	Habitat destruction is the leading cause of vulnerability within plant species. However, changes in temperature, rainfall and fire regimes are contributing threats to plant species. Alpine ecosystems and biodiversity in Australia are particularly vulnerable to climate change that affects snow depth and the spatial and temporal extent of snow, which have all declined since the late 1950s.

The predicted level of impact, i.e., the consequence, of an impact on ecosystems from an increase in GHG emissions as a result of the Activity is evaluated to have a consequence of **Level 1**, based on:

- The low levels of contribution to the Australian carbon budget (0.002%).
- Given the minor contribution to carbon budgets, the indirect emissions are not a substantial cause of the physical effects of climate change on MNES. Therefore, these physical effects are not considered impacts, as per s527E of the EPBC Act.
- Amplitude Energy having a robust emissions reduction process to monitor and address legislative requirements, and enable a systematic process to identify, assess and implement GHG emissions reduction opportunities across the business, meaning the projects direct emissions will continue to be aligned with Australia's GHG emissions commitments.

  Since FY20 Amplitude Energy has been certified carbon neutral by Climate Active in respect of its' scope 1, scope 2 and relevant scope 3 emissions on an equity share basis5. This voluntary process includes calculating emissions, developing and implementing an emissions reduction strategy and using carbon offsets to compensate for the remaining emissions. The certification requires independent technical assessment and verification and ultimately gives Amplitude Energy a detailed understanding of its emissions profile and provides a real cost of carbon for its business activities. Evidence of independent verification of Amplitude Energy's calculation, reporting, and surrender of carbon credit units is publicly available through certification provided by Climate Active which is available on the Climate Active website.

[5] See Amplitude Energy's 2023 Sustainability Report for detail.

6.4.4.4 Risk: Change in Socio-economic Factors

Changes to climate can result in an impact to social receptors that have values which include the ecological receptors previously discussed. This includes KEFs and AMPs. Climate change also impacts on the functions, interests or activities of other users which rely on ecological values, including commercial and recreational fisheries and tourism.

The social receptors that may be impacted in the region of this activity are discussed in Section 4.4.3.

The predicted level of impact, i.e., the consequence, of an impact on socio-economic factors from an increase in GHG emissions as a result of the Activity is evaluated to have a consequence of **Level 1**, based on:

- The low levels of contribution to the Australian carbon budget (0.002%).
- Given the minor contribution to carbon budgets, the indirect emissions are not a substantial cause of the physical effects of climate change on MNES. Therefore, these physical effects are not considered impacts, as per s527E of the EPBC Act.
- Amplitude Energy having a robust emissions reduction process to monitor and address legislative requirements, and enable a systematic process to identify, assess and implement GHG emissions reduction opportunities across the business, meaning the projects direct emissions will continue to be aligned with Australia's GHG emissions commitments.

  Since FY20 Amplitude Energy has been certified carbon neutral by Climate Active in respect of its' scope 1, scope 2 and relevant scope 3 emissions on an equity share basis[6]. This voluntary process includes calculating emissions, developing and implementing an emissions reduction strategy and using carbon offsets to compensate for the remaining emissions. The certification requires independent technical assessment and verification and ultimately gives Amplitude Energy a detailed understanding of its emissions profile and provides a real cost of carbon for its business activities. Evidence of independent verification of Amplitude Energy's calculation, reporting, and surrender of carbon credit units is publicly available through certification provided by Climate Active which is available on the Climate Active website.

6.4.5 Control Measures, ALARP, and Acceptability Assessment

Table 6-13 provides a summary of the control measures and ALARP and acceptability assessment relevant to GHG emissions.

Table 6-13: GHG Emissions ALARP, Control Measures and Acceptability Assessment

GHG Emissions	
ALARP Decision Context and Justification	ALARP Decision Context: Type A Impacts from GHG emissions are well understood. The potential impacts associated with Amplitude Energy Development Activities are assessed as Low. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no significant partner or media interests. The climate is influenced by the concentration of GHG emissions in the atmosphere. Amplitude Energy has a detailed understanding of its emissions profile. Given this, Amplitude Energy applies ALARP Decision Context A.
Control Measure	Source and Description of Control

[6] See Amplitude Energy's 2023 Sustainability Report for detail.

CM03: Marine Assurance Process	Vessels will comply with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution (appropriate to vessel class) for emissions from combustion of fuel including: • Hold a valid International Air Pollution Prevention (IAPP) certificate and have a current international energy efficiency certificate. • Have a Ship Energy Efficiency Management Plan (SEEMP) as per MARPOL 73/78 Annex VI. • Engine NOx emission levels will comply with Regulation 13 of MARPOL 73/78 Annex VI. • Sulphur content of diesel/fuel oil complies with Marine Order Part 97 and Regulation 14 of MARPOL 73/78 Annex VI.
CM08: Planned Maintenance System	Power generation on vessels and the MODU will be operated in accordance with manufacturer's instructions and ongoing maintenance to ensure efficient operation, and thereby GHG emissions reduced to ALARP.
Additional Control Measures Considered	
Use alternative fuels	Reject Potential to reduce the emissions associated with the combustion of fossil fuels, however, no other alternative fuel sources are currently commercially viable for larger vessels or helicopters. The cost to transition to alternatives fuels is grossly disproportionate to the benefits gained.
Use of non-hydrocarbon powered vessels	Reject Currently it would not be commercially viable to implement this measure for the activities discussed in this EP as vessels that do not use hydrocarbon are not common in Australian waters. To bring vessels into Australia to support activities is an increased cost. The overall reduction in emissions (and therefore benefit) from bringing vessel into Australia is relatively small.
Eliminate flaring as an activity	Reject Eliminating flaring as an activity would reduce GHG emissions, however, well testing is a central component of the activity and will allow Amplitude Energy to evaluate reservoir characteristics.
Cease flaring upon meeting clean-up and test criteria, and before exceeding a rate of 60 MMscf/day or duration of 36 hours of flaring	Adopt (CM07) Clean-up and flowback criteria will be defined within the flowback program. The flowback criteria will establish the rates and volumes to be produced from the well to gather sufficient information to characterise the reservoir and fluid, and clean-up the well. Flow from the well will cease once sufficient information has been gathered. Flared volumes of gas will not exceed a rate of 60 MMscf/day, or duration of 36 hours.
Use of 'High combustion efficient flare' for flaring operations	Adopt (CM07) A burner which atomises hydrocarbons to yield smoke free combustion. The use of a flare with higher efficiency, will also result in less unburnt methane thereby reducing GHG emissions. Operational and logistical costs of equipment and implementation are feasible.
Conduct wireline extended reservoir evaluation (instead of well test)	Reject The extended wireline technique for reservoir evaluation would replace well testing and reduce GHG emissions, however this technique is utilised for well deliverability and not data gathering and therefore is not feasible for clean-up and flowback.
Impact and Risk Summary	

Residual Impact Consequence	Level 1 - Localised short-term impacts to receptors with no remedial actions or recovery required.
Residual Risk Consequence	Level 1 - Localised short-term impacts to receptors with no remedial actions or recovery required.
Likelihood	Possible (C) - Could happen when additional factors are present. Easy to postulate a scenario for the occurrence but considered doubtful
Residual Risk	Low
Demonstration of Acceptability	
Principles of ESD	GHG emissions is evaluated as having Level 1 risk consequence which is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Legislation and other requirements considered as relevant control measures include: • Climate Change Act 2022 (Cwth) • National Greenhouse and Energy Reporting Act 2007 (Cwth) • Paris Agreement
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05) • Activities will be undertaken in accordance with the Implementation Strategy (Section 11.0).
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice.
Other Requirements	No objections or claims have been raised related to these impacts during consultation.
Demonstration of meeting the defined acceptable levels in the OPP	Section 8.5.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with GHG emissions. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for GHG emissions: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.

Acceptability Outcome	Acceptable Amplitude Energy has determined that impacts and risks related to GHG emissions are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advice, and significant impact guidelines for MNES. • No claims or objections were raised during consultation that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures. To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: EPO13: Manage direct and indirect GHG emissions from the Activity consistent with Australia's international GHG emissions commitments, as outlined in the *Climate Change Act* 2022 (Cwth). Emissions are to be determined based on the NGER scheme and managed by the Safeguard Mechanism.

6.5 Underwater Sound Emissions - Impulsive

6.5.1 Cause of Aspect

Sources of impulsive underwater sound emissions that will occur as a result of the Activity are identified in Table 6-14 and described in further detail in subsections below. The introduction of impulsive underwater sound emissions may temporarily elevate ambient underwater sound levels in the marine environment.

Table 6-14: Activities that will Generate Impulsive Underwater Sound Emissions

Aspect / Phase	Activity component
Well construction	Logging while Drilling (LWD)
MODU positioning	Positioning - transponders
ROV / AUV operations	Positioning - USBL
Contingent activities	Environmental surveys

6.5.2 Aspect Characterisation

6.5.2.1 Well Construction

Logging while drilling (LWD) and logging via wireline (if required) may use acoustic transducers to transmit localised and temporary impulsive sound into the rock surrounding the near wellbore, from a device lowered around 2 km below the seabed. Well logging is expected to take up to 24-48 hours for wireline operations and 5-10 days for LWD operations.

There is no Vertical Seismic Profiling (VSP) avoiding introduction of associated higher intensity impulsive noise (see Section 3.4.3.7 for further details).

Noise from logging activities is not anticipated to be audible within the overlying ocean. Studies which have recorded sound during a range of drilling and logging activities did not identify a discernible increase in subsea noise levels over general vessel noise when logging was underway (Jimenez-Arranz 2020). Logging, therefore, is not assessed further.

6.5.2.2 MODU Positioning

Transponders may be used during the Activity to assist with the positioning of the infrastructure and equipment (see Section 3.4.1 for further details). When required, transponders will introduce localised and temporary impulsive sound into the marine environment. General positioning will emit one chirp every 5 seconds (estimated to be required for 4 hours at a time) and precise positioning will emit one chirp every second (estimated to be required for 2 hours at a time). The chirps are short in duration between 3 and 40 milliseconds. Transponders will not emit any sound when on standby. Austin et al. (2012) calculated the distances to SPL isopleths for a typical USBL system in open water and found the distance to 160 dB re 1 µPa (SPL) to be 36 m, and thus incidental to, and lower than underwater noise from other project impulsive noise sources.

A USBL system uses transponders to receive the acoustic signal sent out by the system's transceiver. As such, the sound source levels of a USBL assessed in Section 6.5.2.3 are considered a suitable analogue for a transponder that will be used during the positioning activities of the Activity.

6.5.2.3 ROV / AUV Operations

USBL positioning systems use high frequency-short-range acoustic signals. The signals are produced by a small battery-operated beacon. These may be attached to ROVs, deployed by ROVs to subsea equipment and the seabed. The USBL system sends / receives and interprets signals in real time to establish precise locations of equipment and vessels. The sound source levels of a USBL are detailed in Section 6.5.2.4.

6.5.2.4 Environmental Surveys (Contingent)

Environmental surveys have been included as a contingent activity. In the event they are required, the surveys will introduce localised and temporary impulsive sound into the marine environment. Environmental surveys may utilise techniques which use acoustics that direct short, pulsed sound towards the seabed, such as, MBES, SSS, SBP, CTD, USBL and SVP (see Section 3.4.3.9 for further details).

MBES is used to obtain detailed 3-dimensional (3D) maps of the seafloor and to gather data on water depths over the surveyed area. The equipment is most commonly mounted on survey vessels and measures water depth by recording the two-way travel time of a high frequency pulse emitted by a transducer. The beams produce a fanned arc composed of individual beams (also known as a swathe). MBES is typically operated at frequencies above 200 kHz (Table 6-15) and is therefore outside the hearing range of most cetaceans and pinnipeds and will only impact marine fauna capable of hearing higher frequencies.

SSS is used to generate an accurate image of the seabed, which may include 3D imagery to map seabed features. The equipment is typically towed or mounted to an ROV. An acoustic beam is used to obtain an accurate image of a narrow area of seabed to either side of the instrument by measuring the amplitude of back-scattered return signals. Like MBES, this equipment is also typically

operated at a high frequency range and therefore will likely only impact marine fauna capable of hearing higher frequencies.

As described in Section 6.5.2.3, USBL systems are used to determine the positioning of equipment and vessels. Austin *et al*. (2012) calculated the distances to SPL isopleths for a typical USBL system in open water and found the distance to 160 dB re 1 µPa (SPL) to be 36 m, and thus incidental to, and lower than underwater noise from other project impulsive noise sources.

SVP and CTD techniques are anticipated to have sound source levels like MBES given the operation principle is similar to an echosounder (Makar 2022) (Table 6-15).

SBP is a common survey technique and generates sound across a frequency range that overlaps the hearing range of potential receptors from low frequency cetaceans (baleen whales) to high frequency cetaceans (dolphins). Other described impulsive sources have no or minimal frequency overlap with the hearing range of low frequency cetaceans. SBP has comparable impulsive source levels to other survey techniques included within the EP. Considering the source levels and lower frequency range of SBP compared to other impulsive sound sources described (Table 6-15); given SBP is expected to have a higher potential to propagate through the open ocean compared to the other impulsive sound sources described SBP has been used as the basis of the impact assessment and detailed evaluation.

Table 6-15: Positioning and Survey Equipment Source Frequencies and Sound Levels (Welch et al. 2023)

Emission Source	Typical Equipment Model	Sound Frequency Range	Source Sound Level
MBES	R2Sonic 2024 Reson SeaBat 8101	200–400 kHz	SPL: 221 dB re 1 µPa @ 1 m SEL_{SS}: 130 dB re 1 µPa^{2}s @ 40 m PK: 170 dB re 1 µPa @ 40 m
SSS	EdgeTech 4200	70–400 kHz	SPL: 205 dB re 1 µPa @ 1 m SEL_{SS}: 176 dB re 1 µPa^{2}s @ 1 m PK: 210 dB re 1 µPa @ 1 m
SBP	CHIRP - Applied Acoustics AA301	2–16 kHz	SPL: 203.3 dB re 1 µPa @ 1 m SEL_{SS}: 172.6 dB re 1 µPa^{2}s @ 1 m SPL: 191.7 dB re 1 µPa PK: 215 dB re 1 µPa^{2}m^2
	Boomer - Applied Acoustics AP3000	100-1,000 Hz	
USBL	USBL: Sonardyne Ranger	18–36 kHz	SPL: 204 re 1 µPa @ 1m SEL_{SS}: 173 re 1 µPa @ 1m PK: 170 dB re 1 µPa @ 30 m

Note: SELSS is per-pulse SEL (i.e., not an accumulated value).

6.5.3 Underwater Sound Modelling

To determine the spatial extent for impact and risk evaluation, a review of comparative underwater sound characterisation studies was undertaken to define relevant impulsive sound EMBAs:

- McPherson, C, and M Koessler. 2021. Empirical estimation of underwater noise and effect from survey equipment. Memo, Capalaba, Queensland, Australia: JASCO Applied Sciences for Cooper Energy.
- Welch, S.J., M.-N. R. Matthews, D.H. Stroot, A.M. Muellenmeister, and C.R. McPherson. 2023. Otway Exploration Drilling Program: Acoustic Modelling for Assessing Marine Fauna Sound

Exposures. Document 02760, Version 3.0 FINAL. Technical report by JASCO Applied Sciences for Xodus Group (ConocoPhillips Australia).

Modelling by Welch *et al.* (2023), produced for ConocoPhillips' Otway Exploration Drilling Program, used 3 sound propagation models (MONM-BELLHOP, FWRAM and VSTACK), for a SBP sound source located approximately 20 km south of the operational area.

Empirical estimation by McPherson and Koessler (2021) reviewed literature and used a simple spreading loss calculation where there were gaps in literature.

Comparing the predicted underwater sound level increases from both studies found results of modelling by Welch *et al*. (2023) to provide the most relevant estimates of impulsive sound propagation ranges. The modelling by Welch *et al.* (2023) was conducted at two locations at varying depths within VIC/P79 off the coast of Warrnambool within the Otway Basin (see Table 6-16). The modelling used a conservative AP3000 triple-plated boomer SBP system with a verified source level of 169dB re 1 μPa^2m^2s, which has been considered to provide conservative approximations of the potential sound fields and ranges of the SEL24h impact criteria for the range of SBP boomers (Wood and McPherson, 2019).

The lithology within the operational area includes some areas of bare limestone, and some areas with overlaying sand which is comparable to the lithology described within the study by Welch *et al.* (2023) including silty carbonate sand overlaying limestone. The range of water depths modelled by Welch *et al.* (2023) are also comparable to the water depth considered for this Activity: 56 m (see Table 3-1). Welch *et al.* (2023) is therefore considered to provide an appropriate basis for an EMBA by impulsive sound associated with the Activity. Where empirical estimations provide a more conservative estimate, predictions by McPherson and Koessler (2021) were used, where appropriate.

Table 6-16: Description of the Scenarios Modelled for Impulsive Sound Relevant to the Activity

Scenario	Description	Location		Water Depth
		Latitude	Longitude	
1	Boomer type Sub-Bottom Profiling (SBP) 24 h scenario survey lines.	38° 30' 06.3724" S	142° 07' 55.49" E	45 m
2		39° 02' 00.8251" S	142° 34' 07.53" E	110 m

Source: Welch et al. 2023

6.5.3.1 Noise Effect Criteria

Different species groups perceive and respond to sound differently, and so a variety of exposure criteria for the different types of impacts and species groups are considered. The following noise effect thresholds (Table 6-17), based on current best available science, have been used in the impact and risk assessment:

- Peak pressure levels (PK) and frequency-weighted accumulated sound exposure levels (SEL24h) from the US National Oceanic and Atmospheric Administration (NOAA) Technical Guidance (NMFS 2018, and NMFS 2024) and Southall *et al.* (2019) for the onset of Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) in marine mammals.
- Marine mammal behavioural threshold (Level B harassment[7]) based on the current NOAA (NOAA 2024) criterion for marine mammals of 160 dB re 1 µPa (SPL) for impulsive sound sources.

[7] NOAA (2005) defines Level B harassment as "acts that have the potential to disturb (but not injure) a marine mammal or marine mammal stock in the wind by disrupting behavioural patterns including, but not limited to, migration, breathing, nursing, breeding, feeding or sheltering."

Impulsive sound levels greater than 140 dB re 1 µPa (SPL) have a 50% probability of causing behavioural changes to migrating southern right whales and therefore is conservatively defined as the behavioural threshold for low-frequency cetaceans (Wood *et al.* 2012).

- Peak pressure levels (PK) and frequency-weighted accumulated sound exposure levels (SEL_{24h}) from Finneran et al. (Finneran *et al*. 2017) for the onset of PTS and TTS in marine turtles.
- Marine turtle behavioural response threshold of 166 dB re 1 µPa (SPL) (CoA, 2017) as applied by the US NMFS, along with a sound level associated with behavioural disturbance 175 dB re 1 µPa (SPL) (McCauley *et al.*, 2000).
- Sound exposure guidelines for fish, fish eggs and larvae, including quantitative criteria for mortality and potential mortal injury, recoverable injury and TTS and qualitative risk criteria for masking and behavioural effects (Popper *et al.,* 2014). Quantitative criteria are only available for mortality and potential mortal injury for fish eggs and fish larvae.

NOAA has recently published updated guidance for exposure thresholds for the onset of PTS and TTS for marine mammals within the Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0): Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts (NMFS 2024). The updated thresholds now consider both the weighting function shape and the weighted threshold value. These new thresholds present a more conservative frequency-weighted accumulated sound exposure levels compared to those previously used, those suggested by Southall *et al.* (2019).

The sound modelling by McPherson and Koessler (2021) and Welch *et al*. (2023) occurred prior to the publication of the new thresholds guidance in 2024. Amplitude Energy have evaluated the difference that these new thresholds make for the continuous sound emission scenarios (Section 6.6; Appendix 7 - ; Connell *et al.* 2025), compared to previous thresholds, and incorporated the results into Section 6.6. The new modelling results demonstrate that the change to thresholds have some effect on the size of the TTS and AUD INJ (including PTS) sound contours, with some increasing the potential impact radii for some fauna types by ~25%. However, because of the original small potential effect radii for TTS and PTS (generally within a few hundred metres or tens of metres), the changes do not translate into a significant increase in potential for TTS or PTS onset. The radii for both TTS and PTS remain well within the potential behavioural disturbance radii. The low levels of impulsive noise anticipated from the Activity, coupled with the limited impact ranges, make it improbable that TTS or PTS will occur as a result of the activity. Furthermore, the control measures for underwater noise are based on continuous noise impact ranges (refer Section 6.6) and given that the continuous noise radii extend further than the impact ranges for impulsive noise, the controls are expected to remain effective.

Accomando *et al.* (2025) has also recently suggested updates to the underwater sound exposure thresholds for marine turtles. As per the approach detailed above, Amplitude Energy have similarly accounted for these new thresholds for the continuous sound emission scenarios Appendix 7 - ; Connell *et al.,* 2025) and incorporated the results into Section 6.6. As the continuous noise radii extend beyond the impact ranges for impulsive noise, the controls are again considered to remain effective.

Table 6-17: Noise effect criteria for Impulsive Sound

Receptor	Behavioural	Impairment			Injury	
		Masking	Temporary threshold shift	Recoverable injury	Permanent threshold shift / AUD INJ	Mortality or potential mortal injury
Low-frequency cetaceans	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 168 dB re 1 µPa^{2}s PK: 213 dB re 1 µPa	N/A	SEL_{24h}: 183 dB re 1 µPa^{2}s PK: 219 dB re 1 µPa	N/A
High-frequency cetaceans	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 178 dB re 1 µPa^{2}s PK: 224 dB re 1 µPa	N/A	SEL_{24h}: 193 dB re 1 µPa^{2}s PK: 230 dB re 1 µPa	N/A
Very high frequency cetaceans	SPL: 160 dB re 1 µPa	N/A	SEL24h: 140 dB re 1 µPa2s* PK: 196 dB re 1 µPa*	N/A	SEL24h: 159 dB re 1 µPa^{2}s PK: 202 dB re 1 µPa	N/A
Otariid seals	SPL: 160 dB re 1 µPa	N/A	SEL_{24h}: 168 dB re 1 µPa^{2}s PK: 226 dB re 1 µPa	N/A	SEL_{24h}: 185 dB re 1 µPa^{2}s PK: 230 dB re 1 µPa	N/A
Turtles	SPL: 166 dB re 1 µPa SPL: 175 dB re 1 µPa	N/A	SEL_{24h}: 189 dB re 1 µPa^{2}s PK: 226 dB re 1 µPa	N/A	SEL_{24h}: 204 dB re 1 µPa^{2}s PK: 232 dB re 1 µPa	N/A

Receptor	Behavioural	Impairment			Injury	
		Masking	Temporary threshold shift	Recoverable injury	Permanent threshold shift / AUD INJ	Mortality or potential mortal injury
Fish (no swim bladder)	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	SEL_{24h}: >>186 dB re 1 µPa^{2}s	SEL_{24h}: >216 dB re 1 µPa^2 s PK: >213 dB re 1 µPa	N/A	SEL_{24h}: >219 dB re 1 µPa^{2}s PK: >213 dB re 1 µPa
Fish (swim bladder not involved in hearing)	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	SEL_{24h}: >>186 dB re 1 µPa^{2}s	SEL_{24h}: 203 dB re 1 µPa^2 s PK: >207 dB re 1 µP a	N/A	SEL_{24h}: 210 dB re 1 µPa^{2}s PK: >207 dB re 1 µPa
Fish (swim bladder involved in hearing)	(N) High (I) High (F) Moderate	(N) Low (I) Low (F) Moderate	SEL_{24h}: 186 dB re 1 µPa^{2}s	SEL_{24h}: 203 dB re 1 µPa^{2}s PK: >207 dB re 1 µPa	N/A	SEL_{24h}: 207 dB re 1 µPa^{2}s PK: >207 dB re 1 µPa
Fish eggs and fish larvae (also relevant to plankton)	(N) Moderate (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	N/A	SEL_{24h}: >210 dB re 1 µPa^{2}s PK: >207 dB re 1 µPa

**The NMFS 2024 does not include criteria for TTS to cetaceans for impulsive sounds (non-explosive), so criteria from Southall et al. 2019 have been used in line with Jasco 2024.*

6.5.4 Predicted Environmental Impacts and Risks

Potential impacts from impulsive noise emissions are:

- change in ambient sound

Potential risk:

- change in fauna behaviour, including:
  - marine mammals
  - marine turtles
  - fish including eggs and larvae
- auditory impairment (masking, TTS, recoverable injury), or auditory injuries (mortality or potential mortal injuries, PTS) to marine fauna, including:
  - marine mammals
  - marine turtles
  - fish including eggs and larvae

Potential impacts to marine invertebrates, such as cephalopods and crustaceans were not reached within the modelling results (Welch *et al.* 2023).

Indirect effects are possible to conservation values of protected areas and First Nations cultural values and sensitivities. Impacts and risks to First Nations cultural heritage are assessed in Section 8.3.

Socio-economic impacts on commercial fisheries have not been evaluated further, as there are no discernible impacts to behaviour and distribution expected at the population level given the limited nature and scale of activities and associated impulsive underwater sound emissions.

6.5.5 Impact and Risk Evaluation

6.5.5.1 Impact: Change in Ambient Sound

Inherent Consequence Evaluation

Ambient underwater sound is the level of sound which exists in the environment without the presence of the activity. Ambient underwater sound levels in the operational area are expected to range between 110 and 161 dB re 1 µPa. The ambient levels are inferred from passive acoustic monitoring, commissioned by Origin, conducted 5 km offshore from the coastline east of Warrnambool (Duncan *et al.* 2013).

Underwater sound modelling predicted increased levels of underwater sound up to 110 dB re 1 µPa would extend 3.37 km from an SBP sound source in the Otway Basin (Welch *et al.* 2023).

Given that impulsive sound sources of the Activity are related to activities that are intermittent, of a short-term duration and highly localised (change above an SPL of 110 dB re 1 µPa approximately 3.37 km from the SBP sound source), the consequence of this impact has been evaluated as **Level 1**, as underwater sound will return to existing ambient levels following completion of the activity with no remedial or recovery work required.

Risk: Change in Fauna Behaviour – Marine Mammals

Inherent Consequence Evaluation

Impulsive sound emissions may cause behavioural changes to marine mammals depending on the frequency and sound levels received, such that:

- Impulsive sound levels greater than 160 dB re 1 µPa (SPL) is the behavioural threshold for marine mammals including otariid seals, high-frequency cetaceans and very high-frequency cetaceans (NMFS, 2005).
- Impulsive sound levels greater than 140 dB re 1 µPa (SPL) have a 50% probability of causing behavioural changes to migrating southern right whales and therefore is conservatively defined as the behavioural threshold for low-frequency cetaceans (Wood *et al.* 2012).

Underwater sound modelling predicted the impulsive behavioural threshold for otariid seals, high-frequency cetaceans and very high-frequency cetaceans was not reached at any distance from a SBP sound source in the Otway Basin (Welch *et al*. 2023). This infers that impulsive underwater sound emissions from the Activity do not have the potential to cause behavioural changes to otariid seals, high-frequency cetaceans and very high-frequency cetaceans.

Underwater sound modelling predicted the impulsive behavioural threshold for low-frequency cetaceans was reached within 130 m of a SBP source in the Otway Basin (Welch *et al.* 2023). Therefore, impulsive underwater sound emissions generated by the Activity have the potential to cause behavioural changes to low-frequency cetaceans.

The sound source may be utilised throughout the operational area. Only a small part of the operational area may be exposed to noise at levels above behavioural disturbance thresholds, within 130 m of the sound source and this would last for between 5 to 7 days per survey campaign. Therefore, the impact will be temporary and localised. As noted above, underwater sound will return to existing ambient levels following completion of the Activity with no remedial or recovery work required.

A 130 m buffer around the operational area defines the behavioural EMBA for low-frequency cetaceans exposed to impulsive sounds. Table 6-18 provides details on the presence of low-frequency cetaceans, the potential behavioural changes that may occur and the resulting inherent consequence level for each low-frequency cetacean species. A comprehensive review of potential behavioural responses of marine mammals to impulsive noise, such as that resulting from SBP activity, is provided in Erbe *et al*. (2025), which was reviewed to identify potential species-specific behavioural changes. The judgement on potential presence within the behavioural EMBA (may occur vs likely to occur) is based on the overlap of BIAs and also available sightings data for the region, including but not limited to:

- Gill *et al*. (2015) - 123 aerial surveys between 2002 and 2013 from western Bass Strait to eastern Great Australian Bight.
- Origin (2018) – aerial surveys between June 2012 – March 2013 in the Otway Basin.
- Watson *et al.* (2021) – coastal southern right whale sightings between 1993 and 2018 in south-eastern Australia (east of the South Australia / Victorian Border).

Inherent Likelihood

The likelihood of behavioural changes to marine mammals depends on the impulsive sound source used, the potential presence of low-frequency cetaceans within the behavioural EMBA, and the relative sensitivity of different species and individuals to noise. SBP operating frequencies overlap vocalisation frequencies of low-frequency cetaceans (McPherson and Koessler, 2021). This overlap

could potentially mask vocalisations from low-frequency cetaceans causing behavioural changes. MBES and SSS operating frequencies do not overlap vocalisation frequencies of low-frequency cetaceans. As a result, there is no likelihood of behavioural change to low-frequency cetaceans during MBES and SSS operations.

For the risk event of behavioural changes to marine mammals to occur, the following combination of factors are required:

- Impulsive underwater sound emissions (i.e. from SBP operations)
- Low-frequency cetaceans present within 130 m of the impulsive sound source.

Considering the relatively small numbers, potential behaviours and movements of whales in the offshore area overlapping the activity, the likelihood of the impact occurring is considered to be small, with large, low frequency baleen whales unlikely to be present within the very small radius (130 m) of the impulsive sound source at the same time it is in use. Table 6-18 includes details on the frequency of recorded sightings of EPBC listed low-frequency cetaceans (where available) in the Otway Basin to infer presence within the behavioural EMBA. Based on available sightings data, the inherent likelihood level is judged as follows:

- minke whale – Remote (E)
- sei whale – Remote (E)
- pygmy blue whale – Unlikely (D)
- fin whale – Unlikely (D)
- pygmy right whale – Remote (E)
- southern right whale – Unlikely (D)
- humpback whale – Remote (E)

Table 6-18: Inherent Consequence Levels - Impulsive Sound - Behavioural Changes to Marine Mammals

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Low-frequency cetaceans				
Minke whale - EPBC Act: • Cetacean.	• May occur. • No BIAs overlapped. • Gill *et al.* (2015) - one sighting of an individual minke whale (2002-2013). • No confirmed sightings during Amplitude Energy Offshore Campaigns in the Otway.	Change in diving, avoidance or ceasing/reducing calls (Durbach *et al*. 2021; Kvadsheim *et al*. 2017).	• Localised and short-term potential impacts or disturbances to fauna. • Not expected to result in population level impacts.	Level 1
Sei whale - EPBC Act: • Vulnerable • Cetacean • Migratory	• Likely to occur. • No BIAs overlapped. • Gill *et al*. (2015) - 12 sightings of 14 individual sei and like	Movement away from impulsive source and call cessation/ modification inferred from studies of other baleen cetaceans.	• Localised and short-term potential impacts or disturbances to species of	Leve 2

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
	sei whales (2002-2013). • No confirmed sightings during Amplitude Energy Offshore Campaigns in the Otway.		recognized conservation value (nationally threatened). • Not expected to result in population level impacts.	
Pygmy blue whale - EPBC Act: • Endangered • Cetacean • Migratory	• Known to occur. • Foraging BIA overlapped. • During January to June, pygmy blue whales migrate through the operational area. • Origin (2018) – sightings of 120 individuals in the Otway Basin (2012-2013). • Approximately 221 observation records of pygmy blue whales were identified off the coast of Victoria between 2000 and 2024 (Atlas of Living Australia 2025). • One sighting of suspected blue whale in Q1 2025 during Amplitude Energy Offshore Campaign.	Cessation of deep feeding (deep feeding at water depths of 75 to 175 m), increased swimming speed and directed travel away from the sound source (from 160 to 210 dB re 1 µPa RMS) (Goldbogen *et al*. 2013). Responses are highly variable depending on initial behavioural state and environmental conditions (Erbe *et al.* 2025). When exposed to seismic sparker (30–450 Hz) at 131 dB re 1 µPa pk-pk and 114 dB re 1 µPa2s, blue whales demonstrate decreased call rates (di Iorio and Clark 2010).	• Localised and short-term potential impacts or disturbances to species of recognized conservation value (nationally threatened) within BIAs. • The risk of stopping blue whale individuals from deep feeding (Annie-2 well water depth is 56m) is not expected to result in population level impacts.	Level 2
Fin whale - EPBC Act: • Vulnerable • Cetacean • Migratory	• Likely to occur. • No BIAs overlapped. • Gill *et al.* (2015) - 7 sightings of 8 individual fin and like fin whales (2002-2013). • No confirmed sightings during Amplitude Energy Offshore Campaigns in the Otway	Modify song characteristics under increased background noise conditions, and temporary displacement (Castellote *et al*. 2012). When exposed to mid-frequency sonar, only 5 of 15 fine whales demonstrated behavioural responses (Southall *et al.* 2023).	• Localised and short-term potential impacts or disturbances to species of recognized conservation value (nationally threatened). • Not expected to result in	Level 2

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
			population level impacts.	
Pygmy right whale EPBC Act: • Cetacean • Migratory	• May occur. • No BIAs overlapped. • Gill *et al.* (2015) - 1 sighting of 100 individual pygmy right whales (2002-2013).	Movement away from impulsive source and call cessation/ modification inferred from studies of other baleen cetaceans.	• Localised and short-term potential impacts or disturbances to fauna. • Not expected to result in population level impacts.	Level 1
Southern right whale - EPBC Act: • Endangered • Cetacean • Migratory	• Known to occur. • Migration and reproduction BIA overlapped. • During May-June and September-October southern right whales pass through the Operational Area to move to and from coastal aggregation areas. • Watson *et al.* (2021) - 375 individual southern right whales (including 48 breeding females) were identified in south-eastern Australia (east of the SA/Victorian border) (1993-2018). • Some historical sightings during Amplitude Energy offshore campaigns in the Otway (refer to description of the Environment)	Behavioural changes inferred from related species (North Atlantic right whale), that immediately stopped foraging (abandoned foraging dive prematurely) and quickly approached the surface when exposed to amplitude modulated signals with a maximum source level of 173 dB re 1 µPa at 1 m (Nowacek *et al.* 2004; Matthews and Parks 2021). Changes to vocalisations including call cessation/ modification is inferred from studies of other baleen cetaceans.	• Localised and short-term potential impacts or disturbances to species of recognized conservation value (nationally threatened) within BIA. • The risk of behavioural change to migrating southern right whale individuals within highly localised area is not expected to result in population level impacts. • Logans Beach is ~24km from the operational area; no overlap with behavioural disturbance contours from is predicted.	Level 2
Humpback whale - EPBC Act:	• Likely to occur. • No BIAs overlapped.	When exposed to an active seismic array, behavioural changes, including to	• Localised and short-term potential impacts or	Level 1

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
• Cetacean • Migratory	• Gill *et al*. (2015) - 10 sightings of 18 individual humpback whales (2002 – 2013). • Multiple sightings of humpback whales in Q2 2025 during Amplitude Energy Offshore Campaign.	movement patterns, dive/respiratory parameters and rates of breaching were small, variable and temporary (Dunlop *et al*. 2017). Behavioural changes to humpback whales from exposure to lower impulsive sound source levels from geophysical surveys may also result in small, variable, temporary behavioural changes. Humpback whales were more likely to demonstrate a behavioural response to seismic arrays at >130 dB 1 μPa^2s, however, some whales did not change behaviour at the highest source levels of 160–170 dB re 1 μPa^2s (Dunlop *et al.* 2018).	disturbances to fauna. • Not expected to result in population level impacts.	

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to marine mammals from impulsive sound emissions is considered **Low** (Table 6-19).

Table 6-19: Inherent Risk Severity – Impulsive Sound – Behavioural Changes to Marine Mammals

Marine Mammals	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Low-frequency cetaceans			
Minke whale	1	E	Low
Sei whale	2	E	Low
Pygmy blue whale	2	D	Low
Fin whale	2	D	Low
Pygmy right whale	1	E	Low
Southern right whale	2	D	Low
Humpback whale	1	E	Low

6.5.5.2 Risk: Auditory Impairment or Injury - Marine Mammals

Inherent Consequence Evaluation

Auditory injury is defined by DCCEEW (formally DAWE) as both permanent and temporary hearing impairment and any other form of physical harm arising from anthropogenic sources of underwater noise (DAWE 2021). Permanent and temporary hearing impairment for the purposes of this evaluation is the onset of PTS and TTS, respectively. PTS and TTS thresholds defined by Southall *et al.* (2019) have been used to determine the range in which the onset of auditory injury will occur to marine mammals from exposure to impulsive sound (Table 6-20).

Table 6-20: Impulsive underwater sound PTS and TTS onset thresholds for 24-hour sound exposure level (SEL24h) and peak (PK) (Southall et al. 2019)

Hearing Group	PTS onset thresholds		TTS onset thresholds	
	Weighted SEL24h (db re 1 µPa^2.s)	PK (db re 1 µPa)	Weighted SEL24h (db re 1 µPa^2.s)	PK (db re 1 µPa)
Low-frequency cetaceans	183	219	168	213
High-frequency cetaceans	185	230	170	224
Very high-frequency cetaceans	155	202	140	196
Otariid seals	183	232	168	226

Underwater sound modelling of a SBP activity in the Otway Basin was based on a AP3000 triple-plate boomer system towed at a depth of 2 m, where the specifications for the operating frequency (broadband) and per-pulse SEL source level were 200 Hz to 16 kHz and 169 dB 1µPa^{2}m^{2}s, respectively (Welch *et al*. 2023). This SBP boomer system is considered representative of the geophysical survey operations as defined in Table 6-15. MBES and SSS are considered point-like sources, whereas SBP boomer is not a point-like source and expected to emit sound waves over a larger area (Welch *et al*. 2023).

Results of this study predicted the onset of TTS for very high-frequency cetaceans, based on SEL24h thresholds, if very high frequency cetaceans remain within 20 m of an SBP sound source for 24 hours (Welch *et al*. 2023). SEL24h thresholds for other hearing groups were not reached. PK thresholds for all hearing groups were also not reached. SEL24h is a cumulative metric representing the total noise exposure over 24 hours. It assumes continuous exposure at a fixed point, providing a worst-case scenario for evaluation of impulsive underwater sound. Realistically, very high-frequency cetaceans are mobile and would not remain in an injury inducing ensonified area for 24 hours (i.e. within 20 m of an SBP sound source over a prolonged period). As a result, modelled distances of potential injury using accumulated SEL thresholds does not guarantee injury to marine mammals will occur.

Review of the EPBC listed marine mammal species (or species habitat) that may occur within the operational area (Table 4-4) indicates no presence of any very high-frequency cetaceans such as true porpoises, river dolphins, pygmy/dwarf sperm whales or some oceanic dolphins (Southall *et al.* 2019). Oceanic dolphins traveling through the area might experience brief exposure, however this exposure is not expected to not cause injury, noting the mobile nature of this species. As such, auditory injury to marine mammals from the Activity impulsive sound emissions are not credible and not evaluated further.

Inherent Likelihood

Not applicable.

Inherent Risk Severity
Not applicable.

6.5.5.3 Risk: Change in Fauna Behaviour - Marine Turtles

Inherent Consequence Evaluation

Impulsive sound emissions may cause behavioural changes to turtles depending on the frequency and sound levels received, such that:

- Impulsive sound levels greater than 166 dB re 1 µPa (SPL) is the behavioural threshold for turtles (McCauley *et al*. 2000).

Results of underwater modelling of a SBP activity in the Otway Basin did not predict the potential onset of behavioural change to turtles (Welch *et al*. 2023).

However, empirical estimates predicted the impulsive behavioural threshold for turtles is reached within 130 m of the sound source (McPherson and Koessler, 2021). This is consistent with the relative risk criteria from Popper *et al.* (2014) that suggest that behavioural changes (e.g., avoidance, diving) would only be expected for individuals near the source (high risk of behavioural impacts within tens of metres of source and moderate risk of behavioural impacts within hundreds of metres of the source) (McPherson and Koessler 2021). Therefore, the potential for impulsive underwater sound emissions to cause behavioural changes to turtles cannot be ruled out.

A 130 m radius around the location of each impulsive sound source, representing the behavioural EMBA for turtles exposed to impulsive sounds, will be located entirely within the operational area. Table 6-21 provides details on the presence of EPBC listed turtles within the behavioural EMBA, potential behavioural changes that may occur and the resulting inherent consequence level for each turtle species.

Table 6-21: Inherent Consequence Levels - Impulsive Sound - Behavioural Changes to Marine Turtles

Marine Turtles (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Loggerhead turtle - EPBC Act: • Endangered • Marine • Migratory	• Likely to occur. • No BIAs overlapped.	Interrupted basking behaviour and diving in response to sound generated during airgun operations (DeRuiter and Doukara 2012).	• Localised and short-term potential impacts or disturbances to species of recognized conservation value (nationally threatened). • As there are no BIA's for the species within the temperate south east region, only small numbers (if any) expected. No population level impacts expected.	Level 1
Green turtle - EPBC Act: • Vulnerable • Marine • Migratory	• May occur. • No BIAs overlapped.	Increased swimming speed and erratic behaviour when exposed to sound generated by pile driving, airguns, and sonar (Papale *et al*. 2020).		Level 1

Leatherback turtle - EPBC Act: • Endangered • Marine • Migratory	• Likely to occur. • No BIAs overlapped.	Increased swimming speeds, diving and erratic behaviour inferred from studies of other turtle species.		Level 1

Inherent Likelihood

The likelihood of behavioural changes to turtles depends on the impulsive sound source used and the potential presence of turtles within the behavioural EMBA, as well as the relative sensitivity of different species and individuals to noise. Only SBP operating frequencies overlap hearing frequencies of turtles (McPherson and Koessler 2021). This overlap could potentially mask turtle hearing causing behavioural changes. MBES and SSS operating frequencies are outside of hearing frequencies of turtles (McPherson and Koessler 2021). As a result, there is no likelihood of behavioural change to turtles during MBES and SSS operations.

For the risk event of behavioural changes to turtles to occur, the following combination of factors are required:

- SBP operations
- turtles present within 130 m of the SBP sound source.

The Atlas of Living Australia (Atlas of Living Australia 2025) and the Victoria Biodiversity Atlas (VBA) was reviewed to understand the potential likelihood of marine turtle presence within the operational area (ALA 2025; Victorian DELWP 2025). No observations or occurrences of loggerhead turtles, green turtles or leatherback turtles were recorded within the behavioural EMBA. Therefore, the likelihood for all species is judged to be **Remove (E)**.

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to marine turtles from impulsive sound emissions is considered **Low** (Table 6-22).

Table 6-22: Inherent Risk Severity - Impulsive Sound - Behavioural Change to Marine turtles

Species	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Loggerhead turtle	1	E	Low
Green turtle	1	E	Low
Leatherback turtle	1	E	Low

6.5.5.4 Risk: Auditory Impairment or Injury - Marine Turtles

Inherent Consequence Evaluation

Results of underwater modelling of a SBP activity in the Otway Basin did not predict the potential onset of auditory injury to marine turtles (Welch *et al*. 2023). This risk is not evaluated further.

Inherent Likelihood

Not applicable.

Inherent Risk Severity

Not applicable.

6.5.5.5 Risk: Change in Fauna Behaviour – Fish

Inherent Consequence Evaluation

Sound pressure changes may be detected by fish with a swim bladder, as the gas within the swim bladder changes as a result of changing sound pressure. If the swim bladder is near the ear or connected to the hearing system, the hearing sensitivity is even greater (Popper *et al*. 2014). Fish without a swim bladder cannot detect sound pressure. However, most fish species are expected to be able to detect particle motion. The most relevant criteria for considering potential impacts on fish and shellfish are considered to be those provided in the Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al*. 2014). Fish species are grouped into hearing sensitivity categories defined by a number of factors such as their hearing anatomy, particle motion detection, the use of sound during navigation or mating and the presence or absence of a swim bladder:

- Fish with no swim bladder that are sensitive to particle motion and therefore only to a narrow band of frequencies (e.g. cartilaginous fish).
- Fishes with swim bladders that do not appear to play a role in hearing (e.g. Scombridae). Therefore, they are only sensitive to particle motion and only show sensitivity to a narrow band of frequencies.
- Fishes with swim bladders involved in hearing. These species are sensitive to both particle motion and sound pressure. The swim bladder may be close to but not intimately connect to the ear (e.g. eels) or mechanically linked to the ear (e.g. Clupeidae), with the latter representing fish of the greatest hearing sensitivity.
- Eggs and larvae.

The risk of behavioural changes to most fish, including eggs and larvae, from impulsive sound emissions is generally high within tens of metres of the source based on the qualitative guidelines by Popper *et al.* (2014), reducing to moderate within hundreds of metres from the source. The risk of behavioural change remains high for fish with swim bladder involved within hundreds of metres of the source (Popper *et al.* 2014). However, these guidelines are derived for seismic arrays, likely of a greater source level than SBP, and therefore, it is considered that any behavioural responses will likely be limited to within tens of metres from the source, and therefore the use of the 130 m behavioural EMBA is considered appropriate. The underwater sound will only be elevated in the vicinity of the SBP for 5 to 7 days per survey campaign across the 5-year EP period. The impact will be temporary and localised and recovery from any behavioural change caused by the temporary elevation of underwater sound is expected once the survey activities are complete.

Table 6-23provides details on the presence of fish species that are EPBC Act listed, or which have been identified as culturally significant through consultation, within the behavioural EMBA, potential behavioural changes that may occur and the resulting inherent consequence level for each fish species. A comprehensive overview of the potential impact of seismic on fish is described in Carroll *et al.* (2017) and has been reviewed to identify potential behavioural changes, noting SBP typically involves lower source levels compared with seismic surveys. It should also be noted that behavioural responses to elevated underwater sound varies greatly between species, and data is lacking for some species groups (e.g. elasmobranchs). Furthermore, most data is derived from caged studies which are not representative of open conditions (Carroll *et al.* 2017).

Inherent Likelihood

For the risk event of behavioural changes to fish to occur, the following combination of factors are required:

- Impulsive underwater sound emissions (i.e. SBP operations)
- Fish species present within 130 m of the impulsive sound source

Table 6-23 provides details on the presence of EPBC listed fish in the Otway Basin to infer presence within the behavioural EMBA. Based on available data, the inherent likelihood level is judged as follows:

- white shark – Possible (C)
- eastern school shark – Remote (E)
- grey nurse shark – Remote (E)
- porbeagle / mackerel shark – Unlikely (D)
- Australian grayling – Remote (E)
- blue warehou – Possible (C)
- pipefish, pipehorse, seadragon and seahorse species – Unlikely (D)
- short-finned eels - Possible (C).

Table 6-23: Inherent Consequence Levels - Impulsive Sound - Behavioural Changes to Fish

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
White shark - EPBC Act: • Vulnerable • Migratory	• Known to occur. • No BIAs overlapped. • Seasonal presence in southern Australia during early summer.	No significant difference in behaviour when exposed to artificial irregularly pulsed sound (Chapius *et al.,* 2019).	• Unlikely to result in significant behavioural change to species of recognised conservation value (nationally threatened).	Level 1
Eastern school shark - EPBC Act: • Critically endangered	• May occur. • No BIAs overlapped.	Inferred behavioural changes based on coastal sharks displaying less inquisitive behaviours when exposed to irregularly pulsed sound (Chapius *et al*., 2019).	• Highly localised and short-term potential impacts to species of recognised conservation value (nationally threatened), recovery expected.	Level 1
Grey nurse shark - EPBC Act: • Migratory • **Critically Endangered**	• May occur. • No BIAs overlapped.		• Highly localised and short-term potential impacts to species of recognised conservation value (nationally threatened), recovery expected.	Level 1
Porbeagle / mackerel shark - EPBC Act: • Migratory	• Likely to occur. • No BIAs overlapped.		• Highly localised and short-term potential impacts to species of recognised conservation value (nationally threatened), recovery expected.	Level 1
Australian grayling - EPBC Act: • Vulnerable	• May occur. • No BIAs overlapped.	Inferred behavioural changes based on coastal pelagic fish schools dispersing or changing depth when exposed to sonar/echosounder (Hawkins *et al*. 2014).	• Highly localised and short-term potential impacts to species of recognised conservation value (nationally threatened), recovery expected.	Level 1
Blue warehou - EPBC Act: • Critically endangered	• Known to occur. • No BIAs overlapped.	Slotte *et al.* (2004) observed no significant change in horizontal distribution to pelagic fish, however, a vertical movement of mesopelagic fish to deeper waters was observed.	• Highly localised and short-term potential impacts to species of recognised conservation value (nationally threatened), recovery expected.	Level 1

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Pipefish, pipehorse, seadragon and seahorse species - EPBC Act: • Marine	• May occur. • No BIAs overlapped.		• Highly localised and short-term potential impacts, recovery expected.	Level 1
Short-finned eels - Not listed under the EPBC Act. Culturally significant to First Nations people (Koster *et al*. 2021)	Seasonal presence in the Otway Basin and Bass Strait during spawning migration i.e. downstream migration of adult eels during late summer and autumn. Upstream migration of larvae and glass eels, where glass eels enter estuaries during mid-winter to late spring (VFA 2017).	Behavioural avoidance (increased swimming, speed and movements away from the source) observed in some European eel and river lamprey (Deleau *et al.* 2019).	• Highly localised and short-term potential impacts to a culturally important species, recovery expected.	Level 1

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to fish including eggs and larvae from impulsive sound emissions is **Low** (Table 6-24).

Table 6-24: Inherent Risk Severity - Impulsive Sound - Behavioural Changes to Fish

Fish	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
White shark	1	C	Low
School shark	1	E	Low
Shortfin mako	1	D	Low
Grey nurse sark	1	E	Low
Mackerel shark	1	D	Low
Australian grayling	1	E	Low
Blue warehou	1	C	Low
Pipefish, pipehorse, seadragon and seahorse species	1	E	Low
Short-finned eels	1	C	Low

6.5.5.6 Risk: Auditory Impairment or Injury to Fish

Inherent Consequence Evaluation

Results of underwater modelling of a SBP activity in the Otway Basin did not predict the potential onset of auditory impairment or injury to fish including eggs and larvae (Welch *et al.* 2023). This risk is not evaluated further.

Inherent Likelihood

Not applicable.

Inherent Risk Severity

Not applicable.

6.5.6 Control Measures, ALARP, and Acceptability Assessment

Table 6-25 provides a summary of the control measures and ALARP and acceptability assessment relevant to impulsive sound emissions. A detailed assessment has been undertaken and, as part of Amplitude Energy's relevant persons engagement for previous projects and impacts, Amplitude Energy has sought advice from Australian Antarctic Division (AAD) on measures implemented or considered by the AAD for voyages into sensitive areas.

Table 6-25: Underwater Sound Emissions – Impulsive ALARP, Control Measures and Acceptability Assessment

Underwater Sound Emissions - Impulsive	
ALARP Decision Context and Justification	ALARP Decision Context: Type A Impacts from impulsive sound emissions are well understood; there will always be some uncertainty around the reaction of individual animals, and hence the assessment of impacts and risks has been conservative, from the selection of disturbance criteria, modelling assumptions, and evaluation of potential consequence and likelihood.

	Activities are well practised, and there are no conflicts with company values, no partner interests, and no significant media interests. Because the potential impacts to marine fauna of conservation value are evaluated as Level 2, Amplitude Energy believes ALARP Decision Context A should apply to marine fauna with the exception of pygmy blue whales and southern right whales. ALARP Decision Context: Type B ALARP decision context B has been applied in relation to pygmy blue whales and southern right whales because there is a residual (low) risk in relation to behavioural disturbance to these species within a BIA. The conservation management and national recovery plans for these species considers indicate that at certain times of year and for certain activities, additional mitigation actions and an adaptive management plan may be required in keeping with a precautionary approach. Further controls to manage residual risks have been considered and several additional controls have been adopted. The adopted controls ensure the project environmental outcomes can be met and are not inconsistent with the objectives and relevant actions of species recovery plans.
Control Measure	Source and Description of Control
CM08: Planned Maintenance System	Power generation and propulsion systems on vessels and the MODU will be operated in accordance with manufacturer's instructions and ongoing maintenance to ensure efficient operation. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from impulsive sound.*
CM13: Offshore Operational Procedures	At a minimum, vessel operators shall adhere to the distances and vessel management practices of EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans describes strategies to ensure whales and dolphins are not harmed during offshore interactions with vessels and helicopters. Vessels adhere to the distances and vessel management practices of EPBC Regulations (Part 8) with increased caution zone of 500 m between whales and project vessels. *Risk event addressed: Change in fauna behaviour*
Additional Controls Adopted	Source and Description of Control
CM15: Campaign Risk Review	Risk reviews are standard practice for offshore campaigns. The Amplitude Energy Environmental Protocol describes how environmental impact and risk management, including risk assessments, is undertaken for activities including offshore campaigns. As part of campaign planning a risk review will be undertaken to re-assess campaign environmental impacts and risks to ensure ALARP and acceptability criteria are met. The assessment of environmental impacts and risks will focus on aspect: subsea noise, and risks to endangered whale species, specifically pygmy blue whales, and southern right whales. The review framework is described in Section 12.10 and considers: • Model activity scenarios where additional details may have become available. • Integrate into modelling the latest relevant sound exposure thresholds. • Assess any new or updated information to determine if the rationale for previously discounted controls remains reasonable, or if additional measures are required to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. • Potential for cumulative impacts due to concurrent and sequential vessel activities with other projects and titleholders. The review may be undertaken at different stages of the campaign planning, prior to a campaign activity commencing to assess any new or updated information to avoid

	or reduce overlap with endangered whales, where practicable, and to determine if additional controls are required to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from impulsive sound.*
CM17: Offshore Victoria Whale Disturbance Risk Management Procedure	The impact and risk assessment has shown the potential for interaction between whales and the Activity, with some uncertainty around the likelihood of impacts. This uncertainty is addressed through the implementation of actions and adaptive management measures which fall within the Offshore Victoria Whale Disturbance Risk Management Procedure (Section 12.10). The Offshore Victoria Whale Disturbance Risk Management Procedure provides details on level of whale observation effort, triggers for actions and the actions to be taken to avoid injuring whales and avoid behavioural disturbance to endangered whale species (blue whales and southern right whales), reduce the risk of displacement of a foraging blue whale, and minimise the risk of disturbance to a southern right whale in a migration and/or reproduction area (EPO16). The Offshore Victoria Whale Disturbance Risk Management Procedure details requirements of the Activity which are addressed and summarised in Section 6.6.5 and Section 12.10. The requirements have been developed to account for the largest noise contours that may be produced throughout the duration of the activity. As such, the requirements are based on the distances predicted from the modelling of continuous noise emissions (see Section 6.6) and are therefore considered conservative and appropriate for activities which produce impulsive noise emissions. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from impulsive sound.*
CM11: Titleholder Collaboration	Amplitude Energy will share sightings data including behavioural observations with other Titleholders in the Otway region and local research organisations to help inform each other's programs of work and respective risk reviews. This data can be used by appropriate parties for population and behavioural research and to inform management of impacts and risks from their own project activities.
Impact and Risk Summary	
Residual Impact Consequence	Change in ambient sound from impulsive sound: Level 1 – Minor local impacts or disturbances to ambient sound, nil to negligible remedial / recovery works required.
Residual Risk Consequence	Level 2 – Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function; remedial, recovery work to land, or water systems over days / weeks.
Likelihood	Due to the nature and scale of the proposed activities, and considering the proposed controls, the likelihood of behavioural changes due to underwater sound emissions is assessed as: • Possible (C) - Conceivable and could occur at some time. Could occur during the activity although a rare combination of factors would be required for the occurrence.
Residual Risk	Behavioural change, auditory impairment or auditory injury from impulsive sound: Low.
Demonstration of Acceptability	
Principles of ESD	Underwater impulsive sound emissions are evaluated as having up to Level 2 consequence which is not considered as having the potential to result in serious or

	irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Impulsive sound emissions will be managed in accordance with legislative requirements. Sound emissions will: • Not impact on the recovery of marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017). • Be managed such that any pygmy blue whale continues to utilise the area without injury and is not displaced from a foraging area in accordance with DAWE (2021) guidance on key terms, where the action is needed to achieve the objective of the blue whale CMP (DoE 2015a). • Not impact the recovery of the blue whale as per the CMP for the Blue Whale (DoE 2015a). • Not prevent southern right whales utilising a migration BIA or HCTS, or cause auditory impairment (DCCEEW 2024b). • Be managed such that the risk of behavioural disturbance to southern right whales within BIA's and Habitats Critical to Survival (HCTS) is minimised (DCCEEW 2024b) • Not impact the recovery of the southern right whale as per the National Recovery Plan for the Southern Right Whale (DCCEEW 2024b). • Not impact the recovery of the white shark as per the Recovery Plan for the White Shark (DSEWPaC 2013a). Actions from the CMP for the Blue Whale (DoE 2015a) applicable to the activity in relation to assessing and addressing anthropogenic sound have been addressed as per: • Assessing the effect of anthropogenic sound on pygmy blue whale behaviour. Section 6.5.5 assesses the effects of anthropogenic noise from the activity on blue whale behaviour. • Be managed such that any pygmy blue whale continues to utilise the area without injury and is not displaced from a foraging area. Mitigation measures will be implemented to reduce the risk of displacement occurring during operations where modelling indicates that behavioural disturbance within a foraging area may occur (DAWE, 2021). Actions from the Southern Right Whale Recovery Plan (DCCEEW 2024b) applicable to the Activity in relation to addressing anthropogenic noise have been provided for. The specific actions, and how they are addressed are summarised within the acceptability assessment in Section 6.6.5.
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11) Activities will be undertaken in accordance with the Implementation Strategy (Section 11.0).
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice.
Other requirements	No objections or claims have been received during consultation regarding underwater sound emissions.

	Amplitude Energy has previously sought advice from the AAD in relation to the management of impacts from noise. The consultation outcomes are presented within the BMG Closure Project Phase I EP (NOPSEMA ID: 6825) and are not repeated here. Suggestions provided by the AAD have been re-evaluated within the ALARP assessment process below in the context of the Activity.
Demonstration of meeting the defined acceptable levels in the OPP	Section 8.1.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with underwater sound emissions – impulsive. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for underwater sound emissions – impulsive: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	Acceptable Amplitude Energy has determined that impacts and risks related to impulsive sound emissions are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advices, and significant impact guidelines for MNES. No relevant feedback from has been received from stakeholders to inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures for this Activity. To manage impacts to receptors to or below the defined acceptable levels the following EPOs (equivalent to OPP EPOs as detailed in Appendix 1 -) have been applied: EPO14: Impacts to marine fauna from underwater anthropogenic noise emissions will be limited to temporary* behavioural change localised** to the noise source. *Not exceeding the duration of the activity component (i.e. vessel campaign) (described in Section 3.2) **Not exceeding the noise EMBA defined for the activity (described in Sections 6.5 and 6.6) EPO15: No death or injury[8] to EPBC Act listed threatened, migratory or cetacean species. EPO16: Project related underwater noise within biologically important areas and habitat critical to the survival of relevant species will be managed through the implementation of Amplitude Energy Offshore Victoria Whale Disturbance Risk Management Process, such that: • Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area.

	• Southern right whales are not prevented from utilising biologically important areas[9] or habitat critical to the survival of a species or cause auditory impairment. • The risk of behavioural disturbance to southern right whales will be limited to temporary behavioural disturbance of individuals. EPO17: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.

6.6 Underwater Sound Emissions - Continuous

6.6.1 Cause of Aspect

The source of continuous underwater sound emissions that will occur as a result of the Activity are identified in Table 6-26 and described in further detail in subsections below. The introduction of continuous underwater sound emissions may temporarily elevate ambient underwater sound levels in the marine environment.

Table 6-26: Activities that will Generate Continuous Underwater Sound Emissions

Aspect / Phase	Activity component
Well construction	Drilling operations
Support activities	MODU operations
	Vessel operations
	Helicopter operations
	ROV / AUV operations
Contingent activities	Well abandonment activities & vessel based activities

6.6.2 Aspect Characterisation

Vessel and MODU activities are the main contributors of sound emissions. These have been described and modelled within Connell et al. (2023) and used within the impact evaluation. There are other activities that contribute sound at a far lower level that are briefly described below; these sources have not been modelled for this Activity as they are low level and generally accepted as indistinguishable from the vessels and MODU activities.

6.6.2.1 Well Construction

Well construction activities will generate sound emissions during the Activity, including:

- Drilling: the MODU will generate a small amount of continuous sound emissions during drilling transmitted directly via the drill bit. This will be indistinguishable from the MODU activities, therefore expected to have no additive effect on the activity behavioural EMBAs.
- Flaring: only a very small fraction of the acoustic energy produced from flaring transmit through the air/water boundary due to the surface of water acting as a reflective plane and a significant component of acoustic energy reflecting into the air. While underwater received sound pressure level during flaring is estimated to be 136 dB re 1µPa at 1 m (SPL) below the sea surface, it is expected to attenuate to ambient levels within a very short distance (within metres) (Woodside 2024) and therefore expected to have no additive effect on the activity behavioural EMBAs.

6.6.2.2 Support Activities

Support activities will generate sound emissions during the Activity, including:

- The MODU will generate sound from onboard equipment vibrations (e.g., pumps, generators, and machinery), and a smaller portion transmitted directly via the drill bit during drilling. The MODU may operate in a thruster assist mode to move into the well location and to prevent emergency situations as per the Rig Safety Case. This system generates variable continuous sound during infrequent operation of one to six thrusters in response to feedback from the mooring system. The scenarios that generate continuous sound during MODU activities has been evaluated within Section 6.6.2.4.
- Vessels generate continuous sound from propellor cavitation, thrusters, hydrodynamic flow around the hull, and operation of machinery and equipment. Sound from support vessels operating during drilling activities and survey vessels has been assessed to determine the cumulative impact of multiple continuous sound sources in close proximity. The scenarios that generate continuous sound during vessel activities is evaluated within Section 6.6.2.4.
- Helicopter activities will introduce continuous sound emissions due to the noise from the blade rotation. Richardson et al. (1995) reported helicopter sound (for Bell 214 type) being audible in air for four minutes before it passed over receivers, but only detectable underwater for 38 seconds at 3 m depth and for 11 seconds at 18 m depth for the same flight path. This would be a brief daily occurrence. Noise levels for typical helicopters used for offshore transfers (Eurocopter Super Puma AS332) at 150 m separation distance has been measured at a maximum of 90.6 dB (Woodside 2014). Similar to flaring, the majority of the sound is not expected to transfer from air to water, and the portion that does, would attenuate to ambient levels within a very short distance (within metres) and therefore expected to have no additive effect on the activity behavioural EMBAs.

6.6.2.3 Contingent activities

In the event that P&A is required, subsea cutting of wellheads will introduce localised and temporary continuous sound into the marine environment of the operational area. Previous studies have found that the continuous noise generated during well cutting, using a diamond wire cutting of a 32-inch conductor in approximately 80 m of water, was largely indistinguishable from background vessel sound at lower frequencies (Pangerc et al. (2016); modelling by Connell et al. (2021) for the BMG decommissioning project (offshore Victoria) also found that an ROV and cutting activity had no influence on behavioural EMBAs for the activity, which were driven by sound from vessel DP.

6.6.2.4 Underwater Sound Modelling

Amplitude Energy commissioned JASCO to undertake a modelling study of underwater sound levels associated with drilling and support vessel-based activities at Annie-2 to define relevant continuous sound EMBAs for impact and risk evaluation (Appendix 7 - , Connell and Koessler 2025).

Results of the study define the spatial extent of potential acoustic impact to ambient sound and the spatial extent of potential impact thresholds to marine mammals, turtles and fish including eggs and larvae. The predicted spatial extent for the onset of relevant impact thresholds is detailed in the following subsections.

The vessel(s) used during the Activity will be selected as a part of a tender process as planning progresses, and therefore, the specifications are not known. The selected vessels and associated sound source levels are expected to be analogous to those considered by Connell and Koessler

(2025). Notably, the modelling of AHTS is considered representative (albeit conservative) for the survey vessels that will be utilised during the geophysical survey activities.

The MODU under DP (Scenario 9 and 10 within Table 6-27) will be used infrequently during the campaign, for initial manoeuvring over a well centre during the mooring process; and if necessary, during severe weather events to provide additional positioning redundancy to prevent, or respond to, a mooring failure.

Table 6-27 contains the modelled continuous sound scenarios relevant to the Activity.

Table 6-27: Description of Scenarios Modelled for Continuous Sound Modelled at Annie-2 (Connell and Koessler 2025)

Scenario	Description	Number of continuous sound sources per scenario
1	Pre-lay activities represented by a single AHTS pre-laying anchors for drilling operations.	1x AHTS under DP
2	MODU positioning (mooring) represented by a MODU generating no noise, assisted by 3 AHTS.	2x AHTS slow transit 1x AHTS under DP
3	Drilling operations represented by an anchored MODU drilling.	1x MODU anchored and drilling
4	Drilling operations represented by an anchored MODU drilling, assisted by a single AHTS.	1x MODU anchored and drilling 1x AHTS under DP
5	Drilling operations represented by an anchored MODU drilling, assisted by 2 AHTS.	1x MODU anchored and drilling 1x AHTS slow transit 1x AHTS under DP
9	MODU under DP over well centre	1x MODU under DP
10	MODU positioning (mooring) under DP assisted by 3 AHTS	1x MODU under DP 1x Anchor Handler on bridle 2x Anchor Handler within 2 km of location (hooking up anchors)

6.6.2.5 Noise Effect Criteria

Different species groups perceive and respond to sound differently, therefore, a variety of exposure criteria are considered for the different types of impacts and species groups. The noise effect thresholds used in the sound modelling (Connell and Koessler 2025) for the impact and risk assessment represent best available science:

- Frequency-weighted accumulated sound exposure levels (SEL24h) from the NOAA Technical Guidance (NMFS 2024) and Southall et al. (2019) for the onset of auditory injury which includes PTS and TTS in marine mammals from non-impulsive noise sources.
- Un-weighted SPL for behavioural threshold for marine mammals of 120 dB re 1 µPa from non-impulsive sound sources, based on NOAA Technical Guidance (NMFS 2024).
- Frequency-weighted accumulated sound exposure levels (SEL24h) from Accomando et al. (2025) for the onset of PTS (198 dB re 1 μPa^2s) and TTS (198 dB re 1 μPa^2s) in marine turtles.
- Sound exposure guidelines for fish, fish eggs, and larvae (Popper et al. 2014) which includes quantitative criteria for TTS and recoverable injury and qualitative risk criteria for mortality and potential mortal injury, masking and behavioural effects.

6.6.3 Predicted Environmental Impacts and Risks

Potential impacts of continuous underwater sound emissions from the Activity are:

- change in ambient sound.

Potential risks from a change in ambient sound are:

- change in fauna behaviour, including:
  - marine mammals
  - marine turtles
  - fish
- auditory impairment (masking, temporary threshold shift (TTS), recoverable injury) or auditory injuries (mortality or potential mortal injuries, permanent threshold shift (PTS)) to marine fauna, including:
  - marine mammals
  - marine turtles
  - fish (including eggs and larvae).

Indirect effects may occur to conservation values of protected areas and First Nations cultural values and sensitivities. Impacts and risks to First Nations cultural heritage are assessed in Section 8.0.

Socio-economic impacts on commercial fisheries have not been evaluated further, as there are no discernible impacts to behaviour and distribution expected at the population level given the limited nature and scale of activities and associated impulsive underwater sound emissions.

6.6.4 Impact and Risk Evaluation

6.6.4.1 Impact: Change in Ambient Sound

Inherent Consequence Evaluation

Ambient underwater sound levels in the operational area are expected to range between 110 and 161 dB re 1 µPa (Duncan et al. 2013). Underwater sound modelling (Connell and Koessler 2025) predicted increased levels of underwater sound to 110 and 160 dB re 1 µPa would extend:

- 21.3 km to 0.1 km from a drilling operation represented by Scenario 5: MODU drilling operations with standby OSV and resupply (including 1 AHT on standby within 2 km under minimal thrust and 1 AHT doing resupply under DP).
- 25 km to 0.1 km from MODU positioning and support vessel operations represented by Scenario 10: MODU mooring under DP assisted by 3 AHTs (including 1x AHT on bridle and 2x AHTs within 2 km (hooking up anchors)).

As per Section 3.4, MODU positioning is expected to take 3 to 7 days, and drilling operations are expected to be intermittent and temporary. The consequence of a short-term change in ambient sound within (up to) 25 km of the activities has been evaluated as **Level 1**, as underwater sound will return to existing ambient levels following completion of the activity with no remedial or recovery work.

6.6.4.2 Risk: Change in Fauna Behaviour – Marine Mammals

Inherent Consequence Evaluation

Continuous sound emissions from the Activity may cause behavioural changes to marine mammals depending on the frequency and sound levels received.

Continuous sound levels greater than 120 dB re 1 µPa (SPL) has been adopted as a conservative behavioural change threshold for marine mammals (including otariid seals, low-frequency cetaceans, high-frequency cetaceans and very high-frequency cetaceans) (NMFS 2024).

The 120 dB re 1 µPa threshold was derived based on studies examining behavioural responses to drilling and dredging (NOAA 2018), referring to Malme et al. (1983), Malme et al. (1984), and Malme et al. (1986), which were considered in Southall et al. (2007). Malme et al. (1986) found that playback of drillship noise did not produce clear evidence of disturbance or avoidance for levels below 110 dB re 1 µPa (SPL), possible avoidance occurred for exposure levels approaching 119 dB re 1 µPa. Malme et al. (1984) determined that measurable reactions usually consisted of rather subtle short-term changes in speed and/or heading of the whale(s) under observation. It has been shown that both received level and proximity of the sound source is a contributing factor in eliciting behavioural reactions in humpback whales (Dunlop et al. 2017, Dunlop 2019).

Table 6-28 outlines the maximum distance to the behavioural response threshold for marine mammals predicted by the underwater sound modelling. See Appendix 7 - for further details of the modelling report (Connell and Koessler 2025).

An 8.1 km radius around the sound source defines the furthest behavioural EMBA for marine mammals exposed to continuous sounds. The scenarios which result in the largest maximum distances, Scenario 10: Mooring with MODU on DP assisted by 3 AHTS and Scenario 2: Mooring assisted by 3 AHTS , will have short durations of 3 to 7 days. In both scenarios all modelled vessels will be located at or close to the Annie-2 well location, therefore the 8 km behavioural EMBA has been centred on the well location.

Table 6-28: Distance to the Behavioural Threshold for Marine Mammals

Marine Mammal Hearing Group	**Threshold SPL (Lp; dB re 1 µPa)**	**Maximum distance (km)**	**Relevant scenario/s (Connell and Koessler, 2025)**
Behavioural			
Marine mammals	120	0.44	Scenario 1: Drilling Prelays
		7.87	Scenario 2: Mooring with MODU (no noise) + 2 AHTS (slow transit) + 1 AHTS (under DP)
		1.10	Scenario 3: MODU Drilling
		1.13	Scenario 4: MODU Drilling + OSV Under Standby
		7.46	Scenario 5: MODU Drilling Operations with Standby OSV and resupply
		5.36	Scenario 9: MODU on DP
		8.02	Scenario 10: Mooring with MODU on DP + 2 AHTS (hooking up anchors) + 1 AHTS (on bridle)

Table 6-29 provides details on the presence of marine mammals that are EPBC listed. Though there are a range of incidental impacts associated with vessel noise, including attraction, avoidance, and changes to vocalisation, the assessment below focuses on the potential behavioural changes that may occur; this informs the inherent consequence level attributed below. Where a EPBC listed species or species group requires a detailed discussion to justify inherent consequence evaluation, this discussion is provided in the section below. Potential presence within the behavioural EMBA is

determined by the PMST report, overlap of BIAs and available sighting data for the region, including but not limited to:

- Gill et al. (2015) - 123 aerial surveys between 2002 and 2013 from western Bass Strait to eastern Great Australian Bight.
- Origin (2018) – aerial surveys between June 2012 – March 2013 in the Otway Basin.
- Watson et al. (2021) – coastal southern right whale sightings between 1993 and 2018 in south-eastern Australia (east of the South Australia / Victoria border).

Table 6-29: Inherent Consequence Levels - Continuous Sound - Behavioural Changes to Marine Mammals

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Pinnipeds				
Australian fur-seal **New Zealand fur seal** EPBC Act: • Marine (all)	• May occur as per PMST report, however, are considered known to occur based on occurrence records available for the Otway (ALA 2024) and sightings by marine mammal observers during offshore campaigns (e.g. Seiche Environmental, 2020) • No BIAs overlap.	Section 6.6.4.2 describes the potential higher consequences of behavioural responses associated with the behavioural response threshold. Seals are frequently observed offshore and around vessels; marine mammal observers recorded sightings of hundreds of seals in close proximity to vessels over the course of the BMG Closure Project – Phase 1 in offshore Gippsland during 2024. Marine mammal observers for the project reported behaviours including foraging, milling and swimming (BMG / Gippsland MMO Sightings Sheet – Kennedy 2024).	Despite the conservation status of the Australian sea-lion, because of the insignificance of behavioural change to pinnipeds, the consequence is considered minor and local (small, variable, temporary behavioural changes within tens of metres of the source) impacts or disturbances to fauna.	Level 1
Very high-frequency cetaceans				
Pygmy/dwarf sperm whale **True porpoise** EPBC Act: • Vulnerable • Cetacean • Migratory.	• None identified in PMST report and therefore low likelihood of presence. • No BIAs overlapped.	Marine Mammal Observers observed the presence of dolphins in proximity to the vessel whilst on DP during the BMG Phase 1 decommissioning (located within the Gippsland basin >200km km east of this activity). Minor diverse behavioural changes (avoidance, no response, and attraction) to very high-frequency cetaceans are expected.	Minor local (small, variable, temporary behavioural changes within ~8 km from the source) impacts or disturbances to fauna.	Level 1
High-frequency cetaceans				

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Dolphins (Risso's, dusky, common, Indian Ocean, bottlenose) **Toothed whales** (killer, false killer) EPBC Act: • Cetacean • Migratory.	• May or likely to occur. • No BIAs overlapped.	Section 6.6.4.2 describes nominal behavioural responses associated with the behavioural response threshold. Dolphins are frequently observed offshore and around vessels; hundreds of sightings of dolphins were recorded in close proximity to vessels on DP over the course of the BMG Closure Project – Phase 1 in offshore Gippsland during 2024. Marine mammal observers for the project reported behaviours including foraging, milling and swimming. Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur (BMG / Gippsland MMO Sightings Sheet – Kennedy 2024).	Minor local (small, variable, temporary behavioural changes within ~8 km from the source) impacts or disturbances to fauna.	Level 1
Low-frequency cetaceans				
Minke whale - EPBC Act: • Cetacean.	• May occur. • No BIAs overlapped.	Section 6.6.4.2 describes nominal behavioural responses associated with the behavioural response threshold. Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur.	Minor local (small, variable, temporary behavioural changes within ~8 km from the source) impacts or disturbances to fauna.	Level 1
Sei whale - EPBC Act: • Vulnerable • Cetacean • Migratory	• Likely to occur. • No BIAs overlapped. • Between 2002 and 2013, 123 aerial surveys recorded 12 sighting of sei whales (Gill et al., 2015).	Section 6.6.4.2 describes nominal behavioural responses associated with the behavioural response threshold. Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur.	Localised (~8 km from the source) and short-term impacts to species of recognized conservation value not affecting local ecosystem function. See further discussion below.	Level 2
Pygmy blue whale - EPBC Act: • Endangered • Cetacean	• Known to occur. • Foraging BIA overlapped. • During January to June, pygmy blue	Section 6.6.4.2 describes nominal behavioural responses associated with the behavioural response threshold. Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur.	The risk of changing blue whale individuals foraging behaviour is not expected to result in population level impacts. There is a limited spatial area (within ~8 km from the source) that will be potentially	Level 2

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
• Migratory.	whales migrate through the operational area.	Change to blue whale song due to presence of ships increasing background noise levels (Melcon et al. 2012). Vocalisations of blue whales will continue in the presence of vessels, however changes in call level and rate are expected (McKenna 2011). Inferred modification of foraging efficiency because of effects on prey behaviour and masking.	affected, which is slight compared to the total area available for foraging. There are no barriers or potential stressors introduced by the activity which would be expected to have a discernible effect on prey or predator distribution given the natural broad scale and dynamic distribution of both prey and predator. Overall opportunities for foraging would not therefore be expected to be discernible from inherent variability. The potential impacts to individuals are therefore assessed as localised and short-term impacts to species of recognized conservation value not affecting local ecosystem function. See further discussion below.	
Fin whale - EPBC Act: • Vulnerable • Cetacean • Migratory.	• Likely to occur. • No BIAs overlapped.	Section 6.6.4.2 describes nominal behavioural responses associated with the behavioural response threshold. Modify song characteristics under increased background noise conditions, and temporary displacement (Castellote et al. 2012).	Localised (~8 km the source) and short-term impacts to species of recognized conservation value not affecting local ecosystem function. See further discussion below.	Level 2
Pygmy right whale - EPBC Act: • Cetacean • Migratory.	• May occur. • No BIAs overlapped.	Section 6.6.4.2 describes nominal behavioural responses associated with the behavioural response threshold. Minor behavioural changes (avoidance, no response, and attraction) have the potential to occur.	Minor local (small, variable, temporary behavioural changes within ~8 km from the source) impacts or disturbances to fauna.	Level 1
Southern right whale - EPBC Act: • Endangered • Cetacean	• Known to occur. • Migration and reproduction BIA overlapped.	Section 6.6.4.2 describes nominal behavioural responses associated with the behavioural response threshold. Potential increase in stress levels and vocal adaptation in response to increased background	Localised (~8 km from the source) and short-term impacts to species of recognized conservation value not affecting local ecosystem function. The Activity is situated entirely within the southern right whale migration BIA. As a result, the majority of the	Level 2

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
• Migratory.	• During May-June and September-October southern right whales pass through the operational area to move to and from coastal reproduction areas.	noise from shipping, inferred from studies of right whales in the northern hemisphere (Parks et al. 2010; Rolland et al. 2012). Note lactating southern right whales females with calves on calving grounds in Australia produce infrequent vocalisations that are low amplitude and, inferred as a strategy to decrease the risk of acoustically alerting predators (e.g. killer whales) of their presence (DCCEEW 2024b). Disturbance to resting southern right whales nearshore (within preferred calving/resting habitat) has been reported as being triggered by close encounters with humans, including surfers (DCCEEW 2024b) with mother and calf subsequently travelling 20 km within a few hours. As subsea noise generated by surfers is likely to be negligible, this may illustrate disturbance triggers could be both audible and/or visual (i.e. something observed as approaching which results in a threat response). Within Portland Harbour, which resides the Otway region, within the designated reproduction BIA for southern right whales and is an active hub for large international merchant ships, there are recurring sightings during the migration and reproduction seasons (ALA 2024). Noise generated by shipping activities is comparable to the noise generated by vessels likely to be used for the Activity.	behavioural EMBA overlaps this BIA (Figure 6-14). Southern right whales occur within the region from late autumn to late spring (Table 6-30), and this timing may overlap with the planned activities. The well location is approximately 6.6 km from the boundary of the southern right whale Reproduction BIA, located in Victorian coastal waters. As a result, the behavioural EMBA overlaps the southern right whales reproduction BIA by encroaching the BIA's seaward boundary by 1.4 km (Figure 6-14), however, it does not overlap or encroach on the area preferred by breeding southern right whales, which is understood to be within 1 km of the shore, DCCEEW 2024b). The risk of potential change in southern right whale behaviours is related to whales outside of the preferred calving habitat related to those that are moving from one location to another, and not breeding or calving females that prefer shallow sheltered waters. The localised nature of the behavioural EMBA is not expected to present a barrier to migration, nor significantly alter migration distances from avoidance, for the highly mobile migratory southern right whales which travel thousands of kilometres between habitats (Watson et al. 2021). The risk of southern right whale individuals avoiding the operational area is not expected	

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
			to result in population level impacts because of the limited spatial area compared to the total migration and reproduction BIAs overlapped by the behavioural EMBA. See further discussion below.	
Humpback whale - EPBC Act: • Cetacean • Migratory.	• Likely to occur. • No BIAs overlapped.	Short-term behavioural impacts include alterations of dive patterns, swim speeds, swim orientation, group cohesiveness, behavioural state and changes in acoustic behaviour (Sprogis et al. 2020; Arranz et al. 2021).	Marine Mammal Observers were offshore throughout Amplitude Energy's recent BMG subsea wells decommissioning campaign in 2023/24. These activities were completed in the Gippsland basin, offshore Victoria, and are of similar nature to this Activity's well construction activities. MMO's reported whales near to and approaching vessels whilst on DP, no indications of disturbance were observed. Conservatively, potential impacts to humpback whales are assessed as Minor local (small, variable, temporary behavioural changes within ~8 km from the source). Impacts are not expected to result in population level effects.	Level 1

Low-frequency Cetaceans

Low-frequency cetaceans include baleen whales such as sei whale, fin whale, southern right whale and blue whale. Potential presence within the behavioural EMBA and biologically important behaviours for listed threatened low-frequency cetaceans are summarised in Table 6-30.

Table 6-30: Low-frequency cetacean presence and biological important behaviours

Species	Biologically Important Behaviours	Duration of seasonal presence (including shoulder and peak periods)											
		J	F	M	A	M	J	J	A	S	O	N	D
Pygmy blue whale	Foraging BIA		P	P									
Southern right whale	Migration BIA				S						S		
	Reproduction BIA							P	P				
Sei whale	N/A												
Fin whale	N/A												

S – expected shoulder periods; P – Peak period

1. Blue Whale

A foraging BIA (annual high use) for the pygmy blue whale has been identified within the area where the behavioural criteria is reached (Figure 6-11). Several studies have demonstrated the presence of suitable foraging along the continental shelf between South Australia and Tasmania, with highly suitable habitat identified near the Bonney Coast (Ferreira et al. 2024). Pygmy blue whales typically occur in this region from November through June, with foraging activities typically peaking in February and March. This period often coincides with offshore activities in the region due to seasonally calmer weather conditions although other factors such as allocation of drilling equipment can also influence the scheduling of activities.

Blue whale dive times are typically 5-10 minutes for dive depths of 100-200m, and 20-35 minutes for dive depths of 300-500m (Ferreira et al (2024), Owen et al (2016), Gill et al (2011), Double et al (2014), Sprogis et al (2023).

Blue whale foraging patterns are influenced by factors including krill distribution and density. There are three main types of search identified in the literature:

- Broad scale search. Generally whales are on the move between regions in search of food. Krill density is low.
- Mesoscale search. Within a region where whales expect krill. Krill density is increasing.
- Area restricted search (ARS). This can be within a small area. Krill density is high and the whales are staying in and around the patches of krill to feed on them.

As search patterns move from broad to restricted, it is reasoned that the frequency of sightings will increase if those search patterns overlap the activity observation area; this is illustrated in Figure 6-10.

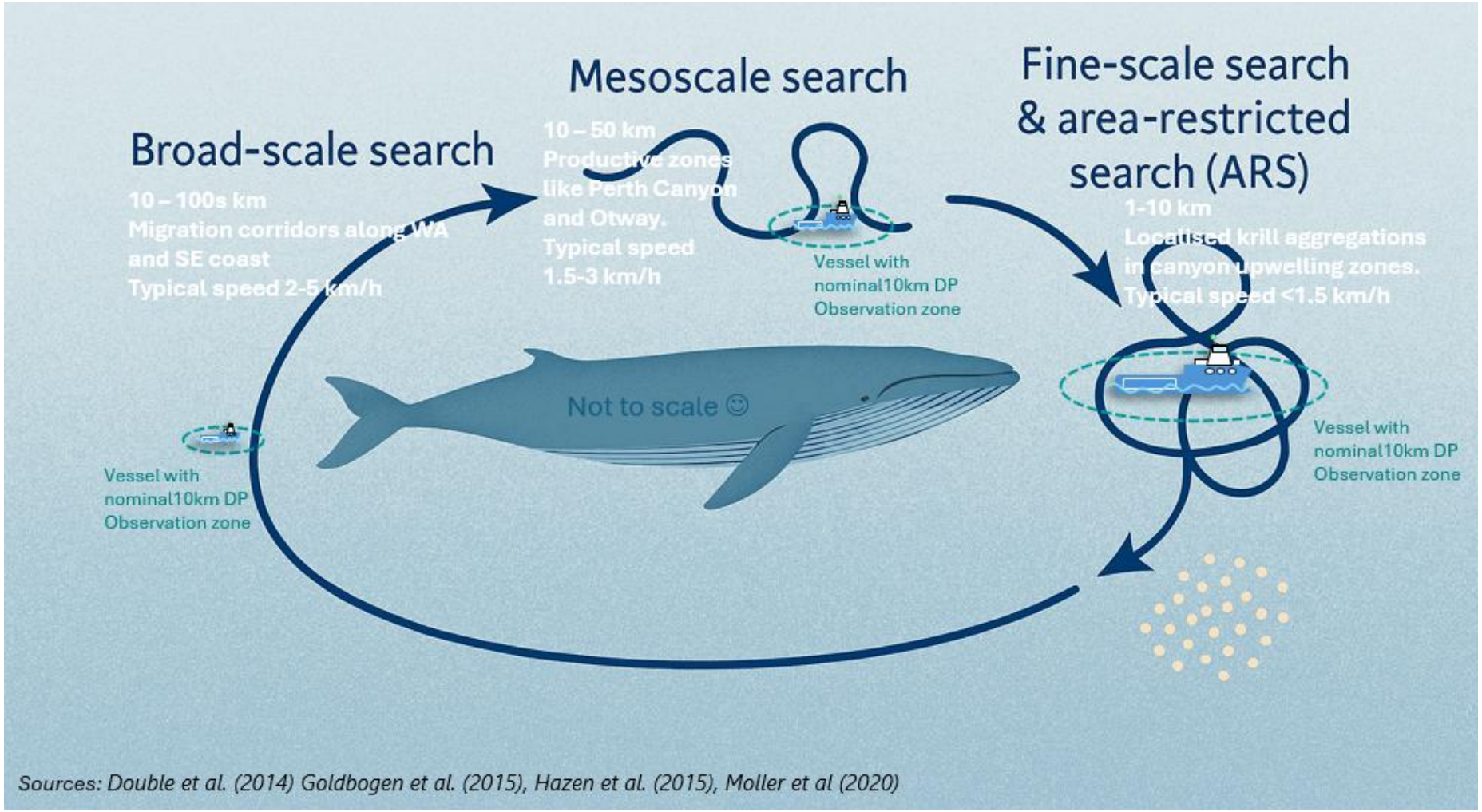


Figure 6-10: Illustrative Example of Blue Whale Foraging Behaviour

The conservation management plan (CMP) for the blue whale provides for both subspecies of blue whales i.e., the Antarctic blue whale and the pygmy blue whale (DoE 2015a). The CMP includes several objectives and actions, with the ultimate objective being recovery of blue whale populations recovery to a level where they can be removed from the Threatened species list. Action A.2.3 of the CMP details that 'anthropogenic noise in BIAs will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area'.

Following the hierarchy of controls, where practicable, the risk will be eliminated. However, it is considered that the CMP and guidance on key terms rationalises that risk elimination is not practicable for all vessel activities in the Otway region, such as shipping, ferries, research vessels and industry vessels, most of which would have the potential to displace a whale based on typical vessel sound source levels. The guidance on key terms therefore refers to risk reduction, rather than elimination.

The CMP identifies shipping noise and industrial noise as threats including impacts from masking, injury and displacement and classifies both threats as a minor consequence, where:

- Minor consequence is defined as – 'individuals are affected but no effect at population level'.

The CMP details that, given the behavioural impacts of noise on pygmy blue whales are largely unknown, a precautionary approach has been taken regarding assignment of possible consequences, hence even Minor consequences to individuals are considered a precautionary assessment in the CMP.

Given no population-level effects are predicted from shipping and industry noise, it follows that Action A.2.3 may not be needed to achieve the CMP objective which is ultimately aimed at population recovery: 'to minimise anthropogenic threats to allow for their conservation status to improve so that they can be removed from the EPBC Act threatened species list'. Though shipping and industry have been present offshore south-east Australia (and within blue whale BIAs) for decades, estimates indicate blue whale populations are recovering (e.g. Branch et al. 2004, Balcazar et al. 2015, McCauley et al. 2018), albeit at a slower rate compared to other species such as the humpback whale (Noad et al. 2011, TSSC 2022).

The potential consequence of behavioural impacts on blue whales has been rated as **Level 2**, based on:

- The conservative approach used in the sound modelling and use of the furthest distances to impact criteria.
- The CMP details that shipping and industrial noise are classed as a minor consequence: individuals are affected but no effect at a population level (DoE 2015a).
- The CMP details that "It is the high intensity signals with high peak pressures received at very short range that can cause acute impacts such as injury and death" (DoE 2015a). Activities which generate continuous sound emissions, such as drilling and vessel operations, do not have high intensity signals. Therefore, it is unlikely that they would cause injury or death to foraging PBW.
- The area of potential impact from the Activity is a relatively small percentage (<1%) of the high-density foraging BIA, which has a total area of 35,627 km^2 (Figure 6-11); hence any displacement from a very localised area around a vessel on DP would not be expected to impact on a whale's overall foraging success in the region. Consistent with the CMP assessment of industry and vessel noise, no population-level effects are predicted.
- The Offshore Victoria Whale Disturbance Risk Management Procedure for the activity (Section 12.10) will be followed during vessel DP operations; thus, control measures will be implemented

to reduce the risk of behavioural impacts and ensure activities are consistent with the blue whale CMP.

- Upwelling and productivity in the region have been shown to be episodic, and of relatively low frequency in the vicinity of the Activity (Figure 6-12; Huang and Wang 2019). As such, any behavioural disturbances resulting from continuous underwater sound is not expected to significantly impact the foraging success of any individual.

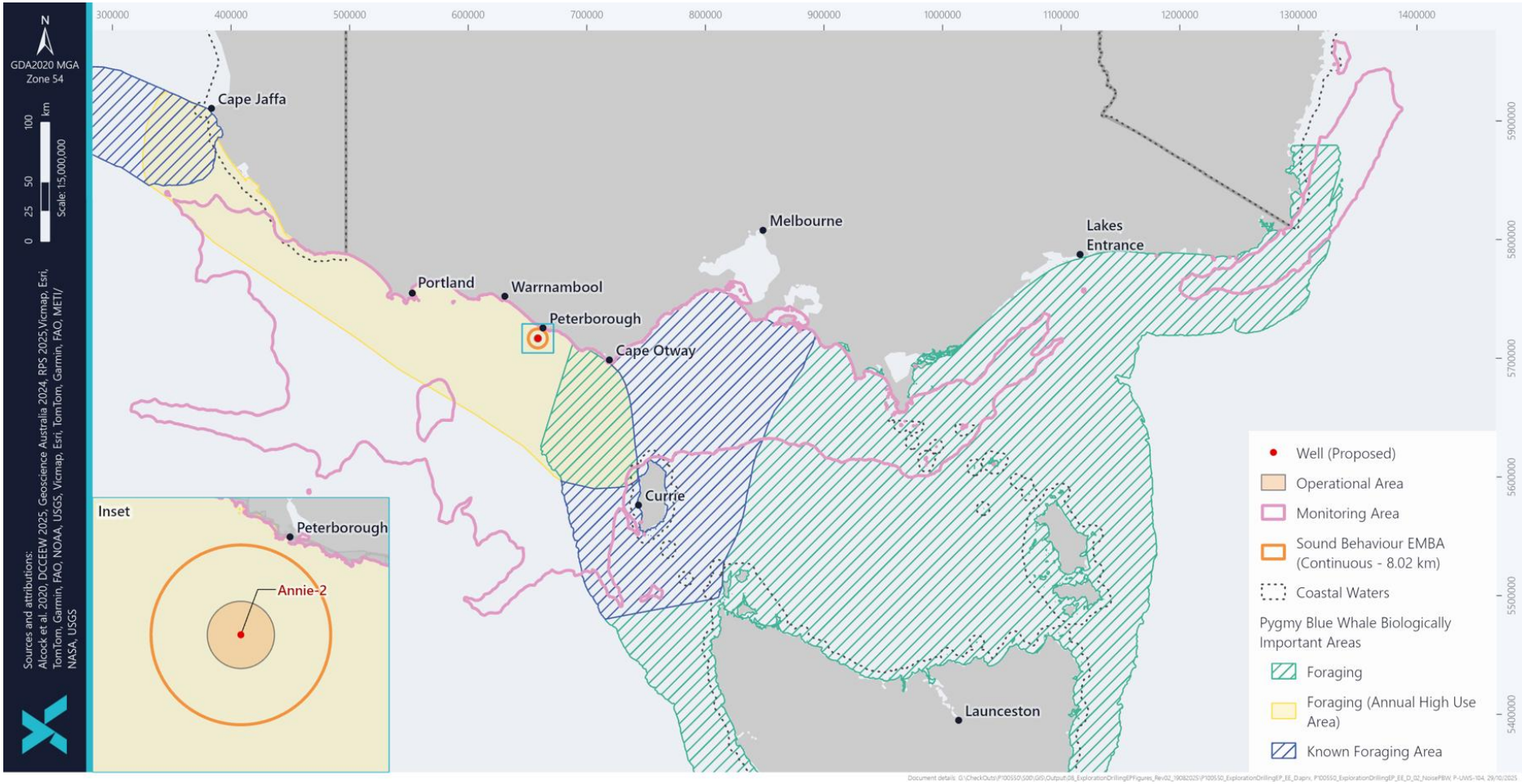


Figure 6-11: Pygmy Blue Whale BIAs and Noise EMBAs

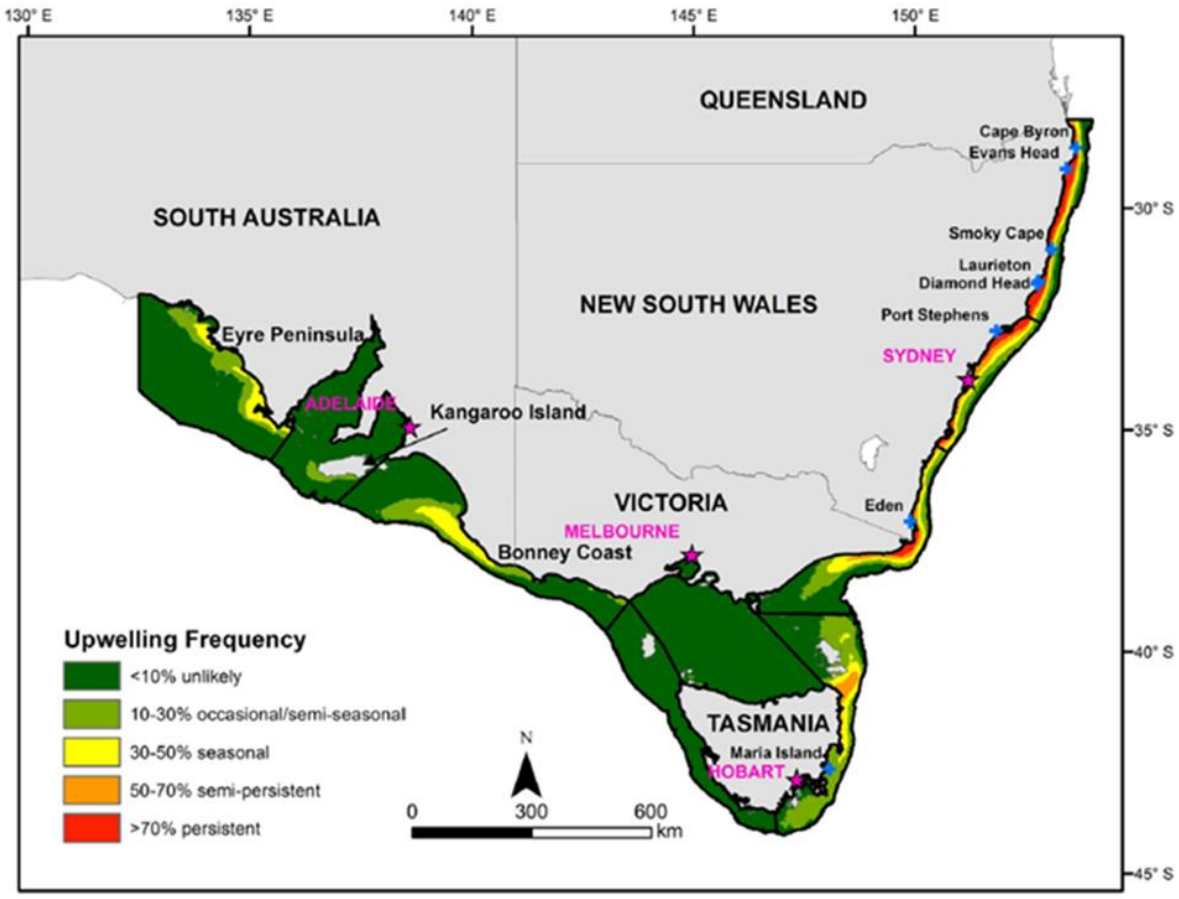


Figure 6-12: Upwelling Frequency in the Bass Strait

2. Southern Right Whale

Southern right whales migrate annually, spending winters in nursery areas in lower latitudes and summers in feeding grounds in higher latitudes. In Australia, southern right whales predominantly aggregate in coastal water reproductive areas, where they calve and nurse their young from May to October. The peak period of abundance typically occurs in late July and August (DCCEEW 2024b). During this time, southern right whales show preference to waters with less than 10 m depth (DSEWPaC 2012a, Charlton & Ward et al. 2019) and approximately 1 km from shore (DCCEEW 2024b). Females accompanied by a calf generally occupy the calving ground for 2 to 3 months between June and September (with a peak in July to August), whereas unaccompanied whales (males and females without a calf) are more variable in their occupancy of coastal areas throughout the reproductive season (Burnell & Bryden 1997, Charlton et al. 2019). Breeding aggregations of southern right whales occur over a wide range across the entire Southern Australian coast, including areas adjacent to high vessel activity such as the Port of Portland and Port Phillip Bay.

Southern right whale movements change with the type of behaviours being undertaken, and within the Otway, there are BIA's which indicate where these different types of behaviour are likely to occur. Figure 6-13 Illustrates the types of behaviours and movement patterns that may be undertaken by southern right whales within the different biologically important areas shown. If whales are calving or resting (which typically occurs close to shore), then it is reasoned that they are more likely to be seen and could be observed at greater frequency. Dive times whilst calving, nursing

and resting are short (generally < 10 minutes), which also increases the chances of being observed whilst in the reproduction BIA.

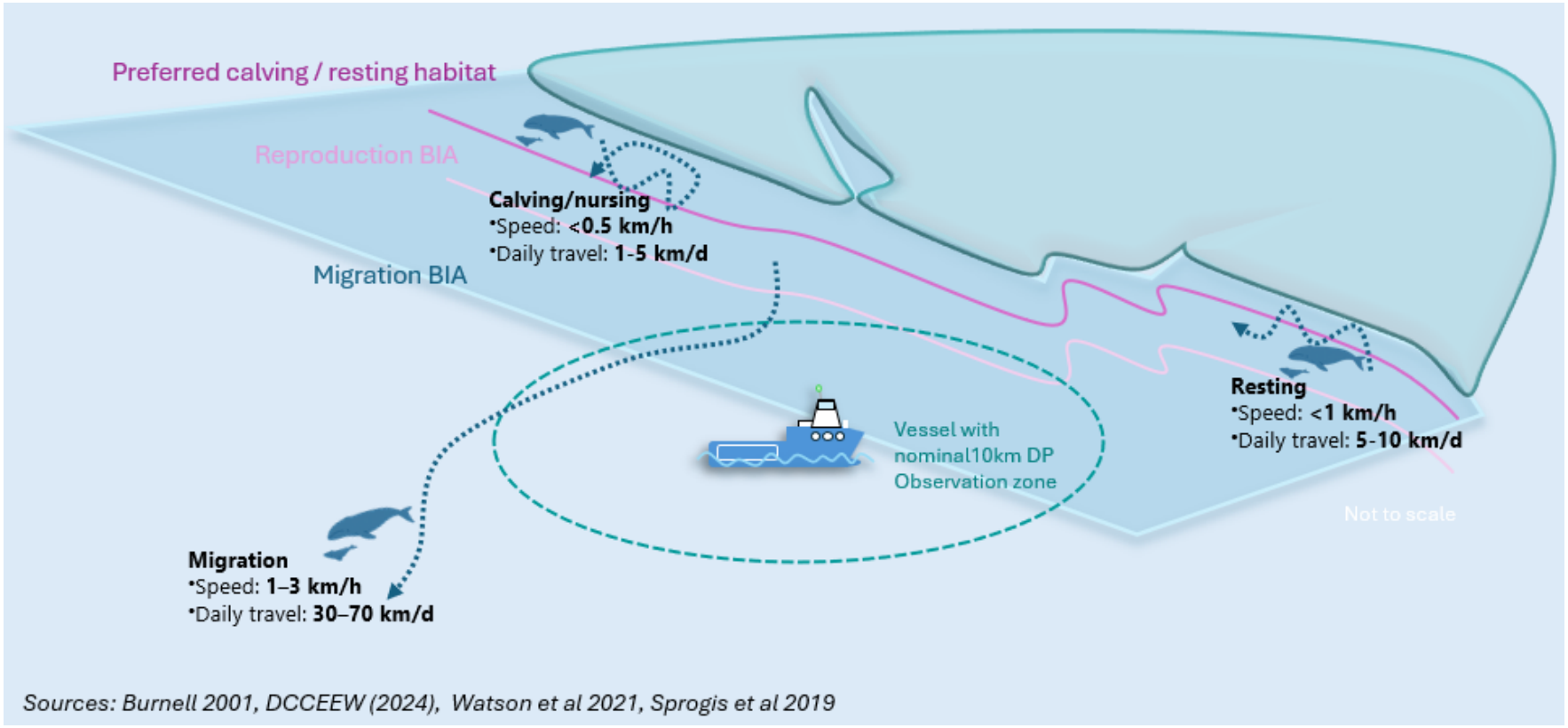


Figure 6-13: Illustrative example of Southern Right Whale Movement Patterns in the Otway

The recently released National Recovery Plan for the southern right whale identifies a reproduction BIA in all Victorian waters including within the region between Portland to Port Campbell (DCCEEW 2024b).This BIA is listed as habitat critical to the survival of the southern right whale (Section 4.4.2); though the BIA is extensive, the only established calving ground in this area is Logans Beach.

The total number of southern right whale individuals identified in south-eastern Australia in a single whale-watching season increased from 3 individuals in 1993 to 368 individuals in 2017 (Stamation et al. 2020). Between 1993 and 2017, a total of 37 individual female southern right whales with calves were identified. Of these, 20 were identified west of Warrnambool, with 14 individual breeding females sighted at Logans Beach, (Stamation et al. 2020). A further 21 individual females were sighted east of Warrnambool: 5 in the Great Ocean Road area, 3 near Wilson's Promontory, 10 off Flinders Island and the east coast of Tasmania, and 3 in New South Wales (Stamation et al. 2020).

The south-eastern population of southern right whales currently has only one established calving ground located at Logans Beach at Warrnambool in south-west Victoria (Watson et al. 2021). At least 93 calves were born at Logans Beach between 1980 and 2018 (Watson et al. 2021), however, there has been no increase in the average number of calves born annually at Logans Beach over the last 3 decades (Stamation et al. 2020). Southern right whales have long lifespans with relatively late maturation and long calving intervals (Charlton, 2017), therefore a significant increase in the number of calves born at Logans Beach is not expected until 2028 based on a theoretical model (Stamation et al. 2020). There are also records of female and calf pairs using bays outside Logan Beach, along the Victorian, Tasmanian and southern NSW coastline from May to September (Stamation et al. 2020). In these areas, small but growing numbers of calving and non-calving whales have been observed to regularly aggregate for short periods (days to weeks). These include coastal waters between Binalong Bay to South-east Cape in Tasmania, the Gippsland coast in Victoria (Stamation et al. 2020), and in numerous protected bays generally south of the NSW Central Coast, potentially extending north as far as Port Macquarie (DECCEW 2024b). Fine-scale habitat selection by southern right whales appears to be influenced by breeding status, with breeding females being more selective than non-calving whales and preferring sheltered, nearshore waters during the early life-stages of their calves (Pirzl 2008, Rayment et al. 2015 cited in DECCEW 2024b).

The behavioural EMBA overlaps a reproduction BIA for southern right whale (Figure 6-14). However, the behavioural EMBA does not overlap or block off entry to preferred habitat of breeding females, (sheltered bays and nearshore waters along the coastline) as the EMBA does not extend to within 2 km of the coast. The EMBA would not be sufficiently large enough to restrict movement into or out of the reproductive BIA or preferred habitats within the BIA. Therefore, continuous underwater sound emissions from the Activity are not expected to impact individuals undertaking reproduction or present a barrier to movement for southern right whale into the reproductive BIA. Further indication that noise from vessels is less likely to restrict movements of southern right whales in this region comes from anecdotal evidence and citizen sightings around the nearby Port of Portland; this is an active shipping Port inside the Southern Right Whale Reproductive BIA, with regular sightings of southern right whales within port limits (Glenelg Shire 2025, AU News 2025, SE Australia Whale Sightings Program 2025). To manage interactions between whales and shipping, the Victorian Government has established caution zones under the State regulatory regime; the caution zones applied to the Activity under this EP are equivalent.

Typical dive durations of SRW are 5-20 minutes on migration and 2-6 minutes when undertaking reproductive behaviours (Best and Schell (1996), Mate et al (2011), Parks et al (2019).

The Activity is within the migration BIA, which encompasses the majority of the ocean off the southern coast of Australia (Figure 6-14). Noise from vessels could elicit a behavioural response, such as avoidance. This could increase the energy requirements of whales at a time when their

energy budgets are reduced. The Activity is not of the nature or scale that could present a barrier to migration, and the sound from Activity vessels would not bae expected to significantly alter overall migration distances which can be multiple thousands of km's during the reproduction season (Watson et al. 2021).

The extent and duration of impacts will vary based on the activities being undertaken. The National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) identifies shipping noise and industrial noise both as a minor consequence for the south-east population, where:

- Minor consequence is defined as – 'individuals are affected but no effect at population level'.

The National Recovery Plan for the Southern Right Whale also details that, given the behavioural impacts of noise on southern right whales are largely unknown, a precautionary approach has been taken regarding assignment of possible consequences.

Southern right whales are considered to be particularly vulnerable to disturbance whilst nursing and resting (DCCEEW 2024b). Preferred habitat for these behaviours is in waters with depths less than 10 m and less than 1 km from shore. The Activity is situated entirely within the southern right whale migration BIA. As a result, the majority of the behavioural EMBA overlaps this BIA (Figure 6 12). The well location is approximately 6.6 km from the boundary of the southern right whale Reproduction BIA, located in Victorian coastal waters.

The specific activities that have the potential to result in a behavioural threshold contour overlap with the reproduction BIA include: MODU hook-up activities (3 - 7 days), mooring activities (7 - 14 days), and when resupply activities occur during drilling (up to 8 hours). The overlap will only encroach a maximum of 1.4 km from the BIA's seaward boundary (Figure 6 12). Crucially, this localised and short-term overlap does not overlap or encroach on the area preferred by breeding southern right whales, which is understood to be within 1 km of the shore, in <10m water, and in sheltered embayment's within Reproduction BIA (Figure 6 12), DCCEEW 2024b) and avoids the well-established calving and nursing area of Logans beach. Logans Beach is the only designated vessel exclusion area for southern right whales in Victoria, who's coastline is entirely encompassed by the southern right whale reproductive BIA, and includes several major Ports for shipping, and coastal towns that support marine industries.

The risk of potential change in southern right whale behaviours is related to whales outside of the preferred calving habitat that would be moving from one location to another, and not breeding or calving females that prefer shallow sheltered waters. It is expected that southern right whale activity within the areas overlapped by the activity behavioural noise EMBA (which is beyond 1km from the shore, >10m water depth and outside of embayment's) will be moving through the area to preferred habitats. The received noise level within the southern right whale reproduction BIA is below the behavioural threshold level except for the localised overlap area located outside of the area preferred by breeding and calving southern right whales.

The localised nature of the behavioural EMBA is not expected to present a barrier to movements or migration, nor significantly alter migration distances from avoidance, for the highly mobile migratory southern right whales which travel thousands of kilometres between habitats (Watson et al. 2021). It is possible that migrating individuals may avoid the operational area where received noise levels are at their loudest, though frequent observations of southern right whales inside the active Port of Portland indicate that individuals may react differently, and may not necessarily avoid vessel noise.

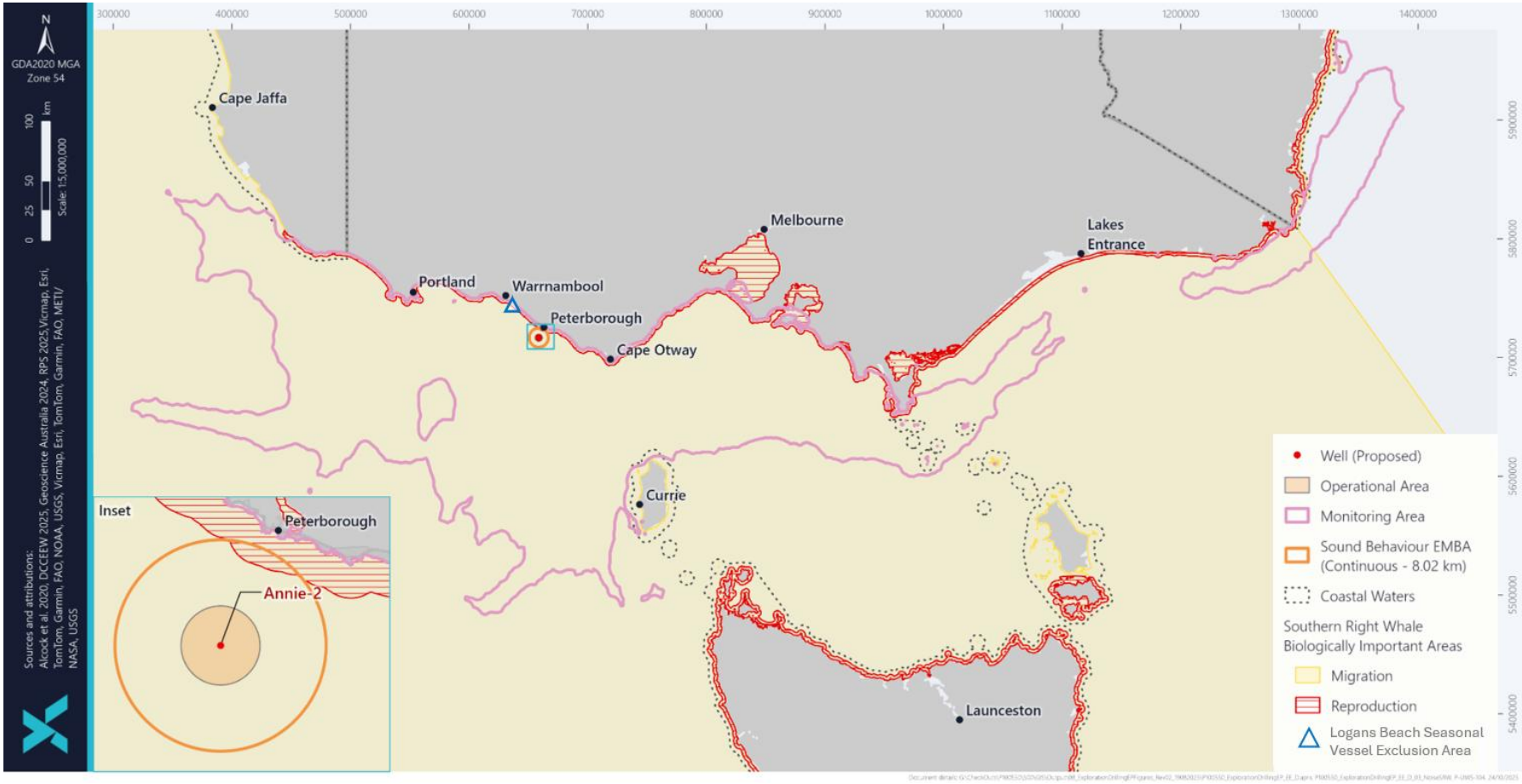


Figure 6-14 : Southern Right Whale BIAs and Noise EMBAs

It is expected that southern right whale activity within this overlap area would be limited to individuals migrating to the preferred aggregation area for reproductive purposes and may include individuals undertaking behaviours (specifically mating, calving, and nursing) (Sprogis et al. 2023). The localised nature of the behavioural EMBA precludes it from acting as a barrier to/from/across the reproductive BIA or preventing any individuals from utilising the reproduction BIA. The potential change in behaviours within the reproduction BIA is expected to be limited to individual SRWs that may be moving to preferred breeding sites such as Logans Beach.

Southern right whales are a highly mobile migratory species which travel thousands of kilometres between habitats used for essential life functions. As such, in the unlikely event that southern right whales are present nearby during the Activity, individuals may avoid the area where the behavioural disturbance criteria are reached. Given their mobility, this is unlikely to prevent their movements through the migration BIA or to/from the reproduction BIA including coastal aggregation areas.

The potential consequence of behavioural impacts on southern right whales has been rated as **Level 2**, based on:

- The conservative approach taken in the sound modelling and use of the furthest distances to impact criteria.
- The National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) identifies shipping noise and industrial noise as threats classed as minor consequence: individuals are affected but no effect at a population level. For context, within Portland Harbour, which resides the Otway region, within the designated Reproduction BIA for southern right whales and is an active hub for large international merchant ships, there are recurring sightings during the migration and reproduction seasons (ALA, 2024), indicating some level of habituation to vessel noise in this region. Noise levels generated by shipping activities is comparable to (and in some cases greater than) the noise generated by vessels likely to be used for the Project activities. Interactions between whales and vessels within Portland Harbour are managed through caution zones established under Victorian Regulations; the caution zones applied to whales under this EP are equivalent to or exceed the Victorian Regulations.
- The Offshore Victoria Whale Disturbance Risk Management Procedure for the activity (Section 12.10) will be followed during vessel operations; control measures will be implemented to reduce the risk of behavioural impacts and ensure activities are consistent with the southern right whale National Recovery Plan. The procedure requires consideration of avoidance of Habitat Critical to the Survival of southern right whales during peak sensitive seasons at the activity planning stage, and the implementation of control measures to avoid disturbance. The control measures adopted to avoid disturbance under this EP encompass dedicated monitoring, activity prestart and action criteria, and well as the application of caution zones with associated vessel speed restrictions; these measures exceed those measures typically applied by existing marine industries along the Victorian coastline, where vessels are the primary source of noise.
- The largest area of potential impact of (behavioural disturbance) from the activity is a small percentage of the migration and reproductive BIAs for the southern right whale (Figure 6-14). Disturbance would be limited to a very localised area around the Activity and would not be expected to prevent migration to or from reproduction BIAs.
- The behavioural EMBA does not overlap or block off entry to preferred habitat of breeding females (sheltered bays and nearshore waters along the coastline) as the EMBA does not extend to within 1 km of the coast. The EMBA would not be sufficiently large enough to restrict movement into or out of the reproductive BIA or preferred habitats within the BIA and will therefore not prevent southern right whales from utilising those areas.

- Southern right whales are a highly mobile migratory species that travel thousands of kilometres between habitats used for essential life functions (DCCEEW 2024b). Within the migration BIA, whales are highly dispersed and may reach and exit the coastline (reproduction BIA) along different trajectories through this area from one breeding cycle to another. Along the Australian coast, individual southern right whales use widely separated coastal areas (200–1,500 km apart) within a season, indicating substantial coast-wide movement. The longest movements are undertaken by non-calving whales, though calving whales have also been recorded at locations up to 700 km apart within a single season (DCCEEW 2024b).

3. **Other Low-frequency Cetaceans**

The EPBC PMST report identified the presence of several additional low-frequency cetacean species within the areas that may be impacted by sound, including the sei whale and fin whale (both EPBC-listed Vulnerable and Migratory).

Sei whales are primarily found in deep water oceanic habitats and are thought to complete long annual seasonal migrations from subpolar summer feeding grounds to lower latitude winter breeding grounds (TSSC 2015a). In Australian waters, sei whales have been infrequently recorded off Tasmania, New South Wales, Queensland, the Great Australian Bight, Northern Territory and Western Australia. The conservation advice for sei whales assesses the threat of anthropogenic noise and acoustic disturbance as minor, with the extent over which the threat may operate as moderate-large (TSSC 2015a). No specific management action for managing underwater sound emissions is defined in the conservation advice.

Fin whales are generally thought to undertake long annual migrations from higher latitude summer feeding grounds to lower latitude winter breeding grounds; however, the full extent of their distribution in Australian waters is uncertain (TSSC, 2015b). The conservation advice for sei whales assesses the threat of anthropogenic noise and acoustic disturbance as minor, with the extent over which the threat may operate as moderate-large (TSSC 2015a). No specific management action for managing underwater sound emissions is defined in the conservation advice.

Given the relatively short duration of activities and localised extent of potential behavioural changes, the consequence of this risk has been evaluated as **Level 2**, as underwater sound may result in localised, short-term impacts to species of conservation value while not affecting local ecosystem function.

Inherent Likelihood

The likelihood of behavioural changes to marine mammals depends on the continuous sound source and the potential presence of low-frequency cetaceans within the behavioural EMBA. For the risk event of behavioural changes to marine mammals to occur, the following combination of factors are required:

- Drilling operations, support vessel-based activities (vessel noise).
- Marine mammals present within 8.02 km of the continuous sound source produced during the Activity.

Table 6-31 details the frequency of recorded sightings of EPBC-listed marine mammals in the Otway Basin to infer presence within the behavioural EMBA, description of likelihood and the resulting inherent likelihood level for each marine mammal species.

Table 6-31: Inherent Likelihood Levels - Continuous Sound - Behavioural Changes to Marine Mammals

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Description of Likelihood	Inherent Likelihood
Pinnipeds			
New Zealand fur-seal **Australian fur-seal** EPBC Act: • Marine (All)	• May occur as per PMST report, however is, are considered known to occur based on records available for the Otway (ALA 2024) sightings by marine mammal observers during offshore campaigns (e.g. Seiche Environmental 2020).) • No BIAs overlap.	Fur seals may occur within the behavioural EMBA; however behavioural changes are unlikely. Amplitude Energy Marine Mammal Observers made hundreds of observations of fur seals proximal to vessels on DP during the BMG Phase 1 wells decommissioning campaign (2023/24). Minor behavioural changes (ranging from avoidance, no response, and attraction) to pinnipeds could occur. The risk event is considered unlikely though conceivable and could occur at some time during the Activity.	Unlikely (D)
Very high-frequency cetaceans			
Pygmy / dwarf sperm whale **True porpoise** EPBC Act: • Vulnerable • Cetacean • Migratory.	• None identified in PMST report and therefore low likelihood of presence. • No BIAs overlapped. • <50 pygmy sperm whales recorded across the Otway between 1988 and 2024. None of these sightings occurred proximal to the Activity operational area (Atlas of Living Australia, occurrence records 2024).	A freak combination of factors would be required for very high-frequency cetaceans to be present within the behavioural EMBA during activities generating continuous sound emissions and for noise from the Activity to have a discernible effect. Any individuals proximal to the activities may or may not alter behaviour.	Remote (E)
High-frequency cetaceans			
Dolphins (Risso's, dusky, common, Indian Ocean, bottlenose) **Toothed whales** (killer, false killer) - EPBC Act: • Cetacean • Migratory.	• May or likely to occur. • No BIAs overlapped. • Gill et al. (2015) - 390 dolphin sightings and 83 sightings of toothed whales (2002-2013).	High-frequency cetaceans may or are likely to occur (depending on the species) within the behavioural EMBA; however behavioural changes are unlikely. Amplitude Energy Marine Mammal Observers made hundreds of observations of dolphins including, common and bottlenose dolphins, and pilot whales proximal to vessels on DP during the BMG Phase 1 wells decommissioning campaign (2023/24). Minor behavioural changes (ranging from avoidance, no response, and attraction) to high-frequency cetaceans could occur. The risk event is considered conceivable and could occur at some time during the Activity.	Unlikely (D)

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Description of Likelihood	Inherent Likelihood
Low-frequency cetaceans			
Minke whale - EPBC Act: • Cetacean.	• May occur. • No BIAs overlapped. • Gill *et al*. (2015) - one sighting of an individual minke whale (2002-2013).	A freak combination of factors would be required for a minke whale to be present within the behavioural EMBA during activities generating continuous sound emissions, and for noise from the Activity to have a discernible effect. Any individuals proximal to the activities may or may not alter behaviour. Behavioural changes to minke whales are not expected to occur from Activity continuous underwater sound emissions.	Remote (E)
Sei whale - EPBC Act: • Vulnerable • Cetacean • Migratory	• Likely to occur. • No BIAs overlapped. • Gill et al. (2015) - 12 sightings of 14 individual sei and like sei whales (2002-2013).	A rare combination of factors would be required for a sei whale to be present within the behavioural EMBA during activities generating continuous sound emissions and for noise from the Activity to have a discernible effect. Any individuals proximal to the activities may or may not alter behaviour. The risk event is considered conceivable and could occur at some time during the Activity but is unlikely.	Unlikely (D)
Pygmy blue whale - EPBC Act: • Endangered • Cetacean • Migratory.	• Known to occur. • Foraging and distribution BIAs overlapped. • During January to June, pygmy blue whales migrate through the operational area. • Origin (2018) – sightings of 120 individuals in the Otway Basin (2012-2013). • Approximately 221 observation records of pygmy blue whales were identified off the coast of Victoria between 2000 and 2024 (Atlas of Living Australia 2025).	The risk event could occur under specific circumstances such that a blue whale is present within the behavioural EMBA during activities generating continuous sound emissions. Pygmy blue whales are known to occur within the behavioural EMBA; any individuals proximal to the activities may or may not alter behaviour. Therefore, the risk event is conservatively considered to be possible.	Possible (C)
Fin whale - EPBC Act: • Vulnerable • Cetacean • Migratory.	• Likely to occur. • No BIAs overlapped. • Gill *et al*. (2015) - 7 sightings of 8 individual fin and like fin whales (2002-2013).	A rare combination of factors would be required for a fin whale to be present within the behavioural EMBA during activities generating continuous sound emissions and for noise from the Activity to have a discernible effect. Any individuals proximal to the	Unlikely (D)

Marine Mammals (EPBC Act Listing)	Presence within Behavioural EMBA	Description of Likelihood	Inherent Likelihood
		activities may or may not alter behaviour. The risk event is considered conceivable and could occur at some time during the Activity but is unlikely.	
Pygmy right whale EPBC Act: • Cetacean • Migratory	• May occur. • No BIAs overlapped. • Gill *et al.* (2015) - 1 sighting of 100 individual pygmy right whales (2002-2013).	A freak combination of factors would be required for a pygmy right whale to be present within the behavioural EMBA during activities generating continuous sound emissions, and for noise from the Activity to have a discernible effect. Any individuals proximal to the activities may or may not alter behaviour. Behavioural changes to pygmy right whales are not expected to occur from Activity continuous underwater sound emissions.	Remote (E)
Southern right whale - EPBC Act: • Endangered • Cetacean • Migratory.	• Known to occur. • Migration and reproduction BIA overlapped. • During May-June and September-October southern right whales pass through the operational area to move to and from coastal aggregation areas. • Watson *et al*. (2021) - 375 individual southern right whales (including 48 breeding females) were identified in south-eastern Australia (east of the SA/Victorian border) (1993-2018).	The risk event could occur under specific circumstances such that a southern right whale is present within the behavioural EMBA during activities generating continuous sound emissions. Southern right whales are known to occur within the behavioural EMBA; any individuals proximal to the activities may or may not alter behaviour. Therefore, the risk event is conservatively considered to be possible.	Possible (C)
Humpback whale - EPBC Act: • Cetacean • Migratory.	• Likely to occur. • No BIAs overlapped. • Gill *et al.* (2015) - 10 sightings of 18 individual humpback whales (2002 – 2013).	The risk event could occur under specific circumstances such that a humpback whale is present within the behavioural EMBA during activities generating continuous sound emissions. Humpback whales are likely to occur within the behavioural EMBA; any individuals proximal to the activities may or may not alter behaviour. Therefore, the risk event is conservatively considered to be possible.	Possible (C)

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to marine mammals from continuous sound emissions is considered **Moderate**. Table 6-32 lists the inherent risk severity for each marine mammal species.

Table 6-32: Inherent Risk Severity – Continuous Sound – Behavioural Changes to Marine Mammals

Marine Mammals	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Pinnipeds			
• New Zealand fur-seal • Australian fur-seal	1	D	Low
Very high-frequency cetaceans			
• Pygmy/dwarf sperm whale, true porpoises	1	E	Low
High-frequency cetaceans			
• Dolphins (Rissos's, dusky, common, Indian Ocean bottlenose, bottlenose) • Toothed whales (killer, false killer)	1	D	Low
Low-frequency cetaceans			
Minke whale	1	E	Low
Sei whale	2	D	Low
Pygmy blue whale	2	C	Moderate
Fin whale	2	D	Low
Pygmy right whale	1	E	Low
Southern right whale	2	C	Moderate
Humpback whale	1	C	Low

6.6.4.3 Risk: Auditory Impairment or Injury – Marine Mammals

Inherent Consequence Evaluation

Auditory impairment and injury include both permanent and temporary hearing impairment (PTS and TTS) and any other form of physical harm arising from anthropogenic sources of underwater noise (DAWE 2021).

Depending on the sound levels received, continuous sound emissions may cause auditory impairment or injury to marine mammals:

- Auditory impairment / auditory temporary threshold shift (TTS) -- an animal's hearing threshold is elevated and recoverable over time.
- Auditory injury / auditory permanent threshold shift (PTS) – an animal's hearing threshold is elevated and never recovers.

Underwater sound modelling predicted the distances that continuous TTS and PTS thresholds for marine mammals were reached (Connell and Koessler 2025). TTS and PTS thresholds for marine

mammals are based on a cumulative metric that assumes a receptor is consistently exposed to a defined sound exposure level for a 24-hour period (SEL24h). Distances predicted for the onset of TTS and PTS thresholds (SEL24h) (Connell and Koessler 2025) infer that the continuous underwater sound emissions from the Activity have the potential to cause:

- Potential TTS within marine mammals within a maximum range of ~4 km.
- Potential PTS within marine mammals within a maximum range of ~610 m.

Table 6-33 summarises the continuous TTS and PTS thresholds for marine mammals and the predicted maximum distances that will be reached by continuous sound from the Activity (Connell and Koessler 2025).

Table 6-33: Distance to TTS and PTS Thresholds for Marine Mammals

Marine Mammal Hearing Group	**Threshold SEL_{24h}, dB re 1 $\mu Pa^2 s$**	**Maximum distance (km)**	**Relevant scenario/s (Connell and Koessler, 2025)**
TTS			
Low-frequency cetaceans	177	3.88	Scenario 10: Mooring with MODU on DP
High-frequency cetaceans	181	0.71	Scenario 10: Mooring with MODU on DP
Very high-frequency cetaceans	161	0.87	Scenarios 9: MODU on DP Scenario 10: Mooring with MODU on DP
Otariid seals	179	0.68	Scenario 10: Mooring with MODU on DP
PTS			
Low-frequency cetaceans	197	0.61	Scenario 10: Mooring with MODU on DP
High-frequency cetaceans	201	0.03	Scenario 2: Mooring Scenario 10: Mooring with MODU on DP
Very high-frequency cetaceans	181	0.11	Scenario 5: MODU Drilling operations with standby OSV and resupply
Otariid seals	199	0.03	Scenario 10: Mooring with MODU on DP

The maximum distance where the potential onset of auditory impairment and injury may occur is 3.88 km, which is referred to as the potential auditory impairment and injury EMBA for marine mammals.

Table 6-34 provides details on the presence of EPBC-listed marine mammals within the auditory impairment/injury EMBA, the potential impairment or injury that may occur and the resulting inherent consequence level for each marine mammal species.

Table 6-34: Inherent Consequence Levels – Continuous Sound – Auditory Impairment or Injury to Marine Mammals

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential auditory impairment or injury	Description of Potential Consequence	Inherent Consequence
Pinnipeds				
New Zealand fur-seal **Australian fur-seal** EPBC Act: • Marine (all)	May occur as per PMST report, however, are considered known to occur based on occurrence records available for the Otway (ALA 2024) and sightings by marine mammal observers during offshore campaigns (e.g. Seiche Environmental 2020) No BIAs overlap.	For the onset of TTS and PTS to occur, pinnipeds need to remain in-water within 680 m and 30 m of the continuous sound sources for 24-hours, respectively (Table 6-33). Seals have been observed to dive and stay submerged for up to two hours (Blix 2018). Seals will then surface from dives for oxygen recovery. The longer the dive the longer the surface recovery time required (Blix 2018). It is not credible for seals to remain in-water for 24-hours for the onset of TTS and PTS to occur based on the limited dive duration.	Not credible	Not applicable
Very high-frequency cetaceans				
Pygmy / dwarf sperm whale **True porpoise** EPBC Act: • Vulnerable • Cetacean • Migratory.	• None identified in PMST report and therefore low likelihood of presence. • No BIAs overlapped.	For the onset of TTS and PTS to occur, very high-frequency cetaceans need to remain within 870 m and 110 m of continuous sound sources for 24-hours, respectively (Table 6-33). It is not credible for very high-frequency cetaceans to remain within 870 m and 110 m of continuous sound sources for 24-hours for the onset of TTS and PTS to occur given the absence of BIAs in the operational area.	Not credible	Not applicable
High-frequency cetaceans				
Dolphins (Risso's, dusky, common, Indian Ocean, bottlenose)	• May or likely to occur. • No BIAs overlapped.	For the onset of TTS and PTS to occur, high-frequency cetaceans need to remain within 710 m and 30 m of continuous sound sources for 24-hours, respectively (Table 6-33).	Not credible	Not applicable

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential auditory impairment or injury	Description of Potential Consequence	Inherent Consequence
Toothed whales (killer, false killer) EPBC Act: • Cetacean • Migratory.		It is not credible for high-frequency cetaceans to remain within 710 m and 30 m of continuous sound sources for 24-hours for the onset of TTS and PTS to occur given the absence of BIAs in the operational area. Amplitude Energy have observed during the BMG decommissioning campaign, dolphins approach DP vessels whilst undertaking foraging behaviours. However, observations indicate that groups and individuals transit quickly through the area, and do not remain in the area long enough for TTS and PTS to occur.		
Low-frequency cetaceans				
Minke whale - EPBC Act: • Cetacean.	• May or likely to occur. • No BIAs overlapped.	For the onset of TTS and PTS to occur, low-frequency cetaceans need to remain within 3.88 km and 0.61 km of continuous sound sources for 24-hours, respectively (Table 6-33). Previous studies which tracked humpback whales recorded average swimming speeds to range from 2.5 – 4.0 km/h, with some individuals swimming rapidly up to 15.6 km/h (Noad and Cato 2007). The operational area does not support habitats that encourage sedentary behaviours given the absence of BIAs in the operational area. Therefore, it is not credible for minke, sei, fin, pygmy blue and humpback whales to remain within 3.88 and 0.61 km of continuous sound sources for 24-hours for the onset of TTS and PTS. During recent DP vessel activities in Gippsland, there were hundreds of observations of whales (mainly humpback whales); whales were often observed in close range to vessels on DP. All whales were moving through the region, and at no point were whales observed to be nearing TTS or PTS exposure times.	Not credible	Not applicable
Sei whale - EPBC Act: • Vulnerable • Cetacean • Migratory			Not credible	Not applicable
Fin whale - EPBC Act: • Vulnerable • Cetacean • Migratory.			Not credible	Not applicable
Humpback whale - EPBC Act: • Cetacean • Migratory.			Not credible	Not applicable

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential auditory impairment or injury	Description of Potential Consequence	Inherent Consequence
Pygmy blue whale - EPBC Act: • Endangered • Cetacean • Migratory.	• Known to occur. • Foraging BIA overlapped. • During January to June, blue whales migrate through the operational area.	Despite the overlap with foraging BIA, it is not credible for blue whales to remain within 3.88 and 0.61 km of continuous sound sources for 24-hours for the onset of TTS and PTS to occur based on: • A type of foraging behaviour (observed in tagged blue whales) involving area restricted searches (ARS) was reported by Bailey et al. (2009). The area that the ARS occurred over ranged from 10 km up to 360 km in radius. Owen et al. (2016) also reported on ARS occurring across an area of 220 km^2 for a satellite tagged blue whale on the west coast of Australia. The maximum Activity TTS contours cover an area of <20 km^2. Therefore, if ARS were to occur it could be expected to extend well beyond any Activity TTS contour and preclude the onset of TTS. • If whales were to interrupt their foraging within the TTS zone to feed on a discrete patch of krill for >24 hours, the movement of plankton (and therefore krill) with the currents would move the feeding zone passively through the TTS zone before TTS onset. Minimum average currents in the operational area are around 0.15 m/s in May (RPS 2019). A discrete patch of krill moving with the plankton (and therefore the current) would move at 540 m/h, moving through the TTS zone well before TTS onset. • Blue whales have been recorded swimming at mean speeds of 2.8 km/hr +/- 2.2 km/hr whilst migrating and foraging (Owen, Jenner and Jenner, 2016) or faster (Möller *et al.* 2020). Sears and Perrin (2017) suggest blue whales most commonly swim at speeds of 3–6 km/hr but they can attain travel speeds of 7–20 km/hr. Accounting for swimming speeds across this range, a whale would be expected to move through any TTS zone associated with the Activity well before TTS onset. • Recent activities within the Otway have overlapped pygmy blue whale foraging periods and blue whales were observed during the activity. Reported behaviours were in line with published information on foraging behaviours and movements, that is, blue whales were not stationary for extended periods of time, or significantly restricted in their range, and were	Not credible	Not applicable

Marine Mammals (EPBC Act Listing)	Presence within Auditory Impairment or Injury EMBA	Potential auditory impairment or injury	Description of Potential Consequence	Inherent Consequence
		never considered to be at risk of TTS (MMO observation data, pers comms Beach Energy 2022).		
Southern right whale - EPBC Act: • Endangered • Cetacean • Migratory.	• Known to occur. • Migration BIA overlapped. • During May-June and September-October southern right whales pass through the operational area to move to and from coastal reproduction areas.	It is not considered credible for southern right whales to remain within 3.88 and 0.61 km of continuous sound sources for 24-hours for the onset of TTS and PTS to occur based on: • TTS and PTS values do not incorporate animal movement (necessary for migration) which prevent southern right whales reaching the range required for auditory impairment and injury to occur. • The operational area and TTS/PTS contours of the Activity overlap the migration BIA for southern right whales where they will be moving to/from preferred aggregation habitats in the Reproductive BIA, which is well outside of the potential TTS/PTS contours. The south-eastern population of southern right whales have one established calving ground located at Logans Beach (Watson et al., 2021), Warrnambool in south-west Victoria, located ~35 km west of the Annie-2 operational area (Figure 6-14). • Southern right whales are highly mobile species which travel thousands of kilometres between habitats used for essential life functions (DCCEEW 2024b). As indicated by the extent of the migration BIA, southern right whales move and migrate across the majority of the ocean off the southern coast of Australia (Figure 6-14). Connecting range movements will prevent southern right whales to remain within the range for over 24-hours required for auditory impairment and injury to occur. The longest movements are undertaken by non-calving whales, though calving whales have also been recorded at locations up to 700 km apart within a single season (DCCEEW 2024b); Figure 6-15 provides an example of the journey of a southern right whale cow-calf pair in the winter of 2020, where distance travelled averaged 40km per day from Cape Schanck, Victoria to Encounter Bay, SA. • As a result, southern right whales that may occur in the vicinity of the activity, are expected to be highly mobile and pass through the area before auditory impairment / injury can manifest.	Not credible	Not applicable

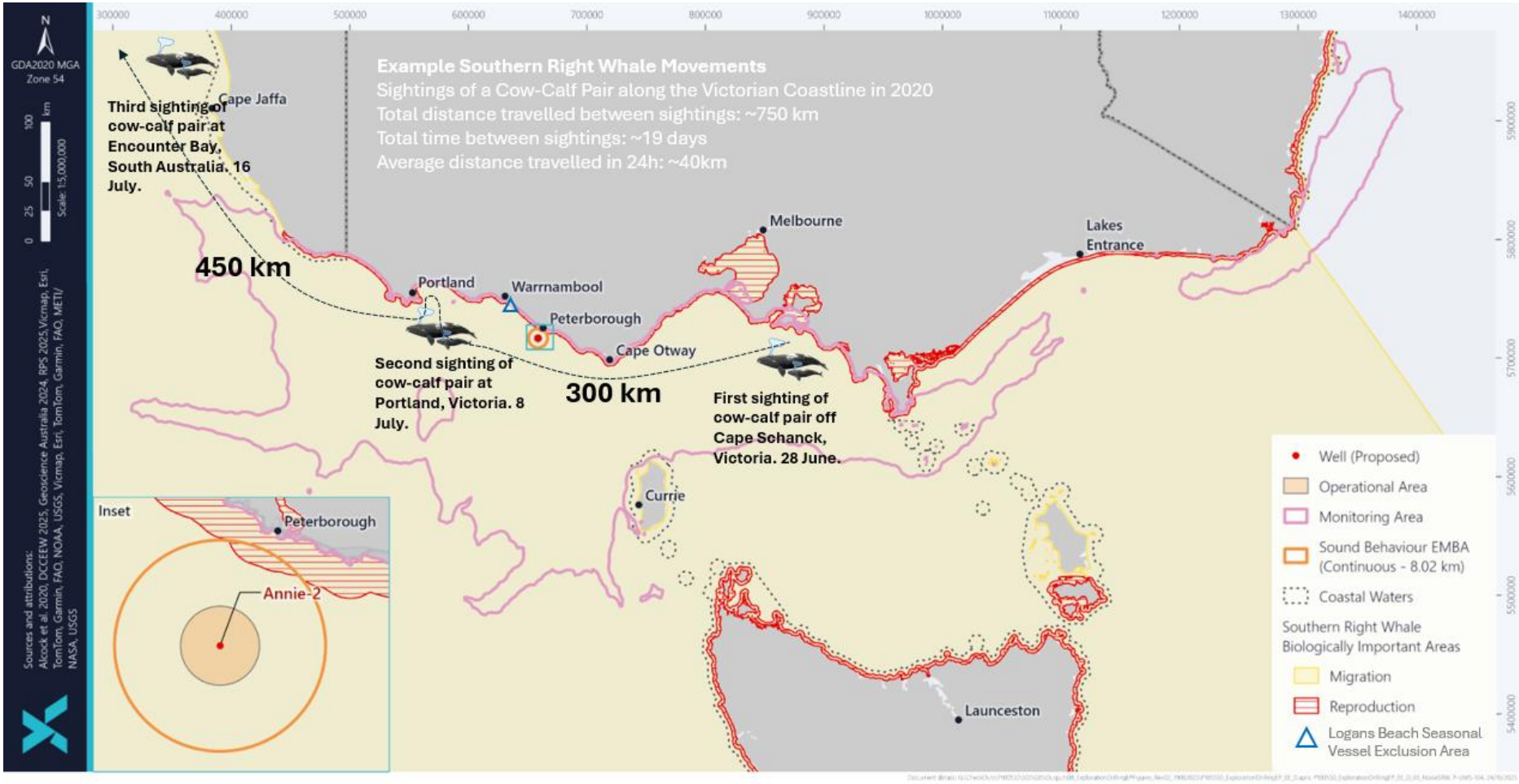


Figure 6-15 Example southern right whale movements from sightings data

Details in Table 6-34 suggest that the presence of marine mammals for extended (≥ 24 hour) periods, and consistently within close proximity to continuous sound sources, is not plausible.

Inherent Likelihood

Not applicable.

Inherent Risk Severity

Not applicable.

6.6.4.4 Risk: Change in Fauna Behaviour – Marine Turtles

Inherent Consequence Evaluation

Continuous sound emissions may cause behavioural changes to marine turtles depending on the distance between individual turtles and a continuous sound source. Relative risk criteria proposed by Popper et al. (2014) suggests that continuous sound sources have a high chance of causing behavioural change to turtles within the near vicinity of a source (tens of metres), and a moderate chance within the intermediate vicinity of a source (hundreds of metres). The relative risk reduces to a low chance of behavioural change within the far (thousands of metres) vicinity of a sound source (Popper et al., 2014). As such, continuous underwater sound emissions from the Activity have the potential to cause behavioural changes to marine turtles.

The operational area is used as a conservative behavioural EMBA for turtles exposed to continuous sounds. Table 6-35 provides details on the presence of EPBC-listed marine turtles within the operational area, potential behavioural changes that may occur and the resulting inherent consequence level for each marine turtle species.

Table 6-35: Inherent Consequence Levels - Continuous Sound - Behavioural Changes to Marine Turtles

Marine Turtles (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Loggerhead turtle - EPBC Act: • Endangered • Marine • Migratory.	• Likely to occur. • No BIAs overlapped.	Increase swimming speeds, and induce diving inferred from studies of other turtle species.	Despite the conservation status of the loggerhead turtle, because of the insignificance of behavioural change to marine turtles, the consequence is considered minor and local (small, variable, temporary behavioural changes within tens of metres of the source) impacts or disturbances to fauna.	Level 1
Green turtle - EPBC Act: • Vulnerable • Marine	• May occur. • No BIAs overlapped.	Observed green turtles increase swim speed and induce diving from approaching	Despite the conservation status of the green turtle, because of the insignificance of	Level 1

Marine Turtles (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
• Migratory.		vessels travelling at speeds less than 4 m/s in open waters (Hazel *et al*. 2007).	behavioural change to marine turtles, the consequence is considered minor and local (small, variable, temporary behavioural changes within tens of metres of the source) impacts or disturbances to fauna.	
Leatherback turtle - EPBC Act: • Endangered • Marine • Migratory.	• Likely to occur. • No BIAs overlapped.	Increase swimming speeds, and induce diving inferred from studies of other turtle species.	Despite the conservation status of the leatherback turtle, because of the insignificance of behavioural change to marine turtles, the consequence is considered minor and local (small, variable, temporary behavioural changes within tens of metres of the source) impacts or disturbances to fauna.	Level 1

Inherent Likelihood

The likelihood of behavioural changes to marine turtles depends on the temporal overlap of the potential presence of marine turtles whilst continuous sound sources are in the operational area, and the sensitivity of different species and individuals to noise.

A high likelihood of behavioural changes to marine turtles requires the following combination of factors:

- Drilling operations, support activities (vessel noise)
- Marine turtles present within tens of metres of continuous sound source.

The Atlas of Living Australia (Atlas of Living Australia) and the Victoria Biodiversity Atlas (VBA) was reviewed to understand the potential likelihood of marine turtle presence within the operational area (ALA 2025; Victorian DELWP 2025). No observations or occurrences of loggerhead turtles, green turtles or leatherback turtles were recorded within the behavioural EMBA. Therefore, the likelihood for all species is considered to be **Remote (E)**.

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to marine turtles from continuous sound emissions is considered to be **Low** (Table 6-36).

Table 6-36: Inherent Risk Severity - Continuous Sound - Behavioural Change to Marine turtles

Species	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Loggerhead turtle	1	E	Low
Green turtle	1	E	Low
Leatherback turtle	1	E	Low

6.6.4.5 Risk: Auditory Impairment or Injury - Marine Turtles

Inherent Consequence Evaluation

Depending on the sound levels received, continuous sound emissions may cause auditory impairment or injury to marine turtles from the onset of TTS and PTS, respectively.

Underwater sound modelling (Connell and Koessler 2025) predicted the continuous TTS and PTS thresholds for turtles was reached within distances listed in Table 6-37.

TTS and PTS thresholds for marine turtles are based on SEL_{24h} which assumes a turtle is consistently exposed to threshold levels for a 24-hour period. Distances predicted by the sound modelling (Connell and Koessler 2025) for the onset of TTS and PTS thresholds (SEL_{24h}) are listed in Table 6-37.

Table 6-37 infers the continuous underwater sound emissions from the Activity have the potential to cause:

- Potential TTS to turtles within 1.16 km
- Potential PTS to turtles within 500 m.

The EMBA for marine turtles exposed to continuous sounds is relatively small (1.16 km radius from the noise source that can operate throughout the operational area).

Table 6-37: Distance to TTS and PTS Threshold for Marine Turtles

Threshold Type	Threshold Weighted SEL_{24h} (dB re 1 μPa^2 s)	Maximum distance (km)	Relevant scenario/s
TTS	178	1.16	Scenario 10: MODU positioning under DP assisted by 3 AHTS
PTS	198	0.5	Scenario 10: MODU positioning under DP assisted by 3 AHTS

Given the absence of BIAs in the operational area, it is not considered credible for individual marine turtles to remain within 1.16 km and 500 m of continuous sound sources for 24-hours. As such, the onset of TTS and PTS to marine turtles as a result of the Activity is not anticipated. Any marine turtles observed in the operational area would be expected to be transiting through since the operational area does not support habitats which encourage sedentary behaviours.

Therefore, auditory impairments or injuries to marine turtles as a result of continuous sound emissions from the Activity is not evaluated further.

Inherent Likelihood

Not applicable.

Inherent Risk Severity

Not applicable.

6.6.4.6 Risk: Change in Fauna Behaviour – Fish

Inherent Consequence Evaluation

Sound pressure changes may be detected by fish with a swim bladder, as the gas within the swim bladder changes as a result of changing sound pressure. If the swim bladder is near the ear or connected to the hearing system, the hearing sensitivity is greater (Popper et al. 2014). Fish without a swim bladder cannot detect sound pressure. However, most fish species are expected to be able to detect particle motion. The most relevant criteria for considering potential impacts on fish and shellfish are considered to be those provided in the Sound Exposure Guidelines for Fishes and Sea Turtles (Popper et al. 2014). Fish species are grouped into hearing sensitivity categories defined by a number of factors such as their hearing anatomy, particle motion detection, the use of sound during navigation or mating and the presence or absence of a swim bladder:

- Fish with no swim bladder that are sensitive to particle motion and therefore only to a narrow band of frequencies (e.g. cartilaginous fish).
- Fish with swim bladders that do not appear to play a role in hearing (e.g. Scombridae). Therefore, they are only sensitive to particle motion and only show sensitivity to a narrow band of frequencies.
- Fish with swim bladders involved in hearing. These species are sensitive to both particle motion and sound pressure. The swim bladder may be close to but not intimately connected to the ear (e.g. eels) or mechanically linked to the ear (e.g. Clupeidae), with the latter representing fish of the greatest hearing sensitivity.
- Eggs and larvae.

Continuous sound emissions may cause behavioural changes to fish including eggs and larvae depending on the distance between fish and a continuous sound source. Relative risk criteria proposed by Popper et al. (2014) suggest a moderate risk of behavioural change to fish with no swim bladders, or those with bladders not involved in hearing, or to fish eggs or larvae, within the near (tens of metres) and intermediate (hundreds of metres) vicinity of a continuous sound source. Fish with swim bladders involved in hearing have a high risk of behavioural change within the near vicinity (tens of metres), and a moderate chance within the intermediate vicinity (hundreds of metres) from a continuous sound source (Popper *et al*. 2014).

There is risk of change in fish behaviour within hundreds of metres of vessels operating within the operational area. As a conservative approach to identify fish BIAs and habitats, the operational area is used as a conservative behavioural EMBA for fish including eggs and larvae exposed to continuous sound.

Table 6-38 provides details on the presence of fish species that are EPBC-listed and have First Nations cultural significance within the behavioural EMBA, potential behavioural changes that may occur and the resulting inherent consequence level for each species.

Table 6-38: Inherent Consequence Levels - Continuous Sound - Behavioural Changes to Fish

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
White shark - EPBC Act: • Vulnerable • Migratory.	• Known to occur. • No BIAs overlapped. • Seasonal presence in southern Australia during early summer.	No detectable relationship between vessel activity and shark residency for any species. This observation suggests habituation of sharks to high levels of vessel activity (Rider et al. 2021). Anthropogenic underwater sounds may trigger investigative or aversive behaviour in some species of shark (Chapuis et al. 2019). No significant behavioural change to sharks from continuous sound is anticipated.	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1
Eastern school shark - EPBC Act: • Critically endangered.	• May occur. • No BIAs overlapped.	No detectable relationship between vessel activity and shark residency for any species. This observation infers habituation of sharks to high levels of vessel activity (Rider et al. 2021). No significant behavioural change to sharks from continuous sound is anticipated.	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1
Shortfin mako EPBC Act: Migratory.	• Likely to occur. • No BIAs overlapped.	No detectable relationship between vessel activity and shark residency for any species. Anthropogenic underwater sounds may trigger investigative or aversive behaviour in some species of shark (Chapuis *et al*. 2019). No significant behavioural change to sharks from continuous sound is anticipated.	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Grey nurse shark (East Coast Population) EPBC Act: • Migratory. • Critically Endangered	• Likely to occur. • No BIAs overlapped.	No detectable relationship between vessel activity and shark residency for any species. This observation infers habituation of sharks to high levels of vessel activity (Rider et al. 2021). No significant behavioural change to sharks from continuous sound is anticipated.	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1
Porbeagle / mackerel shark - EPBC Act: • Migratory.	• Likely to occur. • No BIAs overlapped.	No detectable relationship between vessel activity and shark residency for any species. This observation infers habituation of sharks to high levels of vessel activity (Rider et al. 2021). No significant behavioural change to sharks from continuous sound is anticipated.	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1
Australian grayling - EPBC Act: • Vulnerable.	• Known to occur. • No BIAs overlapped.	Vessel noise can change fish behaviour (e.g. induce avoidance, alter swimming speed and direction, and alter schooling behaviour) (Popper et al. 2014).	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1
Blue warehou - EPBC Act: • Conservation dependent	• Known to occur. • No BIAs overlapped.	Vessel noise can change fish behaviour (e.g. induce avoidance, alter swimming speed and direction, and alter schooling behaviour) (Popper et al. 2014).	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1
Pipefish, pipehorse, seadragon and seahorse species - EPBC Act: • Marine.	• May occur. • No BIAs overlapped.	Vessel noise can change fish behaviour (e.g. induce avoidance, alter swimming speed and direction, and alter schooling behaviour) (Popper et al. 2014).	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Potential Behavioural Changes	Description of Potential Consequence	Inherent Consequence
Short-finned eels - • Not listed under the EPBC Act. • Culturally significant to First Nations people (Koster et al. 2021)	Seasonal presence in the Otway Basin and Bass Strait during spawning migration i.e. downstream migration of adult eels during late summer and autumn. Upstream migration of larvae and glass eels, where glass eels enter estuaries during mid-winter to late spring (VFA 2022b).	A recent study of Anguillid eels demonstrated that acoustic stimuli induced behavioural avoidance (increased swimming, speed and movements away from the source) in some European eel and river lamprey under experimental conditions where swimming space was severely restricted (Deleau et al. 2019).	Minor local (small, variable, temporary behavioural changes within tens of metres of the continuous sound source) impacts or disturbances to fauna.	Level 1

Inherent Likelihood

The likelihood of behavioural changes to fish including eggs and larvae depends on the temporal overlap of the potential presence of fish with continuous sound sources in the operational area.

For a moderate chance of the risk event of behavioural changes to fish to occur, the following combination of factors are required:

- Drilling operations, and support vessel-based activities (vessel noise).
- Fish present within tens of metres of continuous sound source.

Table 6-39 provides details on the frequency of recorded sighting of EPBC-listed fish in the Otway Basin to infer presence within the behavioural EMBA, description of likelihood and the resulting inherent likelihood level for each fish species.

Table 6-39: Inherent Likelihood Levels - Continuous Sound - Behavioural Changes to Fish

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Description of Likelihood	Description of Potential Consequence
White shark - EPBC Act: • Vulnerable • Migratory.	• Known to occur. • No BIAs overlapped. • Seasonal presence in southern	The risk event could occur if a white shark is present within the behavioural EMBA during drilling and vessel activities. White sharks are known to occur within the behavioural EMBA; therefore, the risk event is considered to be possible.	Possible (C)

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Description of Likelihood	Description of Potential Consequence
	Australia during early summer.		
Eastern school shark - EPBC Act: • Critically endangered.	• May occur. • No BIAs overlapped.	A freak combination of factors would be required for a school shark to be present within the behavioural EMBA during drilling and vessel activities. Behavioural changes to school sharks are not expected to occur from Activity continuous underwater sound emissions.	Remote (E)
Shortfin mako **EPBC Act listed** • **Migratory**	• Likely to occur. • No BIAs overlapped.	A rare combination of factors would be required for a shortfin mako to be present within the behavioural EMBA during drilling and vessel activities. The risk event is considered possible but unlikely to occur during the Activity.	Unlikely (D)
Grey nurse shark - EPBC Act: • Migratory.	• Likely to occur. • No BIAs overlapped.	A rare combination of factors would be required for a grey nurse shark to be present within the behavioural EMBA during drilling and vessel activities. The risk event is considered possible but unlikely to occur during the Activity.	Unlikely (D)
Porbeagle / mackerel shark - EPBC Act: • Migratory.	• Likely to occur. • No BIAs overlapped.	A rare combination of factors would be required for a mackerel shark to be present within the behavioural EMBA during drilling and vessel activities. The risk event is considered possible but unlikely to occur during the Activity.	Unlikely (D)
Australian grayling - EPBC Act: • Vulnerable.	• Known to occur. • No BIAs overlapped.	A freak combination of factors would be required for an Australian grayling to be present within the behavioural EMBA during drilling and vessel activities. Behavioural changes to the Australian grayling are not expected to occur from the Activity continuous underwater sound emissions.	Remote (E)
Blue warehou - EPBC Act: • Critically endangered.	• Known to occur. • No BIAs overlapped.	The risk event could occur when additional factors are present, such that a blue warehou is present within the behavioural EMBA during drilling and vessel activities. Blue warehou are known to occur within the behavioural EMBA; therefore, the occurrence of a change in behaviour is possible but considered doubtful.	Possible (C)
Pipefish, pipehorse, seadragon and seahorse species - EPBC Act: • Marine.	• May occur. • No BIAs overlapped.	A freak combination of factors would be required for Syngnathidae to be present within the behavioural EMBA during activities generating continuous sound. Behavioural changes to Syngnathidae are not expected to occur from the Activity.	Remote (E)
Short-finned eels	Seasonal presence in the Otway Basin and Bass Strait	The risk event could occur when additional factors are present, such that short-finned eels as adults during downstream spawning migration or	Possible (C)

Fish (EPBC Act Listing)	Presence within Behavioural EMBA	Description of Likelihood	Description of Potential Consequence
Not listed under the EPBC Act. Culturally significant to First Nations people (Koster et al. 2021)	during spawning migration i.e. downstream migration of adult eels during late summer and autumn. Upstream migration of larvae and glass eels, where glass eels enter estuaries during mid-winter to late spring (VFA 2022b).	as larvae / glass eels during upstream spawning migration is present within the behavioural EMBA during drilling and vessel activities. Short-finned eels are known to occur in the region and disperse widely in the ocean. Some individual eels may enter the behavioural EMBA; therefore, the occurrence of a change in behaviour is possible but considered doubtful.	

Inherent Risk Severity

The highest inherent risk severity of behavioural changes to fish including eggs and larvae from continuous sound emissions is **Low**.

Table 6-40 lists the inherent risk severity for each EPBC Act listed fish.

Table 6-40: Inherent Risk Severity – Continuous Sound - Behavioural Changes to Fish

Fish	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
White shark	1	C	Low
Eastern school shark	1	E	Low
Grey nurse shark	1	D	Low
Porbeagle / mackerel shark	1	D	Low
Australian grayling	1	E	Low
Blue warehou	1	C	Low
Pipefish, pipehorse, seadragon and seahorse species	1	E	Low
Short-finned eels	1	C	Low

6.6.4.7 Risk: Auditory Impairment or Injury – Fish

Inherent Consequence Evaluation

Depending on the sound levels received, continuous sound emissions may cause auditory impairment or injury to fish including eggs and larvae from the onset of TTS and recoverable injury, respectively.

Underwater sound modelling predicted the continuous TTS and recoverable injury thresholds for fish including eggs and larvae was reached within distances listed in Table 6-41 (Popper et al., 2014; Connell and Koessler 2025).

TTS threshold for fish is based on SEL_{12h} which assumes a fish is consistently exposed to threshold levels for a 12-hour period. Recoverable injury thresholds for fish are based on SEL_{48h} which assumes a fish is consistently exposed to threshold levels for a 48-hour period. Distances predicted for the onset of TTS and recoverable injury thresholds listed in Table 6-41 suggest the Activity continuous underwater sound emissions have the potential to cause:

- Potential auditory impairment (TTS) to fish within 130 m
- Potential auditory recoverable injury to fish within 30 m.

A 130 m buffer around the operational area defines the impairment and injury EMBA for fish exposed to continuous sounds.

Table 6-41: Continuous Sound - Distance to TTS and Recoverable Injury Thresholds for Fish

Threshold Type	Threshold SPL (Lp; dB re 1 µPa)	Maximum distance (km)	Relevant scenario/s
TTS	158 for 12 hours	0.13	Scenario 5: MODU Drilling Operations with Standby OSV and resupply
Recoverable injury	170 for 48 hours	0.03	Scenario 5: MODU Drilling Operations with Standby OSV and resupply

It is not considered credible for fish to remain within 130 m and 30 m of continuous sound sources for 12 hours and 48 hours for the onset of TTS and recoverable injury, respectively. The impairment and injury EMBA of 130 m does not support habitats that encourage site fidelity for fish including eggs and larvae.

As described in Section 6.6.4.6, sharks are considered to be habituated to relatively high levels of continuous sound and fish are expected to avoid continuous sound sources in the operational area. Fish that avoid continuous sound sources in the operational area further prevents individuals from remaining within the range required for auditory impairment or injury to occur.

As such, auditory impairments or injuries to fish from Activity continuous sound emissions is not evaluated further.

Inherent Likelihood

Not applicable.

Inherent Risk Severity

Not applicable.

6.6.5 Control Measures, ALARP, and Acceptability Assessment

Table 6-42 provides a summary of the control measures and ALARP and acceptability assessment relevant to continuous sound emissions. A detailed assessment has been undertaken and, as part of Amplitude Energy's relevant persons engagement for previous projects and impacts, Amplitude Energy has sought advice from Australian Antarctic Division (AAD) on measures implemented or considered by the AAD for voyages into sensitive areas.

Table 6-43 provides an extended ALARP assessment.

Table 6-42: Underwater Sound Emissions – Continuous ALARP, Control Measures and Acceptability Assessment

Underwater Sound Emissions - Continuous	
ALARP Decision Context and Justification	ALARP Decision Context: Type A Impacts from continuous sound emissions are well understood, however, there will always be some uncertainty regarding the reaction of individual animals. Thus, the assessment of impacts and risks has been conservative including the selection of disturbance criteria, modelling assumptions, and evaluation of potential consequence and likelihood. Activities are well practised, and there are no conflicts with company values, no partner interests, and no significant media interests. Because the potential impacts to marine fauna of conservation value are evaluated as Level 2, Amplitude Energy believes ALARP Decision Context A should apply to marine fauna with the exception of pygmy blue whales and southern right whales. ALARP Decision Context: Type B ALARP decision context B has been applied in relation to pygmy blue whales and southern right whales because there is a residual (moderate) risk in relation to behavioural disturbance to these species within a BIA. The conservation management and national recovery plans for these species indicate that at certain times of year and for certain activities, additional mitigation actions and an adaptive management plan may be required to maintain a precautionary approach. Further controls to manage residual risks have been considered and several additional controls have been adopted. The adopted controls ensure the Activity environmental outcomes can be met and are not inconsistent with the objectives and relevant actions of species recovery plans.
Control Measure	Source and Description of Control
CM08: Planned Maintenance System	Power generation and propulsion systems on vessels and the MODU will be operated in accordance with manufacturer's instructions and ongoing maintenance to ensure efficient operation. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from continuous sound.*
CM13: Offshore Operational Procedures	At a minimum, vessel operators shall adhere to the distances and vessel management practices of EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans describes strategies to ensure whales and dolphins are not harmed during offshore interactions with vessels and helicopters. Vessels adhere to the distances and vessel management practices of EPBC Regulations (Part 8) with increased caution zone of 500 m between whales and Activity vessels. *Risk event addressed: Change in fauna behaviour*
Additional Controls Adopted	Source and Description of Control
CM11: Titleholder Collaboration	Amplitude Energy will share sightings data including behavioural observations with other Titleholders in the Otway region and local research organisations to help inform each other's programs of work and respective risk reviews. This data can be used by appropriate parties for population and behavioural research and to inform management of impacts and risks from their own Activity activities.

CM15: Campaign Risk Review	Risk reviews are standard practice for offshore campaigns. The Amplitude Energy Environmental Protocol describes how environmental impact and risk management, including risk assessments, is undertaken for activities including offshore campaigns. As part of pre-campaign planning a risk review will be undertaken to re-assess campaign environmental impacts and risks to ensure ALARP and acceptability criteria are met. The assessment of environmental impacts and risks will focus on aspect: subsea noise, and risks to endangered whale species, specifically pygmy blue whales and southern right whales. The review framework is described in Section 12.10 and considers: • Model activity scenarios where additional details may have become available • Integrate into modelling the latest relevant sound exposure thresholds • Assess any new or updated information to determine if the rationale for previously discounted controls remains reasonable, or if additional measures are required to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level The review may be undertaken at different stages of the campaign planning, prior to a campaign activity commencing to assess any new or updated information to avoid or reduce overlap with endangered whales, where practicable, and to determine if additional controls are required to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from continuous sound.*
CM17: Offshore Victoria Whale Disturbance Risk Management Procedure	The impact and risk assessment has shown the potential for interaction between whales and the Activity, with some uncertainty around the likelihood of impacts. This uncertainty is addressed through the implementation of actions and adaptive management measures detailed in the Offshore Victoria Whale Disturbance Risk Management Procedure (Section 12.10). The Offshore Victoria Whale Disturbance Risk Management Procedure is applicable to all vessels engaged in petroleum activities associated with this Activity. The Offshore Victoria Whale Disturbance Risk Management Procedure provides details on level of whale observation effort, triggers for actions and the actions to be taken to avoid injuring whales and avoid behavioural disturbance to endangered whale species (pygmy blue whales and southern right whales), reduce the risk of displacement of a foraging pygmy blue whale, and minimise the risk of disturbance to a southern right whale in a migration and/or reproduction area (EPO16). The Offshore Victoria Whale Disturbance Risk Management Procedure details requirements of the Activity which are addressed and summarised in Section 6.6.5 and Section 12.10. The requirements have been developed to account for the largest noise contours that may be produced throughout the duration of the activity. As such, the requirements are based on the distances predicted from the modelling of continuous noise emissions (see Section 6.6) and are therefore considered conservative and appropriate for activities which produce impulsive noise emissions. *Risk event addressed: Change in fauna behaviour, auditory impairment or auditory injury from continuous sound.*
Impact and Risk Summary	

Residual Impact Consequence	Change in ambient sound from continuous sound: Level 1 – Minor local impacts or disturbances to flora/fauna, nil to negligible remedial / recovery works on land/water systems.
Residual Risk Consequence	Level 2 – Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function; remedial, recovery work to land, or water systems over days / weeks.
Likelihood	Due to the nature and scale of the proposed activities, and considering the proposed control, the likelihood of behavioural changes due to continuous underwater sound emissions is assessed as: • Possible (C) - Conceivable and could occur at some time. Could occur during the activity although a rare combination of factors would be required for the occurrence.
Residual Risk	Behavioural change, auditory impairment or auditory injury from continuous sound: Moderate.
Demonstration of Acceptability	
Principles of ESD	Underwater sound emissions are evaluated as having Level 2 consequence which is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Noise emissions will be managed in accordance with legislative requirements. Noise emissions will: • Not impact on the recovery of marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017a). • Be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area in accordance with DAWE guidance on key terms (2021), where the action is needed to achieve the objective of the blue whale CMP (DoE 2015a). • Not impact the recovery of the blue whale as per the CMP for the Blue Whale (DoE 2015a). • Not prevent southern right whales utilising a migration BIA or HCTS, or cause auditory impairment (DCCEEW 2024b). • Be managed such that the risk of behavioural disturbance to southern right whales within BIA's and HCTS is minimised (DCCEEW 2024b). • Not impact the recovery of the southern right whale as per the National Recovery Plan for the southern Right Whale (DCCEEW 2024b). • Not impact the recovery of the white shark as per the Recovery Plan for the White Shark (DSEWPaC 2013a). Actions from the CMP for the Blue Whale (DoE 2015a) applicable to the activity in relation to assessing and addressing anthropogenic noise have been addressed as per: • Assessing the effect of anthropogenic noise on blue whale behaviour. Section 6.5.4 assesses the effects of anthropogenic noise from the activity on blue whale behaviour. • Be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area. Mitigation measures will be implemented to reduce the risk of displacement occurring during operations

	where modelling indicates that behavioural disturbance within a Foraging Area may occur (DAWE 2021). Actions from the National Recovery Plan for the southern right whale (Eubalaena australis) (DCCEEW 2024b) applicable to the activity in relation to assessing and addressing anthropogenic sound emissions have been addressed as per: • Assessing the effect of anthropogenic noise on southern right whale behaviour (Sections 6.5 and 6.6 assess the effects of anthropogenic noise from the activity on southern right whale behaviour). • Anthropogenic noise in BIAs and habitat critical to the survival of the Southern right whale will be managed such that any southern right whale continues to utilise the area without auditory impairment and is not displaced from these areas. • Sections 6.5 and 6.6 demonstrates that national policies (e.g. EPBC Regulations (Part 8) and Victorian (Marine Mammals) Regulations) were identified and included. • Sections 6.5 and 6.6 demonstrate that the activity can be conducted in a manner that is not inconsistent with the National Recovery Plan, the risk of behavioural disturbance is minimised to ALARP and ensures that the activity will not result in injury of southern right whale.
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11) Activities will be undertaken in accordance with the Implementation Strategy (Section 11.0).
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice.
Other requirements	No objections or claims have been received during consultation regarding underwater sound emissions.
Demonstration of meeting the defined acceptable levels in the OPP	Section 8.2.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with underwater sound emissions – continuous. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed below. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for underwater sound emissions – impulsive: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP.

	• No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	Acceptable Amplitude Energy has determined that impacts and risks related to continuous sound emissions are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advices, and significant impact guidelines for MNES*. • Relevant historical feedback from relevant persons (Australian Antarctic Division) for activities of similar nature and scale to the Project has been used to inform mitigation measures. • No other relevant feedback from stakeholders has been received that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures. To manage impacts to receptors to acceptable levels, the following EPOs (equivalent to OPP EPOs as detailed in Appendix 1 -) have been applied: EPO14: Impacts to marine fauna from underwater anthropogenic noise emissions will be limited to temporary* behavioural change localised** to the noise source. **Not exceeding the duration of the activity component (i.e. vessel campaign) (described in Section3.2).* ***Not exceeding the noise EMBA defined for the activity (described in Section 6.6.4).* EPO15: No death or injury[8] to EPBC Act listed threatened, migratory or cetacean species. EPO16: Project related underwater noise within biologically important areas[8] and habitat critical to the survival of relevant species will be managed through the implementation of Amplitude Energy Offshore Victoria Whale Disturbance Risk Management Process, such that: • Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. • Southern right whales are not prevented from utilising biologically important areas[9] or habitat critical to the survival of a species or cause auditory impairment. • The risk of behavioural disturbance to southern right whales will be limited to temporary behavioural disturbance of individuals. EPO17: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.

[8] *Injury to cetaceans as defined as either auditory impairment (TTS or PTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (Houser 2021; Finneran 2024). Auditory injury may or may not result in a permanent threshold shift (PTS).*

[9] *Biologically important behaviours such as reproduction, feeding, migration and resting (DCCEEW, 2023).*

Table 6-43: Underwater Sound Emissions – Continuous - extended ALARP Assessment

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
Eliminate Activity	PTS, TTS and behavioural disturbance of whales from vessel noise. Rated as Level 2 consequence and Low risk in relation to these project activities.	By not undertaking the activity, sound sources would be eliminated.	N/A	N/A	N/A	Reject. Rationale: Given that DAWE assesses the potential impacts of shipping and industrial noise as 'minor' i.e., 'individuals are affected but no affect at population level' the potential environmental benefits of not undertaking the activity in relation to noise generation are also considered minor. Amplitude Energy does not consider this control as feasible.
Eliminate use of DP vessels during defined periods when blue whales are more likely to occur.	As above.	By avoiding periods when blue whales are more likely to occur, impacts to species of conservation significance during times when they may be in the region and undertaking biologically important behaviours can be eliminated (for the species of concern).	This type of control is not typical of entire BIAs such as blue whale foraging areas, which encompass the entire south east coastline. No offshore industry in the region limits vessel activity to being outside either pygmy blue whale or southern right whale season within the broader species BIAs. It would be impossible for multiple existing marine industries to operate in offshore south east Australia if avoidance of the blue whale foraging season was adopted as a control measure.	Eliminating the use of DP vessels during blue whale seasons would preclude the activity entirely because of the many variables that will influence the activity schedule. Limits schedule flexibility so as to make it impossible to operate.	This has the same or near same effect as eliminating the activity. With a MODU being brought into the region to complete multiple well campaigns for multiple operators, there is very limited scope to influence the activity schedules without it translating in practice to forfeit of the one or more of the contracted activities; this is effectively the same as 'eliminate the activity' which has been ruled out above. Due to the scale of effort and investment associated with the activity, the risk introduced of having to delay the activity due to blue whale season is not considered tolerable. Such a restriction would make operating impracticable and would not be compatible with the safe and efficient operation of the Activity.	Reject. Rationale: Option not feasible. In this region, blue whales may occur over much of the summer months and into autumn. High-cost risk in the case of delays whereby the well had to be deferred.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
Eliminate use of DP vessels during defined periods when southern right whales are more likely to occur. Including: • Consideration of changing the consortium drilling rig schedule • Limiting number of vessels required during MODU hook-up / mooring activities	As above.	By avoiding periods southern right whales are more likely to occur, impacts to species of conservation significance during times when they may be in the region and undertaking biologically important behaviours can be eliminated (for the species of concern).	There are examples of this type of control being applied in well defined, discrete areas, for example, the exclusion of vessels from Logans Beach, Warrnambool (June-Oct) which is an established nursery for southern right whales in the south east, away from major ports and existing built environment. This type of control is not typical of entire BIAs such as or southern right whale Reproduction BIAs or HCTS, which encompass the entire south east coastline including major Ports. No offshore industry in the region limits vessel activity to being outside southern right whale season within the broader species BIAs. It would be impossible for multiple existing marine industries to operate in offshore south east Australia if avoidance of either blue whale or southern right whale seasons were adopted as a control measure.	Eliminating the use of DP vessels during southern right whale seasons would preclude the activity entirely because of the many variables that will influence the activity schedule. Eliminating the use of one or more vessels would reduce the efficiency of the activity significantly; the activity would take longer because there would be periods when the MODU or broader campaign would be waiting on vessel services to proceed with components of the activity. This reduced efficiency is compounded by the exposure to poor weather which can occur at any time of year within this region, and which can reduce the windows of opportunity available to undertake activities such as hook-up and re-supply. Limits schedule flexibility to make it impossible to operate.	This has the same or near same effect as eliminating the activity. With a MODU being brought into the region to complete multiple well campaigns for multiple operators, there is very limited scope to influence the activity schedules without it translating in practice to forfeit of the one or more of the contracted activities; this is effectively the same as 'eliminate the activity' which has been ruled out above. This introduces significant risks, whereby a commitment to avoid doing well construction activities and the necessary sub-activities (MODU mooring) during southern right whale season would result in a high chance the activity would not take place due to potential schedule delays (weather, operations). Due to the scale of effort and investment associated with the activity, the risk introduced of having to delay the activity due to southern right whale season is not considered tolerable. Limiting number of vessels required during MODU connection/ mooring is considered a restriction that would make operating impracticable and would not be compatible with the safe and efficient operation of the Activity.	Reject. Rationale: Option not feasible. In this region, southern right whales occur over winter. Would in practice carry a high risk of failing, and high-cost risk in the case of delays whereby the well had to be deferred.
Anchoring of vessels to hold position rather than use DP	As above.	By anchoring vessels, sound emissions related to vessel DP would be reduced.	This is not feasible as the support vessels are required to move during the activities (i.e., not operate from a static position). Vessels need to be able to maintain position to within a small margin of error, close to offshore facilities and other vessels (in the case of MODU support vessels); anchoring would not allow for this.	Not considered feasible.	N/A	Reject. Rationale: Option not feasible. Vessels need to be able to hold position and maintain a consistent pace and anchoring would

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						restrict this. Would increase seabed disturbance.
Limit power to thrusters of DP vessels and MODU to reduce underwater sound contours	As above.	Limiting thruster power could reduce impacts from subsea underwater sound. Limiting thruster power is possible where activities can be first made safe. This action would not be immediate but should reduce the risk of displacement if whales are foraging or transiting in the vicinity.	Not typically applied to vessels as thruster power is determined by safety limits and operational requirements. Thruster levels are optimised to operating modes and conditions but can be reduced if safe to do so.	Considered feasible if safe to reduce thruster power.	N/A	Implement. Rationale: Thruster power can be reduced if safe to do so. Integrated into CM17: Offshore Victoria Whale Disturbance Risk Management Procedure.
DP vessel underwater sound reduction in design (DNV Silent notation)	As above.	Vessel design can reduce underwater sound.	Relevant persons feedback: Australian Antarctic Division (AAD) advised their new state of the art survey/ice breaker vessel Nuyina which will operate in the Antarctic has been designed to reduce underwater sound and vibration. The vessel has been assigned DNV Silent R notation equivalence at 8 kn electric propulsion for science acoustic work. Currently not typical for industry. A review of industry vessels operating inside and outside of Australian waters has not identified any vessels assigned the DNV Silent notation.	Given the current absence of industry vessels with silent notation, this measure is not considered to be feasible for the project.	N/A	Reject. Rationale: Option not feasible.
Implement safe suspension of DP operations if a pygmy blue whale or southern right whale enters the DP observation zone.	As above.	Safely suspending vessel DP or MODU DP could reduce impacts from subsea underwater sound. Suspending vessel DP is possible where activities can be first made safe, and vessels are able to move maintain station or move away on stern thrusters normally used for transit. This action would not be immediate but should reduce the risk of displacement if whales are foraging (PBW) or transiting (SRW) in the vicinity.	Not typically applied to DP vessels or MODUs. Actions to suspend noise sources are typically applied to activities that generate impulsive underwater sound such as piling and seismic survey.	Cost associated with suspending DP operations, requiring suspension of Cargo or mooring Ops. Potential cost >$4M.	Retrieval of subsea equipment (e.g. ROV) required prior to suspending DP operations. Increased frequency of handling through the splash zone and on deck increases personnel H/S risk exposure. This is considered manageable through existing systems for control of work. Good reliability at project operational level.	Implement. Rationale: reduces risk of displacement of whales. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea noise. Integrated into CM17: Offshore Victoria Whale Disturbance Risk Management Procedure.
Increase pre-start observation period from 30-minutes to 1-hour to account for longer-dive behaviours of blue whales or southern right whales	As above	No benefit for the location of this activity and the extent of the behavioural disturbance observation zone: observation period offers sufficient time to detect	30-minute prestart observations are recognised good practice. It would also be good practice to extend the observation time if the activities were being undertaken in habitat where long dives would be expected to occur, which is not the case for the activities provided for in this EP. **Southern right whales** - the activity (and behavioural disturbance observation zone) is within SRW migration BIA, and adjacent to SRW Reproduction BIA. Typical dive durations of SRW are 5-20 minutes on migration and 2-6 minutes when undertaking reproductive behaviours (Best and Schell (1996), Mate et al (2011),	Cost associated with schedule delays for additional prestart observation time, which could accumulate to be substantial across 3 vessels and the MODU over the activity timeframe.	No new risks. Additional time required to complete the activity, meaning increased duration of exposure to activity risks provided for under this EP.	Reject. Existing 30-minute prestart is appropriately conservative accounting for the area of operation in relation to blue whale and southern right whale BIAs

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
		BW in the activity observation area.	Parks et al (2019). Therefore a 30-minute prestart observation period offers sufficient time to detect SRW in the activity observation area. **Blue whales** - blue whale dive times are typically 5-10 minutes for dive depths of 100-200m, and 20-35 minutes in for dive depths of 300-500m (Ferreira et al (2024), Owen et al (2016), Gill et al (2011), Double et al (2014), Sprogis et al (2023). The activity (and behavioural disturbance observation zone) is within relatively shallow water (56m), therefore deep foraging dives are not physically possible in the activity area and the depths and times associated with deep foraging dives are not applicable in the activity area. Therefore a 30-minute prestart observation period offers sufficient time to detect PBW in the activity observation area.			and expected dive times for these species in this area.
Deploy bubble curtains around MODU and / or vessels.	As above.	Increased confidence no foraging blue whales or southern right whales in the vicinity which could be injured or displaced.	Bubble curtains were raised as an idea during project ALARP workshops and also by the AAD during consultation. No known examples of bubble curtains being used as mitigation for DP vessels.	Not considered feasible	Discussions with technology providers indicates the deployment of bubble curtains offshore in environments like the Otway presents a number of challenges, including: Providing oil-free air to the seabed would require a large quantity of large diesel-run air compressors. At least one additional dedicated DP support vessel would likely be required for these compressors. Currents – Bubble curtains are drastically impacted by currents. Current speeds and directional shifts with wind and tide, which in the dynamic environment of the Otway would result in bubble curtains being distorted and ineffective by the time bubbles rise from the seabed to surface. Alternate options such as the deployment of hoses on close to thruster locations or offset on buoys present SIMOPS and safety risks including congestion of the vessel and MODU safety zone and potential interference with/from thrusters and moorings. As a result, the use of bubble curtains is not considered	Reject. Option not feasible.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
					effective, feasible or practicable.	
Opportunistic monitoring from project vessel crew and helicopter crew. Crew observers are inducted into Monitoring and Communications Protocols including requirement to report all sightings to vessel master. Trained crew to continue observations during MMO rest breaks.	As above.	Increased confidence no foraging blue whales or southern right whales in the vicinity which could be injured or displaced.	Yes. Opportunistic monitoring is typically integrated into offshore industry operations including from vessels and helicopters (where used for crew changes). Crew are typically engaged to support MMO and are experienced in keeping watch offshore.	Costs associated with inducting crew accounted for in planning.	No introduced risks. Good reliability at the project operational level.	Implement. Rationale: supports reducing risk of displacement. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions. Integrated into CM17: Offshore Victoria Whale Disturbance Risk Management Procedure.
A dedicated MMO on each vessel and MODU used throughout the activity.	As above.	Increased confidence of no southern right whales or foraging blue whales in the vicinity which could be injured or displaced. Higher confidence in identifying whales and whale behaviour compared to opportunistic monitoring alone.	Yes. This has been applied to vessels in this region (known foraging blue whale BIA and southern right whale migration BIA) where important behaviours are known to occur. Feedback from Beach Energy undertaking drilling in the Otway Basin was that MMOs on the MODU were not effective due to the MODU having restricted viewing platforms. Dedicated MMOs on each support vessel was seen as more effective. This is also Amplitude Energy's experience during offshore decommissioning activities in the Gippsland offshore Basin in 2023 and 2024. In addition, having a dedicated MMO on each vessel means that pre-activity start, and ongoing observations can be conducted within the full Activity Action Zone (see CM17: Amplitude Energy Offshore Whale Disturbance Risk Management Procedure) for activities where observations are limited. Having a dedicated MMO on each vessel is more effective than having an additional dedicated MMO on the same vessel. AAD advised in relation to rock blasting activities (wharf construction) in the Antarctic, dedicated MMOs were used.	Additional cost of MMO mob/demob and time offshore accounted for in planning.	No introduced risks. Good reliability at the project operational level.	Implement for vessels only. Rationale: supports reducing risk of displacement. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions. Integrated into CM17: Offshore Victoria Whale Disturbance Risk Management Procedure.
Additional dedicated MMO when daylight hours extend beyond 12-hours a day.	As above.	Increased confidence no southern right whales or foraging blue whales in the vicinity which could be displaced. Higher confidence in identifying whales and whale behaviour compared to opportunistic monitoring alone. Risks would remain Low.	This has been applied to vessels in this region where important behaviours are known to occur to manage fatigue issues for long duration activities during periods daylight hours are >12 hour. Crew member (e.g. Officer of the Watch) will receive training from the MMO in whale observation and distance estimation to assist the MMO during daylight hours.	Additional cost of MMO mob/demob and time offshore not accounted for in planning. Potential for limited bed space on vessels. Time to train vessel crew in whale ID and distance estimation.	Marginal bed space on smaller vessel may drive the selection of a larger (and potentially noisier) vessel. MMOs have good reliability at the project operational level. Crew / Officers of the Watch are experienced in working and watch keeping at sea.	Implement for vessels Rationale: supports reducing risk of displacement. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions. Integrated into CM17: Offshore Victoria Whale Disturbance Risk Management Procedure.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
Vessel onboarding process includes consideration of relative nature/scale of potential subsea noise impacts	As above.	Provides opportunity to influence reduction in subsea noise associated with the activity.	There are examples of vessels being designed to minimise noise (e.g., Australian Antarctic Research vessel) but typically vessels are selected based on capability for the work scope.	Cost associated with time for vessel evaluations.	No introduced risks.	Implement Rationale: supports reducing risk of displacement. Costs are not considered to be grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions. Integrated into CM15: Campaign Risk Review.
Limiting resupply and other DP vessel operations such as mooring deployment or retrieval to daylight hours to enable visual detection of whales, i.e. no night-time DP vessel operations	As above.	Increased confidence no foraging blue whales or southern right whales in the vicinity which could be injured or displaced. Risks would remain Low.	This has not been applied to vessels in this region (known foraging blue whale area and southern right whale migration BIA) where important behaviours are known to occur. MODU resupply may take up to 8 hrs, MODU hook-up 5-7 days and mooring deployment 7-14. Limiting operations to daylight hours would likely double the time taken to do these activities (est. additional cost $>5M), and which may then be compounded by the additional exposure to weather delays. This would result in delays to the commencement of drilling and then moving away from the operational area. Thus, limiting these activities to daylight hours is not operationally practicable, or desirable in terms of total duration of activity noise in the area. Additional controls such as pre-start surveys and adaptive management for night operations, as detailed in CM17: Amplitude Energy Whale Management Procedure, will ensure risk are managed to the acceptable level. These controls far exceed the levels of precaution typically applied by other industries such as shipping and fishing that operate inside blue whale and southern right whale BIAs, including southern right whale HCTS.	MODU resupply may take up to 8 hrs (every 2-3 days), MODU hook-up (5-7 days), mooring deployment (7-14 days). Thus, limiting these activities to daylight hours would result in significant additional costs with limited increased benefit with the additional controls implemented as per CM17: Amplitude Energy Whale Management Procedure.	Additional risks having vessels on standby waiting for daylight hours to undertake activity.	Reject Rationale: significant costs with limited increased benefit
No DP operations at night time or during low visibility periods in event blue or southern right whales are sighted preceding night time or low visibility periods.	As above.	Increased confidence no foraging blue whales or southern right whales in the vicinity during night time or during low visibility periods which could be injured or displaced. Risks would remain Low.	As described above limiting activities to daylight operations has not been previously applied under other environment plans (EPs) in this region; it is not operationally possible. Including criteria to suspend DP operations (if safe to do so) based on endangered whale sightings ahead of night time or low visibility periods has been included in other EPs. Avoiding DP activities at night has the potential to reduce the risk of behavioural disturbance to southern right whales or blue whales that may be in the observation zone, however, it is not operationally possible to complete the activity without operations at night, so the control measures and performance standards need to balance risk to each species with operational needs. Blue whales forage and feed in patterns over differing extents depending on factors including krill distribution and density. If multiple blue whales are observed over several hours, this could be an indication that whales may be undertaking area restricted searches (ARS) or mesoscale searches (refer Figure 6-11 in the observation zone, and that these searches are overlapping the observation zone. Observing only one or two whales over several hours is less likely to be an indication of an ARS but may indicate broad scale search over larger areas and less likely restricted to the activity observation zone but rather passing through and therefore at negligible risk of disturbance.	Limiting DP operations during night time or low visibility periods will result in additional costs.	Additional risks having vessels on standby waiting for daylight hours to undertake observations and recommence the activity.	Implement Rationale: supports reducing risk of displacement. Costs are not considered disproportionate given the benefit that the control measure may provide during peak southern right whale reproductive /migration periods and blue whale foraging periods where whales could be present, and the risk reduction associated with undertaking observation in the period (up to 3 hours) ahead of night time or during low visibility periods, and ceasing DP

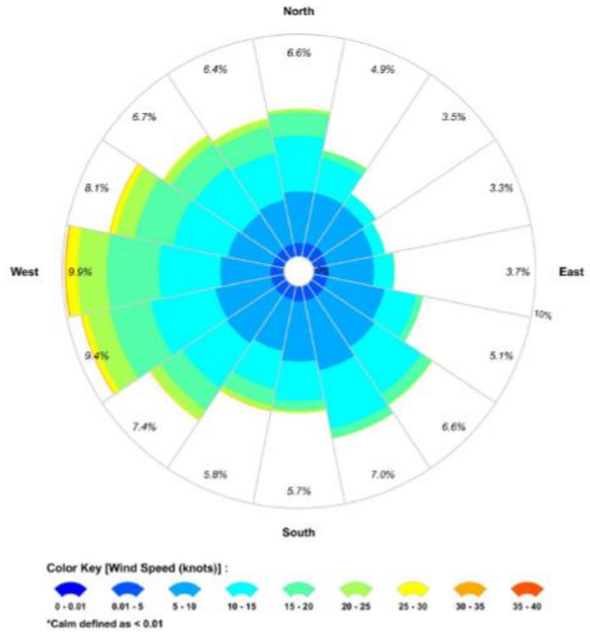
Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
			There are no specific precedents for controls to manage the risk vessel-related behavioural disturbance across these types of behaviours. Considering the search patterns and typical speeds for blue whales it is reasoned that if there are 3 sightings of blue whales within the 3-hour period ahead of sunset, then this provides an indication that either an ARS or mesoscale search pattern may be overlapping the operational area, and therefore cause to suspend DP operations to avoid possible behavioural disturbance. The activity operational area is within a migration BIA for Southern right whales. Southern right whales observed within the portion of the activity observation zone that overlaps the migration BIA are therefore considered to be migrating regardless of the number of whales sighted and frequency of sightings. Migration occurs from/to offshore feeding areas to/from reproductive BIA at the coast (refer Figure 6-13). It is within the reproduction BIA that whales would be calving, nursing and resting, and may be more vulnerable to disturbance from noise generated by vessels. If any southern right whale is observed in the area of overlap between the activity observation zone and the reproductive BIA, but is not observed leaving the zone before sunset, then this is cause to suspend DP operations to avoid possible behavioural disturbance to the whale overnight. The 3-sightings in 3-hours measure is also still applied, because this level of sightings may indicate that a southern right whale (potentially with calf), is resting in the general area, and slowly moving back and forth from the area of overlap between the DP observation zone and reproductive BIA. The measures above are designed with the specific whale behaviours in mind and are considered to be conservative and precautionary. There are multiple ports and vessel traffic within southern right whale reproductive BIA's with no such controls in place. Further to the above, EPS17.6 requires that DP Operations are suspended (if safe to do so) before any whale is observed within the Activity DP TTS zone continuously for 20 hours (i.e. less than the conservatively adopted 24 hours over which the sound exposure level is modelled). By way of examples if a whale is observed within 30 minutes of sunrise in the TTS zone it should be assumed that the whale was present in the TTS zone throughout the preceding night period unless there is clear evidence to the contrary and these hours are included within the 20 hours. Further if during DP operations any whale is observed within the Activity DP TTS zone prior to sunset, it should be assumed that the whale could remain within the TTS zone until sunrise unless there is clear evidence to the contrary, and the 20 hour time frame includes the night time hours given the inability to observe whale movement overnight. These situations are hypothetical and the measure is highly precautionary given the conservatism applied to the modelling of accumulated sound exposure levels which assumes no movement of the whale.			operations if they are sighted.
Limit the number of vessels in the operational area during resupply activities to the minimum required for safe operations (i.e. vessel	As above	Provides opportunity to reduce the subsea noise associated with the activity, reducing the risk of displacement of southern right whales within the reproductive BIA.	The presence of vessels in the operational area is driven by operational requirements. Vessel operations are minimised as part of normal operating requirements. This has been applied to vessels in this region (known southern right reproductive BIA) where important behaviours are known to occur. During resupply activities there are typically two vessels (being the vessel undertaking resupply and vessel on standby to support other rig activities & operations including maintenance) and the MODU will be present in the operational area. Whilst not common, there may be circumstances, to ensure	Additional activities in the operational area requiring a third vessel cannot be undertaken during resupply activities unless deemed as required for safe operations. Costs associated with delaying these activities.	No introduced risks, given that the control measure limits the vessels to the minimum that are required to maintain safe operations and applying the control during resupply activities.	Implement for resupply activities. Supports reducing risk of displacement of southern right whales from reproductive BIA, given the lower subsea noise, and thereby reducing the

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
undertaking resupply and vessel on standby).			safe operations, whereby a third vessel could be required in the operational area, for example to undertake ROV inspection of mooring equipment ahead of inclement weather.			overlap with the reproductive BIA.
If blue whales or southern right whales are observed in the DP observation zone during resupply activities (specifically cargo lifting operations), the resupply vessel will complete the cargo lift, make the load safe and move away from the whale observed in the DP observation zone within 2 hours.	As above.	Provides opportunity to reduce the subsea noise associated with the activity, safely suspending cargo lifting operations if a whale is sighted in the DP observation zone could reduce impacts from subsea underwater sound. This action would not be immediate but should reduce the risk of displacement if whales are foraging (PBW) or transiting (SRW) in the vicinity.	The presence of vessels in the operational area is driven by operational requirements. Vessel operations are minimised as part of normal operating requirements. This has been applied to vessels in this region (known foraging blue whale BIA and southern right reproductive / migration BIA) where important behaviours are known to occur.	Suspension of resupply (cargo lift operations) activities. Delays to unloading the cargo, and vessel having to remobilise alongside the MODU to complete resupply activity. Costs associated with vessel delay to unload cargo.	Additional risks having the supply vessel ceasing cargo lift operations, move off from the MODU, and then come back alongside to complete the resupply activity.	Implement Rationale: reduces risk of displacement of whales. Costs are not grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea noise. Integrated into CM17: Offshore Victoria Whale Disturbance Risk Management Procedure.
Drone surveillance from vessel	As above.	May provide slight increase in visibility beyond nominal MMO viewing platform height for the duration of drone flight. This could provide slight increased confidence no foraging blue whales in the vicinity which could be injured or displaced. Risks would remain Low.	Not for this activity type. Some examples of drone use nearshore and offshore particularly for scientific study, though weather sensitive, and not for sustained periods.	Additional cost of drone hire/purchase and pilot for the duration of the campaign estimated circa $60K.	Dropped object risks. Risks of loss of equipment. Not considered reliable at the operational level for this activity.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk, whilst adding cost and additional operational HSEC risks. The costs/risks are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions.
Monitor oceanographic precursors (early warning system)	As above.	There are oceanographic and biological precursors such as SST, eddies and primary production which may provide an indication of increased secondary production (including krill), which may then be conducive to successful foraging (e.g. Murphy et al. 2017). The benefit of this early warning system is dependent on reliability of these precursors as indicators of blue whale	Not typically applied in offshore industries. Primary productivity measurements are not an accurate pre-cursor to feeding activity. There can be a significant lag between peaks in Chl-A levels and peaks in krill presence. Other factors determine presence of foraging marine mammals aside from prey levels.	Administrative costs of monitoring and interpreting environmental precursors estimated circa $50K.	Reliability is likely to be low, which could lead to many false positives with significant cost and schedule impact to the project.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
		foraging; currently, reliability is likely to be low, which could lead to many false positives. Risks would remain Low.				operational subsea underwater sound emissions.
Satellite imagery	As above.	Satellite imagery can be used to gather oceanographic and biological information to support the understanding of presence of marine mammals in the area. Risks would remain Low.	Not typically applied in offshore industries. Sourcing and interrogating satellite imagery is possible, however at the operational level is not considered reliable.	Administrative costs of monitoring and interpreting satellite images.	Reliability is likely to be low with limited additional benefit relative to accepted controls.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions.
Infra-red systems / night vision systems	As above.	Infra-red (IR) and night vision systems could enhance the ability of MMOs to visually detect the presence of whales. Risks would remain Low.	Infra-red systems are not available as a real-time monitoring tool for operations and have the following limitations: Poor performance of the system in sea states greater than Beaufort Sea State 4 (due to the inability to adequately stabilise the camera) (Verfuss et al. 2018). Conditions such as fog, drizzle, rain limit detections to be made using IR (Verfuss et al. 2018). Detection range for large baleen whales is 1 to 3 km. Trials of night-time detection technologies have been completed by operators in the Otway during 2025 concluded that the technology was not yet suitable for offshore campaigns (pers comms Otway Rig Consortium, 2025).	Additional cost of IR tech hire/purchase and operators for the duration of the campaign estimated circa $100K plus additional MMO's on each vessel to manage night-time observations (~400K)	Reliability is likely to be low with limited additional benefit relative to accepted controls.	Reject Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions.
Passive Acoustic Monitoring (PAM)	As above.	PAM can be used to detect marine mammal calls, and support sightings made by MMO. Feedback from AAD indicated PAM was utilised during rock blasting activities in the Antarctic to verify subsea noise levels; if noise levels	Not typical for offshore vessel activities. Likely to be some interference from vessel noise at close range.	Additional cost of PAM tech hire / purchase and operators for the duration of the campaign estimated circa $100K.	Reliability considered lower than direct observations, with limited additional benefit relative to accepted controls.	Reject. Rationale: The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk. The option adds cost and there is limited confidence in operational reliability for this application. The costs

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
		were higher than anticipated then explosive charges could be reduced.				are grossly disproportionate to the risk reduction achieved in relation to temporary operational subsea underwater sound emissions.
Campaign risk review in advance of campaign to ensure control measures continue to reduce impacts and risks to ALARP	As above.	Increased confidence the rationale for control measure selection and rejection are still valid, and that impacts and risks remain ALARP.	Yes – reflects intent of Amplitude Energy Risk Management (including change management) Processes. Including a minimum timeframe in advance of the campaign allows for further information (e.g. recent baseline information) to be considered in the risk review.	Cost of risk review accounted for as part of project planning.	None.	Implement. The Pre-Activity Risk Review Process includes provision for completing the risk review prior to the campaign commencing. Note – the timing of different risk review elements may differ, for example re-modelling (if required, may be long lead), whereas reconsideration of some control measures and additional would typically be reconsidered as part of the activity HAZID which may be completed ~1-6 months prior to mobilisation depending on the complexity of the project. Integrated into CM15: Campaign Risk Review.
Extend the Marine Mammal Observer and Activity modification provisions beyond peak foraging/migration seasons, to include shoulder season.	As above.	Increased confidence in no southern right whales or foraging blue whales in the vicinity which could be disturbed by noise from the activity.	Not typical for offshore vessel activities. Maritime Vessels typically rely on Vessel Crew to observe for whales. Crew / Officers of the Watch are experienced in working and watch keeping at sea (AMSA, 2023).	Additional costs associated with mobilising MMO and/ or inducting Crew to implement the risk management provisions.	Marginal bed space on smaller vessel may drive the selection of a larger (and potentially noisier) vessel. MMOs have good reliability at the project operational level.	Implement. The Offshore Victoria Whale Disturbance Risk Management Procedure (CM17) will monitor DP Observation Zones (and apply response actions) throughout the entire activity.
Collaboration with nearby titleholders to identify activity overlap and align approaches with whale disturbance risk management.	As above	Consistent implementation of control measures. Increased opportunities to improve outcomes across the Otway Basin activities.	Yes – considered good practice to share relevant learnings.	Cost of time to facilitate and partake in meetings / communications and implement associated actions.	None	Implement. Amplitude Energy participates in relevant communications with other Titleholders in the Otway, providing opportunity to discuss cumulative impacts and their management.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						Integrated into CM11: Titleholder Collaboration and CM18: Other Detection Technologies.
Dedicated broad scale vessel survey in the 7-days prior to MODU hook-up / mooring.	As above	May provide increased confidence of no foraging blue whales or southern right whales in the vicinity which could be injured or displaced. However in relation to this sub-activity the potential increase in confidence (presence/absence blue whale or southern right whale) is considered marginal given a 30-minute pre-watch of the DP observation zone will be completed before MODU mooring to provide real-time assessment of the potential of foraging blue whales and southern right whales within the area (Figure 12-8).	It is recognised good practice to minimise noise in the marine environment however a requirement for pre-activity marine mammal surveys are not typically applied to behavioural disturbance contours associated with vessels. Vessels in the region including the large shipping fleet, which may be as noisy as activity vessels, would not be expected to complete marine mammal surveys prior to turning on vessel thrusters and moving through either blue whale or southern right whale BIAs or HCTS. The 30-minute pre-watch and nighttime pre-watch criteria by dedicated MMOs of the campaign vessels will provide broad coverage of the behavioural EMBA, and far exceed typical controls applied by vessels in the region.	Cost of mobilising a vessel to the Operational Area, hiring a fit for purpose vessel to complete the survey. Estimated cost is >$100K in equipment, materials, people, per day.	HSE risks associated with vessel work can be managed via existing control of work. Risk to project schedule if the schedule window is not suitable for vessel survey, or if vessel becomes unavailable. Estimated cost risk is $2M associated with possible schedule delays.	Reject The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk noting the existing 30-minute pre-watch of the DP observation zone will be completed, whilst adding significant cost and additional operational HSEC and schedule risks.
Broad scale vessel survey daily or weekly, or targeted before support vessel DP resupply activities.	As above	May provide increased confidence of no foraging blue whales or southern right whales in the vicinity which could be injured or displaced. However in relation to this sub-activity the potential increase in confidence (presence/absence blue or southern right whales) is considered marginal given a 30-minute pre-watch of the DP observation zone will be completed before vessel DP resupply activities (Figure 12-8).	It is recognised good practice to minimise noise in the marine environment however a requirement for pre-activity marine mammal surveys are not typically applied to behavioural disturbance contours associated with vessels. Vessels in the region including the large shipping fleet, which may be as noisy as activity vessels, would not be expected to complete marine mammal surveys prior to turning on vessel thrusters and moving through either blue whale or southern right whale BIAs or HCTS. The 30-minute pre-watch and nighttime pre-watch criteria by dedicated MMOs of the campaign vessels will provide broad coverage of the behavioural EMBA, and far exceed typical controls applied by vessels in the region.	Cost of mobilising a vessel to the Operational Area, hiring a fit for purpose vessel to complete the survey. Estimated cost is >$100K in equipment, materials, people, per day. This equates to an extra $3 Million over the course of a 60-day campaign (if done every 2 days).	HSE risks associated with vessel work can be managed via existing control of work. Risk to project schedule if the schedule window is not suitable for vessel survey, or if vessel becomes unavailable. Estimated cost risk is $2M associated with possible schedule delays.	Reject The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk noting the existing 30-minute pre-watch of the DP observation zone will be completed, whilst adding significant cost and additional operational HSEC and schedule risks.
Dedicated daily or weekly aerial surveys during activities, or targeted before support vessel DP resupply activities.	As above	May provide increased confidence of no foraging blue whales or southern right whales in the vicinity which could be injured or displaced. However in relation to this sub-	Not typically applied to resupply activities. Aerial survey typically applied to activities that generate impulsive noise such as seismic survey. Could be considered good practice under the right weather conditions. There is a lower probability of detection over smaller areas compared to other survey methods (e.g. vessel-based surveys) (DECCEW, 2024).	Aerial surveys for every resupply activity could introduce significant cost and risk to the activities. Significant delays to the activity schedule in the event that the aerial survey is	HSE risks associated with aerial survey can be managed via existing control of work, though still introduce a high occupational health and safety risk relative to other	Reject The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk noting the existing 30-minute pre-watch of the DP

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
		activity the potential increase in confidence (presence/absence BW or SRW) is considered marginal given a 30-minute pre-watch of the DP observation zone will be completed before resupply activities to provide real-time assessment of the potential of foraging blue whales and southern right whales within the area (Figure 12-8). Lower probability of detection over smaller areas compared to other survey methods (e.g. vessel-based surveys).	Detection probability is reduced when wind is >10 knots or with glare from the sun (DECCEW, 2024). Within the offshore Otway; whilst periods of low wind do occur, they are inherently unpredictable and generally occur for <~25% of the year for the Annie location (wind rose shown below). This is unlike other regions in Australia where there is higher confidence in wind regimes from season to season.  The image below is indicative of a typical day in the Bass Strait in the Gippsland, which is less exposed to the south-westerly wind regime than the Otway. Wind in this image is over 10-knots showing cetacean activity captured from support vessel with MMO on board. 	delayed due to waiting for safe weather windows for the flight. Potential costs >$10M (mainly associated with risk of weather delays)	observation techniques (DCCEEW 2024p). Getting an aerial survey off the ground and back safe is weather dependent; weather in the Otway Basin is changeable, hence introduces an additional variable to project schedule risk. Depending on weather systems, suitable conditions for aerial survey may only occur a few times a month, and potentially all in the same week.	observation zone will be completed, whilst adding significant cost and additional operational HSEC and schedule risks.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
			Photo by MMO Claudia Hartmeier for Cooper Energy BMG Decommissioning Project Phase 1 2023-2024. Gippsland region offshore Victoria. Image below showing abnormally still ocean offshore Bass Strait in the Gippsland; Humpback whale and calf approaching support vessel (MMO on board).  Photo by MMO Bec Hall for Cooper Energy BMG Decommissioning Project Phase 1 2023-2024. Gippsland region offshore Victoria. Images below showing blue whale and pilot whales as captured by camera from aerial survey in the Gippsland Region. The minimum specifications for this survey were wind speed had to be <10 knots, and cloud base altitude had to be above 800m.  Photo by Fathom Pacific during aerial survey for Cooper Energy 2022/2023. Gippsland region offshore Victoria.			

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
			 Photo by Fathom Pacific during aerial survey for Cooper Energy 2022/2023. Gippsland region offshore Victoria.			
The use of land or based observation platforms, or vessel-based survey to observe for southern right whales within the area of overlap between activity behavioural EMBA and the southern right whale reproduction BIA during MODU mooring hook-up.	As above	Will increase confidence in no southern right whales are within the area of overlap between the behavioural EMBA and the reproduction BIA	Not typical for offshore vessel activities. Maritime Vessels typically rely on Vessel Crew to observe for whales in close proximity to vessels only, including within southern right whale reproductive BIA. Crew / Officers of the Watch are experienced in working and watch keeping at sea (AMSA, 2023). The viewing platform onshore (based on Halladale Point) is ~10m height above sea level, at this height the visible horizon is ~11km away, and detection of southern right whales within the Reproductive BIA which extends ~3km from shore, should be possible, though may not be possible across the entire section of overlap between activity behavioural EMBA and the southern right whale reproduction BIA.	Additional costs associated with mobilising MMO to shoreside viewing point and establishing communications within the MMO network.	HSE risks associated with mobilising an MMO to cliffside lookout point in variable weather conditions. May not be safe in storm conditions, which are more likely in winter. Visual detection is theoretically possible but requires confirmation through implementation. For a single shore-side survey the costs are expected to be <$10K. The reliability of this measure is expected to be low-moderate. An alternate observation method will be vessel-based survey over the area of overlap between the activity behavioural EMBA and southern right whale reproduction area, which is a well-established practice, and cost of adopting this for one-off activity is not prohibitive, assuming a project vessel could be diverted to complete the survey.	Seasonal implementation Use of land-based or vessel-based observations to sight cetaceans within the SRW reproduction BIA during MODU mooring will be implemented for MODU hook-up activities where the behavioural noise EMBA for the activity overlaps the SRW reproduction BIA during the southern right whale season (including shoulder seasons). The survey (at least 1 hour observation) is to be conducted the day of, or the day prior-to the commencement of MODU hook-up or mooring, and resupply sub-activities. DP operations will not commence if a southern right whale is are within the area the behavioural noise contours are predicted to overlap the reproduction BIA,

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						Integrated into CM17: Offshore Victoria Whale Disturbance Risk Management Procedure and EPS 17.2.
The use of land or based observation platforms, or vessel-based survey to observe for southern right whales within the area of overlap between activity behavioural EMBA and the southern right whale reproduction BIA during MODU resupply	As above	Will increase confidence in no southern right whales are within the area of overlap between the behavioural EMBA and the reproduction BIA	Not typical for offshore vessel activities. Maritime Vessels typically rely on Vessel Crew to observe for whales near vessels only, including within southern right whale reproductive BIA. Crew / Officers of the Watch are experienced in working and watch keeping at sea (AMSA, 2023). The viewing platform onshore (based on Halladale Point) is ~10m height above sea level, at this height the visible horizon is ~11km away, and detection of southern right whales within the Reproductive BIA which extends ~3km from shore, should be possible, though may not be possible across the entire section of overlap between activity behavioural EMBA and the southern right whale reproduction BIA.	Additional costs associated with mobilising MMO to shoreside viewing point and establishing communications within the MMO network.	HSE risks associated with mobilising an MMO to cliffside lookout point in variable weather conditions. May not be safe in storm conditions which are more likely in winter. Visual detection is theoretically possible but requires confirmation through implementation. Because of the frequency and flexibility required for MODU resupply activities (typically every 2-3 days but heavily weather dependent), it is expected that two dedicated MMO would need to be stationed at an onshore lookout at all times during daylight hours. Estimated cost of MMO and coordination for 60-day campaign is circa $500,000. Because of the impact of weather over the course of the campaign the overall reliability of this measure is expected to be low-moderate. An alternate observation method of vessel-based survey over the area of overlap between the activity behavioural EMBA and southern right whale reproduction area could be done but is high cost, and overall low reliability because the availability of a vessel to do the survey would likely necessitate a 4th vessel to manage logistical constraints, and increase overall levels of noise of the campaign, as well as adding to the potential risk of collisions between additional vessels and whales.	Reject The measure is not typical practice for this type of activity and does not result in a discernible reduction in risk noting the existing 30-minute pre-watch of the DP observation zone will be completed, whilst adding significant cost and additional operational HSEC risks, and adding significant logistical complexity to an already complex activity.

6.7 Introduction, Establishment and Spread of IMS

6.7.1 Cause of Aspect

Invasive marine species (IMS) include marine plants or animals that have been introduced into a region beyond their natural range. IMS can survive, reproduce and establish founder populations which may predate on or outcompete native species. Species of concern are those that are not native and are able to spread by human mediated or natural means. The activities that may cause an unplanned introduction of IMS due to the Activity are identified in Table 6-44 and described in further detail in subsections below.

Table 6-44: Activities that may result in the Introduction of IMS

Aspect / Phase	Activity component
Support activities (vessel based)	MODU operations including contingent P&A
	Vessel operations including contingent activities
	ROV operations

The survival and invasive capabilities of IMS once introduced depend on certain environmental factors, such as water temperature, depth, salinity, nutrient levels, habitat type and competition. Successful IMS invasion requires the following circumstances:

- Colonisation and establishment of the IMS on a vector (e.g. vessel hull) in a donor region (e.g. home port).
- Survival of the IMS on the vector during the voyage from the donor to the recipient region (e.g. operational area).
- Colonisation (e.g. dislodgement or reproduction) of the IMS in the recipient region, followed by successful establishment of a viable new local population.

Various natural and anthropogenic events establish pathways for IMS translocation and introduction around Australia. In relation to the Activity facilities and activities, the introduction, establishment and spread of IMS could occur through several different pathways and risk events, as described in Table 6-45.

Table 6-45: Pathways for the Introduction, Establishment and Spread of IMS

Pathway to Introduction	Means of Establishment	Mechanisms of Spreading
IMS is transferred into the field, becomes established and spreads.		
IMS within biofouling on MODU or vessels dislodged to the seabed. IMS within biofouling on equipment that is routinely submerged in water, and which is dislodged to the seabed.	Suitable habitat and conditions available for IMS in field.	Once established may spread by itself if conditions are suitable. In field equipment may provide connectivity allowing spread across infrastructure. Other anthropogenic influence (e.g. fishing) could spread established IMS within and outside of the field.

IMS is transferred between vessels, establishes on vessels and is spread to other areas (e.g. ports).		
Discharge of ballast water containing IMS. Cross contamination of IMS between vessels and the MODU.	Suitable habitat and conditions available for IMS on vessels and within ballast and seawater systems.	IMS spreads between ports and other facilities via vessels acting as a vector.
IMS is transferred out of the field, becomes established at locations inside or outside the region and spreads.		
Already established populations of IMS within the offshore field via natural or anthropogenic influences are recovered with equipment and dislodged whilst being transferred to shore.	Suitable habitat and conditions available for IMS at shoreside facilities.	Once established may spread by itself if conditions are suitable. May become established on structures at ports, and from there spread to vessels which then become a vector for the spread of IMS.

6.7.2 Aspect Characterisation

6.7.2.1 IMS Already Established in the Region

A variety of IMS have become established within ports around Australia. Even within the same region, different ports may host a mix of established IMS (Australian Government, 2019). Ports are often suitable for establishment of IMS because they are regularly exposed to IMS from many different vessels that may lay-up for long periods of time. Ports also typically have shallow areas and hard structures which provide suitable substrate for establishment. IMS can be translocated from a port in either vessel ballast or as biofouling, as described in the sections below.

Table 6-46 details the marine pests of greatest concern for the relevant domestic locations for the Activity, compared with the IMS potentially occurring in Australian waters. Whilst the number of IMS potentially occurring within Australian waters is extensive, the list below is compiled from the known IMS listings on the Australian Government Marine Pest website (Australian Government, 2025), IMS of most concern on the Victorian Parks website (Parks Victoria 2025) and advice from State Government Biosecurity dept.

Table 6-46: High-Risk Marine Species of Concern to Australia (Australian Government, 2019; Parks Victoria, 2025)

Scientific Name	**Common Name**	**Key Ports in the Region (✓ = confirmed IMS; w = keep watch for) (Australian Government, 2025)**	
		Portland (Otway)	Melbourne / Geelong (Port Phillip Bay)
Invasive Marine Species (not known to be established in Australia)			
Balanus improvises	Barnacle	-	-
Caprella mutica	Japanese skeleton shrimp	-	-

Caulerpa taxifolia (exotic strains only)	Green macroalga	-	-
Charybdis japonica	Lady crab, Asian paddle crab	-	-
Corbula (Potamocorbula) amurensis	Asian clam, brackish-water corbula	w	w
*Crassostrea gigas**	Pacific Oyster	-	-
Crepidula fornicate	American slipper limpet	w	w
Didemnum perlucidum	White colonial sea squirt	-	-
Ensis directus	Jack-knife clam	-	-
Eriocheir sinensis	Chinese mitten crab	w	w
Hemigrapsus takanoi/penicillatus	Brush-clawed shore crab	-	-
Marenzelleria spp. (invasive species, marine/estuarine incursions)	Red gilled mudworm	-	-
Mnemiopsis leidyi	Comb jelly	-	-
Mya arenaria and japonica	Soft shell clam	w	w
Mytella strigata	Charru mussel	w	w
Mytilopsis sallei	Black striped false mussel	w	w
Neogobius melanostomus (marine/estuarine incursions)	Round goby	-	-
Perna canaliculus	New Zealand green-lipped mussel	-	-
Perna perna	Brown mussel	-	-
Perna viridis	Asian green mussel	w	w
Rapana venosa (syn. Rapana thomasiana)	Rapa whelk	w	w
Rhithropanopeus harisii	Harris' mud crab	-	-
Sargassum muticum	Asian seaweed	-	-
Siganus rivulatus	Marbled spinefoot, rabbit fish	-	-
Spartina anglica and Spartina x townsendii sp	Cord Grass	-	-
Urosalpinx cinerea	Atlantic oyster drill	-	-

Established in Australia			
*Asterias amurensis**	Northern Pacific sea star	-	✓
Arcuatula senhousia	Asian bag mussel, Asian date mussel	✓	✓
*Carcinus maenas**	European green crab	-	✓
Codium fragile spp. Tomentosodies	Green macroalga	-	-
Didemnum vexillum	Carpet sea squirt	-	-
Grateloupia turuturu	Red macroalga	-	-
Hemigrapsus sanguineus	Asian shore crab	w	✓
*Maoricolpus roseus**	New Zealand screwshell	-	-
*Sabella spallanzanii**	European fan worm	✓	✓
*Undaria pinnatifida**	Wakame	-	✓
Varicorbula gibba	European clam	-	-
Caulerpa taxifolia	Aquarium caulerpa	-	-
Holoplankton high-risk species			
Alexandrium monilatum, Dinophysis norvegica and *Pfiesteria piscicda*	Toxic dinoflagellate species	-	-
Chaetoceros concavicornis and *Chaetoceros convolutes*	Centric diatom species	-	-
Pseudo-nitzschia seriata	Pennate diatom	-	-
* Most concerning IMS in Victoria (Parks Victoria, 2025).			

6.7.2.2 IMS Associated with MODU, Vessels and Activity Equipment

Ballast Water

Ballast water maintains stability of ships at sea to provide safe operating conditions. Water is pumped into the ballast tanks of ships from the surrounding environment and is subsequently released when the ships weight needs to be lightened. This transfer of water, which may contain bacteria, microbes, small invertebrates, eggs, cysts and larvae may result in the introduction and spread of IMS, if these species can survive and establish (IMO 2025a).

Vessels are required to manage ballast water to minimise the risk of IMS introduction and spread, in accordance with the International Maritime Organisation (IMO) Ballast Water Convention (IMO 2017), the Australian Ballast Water Management Requirements (DAWE 2020a) and the Biosecurity Act 2015. The obligations of vessels operating in Australian waters includes the development of a valid ballast water management plan and the use of approved ballast water management systems. Since the Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF) (and

predecessors) introduction of mandatory ballast water regulations, where ballast water must be exchanged outside territorial sea (12 nm off the Australian coast, including islands), risk of IMS from international shipping has been greatly reduced.

Biofouling

Biofouling occurs through the accumulation of microorganisms, plants, algae or other organisms on submerged structures, including the underwater surfaces of ships (e.g. propellers, anchors and hulls) (IMO, 2025b). Installed infrastructure may also provide marine organisms, including IMS, with a substrate to attach to.

Biofouling is one of the main vectors for the introduction and spread of IMS and Department of Agriculture and Water Resources (DAWR) (2018) suggest that biofouling has been responsible for more IMS introductions than ballast water. DAFF provide guidelines for the management of IMS from biofouling (DAFF 2009) and have now also specified requirements for vessels of international origin to manage biofouling risk (DAFF 2023).

The MODU, vessels and equipment may be sourced internationally and domestically. Vessels will transit between the MODU and domestic ports. IMS on the MODU or vessels can be dislodged to the seabed and establish if conditions and habitats are suitable. Anthropogenic influences (e.g., vessel transit, fishing) could spread IMS within and outside of the field. There will be periods where the MODU and vessels work in close proximity, where there may be potential for IMS to translocate from equipment, or from one vessel to another if vessels are not managed appropriately, for example, through ballast exchange or dislodged biofouling.

6.7.3 Predicted Environmental Impacts and Risks

The potential impacts and risk events associated with IMS introduction (assuming their survival, colonisation and spread) could result in a change in ecosystem dynamics which may include:

- change in ecosystem dynamics.
- change to the functions, interests, or activities of other marine users.

The introduction of IMS could occur within the operational area. Receptors which may be directly affected include marine invertebrates and benthic habitats. Indirect effects are possible to commercial fisheries, conservation values of protected areas and First Nations cultural values and sensitivities. Impacts and risks to First Nations cultural heritage are assessed in Chapter 8.0.

6.7.4 Impact and Risk Evaluation

6.7.4.1 Risk: Change in Ecosystem Dynamics

Inherent Consequence Evaluation

Due to the complexity of ecosystems, there is a high degree of uncertainty in predicting how an introduced species may interact with a new environment. The level of invasiveness and ultimate impact of the species will be dependent on the conditions of the new environment being favourable for that species. Not all introduced species will survive and establish in a new environment.

The benthic habitats at the operational area are characterised by hard substrate and reef with patches of sand / rubble, typical of the broader Otway region. Therefore, areas of rocky substrate do

exist which may provide habitat for diverse assemblages of species. Any IMS introduced into the operational area have the potential to become established on the seabed, impacting the benthic habitats and species present.

If IMS survive and establish, they may change ecosystem dynamics by altering predator-prey interactions, out-competing native species for resources, segregating habitat, spreading viruses or toxic chemicals, altering water quality, and disturbing, injuring or killing vital ecosystem organisms (ecosystem engineers and keystone species). Higher trophic levels may also be impacted by the introduction of IMS. Marine mammals and birds foraging offshore can be indirectly affected by any changes in prey associated with IMS, possibly reducing food availability.

If IMS were transferred between the MODU and support vessels within the operational area, spread of IMS is possible to areas beyond the operational area. Ports and other offshore industry could potentially be exposed through both ballast and biofouling, impacting benthic habitats, marine fauna and coastal and offshore socio-economic receptors beyond the operational area.

IMS may be difficult and costly to eradicate from areas once established (Hewitt et al. 2002). If the introduction is captured early, eradication may be effective but is likely to be expensive, disruptive and, depending on the method of eradication, harmful to other local marine life.

IMS introduction and establishment is evaluated to have a consequence **Level 4**, based on:

- Species in the operational area of conservation value.
- Ability of introduced IMS to impact areas beyond the operational area.
- Difficulty to eradicate IMS once established and potential long-term effects.

6.7.4.2 Risk: Change to the Functions, Interests, or Activities of Other Users

Inherent Consequence Evaluation

IMS may also impact socio economic receptors through a reduction in ecological values. Primary impacts include direct damage to vessels, equipment and infrastructure, leading to a reduction in efficiency, productivity and profit. IMS can deplete fishing grounds and aquaculture stock, with between 10% and 40% of Australia's fishing industry being potentially vulnerable to marine pest incursion.

For example, the introduction of the Northern Pacific Sea star in Victorian and Tasmanian waters was linked to a decline in scallop fisheries (Dommisse and Hough 2004). As described in Section 4.4.3, 13 managed fisheries (6 Commonwealth and 7 State managed) were identified within the operational area, of which 6 have recorded fishing efforts. Furthermore, tourism operators may utilise the operational area for a number of activities such as fishing charters which commonly target bluefin tuna, gummy, school and mako sharks and reef species such as snapper.

As above, IMS introduction and establishment is evaluated to have a consequence **Level 4**, based on:

- Species in the operational area of conservation value.
- Ability of introduced IMS to impact areas beyond the operational area.
- Difficulty to eradicate IMS once established and potential long-term effects.

Inherent Likelihood

Highly disturbed nearshore environments (such as marinas) are more susceptible to IMS establishment than open-water environments (Paulay et al. 2002). Successful IMS establishment is dependent upon suitable substrate and habitat availability, such as rocky and hard benthic habitat or subsea infrastructure. The probability of successful IMS establishment and spread decreases in well-mixed, deep ocean waters away from coastal habitats (Geiling 2014). Although the operational area is expected to have some hard benthic habitat, it is in an open-water environment with water depths greater than 50 m and thus is not expected to be conducive to the translocation and survival of IMS from vessels or the MODU to the seabed.

Any IMS introduced to the operational area would be expected to remain fragmented and isolated, and only within the vicinity of the infrastructure (i.e. it would not be able to propagate to nearshore environments).

In summary, the chances of successful colonisation inside the operational area are considered small given:

- The operational area occurs outside of coastal waters where the risk of IMS establishment is considered greatest (BRS 2007).
- The Australian Government Bureau of Resource Sciences (BRS) established that the relative risk of IMS incursion decreases with distance from the coast. The modelling estimates: 33% chance of establishment at 3 nm, 8% chance at 12 nm and 2% chance at 24 nm based on a 50 m depth contour. The operational area is in approximately 56 m water depth and is located offshore.
- Practices for minimising the risk of IMS spread are well established within the marine industry and there are clear requirements set by the DAFF.
- Amplitude have established communications with Victorian Government Biosecurity specialists who provide advice on species of interest and requirements as they evolve.
- The operational area will not have any long-term platforms, FPSO or moored vessels, with the MODU and vessels being in the operational area temporarily; as vessels and MODUs will be moving relatively frequently, the risk of attachment of IMS and colonisation of the facilities is reduced compared to a permanent or semi-permanent vessel presence.
- There have been no IMS introductions from Amplitudes previous activities or other activities in the vicinity.
- The likelihood of IMS becoming established within the operational area as a result of the activities is therefore considered **Remote (E)**.

The spread of IMS from the operational to areas elsewhere via translocation of IMS between vessels is also considered here. Several factors reduce the chance of IMS translocating between vessels:

- Support vessels will come alongside the MODU where required; time alongside is relatively short and managed via DP; there is typically no or minimal contact between support vessels and the MODU.
- The offshore environment within the Otway region is highly dispersive, and vessels will be frequently moving; these conditions are not typically conducive to the establishment of marine organisms onto a new surface.

- There are several international and national management measures which already manage the potential introduction of IMS.
- The likelihood of the transfer of IMS between vessels within the operational area, and which may then become established elsewhere, as a result of the activities is considered **Remote (E)**.

Inherent Risk Severity

The inherent risk severity of the introduction, establishment and spread of IMS is considered **Moderate**.

6.7.5 Control Measures, ALARP, and Acceptability Assessment

Table 6-47 provides a summary of the control measures and ALARP and acceptability assessment relevant to the introduction, establishment and spread of IMS.

Table 6-47: Introduction, Establishment and Spread of IMS ALARP, Control Measures and Acceptability Assessment

Introduction, Establishment and Spread of IMS	
ALARP Decision Context and Justification	ALARP Decision Context: Type B The introduction, establishment and spread of IMS has been assigned a Level 4 consequence; the likelihood of this consequence occurring is considered Remote. The causes resulting in an introduction of IMS from a planned release of ballast water or biofouling are well understood and effectively managed by international and national requirements and industry guidance. Amplitude and their offshore service partners are experienced in industry requirements and their operational implementation through their existing ongoing operations. No objections or concerns were raised during consultation regarding this activity or its potential impacts and risks.
Control Measure	Source and Description of Control
CM20: Amplitude IMS Risk Management Protocol	The National biofouling management guidelines for the petroleum production and exploration industry (DAFF 2009) recommend a biofouling risk assessment is undertaken for vessels and MODUs and, where necessary, conducting in water inspection, cleaning and antifouling renewal. These guidelines should also be read in conjunction with the Anti-fouling and In-water Cleaning Guidelines (DoA 2015)[10]. In line with these recommendations Amplitude Energy uses an IMS Risk Assessment to evaluate IMS risks. Prior to and during operations the Amplitude IMS Risk Management Protocol will be implemented for all vessels, MODU and submersible equipment, and will consider all regions visited by the facilities (international and domestic). The Amplitude IMS Risk Management Protocol has been prepared to align with: • Advice from the Victorian Government Marine Biosecurity Section. • National biofouling management guidelines for the petroleum production and exploration industry (DAFF 2009). • Australia Biofouling Management Requirements (DAFF 2023).

[10] Draft Australian Anti-Fouling and In-Water Cleaning Guidelines were published in 2024 (**https://www.waterquality.gov.au/anz-guidelines/resources/guidance**).

	• Guidelines for the control and management of a ships' biofouling to minimise the transfer of invasive aquatic species (IMO Biofouling Guidelines; IMO 2023). • Reducing marine pest biosecurity risks through good practice management Information paper (NOPSEMA 2020). Further information on the Amplitude IMS Risk Management Protocol is provided within Section 12.9.
Impact and Risk Summary	
Residual Impact Consequence	N/A
Residual Risk Consequence	Level 4: Extensive medium to long-term impact on highly valued ecosystems, species populations or habitats.
Likelihood	Remote (E): A combination of factors would be required for an occurrence. Not expected to occur during the activity. Occur in exceptional circumstances.
Residual Risk	Moderate
Demonstration of Acceptability	
Principles of ESD	Introduction, establishment and spread of IMS is evaluated as having Level 4 consequence which has the potential to result in serious or irreversible environmental damage. With the established processes in place, there is little residual uncertainty associated with this aspect. The activities and impact pathways are well known, regulated and managed. It is not considered that there is significant scientific uncertainty associated with this aspect. Therefore, the precautionary principle has not been applied beyond the precautionary measures already integrated into the IMS protocol.
Legislative and Conventions	The control measures proposed to manage this risk are meet the following requirements: • *Biosecurity Act 2015 (Cwth)* - Chapter 5, Part 3 (Management of discharge of ballast water) & Chapter 4 (Managing biosecurity risks). • International Convention for the Control and Management of Ships' Ballast Water and Sediments 2004 (the BWMC). • *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006*. • AMSA Marine Order 98: Marine Pollution Prevention - Anti-fouling Systems. • *Environment Protection Act 1970 (Vic)*. • Environment Protection (Ships Ballast Water) Regulations 2006. • Australian Ballast Water Management Requirements (DAFF 2020). • Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (IMO 2023). • National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (DAFF 2009). • Australia Biofouling Management Requirements (DAFF 2023).
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03).

	• Health Safety and Environment Management (MS09). • Supply Chain and Procurement Management (MS11). Activities will be undertaken in accordance with the Implementation Strategy (Section 11.0).
External Context	Activity will be undertaken in a manner consistent with relevant legislation, industry standards and guidelines, offshore practices and benchmarking. The activity is not predicted to result in impacts to species that would be inconsistent with recovery plans or conservation advice. No objections or claims have been received during consultation regarding IMS.
Demonstration of meeting the defined acceptable levels in the OPP	Section 9.4.6 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with introduction, establishment and spread of IMS. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for introduction, establishment and spread of IMS: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	Acceptable Amplitude has determined that impacts and risks related to the introduction, establishment and spread of IMS are acceptable, based on: • The planned management of impacts and risks integrates Amplitude internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advice, and significant impact guidelines for MNES. • No feedback from relevant persons has been received that would inform the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures other than DEECA (Event ID 2025 0811 081516 6215 Appendix 8) regarding the presence of *Undaria pinnatifida in the Port of Portland.* To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: • EPO21: No introduction, establishment or spread of invasive marine species.

6.8 Accidental Hydrocarbon Release

6.8.1 Cause of Aspect

Hydrocarbons may be accidentally released into the marine environment as a result of the Activity as identified in Table 6-48 and described in subsections further below.

Table 6-48: Activities that may result in an Accidental Release of Hydrocarbons

Aspect / Phase	Activity component
Well Construction and Contingent Plug and Abandonment	Drilling operations
Support activities, including contingent vessel based activities	Vessel operations

This section addresses the high order (most severe or worst-case) spill scenarios. LOC from subsea infrastructure is assessed in Table 6-4. These scenarios could result in a smaller extent, which have been captured within the EMBA and monitoring area defined and assessed within this EP.

6.8.2 Aspect Characterisation

Amplitude Energy have identified two credible, worst-case, spill scenarios that may occur during support and well construction activities during the Activity:

- A continuous release of 10,562 m^3 of condensate over 104 days as a result of a Loss of Well Containment (LOWC).
- An instantaneous release of 250 m^3 MDO over 6 hours as a result of a vessel collision rupturing a vessel fuel tank and causing a Loss of Containment (LOC).

6.8.2.1 Well Construction

A LOWC has been determined as a credible scenario with the potential to lead to an uncontrolled release of reservoir hydrocarbons or other well fluids into the environment.

There are multiple controls in place to prevent a LOWC. Multiple levels of controls must fail at each level of the control hierarchy for a LOWC to occur. These are described in detail and managed under the Well Operations Management Plan (WOMP), and facility specific Safety Case. Both documents must be accepted by NOPSEMA before an activity can occur.

6.8.2.2 Support Activities

Support activities during the Activity will include vessel operations for surveys including monitoring, IMR (including subsea inspection), towing, mooring MODU standby, and supply runs. It is considered credible that an unplanned release of MDO into the marine environment could occur as a result of hull damage or a fuel tank rupture following a vessel collision between the support vessel and another, or a support vessel and the MODU, or the support vessel and a third-party vessel. Vessel collisions typically occur due to:

- navigational error or loss of position

- mechanical failure
- extreme weather events.

Vessel grounding has not been assessed as a credible risk as there are no emergent features within the operational area.

Amplitude Energy assessed the worst-case credible spill scenario that could result from a vessel collision. As vessels have not yet been contracted, a nominal fuel tank volume was used based on AHTS vessels used during previous Amplitude Energy campaigns. This approach aligns with AMSA's guideline for indicative maximum credible spill volumes for other, non-oil tanker, vessel collision (AMSA 2015).

6.8.3 Quantitative Hydrocarbon Spill Modelling

Amplitude Energy commissioned RPS Group to conduct stochastic modelling and deterministic analysis (RPS 2023, 2024; Appendix 6 -) based on the worst-case credible scenarios (

Table 6-49).

The subsea LOWC scenario was modelled on the flow rate data acquired from the drilling of the Annie-1 well. A Response Time Model (RTM) was utilised to determine the worst-case scenario and is primarily based on the location of rig available to drill the relief well. The spill duration for the worst-case scenario was determined by utilising the time to drill a relief well based on this RTM modelled. The simulation duration of the model allows for 14 days on top of the time to kill the well (104 days) to allow time for the trajectory, weathering, and fate of the total hydrocarbon release volume to be modelled. See the activity-specific SCERP for further details.

A spill of 250 m^3 was determined to be an appropriate and conservative volume for this Activity as the larger fuel tanks on board industry vessels tend to be within range of this volume. It is acknowledged that vessel fuels tanks may be smaller or larger, however, this volume is considered sufficient for this stage of planning. Also noting in the event of a fuel tank rupture, the rate of release of the overall hydrocarbon inventory on a vessel may vary, however is unlikely to be instantaneous and over such a short period of time as 6-hours

The spill modelling was performed using an advanced three-dimensional trajectory and fates model, Spill Impact Mapping Analysis Program (SIMAP). The SIMAP model calculates the transport, spreading, entrainment and evaporation of spilled hydrocarbons over time, based on the prevailing wind and current conditions, and the physical and chemical properties.

The SIMAP system, the methods and analysis presented herein use modelling algorithms which have been anonymously peer reviewed and published in international journals. Further, RPS warrants that this work meets and exceeds the ASTM Standard F2067-13 “Standard Practice for Development and Use of Oil Spill Models”.

The SIMAP model can track hydrocarbons to levels lower than are biologically significant or visible to the naked eye. Therefore, reporting thresholds have been specified (based on the scientific literature) to account for “exposure” on the sea surface and “contact” to shorelines at meaningful levels.

Table 6-49: Spill Modelling Parameters for the LOWC and Vessel LOC scenarios

Parameter	Spill Scenario	
	LOWC	Vessel LOC
Location	Annie-2	
Maximum credible spill volume	10,562 m^3 (66,430 bbl)	250 m^3 (1,572 bbl)
Number of randomly selected spill start times	100 per season (200 per scenario)	
Model period	Summer (November to April)	
Hydrocarbon type	Annie-1 Condensate	Marine Diesel Oil (MDO)
Release type / depth (m)	Subsurface / 36 m	Surface
Release duration	104 days	6 hours
Simulation length	118 days	30 days
Surface hydrocarbon concentration thresholds (g/m^2)*	1 (low); 10 (moderate); 50 (high)	
Shoreline hydrocarbon accumulation thresholds (g/m^2)*	10 (low); 100 (moderate); 1,000 (high)	
Dissolved hydrocarbon concentrations (ppb)*	10 (low); 50 (moderate); 400 (high)	
Entrained hydrocarbon concentrations (ppb)*	10 (low); 100 (high)	

* See Table 6-2 for hydrocarbon threshold rationale.

6.8.3.1 Hydrocarbon Thresholds

Hydrocarbon spill events, have the potential to expose ecological and social receptors to different hydrocarbon expressions and concentrations. Hydrocarbon expressions include:

- surface
- shoreline
- in-water.

The concentration thresholds used in the impact assessment for the different exposure types (surface, in-water, shoreline) are described in Table 6-50. These impact thresholds and exposure pathways are then applied at a receptor level for use in the consequence evaluations. These thresholds align with the NOPSEMA environmental bulletin 'Oil Spill modelling' (NOPSEMA 2019).

Table 6-50: Hydrocarbon Impact Thresholds

Exposure Level	Impact Threshold	Justification
Surface Hydrocarbon		
Low	1 g/m^2	Approximates range of socioeconomic effects and establishes planning area for scientific monitoring.

Exposure Level	Impact Threshold	Justification
Moderate	10 g/m^2	Approximates lower limit for harmful exposures to birds and marine mammals.
High	50 g/m^2	Approximates surface oil slick and informs response planning.
Shoreline Hydrocarbon		
Low	10 g/m^2	Predicts potential for some socio-economic impact.
Moderate	100 g/m^2	Loading predicts area likely to require clean-up effort.
High	>1000 g/m^2	Loading predicts area likely to require intensive clean-up effort.
In-water – Dissolved Hydrocarbon		
Low	10 ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.
Moderate	50 ppb	Approximates potential toxic effects, particularly sublethal effects to sensitive species.
High	400 ppb	Approximates toxic effects including lethal effects to sensitive species.
In-water – Entrained Hydrocarbon		
Low	10 ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.
High	100 ppb	As appropriate given oil characteristics for informing risk evaluation.

6.8.3.2 Hydrocarbon Characteristics

The MDO selected for modelling is a light persistent hydrocarbon (classified as Group II by the International Tankers Owners Pollution Federation (ITOPF 2014), with a low dynamic viscosity and low pour point (

Table 6-51). The hydrocarbon has low (10%) residual component (i.e., the component that tends not to evaporate and that may persist in the marine environment) (

Table 6-51).

The condensate modelled for the LOWC scenarios was based on Annie-1 condensate; a light persistent hydrocarbon (classified as Group II (ITOPF 2014), with a low dynamic viscosity and low pour point (

Table 6-51). Annie-1 condensate has been modelled as it is a conservative proxy. The condensate comprises of a significant portion of volatiles and semi- to low-volatiles (82.5% total) with 17.5% residual components. This means the condensate will evaporate readily when on the water surface, with the persistent components to remain on the water surface over time (

Table 6-51).

A few specific physical characteristics were not available for Annie-1 (

Table 6-51). Therefore, this information was supplemented from the Minerva condensate assay, found in a nearby reservoir and considered an appropriate analogue for this information.

Table 6-51: Physical Characteristics of Annie-1 Condensate and MDO

Type	API	Pour Point (°C)	Density kg/m^3	Viscosity cP	Non-persistent			Persistent
					Volatiles (BP < 180°C)	Semi-volatiles (180°C < BP < 265°C	Low Volatiles (265°C < BP < 380°C)	Residuals (BP > 380°C)
MDO	24	-9	890 at 25°C	14.0 at 25°C	4%	32%	54%	10%
Annie-1	41	-30*	820 at 16°C	1.063 at 20°C*	8%	46.5%	28%	17.5%

*Physical characteristics results used from Minerva condensate essay.

6.8.3.3 Weathering and Fate

A series of model weathering tests were conducted to illustrate the potential behaviour of the MDO and condensate when exposed to idealised and representative environmental conditions. The modelling reports commissioned by Amplitude Energy and produced by RPS has been attached in Appendix 6 - .

The findings are summarised in the subheadings below.

Vessel LOC - MDO

The mass balance for the MDO under constant 5 knot winds show that 34.3% of the oil will evaporate within 24 hours (Figure 6-16). Under calm conditions, the majority of the remaining oil on the water surface will weather at a slower rate as it is comprised of low volatile, longer-chain compounds.

Under variable-wind conditions where winds are of greater strength on average, entrainment of MDO into the water column is shown to increase (Figure 6-17). Approximately 24 hours after the spill, 83.1% of the oil is shown to have entrained and a further 11.4% is shown to have evaporated, leaving only a small proportion of the oil floating on the water surface (1.3%). The increased level of entrainment during variable-winds results in a higher percentage of decay at an approximate rate of 3% per day, compared to 0.4% per day during constant winds.

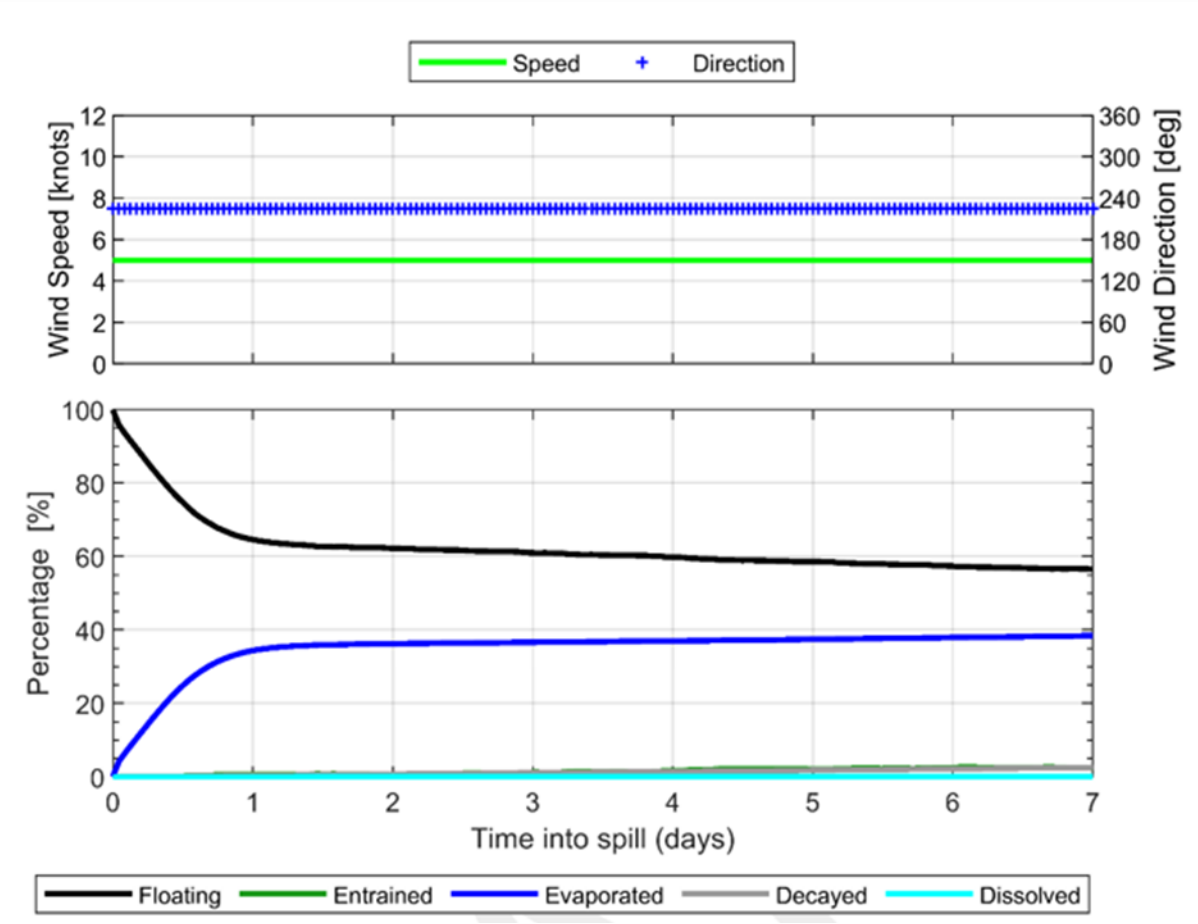


Figure 6-16: Proportional Mass Balance Plot Representing the Weathering of MDO Spilled onto the Water Surface over 1 hour and Subject to a Constant 5 knots Wind Speed at 15 °C Water Temperature (RPS 2023).

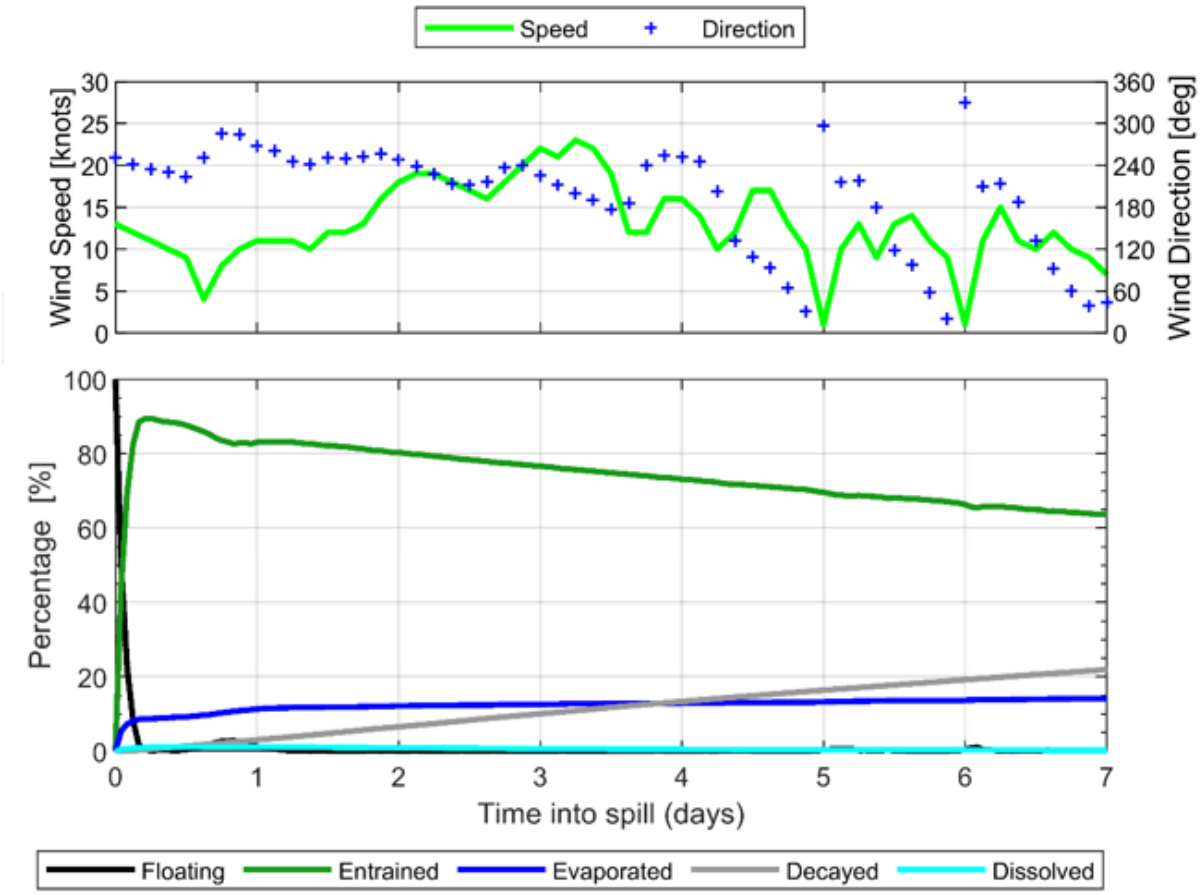


Figure 6-17: Proportional Mass Balance Plot Representing the Weathering of MDO Spilled onto the Water Surface over 1 hour and Subject to a Variable Wind Speeds (1-23 knots) at 15 °C Water Temperature (RPS 2023).

LOWC – Condensate

The mass balance for condensate under constant 5 knot winds show that 52.4% of condensate is expected to evaporate within 24 hours (Figure 6-18). Under calm conditions, the majority of the remaining condensate on the water surface will weather at a slower rate as it is comprised of less volatile, longer-chain compounds. Evaporation shall cease when only the residual compounds remain.

Under variable-winds where winds are of greater strength on average, entrainment of condensate into the water column is shown to increase (Figure 6-19). Approximately 24 hours after the spill, 70.1% of the mass is shown to have entrained and a further 23.8% has evaporated, leaving only a small proportion floating on the water surface (<1%). The increased level of entrainment during variable-winds results in a higher percentage decaying at an approximate rate of 2.5% per day, to <0.7% per day for constant-winds.

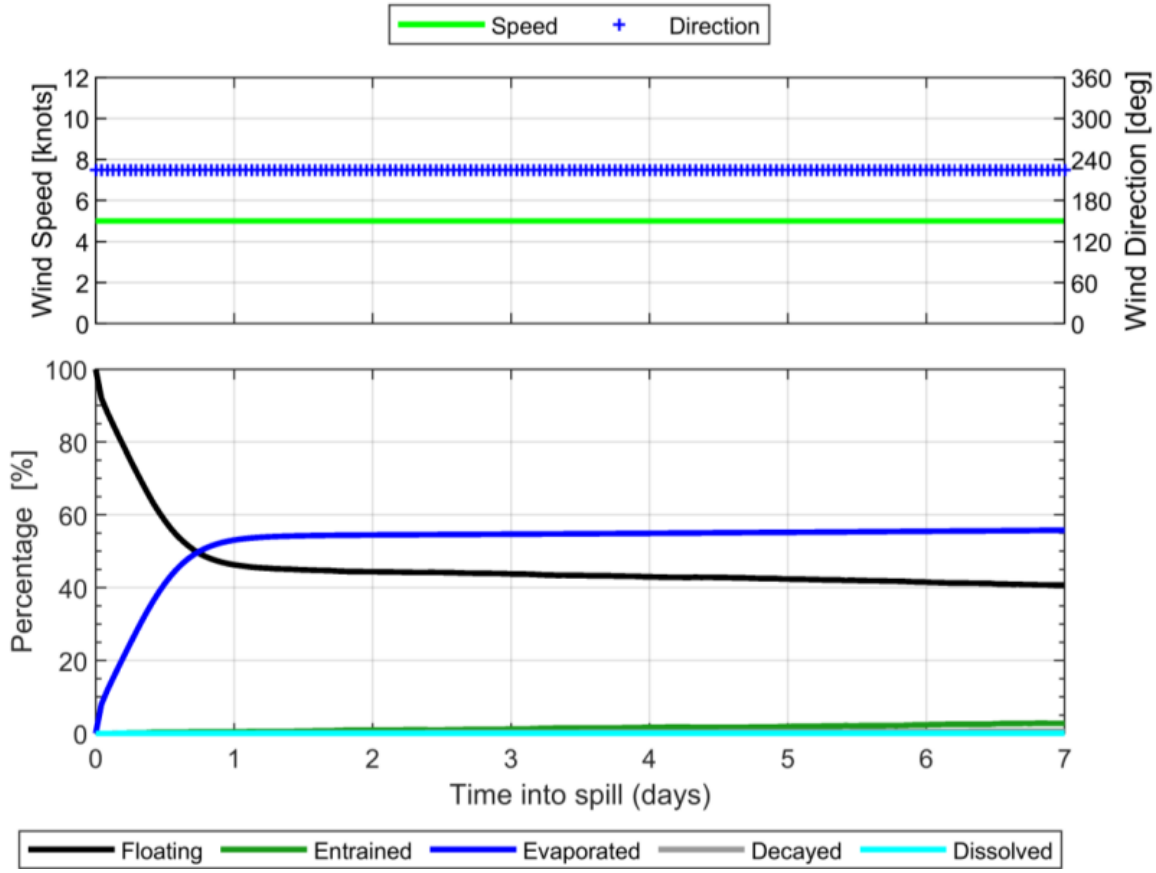


Figure 6-18: Proportional Mass Balance Plot Representing the Weathering of Annie-1 Condensate Spilled onto the Water Surface over 1 hour and Subject to a Variable Wind Speeds (1-23 knots) at 15 °C Water Temperature (RPS 2024).

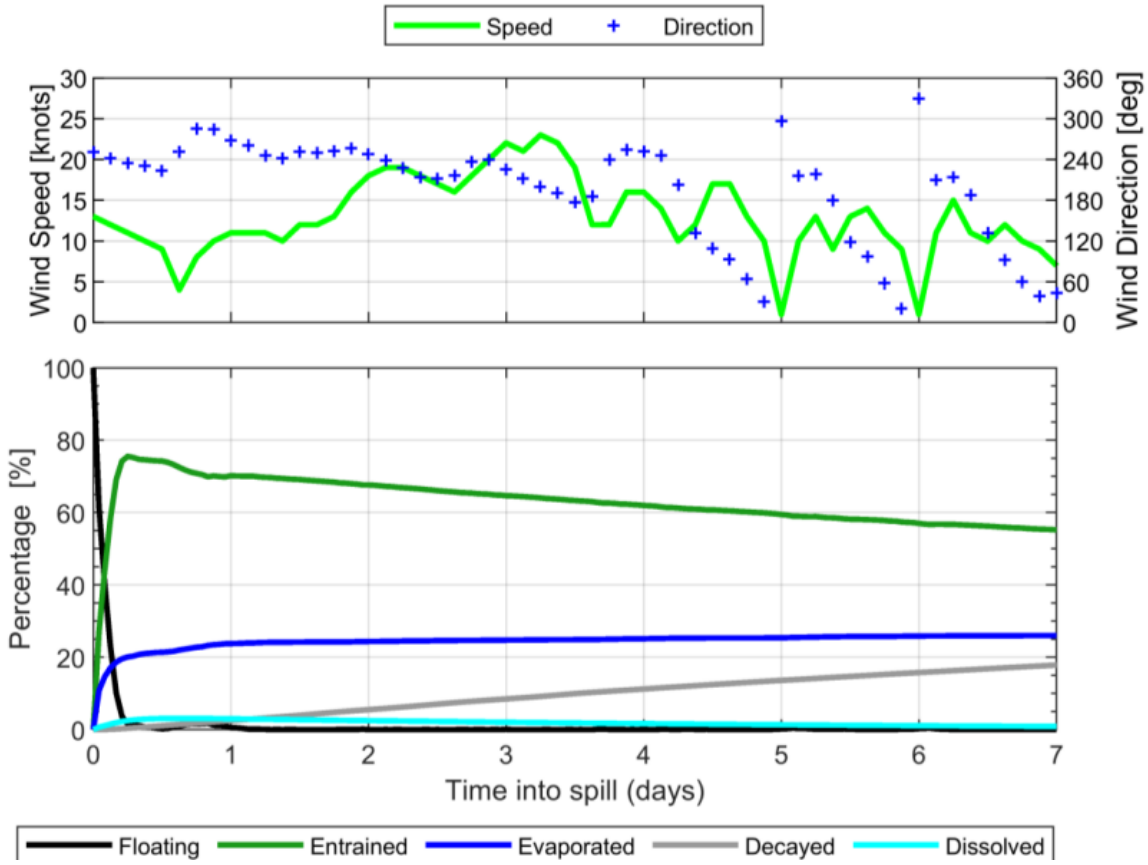


Figure 6-19: Proportional Mass Balance Plot Representing the Weathering of Annie-1 Condensate Spilled onto the Water Surface over 1 hour and Subject to a Variable Wind Speeds (1-23 knots) at 15 °C Water Temperature (RPS 2024).

6.8.3.4 Modelling Results

Stochastic Analysis

Vessel LOC – MDO

Table 6-52 provides a summary of the results from the stochastic modelling provided in Appendix 6 - for Vessel LOC (MDO) during the Activity (RPS 2023).

Table 6-52: Stochastic Modelling Output Summary for Vessel LOC - MDO

Exposure Values	Summary of worst-case predicted exposure
Surface Hydrocarbon	
Low (1 g/m^2)	Floating hydrocarbon at this level is expected to be visually detectable but not have ecological impacts. • The maximum distance for floating hydrocarbon exposure from the source was predicted to be 32.5 km. • Would intersect with BIAs for cetacean, seabird and shark species. • Would intersect with the Twelve Apostles Marine Park.

Exposure Values	Summary of worst-case predicted exposure
Moderate (10 g/m^2)	Floating hydrocarbon at this level has the potential to cause ecological impacts. • The maximum distance for floating hydrocarbon exposure from the source was predicted to be 10.3 km. • Would intersect with BIAs for cetacean, seabird and shark species.
High (100 g/m^2)	Surface hydrocarbon at this level is likely to cause ecological impacts. • The maximum distance for floating hydrocarbon exposure from the source was predicted to be 2.8 km. • Would intersect with BIAs for cetacean, seabird and shark species.
Shoreline Hydrocarbon	
Low (10 g/m^2)	Shoreline hydrocarbon at this level is expected to be visually detectable but not have ecological impacts. • The probability of hydrocarbon accumulation on any shoreline at or above the low threshold was 60%. • The minimum time to shore at or above the low threshold was 22 hours. • The maximum total volume of hydrocarbon ashore for a single spill trajectory was 43.2 m^3. • The maximum length of hydrocarbon ashore above the low threshold was 32 km.
Moderate (100 g/m^2)	Shoreline hydrocarbon at this level has the potential to cause ecological impacts. • The minimum time to shore at or above the moderate threshold was 1 day. • The highest maximum probability of shoreline accumulation is 28% at Corangamite. • The maximum length of hydrocarbon ashore above the moderate threshold was 11 km.
High (500 g/m^2)	Shoreline hydrocarbon at this level is likely to cause ecological impacts. • The maximum length of hydrocarbon ashore above the moderate threshold was 1 km.
In-water Exposure - Dissolved	
Low (10pb)	Dissolved hydrocarbon at this level is not expected to have ecological impacts. • The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 2 hours. • The probability of intersect with the Twelve Apostles Marine Park is 1%. • Would intersect with BIAs for cetacean, seabirds and shark species.
Moderate (50 ppb)	Dissolved hydrocarbon at this level has the potential to cause ecological impacts. • The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 5 hours. • Would intersect with BIAs for cetacean, seabirds and shark species.
High (400 ppb)	No exposure at this threshold was predicted.
In-water Exposure - Entrained	
Low (10 ppb)	Entrained hydrocarbon at this level is not expected to have ecological impacts. • The minimum time to entrained hydrocarbon exposure at any given receptor(s) was 1 hour. • Would intersect with BIAs for cetacean, seabirds and shark species.

Exposure Values	Summary of worst-case predicted exposure
High (100 ppb)	Entrained hydrocarbon at this level has the potential to cause ecological impacts. • The minimum time to entrained hydrocarbon exposure at any given receptor(s) was 1 hour. • Would intersect with BIAs for cetacean, seabirds and shark species.

LOWC – Condensate

Table 6-53 provides a summary of the results from the stochastic modelling report provided in Appendix 6 - for LOWC (Condensate) during the Activity (RPS 2024).

Table 6-53: Stochastic Modelling Output Summary for LOWC

Exposure Values	Summary of worst-case predicted exposure
Surface Hydrocarbon	
Low (1 g/m^2)	Floating hydrocarbon at this level is expected to be visually detectable but not have ecological impacts. • Worst-case maximum distance from the source was predicted as 55.7 km. • Would intersect with BIAs for cetacean, seabirds and shark species.
Moderate (10 g/m^2)	Floating hydrocarbon at this level is expected to be visually detectable but not have ecological impacts. • Worst-case maximum distance from the source was predicted as 3.2 km. • Would intersect with BIAs for cetacean, seabirds and shark species.
High (100 g/m^2)	No exposure at this threshold was predicted.
Shoreline Hydrocarbon	
Low (10 g/m^2)	Shoreline hydrocarbon at this level is expected to be visually detectable but not have ecological impacts, • The highest probability of shoreline accumulation was 100% at the following LGAs: – Corangamite, Moonlight Head, Colac Otway, Moyne, Bay of Islands, Cape Otway West. • The worst-case minimum time to shore at or above the low threshold was predicted to be 0.96 days (at Moyne and Bay of Islands). • The worst-case maximum length of hydrocarbon ashore at low threshold was predicted as 224 km.
Moderate (100 g/m^2)	Shoreline hydrocarbon at this level has the potential to cause ecological impacts. • The highest probability of shoreline accumulation was 100% at the following LGA: – Corangamite and Moonlight Head. • The worst-case minimum time to shore at or above the moderate threshold was predicted to be 1.25 days (at Corangamite and Port Campbell). • The worst-case maximum length of hydrocarbon ashore at the moderate threshold was predicted as 62 km.
High (1,000 g/m^2)	Shoreline hydrocarbon at this level is likely to cause ecological impacts. • The highest probability of shoreline accumulation was 27% at the following LGAs: – Corangamite.

Exposure Values	Summary of worst-case predicted exposure
	• The worst-case minimum time to shore at or above the high threshold was predicted in ~26 days (at Moyne and Bay of Isle). • The maximum length of hydrocarbon ashore at or above the high threshold was 6 km.
In-water Exposure - Dissolved	
Low (10pb)	Dissolved hydrocarbon at this level is not expected to have ecological impacts. • The worst-case minimum time to entrained hydrocarbon exposure at any given receptor(s) was 1.63 days across all locations. • Worst case scenario probabilities of intersect with the following conservation values and sensitivities: – Bonney Coast Upwelling KEF (1%) – Apollo AMP (1%) – Twelve Apostles Marine National Park (40%). • Probabilities of up to 50% would intersect Victoria State Waters. • Would intersect with BIAs for cetacean, seabirds and shark species.
Moderate (50 ppb)	No exposure at this threshold was predicted.
High (400 ppb)	No exposure at this threshold was predicted.
In-water Exposure - Entrained	
Low (10 ppb)	Entrained hydrocarbon at this level is not expected to have ecological impacts. • The worst-case minimum time to entrained hydrocarbon exposure at any given receptor(s) was 0.04 day across all locations. • Worst case scenario probabilities of intersect with the following conservation values and sensitivities: – AMPs: Apollo AMP (97%), Beagle AMP (36%), Zeehan AMP (9%), and Nelson AMP (7%) – MNPs: Twelve Apostles Marine Park (100%), Wilsons Promontory (60%), Discovery Bay (30%), Bunurong (28%), Point Addis (23%), Port Phillip Heads (25%), Churchill Island (12%), and Cape Howe (2%). – KEFS: Bonney Coast Upwelling (71%), West Tasmania Canyons (27%), Upwelling East of Eden (10%), Canyons on the Eastern Continental Slope (6%), Shelf Rocky Reefs (1%). – MPs: Batemans (1%) and Lower South East (3%). – MS: Mushroom MS (25%). – RAMSAR wetlands: Western Port (12%) and Port Phillip Bay Western Shoreline and Bellarine Peninsula (6%). • Would intersect with BIAs for cetacean, seabirds and shark species. • Would intersect with Victorian (100%), Tasmanian (15%), South Australian (10%), and New South Wales (2%) State Waters.
High (100 ppb)	Entrained hydrocarbon at this level has the potential to cause ecological impacts. • The worst-case minimum time to entrained hydrocarbon exposure at any given receptor(s) was 0.08 days.

Exposure Values	Summary of worst-case predicted exposure
	• Worst case scenario probabilities of intersect with the following conservation values and sensitivities: – Apollo AMP (65%) – Twelve Apostles Marine Park (100%). • No KEFs, MPs, or MSs were intersected at this threshold. • Would intersect with BIAs for cetacean and shark species. • Would intersect with Victorian State Waters only (100%).

Deterministic Analysis

Deterministic analysis was used to assess the impact of the individual simulations considered to have the greatest impact on the environment. The scenarios were selected and presented based on a variety of criteria detailed in Table 6-54 (RPS 2023; 2024).

Table 6-54: Summary of Deterministic Modelling Outcomes for the Spill Scenarios

Deterministic Analyses Criteria	Vessel LOC - MDO	LOWC - Condensate
The largest swept area for surface oil above 10 g/m^2	The maximum area of exposure on the sea surface at the visible hydrocarbon threshold (10 g/m^2) scenario reached its peak within the first day and was approximately 29 km^2.	The maximum area of exposure on the sea surface at the visible hydrocarbon threshold (10 g/m^2) scenario reached its peak within the first 3.8 days and was approximately 4.9 km^2.
The largest swept area for surface oil above 50 g/m^2	The maximum area of exposure on the sea surface at the visible hydrocarbon threshold (50 g/m^2) scenario reached its peak within the first day and was approximately 5 km^2.	There was no exposure to surface oil above 50 g/m^2.
The greatest total volume of oil ashore above 100g/m^2	The largest total volume of oil exposure ashore was 37 m^3 which occurred over 9 days.	The largest total volume of oil exposure ashore was 264.9 m^3 which occurred over 113 days.
The longest length of shoreline with oil accumulation above 100g/m^2	The maximum length of actionable shoreline hydrocarbon (100 g/m^2) was approximately 11 km.	The maximum length of actionable shoreline hydrocarbon (100 g/m^2) was approximately 56 km.
Largest area of entrained hydrocarbon exposure above 100 ppb	The maximum area of entrained hydrocarbon exposure in the water column at the response hydrocarbon threshold (100 ppb) was approximately 636 km^2. Additionally, approximately 52 m^3 remained entrained within the water column at the end of the simulation.	The maximum area of entrained hydrocarbon exposure in the water column at the response hydrocarbon threshold (100 ppb) was approximately 2,295 km^2. Additionally, approximately 1,120 m^3 remained entrained within the water column at the end of the simulation.

Deterministic Analyses Criteria	Vessel LOC - MDO	LOWC - Condensate
Largest area of dissolved hydrocarbon exposure above 50 ppb	The maximum area of dissolved hydrocarbon exposure in the water column at the response hydrocarbon threshold (50 ppb) was approximately 2 km^2.	There was no exposure to dissolved hydrocarbons above 50 ppb.

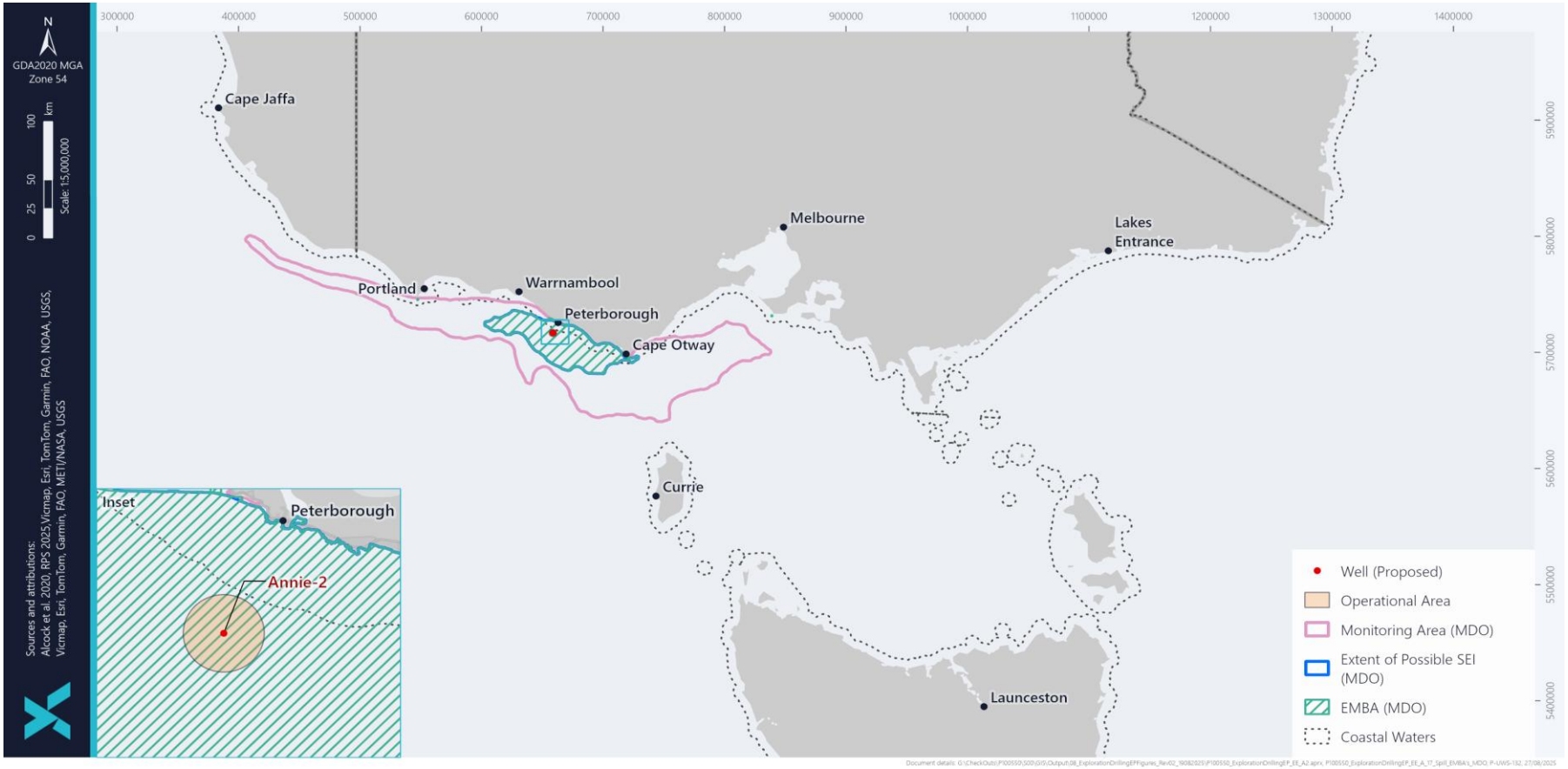


Figure 6-20: EMBA, Monitoring Area and Extent of Potential Socio-Economic (SE) Impacts for the Vessel LOC - MDO Spill Scenario
(Note: The Monitoring Area and Extent of Possible SEI threshold spill scenarios overlap in this figure. While they appear similar, they represent separate scenarios and are considered independently).

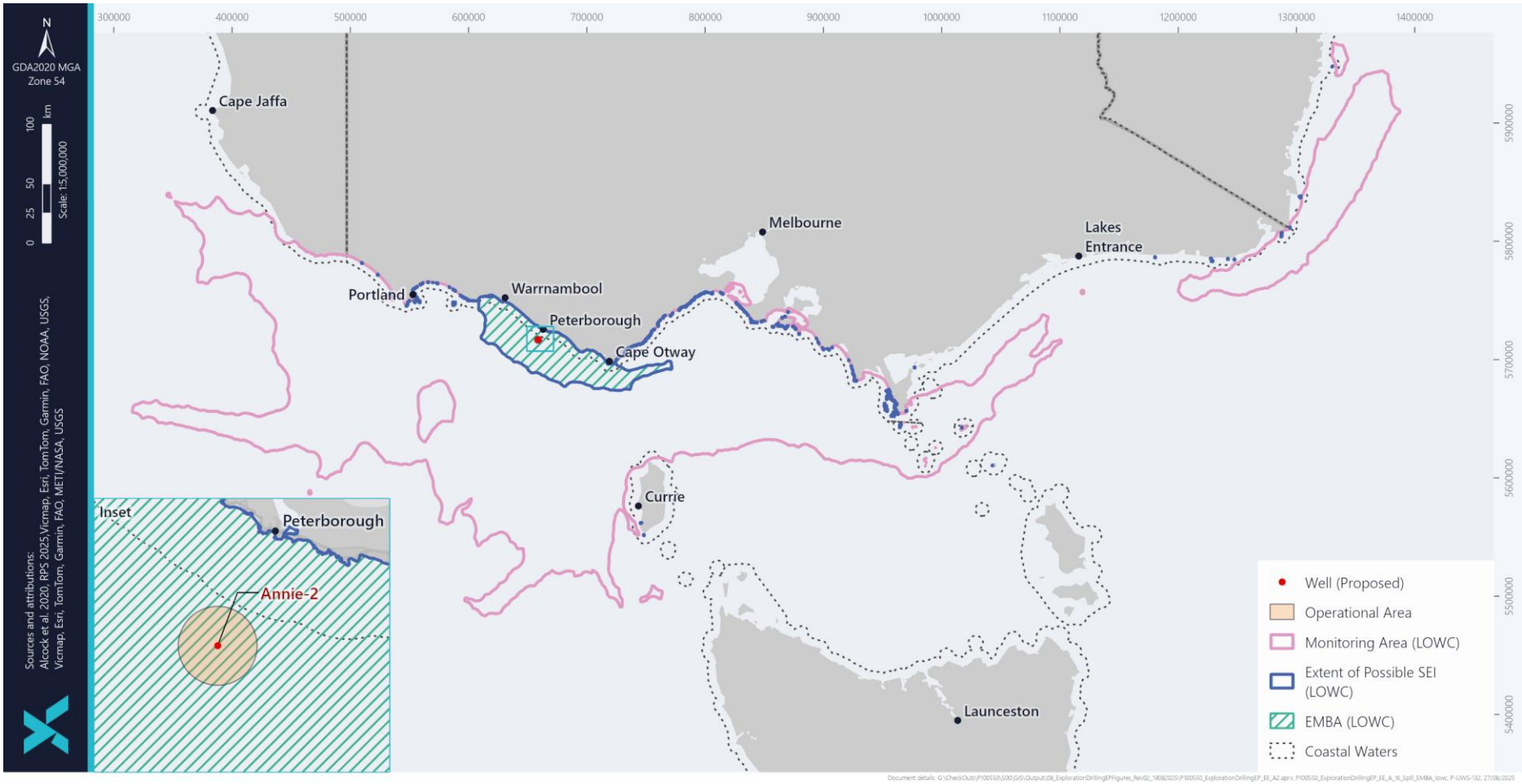


Figure 6-21: EMBA, Monitoring Area and Extent of Potential Socio-Economic (SE) Impacts for the LOWC Spill Scenario

6.8.4 Predicted Environmental Impacts and Risks

Potential impacts from an accidental release of hydrocarbons are:

- change in water quality.

Potential risk:

- change in habitat
- impact to marine fauna:
  - change in fauna behaviour
  - injury / mortality to fauna
- change in ecosystem dynamics
- change to the functions, interests, or activities of other users.

Impacts and risks to cultural heritage are assessed in Section 8.0.

6.8.5 Impact and Risk Evaluation

6.8.5.1 Impact: Change in Water Quality

Inherent Consequence Evaluation

An accidental release of hydrocarbons into the marine environment will result in a change in water quality. Annie condensate and MDO are both classified as a light non-persistent hydrocarbon (Group II), containing a high proportion of volatile components and only a small proportion of non-volatile (persistent) components.

Based on the spill modelling report for MDO approximately 34.2 - 83.1% is anticipated to evaporate from the water surface within the first 24 hours. MDO has a strong tendency to entrain within the upper water column, leaving a small proportion remaining on the water surface. Approximately 10% is residual and will remain to decay slowly over time (RPS 2023).

Regarding the condensate spill following a LOWC, approximately 52.4 - 70.1% is anticipated to evaporate from the water surface within the first 24 hours. Annie condensate has a strong tendency to entrain within the upper water column, leaving a small proportion remaining on the water surface. Approximately 17.5% is residual and will remain to decay slowly over time (RPS 2024).

High proportions of entrained hydrocarbons reduce the proportion being evaporated; however, it also increases the rates of hydrocarbon decay when mixed in the water column. Entrained hydrocarbon will often remain in the upper water column until conditions are calm then will float to the surface and reform as a slick. A change in water quality is expected to be short-term based on the weathering behaviour described above.

Given the nature of the MDO and condensate hydrocarbons, the forecasted weathering processes, and the offshore metocean conditions, the area of exposure following a spill event is anticipated to be localised and short-term. The water quality of the area exposed to hydrocarbons is expected to return to pre-spill conditions relatively rapidly. Long-term adverse impacts to the water quality are not anticipated. Matters relating to potentially impacted receptors from a change in water quality within the exposed area are discussed for the specific receptors below.

Therefore, the predicted level of impact, i.e., the consequence of a change in water quality from an accidental release of hydrocarbon is evaluated as **Level 2**.

6.8.5.2 Risk: Change in Habitat

Inherent Consequence Evaluation

Impacts to ecological receptors, such as habitats, are assessed based on the hydrocarbon exposure thresholds that have been identified to potentially cause harmful impacts in ecological receptors. The potential extent of these thresholds is determined boundary of the ecological EMBA (EMBA) which is based on the modelling (Figure 6-20 and Figure 6-21).

The thresholds that apply to the outer extent of potential ecological impacts are:

- surface (moderate)
- shoreline (moderate)
- in water – dissolved (moderate)
- in water – entrained (high).

Potential impacts to habitats are assessed in Table 6-55.

The EPBC Protected Matters Report for the EMBA (MDO) and the EMBA (LOWC) are in Appendix 5 - .

Table 6-55: Consequence Evaluation for Hydrocarbon Exposure – Ecological Receptors - Habitats

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Seagrass</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MDO</td></tr>
<tr><td colspan="2">Seagrass meadows are predicted to be exposed to in-water hydrocarbons.
Hydrocarbon exposure in nearshore and intertidal areas is predicted to occur only at low thresholds for dissolved hydrocarbons, which is not expected to have ecological impacts (RPS 2024).
Exposure to entrained hydrocarbons at the high threshold level are only predicted within Victoria State Waters, not within Tasmania, South Australian or NSW State waters.</td><td>Seagrasses may be present within the EMBA (MDO) and are predicted to be exposed to in-water hydrocarbons.
Hydrocarbon exposure in nearshore and intertidal areas is predicted to occur at moderate thresholds for dissolved hydrocarbons, with some sites (such as Colac Otway, Corangamite and Moyne) predicted to be exposed to high thresholds of entrained for the worst-case scenario modelled (RPS 2023).
Potential exposure to entrained hydrocarbons at the high threshold level are only predicted within Victoria State Waters.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Given seagrass communities are typically found in nearshore shallow coastal waters, exposure to surface (floating) hydrocarbons is not expected.</td><td>Seagrass meadows, within intertidal or shallow nearshore waters have the potential to be exposed to in-water exposure (entrained and dissolved) only predicted to occur within the upper 0–10 m of the water column.
Seagrass meadows are important in stabilising seabed sediments, and providing nursery grounds for fish and crustaceans, and a protective habitat for the juvenile fish and invertebrates species (Huisman 2000; Kirkham 1997).
Seagrass ecosystems exposed to hydrocarbons can result in direct mortality from smothering. Petroleum fractions may also be absorbed into the seagrass tissues, which can then lower the organism’s tolerance to other stressors and reduce growth rates (Zieman et al. 1984).</td><td>Given seagrass communities are typically found in nearshore shallow coastal waters, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

<table>
<tr><td colspan="3">Summary:
Given the restricted range of exposure (shallow nearshore and intertidal waters only) and the predicted lower concentrations of hydrocarbons expected to be in these waters, any impact to seagrass is not expected to result in long-term or irreversible damage. Consequently, the potential consequence to seagrass is considered to be Level 2, as they may result in localised short-term impacts to habitats of recognised conservation value but not affecting local ecosystem functioning.</td></tr>
<tr><td colspan="3">Macroalgae</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MDO</td></tr>
<tr><td colspan="2">Macroalgae are predicted to be exposed to in-water hydrocarbons. In-water hydrocarbon exposure in nearshore, intertidal, and subtidal areas is predicted to only occur at low thresholds for dissolved hydrocarbons, which is not expected to have ecological impacts (RPS 2024). Some sites (such as Colac Otway, Corangamite and Moyne) are predicted to be exposed to high thresholds of entrained (RPS 2024).
Exposure to entrained hydrocarbons at the high threshold level are only predicted within Victoria State Waters, not within Tasmania, South Australian or NSW State waters.
In-water exposure (entrained and dissolved) is only predicted to occur within the upper 0–10 m of the water column; therefore, benthic habitats, such as macroalgae, within intertidal or shallow nearshore waters has the potential to be exposed.</td><td>Macroalgae are predicted to be exposed to in-water hydrocarbons. In-water exposure (entrained and dissolved) is only predicted to occur within the upper 0–10 m of the water column; therefore, benthic habitats, such as macroalgae, within intertidal or shallow nearshore waters has the potential to be exposed.
In-water hydrocarbon exposure in nearshore, intertidal, and subtidal areas is predicted to occur at moderate thresholds for dissolved hydrocarbons, with some sites (such as Colac Otway, Corangamite and Moyne) are predicted to be exposed to high thresholds of entrained (RPS 2023).
Potential exposure to entrained hydrocarbons at the high threshold level are predicted only within Victoria State Waters.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Given macroalgae are typically found within the water column attached to benthic substrate, exposure to surface (floating) hydrocarbons is not expected.</td><td>In-water exposure (entrained and dissolved) is only predicted to occur within the upper 0–10 m of the water column; therefore, macroalgae within intertidal or shallow nearshore waters has the potential to be exposed.
Macroalgal systems are an important source of food and shelter for many ocean species; including in unattached drift or wrack forms (McClatchie et al. 2006).</td><td>Given macroalgae are typically found within the water column attached to benthic substrate, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

	The physical effects of smothering, fouling and asphyxiation has been documented from oil contamination in macroalgae. Reported toxic responses to hydrocarbons have included a variety of physiological changes to enzyme systems, photosynthesis, respiration, and nucleic acid synthesis (Lewis and Pryor 2013). A review of field studies conducted after spill events by Connell et al. (1981) indicated a high degree of variability in the level of impact, but in all instances, the algae appeared to be able to recover rapidly from even very heavy hydrocarbon exposure.	
Summary: Given the restricted range of exposure (shallow nearshore and intertidal waters only) and the predicted lower concentrations of hydrocarbons expected to be in these waters, any impact to macroalgae is not expected to result in long-term or irreversible damage. Consequently, the potential consequence to macroalgae are considered to be **Level 2**, as they may result in localised short-term impacts to habitats of recognised conservation value, but not affecting local ecosystem functioning.		
Benthic Habitat		
Exposure Evaluation		
Condensate		**MDO**
Benthic assemblages, such as soft corals and sponges, may be present within the area exposed to in-water hydrocarbons at relevant exposure thresholds following a LOWC of condensate. Corals are not identified as a dominant habitat type within the area predicted to be exposed to hydrocarbons at relevant exposure thresholds. Soft corals are typically present in deeper waters throughout the continental shelf, slope and off-slope regions, to well below the limit of light penetration. Sponges are more common in the region, occurring in patchy distribution on hard substrates over a range of depths but are more dominant in deeper waters. Refer Section 4.44.4.2 for a description of the benthic types found within the wider Monitoring area.		Benthic assemblages, such as soft corals and sponges, may be present within the area exposed to in-water hydrocarbons at relevant exposure thresholds following a LOC of MDO. Corals are not identified as a dominant habitat type within the area predicted to be exposed to hydrocarbons at relevant exposure thresholds. Soft corals are typically present in deeper waters throughout the continental shelf, slope and off-slope regions, to well below the limit of light penetration. Sponges are more common in the region, occurring in patchy distribution on hard substrates over a range of depths but are more dominant in deeper waters. Refer Section 4.44.4.2 for a description of the benthic types found within the wider Monitoring area.

The worst-case scenario modelled predicted exposure at moderate (50 ppb) thresholds of dissolved, and high thresholds of both dissolved (400 ppb) and entrained (100 ppb) (RPS 2024).	The worst-case scenario modelled predicted exposure at moderate (50 ppb) thresholds of dissolved, and high thresholds of both dissolved (400 ppb) and entrained (100 ppb) (RPS 2023).

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Given these assemblages are benthic, exposure to surface (floating) hydrocarbons is not expected.	Exposure of entrained hydrocarbons to shallow subtidal corals has the potential to result in lethal or sublethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Shigenaka 2011). Contact with corals may lead to reduced growth rates, tissue decomposition, and poor resistance and mortality of sections of reef (NOAA 2010). Exposure to hydrocarbons has been found to impact metamorphosis and attachment of sponge larvae, however, only at high concentrations of over 10,000 ppb (Negri et al. 2016). Given in-water exposure concentrations are not anticipated at this level, impacts to sponges are not anticipated. In-water exposure (dissolved or entrained) at relevant exposure thresholds is only predicted to occur within the upper 0–10 m of the water column, therefore, soft corals and sponges found in water depths below 10 m are not anticipated to be impacted by in-water hydrocarbon exposure.	Given these assemblages are benthic, exposure to shoreline hydrocarbons is not expected.

Summary:
Given the lack of coral reef formations, and the sporadic cover of sponges and hard or soft corals in mixed nearshore reef communities along the Victorian coast, any impacts that may occur are anticipated to be limited to isolated corals and sponges. Consequently, the potential consequence to soft corals and sponges are considered to be **Level 1**, as they could be expected to result in localised, short-term impacts.

Rocky Shoreline

Exposure Evaluation

Condensate	MDO

Rocky shorelines are found along the Victorian coastline, particularly between Warrnambool and Cape Otway (Section 4.4) and may be present within the area exposed to shoreline hydrocarbons at relevant exposure thresholds following a LOWC of condensate. The modelling predicted shoreline accumulation to occur at, or above, the low, moderate, and high thresholds at 100%, 100%, and 27% probabilities, respectively, for various shoreline locations (RPS 2024). Shoreline contact at the moderate threshold was anticipated to occur within 1.25 days for the worst-case credible modelled scenario. The worst-case maximum total volume of hydrocarbon ashore was predicted as 312.1 m^3. The modelling also predicted rapid evaporation during the first 24 hours following the release of condensate and depending on the weather conditions (i.e., wind speeds) the remainder of the condensate is predicted to readily entrain into the water column (more entrainment under higher wind speeds) (RPS 2024). Given the hydrocarbon characteristics of the condensate, being a volatile and light non-persistent hydrocarbon with approximately 17.5% residual, including 10% wax content, majority of the volatile ends will evaporate rapidly (RPS 2024). Therefore, in the unlikely event that hydrocarbons were to reach shorelines predicted below relevant thresholds, hydrocarbon sheens would not be expected, instead isolated patches of highly weathered waxy flakes may occur.	Rocky shorelines are found along the Victoria coastline, particularly between Warrnambool and Cape Otway (Section 4.4) and may be present within the area exposed to shoreline hydrocarbons at relevant exposure thresholds following a LOC of MDO. The modelling predicted the maximum probability of shoreline loading at or above the moderate exposure of 28% with shoreline contact at this threshold anticipated within 3 days for the worst-case credible modelled scenario (RPS 2023). In favourable evaporation conditions, modelling predicted evaporation of about 4% of the oil mass in the first 12 hours and a further 32% within the first 24 hours. A further 54% should evaporate over several days, with the remainder persisting in the water column (RPS 2023).

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Given this receptor is located on the shoreline, exposure to surface (floating) hydrocarbons is not expected.	Given this receptor is located on the shoreline, exposure to in-water hydrocarbons is not expected.	The sensitivity of a rocky shoreline to oiling is dependent on a number of factors including its topography and composition, position, exposure to oceanic waves and currents. Exposed rocky shorelines have been shown to be less sensitive than sheltered rocky shorelines. Rocky shorelines provide habitats for invertebrates and can also be utilised by some pinniped (haul-out sites) and bird species (noting that foraging and breeding/nesting typically occurs above high tide line).

		The impact of oil on any organism depends on the toxicity, viscosity and amount of oil, on the sensitivity of the organism and the length of time it is in contact with the oil. Even where immediate damage to rocky shores from oil spills has been considerable, it is unusual for this to result in long-term damage and the communities have often recovered within 2 or 3 years (IPIECA 1995). Due to the tidal action and constant wave washing on this type of shoreline rapid weathering of any hydrocarbons in the intertidal area is expected, and the minimal remaining oil weathers, the residual components of the oil will resolidify to waxy particles, decreasing the risk of exposures, making it unlikely that toxicity or smothering effects to exposed fauna will occur on this type of shoreline.

Summary:
Due to the highly volatile nature of the hydrocarbons as a light non-persistent hydrocarbon, hydrocarbons accumulating on certain shorelines, such as rocky shorelines, may easily by washed off in the presence of tidal and/or wave action. However, rocky shorelines provide habitats to a diverse range of fauna and flora which may be impacted by exposure to hydrocarbons. Consequently, the potential impacts and risks to rocky shorelines from an unplanned hydrocarbon release event are assessed to be **Level 3** based on the potential for localised, medium-term impacts.

Sandy Shoreline

Exposure Evaluation

Condensate	MDO
Sandy shorelines are present along the Victoria coastline (Section 4.4) where hydrocarbons may contact in the unlikely event that they are released into the marine environment. The maximum length of shoreline impacted at the moderate threshold was 34.5 km, at the Corangamite LGA. The minimum time before shoreline accumulation ranged from 0.96 days to 66.96 days for the low to high thresholds, with a peak volume of 312.1 m^3 predicted ashore (RPS 2024). This stretch of shoreline is dominated by sandy habitats.	Sandy shorelines are the dominant shoreline type along the Victoria coastline (Section 4.4) where hydrocarbons may contact in the unlikely event that they are released into the marine environment. The maximum length of shoreline impacted at the moderate threshold was 10 km, with a maximum peak volume ashore of 43.1 m^3 – both at the Corangamite LGA (RPS 2023). Therefore, sandy beaches have the potential to be exposed to hydrocarbons at, or above the low, moderate, and high threshold (RPS 2023).

The condensate comprises a significant portion of volatiles and semi to low volatiles (82.5% total) with 17.5% residual components, which means it will evaporate readily when on the water surface, with the persistent components to remain on the water surface over time. Given the hydrocarbon characteristics of the condensate, being a volatile and Group II non-persistent hydrocarbon, the majority of the volatile ends will evaporate rapidly (RPS 2024). Therefore, in the unlikely event that hydrocarbons were to reach the Victoria shoreline at relevant thresholds, hydrocarbon sheens would not be expected, instead isolated patches of highly weathered waxy flakes would be expected.	The condensate LOWC spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA (LOWC).

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Given this receptor is located on the shoreline, exposure to surface (floating) hydrocarbons is not expected.	Given this receptor is located on the shoreline, exposure to in-water hydrocarbons is not expected.	Sandy beaches are considered to have a low sensitivity to hydrocarbon exposure. Sandy beaches provide habitat for a diverse assemblage (although not always abundant) of infauna (including nematodes, copepods and polychaetes); and macroinvertebrates (e.g. crustaceans). In the event of shoreline contact, a sandy beach may allow oil to percolate through the sand, thus increasing its ability to hold more oil ashore over tidal cycles and various wave actions than an equivalent area of water; hence oil can increase in thickness onshore over time. Given the low viscosity of this residue, it is likely to permeate into sand areas. The tides and constant wave washing are expected to lead to rapid weathering of any hydrocarbons in the intertidal area and it is unlikely that toxicity or smothering effects to exposed fauna will occur on this type of shoreline. The modelling predicted rapid evaporation during the first 24 hours of the hydrocarbon release and depending on the weather conditions (i.e., wind

		speeds) the remainder of the condensate is predicted to readily entrain into the water column (more entrainment under higher wind speeds) (see Section 6.8.3.3). Therefore, as the volatile components of the hydrocarbon evaporates and the remaining oil weathers, the residual components of the oil will resolidify to waxy particles, and the risk of exposure decreases.
Summary: Due to the highly volatile nature of the hydrocarbons as a light non-persistent hydrocarbon, hydrocarbons accumulating on certain shorelines, such as sandy shorelines, may easily by washed off in the presence of tidal and/or wave action. Consequently, the potential impacts and risks to sandy beaches from an unplanned hydrocarbon release event are assessed to be **Level 2** based on the potential for localised, short-term impacts.		
Mangroves		
Exposure Evaluation		
Condensate	**MDO**	
Mangroves are not a dominant habitat found within the area potentially exposed to hydrocarbons. However, a few isolated patches of mangroves can be found along the Victorian coastline, predominantly with inlets or bays including Western Port Bay and Corner Inlet (Section 4.4). These mangroves have the potential to be exposed to hydrocarbons within the EMBA (LOWC) (RPS 2024). Modelling of the condensate LOWC spill scenario predicted probability of accumulation to any shoreline at, or above, the moderate threshold was 100%. The maximum total volume ashore for a single spill trajectory was 312.1 m^3, and the maximum length of shoreline accumulation at the moderate and high thresholds was 34.5 km and 5.5 km, respectively.	Mangroves are not a dominant habitat found within the area potentially exposed to hydrocarbons. However, a few isolated patches of mangroves can be found along the Victorian coastline, predominantly with inlets or bays (Section 4.4). The condensate LOWC spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA (LOWC).	
Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Mangroves are considered to have a high sensitivity to hydrocarbon exposure.	The change in toxicity levels within the marine environment can penetrate the root surfaces, via the respiratory	Mangroves are considered to have a high sensitivity to hydrocarbon exposure. Hydrocarbon can enter

Mangroves can be killed by heavy or viscous oil, or emulsification, that covers the trees' breathing pores thereby asphyxiating the subsurface roots, which depend on the pores for oxygen. Mangroves can also take up in-water hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop et al. 1987).	capabilities of the roots, poisoning the plant. Acute impacts to mangroves can be observed within weeks of exposure, whereas chronic impacts may day months to years to detect.	mangrove forests when the tide is high and be deposited on the aerial roots and sediment surface as the tide recedes (IPIECA 1993; NOAA 2014). Physical smothering of aerial roots by hydrocarbons can block the trees' breathing pores used for oxygen intake and result in the asphyxiation of sub-surface roots (IPIECA 1993). Heavy or viscous oil, or emulsification, can kill mangroves via this process. However, heavy oil coating is unlikely due to the highly volatile nature of the hydrocarbon. As the volatile components evaporate and the remaining oil weathers, the residual components of the oil will resolidify to waxy particles, and the risk of exposure decreases. Given the non-persistent nature of the hydrocarbon there is expected to be minimal impact from smothering of aerial roots or seedlings. However, if the residual oil does melt, some impact to the root systems and seedlings may occur.

Summary:

There are only a few isolated mangroves communities that may be exposed to hydrocarbons.

Given the non-viscous nature of the hydrocarbons, impacts are expected to be limited to the volatile component of the hydrocarbon, however given their sensitivity to hydrocarbons, the potential consequence to mangroves is assessed to conservatively based on the potential for localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function. Consequently, the potential impacts and risks to mangroves from an accidental hydrocarbon released is assessed to be **Level 3**.

Coastal Saltmarsh

Exposure Evaluation

Condensate	MDO
Communities of saltmarsh are predicted to be within the area potentially exposed to hydrocarbons ashore; and is present within some estuaries and inlet/riverine systems along the Victorian coastline. Some of the saltmarsh habitat along this coast will be representative of the Subtropical and Temperate Saltmarsh TEC (see Section 4.0 for further details).	Saltmarshes may potentially be exposed to hydrocarbons in the event of shoreline accumulation following a LOC from a vessel. Saltmarsh habitats are present within estuaries, inlets, and riverine systems in many parts along the Victorian coast (Section 4.0).

Modelling of the LOWC spill scenario predicted hydrocarbon exposure at, or above the moderate threshold predominantly between Port Fairy and the east of Cape Otway along the Victorian coastline. Shoreline contact at this threshold was anticipated within 1.25 days for the worst-case credible modelled scenario. Hydrocarbon exposure at, or above, the high threshold was predicted at Peterborough, Princetown and Cape Otway (RPS 2024).	The condensate LOWC spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA (LOWC).

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Given this receptor is located on the shoreline, exposure to surface (floating) hydrocarbons is not expected.	Given this receptor is located on the shoreline, exposure to in-water hydrocarbons is not expected.	Saltmarsh is considered to have a high sensitivity to hydrocarbon exposure. Oil can enter saltmarsh systems during the tidal cycles if the estuary/inlet is open to the ocean. Similar to mangroves, this can lead to a patchy distribution of the oil and its effects, because different places within the inlets are at different tidal heights. Oil (in liquid form) will readily adhere to the marshes, coating the stems from tidal height to sediment surface. Heavy oil coating is unlikely due to the highly volatile nature of the hydrocarbon. As the volatile components evaporate and the minimal remaining oil weathers, the residual components of the oil will resolidify to waxy particles, and the risk of exposure decreases. Evidence from case histories and experiments shows that the damage resulting from oiling, and recovery times of oiled marsh vegetation, are very variable. In areas of light to moderate oiling where oil is mainly on perennial vegetation with little penetration of sediment, the shoots of the plants may be killed but recovery can take place from the underground systems. Good recovery commonly occurs within one to two years (IPIECA 1994). However, when oil penetrates the soil and the initial mortality of the

		vegetation is extensive, recovery to reference conditions may take 3–4 years (Hester and Mendelssohn 2000).
Summary: The potential consequence to saltmarsh is assessed to be **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.		

Inherent Likelihood

Historical LOWC incidents events during development drilling have been reported at a frequency for a gas well of 4.2 x 10^{-5} per drilled well (IOGP 2019). This represents the frequency of the cause (i.e. a LOWC); additional environmental factors would be necessary for the worst-case consequences to habitats to eventuate.

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of an accidental release of condensate causing Level 3 consequences to habitats is considered **Unlikely (D)**.

Inherent Risk Severity

The inherent risk severity of an accidental release of condensate causing impacts to habitats is considered **Moderate**. Table 6-56 lists the inherent risk severity for each habitat type.

Table 6-56: Inherent Risk Severity – Condensate Exposure – Ecological Receptors – Habitats

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Severity
Seagrass	2	D	Low
Macroalgae	2	D	Low
Benthic Habitat	1	D	Low
Rocky Shoreline	3	D	Moderate
Sandy Shoreline	2	D	Low
Mangroves	3	D	Moderate
Coastal Saltmarsh	3	D	Moderate

6.8.5.3 Risk: Impact to Marine Fauna

Inherent Consequence Evaluation

Impacts to ecological receptors, such as marine fauna, are assessed based on the hydrocarbon exposure thresholds that have been identified to potentially cause harmful impacts in ecological receptors. The potential extent of these thresholds is determined boundary of the ecological EMBA (EMBA) which is based on the modelling (Figure 6-20 and Figure 6-21).

The thresholds that apply to the outer extent of potential ecological impacts are:

- surface (moderate)
- shoreline (moderate)
- in water – dissolved (moderate)
- in water – entrained (high).

Potential impacts to marine fauna are assessed in Table 6-57. The inherent risk severity of an accidental release of condensate causing impacts to habitats is considered **Moderate**. Table 6-56 lists the inherent risk severity for each habitat type.

Table 6-56

The EPBC Protected Matters Report for the EMBA (MDO) and the EMBA (LOWC) are in Appendix 5 - .

Table 6-57: Consequence Evaluation for Hydrocarbon Exposure – Ecological Receptors – Marine Fauna

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Plankton</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MDO</td></tr>
<tr><td colspan="2">Plankton is found in nearshore and open waters in the water column.
Plankton population distributions are expected to be highly variable both spatially and temporally and are likely to comprise characteristics of tropical, southern Australian, central Bass Strait and Tasman Sea populations (see Section 4.4.2).
Plankton populations may be present within the area potentially exposed to hydrocarbons in the EMBA (LOWC).
Modelling of the condensate LOWC spill scenario predicted moderate exposure thresholds of surface hydrocarbons up to 3.2 km (east) of the release location. Exposure in nearshore and open water areas is predicted to only occur at low thresholds for dissolved hydrocarbons, which is not expected to have ecological impacts (RPS 2024). Some sites (such as Colac Otway, Corangamite and Moyne) are predicted to be exposed to high thresholds of entrained for the worst-case scenario modelled (RPS 2024).</td><td>Plankton is found in nearshore and open waters in the water column.
Plankton populations may be present within the area potentially exposed to hydrocarbons in the EMBA (MDO).
Modelling of the MDO spill scenario predicted moderate exposure thresholds of surface hydrocarbons up to 10.3 km (west) of the release location. Exposure in nearshore and open water areas is predicted to occur at moderate thresholds of dissolved with some sites predicted to be exposed to high thresholds of entrained for the worst-case scenario modelled (RPS 2023).</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>These organisms migrate vertically through the water column to feed in surface waters at night (NRDA 2012). As they move close to the sea surface it is possible that they may be exposed to surface hydrocarbons, however, the potential impacts from in-water exposure (dissolved or entrained) will be greater.
The presence of surface hydrocarbons may result in a reduction of light penetrating the water column, which may again affect the rate of photosynthesis, particularly in instances where there is prolonged presence of surface</td><td>Impacts, including injury and mortality, to planktonic species may occur due to a change in water quality following an unplanned hydrocarbon release. Plankton are widely dispersed throughout the water column, although exposure is predicted to occur within the 0-10 m water depth, where plankton are most abundant.
Relatively low concentrations of hydrocarbon are toxic to both plankton (including zooplankton and ichthyoplankton (fish eggs and larvae)). Plankton risk exposure through</td><td>Given plankton are only found within the water column, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

hydrocarbons over an extensive area. A reduction in the rate of photosynthesis may inhibit growth, depending on the concentration range. For example, photosynthesis is stimulated by low concentrations of oil in the water column (10-30 ppb) but becomes progressively inhibited above 50 ppb. Conversely, photosynthesis can be stimulated below 100 ppb for exposure to weathered oil (Volkman et al. 1994).	ingestion, inhalation and dermal contact with in-water hydrocarbons. Effects will be greatest in the area close to the spill source where hydrocarbon concentrations are likely to be highest. Highly volatile hydrocarbons generally have higher toxicity levels when initially released due to the presence of the volatile components (Di Toro et al. 2007), however, with rapid weathering expected, this toxicity decreases. Furthermore, the actual area of exposure is expected to be extremely localised and temporary due to the influence of waves, currents and weathering processes. Reproduction by survivors or migration from unaffected areas is likely to rapidly replenish losses (Volkman et al. 1994). Oil spill field observations show minimal or transient effects on plankton (Volkman et al. 1994). Once background water quality is re-established, plankton has been shown to take weeks to months to recover (ITOPF 2011b), allowing for seasonal influences on the assemblage characteristics, therefore long-term impacts are not anticipated. Due to the hydrocarbon characteristics, expected weathering and fate, the relatively quick recovery times of plankton, unplanned releases of hydrocarbons are not expected to have a substantial adverse effect on plankton life cycle and spatial distribution and therefore unlikely to affect populations at the regional scale or affect local ecosystem functioning.	
Summary: Any impact is expected to be localised and temporary, meaning that an oil spill in any one location is unlikely to have long-lasting impacts on plankton populations at a regional level. Once background water quality is re-established, plankton has been shown to take weeks to months to recover. Consequently, the potential impacts to plankton are considered to be **Level 2** as they could be expected to result in localised short-term impacts, but not affecting local ecosystem functioning.		
Benthic Invertebrates		
Exposure Evaluation		

Condensate	MDO
Marine invertebrates identified within the region, including commercially important species, may be impacted by in-water exposure of hydrocarbon expected to occur within the upper 0–10 m of the water column and shallow coastal areas of the EMBA (condensate LOWC). Invertebrates that live in intertidal zones include crustaceans, molluscs and infauna. These can be present in a wide range of habitats including sandy beaches and rocky shores. Modelling of the condensate LOWC spill scenario predicted in nearshore and intertidal areas is predicted to occur at low and high thresholds for entrained. No exposure at moderate or high thresholds was predicted for dissolved in-water hydrocarbons from the condensate LOWC modelled scenario (RPS 2024).	Marine invertebrates identified within the region, including commercially important species, may be impacted by in-water exposure of MDO expected to occur within the upper 0–10 m of the water column and shallow coastal areas of the EMBA (MDO). Exposure to hydrocarbons for invertebrates is typically via direct contact and smothering but can also occur via ingestion. Modelling of the MDO spill scenario predicted exposure in nearshore and intertidal areas is predicted to occur at low thresholds of dissolved and entrained, moderate thresholds of dissolved, with some sites predicted to be exposed to high thresholds of entrained for the worst-case scenario modelled. The maximum dissolved and entrained hydrocarbon concentration for the MDO spill scenario at any given receptor(s) to be 77 ppb and 5,819 ppb, respectively (RPS 2023).

Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Given invertebrates are only found within the shallow nearshore waters, exposure to surface (floating) hydrocarbons is not expected.	Entrained and dissolved hydrocarbons can have negative impacts on marine invertebrates and associated larval forms. Impacts to some adult species (e.g. crustaceans) is reduced as a result of the presence of an exoskeleton, while others with no exoskeleton and larval forms may be more prone to impacts. Acute or chronic exposure through contact and/or ingestion can result in toxicological risks. For some taxa, the presence of an exoskeleton (e.g. crustaceans) reduces the impact of hydrocarbon absorption through the surface membrane. Invertebrates with no exoskeleton and larval forms may be more prone to impacts. Sessile invertebrates could be exposed to varying levels of condensate; exposure timeframes would be expected to be short given the propensity of condensate to rapidly evaporate and disperse. Localised impacts to larval stages may occur which could impact on population recruitment that year.	Inshore and intertidal benthic species may be exposed to hydrocarbons accumulating on the shoreline. Benthic communities associated with inshore reefs would be exposed to very low-level hydrocarbons. The predicted area of shoreline contact is mixed sand/shore platform. Residues deposited on these areas are rapidly remobilised due to wave and tidal action, so any accumulation is likely to be short-term and temporary. Exposure to hydrocarbons for invertebrates is typically via direct contact and smothering but can also occur via ingestion.

	Filter-feeding benthic invertebrates such as sponges, bryozoans, abalone and hydroids may be exposed to sub-lethal impacts, however, population level impacts are considered unlikely. Exposure to hydrocarbons has been found to impact metamorphosis and attachment of sponge larvae, however, only at high concentrations of over 10,000 ppb (Negri et al. 2016). Given in-water exposure concentrations are not anticipated at this level, impacts to sponges are not anticipated. Tissue taint may occur and remain for several months in some species (e.g. lobster, abalone) however, this will be localised and low level with recovery expected. Tainting of recreation or commercial species is considered unlikely to occur, however if it did it is expected to be localised, low level and recoverable.	At 100 g/m^2, resident fauna such as worms, molluscs and crustaceans may suffer lethal impacts if hydrocarbons penetrate into sediments. On this basis, impacts to near-shore benthic and shoreline assemblages are considered to be limited, localised, and if impacts occur, areas will be rapidly recolonised by adjacent species

Summary:
Due to the characteristics of the hydrocarbons and the well-mixed nature of the waters, coating of benthic assemblages and prolonged exposure to hydrocarbons is considered highly unlikely. At this threshold, there may be ecological impacts to benthic assemblages stranded on the shoreline. However, wave action at the shoreline will rapidly disperse and weather the hydrocarbons naturally.

Consequently, the potential impacts to invertebrates are considered to be **Level 2** as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.

Fish and Sharks

Exposure Evaluation

Condensate	MDO
Several fish species may be present within the EMBA (LOWC). Species present in the EMBA (LOWC) are largely cool temperate species, common within the South Eastern Marine Region. BIAs overlapped with the EMBA (LOWC) at the relevant thresholds are: • Distribution BIA for the white shark (surface exposure). • Distribution and foraging BIAs for the white shark (entrained exposure only).	Several fish species may be present within the EMBA (MDO). BIAs identified within the EMBA (MDO) at the relevant thresholds are: • Distribution BIA for the white shark (surface exposure). • Distribution BIA for the white shark (by dissolved and entrained), and foraging BIA for entrained exposure only. See Section 4.4.2 for details of all EPBC-listed fish species within the wider Monitoring Area.

See Section 4.4.2 for details of all EPBC-listed fish species within the wider Monitoring Area.	

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Since fish and sharks do not generally break the sea surface, the impacts of surface hydrocarbons to fish and shark species are unlikely to occur. Near the sea surface, fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al. 1994).	Fish may be exposed to hydrocarbon droplets through a variety of pathways, including direct dermal contact with diffusion across their gills (Hook et al., 2016); ingestion of contaminated prey; and inhalation (e.g. elevated dissolved contaminant concentrations in water passing over the gills). Pelagic fish species are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters. Adult fish kills reported after oil spills, occur mainly to shallow water, near-shore benthic species (Volkman et al. 1994). Fish are most vulnerable to hydrocarbons during their embryonic, larval and juvenile life stages. Embryos and larvae may sustain mechanical damage to feeding and breathing apparatus from contact with oil droplets, and genetic damage, physical deformities and altered developmental timing from hydrocarbons in water (Fodrie and Heck 2011). There may also be chronic effects to fish exposed to hydrocarbons in early life stages, such as disruption of predator avoidance behaviour (Hjermann et al. 2007). Eggs and larvae exposed to weathered concentrations of hydrocarbons in water for a prolonged period of time have been shown to be immunosuppressed (Hjermann et al. 2007). There is a known distribution and foraging BIA for the white shark in the area exposed to in-water hydrocarbons (RPS 2023). Pelagic species including white sharks, are generally highly mobile, with wide-spread distribution ranges. Therefore, these species are not likely to be severely impacted by a spill	Given fish and sharks are found within nearshore and offshore waters, exposure to shoreline hydrocarbons is not expected.

	which has relatively limited spatial extent. Furthermore, long-term damage is not expected as the dissolved/entrained hydrocarbons within the water column beyond the immediate vicinity of the release are not predicted to be of sufficient concentrations over a large enough area to cause harm (ITOPF 2011a).	

Summary:

There is a known distribution and foraging BIA for the white shark in the area exposed to in-water hydrocarbons.

Pelagic free-swimming fish and shark species are generally highly mobile, with wide-spread distribution ranges, and therefore, are unlikely to suffer long-term damage from oil spill exposure because dissolved/entrained hydrocarbons in the water column beyond the immediate vicinity of the release are not expected to be of sufficient concentrations over a large enough area to cause harm (ITOPF 2011a).

Furthermore, potential impacts on eggs and larvae entrained in the upper water column are not expected to be significant given the temporary period of water quality impairment, and the limited geographical extent of the spill. As egg/larvae dispersal is extensive in the upper layers of the water column and it is expected that current induced drift will rapidly replace any affected populations.

Potential impacts are assessed as **Level 2** as they could be expected to be localised and short-term impacts to species of recognised conservation value, but not affecting local ecosystem functioning.

Avifauna

Exposure Evaluation

Condensate	MDO
Several threatened, migratory and/or listed marine avifauna species may be present within the EMBA (LOWC). These species have the potential to be resting, feeding or nesting within the area predicted to be exposed to hydrocarbons found on the surface, in-water and/or ashore. Several foraging BIAs for several albatross, shearwater, petrel and gannet species were identified within EMBA (LOWC) at relevant exposure thresholds, these included: • Antipodean albatross • Black petrel • Black-browed albatross	Several threatened, migratory and/or listed marine avifauna species may be present within the EMBA (MDO spill). These species have the potential to be resting, feeding or nesting within the area predicted to be exposed to hydrocarbons found on the surface, in-water and/or ashore. Several foraging BIAs for several albatross, shearwater, petrel and gannet species were identified within EMBA (MDO), these included: • Antipodean albatross • Australasian gannet • Black-browed albatross • Buller's albatross

• Buller's albatross • Campbell albatross • Common diving-petrel • Indian, yellow-nosed albatross • Short-tailed shearwater • Shy albatross • Wandering albatross • Wedge-tailed shearwater • White-faced storm-petrel Modelling of the LOWC spill scenario predicted moderate exposure thresholds of surface hydrocarbons up to 3.2 km (east) of the release location and 57% probability of floating oil exposure at moderate exposure thresholds for all avifauna foraging BIAs (RPS 2024). No breeding or migration BIAs were identified within the EMBA (LOWC) at relevant exposure thresholds. See Section 4.4.2 for further details of these species listed above, and all other EPBC listed species within the wider Monitoring EMBA.	• Campbell albatross • Common diving-petrel • Indian, yellow-nosed albatross • Short-tailed shearwater • Shy albatross • Wandering albatross • White-faced storm-petrel Modelling of the MDO spill scenario predicted moderate exposure thresholds of surface hydrocarbons up to 10.3 km (west) of the release location and 100% probability of floating oil exposure at moderate exposure thresholds for all avifauna foraging BIAs (RPS 2023). No breeding or migration BIAs were identified within the EMBA (MDO) at relevant exposure thresholds. See Section 4.4.2 for further details of these species listed above, and all other EPBC listed species within the wider Monitoring EMBA.

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Avifauna have the potential to be rafting, resting, diving and feeding within the area predicted to be contacted by surface hydrocarbons; diving or foraging within in-water hydrocarbons; and foraging and nesting within shoreline exposure. Direct contact with hydrocarbons is likely to foul plumage, which may result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impaired waterproofing (ITOPF 2011a). A loss of water-proofing results increased heat loss, subsequently resulting in an increased metabolism of food	Seabirds could be impacted by in-water hydrocarbon exposure directly (i.e., whilst diving through the water column foraging) or indirectly (i.e. by consuming hydrocarbon-tainted fish, resulting in sub-lethal or toxic impacts). Impacts to prey (i.e. pelagic fish) following a hydrocarbon release may disrupt and limit food supply both for the maintenance of adults and the provisioning of young. Penguins may be especially vulnerable to oil because they spend a high portion of their time in the water and readily lose insulation and buoyancy if their feathers are oiled.	Shoreline species may suffer both direct oiling and potential displacement from foraging and nesting sites. Acute or chronic toxicity impacts (death or long-term poor health) to small numbers of birds is possible, however this is not considered significant at a population level. Direct impacts to habitats at breeding sites may occur, subsequently contaminating nests (Clarke 1984).

reserves in the body, which may lead to emaciation (DSEWPaC 2011a). A bird suffering from cold, exhaustion and a loss of buoyancy (resulting from fouling of plumage) may dehydrate, drown or starve (ITOPF 2011a; DSEWPaC 2011a; AMSA 2013). Physical smothering may also result in impaired navigation and flight performance (Hook et al. 2016). Inhalation or direct ingestion from preening of oiled feathers may result in internal tissue irritation in their lungs and stomachs (ITOPF 2011a). This has the potential to result in mortality depending on the amount consumed.	Previous spills have recorded large death tolls of penguins, however these have all been spill of heavy fuel all, such as the Iron Baron vessel spill, of 325 tonnes of bunker fuel in Tasmania in 1995, is estimated to have resulted in the death of up to 20,000 penguins (Hook et al. 2016). However, the presence of birds within in-water hydrocarbons at moderate exposure levels is expected to be limited, due to the transitory nature of most foraging individuals and the absence of offshore aggregation areas in the area. There are foraging BIAs for a number of bird species in the area exposed to in-water hydrocarbons (RPS 2023). However, the foraging BIAs are typical over relatively extensive areas, therefore, impacts are not anticipated at a population level due to the localised and temporary exposure of moderate levels of surface hydrocarbons.	Oiled fauna may track oil into their nests, which may then have subsequent impacts on any eggs present. Given the volatility of the exposed oil, any impact to nests is expected to occur to individuals and not considered to pose a long-term risk at population level. Impacts to bird species are not anticipated to be long-term or affect population functioning due to the widespread areas available for foraging, the transitory nature of foraging birds, the absence of offshore aggregation areas in the area, and the weathering properties of the condensate.
Summary: Acute or chronic toxicity impacts (death or long-term poor health) to seabirds is possible, however, the presence of birds within areas exposed to moderate threshold levels is expected to be limited, due to the transitory nature of foraging individuals, and given the absence of offshore aggregation areas in the area. Therefore, impacts to these species are not anticipated to be long-term or affect population functioning due to the widespread areas available for foraging and breeding, the transitory nature of foraging birds, the absence of offshore aggregation areas in the area, and the weathering properties of the condensate. Consequently, the potential impacts and risks to avifauna are considered to be **Level 3** as they could be expected to result in localised, medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function.		
Marine Reptiles		
Exposure Evaluation		
Condensate	**MDO**	
There may be marine turtles in the area predicted to be exposed to hydrocarbons at relevant exposure levels. Marine turtles may be exposed when transiting through the in-water hydrocarbons, surfacing to breathe within the surface slick, or nesting on oiled shorelines. Five EPBC listed species have the potential to be present within the EMBA (LOWC), these include:	There may be marine turtles in the area predicted to be exposed to hydrocarbons at relevant exposure levels. However, there are no BIAs or habitat critical to the survival of the species within the EMBA (MDO). The condensate LOWC spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA (LOWC).	

• Loggerhead turtle • Green turtle • Leather back turtle • Hawksbill turtle • Flatback turtle However, there are no BIAs or habitat critical areas to the survival of the species within the EMBA (LOWC).	

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Hydrocarbons can be ingested as marine turtles make large, rapid inhalations before they dive which may result in inhalation of toxic vapours from hydrocarbons in surface waters which may cause harm to the internal organs of turtles. This can lead to respiratory irritation, inflammation, emphysema or pneumonia (NOAA 2010).	Entrained hydrocarbons within the water column can adhere to body surfaces (Gagnon and Rawson 2011) and can enter cavities such as the eyes, nostrils, or mouth. This can cause an elevated susceptibility to infections (NOAA 2010). Historically, very few marine turtles have been identified to be impacted following previously hydrocarbon spill, despite occurring in areas where they are known to be relatively abundant (Short 2011). However, oiling has been shown to have the potential to cause mortality depending on the size of the individual and the extent of oiling (DWH Natural Resource Damage Assessment Trustees, 2016). Following the Macondo spill in the Gulf of Mexico, a large number of marine turtles were found dead, however a significant number was found alive and oiled, which were later successfully released. Indicating that oiling does not necessarily lead to mortality (NOAA 2013). The number of marine turtles that may be exposed to hydrocarbons during a hydrocarbon release is expected to be low due to the localised and temporary presence of hydrocarbons at moderate exposure levels, the low number of turtles foraging or migrating through Otway Basin in	Marine turtles may experience oiling impacts on nesting beaches when they come ashore to lay their eggs. There is potential for contamination of turtle eggs to result in toxic impacts to developing embryos. Turtle hatchlings are expected to be more vulnerable to smothering as they emerge from the nests and make their way over the intertidal area to the open water (AMSA 2015). Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects including impaired movement and bodily functions (Shigenaka 2011). Hatchlings sticky with oily residues may also have more difficulty crawling and swimming, rendering them more vulnerable to predation. The absence of BIAs or habitat critical to the survival of the species within this area indicates that the number of

	general. The potential impact would be limited to individual transiting marine turtles, with population impacts not anticipated.	turtles impacted by a shoreline exposure is low. The potential impact would be limited to individual transiting marine turtles, with population impacts not anticipated.

Summary:

Marine pollution is listed as a threat to marine turtle in the Recovery Plan for Marine Turtles in Australia, 2017 – 2027, particularly in relation to shoreline oiling of nesting beaches.

The number of marine turtles that may be exposed to hydrocarbons during a LOWC event is expected to be low due to the localised and temporary presence of hydrocarbons at moderate exposure levels, the low number of turtles foraging or migrating through Otway Basin in general, and the absence of BIAs or habitat critical to the survival of the species within this area. The potential impact would be limited to individual transiting marine turtles, with population impacts not anticipated.

Consequently, the potential impacts and risks to marine reptiles are considered to be **Level 2** as localised short-term impacts to species of recognised conservation value, but not affecting local ecosystem functioning.

Pinnipeds

Exposure Evaluation

Condensate	MDO
There may be pinnipeds in the area predicted to affected by hydrocarbons. Pinnipeds that are present within the EMBA (LOWC), such as the Australian and New Zealand fur seal, have the potential to be impacted by surface hydrocarbons when surfacing to breathe, in-water hydrocarbons when transiting through the area, and shoreline accumulated hydrocarbons that occur at haul-out sites along the coastline. There are no BIAs or biologically important behaviours for pinnipeds within the EMBA (LOWC) at relevant exposure thresholds.	Pinnipeds such as the Australian sea lion, Southern elephant seal and the New Zealand and Australian fur-seals, may be within the area predicted to affected by hydrocarbons. However, there are no BIAs or habitat critical to survival of species within the EMBA (MDO) at relevant exposure thresholds.

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Exposure to surface hydrocarbons at, or above the moderate threshold can cause skin and eye irritations and disruptions to thermal regulation due to covering of insulating fur. Hook et al. (2016) reports that seals appear not to be very sensitive to	Pinnipeds may be impacted by in-water hydrocarbon exposure as they have high site fidelity to established colonies and haul-out areas. This is corroborated by Geraci and St. Aubins (1988) who recorded seals, sea- lions and fur-seals swimming in oil slicks during a number of documented	Pinnipeds hauling out on exposed shores could be exposed by direct contact of oil with skin/body. Individual adults may also be impacted by oil while transiting through the nearshore

contact with oil, but instead to the toxic impacts from the inhalation of volatile components. ITOPF (2011a) demonstrates that species that rely on fur to regulate their body temperature (such as fur-seals) are most vulnerable to oil, as the animals may die from hypothermia or overheating, depending on the season, if the fur becomes matted with oil. Heavy oil coating and tar deposits on fur-seals may also result in reduced swimming ability and lack of mobility out of the water. Heavy coating is not expected given the volatile components of the hydrocarbon will evaporate, and the minimal remaining oil will weather. The residual component of the oil is expected to resolidify to waxy particles, decreasing the risk of exposure.	spills. Indicating that they are less likely to practice avoidance behaviours in the event of a hydrocarbon release. However, there are no BIAs or biologically important behaviour for pinnipeds within the area predicted to be exposed to released hydrocarbon. Hydrocarbons in the water column or consumption of prey affected by the oil may cause sub-lethal impacts to pinnipeds, however given the localised nature of the spill, and the rapid loss of the volatile components of condensate in choppy and windy seas (such as that of the EMBA), impacts are expected to be temporary and localised.	environments at haul-out sites that may be impacted from the spill event. Although, direct oiling is possible, it is expected to have a limited window for occurring due to rapid weathering of condensate. However, there are no BIAs or biologically important behaviours for pinnipeds within the area predicted to be exposed to released hydrocarbon.

Summary:
Conservation Listing Advice for the Neophoca cinerea (Australian sea lion) (TSSC 2020c) identifies oil spills as a potential threat to habitat. However, activities within this EP will not be inconsistent with the conservation and management priorities outlined in this advice.

Given condensate is considered a light hydrocarbon that rapidly evaporates, the number of pinnipeds exposed is expected to be low, with population impacts not anticipated, due to the localised and temporary presence of hydrocarbons at moderate exposure levels and the absence of BIAs in the area.

The potential impacts to pinnipeds from a shoreline hydrocarbon exposure event are considered to be **Level 3**, as the impacts could be expected to result in localised, medium-term impacts to species/habitats of recognised conservation value but not affecting local ecosystem functioning.

Cetaceans

Exposure Evaluation

Condensate	MDO
Several threatened, migratory and/or listed marine cetaceans' species have the potential to be within the condensate LOWC EMBA. Cetaceans may come into contact with hydrocarbons when transiting through or foraging within the exposed area. The following BIAs are within the EMBA (LOWC) exposed to hydrocarbons at moderate exposure levels: • Pygmy blue whale known foraging and distribution BIAs • Southern right whale aggregation and known core range BIAs	Several threatened, migratory and/or listed marine cetacean species have the potential to be migrating, resting or foraging within the EMBA (MDO). Cetaceans may come into contact with hydrocarbons when transiting through or foraging within the exposed area. The following BIAs are within the EMBA (MDO) exposed to hydrocarbons at moderate exposure levels: • Pygmy blue whale known foraging and distribution BIAs • Southern right whale aggregation, migration and resting on migration BIAs.

Surface hydrocarbons are anticipated to extend for a maximum of ~55.7 km and ~3.2 km at the low and moderate thresholds respectively, in the worst-case scenario modelled (RPS 2024). No surface exposure at the high threshold was modelled for the LOWC spill scenario. Therefore, potential exposure to moderate levels of surface hydrocarbons is expected to be limited to transient individuals given the localised moderate exposure area (<3.2 km from the release site). In-water hydrocarbons are mostly predicted to occur at low thresholds of dissolved (up to 50%) and entrained up to (100%), with high probabilities of high thresholds of entrained (up to 100%) (RPS 2024).	Surface hydrocarbons are anticipated to extend for a maximum of ~32.5 km, ~10.3 km and ~2.8 km at the low, moderate and high thresholds, respectively, in the worst-case scenario modelled (RPS 2023). Therefore, potential exposure to moderate levels of surface hydrocarbons is expected to be limited to transient individuals given the localised moderate exposure area (<10.3 km from the release site). In-water hydrocarbons are mostly predicted to occur at low thresholds of dissolved and entrained (up to 94%), with low probabilities of moderate thresholds of dissolved (3%), and a few sites with high thresholds of entrained hydrocarbon exposure for the worst-case scenario modelled (RPS, 2023).

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
If whales are foraging at the time of the spill, potential exposure to moderate levels of surface hydrocarbons is expected to be limited to transient individuals given the localised moderate exposure area. As cetaceans' surface to breathe the inhalation of hydrocarbon droplets, vapours and fumes at the surface is a distinct possibility (Helm et al. 2014). Inhalation of surface hydrocarbons could damage mucous membranes, damage airways, or even cause death. Furthermore, ingestion of contaminated prey could cause toxic impacts. The risk is greatest near the source of a fresh spill because volatile toxic vapours disperse relatively quickly (Helm et al. 2014). Direct surface oil contact with hydrocarbons is considered to have little deleterious effect on cetaceans, and any effect is likely to be minor and temporary. The skin is an effective barrier to toxicity (Geraci & St Aubin 1988). Hydrocarbons tend to adhere to rough surfaces, hair, or calluses of animals. Cetaceans have mostly smooth skin, with limited rough surfaces, so contact with hydrocarbons by cetaceans is expected to cause only minor hydrocarbon adherence.	Several cetacean species may be exposed to moderate dissolved or high entrained exposure (in the upper 0 -10 m of the water column) which thresholds in the water column following a hydrocarbon release. In-water hydrocarbons are mostly predicted to occur at low thresholds of dissolved and entrained (100%), with low probabilities of moderate thresholds of dissolved, and a few sites with high thresholds of entrained for the worst-case scenario modelled. Cetacean exposure to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and St Aubin, 1988). Such impacts are associated with 'fresh' hydrocarbons, the risk of impact declines rapidly as the condensate weathers. Geraci and St Aubin (1988) found little evidence of cetacean mortality from hydrocarbon spills; however, some behaviour disturbance (including avoidance of the area) may occur. While this reduces the potential for physiological impacts from contact with hydrocarbons, active avoidance of an area may disrupt behaviours such as migration, or displace	Given cetaceans are pelagic species, exposure to shoreline hydrocarbons is not expected.

Studies have shown that hydrocarbon are not expected to accumulate in or around the eyes, mouth, blow hole, or other potentially sensitive external areas (Helm et al. 2014). Insulation is provided by a layer of blubber rather than hair or fur, so it is unlikely oil would compromise the thermoregulatory system of cetaceans. Individual southern right whales found within the aggregation BIA may have a higher likelihood of exposure to hydrocarbons compared to the transient individuals found exposed within the migration BIA. However, only a comparatively small area of the reproduction BIA is predicted to be overlapped by the EMBA (LOWC) (RPS 2024). Given, the hydrocarbon is a light and non-persistent one; and the BIA being relatively far from the release site, indicates that majority of the hydrocarbon volume will have undergone weathering, as predicted within Section 6.8.3.3. Physical contact by individual whales of hydrocarbon is unlikely to lead to any long-term impacts. Given the mobility of whales, only a small proportion of the population would surface in the affected areas, resulting in short-term and localised consequences, with no long-term population viability effect.	individuals from important habitat, such as foraging, resting or breeding. However, the strong attraction to specific areas for breeding or feeding (e.g. use of the Warrnambool coastline as a nursery area for southern right whales) may override any tendency for cetaceans to avoid the noxious presence of hydrocarbons. The potential for environmental impacts would be limited to a relatively short period following the release and would need to coincide with a migration event to result in exposure to a large number of individuals. However, such exposure is not anticipated to result in long-term impacts to population viability.	
Summary: As highly mobile animals, in general it is very unlikely that cetaceans will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations that would lead to chronic toxicity effects. The National Recovery Plan for the Southern Right Whale (DCCEEW 2024b) details that oil spills have the potential to have the greatest impact on southern right whales within or near reproduction BIAs, when there are larger concentrations of whales engaged in breeding activities over sustained periods of time (i.e., weeks to months) and where oil may accumulate. It is acknowledged that low levels of surface hydrocarbons may occur within the southern right whale reproduction BIA. However, given the condensate is considered a light hydrocarbon that rapidly evaporates, the number of cetaceans exposed within the reproduction BIA by the time the hydrocarbon is present is expected to be low, with population impacts not anticipated, is unlikely to lead to long-term impacts or result in viable long-term population effects. The potential consequence to cetaceans is assessed as **Level 3** based on the potential for localised, medium-term impacts to species of recognised conservation value but not affecting local ecosystem functioning.		

Inherent Likelihood

Historical LOWC incidents events during development drilling have been reported at a frequency for a gas well of 4.2 x 10^{-5} per drilled well (IOGP 2019). This represents the frequency of the cause (i.e. a LOWC); additional environmental factors would be necessary for the worst-case consequences to marine fauna to eventuate.

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of an accidental release of condensate causing Level 3 consequences to habitats is considered **Unlikely (D)**.

Inherent Risk Severity

The inherent risk severity of an accidental release of condensate causing impacts to marine fauna is considered **Moderate**. Table 6-58 lists the inherent risk severity for each receptor type.

Table 6-58: Inherent Risk Severity – Condensate Exposure – Ecological Receptors – Marine Fauna

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Severity
Plankton	2	D	Low
Benthic invertebrates	2	D	Low
Fish and sharks	2	D	Low
Avifauna	3	D	Moderate
Marine reptiles	2	D	Low
Pinnipeds	3	D	Moderate
Cetaceans	3	D	Moderate

6.8.5.4 Risk: Change in Ecosystem Dynamics

Inherent Consequence Evaluation

Impacts to social receptors, such as sensitive ecosystems, are assessed based on the hydrocarbon exposure threshold that could result in a visual sheen or exceedance of water quality guidelines and are considered an indicator of possible Socio-Economic impacts (SEI) within the marine and coastal environment. The potential extent of these thresholds is determined by modelling (Figure 6-20 and Figure 6-21).

Exposure concentrations are not uniform to the outer extent of these thresholds. Concentrations would typically be lower, and the chance of exposure more remote beyond the ecological EMBA.

The thresholds that apply to the outer extent of potential visual/water quality impacts are:

- surface (low)
- shoreline (low)
- in water – dissolved (moderate)
- in water – entrained (high).

Potential impacts to social receptors are assessed in Table 6-59.

The EPBC Protected Matters Reports relevant to the hydrocarbon spill thresholds are in Appendix 5 -
.

Table 6-59: Consequence Evaluation for Hydrocarbon Exposure – Social Receptors – Natural Systems

<table>
<tr><td colspan="3">Impact and Risk Evaluation</td></tr>
<tr><td colspan="3">Australian Marine Parks (AMPs)</td></tr>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MDO</td></tr>
<tr><td colspan="2">Modelling of the condensate LOWC spill scenario predicted one AMP to be within the range of hydrocarbon exposures relevant to socio-economic impacts, including:
• Apollo AMP (Multiple Use Zone (IUCN VI).
LOWC spill modelling indicates that 6% of the Apollo AMP may be exposed to hydrocarbons at relevant in-water (entrained) thresholds (RPS 2024).
See Section 4.4.3 for the major conservation values of this AMP.</td><td>Modelling of the MDO spill scenario predicted one AMP to be within the range of hydrocarbon exposures relevant to socio-economic impacts, including:
• Apollo AMP (Multiple Use Zone (IUCN VI).
MDO spill modelling indicates that 25% of the Apollo AMP may be exposed to hydrocarbons only at relevant in-water (entrained) thresholds (RPS 2023).
See Section 4.4.3 for the major conservation values of this AMP.</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>The modelling did not predict contact by surface hydrocarbons for Apollo AMP, at or above the low threshold. However, values identified with the AMP may have the potential to be impacted by surface hydrocarbons at the relevant thresholds outside of the AMP.
Seabirds are the value which has been identified for this AMP that may be impacted by surface hydrocarbons by rafting, resting, diving or feeding within the surface slick. Impact to seabirds from direct or indirect exposure to surface hydrocarbons may cause a subsequent negative impact to the value of the AMP, however any impact is expected to be limited to a small number of individuals, with no impacts to regional populations.</td><td>The exposure of entrained hydrocarbons will be greatest within the upper 0-10 m of the water column and areas close to the spill source. The Apollo AMP is located within waters 80-120 m, respectively; therefore, conservation values within the AMP, such as ecosystems, habitats and sea-floor features are not predicted to be impacted.
The Apollo AMP is important foraging areas for seabirds. There is a low probability that seabirds will be exclusively feeding within the area exposed to hydrocarbons given their extensive foraging grounds. Therefore, there is a chance that foraging seabirds will experience sub-lethal impacts from consuming contaminated prey, however, impacts will be limited</td><td>Given the AMP is located in Commonwealth waters, exposure to shoreline hydrocarbons is not expected.</td></tr>
</table>

	to individuals and are not expected to cause impacts at a population-level. The Apollo AMP also provides important migratory pathways for cetaceans (i.e. humpback, blue, fin, and sei whales). However, as cetaceans are highly mobile pelagic species, they are unlikely to be exposed to discrete patches of hydrocarbons for long.	

Summary:
The potential consequence to Australian Marine Parks from exposure are assessed as **Level 3** based on the potential for localised, medium-term impacts to habitats or species of recognised conservation value or to local ecosystem functioning.

Refer also to:

- Ecological Receptors - Marine fauna

State Marine Parks and Reserves

Exposure Evaluation

Condensate	MDO
The modelling of the condensate LOWC spill scenario identified one State Park and reserve that may be present within the range of hydrocarbon exposures relevant to socio-economic impacts, including: • Twelve Apostle Marine National Park The Twelve Apostles Marine National Park was the only State Protected Area that was identified to also be exposed to in-water (high threshold) for entrained hydrocarbons and surface (low threshold) hydrocarbons. Values associated with this State Protected Area include habitats (i.e. reefs, limestone formation, and kelp beds) for a diverse range of invertebrates, fish, mammals and seabirds. Given the hydrocarbon characteristics of the condensate, being a volatile and light non-persistent hydrocarbon with approximately 17.5% residual, including 10% wax content, majority of the volatile ends will evaporate rapidly (RPS 2024). Therefore, in the unlikely event that hydrocarbons were to reach shorelines predicted below	The modelling of the MDO spill scenario identified 4 State Protected Areas that may be present within the extent of hydrocarbon exposures at socio-economic thresholds for shoreline accumulation. These include: • Twelve Apostle Marine National Park • The Arches Marine Sanctuary • Discovery Bay Marine National Park • Marengo Reefs Marine Sanctuary. The Twelve Apostles Marine National Park was the only State Protected Area that was identified to also be exposed to in-water (moderate threshold) and surface (low threshold) hydrocarbons. MDO spill modelling indicates that 1% and 65%of the of the Twelve Apostles Marine National Park may be exposed to hydrocarbons at relevant in-water dissolved and entrained thresholds, respectively (RPS 2023).

relevant thresholds, hydrocarbon sheens would not be expected, instead isolated patches of highly weathered waxy flakes may occur. See Section 4.4.3 for the major conservation values of these Marine Parks and Reserves.	Conservation values for this protected area include high levels of marine fauna and flora diversity, including fish and invertebrate assemblages and benthic coverage (sponges, soft corals, macroalgae). See Section 4.4.3 for the major conservation values of these Marine Parks and Reserves.

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
The values identified within the identified State marine protected areas that have the potential to be exposed to surface hydrocarbons at, or above, the low threshold. Impacts to the values of the marine park (i.e. seabirds) may cause subsequent negative impacts to the value of the marine park. Furthermore, visible surface hydrocarbons (i.e. a rainbow sheen) may have the potential to reduce the visual amenity of the area, also impacting the value. However, given the nature of the hydrocarbon, being light non-persistent hydrocarbon, it is expected to remain in waxy flake-like state; and in most cases surface oiling is not expected to the visible from shore.	The exposure of entrained hydrocarbons will be greatest within the upper 0-10 m of the water column and areas close to the spill source. Therefore, conservation values within these state parks and reserves, such as benthic and pelagic species, ecosystems, habitats and sea-floor features are not predicted to be exposed to in-water hydrocarbons and therefore not predicted to be impacted.	Visible shoreline hydrocarbons have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities within the identified protected areas. Given the non-persistent nature of the hydrocarbon, waves and tidal action are anticipated to continue the weathering process in the event that shoreline contact occurs. Any residual components of the oil will resolidify to waxy particles, decreasing the risk of exposure and potential for heavy coating of the shorelines. Majority of the coastlines that may be exposed to shoreline hydrocarbon accumulation are relatively unpopulated. Therefore, given the nature of the hydrocarbon, anticipated weathering processes, impacts are not anticipated to be long-term.

Summary:
The potential consequence to State parks and reserves from exposure are assessed as **Level 3** based on the potential for localised medium-term impacts to habitats or species of recognised conservation value or to local ecosystem functioning.

Refer also to:

- Ecological Receptors - Marine fauna.

Wetlands

<table>
<tr><td colspan="3">Exposure Evaluation</td></tr>
<tr><td colspan="2">Condensate</td><td>MDO</td></tr>
<tr><td colspan="2">Modelling of the condensate LOWC spill scenario predicted five internationally important wetlands (Ramsar) could be present within the extent of hydrocarbon exposures at socio-economic thresholds for shoreline accumulation, including:
Port Phillip Bay (Western Shoreline) and Bellarine Peninsula
Western Port
Corner Inlet
Piccaninnie Ponds Karst Wetlands
Glenelg Estuary and Discovery Bay Wetlands.
A number of additional wetlands of national importance are also identified as having the potential to be exposed to hydrocarbon thresholds for socio-economic impacts within the wider Monitoring Area (see Section 4).
See Section 4.4.3 for further details on these wetlands.</td><td>There are no wetlands of International Importance (Ramsar) identified that have the potential to be exposed to hydrocarbon thresholds for socio-economic impacts.
The condensate LOWC spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA (LOWC).</td></tr>
<tr><td colspan="3">Consequence Evaluation</td></tr>
<tr><td>Surface Exposure</td><td>In-water Exposure</td><td>Shoreline Exposure</td></tr>
<tr><td>Given wetlands are located onshore, exposure to surface (floating) hydrocarbons is not expected.</td><td>Given wetlands are located onshore, exposure to in-water hydrocarbons is not expected.</td><td>Wetlands, including internationally important Ramsar wetlands, are saline marsh areas and estuarine environments that are a continuation from the marine environment. Therefore, the impacts of hydrocarbons on wetlands are generally similar to those described for mangroves and saltmarshes. Depending on where the shoreline contact occurs there is a potential for shoreline oil to move into the estuary and wetlands, potentially impacting the aesthetic and ecological value of the wetland. The degree of direct impact of oil on wetland vegetation are variable and complex, and can be both acute and chronic, ranging from short-term disruption of plant functioning to mortality.</td></tr>
</table>

		Spills reaching wetlands during the growing season will have a more severe impact than if oil reaches wetlands during the times when many plant species are dormant. Furthermore, shoreline hydrocarbon exposure at, or above, the low threshold may impact the key receptors of wetlands (e.g. waterbirds, fish and invertebrates) which may cause a subsequent negative impact to the value of the wetland, however, is expected to be limited to a small number of individuals, with no impacts to regional populations.

Summary:
The potential consequence to wetlands from exposure are assessed as **Level 3** based on the potential for localised medium-term impacts to species or habitats of recognised conservation value or to local ecosystem function.

Refer also to:

- Ecological Receptors - Marine fauna

Key Ecological Features (KEFs)

Exposure Evaluation

Condensate	**MDO**
Modelling of the LOWC spill scenario predicted exposure from in-water hydrocarbons at, or above low exposure levels, to overlap five KEFs, these include: • Bonney Coast Upwelling • Canyons on the Eastern Continental Shelf • Shelf rocky reefs • Upwelling East of Eden • West Tasmania Canyons. These KEFs are all associated with unique sea-floor features of ecological significance (and important habitat forming species, such as sponges, attached megafauna, and hard substrate formations which create a habitat for diverse species (see Section 4.4.3).	Modelling predicted exposure from in-water hydrocarbons at, or above low exposure levels, to overlap two KEFs, these include: • Bonney Coast Upwelling • Shelf rock reefs. See Section 4.4.3 for further details on these KEFs.

The Bonney Coast Upwelling is also an area of high abundance of plankton, such as krill which acts as a food source to many seabirds, fish and cetacean species. Furthermore, seasonal upwelling events which brings cold nutrient rich waters to the sea surface within these KEFs contribute to the high productivity and biodiversity associated within these areas. Shelf Rocky Reefs are not a spatially defined KEF but is known to be well represented within the southeast marine region, on the continental shelf. The shelf rocky reefs KEF in particular supports a variety of benthic communities, such as coral, sponges and benthic communities, along the continental shelf within the temperate east marine region (see Section 4.4.3). See Section 4.4.3 for further details on these KEFs.	

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Given the values identified for each KEF that may be exposed to hydrocarbons are pelagic or benthic, exposure to surface (floating) hydrocarbons is not expected.	The values identified within these KEFs have the potential to be exposed to entrained hydrocarbons at, or above, the low threshold. However, the exposure of entrained hydrocarbons will be greatest within the upper 0-10 m of the water column and areas close to the spill source. Therefore, the spill is unlikely to intersect with majority of the values of the KEFs which are concentrated within the water column >10 m deep or along the seafloor at varying water depths. Hydrocarbon exposure to the key receptors of the KEFs (e.g. seabirds, pinnipeds and cetaceans) may cause a subsequent negative impact to the value of the KEFs, however is expected to be limited to a small number of individuals, with no impacts to regional populations. The Bonney Coast Upwelling is also an area of high abundance of plankton, such as krill which acts as a food source to many seabirds, fish and cetacean	Given the identified KEFs are all located in offshore waters, exposure to shoreline hydrocarbons is not expected.

	species. Plankton populations may be impacted by hydrocarbon exposure, however, would be expected to be limited to a small proportion of the productivity driven by the Bonney upwelling, with no impacts to the overall system and productivity across the region. The modelling predicted only a small portion of the Bonney Coast Upwelling (approximately 8%) to be overlapped by the hydrocarbon thresholds relevant to potential socio-economic impacts. Therefore, any impacts are anticipated to localised and not impact the overall value of the KEF. Furthermore, given light non-persistent nature of the hydrocarbon, any impacts to KEFs are expected to be localised and short-term.	

Summary:
The potential consequence to KEFs is assessed as **Level 3** based on the potential for localised, medium-term impacts to habitats or species of recognised conservation value or to local ecosystem functioning.

Refer also to:

- Ecological Receptors - Marine fauna.

Threatened Environmental Communities (TECs)

Exposure Evaluation

Condensate	**MDO**
Modelling of the condensate LOWC spill scenario predicted exposure from shoreline hydrocarbons at, or above low exposure levels, to overlap 10 TECs. All 10 TEC'S have shoreline exposure, these include: • Giant Kelp Marine Forests of South East Australia (Endangered) • Subtropical and Temperate Coastal Saltmarsh (Vulnerable) • Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community (Endangered) • Natural Damp Grassland of the Victorian Coastal Plains (Critically Endangered)	Modelling of the MDO spill scenario predicted the exposure of hydrocarbon exposures at socio-economic thresholds to overlap several TECs, those with marine or shoreline features include: • Giant Kelp Marine Forests of South East Australia • Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community (Endangered) • Subtropical and Temperate Coastal Saltmarsh (Vulnerable) • Natural Damp Grassland of the Victorian Coastal Plains (Critically Endangered).

• Karst springs and associated alkaline fens of the Naracoorte coastal plain bioregion • Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Critically Endangered) • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered) • Natural Temperate Grassland of the Victorian Volcanic Plain (Critically Endangered) • Tasmanian Forests and Woodlands dominated by black gum or Brookers gum (Eucalyptus ovata / E. brookeriana) (Critically Endangered) • Tasmanian white gum (Eucalyptus viminalis) wet forest (Critically Endangered). Values associated with these TECs (see Section 4.4.3) are listed as critically endangered, endangered or vulnerable, and can be sensitive to hydrocarbon exposure.	The condensate LOWC spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA (LOWC).

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Given the identified TECs are all located onshore or in coastal intertidal waters, exposure to surface (floating) hydrocarbons is not expected.	Given the identified TECs are all located onshore or in coastal intertidal waters, exposure to in-water hydrocarbons is not expected.	TECs have the potential to be exposed to shoreline hydrocarbons at, or above, the low threshold. Any hydrocarbon exposure to the key receptors of the TECs may cause a subsequent negative impact to the value of the TECs, However, potential impacts to socio-economic receptors (tourism, cultural and/or other social values associated with the TECs) are more likely to occur as a result of a reduction in the visual amenity, rather than ecological impacts of hydrocarbon exposure at low threshold. Shoreline hydrocarbons often become concentrated as it strands ashore. However, most of the oil is concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). The majority of the TECs are located above the

		high tide mark, therefore, impacts are not anticipated to occur. Furthermore, given light non-persistent nature of the hydrocarbon, any impacts to TECs are expected to be localised and short-term.
Summary: Given the rapid weathering and non-persistent nature of the condensate, the potential consequence to TECs is assessed as **Level 2** based on the potential for localised short-term impacts to species of recognised conservation value not affecting local ecosystem function.		
Heritage Places		
Exposure Evaluation		
Condensate	**MDO**	
Modelling of the LOWC spill scenario predicted that only one heritage area could be within the extent of hydrocarbon exposures at socio-economic thresholds (RPS 2024). These include: • Great Ocean Road and Scenic Environment • Point Nepean Defence Sites and Quarantine Station Area. No World Heritage Places were identified as having the potential to be exposed to hydrocarbon exposures at socio-economic thresholds within the potential exposure area for condensate LOWC (RPS 2024).	Modelling of the MDO spill scenario predicted that only one National heritage area could be within the range of hydrocarbon exposures relevant to socio-economic impacts, and no World heritage areas (RPS 2023): • Great Ocean Road and Scenic Environment. The condensate LOWC spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA (LOWC).	
Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Identified offshore heritage places are located on benthic substrate, and therefore exposure to surface (floating) hydrocarbons is not expected. The Great Ocean Road and Scenic Environments has been identified as an onshore heritage place located ~25 km from the operational area. An unplanned spill may have the potential to impact on the aesthetic and	Historical shipwrecks (see 4.4.3) have the potential to be impacted by in-water hydrocarbons above the high threshold, despite there being limited information on the effect of oil spills on historic shipwrecks. Laboratory studies conducted with 5 mg/l (5000 ppb) of crude oil have shown that crude oil and potentially chemical dispersant could impact the biodiversity and metabolic function of microbial biofilms colonising metal-hulled shipwrecks (Salerno et al. 2018). This	These heritage places have the potential to be exposed to shoreline hydrocarbons at, or above, the low threshold. Visible shoreline hydrocarbons may have the potential to reduce the visual amenity of the area, subsequently impacting the value of the heritage areas. Any impact to the environmental values of the areas (i.e. the environment of the Great Ocean Road and

scenic landscape values of the Great Ocean Road and Scenic Environs if a sheen is visible. Modelling predicts that in the unlikely event of a spill, highest concentrations of surface oil would tend to occur offshore, and that high proportions of the hydrocarbons would evaporate and disperse within the water column within a short time of being spilled. Traces of hydrocarbons could be visible in the near term (for days or weeks) following a spill.	could have downstream effects on corrosion rates of metal hulls, potentially impacting their longevity in the marine environment.	Scenic Environments and Deen Maar) may affect ecological values of the heritage areas. See Section 8 for further assessment of changes to First Nations cultural heritage values and sensitivities. However, the modelling predicted rapid evaporation during the first 24 hours following the hydrocarbon release, depending on the weather conditions (i.e. wind speeds). Given the non-persistent nature of the hydrocarbon, waves and tidal action are anticipated to continue the weathering process in the event that shoreline contact occurs.
Summary: Given the rapid weathering and non-persistent nature of the condensate, the potential consequence to heritage places is assessed as **Level 2** based on the potential for localised short-term impacts. Refer also to: • Ecological Receptors - Benthic Habitats • Ecological Receptors - Marine Fauna • Social Receptors – Human Systems (Recreation and Tourism) • Section 8.0: Changes to First Nations Cultural Heritage Values and Sensitivities.		

Inherent Likelihood

Historical LOWC incidents events during development drilling have been reported at a frequency for a gas well of 4.2 x 10^{-5} per drilled well (IOGP 2019). This represents the frequency of the cause (i.e. a LOWC); additional environmental factors would be necessary for the worst-case consequences to natural systems to eventuate.

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of an accidental release of condensate causing Level 3 consequences to habitats is considered **Unlikely (D)**.

Inherent Risk Severity

The inherent risk severity of an accidental release of condensate causing impacts to social receptors is considered **Moderate**. Table 6-60 lists the inherent risk severity for each receptor type.

Table 6-60: Inherent Risk Severity – Condensate Exposure – Social Receptors – Natural Systems

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Severity
AMPs	3	D	Moderate
State Parks and Reserves	3	D	Moderate
Wetlands	3	D	Moderate
KEFs	3	D	Moderate
TECs	2	D	Low
Heritage Places	2	D	Low

6.8.5.5 Risk: Change to the Functions, Interests, or Activities of Other Users

Inherent Consequence Evaluation

Impacts to social receptors, such as other marine users, are assessed based on the hydrocarbon exposure threshold that could result in a visual sheen or exceedance of water quality guidelines and are considered an indicator of possible Socio-Economic (SE) impacts within the marine and coastal environment. The potential extent of these thresholds is determined by modelling (Figure 6-20 and Figure 6-21).

Exposure concentrations are not uniform to the outer extent of these thresholds. Concentrations would typically be lower, and the chance of exposure more remote beyond the ecological EMBA.

The thresholds that apply to the outer extent of potential visual/water quality impacts are:

- surface (low)
- shoreline (low)
- in water – dissolved (moderate)
- in water – entrained (high).

Potential impacts to social receptors are assessed in Table 6-60.

The EPBC Protected Matters Reports relevant to the hydrocarbon spill thresholds are in Appendix 5 - .

Table 6-61: Consequence Evaluation for Hydrocarbon Exposure – Social Receptors – Human Systems

Impact and Risk Evaluation	
Coastal Settlements	
Exposure Evaluation	
Condensate	**MDO**
Several local government areas along the Victorian coastline are identified as having the potential to be exposed to hydrocarbons at low threshold; predominantly between Yambuk and east of Cape Otway, where there is also potential for increased concentrations of hydrocarbons at levels that could have ecological impacts. The scenarios modelled predicted shoreline exposure could occur at the low threshold at 28 local government areas (RPS 2024), including: • Anser Island • Colac Otway • Corangamite • East Gippsland • Glenelg • Greater Geelong • Kanowna Island • King Island • Lady Julia Percy Island • Mornington Peninsula • Moyne • Phillip Island • Rodondo Island • South Gippsland • Warrnambool. The stretch of coastlines where the outer extent of hydrocarbons could reach at the low shoreline exposure threshold have low coastal development and settlement. Within the	There are several local government areas identified as potentially being overlapped by the spatial extent of shoreline hydrocarbon exposure at the low threshold. The scenarios modelled predicted shoreline exposure could occur at the low threshold at 5 local government areas, including: • Colac Otway • Corangamite • Glenelg • Mornington Peninsula • Moyne. The condensate LOWC spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA (LOWC).

range of potential ecological impacts, indicative of more severe socio-economic impacts, are areas where there is relatively high development, including Port Campbell and Warrnambool (Section 4.4.3).		
Consequence Evaluation		
Surface Exposure	**In-water Exposure**	**Shoreline Exposure**
Given these coastal settlements occur on the shoreline, exposure to surface (floating) hydrocarbons is not expected.	Given these coastal settlements occur on the shoreline, exposure to in-water hydrocarbons is not expected.	Visible hydrocarbons have the potential to reduce the visual amenity of the area for coastal settlements. Coastal settlements are within the area potentially exposed to hydrocarbons ashore; however, the stretch of coast to be exposed is not densely populated. Noting that these events will be temporary, so duration of exposure is also limited. Most of the hydrocarbons will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA 1995) and expected to be visible.
Summary: Given its rapid weathering and potential for tidal flushing and rapid degradation, the potential consequence to coastal settlements is assessed as **Level 2** based on the potential for localised short-term impacts.		
Recreation and Tourism		
Exposure Evaluation		
Condensate	**MDO**	
The Victorian coast and marine region provide a diverse range of land-based and near-shore tourism opportunities, including surfing, fishing, sight-seeing, diving and snorkelling (Section 4.4.3). Modelling of the LOWC spill scenario predicted shoreline hydrocarbon exposure at, or above the low (10 g/m^2) threshold predominantly between Yambuk and east of Cape Otway along the Victorian coastline (RPS 2024). Surface hydrocarbon exposure at, or above the low threshold (1 g/m^2) was only predicted for offshore and nearshore waters, along the Peterborough to Princetown coast sections.	Recreation and tourism activities may be present within the area exposed to MDO hydrocarbons in the event of a spill. Modelling of the MDO spill scenario predicted low exposure thresholds of surface hydrocarbons are predicted up to 32.5 km (west) of the release location. Areas where low threshold surface hydrocarbon is predicted include Twelve Apostle MNP, Corangamite, and Moonlight Head.	

In general, recreational and tourism activities are generally restricted to shallow coastal waters and shorelines.	

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Visible surface hydrocarbons (i.e. a rainbow sheen) on the surface have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. However, given the nature of the condensate, being light non-persistent hydrocarbon, it is expected to remain in waxy flake-like state; and in most cases surface oiling is not expected to the visible from shore.	In-water exposure to entrained condensate could overlap and may result in a negative impact to recreation and tourism activities. Tourism and recreation activities can be indirectly exposed to impacts from in-water hydrocarbons, as the activities are often linked to the presence of ecological features, such as marine fauna (e.g. whale watching, recreational fishing). Any impact to receptors that provide nature-based tourism features (e.g. whales) may cause a subsequent negative impact to recreation and tourism activities.	Visible hydrocarbons stranded on shorelines have the potential to reduce the aesthetic value for tourism and discourage recreational activities that may be operating within the area. Precautionary exclusion from shorelines may be implemented by local governments until water quality monitoring verifies the absence of residual hydrocarbons. This could cause disruption to some recreational and tourism activities within that area. Given the nature of the condensate, being light non-persistent hydrocarbon, it is expected to remain in waxy flake-like state; and in most cases surface oiling is not expected to the visible from shore. On shorelines, the wave and tidal action, together with predicted weathering, indicates that hydrocarbons along shorelines will continually wash off the substrates, and be readily flushed into the water, leading to further weathering.

Summary:
Given condensates rapid weathering and potential for tidal flushing and rapid degradation, the potential consequence to recreational and tourism is assessed as **Level 2** based on the potential for localised short-term impacts.

Refer also to:

- Ecological Receptors - Habitats Ecological Receptors - Marine Fauna.

Commercial Fisheries

Exposure Evaluation

Condensate	MDO

Several commercial and state fisheries have the potential to be exposure to hydrocarbons at socio-economic impact thresholds. These include: • 9 Commercial Fisheries • 8 Victorian State Fisheries • 5 Tasmanian State Fisheries • 3 South Australia State Fisheries • 9 NSW State Fisheries. For Tasmania, only the shoreline of King Island has the potential to be exposed to hydrocarbon accumulation on the shoreline, and only at low thresholds, not having the potential for ecological impacts. No exposure to in-water hydrocarbons were predicted for this location (RPS 2024). The shallow waters of King Island are where seaweed collectors harvest bull kelp. Therefore, the potential impact to this State fishery has been assessed below.	Several commercial and state fisheries have the potential to be exposed to hydrocarbons at socio-economic impact thresholds. The condensate LOWC spill scenario has been identified as the worst-case scenario for this activity. Therefore, the consequence evaluation is based on the worst-case area of exposure; the EMBA (LOWC).

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure
Visible surface hydrocarbons (i.e. a rainbow sheen) may have the potential to affect public perception of the industry, potentially causing a negative economic impact. Physical displacement of commercial fishers has the potential to occur due to the establishment of exclusion zones during a spill response. However, due to the nature of the condensate, being a light non-persistent hydrocarbon, with high anticipated evaporation and entrainment rates, exclusion zones are not expected to be long-term and are unlikely to result in significant impacts.	In-water exposure to entrained hydrocarbons may result in a reduction in commercially targeted marine species, resulting in impacts to commercial fishing and aquaculture. Actual or potential contamination of seafood can affect commercial and recreational fishing and can impact seafood markets long after any actual risk to seafood from a spill has subsided (NOAA 2002) which can have economic impacts to the industry. In-water exposure is limited to the upper 0 – 10 m of the water column, and not within the deeper areas of the water column where rock lobster and giant crab species are found. Due to the sensitivity, a small number of juvenile fish, larvae, and planktonic organisms, could be impacted,	There was one fishery identified that has the potential to be impacted by exposure to (low) shoreline hydrocarbons; the Tasmanian State bull kelp industry located within the shallow waters of King Island. Hydrocarbon smothering has the potential to cause fouling and asphyxiation (Blumer 1971; Cintron et al. 1981) and act as a physical barrier for the diffusion of CO2 across cell walls to macroalgae (O'Brien & Dixon 1976). Any impacts to commercially valuable seaweed have to potential to result in a negative economic impact to the industry. However, as the modelling predicted no exposure of the area to in-water or surface hydrocarbons, where majority of the fishery is located, the nearshore operators are unlikely to be impacted.

	however impacts are not expected to affect population viability or recruitment.	Only the shoreline harvesters, could be affected by short-term closures but would be expected to recover relatively rapidly, with no long-term or irreversible damage given the potential concentrations of hydrocarbons that could reach King Island are below those that could cause ecological impacts.

Summary:
In-water exposure is limited to the upper 0 – 10 m of the water column, and not within the deeper areas of the water column where rock lobster and giant crab species are found. Any acute impacts are expected to be limited to individuals and not expected to cause impacts at a population level. The potential consequence to commercial fisheries is assessed as **Level 2** based on the potential for localised, short-term impacts.

Refer also to:

- Ecological Receptors -Marine Fauna

Other Offshore Industry

Exposure Evaluation

Condensate	MDO
Other offshore industry, such as shipping, petroleum exploration and production, other offshore infrastructure and defence activities, could be exposed to hydrocarbons according to modelling of the LOWC spill scenario. The South-east Marine Region in general is one of the busiest shipping regions in Australia, which encompasses the Otway Basin. A number of producing oil and gas wells occur within the Monitoring Area. Current operators with producing fields in the Otway Basin include Beach Energy (Otway Gas Field Development) and Amplitude Energy (CHN Development). Numerous other petroleum exploration activities, including seismic surveys and exploration drilling, have been undertaken in the permits of the Otway Basin. Many of training areas, sea dumping sites and UXO sites have the potential to be exposed to low levels of hydrocarbons. A number of these sites are located in and around Port Phillip Bay and Western Port Bay.	Other offshore industry, such as shipping, petroleum exploration and production, other offshore infrastructure and defence activities, could be exposed to hydrocarbons according to modelling of the MDO spill scenario (Section 4.4.3). The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023), therefore, the consequence evaluation for the LOWC spill scenario is considered to be conservative and inclusive of the MDO spill scenario.

Consequence Evaluation

Surface Exposure	In-water Exposure	Shoreline Exposure

Physical displacement of other offshore industry may occur due to the establishment of exclusion zones during the spill response. This has the potential to cause negative economic impact. However, due to the light non-persistent nature of the hydrocarbon, with high anticipated evaporation and entrainment rates, exclusion zones are not expected to be long-term and are unlikely to result in significant impacts.	Given these industries are all located in offshore waters which utilise the sea surface vicinity, exposure to in-water hydrocarbons is not expected.	Given industries are all located in offshore waters, exposure to shoreline hydrocarbons is not expected.
Summary: The potential consequence to other offshore industry is assessed as **Level 2** based on the potential for localised, short-term impacts.		

Inherent Likelihood

Historical LOWC incidents events during development drilling have been reported at a frequency for a gas well of 4.2 x 10^{-5} per drilled well (IOGP 2019). This represents the frequency of the cause (i.e. a LOWC); additional environmental factors would be necessary for the worst-case consequences to human systems to eventuate.

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of an accidental release of condensate causing Level 2 consequences to habitats is considered **Unlikely (D)**.

Inherent Risk Severity

The inherent risk severity of an accidental release of condensate causing impacts to social receptors is considered **Low**. Table 6-62 lists the inherent risk severity for each receptor type.

Table 6-62: Inherent Risk Severity – Condensate Exposure – Social Receptors – Human Systems

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Severity
Coastal Settlements	2	D	Low
Recreation and Tourism	2	D	Low
Commercial Fisheries	2	D	Low
Other Offshore Industry	2	D	Low

6.8.6 Control Measures, ALARP, and Acceptability Assessment

Table 6-63 provides a summary of the control measures and ALARP and acceptability assessment relevant to worst case release scenarios.

Table 6-63: Accidental Hydrocarbon Release ALARP, Control Measures and Acceptability Assessment

Accidental hydrocarbon release	
ALARP Decision Context and Justification	ALARP Decision Context: Type B The activities proposed that could lead to Vessel LOC and a LOWC event are not new and have been undertaken by Amplitude Energy in the time since they become titleholder and operator. The wells are operated per the regulatory accepted WOMP and integrity management plan. The risks associated with Vessel LOC and LOWC are well understood; given the spatial and temporal scale of a worst-case discharge, and the sensitivities in the region, a worst-case scenario has the potential to result in Level 3 consequences. Consequently, Amplitude Energy believes that ALARP Decision Context B should be applied. However, from the outset of the planning phase, due to inherent complexity and some uncertainty associated with this aspect for this Activity, Context C has also been applied, and is reflected in: • The conservative assumptions used to characterise worst -case discharge scenarios for the LOWC. • Detailed assessment of potential impacts and risks.

	• Detailed assessment of control measures and selection of contingency measures in line with a precautionary approach. • Preparation of detailed response plans.
Control Measure	Source and Description of Control
Preventative	
CM01: Marine exclusion and caution zones	Exclusion zones are frequently installed over petroleum wells, structures and equipment established via Notice to Mariners around vessels undertaking petroleum activities. Temporary exclusion or caution zones are applied around vessels where they may be restricted in their manoeuvrability.
CM02: Pre-start Notifications	Under the Navigation Act 2014 (Cwth), the AHS are responsible for maintaining and disseminating hydrographic and other nautical information and nautical publications including: • Notices to Mariners • AUSCOAST warnings. Relevant details will be provided to the Joint Rescue Coordination Centre (JRCC) to enable AUSCOAST warnings to be disseminated.
CM03: Marine Assurance Process	Marine Assurance Process ensures that maintenance systems are in place ensure that safety-critical equipment is maintained in accordance with manufacturer specifications to enable optimal performance.
	The vessels and MODU will adhere to navigational safety requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • AMSA MO 21: Safety and emergency arrangements gives effect to SOLAS regulations dealing with life-saving appliances and arrangements, safety of navigation and special measures to enhance maritime safety. • AMSA MO 27 - Safety of Navigation and Radio Equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards • AMSA MO 30 - Prevention of collisions requires that onboard navigation, radar equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. • AMSA MO 70 - Seafarer certification meets the requirements for qualifications and training.
	In accordance with MARPOL Annex I and AMSA MO 91 [Marine Pollution Prevention – oil], a Shipboard Marine Pollution Emergency Plan (SMPEP) or Shipboard Oil Pollution Emergency Plan (SOPEP) (according to class) is required to be To prepare for a spill event, the SMPEP/SOPEP details: • Response equipment available to control a spill event. • Review cycle to ensure that the SMPEP/SOPEP is kept up to date. • Testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP/SOPEP details: • Reporting requirements and a list of authorities to be contacted. Activities to be undertaken to control the discharge of hydrocarbon.
CM05: Ongoing Consultation	Notifications for any on-water activities and ongoing consultations undertaken per Section 11.0 - Consultation.

CM10: Amplitude Energy Offshore Chemical Assessment Procedure	All planned chemical discharges shall be assessed and deemed acceptable before discharge, in accordance with Amplitude Energy's Offshore Environment Chemical Assessment Process.
CM14: MODU Material Transfer Process	MODU will have a bulk fluid transfer process in place before commencing operations. This process will include: • MODU-to-vessel communication protocols. • Transfer hose integrity checks. • Transfer hose pressure test. • Continuous visual monitoring during transfers. • Tank volume monitoring. • Avoidance of bulk hydrocarbon transfers at night, or otherwise artificial illumination of the of the operational areas on the MODU, vessel and water between them during the transfer. • Weather limitations for bulk transfers.
CM15: Campaign Risk Review (modelling)	Spill modelling undertaken for both loss of MDO and LOWC to inform this EP and the spill response planning including SCERP, OPEP and OSMP.
CM22: NOPSEMA accepted WOMP	Under Part 5 of the OPGGS (Resource Management and Administration) Regulations 2011, an accepted WOMP is required before well activities can be undertaken. The WOMP details well barriers and the integrity testing that will be in place for the activity. The accepted WOMP (and its implementation) is therefore considered a key component of the environmental risk management for the campaign.
CM23: NOPSEMA accepted safety case	Under OPGGS (Safety) Regulations 2009 the following safety cases will be required for the campaign: • MODU facility safety case • Campaign Safety Case Revision. Each safety case will identify all hazards having the potential to result in major accident events (MAEs) associated with the respective facility. Safety cases therefore address major source control events associated with both the wells and the facilities (MODU) including surface and subsea well releases, and vessel collision. As part of MAE prevention and control, formal safety assessments are detailed and systematic assessment of the risk associated with each of those hazards, including the likelihood and consequences of each potential major accident event; and identifies the technical and other control measures that are necessary to reduce that risk to ALARP. The accepted safety cases (and their implementation) are therefore considered key components of the environmental risk management for the campaign.
Response	
CM24: Source Control Emergency Response Plan (SCERP)	A source control emergency response plan (SCERP) is developed for the activities. Where applicable to the campaign, the SCERP will address: • Arrangements for the provision of the Source Control IMT personnel (numbers, competency, capability for the duration of the response). • Arrangements for the provision of equipment and supplies. • Arrangements for equipment and personnel monitoring and tracking. • Activation and mobilisation plans, including activation and expenditure authority and regulatory approval processes.

	• Logistics plans and providers. • SIMOPS planning process. • Deployment and installation plans. • Well kill and shut-in plans.
CM25: Oil Pollution Emergency Plan (OPEP)	Under the Regulations, the petroleum activity must have an accepted Oil Pollution Emergency Plan (OPEP) in place before the activity commences. In the event of a LOWC, the OPEP will be implemented. The Offshore Victoria OPEP has been developed and provides for emergency response for scenarios described under this EP. By committing to implement this EP, Amplitude Energy acknowledges that any response will be implemented in accordance with the requirements described within the OPEP.
CM26: Operational and Scientific Monitoring Plan	Amplitude Energy's OSMP details the arrangements and capability in place for: • Operational monitoring of a hydrocarbon spill to inform response activities. • Scientific monitoring of environmental impacts of the spill and response activities. Operational monitoring will allow adequate information to be provided to aid decision making to ensure response activities are timely, safe, and appropriate. Scientific monitoring will identify if potential longer-term remediation activities may be required and potential breaches of protected places management objectives, specifically those of Australian Marine Parks.
Impact and Risk Summary	
Residual Impact Consequence	N/A
Residual Risk Consequence	Level 3: Localised medium-term impacts to species or habitats of recognized conservation value or to local ecosystem function; remedial/recovery work to land/water systems over months/year.
Likelihood	Based upon AMSA Annual Report 2023-24 (serious incident reports) (AMSA 2024), a LOC of MDO from a vessel is considered: • Unlikely (D) – As a rare combination of factors would be required for an occurrence; the event is conceivable and could occur at some time; and could occur during the activity. An assessment LOWC incidents was undertaken using SINTEF records (2013). This provided an indicative probability of a LOWC from well intervention or drilling that can be reasonably expected to occur, based on previous incidents. Statistics indicate the chances of the activity resulting in a LOWC are 1 × 10-4; this aligns to a likelihood rating D (Unlikely) under the Amplitude Energy risk matrix. The identified control measures to prevent a LOWC event include clear design and assurance standards, and consequently, it is considered: • Unlikely (D) - As a rare combination of factors would be required for an occurrence; the event is conceivable and could occur at some time; and could occur during the activity.
Residual Risk	Moderate
Demonstration of Acceptability	
Principles of ESD	The potential impact associated with this aspect is limited to a localised medium-term impact to species or habitats of recognized conservation value or

	to local ecosystem function; remedial, recovery work to land/water systems over months/year. The activities were evaluated as having the potential to result in a Level 3 consequence thus is not considered as having the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Legislation and other requirements considered relevant control measures include: • AMSA Marine Order 3 [Seagoing qualifications] • AMSA Marine Order 30 [Prevention of collisions] • AMSAs Marine Order 91 [Marine Pollution Prevention – oil] • OPGGS(E)R – Amplitude Energy Victorian OPEP (VIC-EPER-EMP-0001) • OPGGS(E)R- Amplitude Energy OSMP (VIC-ER-EMP-0002) • Navigation Act 2014 – Notifications.
Internal Content	The environmental controls proposed reflects Amplitude Energy's HSEC Policy commitment to take all reasonably practicable steps to protect the health and safety of workers, contractors, partners, and communities, and ensuring its business is conducted in an environmentally responsible manner. Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Incident and Crisis Management (MS10) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05).
External Context	Suggestions from State emergency agencies have been adopted unless otherwise discussed and agreed. Amplitude Energy retains contact details of First Nations organisations to be contacted in the event of a spill, noting traditional owners may alternatively be engaged by the State Control Agency.
Demonstration of meeting the defined acceptable levels in the OPP	Sections 9.5.7 and 9.6.7 of the **East Coast Supply Project OPP** demonstrates the acceptability of impacts and risks associated with accidental hydrocarbon release. This acceptability demonstration is also valid and appropriate for the Activity (given this Activity is described and assessed in the OPP) and is supported by further evaluation against the acceptability factors as detailed above. Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for accidental hydrocarbon release: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP.

	• No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	Acceptable Amplitude Energy has determined that the risks related to an accidental hydrocarbon release are acceptable, based on: • The planned management of risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD. • The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advices, and significant impact guidelines for MNES. • Feedback has been received from relevant persons that has informed the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures. To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: EPO19: No unplanned release of chemicals or hydrocarbons to the marine environment EPO17: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.

7.0 Oil Spill Response

7.1 Oil Spill Response Strategies

This section represents the risk assessment for oil spill response options.

Amplitude Energy has developed a regional Offshore Victoria OPEP (VIC-ER-EMP-0001) which contains further detail of the response strategies that would be implemented in the event of a hydrocarbon spill and the relevant control measures.

7.1.1 Response Option Selection

Spill response strategies are triggered in the event of a hydrocarbon spill. Not all response options and tactics are appropriate for every oil spill. Different oil types, spill locations, and volumes require different response options and tactics, or a combination of response options and tactics, to form an effective response strategy.

A Net Environmental Benefit Analysis (NEBA) is the process of considering advantages and disadvantages of different spill response options (including no response) to arrive at a spill response decision resulting in the lowest overall environmental and social impacts. NEBA is undertaken at a strategic level to identify pre-determined recommended response strategies, and an operational NEBA is undertaken throughout the emergency response. The process requires the identification of sensitive environmental receptors and the prioritisation of those receptors for protection so that the strategic objectives of the response can be established.

Table 7-1 provides an assessment of the available oil spill response options, their suitability to the potential spill scenarios and their recommended adoption for the identified events.

7.1.2 Response Priority Areas

To support the identification of priority response areas, shoreline sensitivity analysis and mapping was undertaken guided by IPIECA principles and informed by the regional description of the environment and understanding of receptor presence in the region. The Response Priority Areas (RPAs) are detailed in the OPEP.

7.1.3 Pre-spill Net Environmental Benefit Assessment

Each of the RPAs used location specific information to refine the receptor presence and include a priority ranking based upon the sensitivity criteria detailed in the OPEP.

An assessment of the effective spill response strategies and the net benefit they offer, specific to the sensitivities located within each of the RPAs is also provided in the OPEP.

Table 7-1 provides an assessment of the available oil spill response options, their suitability to MDO and condensate, and their recommended adoption for the loss of containment scenario's relevant to this EP.

Table 7-1: Suitability of Response Options for MDO and LOWC Condensate Spills

Response Strategy	Description	MDO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
Source Control	Limit flow of hydrocarbons to environment.	Achieved by vessel SOPEP / SMPEP	✓	✓	In accordance with the Source Control Emergency Response Plan. The plan provides a response to release incidents from subsea wells (refer Section 7.2.2	✓	✓
Monitor & Evaluate	To maintain situational awareness, all monitor and evaluate options suitable: • direct observation – aerial or marine • vector calculations • Oil Spill Trajectory Modelling (OSTM) • satellite tracking buoys.	Modelling identifies that for MDO spills under favourable conditions, approximately 83.1% of the oil mass should have entrained and a further 11.4% will evaporate within the first 24 hours. Leaving only a small proportion floating on the water surface (1.3%) (Section 6.8.3.2). Aerial surveillance is considered more effective than vessel surveillance to inform spill response and identify if oil has contacted shoreline or wildlife. Vessel surveillance limited in effectiveness in determining spread of oil. Manual calculation based upon weather conditions will be used at the time to provide guidance to aerial observations. Oil Spill trajectory modelling utilised to forecast impact areas. Deployment of oil spill monitoring buoys at the time of vessel incident will assist in	✓	✓	Modelling identifies that under favourable weather conditions, approximately 70.1% of the mass is shown to have entrained and a further 23.8% has evaporated 24 hours after the spill, leaving only a small proportion floating on the water surface (<1%). This means the condensate will evaporate readily when on the water surface, with limited persistent components to remain on the water surface over time (Section 6.8.3.3). For a significant spill event (LOWC), hydrocarbons will likely be present at the surface for the duration of the release. To maintain situational awareness, all monitor and evaluate techniques will be considered during condensate spill incidents to understand the possible impacts (refer to Section 7.2.6.3 for risk and ALARP assessment).	✓	✓

Response Strategy	Description	MDO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
		understanding the local current regime during the spill event (refer to Section 7.2.6.3 for risk and ALARP assessment).					
Dispersant Application	Breakdown surface spill & draw droplets into upper layers of water column. Increases biodegradation and weathering and provides benefit to sea-surface /air breathing animals.	MDO, only has a small persistent fraction, due to the fact that the hydrocarbon will spreads rapidly to thin layers and evaporate or entrain. There is insufficient time to respond while suitable surface thicknesses are present. Dispersant application can result in punch-through where dispersant passes into the water column without breaking oil layer down if surface layers are too thin. Application can contribute to water quality degradation through chemical application without removing surface oil. Considered not to add sufficient benefits.	X	X	Otway condensates have low levels of persistent hydrocarbon and will weather rapidly. Given the low viscosity of this liquid any surface oils will spread rapidly to thin layers, as reflected in predictive modelling, and are not suited to dispersant application due to potential “punch-through” (refer to MDO assessment). Possible viable application for safety purposes (safe access to the well for capping). Possible net benefit where it facilitates safe access to the well for capping. Dispersant application to only occur at the well site (Commonwealth waters).	✓ (Possible)	✓ (Possible)
Contain & Recover	Booms and skimmers to contain surface oil where there is a potential threat to environmental	Response relies on calm sea conditions, thicknesses >10 µm to collect and adequate deployment timeframes. MDO spreads and disperses rapidly to below recoverable thicknesses.	X	X	As per MDO assessment, surface oils will not be present in suitable thicknesses to make contain and recover a viable response option given the low viscosity of the condensate hydrocarbons. In general, method only recovers approximately 10-15% of total spill	X	X

Response Strategy	Description	MDO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
	sensitivities.	The prevailing meteorological conditions in the Otway would also likely preclude containment and recovery techniques. In general, method only recovers approximately 10-15% of total spill residue, creates significant levels of waste, requires significant effort and suitable weather conditions (calm) to be deployed. Weather conditions limit deployment in the Otway offshore environment.			residue, creates significant levels of waste, requires significant effort and suitable weather conditions (calm) to be deployed. Weather conditions limit deployment in the Otway offshore environment.		
Protect & Deflect	Booms and skimmers deployed to protect environmental sensitivities.	MDO has a low component of persistent components that have the potential to reach shorelines. Effective response strategies to protect open estuaries that have environmental sensitivities (aquatic vegetation, recreational users) may be beneficial. For example, booming or sand berms may offer some net benefit to estuarine environments which are open to the sea. Stochastic modelling indicated that Port Campbell may be contacted by hydrocarbons at low thresholds within 1 day in the event of a LOC from a vessel.	✓	✓	Predictive modelling identified a number of sensitive shoreline systems that may be contacted by shoreline accumulation in the event of an unplanned LOWC. The closest inlet to the activity (and one of the more exposed sites from a spill scenario perspective) was identified at Port Campbell Bay. Stochastic modelling indicated that the minimum time to contact at Port Campbell in a worst-case release could occur within 1 day of a release. Deterministic modelling indicated that the minimum time for shoreline accumulation at low thresholds will occur within 4.2 days of a release.	✓	✓

Response Strategy	Description	MDO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
		Success of protection and deflection techniques at this location will be influenced by the prevailing and generally dynamic conditions at the time of the spill. Protection and deflection techniques will be considered if shoreline contact is predicted at sensitive receptors (refer to Section 7.4 for risk and ALARP assessment).			The success of this strategy will be influenced by the prevailing and generally dynamic conditions at the time of the spill. Options which can be considered include a simple boom arrangement in the mouth of a small estuary or installation of a temporary sand berm to prevent residue ingress (refer to Section 7.4 for risk and ALARP assessment). Shoreline booming (i.e. sea booming) is not considered viable due to the high energy environment of the Otway coast and the hazards of deploying and maintaining in such an environment.		
Shoreline Clean-up	Where shoreline impact is predicted, shoreline clean-up assessment technique (SCAT) assessment is initiated. If SCAT and Net Environmental Benefit Assessment (NEBA) assess clean-up is of net benefit, initiate clean-up. Shoreline clean-up is a last response strategy due to the	Shoreline contact by MDO may occur at low, moderate and high levels from an MDO spill (generally less than 100 g/m^2). Modelling of the worst-case results following a LOC of MDO predicted shoreline volume of 43.1 m^3 of MDO contacting Corangamite 1 hour after the spill event. Much of the shoreline affected by condensate residues is rock platform or sandy beach stretches with backing cliffs. Shoreline clean-up may hazardous and due to the nature of the shoreline habitat remediates	✓	✓	Shoreline contact by condensate may occur at low, moderate and high levels from an LOWC spill (generally less than 100 g/m^2 with a few receptors that may be contacted by hydrocarbons up to 1,000 g/m^2). Deterministic modelling of the worst-case results following a LOWC predicted shoreline volume of 264.9m^3 of condensate residue by 113 days after the spill event. Much of the shoreline affected by condensate residues is rock platform or sandy beach stretches with backing cliffs. Shoreline clean-up may hazardous and	✓	✓

Response Strategy	Description	MDO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
	potential environmental impact; heavy resource requirements; health and safety concerns to responders; logistical complexities and waste management considerations	rapidly. Access to these areas is limited along the Otway coastline. MDO residue reaching accessible sand shorelines is likely to infiltrate sand where it will be susceptible to remobilisation by wave action (reworking) until naturally degraded. Due to the light nature of the product and its dispersion in the environment prior to reaching shorelines it is possible that there would be insufficient quantities for manual clean-up. MDO does not discolour shoreline as much as other hydrocarbon types. Manual collection techniques likely to have limited effectiveness. Use of sediment reworking is possible. However, the potential for shoreline assessment and clean-up will be considered as part of the NEBA in the event of a spill incident. Response strategy offers net benefit to shoreline species which are sensitive to oil spill residues (e.g., birds) (refer to Section 7.5 for risk and ALARP assessment).			due to the nature of the shoreline habitat remediates rapidly. Access to these areas is limited along the Otway coastline. Hydrocarbons reaching sandy shorelines are predicted to infiltrate sand where the residue will be susceptible to remobilisation by wave action (reworking) until naturally degraded. Due to the light nature of the product and its dispersion in the environment prior to reaching shorelines it is possible that there would be insufficient quantities for manual clean-up. The response strategy may offer net benefits to shoreline species which are sensitive to oil residues (e.g., birds) (refer to Section 7.5 for risk and ALARP assessment). Shoreline assessment and clean-up is considered viable along certain sand sections of the Otway coast and will still be considered as part of a NEBA in the event of a spill incident.		
Oiled Wildlife	Consists of capture, cleaning and	Given limited size and rapid spreading of the MDO spill, large scale wildlife	✓	✓	Given the nature of the Otway condensate and its rapid spreading to thin layers and	✓	✓

Response Strategy	Description	MDO Spill Assessment			Condensate Spill Assessment		
			Viable Response?	Net Benefit?		Viable Response?	Net Benefit?
Response (OWR)	rehabilitation of oiled wildlife. May include hazing or pre-spill captive management. In Victoria, this is managed by DEECA.	response is not predicted. However, there is the potential that individual birds could become oiled in the vicinity of the spill. OWR may offer net benefits for both seabirds and shorebirds within the surface oil and shoreline residue zones >100 g/m^2 which result from the MDO spill. OWR is both a viable and prudent response option for this spill type (refer Section 7.6 for risk and ALARP assessment).			limited volumes of residue washed ashore, it is predicted there will be limited impacts to species sensitive to oil residues such as birds. However, OWR may offer net benefits to seabirds which come into contact and area affected by these minor residues. OWR is both a viable and prudent response option for this spill type (refer Section 7.6 for risk and ALARP assessment).		

7.2 Source Control

7.2.1 Vessel LOC

Source control arrangements for significant vessel spills resulting from fuel tank perforation includes:

- closing water-tight doors
- checking bulkheads
- determining whether vessel separation will increase spillage
- isolating penetrated tanks
- tank lightering etc.

Source control relies upon the activation of the vessels SOPEP / SMPEP (or equivalent).

7.2.2 Subsea LOWC

Source control activities for a LOWC, including methodologies and resources to implement source control and limit the hydrocarbon released to the environment are detailed in the Source Control Emergency Response Plan (SCERP) (VIC-DC-ERP-0001).

Typical source control activities for a LOWC include:

- site survey and debris clearance
- manual intervention of well control equipment
- subsea dispersant application
- well capping
- relief well.

Table 7-2 provides an overview of the applicability of these LOWC source control response options for the spill scenario covered within this EP.

Table 7-2: Overview of Level 3 Source Control Options Applicable to the Activity

Source Control Techniques	Site Survey and debris clearance.	Manual Intervention of Well Control Equipment	Subsea Dispersant Application	Well Capping	Relief Well
Suitability ***Is the response strategy suitable for the scenario?***	Yes – survey would be required to confirm the leak source. Debris clearance may be required to deal will equipment deployed to the well from the MODU.	Yes – manual intervention would be attempted if auto-shut-in fails.	Possible - as a means of reducing VOCs at surface to support safe well access. Unlikely to be of benefit as an environmental impact mitigation measure.	Unlikely to be suitable for the well considering water depths and high energy environment. If high flow rates, given shallow water depths, a cap is unlikely to be deployable given VOCs and buoyancy at surface. Retained as a possible solution if low flow and conditions permit.	Yes – if intervention not successful then relief well would be required as primary response strategy.
Functionality / Feasibility ***How does the response strategy perform to achieve its required risk reduction?***	Site survey assists in identifying equipment status and hazards. Debris clearance equipment is used to enable access to the well if obstructed. This option enables data to be gathered and the site to be prepared to both select and enable subsequent source control options.	Capability to manually intervene the well control equipment will be maintained throughout the campaign when well control equipment is deployed.	Subsea dispersant application is sometimes considered as an environmental mitigation to reduce shoreline loading of oil by increasing dispersion into the water column, enhancing dilution and weathering. Given the well is gas/condensate, the efficacy of dispersant application would be expected to be low, however is retained as an option in a low-flow scenario where dispersant, if applied at the well, may help to reduce the	Well capping can curtail the hydrocarbon flow prior to permanent plugging of the well. This source control option is unlikely to be possible given the shallow water depths and high energy offshore environment. Anticipated WCD flow rates from the well would affect cap land out and create a flammable environment at surface restricting access. Studies undertaken by Trendsetter Engineering	This source control technique has been proven successful in Australia (e.g. Montara) and internationally (Macondo). Considered technically feasible and effective on the blowout scenario. Stemming the flow of hydrocarbons from a well by injecting kill density fluid into the well bore is a proven method of regaining control of a well. This is often achieved by directionally drilling a relief well to intercept the wellbore and then

Source Control Techniques	Site Survey and debris clearance.	Manual Intervention of Well Control Equipment	Subsea Dispersant Application	Well Capping	Relief Well
			concentration of VOCs at surface and thereby help reduce risks to response operators in the immediate vicinity of the well. The equipment to perform the task is available. Monitoring is required during the response to confirm optimum treatment rates and overall efficacy.	have considered capping options for gas/condensate wells in the Bass Strait, in greater water depths (generally more amenable to capping) compared to the Otway facilities. The studies ruled out capping, including via direct and offset installation as an option for the reasons described above. Though essentially ruled out, Amplitude Energy would still consider the use of capping equipment on a case-by-case basis.	pumping fluid to stem the flow. Once the well is stabilised, cement can be pumped into the well to form a permanent barrier to isolate the flow zone.
Dependencies / Effectiveness ***Does the response strategy rely on other systems to perform its intended function?***	Response is reliant on availability of equipment and trained / experienced personnel to undertake activities: • subsea debris removal equipment and operators • survey vessel and/or Support vessel.	Response is reliant on availability of equipment and trained / experienced personnel to undertake activities: • subsea intervention equipment and operators • survey vessel and/or Support vessel • safety case and/or revision.	Response is reliant on availability of equipment and trained / experienced personnel to undertake activities: • subsea decommissioning / dispersant application equipment and operators • support vessel • safety case and/or revision.	Response is reliant on availability of equipment and trained / experienced personnel to undertake activities: • support vessel • Well capping solution/vendor • well Control Specialist Company (including emergency air freight capability).	Response is reliant on availability of equipment and trained / experienced personnel to undertake activities: • MODU and trained staff • well engineering services and management contractor • well control specialists

Source Control Techniques	Site Survey and debris clearance.	Manual Intervention of Well Control Equipment	Subsea Dispersant Application	Well Capping	Relief Well
	• possible safety case and/or revision.			• safety case and/or revision.	• well equipment availability • safety case and/or revision.
Availability and Timely ***The response strategy is available to perform its function, in sufficient time?***	Survey and debris clearance equipment is available within Australia as part of the AMOSC Subsea First Response Toolkit (SFRT). Similar packages are also available internationally including from Wild Well Control (WWC).	The campaign will have the capability to mount an intervention response. At least two work-class ROVs and tooling compatible with the subsea wells and project pressure control equipment will be mobilised for the campaign.	Subsea Dispersant equipment is available within Australia as part of the AMOSC. Other subsea dispersant equipment packages are available internationally including from WWC. Dispersant stocks are available within Australia through AMOSC. Additional stocks may also be available through AMSA if requested as per the National Plan. This EP includes a dispersant needs analysis demonstrates there are sufficient stocks available for a response.	Capping stack through WWC is available in Scotland and other providers in Singapore and can be sea or air freight to Australia. Suitable construction support vessels (CSVs) are typically located in Singapore, NWS and within the region depending on industry activity. Estimated timeline to achieve successful capping option (if deemed suitable for the incident) is provided below.	Relief well MODU, services and equipment can be sourced via APPEA Mutual Aid MoU. Timeline breakdown is provided in below.

7.2.2.1 Site Survey and Debris Clearance and Intervention

Scope of Activity

Site survey and debris clearance are key preliminary tasks that assist in selecting subsequent source control options.

- Survey allows the response team to understand any issues which may preclude installation of equipment or other constraints to safely enter and work in the area.
- The need for debris removal activities will dependent upon the scenario, damage to the subsea facilities such as subsea well components, MOU riser and well control equipment. Debris clearance may involve the use of ROVs and cutting of equipment to ensure a clear path for manual intervention and/or capping.
- Intervention and is likely the earliest opportunity to stem or stop the release of hydrocarbons. Intervention would include the use of ROVs and tooling which can interface with the Otway wells and project subsea pressure control equipment.

Various options are available for equipment supply (Table 7-3). Response specialists such as AMOSC/Oceaneering and Wild Well control can provide equipment packages.

Table 7-3: Indicative Survey and Debris Clearance Equipment

Response Options	Equipment Applicable to Source Control Options
Survey Debris Clearance Intervention	• Cameras - inspection ROV operated • ROVs • Grinders / super grinders • Impact wrenches • Multipurpose cleaning tools • Remote control units • Hydraulic cutters • Chopsaws • Diamond wire cutters • Hydraulic power units • ROV dredges • Torque tools • Test jig • Pressure control equipment intervention skid and operating equipment • Linear valve override tools • Manipulator knife • Flying lead orientation tool • Umbilicals.

Site Survey and Debris Clearance and Intervention RTMs

Table 7-4 outlines the key activities and estimated response time model (RTM) associated with gaining access to inspection, debris clearance, intervention and subsea dispersant equipment. The RTM considers response times for:

- Sourcing applicable debris removal equipment and subsea dispersant will be through a 3rd party provider such as AMOSC (SFRT based in Western Australia); hardware may alternatively be

mobilised via WWC (Houston) where it supports best case response times. Table 7-4 shows the RTM for the AMOSC SFRT equipment.

- Dispersant stores are available in Victoria (Geelong) and available through AMOSC's warehousing facilities who will also manage inventory levels through the response. The project RTM is aligned to industry RTM with the project variable component transportation time from warehouse to port facility.

Table 7-4: RTM Subsea First Response Tools

3rd Party (AMOSC)	Time (Days)	Cumulative (Days)
Initial notification to arrival of crews at warehouse to load trucks	0.25	0.25
Prepare and load equipment on trucks (5 in total)	0.65	0.90
Transit time (road) to Portland	3.00	3.90
Unload at Portland	0.31	4.21
Charge SAM	2.00	6.21
Load SFRT to vessel and sea fasten	0.13	6.33
Transit to Wellsite and commence scope	0.32	6.65
Set-up at site and deploy	1.00	7.65
Total Time (days)		7.65
Additional time to mobilise project vessel (base case)	0	
Additional time to mobilise additional vessel (contingency)	0 - 2	

7.2.2.2 Subsea Dispersant Application

Scope of Activity

A LOWC is predicted to result in a surface gas plume at the sea surface, resulting in high levels of VOCs near the plume. Additional volumes of condensate transported to the surface are predicted to spread out from the flowing well and contribute to increased levels of VOCs within the air surrounding the flowing well, increasing the risk LELs may be exceeded nearer to the well site.

Dispersant application is included as a safety-related control measure where VOCs from surface oil may exceed lower explosive limits (10% LEL) around well control activities (i.e. well intervention from surface).

The methods of dispersant application that may provide a benefit for the purposes of LEL reduction are:

- Subsea dispersant application. Relevant to a lower-flow / capping scenario. Noting dispersant application subsea is unlikely to be safe (proximity to wellsite) or effective given the shallow water depth, high volumes of gas (and low liquids) that would lift dispersant to surface at a high rate within the gas plume.
- Dispersant application would be limited to the near vicinity of the well control response operations only, and outside of state waters and state or national marine parks

Resources for Dispersant Application

Depending on the scenario, various resources may assist in reducing LELs in the air around the well response site to safe working levels. Key components requiring mobilisation / activation and their availability (or accessibility) is described within the OPEP. For larger resource components such as the subsea dispersant application package; this equipment can be road freighted if sourced within Australia or airfreighted either to Melbourne or to a DSV location (e.g. Singapore).

There are several dispersant products stockpiled within Australia, and which are available through AMOSC; these are referred to as oil spill control agents (OSCA's). Those which may potentially be effective on light oils include Dasic Slickgone NS and Dasic Slickgone EW; Dasic Slickgone NS is also currently selected in Australia for subsea applications (AMSA 2019). Given its availability, potential efficacy for gas condensate types detailed within this OPEP, and registration as an OSCA, Dasic Slickgone NS is a prime candidate for selection. This does not preclude the use of other OSCA's noting all are selected on the basis of their moderate (or lesser) toxicity (Irving and Lee 2015), and also any product would be assessed prior to use per the Amplitude Energy Offshore Chemical Assessment Process. Additional stockpiles may be requested through AMSA as per the National Plan.

Resource Required and Availability

Table 7-10 provides an indication of the amount of dispersant required for the subsea dispersant (SSD) package to treat the worst case LOWC scenario (identified in Section 6.8). A 1:100 application ratio has been used, as recommended within IPIECA (2015), to determine the volume of dispersant required for the worst-case scenario. Table 7-10 also describes the NS Dasic Slickgone dispersant stocks within Australia available to adequately support a dispersant response.

The OPEP provides further details the capability to undertake dispersant application activities in accordance with the identified required resources identified in Table 7-10, their availability, and hence Amplitude Energy's capability to support a response. Evaluation has determined that there are sufficient dispersant stockpiles within Australia to maintain a dispersant response for the duration of a worst-case spill event.

Table 7-5: Analysis of Dispersant Required vs. Availability

Description	Parameter
Dispersant Required	
Worst case release duration (days)	104
Total condensate release volume (m^3)	10,562
Average release rate (condensate) (m^3/days)	101.6
Dispersant application ratio	1:100 (dispersant: oil)
Dispersant required (m^3/days)	1.2
Total Dispersant required*	124.8 m^3
Dispersant Availability	
AMOSC Geelong (Vic)	79 m^3
AMOSC Fremantle (WA)	504 m^3
AMOSC Exmouth (WA)	75 m^3
AMOSC Members Dampier (WA)	5 m^3
Total	663 m^3
Needs Provided for?	Yes

7.2.2.3 Well Capping

Scope of Activity

Capping provides a means to hydraulically seal a well and stop the flow of hydrocarbons during a LOWC, prior to the completion of a relief well should intervention be unsuccessful. Capping may not be suitable in all scenarios or under all environmental conditions; relief well drilling remains the primary source control solution in the event of a LOWC.

Various well capping solutions may be suitable in responding to a LOWC when drilling and a solution to cap during drilling campaigns will be maintained whilst there is a risk of LOWC.

Capping Feasibility and Solutions

The feasibility/effectiveness of well capping and relief well drilling is provided in Table 7-2. As shown in this assessment, capping is unlikely to be selected for regaining control of the Otway wells, as a loss of well control in shallow water depths with any of the wells flowing at absolute open flow (AOF) will require a relief well to perform the well kill. Running a capping stack into a high velocity jet stream of dry gas in shallow water is not considered practicable. Despite this, for a loss of well control event a capping stack will be considered on a case-by-case basis.

An example of where a capping equipment may be deployed would be if the well partially bridged downhole – reducing or eliminating flow sufficiently to consider running a capping stack. Under these circumstances the running of the capping stack would be dependent on many factors including but not limited to:

- Gas readings at the sea surface of less than 10% LEL.
- Gas boil not effecting the stability of the vessel/s.
- Suitable weather conditions for running the capping stack.
- Risk assessment.

Deployment Vessels

Amplitude Energy also monitors the marine market and access to active vessels with a range of specifications that may be required for cap deployment. Vessels of the type and specification that would be required for this activity can typically be sourced from Singapore if not already in country.

The prerequisites for a capping vessel include:

- CSV type vessel or similar
- DP2 minimum
- Minimum 65T heave compensated crane
- Work class ROV Installed
- Australian Safety Case.

Capping RTMs

Table 7-6 outlines the key activities and estimated timeframe associated with capping. The RTMs consider sourcing a vessel from various regions. The presence of a suitable vessel being in the region is dependent on other operator activities and schedules; vessel availability will be monitored by Amplitude Energy and response time models adjusted to reflect best available timeframes.

The Amplitude Energy well engineering team and well control partners would collectively assess the situation and evaluate equipment and logistics needs. Installing a subsea well cap requires access to personnel with specialised knowledge on the operation of such systems. Amplitude Energy

maintains contracts with well control companies (such as Wild Well Control) to supply technical services and guidance, equipment, specialised well control and capping installation.

Table 7-6: Capping System Installation Timeline

Activity Description - Capping Stack Source Control		**Intl Case**	**Mid Case**	**Local Case**
Capping Vessel Mobilisation Point		Asia - Singapore	Northwest Shelf	Victorian Waters
Capping Vessel Type		CSV	CSV	CSV
Capping Stack Equipment		Capping Stack	Capping Stack	Capping Stack
No.	Activity Description	Estimated Days	Estimated Days	Estimated Days
LOWC – Caping Stack Feasible				
1	Activate well control team and commence planning	2.0	2.0	2.0
2	Contract and mobilise CSV and transit to port facility (concurrent with activities No. 3-7)	23.0	14.0	6.0
3	Prepare capping stack package mobilisation from Scotland	5.5	5.5	5.5
3.1	Initial callout to arrival of crews at warehouse to load trucks	0.5	0.5	0.5
3.2	Sourcing aircraft and obtaining landing rights	0.5	0.5	0.5
3.3	Equipment movement to Prestwick Airport	2.0	2.0	2.0
3.4	AN124 transit to Prestwick airport	2.0	2.0	2.0
3.5	Load AN124	0.5	0.5	0.5
5	Air freight capping stack from Scotland (Prestwick Airport) to Melbourne (Airport)	1.5	1.5	1.5
6	Unload capping system and customs clearance	1.0	1.0	1.0
7	Transit capping stack / equipment to Port Facility	0.5	0.5	0.5
8	Assemble, perform functionality and pre-deployment checks	1.5	1.5	1.5
9	Load-out and sea fasten on CSV	1.0	1.0	1.0
10	Transit from port facility to Wellsite	0.7	0.7	0.7
11	Salvage operations to clear path for capping system (if not completed prior)	5.0	5.0	5.0
12	Position and deploy capping stack to well and perform shut-in operations	3.0	3.0	3.0
13	Well no longer flowing - source controlled	-	-	-
Total Time Estimate (days)		34.7	25.7	21.7

Note:
Capping response concurrent with Inspection and Debris clearance response; cap deployment follows confirmation of suitable deployment pathway and agreement to release by provider.
Vessel with AU Safety Case preferentially selected.

7.2.2.4 Relief Well

Scope of Activity

The scope of drilling a relief well is the same as drilling a standard well although it will be a deviated well due to the need to drill at distance from the original flowing well. A relief well is typically drilled as a straight hole down to a planned kick-off point, where it is turned towards the target using directional drilling technology and tools to get within 30 - 60 m of the original well. The drilling assembly is then pulled from hole and a magnetic proximity ranging tool is run on wireline to determine the relative distance and bearing from the target well. Directional drilling continues with routine magnetic ranging checks to allow for the original well to be intersected. Once the target well is intersected dynamic kill commences by pumping kill weight mud and cement downhole to seal the original well bore.

Planning for the relief well will begin simultaneously with other well intervention options. Outline relief well plans, and methodology are contained in the activity SCERP. This plan details the process for relief well design with key activities prioritised as part of the immediate response operations:

- Mobilisation of well control and relief well specialists.
- Confirmation of relief well strategy with well specialist to define MODU/vessel requirements:
  - Confirm relief well location using geophysical site survey data. This will consider the prevailing weather at the time of the incident, seabed infrastructure in the area and directional drilling requirements for well intersection.
  - Validate relief well casing design.
- Screen available MODUs in the region with current Australian Safety Case and select MODU with appropriate technical specifications to execute the strategy*.
- Prepare and submit regulatory documentation required for relief well activities.
- Mobilise necessary equipment and services such as directional drilling equipment and appropriate ranging tools for relief well strategy.

*Note: A memorandum of understanding has been established between Australian operators (including Amplitude Energy) to expediate access to suitable MODUs, equipment and services for relief well drilling. If required Amplitude Energy is able to request the use of a MODU, equipment and services, that may be under contract to another operator. Minimum technical specifications for the well kill have been assessed in the Well Control Modelling Report for Otway, the selected MODU will meet these requirements and be capable of operating in the Metocean conditions at the relief well location.

Relief Well Design

The SCERP and relief well plan includes technical details as to the design and equipment requirements to drill a relief well in the Otway field. The APPEA relief well complexity assessment provides an overview of some of the key planning considerations which are addressed within these documents (Table 7-7). Annie-2 relief well is considered low complexity.

Detailed well kill modelling has demonstrated that the Otway wells (including Annie-2) can be killed via a single relief well. Relief wells are expected to have similar formation strength as existing wells in the Otway fields, hence modelling and planning has provided for formation fracture gradients recorded during historical drilling in the Otway. The basic design is for a directional relief well targeting the targeting the wellbore at base of the 9-5/8” casing (Annie-2 open hole scenario). The relief well architecture would comprise:

- 26” x 42” conductor hole drilled to ~ 45 – 60 m below seabed - sufficient depth as required for conductor loading and fatigue mitigation. 36” conductor will be installed and cemented to seabed

- 17-1/2" surface hole directionally drilled riserless to Narrawaturk Marl / Pember mudstone before running 13-3/8" surface casing, the well will be kicked off to achieve build up to the target sail angle (~40°)
- 12-1/4" hole directionally drilled with BOPs installed to before running 9-5/8" intermediate casing. The well will continue to maintain sail angle until reaching proximity of the target well and dropping to inclination at TD ~ 0-2° with the relief well casing point within close proximity of the target, allowing for interval of 9-5/8" casing and open hole below the casing shoe intersect the wellbore
- 8-1/2" hole drilled to TD, allowing for sufficient depth to intersection with adjustments possible in any direction from vertical. This section of the well is designed to intercept the target wellbore, which may be iterative until success.

Table 7-7: Relief Well Complexity Assessment (after APPEA 2021)

Design Parameter	**Complexity Category**								
	Low			**Medium**			**High**		
Flow Potential	Low pressure well (MASP < 5kpsi) and/or tight reservoir.			Low - moderate pressure well (MASP < 10kpsi), conventional reservoir.			High pressure well (MASP > 10kpsi) and/or high permeability reservoir		
Score	1	2	3	4	5	6	7	8	9
Reservoir Fluids	Dry Gas			Wet Gas / Condensate			Crude Oil		
Score	1	2	3	4	5	6	7	8	9
Trajectory (Relief Well)	• Max. inclination < 30˚ • Max. DLS < 2.5˚/30m • Nearest offset > 5km			• Max. inclination > 60˚ • Directional plan achievable with standard tools. • Offset wells < 5km that required A/C screening			• Max. inclination > 60˚ • Short radius or high build rate through shallow formations. • Multi-well location e.g. subsea drill-centre or platform.		
Score	1	2	3	4	5	6	7	8	9
Surface location	No constraints on surface location.			Seabed features, subsea or surface infrastructure limit choice of surface.			No constraints on surface location.		
Score	1	2	3	4	5	6	7	8	9
Temperature	Max. BHST < 150˚C			150˚C < Max. BHST < 180˚C -and/or SBM required			BHST > 180˚C		
Score	1	2	3	4	5	6	7	8	9
Long-lead equipment (casing & wellheads)	Standard casing and wellheads specs – same as source well.			Standard casing and wellheads specs – different from source well.			Unusual casing and/or wellhead specs. May require additional effort to assure timely supply.		
Score	1	2	3	4	5	6	7	8	9
Availability of technically suitable relief well rigs	Multiple suitable rigs likely to be operating offshore Australia.			At least one suitable MODU likely to be operating offshore Australia, with			Limited availability of suitable rigs.		

Design Parameter	Complexity Category								
	Low			Medium			High		
				alternative rigs available in the region.					
Score	1	2	3	4	5	6	7	8	9
Hazardous formation fluids (H2S or CO2)	None expected			Expected, but not likely to affect material selection or relief well location.			Expected and may require special safety precautions, well materials, or affect the location of a relief well.		
Score	1	2	3	4	5	6	7	8	9

MODU considerations

The default surface location offset distance of the relief well is 1 km from the flowing well. The Metocean conditions (prevailing wind and currents) are considered when finalising the surface location. The location of the relief well is positioned to ensure the relief well MODU is upwind for as much time as possible to limit potential exposure to hydrocarbons from the LOWC. This places a relief well in water depths between approximately 60 m and 80 m, depending on the target well.

The relief well can be executed using a semi-submersible MODU (moored) similar to that used for drilling the development wells.

Moorings are expected to extend approximately 2 km from the MODU and may therefore extend beyond the distance of the Activity operational area, which may expand by approximately 1-2 km radius under emergency conditions.

MODU mooring and anchor suitability analysis have been completed previously for the Otway Title areas and has concluded that MODU anchors (e.g. 15mT Stevpris Mk6, a commonly available size) or rental anchors of the same or higher performance would be appropriate for Otway locations. At least two anchor handling and tow support (AHTS) vessels would be required to tow the MODU (if not self-propelled) and install the moorings. An active MODU would already be supported by AHTS vessels and hence would likely be accompanied by those vessels during relief well drilling. AHTS vessels could also be sourced from hubs such as NWS and Singapore.

There are typically multiple semi-submersible MODUs capable of drilling such wells within Australian waters. Higher activity is typical in the NWS, though drilling MODU's have also been active in the SE region through much of the period 2017-22.

For planning purposes Amplitude Energy assesses four mobilisation scenarios for sourcing a relief well MODU:

- Regional semi-submersible MODU in Victorian waters.
- Northwest Shelf semi-submersible MODU in West Australian waters.
- International (Asia) semi-submersible MODU in Singapore waters.
- International (Pacific) semi-submersible MODU in New Zealand waters.

The mobilisation case of a relief well semi-submersible MODU from New Zealand has been reviewed and should a suitable MODU be available it would also be considered as part of the relief well planning. Access to MODU in New Zealand would depend on MODU contract commitments at the time and Title holder / Joint Venture and MODU owner willingness to release MODU, and the existence of a valid Australian Vessel Safety Case.

International time case – MODU is mobilised from Singapore

The international case model has been developed to assess mobilising a suitable MODU from outside of Australian waters. This may be due to a number of reasons for example:

- No active working MODU in Australian waters.
- Deficient MODU capabilities to drill and kill the well.
- MODU unable to be released due to restrictions (such as biosecurity, well control event, equipment failure, weather, regulator enforcement etc.).
- Complex scopes to suspend well and demobilise from location i.e. deep-water mooring recovery.

While other suitable MODU options are likely available closer to the relief well site there should not be a requirement to look further than the area of Singapore which continually services the oil and gas and maritime industries.

The base case transit time is the longest of all cases presented. Additionally, the selected MODU should have a current Australian Vessel Safety Case and no restrictions to enter the county.

Mid time case – MODU is mobilised from Northwest Shelf

The mid case model has been developed to assess bringing in a suitable MODU from the Northwest Self (NWS) (location Exmouth). This may be due to a number of reasons for example:

- No active suitable working MODU in local Victorian waters.
- Deficient MODU capabilities to drill and kill the well.
- MODU unable to be released due to restrictions (such as biosecurity, well control event, equipment failure, weather, regulator enforcement etc.).
- Complex scopes to suspend well and demobilise from location i.e. deep-water mooring recovery.

The Exmouth point of departure for the mobilisation is a nominal position in the NWS; a MODU further North in the area would require additional transit time. However, this would not be excessive or warrant a separate RTM estimate.

The NWS is the presently the main activity hub for oil and gas operations in Australia, multiple companies have continuous MODU operations on the NWS. Hence the area is likely to hold multiple options for securing relief well semi-submersible MODU. Additionally, transit time is improved when compared to the base case transit time.

Local time case – MODU is mobilised from Victorian waters

The local case model has been developed to assess a technically capable and locally available semi-submersible MODU in the offshore Victoria area. Transit time is improved for the local case when compared to the base and mid case. A suitable local rig would be the preferred option during a relief well operation but may not be selected for several reasons for example:

- Lack of appropriate MODU capabilities to drill and kill the well.
- RTM favours selection of alternate MODU (Complex scope to suspend well and demobilise from local location, stacked or requirement for hull inspection prior to mobilisation).
- MODU unable to be released due to restrictions (such as well control event, equipment failure, weather, regulator enforcement etc.).
- No MODU available locally during activities.

The Victorian offshore oil and gas sector is serviced sporadically by semi-submersible MODUs with Title holders mobilising more frequently to NWS (Mid case) from Asia. Therefore, should a relief well

MODU be required it will likely be mobilised from either the NWS or Asia. Response Time Model (RTM) estimates have been developed and will continue to be reviewed and updated to reflect the most favourable case mobilisation of relief well MODU to the relief well location.

Relief Well RTMs

Amplitude Energy RTM models contain the same activities and time for well construction, dynamic kill and abandonment of the well. The time model only changes due to mobilisation point of the MODU.

Amplitude Energy has estimated the following timeframes for the total relief well installation and well kill scope (Table 7-8). The series of cases is used to help understand critical activities to undertaking the relief well scope. Amplitude Energy has assessed and selected a number of measures to debottleneck source control contingencies (ALARP assessment in Table 7-20).

Table 7-8: Relief Well RTMs

Response Time Model – Relief Well Drilling & Well Kill		**Intl Case**	**Mid Case**	**Local Case**
MODU Mobilisation Point		Asia - Singapore	Northwest Shelf	Victorian Waters
No.	Activity Description	Estimated Days	Estimated Days	Estimated Days
Source Control Relief Well Activation Phase				
1	Activate Well Control Team, commence planning and notifications	2.0	2.0	2.0
2	Select MODU, inspect and complete contracting work scope	6.0	6.0	6.0
3	Demobilise equipment from MODU	1.0	1.0	1.0
4	Retrieve anchors and commence MODU move preparations	2.0	2.0	2.0
MODU Transit Phase				
5	MODU Transit Phase	47.4	25.7	8.9
Well Construction, Ranging & Intercept, Well Kill Phase				
6	Run anchors and position MODU	2.0	2.0	2.0
7	Mobilise equipment to rig	1.0	1.0	1.0
8	Prepare to Spud	0.5	0.5	0.5
9	Drill 26" x 42” Conductor Hole Section	0.8	0.8	0.8
10	Run and cement 36” Conductor	1.5	1.5	1.5
11	Directionally drill 17-1/2” Surface Hole Section	2.3	2.3	2.3
12	Run and cement 13-3/8” Surface Casing	1.2	1.2	1.2
13	Run and test BOP	2.2	2.2	2.2
14	Directionally drill 12-1/4” Intermediate Hole Section	8.8	8.8	8.8
15	Run and cement 9-5/8” Intermediate Casing	3.7	3.7	3.7
16	Directionally drill 8-1/2” Reservoir Hole Section, ranging runs #1-4	15.4	15.4	15.4
17	Pre-kill preparations	0.5	0.5	0.5
18	Well kill operations, attempt #1	1.5	1.5	1.5
19	Pre-kill preparation	0.5	0.5	0.5
20	Well kill operations, attempt #2, flow stopped	1.5	1.5	1.5

Response Time Model – Relief Well Drilling & Well Kill		Intl Case	Mid Case	Local Case
Time to Complete Well Kill (days)		101.7	80.0	63.2
Relief Well Abandonment Phase				
21	Plug and abandon Well	4.5	4.5	4.5
22	Pull BOPs	1.2	1.2	1.2
23	Remove wellhead	0.8	0.8	0.8
24	Retrieve anchors and release MODU	2.0	2.0	2.0
Total Relief Well Duration (Days)		110.2	88.5	71.7

Regulatory Approval Timing Considerations

Planning for relief well drilling will occur in parallel to other tertiary well control responses. A key component of the relief well drilling will be the preparation, submission, and approval of the regulatory documents. Generally, for well operations the regulatory and risk management processes fall on critical path hence in an emergency these documents will require a high level of focus immediately to ensure they are in place prior to arrival of the MODU.

The following documents will require consideration:

- Vessel Safety Case (VSC):
  - The selected MODU is expected to have a valid VSC, and it is not expected to affect response times.
- Scope of Validation (SoV):
  - Any proposed significant change to an offshore facility (i.e. MODU or Vessel) will require a SoV to be proposed to NOPSEMA and agreed prior to submission of a SCR. Depending on the level of changes the time to complete and gain approval could possibly affect the response time to have regulatory documentation in place prior to start of relief well operations.
- Safety Case Revision (SCR):
  - The SCR will require preparation, submission and approval prior to operations and is expected to be on critical path for relief well activities (Table 7-9).
- Well Operations Management Plan (WOMP):
  - The in force WOMP is expected to be suitable for relief well drilling and not expected to require a revision and resubmitted.
- Environmental Plan (EP):
  - The EP is designed to provide for source control response activities. Significant changes may require resubmission subject to initial change assessment, though is not expected to affect overall response time.
- Well Activity Notice (WAN):
  - WAN is not expected to affect response time.

As part of the preparation of the above documentation a number of formal safety assessments will be conducted as part of risk management these include:

- Hazard Identification (HAZID) workshop (identity's risks, assesses hazards and mitigations to control works site hazards with aim to remove major accident events).

- Hazard Operations (HAZOP) workshop (risk assesses the operational sequence and place controls to reduce hazards to ALARP).
- Risk Assessments for safety critical equipment (Vessel Equipment, BOP, Mooring, Fluids Handling).

Table 7-9: Safety Case Revision Preparation and Approval Time

No.	Safety Case Revision Submission Key Steps (Standard MODU)	Time Estimate (Days)
1	Planning, regulatory consultation, HAZID/HAZOP Workshops, document preparation	**2 weeks**
2	Internal review cycle and submit	**1 week**
3	Priority Regulatory Assessment Period	**1 week**
Total time		**4 weeks (28 day)**

Response Arrangements

Amplitude Energy maintains contracts/agreements with specialist resources to supply well control expertise and support for drilling a relief well. This includes:

- Well engineering support services such as ADD Energy, AZTECH Well Construction, Airswift, Access Human Talent and Wild Well Control.
- Technical writing and risk engineering services to support regulatory documentation workflows and submissions is provided by experienced specialists such as ADD Energy.
- Wild Well Control: Well control specialists with experience in relief wells and the coordination of installation activities.
- Wellhead and casing materials supplier.

Amplitude Energy is party to the Industry Memorandum of Understanding to share drilling rigs, equipment and resources (well site services) in the event of an emergency. The MoU provides for the timely transfer of third-party contractual arrangements involved in the release of a MODU and well site services to the Titleholder for relief well drilling.

Equipment and materials needed to construct a relief well will be able to be sourced either directly from suppliers or through the industry APPEA Mutual Aid MoU.

All equipment and materials are tracked and identified prior to the commencement of the offshore activity through the “relief well readiness form” process (refer to OPEP Section 6.2: Source Control Resource Availability). All equipment and materials are expected to be sourced and transported to site during the SCR approval RTM, MODU transit and anchoring phase for the base and mid case response time model estimates. For the local MODU mobilisation case; an operational MODU would also have equipment and services, with additional equipment and services available via APPEA MoU.

Amplitude Energy will conduct a “relief well readiness check” and engage Title holders to ascertain and confirm the level of critical equipment inventories during the operational period for the purpose of drilling a relief well.

MODU activity outlook and monitoring

Amplitude Energy keeps a watching brief on vessel availability through industry forums and vessel broker updates and is also a participant of the Australian Drilling Industry Steering Committee (DISC). Through DISC, Amplitude Energy receives regular updates on the location and operational status of

MODU's operating in Australian waters, which could be made available for a source control response.

7.2.3 Cause of Aspect

The activities associated with source control that have the potential to impact marine environment are identified in Table 7-10 and described in subsections below.

Table 7-10: Source Control Activities that may Impact the Environment

Aspect / Phase	Activity component
Site survey and debris clearance	ROV operations
	Vessel operations
Subsea Dispersant	Subsea dispersant application
Well capping	Vessel operations
Relief well	Drilling operations
	MODU and vessel operations

The potential impacts and risks associated with vessel, MODU and ROV operations, including their presence within the field and operational discharges and emissions, are not expected to be similar to the impacts and risks already provided for vessel, MODU and ROV operations for the Activity within Section 6.0 of this EP. As such, these impacts have not been evaluated further within this section.

The potential impacts and risks associated with subsea dispersant application that may be used for a LOWC source control (if identified as a recommended response during the operational NEBA) has been identified as the strategy that may introduce impacts and risks that have not previously been assessed within this EP.

7.2.4 Aspect Characterisation

As per Table 7-1, subsea dispersant application may be used as a source control strategy in the event of a LOWC. Given the low levels of persistent components of the hydrocarbon, the condensate is expected to weather rapidly, with surface oils spreading rapidly to thin layers, as reflected in predictive modelling, and are not suited to dispersant application due to potential "punch-through".

The source control strategy has been maintained as a possible viable application specifically for safety purposes (safe access to the well for capping). Due to potential sensitivities of some species to chemical dispersant, the dispersant will only be applied when the NEBA decision-making process has determined that its application will have a net environmental benefit, directed by the Control Agency.

Application of the subsea dispersant will be undertaken using a subsea dispersant wand attached to ROV so the dispersant can be applied directly to the well site.

See the regional Offshore Victoria OPEP (VIC-ER-EMP-0001) for further details for each technique.

7.2.5 Predicted Environmental Impact and Risks

The potential impacts associated with subsea dispersant application are:

- change in water quality

Potential risk:

- injury / mortality to marine fauna.

7.2.6 Impact and Risk Evaluation

7.2.6.1 Impact: Change in Water Quality

The application of chemical dispersant can be highly effective in assisting the natural process of biodegradation, minimising the risk of oil impacts to vulnerable coastal receptors, and reducing hazardous volatile organic compounds reaching the surface. However, the application of chemical dispersant will result in a localised reduction in the water quality within the receiving marine environment and may have an additional impact that has not been previously assessed, which are associated with its inherent toxicity.

The decision to use chemical dispersants, as with all response strategies, is governed by the outcomes of a NEBA, as directed by the Control Agency. Any dispersant used would be selected from the AMSA OSCA Register prior to use (AMSA 2024). Criteria for inclusion on the OSCA Register includes a ban on toxic components including benzene, carbon tetrachloride or other chlorinated hydrocarbons, phenols, cresols, caustic alkali, or free mineral acid.

Given the limited area over which dispersant would be used (i.e., the near proximity of the well site), the effects of dilution upon entering the water column, currents, wave action, and turbulence due to the flowing well, the water column is expected to be continually mixing, further diluting the dispersant. As such, changes to water quality are expected to be localised and short-term.

Furthermore, given the extent of the wider EMBAs expected for the two credible spill scenarios, any changes to water quality from the application of chemical dispersant within the restricted well site area is anticipated to be less than the extent of change to water quality that would result from the hydrocarbon spill itself.

Therefore, the predicted level of impact, i.e., the consequence of a change in water quality from an accidental release of hydrocarbon is evaluated as **Level 2**.

7.2.6.2 Risk: Injury / Mortality to Marine Fauna

Inherent Consequence Evaluation

The application of chemical dispersant into the marine environment has the potential to result in injury/mortality to marine species due the potential toxicity effects of the chemical dispersant. In general, the sensitivity of species to chemical dispersants depends on the species type and life-stage, the dispersant type, volume, and exposure duration.

The environmental receptors which may be impacted by elevated dispersant concentrations in the water column include pelagic fish and plankton. Demersal and benthic organisms are less likely to be exposed to high concentrations of dispersant given the buoyancy of dispersants and hydrocarbons from the flowing well relative to seawater; typically, relatively little oil reaches the seabed when compared to oil in the water column (Hook & Lee 2015; IPIECA 2015).

Secondary effects such as oxygen depletion (associated with biodegradation of the product) have the potential to impact marine communities. However, given the shallow water depths, dynamic nature of the environment resulting in continual mixing within the water column and replenishment of oxygen these impacts are considered unlikely.

Analysis of the representative ecotoxicity profiles available on the supplier safety data sheets (SDS) for Dasic Slickgone NS and Dasic Slickgone EW, dispersant types listed on the dispersants register on the OSCA list in Australia (AMSA 2024), indicate they will readily biodegrade and not bioaccumulate

once in the marine environment. These dispersants are much less toxic than early-generation dispersants, with acute toxicity values for Dasic Slickgone NS measured as 2.6 ppm (96h EC50) and Dasic Slickgone EW measured as 22.1 ppm (48h EC50), respectively (AMSA 2024).

A review of oil spill dispersants by Fingas (2008) confirmed that dispersant toxicity is consistently less than the toxicity of dispersed oil. A literature review undertaken in by CSIRO in 2014 discusses several studies that investigate the possible synergistic effects of dispersant and oil (Hook & Lee 2015). Whilst there are various results reported in the literature, recent studies on fish embryos indicate that the combination of oil and dispersant do not add appreciably to toxic response when compared to oil alone (Hook & Lee 2015).

An assessment on the toxic effects of subsea dispersant application of Dasic Slickgone NS was undertaken by AMSA and CSIRO to assess how long dispersant concentrations might exceed safe levels (PNEC) compared to how quickly the water refreshes, using conservative (worst-case) toxicity values from the SDS (AMSA-CSIRO 2016). The study identified that toxic effects were limited to within 160–500 m of the well, with concentrations dropping below concern levels beyond that (AMSA-CSIRO 2016). Toxicity is considered unlikely even near the well due to rapid dilution, water movement, and short exposure durations. Additional natural mixing from well turbulence, wind, and surface conditions further reduces dispersant concentration and exposure time. The study acknowledged that surface application (from vessels) might lead to higher short-term concentrations, but dilution before use and localised application keep potential toxic effects near the source (inside the operational zone) (AMSA-CSIRO 2016).

As such, the potential for toxic effect due to subsea dispersant application are considered to be limited, with impacts following the response operations are not expected given the limited potential for the chemicals bioaccumulate or persist within environmental matrices. The consequence evaluations for the receptors that may be within the immediate vicinity of the subsea dispersant application activities (the operational area) are shown in Table 7-11.

Table 7-11: Consequence Evaluation for Potential Dispersant Exposure – Ecological Receptors – Habitats and Marine Fauna

Impact and Risk Evaluation	
Corals	
Exposure Evaluation	**Consequence Evaluation**
Soft corals may be present within reef and hard substrate areas in the operational area. Dispersant application is a safety measure and will only be applied in the immediate vicinity of the well to lower VOCs around the response activities. Only organisms close to the dispersant application are expected to be exposed to concentrations which might have a toxic effect; these levels of dispersant would be expected to be short-lived with the water column being well mixed and relatively quick refreshment rates due to the dynamic nature of the ocean in the Otway Region.	Given the lack of hard coral reef formations, and the sporadic cover of soft corals in mixed reef communities, toxic impacts are considered to be limited to isolated corals. Consequently, the potential impacts to corals are considered to be Level 2, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value, but not affecting local ecosystem functioning.
Plankton	
Exposure Evaluation	**Consequence Evaluation**
Plankton are likely to be exposed to concentrations of dispersant with the potential for toxic effect in areas where dispersant is applied.	Planktonic organisms could be impacted by dispersant via a number of pathways; studies of impacts to diatoms showed that cell membranes can be damaged, impacting survivability (Hook & Osbourne 2012). Plankton are numerous and widespread; they contain a myriad of species at various life stages and is a key component of the marine food web. Plankton distribution and composition is not uniform and is in a constant state of flux – it is influenced by natural variations in the oceans such as salinity, temperature, nutrient availability and currents. Given the short-term nature of possible exposure to dispersant, and the natural variations to plankton assemblages, recovery of both biomass and diversity would be expected within the days and weeks following the response. Consequently, the potential impacts to plankton are considered to be Level 2, as they could be expected to cause short-term and localised impacts, but not affecting local ecosystem functioning.
Benthic invertebrates	
Exposure Evaluation	**Consequence Evaluation**
Filter-feeding benthic invertebrates such as sponges, bryozoans, abalone and hydroids may be exposed dispersants, however, only within a very localised area and for a short time frame. In-water invertebrates of value have been identified to	Acute or chronic exposure through contact and/or ingestion can result in toxic impact, effecting survivability. However, given the limited extent of dispersant application, and short-term nature of response activities (which might require

include squid, crustaceans (rock lobster, crabs) and molluscs (scallops, abalone); all may be present within the operational area. Several commercial fisheries for marine invertebrates are within the area predicted to be exposed above the impact threshold (see commercial fisheries and recreational fisheries).	dispersant application), impacts would be limited to low numbers, and are unlikely to appreciably affect overall recruitment rates across the region Consequently, the potential impacts to marine invertebrate are considered to be Level 2, as they could be expected to cause short-term and localised impacts, but not affecting local ecosystem functioning.
Fish and Sharks	
Exposure Evaluation	**Consequence Evaluation**
Many species of fish, shark and syngnathids occur in the region and may occur within operational area; the species which may be present occupy pelagic and demersal environments. Fish, sharks and syngnathids therefore have the potential to be exposed to elevated concentrations of dispersant during response operations. There are no BIAs or Habitat Critical areas identified for EPBC Act listed fish within the operational area.	Pelagic free-swimming fish, sharks are unlikely to suffer long-term damage from dispersant exposure given dispersant use would be targeted and limited to response operations around the well. Syngnathids are less likely to be exposed to toxic levels of dispersant given they occupy demersal habitats, where elevated levels of dispersant are more likely in the upper water column. Elevated concentrations of dispersant in the near vicinity of the discharge could result in acute toxicity to marine biota such as juvenile fish, larvae, and planktonic organisms, although impacts are not expected cause population-level impacts. There is the potential for localised and short-term impacts to fish communities; the consequences are ranked as Level 2. Impacts on eggs and larvae are not expected to be significant given the temporary period of water quality impairment, and the limited areal extent of dispersant application relative to the abundance and natural variability recruitment within a given region. Impact is assessed as temporary and localised and are considered Level 2.
Marine Reptiles	
Exposure Evaluation	**Consequence Evaluation**
Marine turtle may occur within the operational area. However, there are no BIAs or habitat critical to the survival of the species within the operational area.	Impacts to marine turtles are not expected in relation to exposure to dispersant; the transient nature of marine turtles in the region limits their potential to be exposed to dispersant; as dispersants such as Dasic Slickgone are also not expected to persist or accumulate up the food chain (Irving & Lee 2015). Any consequences (e.g. behavioural change) would be temporary and localised, which are ranked as Level 1.
Marine Mammals	
Exposure Evaluation	**Consequence Evaluation**

Several threatened, migratory and/or listed cetacean species have the potential to occur in the operational area. The operational area also overlaps BIAs for a few cetacean species, including: • Pygmy blue whale foraging (annual high use area) • Southern right whale migration Two species of pinniped may occur in the vicinity of response activities; such as the Australian and New Zealand fur seal. There are no BIAs or biologically important behaviours for pinnipeds within the operational area.	Impacts to marine mammals are not expected in relation to exposure to dispersant; the transient nature of marine mammals in the region limits their potential to be exposed to dispersant; dispersants such as Dasic Slickgone are also not expected to persist or accumulate up the food chain (Irving & Lee 2015; AMSA 2024). In their review of dispersant impacts, Hook & Lee (2015) noted they did not review of the effects on marine mammals given dispersant use is accepted as providing a net benefit by reducing the probability of their exposure to surface oil slicks. Any consequences (e.g. behavioural change) would be temporary and localised, which are ranked as Level 1.

Inherent Likelihood

As discussed in Section 6.8, LOWC events, and the subsequent potential requirement for dispersant application, are historically infrequent events. Therefore, additional environmental factors would be necessary for the worst-case consequences to habitats and marine fauna to eventuate.

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of the application of dispersant causing **Level 2** consequences to habitats and marine fauna is considered **Unlikely (D).**

Inherent Risk Severity

The inherent risk severity of a dispersant application causing impacts to habitats and marine fauna is considered **Low**. Table 7-12 lists the inherent risk severity for each receptor type.

Table 7-12: Inherent Risk Severity – Dispersant Application – Social Receptors – Human Systems

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Coral	2	D	Low
Plankton	2	D	Low
Invertebrates	2	D	Low
Fish and Sharks	2	D	Low
Marine Reptiles	1	D	Low
Marine Mammals	1	D	Low

7.2.6.3 Risk: Change to the Functions, Interests, or Activities of Other Users

Inherent Consequence Evaluation

Other marine users, such as commercial fisheries and recreational users, which are active within the region have the potential to be impacted by the application of chemical dispersants into the marine environment. The physical displacement of commercial fishers from the area due to the establishment of exclusion zones during the spill response has the potential to cause a negative economic impact. However, any exclusion zone that will be established for the application of chemical dispersant will ultimately be spatially smaller than the extent of the hydrocarbon spill itself.

Toxicity exposure may result in a reduction in commercially targeted marine species (i.e. juvenile fish, larvae and invertebrate species), subsequently resulting in impacts to commercial fishing productivity. Given that embryos, larvae and juvenile fish are the most sensitive to toxicity, there is a particular risk if the timing of a spill and its response (subsea dispersant application), overlaps with the timing of a species reproduction event (i.e. a spawning event). This could lead to some component, or all of a year class of commercially targeted marine species (i.e. fish and invertebrate species) to be impacted.

The consequence evaluations for the receptors that may be within the immediate vicinity of the subsea dispersant application activities (the operational area) are shown in Table 7-13.

Table 7-13: Consequence Evaluation for Dispersant Application – Social Receptors – Human Systems

Impact and Risk Evaluation	
Commercial Fisheries	
Exposure Evaluation	**Consequence Evaluation**
Several commercial fisheries overlap the operational area, including the management areas for 6 Commonwealth-managed fisheries and 7 State-managed fisheries. The application of dispersant may impact the fisheries which target pelagic species within the water column. The fisheries which target demersal species are less likely to experience exposure, whilst some dispersant may reach the seabed, concentrations of dispersant are likely to be diluted below toxicity thresholds. The operational area covers only a small fraction of the potential fishing grounds for all species; similarly, only a small fraction of catch has the potential to be affected (see Figure 4-25 to Figure 4-32).	Any acute impacts are expected to be limited to small numbers of juvenile fish, larvae, and planktonic organisms, which are not expected to affect population viability or recruitment. Impacts from entrained exposure are unlikely to manifest at a fish population viability level. The consequence to commercial and recreational fisheries is assessed as temporary and localised, and ranked as Level 1. Refer also to: • Fish and sharks • Invertebrates.
Recreation and Tourism	
Exposure Evaluation	**Consequence Evaluation**
Recreation and tourism is also linked to the presence of marine fauna (e.g. whales), particular habitats and locations for recreational fishing.	Any impact to receptors that provide nature-based tourism features (e.g. whales) may cause a subsequent negative impact to recreation and tourism activities. However, the relatively short duration, and distance from shore means there may be temporary and localised consequences, which are ranked as Level 1. Refer also to: • Fish and Sharks • Marine mammals • Invertebrates.

Inherent Likelihood

As discussed in Section 6.8, LOWC events, and thus, the subsequent potential requirement for dispersant application, are historically infrequent events. Therefore, additional environmental factors would be necessary for the worst-case consequences to human systems to eventuate.

Due to the nature of this activity, the multiple control measures that will be in place, and based on previous occurrences, the impact is considered conceivable and could occur, however, it would require a rare combination of factors. Therefore, the inherent likelihood of the application of dispersant causing Level 2 consequences to human systems is considered **Unlikely (D).**

Inherent Risk Severity

The inherent risk severity of a dispersant application causing impacts to human systems is considered Low. Table 7-14 lists the inherent risk severity for each receptor type.

Table 7-14: Inherent Risk Severity – Dispersant Application – Social Receptors – Human Systems

Receptor	Inherent Consequence Level	Inherent Likelihood Level	Inherent Risk Severity
Commercial Fisheries	1	D	Low
Recreation and Tourism	1	D	Low

7.3 Monitor and Evaluate

7.3.1 Cause of Aspect

The activities associated with monitor and evaluate that have the potential to impact marine environment are identified in Table 7-15 and described in subsections below.

Table 7-15: Monitor and Evaluate Activities that may Impact the Environment

Aspect / Phase	Activity component
Monitor and Evaluate	Vessel operations
	Aircraft operations

7.3.2 Aspect Characterisation

Several methods can be used for monitor and evaluate, including:

- vessel and aerial observations
- satellite tracking drifter buoys
- Oil Spill Trajectory Modelling (OSTM).
- weathering predictions
- vector analysis.

See the regional Offshore Victoria OPEP (VIC-ER-EMP-0001) for further details for each technique.

7.3.3 Predicted Environmental Impact and Risks

The potential impacts of vessel and aircraft operations include:

- change in fauna behaviour
- injury / mortality to marine fauna.

The techniques for monitor and evaluate response are not expected to create any additional impacts on the environment that have not already been assessed within Section 6.0 of this EP for helicopter and vessel activities that will be undertaken during the Activity.

Due to the nature and scale of these activities, the evaluation undertaken in Section 6.0 is considered appropriate for any aerial or marine surveillance that will be required for monitor and evaluate spill response activities. Thus, these impacts have not been considered further.

7.4 Protection and Deflection

7.4.1 Cause of Aspect

The activities associated with shoreline assessment and clean-up that have the potential to impact marine environment are identified in Table 7-16 and described in subsections below.

Table 7-16: Protection and Deflection Activities that may Impact the Environment

Aspect / Phase	Activity component
Protection and Deflection	Shoreline access – personnel and equipment
	Boom deployment

7.4.2 Aspect Characterisation

In the event of a spill incident with a risk to shoreline receptors, protection and deflection techniques may be implemented to identified shoreline 'protection priorities' typically located in sensitive and accessible locations.

Shoreline protection and deflection strategies include:

- Nearshore boom deployment to deflect hydrocarbons to other areas for recovery or towards an area where there will be reduced impact (compared to more sensitive sites).
- Skimming operations to recover any collected free-floating hydrocarbons.
- Sand berms (i.e. ridge of sand) can also be created across inlet openings to form a physical barrier to separate hydrocarbons from sensitive resources.

Booming and skimming operations are dependent on current, wave and wind conditions.

See the regional Offshore Victoria OPEP (VIC-ER-EMP-0001) for further details for each technique.

7.4.3 Predicted Environmental Impact and Risks

The techniques for protection and deflection will predominantly not create any additional impacts on the environment that have not already been assessed within Section 6.0 of this EP for vessel operations that will be undertaken during The Activity.

The anchoring/attachment of the nearshore boom within the nearshore water and on the shoreline, including shoreline response workers deployed to the shorelines may have an additional impact that has not been previously assessed.

The potential impacts of these activities are:

- change in habitat
- change to the functions, interests, or activities of other marine users.

7.4.4 Impact and Risk Evaluation

7.4.4.1 Risk Event: Change in Habitat

Inherent Consequence Evaluation

Shoreline response activities, such as techniques that used during protection and deflection, have the potential to impact shallow coastal areas or benthic habitats where sensitive habitats and aggregations of wildlife may be present.

The potential impacts vary, depending on the method used and the nearshore and / or shoreline habitat. A loss of vegetation may occur where equipment cannot be mobilised using existing tracks. The use of vessels and the anchoring of nearshore booms within nearshore environments has the potential to disturb sensitive near-shore estuarine habitats, such seagrass and mangrove and shoreline habitats, such as sandy beaches.

Based upon the nature of the spill events associated with this EP, and the limited area of shoreline that would likely be exposed to hydrocarbons above impact / response thresholds, impacts are likely to be highly localised around the response infrastructure. These impacts would likely result in localised medium-term impacts to species or habitats with recover over months to a year.

As such, the consequence has been ranked as a **Level 3**.

Inherent Likelihood

Given the low likelihood of a spill event occurring, and modelling scenarios which indicate shoreline exposure has a relatively low probability of occurring, this consequence is considered to have a **Remote (E)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low.**

7.4.4.2 Risk: Change to Functions, Interests, or Activities of Other Marine Users

Inherent Consequence Evaluation

Shoreline response activities, such as strategies that used during protection and deflection, have the potential to cause in temporary beach closures impacting other marine users within the area. Recreational activities (such as swimming, walking, fishing, boating) in affected areas will be excluded until access is again granted by local authorities or until spill operations cease. Closure of a certain area or attraction, resulting in economic losses to the business are likely to eventuate.

As described in Section 6.8, MDO and condensate are both light non-persistent hydrocarbons, which weather rapidly. Therefore, clean-up operations are expected to take days to weeks following source control incident. As such, these impacts would likely result in localised short term impacts social receptors. As such the consequence has been ranked as a **Level 2**.

Inherent Likelihood

Given the low likelihood of the spill events occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.5 Shoreline Assessment and Clean-up

7.5.1 Cause of Aspect

The activities associated with shoreline assessment and clean-up that have the potential to impact marine environment are identified in Table 7-17 and described in subsections below.

Table 7-17: Shoreline Assessment and Clean-up Activities that may Impact the Environment

Aspect / Phase	Activity component
Shoreline Assessment and Clean-up	Shoreline access – personnel and equipment
	Shoreline clean-up
	Waste collection and disposal

7.5.2 Aspect Characterisation

Shoreline clean-up involves monitoring shorelines and/or the removal of hydrocarbons that have accumulated on the shorelines. In general shoreline clean-up tactics include:

- shoreline assessment
- shoreline clean-up:
  - manual removal (i.e., use of shovels, rakes, sieves)
  - mechanical clean-up (i.e. use of machinery
  - vacuum systems
  - low and high pressure washing / flushing
  - surf washing
  - sorbents.

See the regional Offshore Victoria OPEP (VIC-ER-EMP-0001) for further details for each technique.

7.5.3 Predicted Environmental Impact and Risks

The potential impacts of these activities are:

- change in habitat
- change in fauna behaviours
- change to the functions, interests, or activities of other marine users.

7.5.4 Impact and Risk Evaluation

7.5.4.1 Risk: Change to Habitats

Inherent Consequence Evaluation

The potential impacts of shoreline response activities will vary, depending on the nature and scale of the spill incident, the method used, and the nearshore/shoreline habitat impacted.

As condensate and MDO are both light, non-persistent hydrocarbons, they will weather rapidly once released to the marine environment. Only a small fraction comprising persistent residuals will remain. Under low energy conditions, the residual components may form a thin liquid sheer on the coast and may persist in the environment; this may allow them to be physically removed.

The shorelines within the EMBA, particularly those close to the activity location and at higher probability of exposure, are predominantly rocky shore platforms backed by sheer rocky cliffs interspersed with sandy beaches. Rock platforms and cliffs/headlands are low sensitivity habitats and often inaccessible. Natural recovery methods are most effective, safe and feasible for these habitat types. For exposed rocky shores or exposed wave-cut platforms any oil residue deposited is rapidly removed from exposed faces and clean-up is usually not required (NOAA, 2013). Shoreline clean-up typically is only considered for sandy beaches that may be affected by hydrocarbon residues. As with all spill response activities, this strategy will only occur if a net benefit has been established via the completion of a NEBA.

Based upon the low viscosity, it is possible that MDO and condensate will infiltrate porous shorelines (such as sandy beaches) where it washes onshore rapidly and has not significantly weathered. Consequently, mechanical recovery may be required upon completion of a NEBA, which may result in the excavation of shorelines. If not done correctly, any excavation of hydrocarbon contaminated materials along the coast could exacerbate beach erosion to a point where its recovery longer term recovery.

Based upon the potential for localised medium-term impacts to shoreline habitats, the consequence has been ranked as **Level 3**.

Inherent Likelihood

Given the low likelihood of the spill events occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a **Remote (E)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.5.4.2 Risk: Change in Fauna Behaviours

Inherent Consequence Evaluation

The use and movement of vehicles, equipment and personnel during shoreline response activities can directly disturb marine fauna including important or sensitive habitats, such as nests of turtles and birds and bird roosting areas. Shoreline clean-up may require strategies which physically remove of substrates, or cause erosion by responder access, could directly impact marine fauna and their habitats. Furthermore, the noise disturbance created by shoreline clean-up activities could potentially disturb the feeding, breeding, nesting or resting activities of resident and migratory fauna species that may be present (such as shorebirds and seabirds).

On the basis that these disturbances could cause medium term impacts to local populations of shorebirds and seabirds, the consequence has been ranked as **Level 3**.

Inherent Likelihood

Given the low likelihood of the spill events occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low.**

7.5.4.3 Risk: Change to the Functions, Interests, or Activities of Other Marine Users.

Inherent Consequence Evaluation

The presence of hydrocarbons on shorelines, and the associated clean-up operations, depending on location, may lead to temporary beach closures. Any recreational activities present in affected areas (such as swimming, walking, fishing, boating) will be excluded until access is again granted by local authorities.

Closure of a certain area or attraction, resulting in economic losses to the business are likely to eventuate. The shorelines within the EMBA, particularly those close to the activity location and at higher probability of exposure, are predominantly isolated, unpopulated, and remote rocky shore platforms backed by sheer rocky cliffs.

The presence of shoreline clean-up operations along a shoreline has the potential to reduce the visual amenity of known heritage sites along the coastline, subsequently potentially impacting the value of the site to First Nations people.

As described in Section 6.8, MDO and condensate are both light non-persistent hydrocarbons, which weather rapidly. As such, these impacts would likely result in localised short term impacts social receptors. As such the consequence has been ranked as a **Level 2**.

Inherent Likelihood

Given the low likelihood of the spill events occurring, and modelling scenarios which indicate shoreline exposure has a low probability of occurring, this consequence is considered to have a **Hypothetical (F)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.6 Oiled Wildlife Response

7.6.1 Cause of Aspect

The activities associated with oiled wildlife (OWR) have the potential to impact marine environment are identified in Table 7-18 and described in subsections below.

Table 7-18: Oiled Wildlife Response Activities that may Impact the Environment

Aspect / Phase	Activity component
Oiled Wildlife Response	Secondary OWR activities (disturbance)
	Tertiary OWR activity (handling / treatment)

7.6.2 Aspect Characterisation

OWR has the potential to cause impacts to marine fauna. Activities associated with the response that can cause impacts to marine fauna include:

- primary response:

  - Spill response strategies to prevent exposure of hydrocarbons to wildlife.
- secondary response:
  - Hazing (i.e., deterrence of wildlife away from the hydrocarbon spill).
  - Pre-emptive capture (i.e., isolation and / or capture and relocation of wildlife away from contaminated areas to unaffected areas).
- Tertiary response:
  - capturing
  - cleaning
  - rehabilitation
  - transportation
  - stabilisation for release.

See the regional Offshore Victoria OPEP (VIC-ER-EMP-0001) for further details for each technique.

7.6.3 Predicted Environmental Impact and Risks

The potential risk associated with oiled wildlife response are:

- disturbance / injury / mortality to marine fauna.

7.6.4 Impact and Risk Evaluation

7.6.4.1 Risk: Disturbance / Injury / Mortality to Marine Fauna

Inherent Consequence Evaluation

OWR activities have the potential to disrupt marine fauna.

Activities such as hazing involves the use of visual, auditory or sensory deterrents to keep healthy marine fauna away from the hydrocarbon spill. This can lead to disturbance of marine fauna away from known congregation, resting, feeding, breeding or nesting areas which may have a short- or long-term impact on the survival of that group if cannot access preferred resources. This can lead to disturbance of marine fauna, such as the separation of groups or adults/juveniles, collisions with marine fauna, inadvertent movement of animals into the oiled area, or scattering of oiled animals

Pre-emptive capture involves the capture and relocation of marine fauna before they become oiled. Potential impacts include relocation to inappropriate areas that will not support the animal's requirements (e.g. habitat, food sources).

Inappropriate capturing and incorrect handling of marine fauna by untrained personnel may cause distress, injury and death to the individual. To prevent this, only State Control Agency authorised oiled wildlife responders will approach and handle fauna. This will eliminate any handling impacts to fauna from untrained personnel and reduce the potential for distress, injury or death of a species.

Due to the potential for localised short-term impacts to species / habitats of recognised conservation value but not affecting local ecosystem functioning, the potential impacts form this activity have been identified as **Level 2**.

Inherent Likelihood

Given the low likelihood of a spill event occurring, and modelling scenarios which indicate shoreline exposure has a relatively low probability of occurring, this consequence is considered to have a **Remote (E)** likelihood of occurring.

Inherent Risk Severity

The inherent risk severity for this event is ranked as **Low**.

7.7 Control Measures, ALARP, and Acceptability Assessment

Table 7-19 provides a summary of the control measures and ALARP and acceptability assessment relevant to spill response strategies.

Additional source control ALARP considerations are included in Table 7-19.

Table 7-19: Spill Response ALARP, Control Measures and Acceptability Assessment

Spill response strategies	
ALARP Decision Context and Justification	ALARP Decision Context: Type A The spill response measures described in this plan are standard practice for marine oil spills. There is a good understanding of potential impacts and risks from the response techniques, and the control measures required to manage them. There is little uncertainty associated with the potential environmental impacts and risks, evaluated as Level 3 due to the small disturbance footprint expected with the response techniques. No objections or concerns were raised during consultation regarding this activity or its potential impacts and risks. As such, Amplitude Energy considers ALARP Decision Context A should apply.
Control Measure	Source and Description of Control
CM10: Amplitude Energy Offshore Chemical Assessment Procedure	All planned chemical discharges shall be assessed and deemed acceptable before discharge, in accordance with Amplitude Energy's Offshore Environment Chemical Assessment Process.
CM24: SCERP	Source control capability is maintained in accordance with the SCERP. Source control response activities will be implemented in accordance with the SCERP.
CM25: OPEP	Emergency spill response capability is maintained in accordance with the OPEP. Emergency response activities will be implemented in accordance with the OPEP.
CM26: OSMP	Operational and scientific monitoring will be implemented in accordance with the OSMP.
Impact and Risk Summary	
Residual Impact Consequence	N/A
Residual Risk Consequence	Level 2 - Localised short-term impacts to species or habitats of recognised conservation value not affecting local ecosystem function; remedial, recovery work to land, or water systems over days/weeks.
Likelihood	The likelihood of LOWC event requiring source control response such as dispersant application is determined to be Unlikely (D) (Section 6.8). As

	such, the likelihood of impacts from response activities have been assessed as: • Unlikely (D) - A rare combination of factors would be required for an occurrence. Conceivable and could occur at some time. Could occur during the activity.
Residual Risk	Low
Demonstration of Acceptability	
Principles of ESD	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity. The activities do not have the potential to result in serious or irreversible environmental damage. Consequently, no further evaluation against the principles of ESD is required.
Legislative and Conventions	Legislation and other requirements considered as relevant control measures include: • OPGGS Act • EPBC Act 1999 and EPBC Regulations 2000 • Emergency Management Act 2013 (Victoria) • Wildlife Act 1975 (Victoria) • NOPSEMA/AMSA Australian Dispersant Selection Process Explanatory Note. If required for response activities - Amplitude Energy anticipates using dispersants listed on the National Plan OSCA register. • NOPSEMA Oil Pollution Risk Management Paper, including the following guidance: – During the planning phase consider characterisation of hydrocarbons and dispersant efficacy testing. For this Activity hydrocarbons properties are predicted to be primarily gas with a small proportion of condensate on the basis of hydrocarbons produced from the same formations in the same region. Several dispersants available on the OSCA register are identified as possibly effective on light oils. Dispersant use is a safety control measure only (to reduce VOCs at surface). – Demonstration of ALARP response planning, to include controls such as dispersant selection process, application zones and monitoring. For the current campaign - each of these controls are provided for within the performance standards outlined below. – An evaluation of the impacts and risks should be provided and demonstrate that they will be reduced to ALARP and be of an acceptable level. • Oil Spill Response Technical Guidelines: The adopted controls have been guided by the following technical guides: – Wildlife Response Preparedness (IPIECA 2014). – State Maritime Emergencies (non-search and rescue) Subplan (State of Victoria, Department of Transport, 2021). • OPGGS(E)R 2009 – Amplitude Energy Offshore Vic OPEP, OSMP.

Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Incident and Crisis Management (MS10) • Supply Chain and Procurement Management (MS11) • External Affairs & Stakeholder Management (MS05) • Operations Management (MS07)
External Context	Suggestions from State emergency agencies have been adopted unless otherwise discussed and agreed. During consultation on this and other recent environment plans it was confirmed that First Nations peoples should be involved in any spill clean-up response on their Country; and should be contacted to provide advice on cultural matters in the event of a spill encroaching on shorelines. This was reiterated in our webinar, a recording of which is on our website, and re-affirmed during consultation with GLaWAC (Event ID 2025 0828 141512 7349). Amplitude Energy retains contact details of First Nations organisations to be contacted in the event of a spill, noting Traditional Owners may alternatively be engaged by the State Control Agency. This has become standard in our emergency response planning. No concerns have been raised to date during consultation regarding impacts and risks from chemical discharges during planned activities, nor have any stakeholders raised any questions or concerns in relation to the use of dispersants for operational purposes during spill response. As such, Amplitude Energy considers that there is broad acceptance of the impacts associated with the activity.
Demonstration of meeting the defined acceptable levels in the OPP	Impacts and risks associated with the Activity are expected to be below the defined acceptable levels as described in the OPP by meeting the additional acceptability criteria described in Section 5.2.4.3, such as that for oil spill response: • OPP EPOs and EP EPOs are equivalent (refer Appendix 1 - , Table 10-1). • OPP control measures and EP control measures are equivalent (refer Appendix 1 - , Table 10-2). • Consequence, likelihood and residual risk are the same as those defined in the OPP. • No changes to internal or external context as defined in the OPP including no additional objections and claims were raised against this aspect.
Acceptability Outcome	Acceptable Amplitude Energy has determined that impacts and risks related to dispersant application response are acceptable, based on: • The planned management of impacts and risks integrates Amplitude Energy internal requirements, including relevant management system processes. • The activities will be managed in a way that is not inconsistent with the relevant principles of ESD.

	• The proposed controls and impact and risk levels are not inconsistent with national and international standards, laws, and policies including applicable plans for management and conservation advices, and significant impact guidelines for MNES. • No feedback has been received from relevant persons that has informed the values and sensitivities /existing environment, impacts and risks, performance outcomes or mitigation measures To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: • EPO19: No unplanned release of chemicals or hydrocarbons to the marine environment.

Table 7-20: Source Control ALARP Evaluation

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
Risk Avoidance						
Do not undertake activity.	Moderate Risk. Worst Case LOWC.	Deferral / avoidance of other (relatively minor impacts and risks associated with the activity).	No. As operator and Titleholder there is an obligation to develop resources within that Title in accordance with the Act and work programs.	Infrastructure for future gas resources not developed. Increased pressure on east coast domestic gas supply.	Meeting east coast gas demand would require other means of gas supply and development elsewhere.	Reject Rationale: Amplitude Energy has an obligation to develop reserves from the Title Areas under their operation. Amplitude Energy has a track record of safely developing and operating gas developments in the region.
Response Preparedness						
Build or purchase Capping Stack and (pre-position) have on Standby.	As above.	May allow for reduction in response time model by approx. 19 days where combined with standby vessel (Table 7-6 – time required to mobilise rental capping stack additional to other RTM elements) Risks may be reduced from Moderate to Minor.	No. Not typical in the offshore industry in Australia. Typically, where confirmed as a feasible option, operators sign up to a capping stack accessible from overseas. Stacks are strategically placed around the globe to enable rapid deployment to other regions.	$2 - $20MM. Build times likely to be 1-2 years. ($2MM is to build a category 1 cap with capability to plug and kill the well but limited or no intervention capability), cost increases with complexity including ability to intervene post capping to estimated $20MM.	No significant introduced risks.	Reject Rationale: Provides no additional benefit over the capping provisions integrated into the project. Provides small reduction in time to cap compared to utilising industry capping solution but at significant additional cost and resource burden. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
			Capping unlikely to be feasible for Otway wells.	Considerable time (1-2yrs) and resources required to commission and fabricate bespoke capping stack for the project and then maintain near to field.		
Maintain Agreement with Capping Stack provider	As above	Mobilisation time is reduced. Note RTM is based on mobilisation times advised by third party provider and hence reflect 'ready to deploy status'. Risks reduced but remain Moderate.	Not typical in the Otway. Capping unlikely to be feasible. Services are available and utilised by multiple operators for suitable projects.	Administrative costs Approx. $500K to sign-up to capping stack in 'ready to deploy status'. This is not proposed for Otway drilling given likely not a feasible option. Capping stack sent by air freight, e.g. from Scotland to Melbourne, loadout to Port of Melbourne (or similar) and sail to site.	No significant introduced risks.	Implement Rationale: Maintains relationship with capping stack provider. Potentially reduction in time to control source though given high initial WCD flow profiles and risks is within the Moderate category. Costs are not grossly disproportionate to the potential environmental risk reduction. Integrated via: OPEP C8 Source Control Emergency Response Equipment
Mobilise capping stack	As above.	Combined with a local capping stack, having a	No. Not typical in the offshore	Estimated > $5MM for the duration of	No significant introduced risks.	Reject

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
vessel to standby in region.		vessel available on standby ready to deploy a stack has the potential to reduce response times by approx. 19 days depending on survey, debris clearance and intervention (operations which would be initiated in the first instance). Risks may be reduced from Moderate to Minor.	industry in Australia. Typically, operators will source vessels as needed either vessel of opportunity or via MoU. Capping unlikely to be feasible for Otway wells.	the campaign plus $2 - $20MM for the capping stack on standby in the region.		Rationale: Any time saving with this option is unlikely to achieve capping before tapering of the high initial WCD flow rate. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.
Relief well MODU, services and equipment on standby in the region.	As above	This option could remove a significant proportion of time associated with the RTM MODU activation phase and transit phase (between 9 and 47 days) depending on options available on the day. Time to drill a relief well remains > 40 days by which time the well flow is predicted to have peaked and shoreline contact	No. Not typical in the offshore industry in Australia. Typically, operators will plan to source vessels as needed either vessel of opportunity or via MoU. Wells complexity assessment shows well can be	Estimated > $50MM for the duration of the campaign. Increased workload on project team to coordinate / maintain through critical planning and execution phases.	Operational environmental impacts and risks and safety risks at standby location. Increase biosecurity risks having MODU on standby.	Reject Rationale: Any time saving with this option would not achieve source control before either intervention/ capping or prevent high initial WCD flow rate and associated shoreline accumulation. The significant costs and planning burden are considered to be grossly disproportionate to the potential environmental risk reduction.

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		occurred (noting intervention and capping attempts to stop flow in the interim). Volume of oil ashore and risks would be reduced but would remain Moderate.	drilled with typical MODU.			
Wait to undertake project at a time when a MODU is drilling in the region and could support a relief well.	As above.	This option could remove a significant proportion of time associated with the RTM MODU activation phase and transit phase (between 9 and 47 days) depending on options available on the day. Time to drill a relief well remains > 40 days by which time the well flow is predicted to have peaked and shoreline contact occurred (unless intervention is successful in the interim). Volume of oil ashore and risks would be	No. Not typical in the offshore industry in Australia. Typically, operators will plan to source MODU as needed e.g. via industry MoU or directly with MODU operators. The well complexity assessment shows well can be drilled with typical MODU.	Committing to only undertaking drilling when a MODU is in the region would severely restrict operational flexibility and would (likely) lead to the exceedance of decommissioning deadlines set in General Direction 824.	Exceedance of deadlines set in General Direction 824.	Reject Rationale: Any time saving with this option would not achieve source control before tapering of the high initial WCD flow rate and associated shoreline accumulation. The significant costs, planning burden and risk to regulatory deadlines are considered to be grossly disproportionate to the potential environmental risk reduction.

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		reduced but would remain Moderate.				
Incorporation of an Emergency shut-in Device, such as a KBOS or equivalent, into the engineering design.	As above	This option provides an additional independently operated barrier and shut-in device that could be operated in the event of a LOWC. If existing primary, secondary, and tertiary well control systems fail (this is unlikely), KBOS or similar system would provide additional redundancy, reducing the likelihood of LOWC incident impacting the shoreline, though would not eliminate the risk, or the need for a suitably resourced source control response.	No. Not typical in the offshore industry in Australia. The option has been considered by a few operators; however, no operator has installed the device within Australian waters.	Engineering / modelling would be required to determine suitability. Additional costs associated with the device. Capex ~7M. Plus additional costs to integrate into the BOP. Additional time to install the device. Lead time to build, deliver and install excessive and not practical within project timeframe.	The additional height and weight of certain Emergency shut-in Devices (~5.5m and ~120MT for MCD) which may require additional tethering to prevent fatigue if possible. Additional units would also be required on the seabed. Additional equipment footprint on seabed (relatively minor) Never before installed with the planned BOP type; this has the potential to introduce compatibility and functionality issues within the existing well control systems.	Reject Rationale: The significant logistical and economic costs are considered to be grossly disproportionate to the potential risk reduction achieved given the multi-level well control strategies that are already being implemented to prevent a loss of well control that reduce risks to ALARP. Installation of an additional closure device adds significant complexity to the BOP system and would not significantly reduce the likelihood of a protracted LOWC.
Pre-drill relief well top holes for the existing and	As above.	Estimated time saving of 2.3 days if section pre-drilled and conductor cemented.	No. Not typical in the offshore industry in Australia.	Estimated at $49MM just to mobilise MODU and drill top hole	Increased SIMOPS Risk, Drilling risks.	Reject Rationale: Any time saving with this option would not achieve source control before tapering of the high

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
development well sites.		Unless combined with a MODU being on standby this option is not considered to provide significant benefit, noting time to move the MODU and drill the remaining well would still exceed the peak well flow period. The is also a real risk that the top-hole location would no longer appropriate or safe depending on the scenario and conditions offshore.		for the relief well. Plus $5MM+ to cut and recover wellheads at the end of campaign. Increased workload on project team to coordinate.	Operational Environmental Impacts and Risks. Safety Risks.	initial WCD flow rate and associated shoreline accumulation. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.
Maintain complete inventory (all materials and consumables) to drill relief well.	As above.	Ensures no equipment or consumables are critical path to drill a relief well. Unlikely to significantly reduce times unless combined with MODU being on standby, noting well site services and equipment are available through the APPEA MoU.	No. Not typical for individual operators to maintain their own inventory to drill a relief well unless undertaking well construction project where they may have spares available	Estimated at > $10MM to purchase + $0.75MM to store and maintain per annum. Increased workload on project team to maintain.	Yard HSEQ risks. Consumable expiry / maintenance.	Reject Rationale: Any time saving with this option would not achieve source control before tapering of the high initial WCD flow rate and associated shoreline accumulation. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		Otway relief well can utilise standard equipment. Slight reduction in risk.	and/or complex wells.			
Long leads: Purchase and maintain inventory of casing to drill relief well.	As above	Ensures these long leads are not critical path to drill a relief well. Unlikely to significantly reduce times unless combined with MODU being on standby, noting well site services and equipment are available through the APPEA MoU. A relief well within the Otway Basin can utilise standard equipment. Slight reduction in risk.	No. Not typical for individual operators to maintain their own inventory to drill a relief well unless undertaking well construction project where they may have spares available and/or complex wells.	Estimated at > $5MM to purchase + $0.5MM to store and maintain per year. Increased workload on project team to maintain.	Yard HSEQ risks.	Reject Rationale: Any time saving with this option would not achieve source control before tapering of the high initial WCD flow rate and associated shoreline accumulation. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.
Long leads: Purchase and maintain wellhead and conductor.	As above	Ensures these long leads are not critical path to drill a relief well. Unlikely to significantly reduce times unless combined with MODU being on standby, noting well site services and equipment are	No. Not typical for individual operators to maintain their own inventory to drill a relief well unless undertaking well construction project where	Estimated at >$2MM to purchase, + 0.1MM to store and maintain per year. Increased workload on project team to maintain.	Yard HSEQ risks.	Reject Rationale: Any time saving with this option would not achieve source control before tapering of the high initial WCD flow rate and associated shoreline accumulation. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		available through the APPEA MoU. Otway relief well can utilise standard equipment. Slight reduction in risk.	they may have spares available and/or complex wells.			
Project vessel or MODU available with ROV and subsea intervention tooling, during well activities.	As above.	ROV available on the project provides the quickest means of implementing this response aspect. Likely to offer quickest response (within hours/days). Supports a shift in risk from Moderate to Minor.	Industry practice is currently to sign up to industry debris clearance package which can be transported to site in approx. 7 days and to source vessel of opportunity.	Typically captured in vessel rates / designed into the Activity.	No additional risk.	Implement. Provides means to immediately progress source control. Potentially significant reduction in time to control the well, may help prevent significant volumes of oil reaching the ocean and shorelines and therefore reduce consequence and overall risk from moderate to minor. Costs are currently integrated into current project design via project vessel and equipment selection and are not grossly disproportionate to the environmental risk reduction. Integrated via: OPEP C8 Source Control Emergency Response Equipment
Access to shared industry subsea intervention toolkit.	As above.	Project equipment does not include complete debris clearance package, dispersant or	Yes, if project equipment is not available.	Approx. $400K for duration of campaign.	No introduced risks	Implement (debris clearance component). Rationale: Debris clearance equipment may be needed to access the well. Costs are not

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		dispersant application equipment. Required to support implementation of OPEP strategies. Reduction of risks if successful though likely to remain in the moderate category overall. Dispersant component unlikely to be required.				grossly disproportionate to the potential environmental risk reduction. Dispersant and associated equipment unlikely to be required. Integrated via: OPEP C8 Source Control Emergency Response Equipment
Industry MoU for Mutual Aid for offshore incident.	As above.	This could provide quickest access to a relief well MODU. Time to make well safe may add approx. 3-days to overall activation timeframe before transit phase. Time to drill a relief well remains > 40 days by which time the well flow is predicted to have peaked and shoreline contact occurred. Risks remain Moderate.	Yes. Industry initiative commonly adopted. Likely to provide the quickest possible timeframe to implement source control response. MoU for Mutual Aid: "To Facilitate the Release and Transfer of Drilling Units and Well-Site Services between Operators in Australian and	Costs upon activation. In accepting a MODU from another operator the recipient is liable for the costs incurred by that operator, which are difficult to quantify but could be significant, nominally $50M to re-instate their drilling campaign.	No introduced risks.	Implement. Rationale: likely to provide the quickest means to drill relief well. Though relief well drilling does not reduce risks below the moderate level, a relief well would reduce overall volumes released and eliminate any legacy issues (e.g. due to recharge). Costs upon activation are not grossly disproportionate to the environmental risk reduction. Integrated via: OPEP C8 Source Control Emergency Response Equipment

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
			Timor-Leste-administered Waters in preparedness for an offshore incident". This includes: a) Drilling Unit; and/or b) to the extent suitable for use in connection with the Offshore Incident, third party contractor personnel, equipment, materials, consumables and other well-site services (including, but not limited to, logistical support, cementing, well intervention and vessel support used in connection with such Drilling Units			

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
			(collectively, "Well-Site Services").			
Monitoring of drilling inventories available including through AEP MoU for the purposes of drilling relief well.	As above.	Verification of available inventory which can be reflected in RTMs to identify and address potential bottlenecks. Slight reduction in risk.	Yes, good practice to verify and to reflect in RTMs.	Administrative effort only.	No additional risk.	Implement. Rationale: identifies potential bottlenecks to relief well drilling prior to and during drilling to then consider alternate arrangements. Though relief well drilling does not reduce risks below the moderate level, a relief well would reduce overall volumes released. Costs of this option are not grossly disproportionate to the environmental risk reduction. Integrated via: OPEP C8 Source Control Emergency Response Equipment OPEP C9 Source Control Response Resources Monitoring.
MODU / Vessel contract tracking and forecasting via Vessel brokerage monthly (during drilling) MODU / vessel updates	As above	Save approximately 1-2 days in identifying suitable/ready MODUs and vessels. Slight reduction in risk.	Yes. Industry initiative commonly adopted.	Minor administrative costs.	No additional risk	Implement. Rationale: maintains awareness of vessels and MODU's capable of supporting a source control response providing a small reduction in overall response times. Costs are not grossly disproportionate to the environmental risk reduction.

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
and/or participation with DISC.						Integrated via: OPEP C9 Source Control Response Resources Monitoring
Source Control Contingency Response Plan developed, tested and utilised in the event of a source control incident.	As above	Clear response plans, allowing basis for managing the source control response to best case timeframes on the day. Risks reduced but remain Moderate.	Yes. Required. APPEA DISC provides content guidelines.	Estimated $100K	No additional risk	Implement. Rationale: Enables source control strategies to be clearly communicated and expedited. Costs are not grossly disproportionate to the environmental risk reduction. Integrated via: C6 Source Control Emergency Response Planning
WOMP which provides for source control activities.	As above	Saves time and personnel resources during a response. Can be completed during the planning phase avoiding significant rework of plans in the event of a source control response. Slight reduction in risk.	Yes	Estimated $100K	No additional risk	Implement. Rationale: Assists in source control strategies being clearly communicated and expedited. Costs are not grossly disproportionate to the environmental risk reduction. Integrated via: C6 Source Control Emergency Response Planning
Amplitude Energy to maintain contracts with well control specialists.	As above	This could save days required to contract required resources. Risks reduced but remain Moderate.	Yes. All operators rely on contractors for ramp-up support.	Estimated $100K	No additional risk	Implement. Rationale: Enables source control strategies to be expedited. Costs are not grossly disproportionate to the environmental risk reduction. Integrated via:

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
						C7 Source Control Emergency Response Personnel
Pre-Mobilisation of Relief Well (Source Control) Personnel prior to drilling.	As above	This could save days required to form the broader source control team. May be of limited benefit considering expertise to commence a response are already available in the project team and ramp up via project and emergency response contractors. Slight reduction in risk.	No. All operators rely on contractors for ramp-up support as needed.	Estimated > $100K/day (> $10MM for the duration of the campaign).	No additional risk	Reject. Rationale: A contingent of source control personnel are obtained though service providers who are also available to support other companies and projects in emergency conditions. Mobilisations can occur quickly, and advice sought remotely in the interim, such that time savings (if any) are likely minimal. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.
Relief Well (Source Control) personnel resourcing plan in place prior to drilling.	As above	Of benefit to identify where resources would be coming from / key contacts and roles. Slight reduction in risk.	Yes	Estimated $20K. Mapped out as part of the SCERP.	No additional risk	Implement. Rationale: Enables source control strategies to be expedited. Costs are not grossly disproportionate to the environmental risk reduction. Integrated via: C7 Source Control Emergency Response Personnel
Pre-identify a quadrant for suitable relief well locations.	As above	Assists in making decision on the area for optimal location for relief well based on weather conditions	Yes	As part of nominal relief well plans.	No additional risk	Implement. Rationale: Enables source control strategies to be expedited. Costs are largely accounted for through

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		and subsea hazards. Risks reduced but remain Moderate.				existing project planning work and are not grossly disproportionate to the environmental risk reduction. Integrated via: C6 Source Control Emergency Response Planning
Nominal mooring analysis for drilling in field from moored MODU.	As above.	Mooring analysis completed for the Otway Field. Additional analysis completed prior to drilling, targeted at the well location. Note: A site survey will be required at the time of LOWC to confirm location position and a new mooring analysis will be completed for the selected rig. Risks reduced but remain Moderate.	Not typical for solely for relief well purposes.	Already available to project. Mooring analysis completed as part of campaign preparations.	No additional risk.	Implement
Pre lay of relief well MODU moorings.	As above	May save 2-3 days, only if laid in correct locations. Locations may change at the time depending on scenario and offshore conditions. Risks	Not typical for solely for relief well purposes.	Estimated > $2.5MM.	Additional impacts to seabed. Additional Risk to other sea users if RW outside existing exclusion zones (fisheries snag risk).	Reject. Rationale: Any time saving with this option would not achieve source control before tapering of the high initial WCD flow rate and associated shoreline accumulation. Significant additional costs and project

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
		reduced but remain Moderate.				planning capacity are considered to be grossly disproportionate to the potential environmental risk reduction.
Pre-accepted safety case revision for possible relief well MODUs and source control vessels.	As above	Time saving and may assist in developing relationship with MODU operator. Multiple variables mean a particular MODU may not be available on the day, hence SCR of no benefit but significant effort and cost. MODU's / vessels for which safety cases were developed may not be available at the time, hence industry has utilised the MoU model which generally allows access to a range of MODUs and well site services. No risk reduction afforded.	No, no known examples of an accepted SCR specifically for a relief well MODU and vessels.	Estimated $500K + Regulator Levies. Increased workload on project team during critical planning and execution phase.	No, no known examples of an accepted SCR specifically for a relief well MODU and vessels.	Reject. Rationale: Any time saving with this option would not achieve source control before tapering of the high initial WCD flow rate and associated shoreline accumulation. MODUs and response vessel availability will change with time; facilities may be unavailable or may not be the most expedient option to support a response at the time one may be needed. There is a significant risk of wasted planning effort where directed at a single facility. There is also a risk of obscuring optimal (most expedient) options to drill a relief well where plans become tailored to a particular option. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
Prepare outline safety case revision for MoU MODU prior to drilling.	As above	Unlikely to accelerate SCR times significantly noting that MODU selection is uncertain until the time of the event. There are pre-exiting safety cases which provide a basis for format. Major part of development of SCR is workforce engagement with the service partners for the scope, which is based on the MODU selected at the time. No risk reduction afforded.	Not typical but at least one example of this recently.	Estimated $100K. Increased workload on project team during critical planning and execution phase.	No additional risk.	Reject. Rationale: Any time saving with this option would not achieve source control before tapering of the high initial WCD flow rate and associated shoreline accumulation. MODUs and response vessel availability will change with time; facilities may be unavailable or may not be the most expedient option to support a response at the time one may be needed. There is a significant risk of wasted planning effort where directed at a single facility. There is also a risk of obscuring optimal (most expedient) options to drill a relief well where plans become tailored to a particular option. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.
Contract in place for Safety Case Expertise to expedite development.	As above	Accelerates preparation times noting personnel familiarity with Titleholder systems, processes and field. Slight reduction in risk.	Yes	No additional burden	No additional risk	Implement. Rationale: Enables source control strategies to be expedited. Costs are not grossly disproportionate to the environmental risk reduction. Integrated via:

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
						C7 Source Control Emergency Response Personnel
In the event a suitable MODU not available through APPEA MoU, prepare mobilisation plan for nominal MODU outside of Australia.	As above	Identifies pathway to bring suitable MODU for relief well drilling into Australia and to the region. Some reduction in risk but remains Moderate.	Good practice as part of relief well planning.	Estimated $100K as part of relief well planning.	No additional risk	Implement. Rationale: Assists in expediting source control strategies. Costs are not grossly disproportionate to the environmental risk reduction. Integrated via: C10 Source Control Response Logistics
Identify pathway for biosecurity clearance of a nominal MODU and vessels from southeast Asia prior to commencing well drilling.	As above.	Time saving (accelerated biosecurity clearance) and reduction in HSEC risk - MODU able to mobilise directly to well site.	Yes, if MODU known.	Estimated $100K	Additional time for project team to maintain MODU/vessels in ready-to go state.	Implement Rationale: Assists in expediting source control strategies. Costs are not grossly disproportionate to the environmental risk reduction. Integrated via: C10 Source Control Response Logistics
Invasive Marine Species (IMS) Risk Assessment (RA) of most suitable relief well MODU prior to drilling	As above.	Assists in identifying IMS actions to be completed during mobilisation. Reduces risk of IMS transfers if mobilised. Only of benefit if MODU is	Standard practice in the prequalification phase.	Estimated $10K.	Additional time for project team to maintain IMS assessment.	Implement. Rationale: Assists in expediting source control strategies. Costs are not grossly disproportionate to the environmental risk reduction. Integrated via:

Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion
(and updated if MODU changes).		known/contracted otherwise of no value.				C10 Source Control Response Logistics

8.0 First Nations Cultural Heritage Values and Sensitivities

This section evaluates the potential for Activity activities to affect cultural heritage and the continuation of cultural practices. In doing so, this section:

- Identifies the potential impacts to environment receptors that are, or are linked to, cultural features of the environment that could be affected by Activity aspects (Section 8.1).
- Summarises the outcomes of the impact and risk assessments (from Section 6.0) for environment receptors that are also cultural features, or are linked to cultural features of the environment, to characterise the relevant Activity aspects (Section 8.2).
- Evaluates to what degree the cultural features of the environment, and their value to first nations cultural practices and heritage, could be degraded considering the nature and scale of impacts / risk to relevant environment receptors (Section 8.3).

Environmental Performance Outcomes (EPO's) have been developed for this Activity that are specific to First Nations peoples cultural heritage (Section 8.4). These EPOs are designed to be equal to or better than the acceptable levels of impact and risk: No impact to underwater cultural heritage

Further, there are measures evaluated and adopted following research, training and consultation, to ensure acceptable levels are not exceeded and that impacts and risks are managed to ALARP.

The section has been written with consideration to N-04750-GN1344 A339814 (NOPSEMA 2024) and First Nations vocabulary: using culturally appropriate language and terminology (APSC 2022), First Nations people's Country Plans[11], Consultation with First Nations peoples, participation in cultural experiences, and training led by Gunditjmara people on Gunditjmara Country.

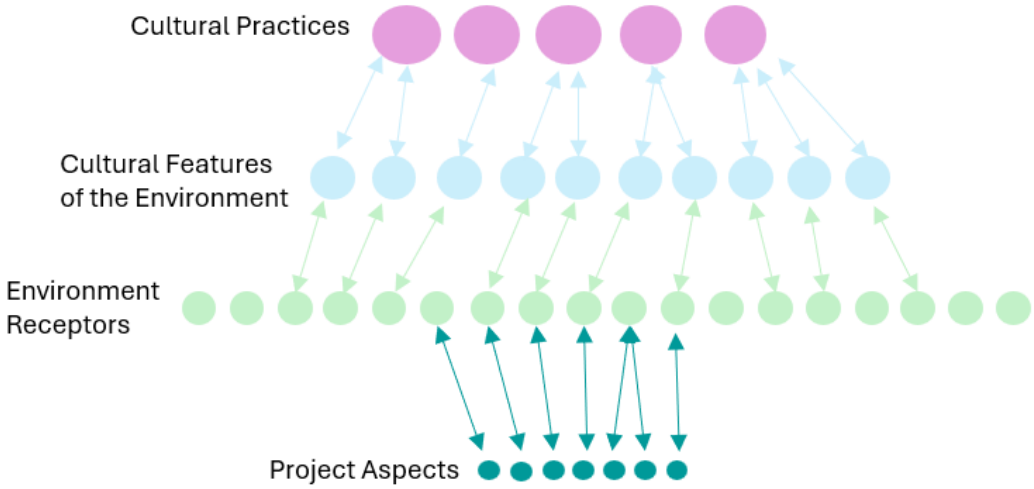


Figure 8-1: Receptors, and links to Cultural Features and Practices

[11] Gunditj Mirring Traditional Owners Aboriginal Corporation 2023; Wadawurrung Traditional Owners Aboriginal Corporation, 2020; Gunaikurnai Whole-of-Country Plan (Gunaikurnai Land and Waters Aboriginal Corporation 2015); Eastern Maar Aboriginal Corporation, 2014.

8.1 Summary of Potential Impacts to Cultural Features

Table 8-1 describes how relevant aspects of the Activity could impact tangible and intangible cultural features. Importantly, this is not a description of predicted impacts, but of the mechanisms by which an Activity aspect could affect a tangible or intangible cultural feature and its value for to First Nations people. Within In this section, environment receptors, that are also cultural features, that were identified through consultation for Amplitude Energy activities in the Otway, including Otway Operations (Otway Offshore Operations Environment Plan) and the Athena Supply Project (Athena Supply Project) as having particular value to First Nations peoples, have been considered. These cultural features include the Bonney upwelling, Deen Maar, eel migration, and whale migration.

Table 8-1: Potential impacts to cultural features

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
Tangible Cultural Heritage			
Coastal/island places and objects	• Victorian coastline • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory and associated flooded Land Bridge • Tyrendarra lava flow	• Accidental Hydrocarbon Release • Spill Response	Shoreline hydrocarbon exposure has the potential to change the cultural heritage value of the site (Section 6.8) if sites are not accessible to First Nations people to be able to practice culture, or if sites are perceived to have been degraded by tainting with hydrocarbons. Section 6.8 identifies there is only low risk of minor local impacts to coastal/islands places and objects from hydrocarbon exposure in the event of unplanned discharge and accidental hydrocarbon release events. Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to, cultural features and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices.
Submerged sites	• Tyrendarra lava flow (Julia reef) • Wilsons Promontory and associated flooded land bridge	Accidental Hydrocarbon Release	Seabed disturbance (Section 6.3) has the potential to change the cultural heritage value of submerged landscapes if that disturbance is widespread and within those landscapes that feature within cultural practices, traditions and customs. There are no potential impacts to the seabed from the activity which have more than a localised footprint (within the operational area), and therefore there will be no landscape scale impacts, or effects on the submerged elements of the Tyrendarra lava flow which is >50 km from the operational area. Table 8-2 identifies there is only low risk of minor local impacts to environment receptors that are linked to submerged sites from hydrocarbon exposure (in the event of unplanned discharge and accidental hydrocarbon release events). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices.

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
Intangible Cultural Heritage			
Sea Country	State and Commonwealth waters, including the Commonwealth marine environment, and habitats and species therein.	All Aspects	First Nations cultural heritage values associated with Sea Country, including culturally significant ecosystems and species, are considered based on their ecological values, food sources, and/or culturally significant totemic values. The First Nations people's values associated with culturally significant marine ecosystems and species have the potential to be disrupted if there are impacts to ecosystem functioning and integrity or species population. Table 8-2 summarises potential impacts and risks to environment receptors that are linked to Sea Country are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), with no impacts at species population levels. The introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response is a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices.
Creation/ Dreaming sites, Songlines, sacred sites and Ancestral beings	• Victorian coastline • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory and associated flooded land bridge • Tyrendarra lava flow • Whales	Multiple Aspects – see Section 8.2	Protection of whales is essential to Gunditjmara spiritual and physical well-being. Section 8.2 summarises potential impacts and risks environmental receptors that are linked to Creation/ Dreaming sites, Songlines, sacred sites and Ancestral beings are mostly limited to localised, short-term and recoverable impacts (Level 1 or 2 consequences). However, the introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response have a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to, cultural features and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions and customs.

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
Cultural obligations to care for Country, Knowledge systems, and Connection to Country	State and Commonwealth waters, including the Commonwealth marine environment, and habitats and species therein.	All Aspects	The potential disruption to the cultural ties to and responsibility to care for Sea Country is linked by potential impacts to the environment and the exclusion of First Nations people from Country or decision-making processes. Potential change to knowledge on cultural heritage values will occur when the value is displaced, depleted or there is significant reduction in population of the value. If the value doesn't exist within the local area of Country, knowledge systems of that value will be disrupted or lost. Limitation on access, for safety reasons, can also affect the ability of First Nations peoples to practice their cultural obligations, traditions and customs, foster knowledge systems, and maintain connection to particular elements of country. Table 8-2 summarises potential impacts and risks to environment receptors that are linked to cultural features. These impacts and risks are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), with no impacts at the population level. The introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response carries a risk of up to Moderate severity for some environmental receptors that are also cultural features, including culturally significant species and places (Deen Maar). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to tangible and intangible cultural features and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, customs and traditions.
Ecosystems and Species			
Culturally significant species and food resources	Food resources (current and historical): • Fish, sharks, rays, eels (Kooyang), shellfish, crustaceans, whales, seals, Seabirds - collection from coastal	Multiple Aspects (see Section 8.2)	Food resources: The potential change to food resources can occur when the resource is depleted (such as a reduction in population of a species) or displaced. The ability for First Nations people to continue to collect marine species (as a food resource) has the potential to change if impacts and risks to the resource species results in a reduction in population or change movements and distribution that lowers their occurrence within Sea Country of a group of First Nations peoples. Connection to Ancestors:

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
	and riverine environments • Plankton (basis of the food chain that provides for culturally significant species) Connection to ancestors: • Whales		Impacts to culturally significant species at a population level has the potential to erode the ability for First Nations people ability to care for culturally significant species, and to continue cultural practices, traditions and customs that involve those species. Table 8-2 summarises potential impacts and risks to environment receptors, that include culturally significant species linked to resources, and those linked to ancestors (and associated obligations to care for those species as part of caring for Sea Country). The levels of impact are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), with no impacts at the population level. The (unplanned) introduction, establishment and spread of IMS and accidental hydrocarbon release have a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices.
Culturally significant species	Plankton associated with the productivity of Bonney Upwelling (Key Ecological Feature)	Multiple Aspects (see Section 8.2)	In relation to the physical occurrence and characteristics of the Bonney Upwelling, Butler et al. (2004) identify climate change as a possible influence on its strength or frequency, though was not of serious concern. Table 6 12 identifies GHG emissions associated with the activity as having a Level 1 Consequence, in the context of being equivalent to a small proportion of national GHG budgets that are linked to NDCs under the Paris agreement to limit the effects of global warming. Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, customs, and traditions.
Water quality	State and Commonwealth waters, including the Commonwealth marine	Multiple Aspects (see Section 8.2)	Impacts to water quality from hydrocarbon exposure (Section 6.8), seabed disturbance (Section 6.3), and discharges (Section 6.2.1 and 6.2.2) result in potential physical/tangible change to cultural heritage value of oceans and waterways.

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
	environment, and habitats and species therein.		Table 8-2 summarises potential impacts and risks to water quality are mostly limited to localised, short-term and recoverable impacts (Level 1 consequences or low risk severity). Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions, and customs.
Nearshore benthic habitats	Seabed in State Waters, including the habitats and species therein.	• Accidental Hydrocarbon Release • Introduction and establishment of IMS	Change to benthic habitats occurring at a widespread level, such as the introduction, establishment and spread of IMS (Section 6.7), has the potential to change the cultural heritage values of benthic ecosystems in coastal environment that provide habitat for culturally significant species, and resources for First Nations people. Table 8-2 summarises potential impacts and risks to benthic habitats from the activity; these are limited to localised and short-term impacts (Level 1 consequence) within the operational area. However, the introduction, establishment and spread of IMS has a risk of up to Moderate severity (Level 4 consequence), with impacts having the potential to extend beyond the operational area. Section 8.3 considers the level of impact and risk to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions, and customs.
Intertidal communities and shorelines	Victorian State waters and shorelines: • Mangroves, macroalgae, seagrass, coastal saltmarsh, rocky and sandy shorelines.	• Accidental Hydrocarbon Release • Introduction and establishment of IMS • Spill Response	Shoreline hydrocarbon exposure (Section 6.8) and spill response activities (Section 7.6 and 7.7) resulting in potential physical/tangible change to cultural heritage value of intertidal communities and shorelines. Table 8-2 summarises potential impacts and risks to intertidal communities and shorelines are mostly limited to localised and short-term impacts (Level 1 consequence). However, the introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response is a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)).

Cultural features	Receptors relevant to the Activity	What Activity Aspects could interact with these receptors?	How could cultural features be impacted by Activity Aspects
			Section 8.3considers the level of impacts and risks to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions, and customs.
Marine Park/ coastal reserves / wetlands	Wilsons Promontory, Ninety Mile Beach, Marengo Reef	• Accidental Hydrocarbon Release • Introduction and establishment of IMS • Spill Response	Hydrocarbon exposure (Section 6.8) resulting in potential physical/tangible change to cultural heritage value of Marine Parks, coastal reserves and wetland habitats that sustain culturally significant species. Table 8-2 summarises potential impacts and risks to marine parks/coastal reserves/wetlands are mostly limited to localised and short-term impacts (Level 1 consequence). However, the introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response is a risk of up to Moderate severity (consequence Level 4 and 3 (respectively)). Section 8.3 considers the level of impacts and risks to environment receptors that are also, or that are linked to cultural features, and evaluates the potential for degradation of those cultural features, and to their value in relation to continuation of cultural practices, traditions, and customs.

8.2 Activity Aspect Interactions with Cultural Features

Offshore development within or adjacent to Sea Country has the potential to impact cultural features of the environment. Table 8-2 above identifies the potential interactions between the particular aspects of this Activity and relevant Cultural Features of the environment identified through consultation, review of County Plans, on Country training, listening, and desktop research. Within Table 8-2, for each interaction the level of impact or risk is identified for the environment component that is intrinsically linked to, is part of, or is also a cultural feature.

The evaluation for each relevant environment component is detailed within Sections 6.0 and 1.0. The predicted impacts to these receptors are typically localised and / or generally short-term. The risk events associated with the activity typically have a higher consequence and could result in more extensive, and longer-term impacts to environment receptors. The most severe risk events being a major loss of hydrocarbon containment, and establishment and spread of IMS. These risk events are Unlikely, or Remote, and there are established effective measures in place to prevent their occurrence.

Considering the level of impact or risk from activity aspects assists determining the spatial and temporal extent of the potential disturbance to, or degradation of, the associated cultural feature.

For further details on the intrinsic links between cultural features of the environment and First Nations people's heritage site and values refer to Section 4.4.4

Table 8-2: Potential Interaction between Activity Planned and Unplanned Aspects and Cultural Features of the Environment relating to First Nations People Cultural Heritage Sites and Values

Cultural feature of the environment relating to First Nations people's heritage sites and values	Environmental receptor where the cultural feature may exist	Planned Emissions - Light	Planned Emissions - Atmospheric	Planned Discharges – Drill Cutting and Fluids	Planned Discharges – Cement	Planned Discharges – Operational	Planned Discharges – Other	Unplanned Physical Presence – Interaction with Marine Fauna	Unplanned Discharge – LOC (Chemicals and Hydrocarbons)	Unplanned Discharge – Hazardous / Non-hazardous waste	Seabed Disturbance	GHG Emissions	Underwater Sound Emissions – Impulsive	Underwater Sound Emissions – Continuous	Introduction, Establishment and Spread of IMS	Accidental Hydrocarbon Release (vessel and LOWC)	Oil Spill Response
Tangible Cultural Heritage																	
Coastal/ island places and objects, and submerged sites	• Victorian coastline • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory and associated flooded Land Bridge • Tyrendarra lava flow															✓ Low inherent risk severity to heritage places Section 6.8.5	✓ Low risk severity associated with restricted access Section 1.0
Intangible Cultural Heritage																	
Sea Country	All physical and ecological receptors (Section 4.4.1 and 4.4.2)	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour Section 6.2.1	✓ Consequence Level 1 - temporary and localised change in air quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to water quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Consequence Level 1 – minor local impacts to water quality Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 6.2.2	✓ Low inherent risk to water and sediment quality Section 6.2.2	✓ Low inherent risk to water and sediment quality Section 6.2.2	✓ Consequence Level 1 – minor local impacts to physical substrate Section 6.3.4.4	✓ Consequence Level 1 – minor contribution to carbon budget Section 6.4.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.4	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats, avifauna, pinnipeds and cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 1.0
Creation/ Dreaming sites, Songlines, sacred sites and	• Culturally significant species • The Convincing Ground			✓ Consequence Level 1 – minor local impacts to	✓ Consequence Level 1 – minor local impacts to	✓ Consequence Level 1 – minor local impacts to		✓ Low inherent risk severity to marine fauna		✓ Low inherent risk to water and sediment quality		✓ Consequence Level 1 – minor contribution to	✓ Consequence Level 2 – localised and short-term	✓ Consequence Level 2 – localised and short-term	✓ Moderate inherent risk severity from IMS	✓ Moderate inherent risk severity to shoreline habitats,	✓ Moderate inherent risk severity to shoreline habitats

Cultural feature of the environment relating to First Nations people's heritage sites and values	Environmental receptor where the cultural feature may exist	Planned Emissions - Light	Planned Emissions - Atmospheric	Planned Discharges – Drill Cutting and Fluids	Planned Discharges – Cement	Planned Discharges – Operational	Planned Discharges – Other	Unplanned Physical Presence – Interaction with Marine Fauna	Unplanned Discharge – LOC (Chemicals and Hydrocarbons)	Unplanned Discharge – Hazardous / Non-hazardous waste	Seabed Disturbance	GHG Emissions	Underwater Sound Emissions – Impulsive	Underwater Sound Emissions – Continuous	Introduction, Establishment and Spread of IMS	Accidental Hydrocarbon Release (vessel and LOWC)	Oil Spill Response
Ancestral beings	• Deen Maar • Discovery Bay Coastal Park			water quality Section 6.2.1	marine fauna Section 6.2.1	marine fauna Section 6.2.1		Section 6.2.2		Section 6.2.2		carbon budget Section 6.4.5	impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	impacts to cetaceans. Low Risk Severity. Section 6.6.4	Section 6.7.4	avifauna, pinnipeds and cetaceans. Section 6.8.5	Section 1.0
Cultural obligations to care for Country	All physical and ecological receptors (Section 4.4.1 and 4.4.2)	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour Section 6.2.1	✓ Consequence Level 1 - temporary and localised change in air quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to water quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Consequence Level 1 – minor local impacts to water quality Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 6.2.2	✓ Low inherent risk to water and sediment quality Section 6.2.2	✓ Low inherent risk to water and sediment quality Section 6.2.2	✓ Consequence Level 1 – minor local impacts to physical substrate Section 6.3.4.4	✓ Consequence Level 1 – minor contribution to carbon budget. Section 6.4.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.4	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats, avifauna, pinnipeds and cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 1.0
Knowledge systems	• Culturally significant species • The Convincing Ground • Deen Maar • Discovery Bay Coastal Park • Wilsons Promontory and associated flooded Land Bridge • Tyrendarra lava flow			✓ Consequence Level 1 – minor local impacts to water quality Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1		✓ Low inherent risk severity to marine fauna Section 6.2.2				✓ Consequence Level 1 – minor contribution to carbon budget Section 6.4.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.4	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats, avifauna, pinnipeds and cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 1.0

Cultural feature of the environment relating to First Nations people's heritage sites and values	Environmental receptor where the cultural feature may exist	Planned Emissions - Light	Planned Emissions - Atmospheric	Planned Discharges – Drill Cutting and Fluids	Planned Discharges – Cement	Planned Discharges – Operational	Planned Discharges – Other	Unplanned Physical Presence – Interaction with Marine Fauna	Unplanned Discharge – LOC (Chemicals and Hydrocarbons)	Unplanned Discharge – Hazardous / Non-hazardous waste	Seabed Disturbance	GHG Emissions	Underwater Sound Emissions – Impulsive	Underwater Sound Emissions – Continuous	Introduction, Establishment and Spread of IMS	Accidental Hydrocarbon Release (vessel and LOWC)	Oil Spill Response
Connection to Country	All physical and ecological receptors (Section 4.4.1 and 4.4.2)	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour Section 6.2.1	✓ Consequence Level 1 - temporary and localised change in air quality. Section 6.2.1	✓ Consequence Level 1 – minor local impacts to water quality. Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna. Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna. Section 6.2.1	✓ Consequence Level 1 – minor local impacts to water quality. Section 6.2.1	✓ Low inherent risk severity to marine fauna. Section 6.2.2	✓ Low inherent risk to water and sediment quality. Section 6.2.2	✓ Low inherent risk severity to cultural heritage sites. Section 6.2.2	✓ Consequence Level 1 – minor local impacts to physical substrate. Section 6.3.4.4	✓ Consequence Level 1 – minor impact to freshwater rivers and wetlands. Section 6.4.4	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.4	✓ Moderate inherent risk severity from IMS. Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats, avifauna, pinnipeds and cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats. Section 1.0
Ecosystems and Species																	
Culturally significant species and food resources	Fish, sharks, rays, eels (Kooyang), shellfish, and crustaceans from coastal environments									✓ Low inherent risk to marine fauna Section 6.2.2		✓ Consequence Level 1 – minor impact to freshwater rivers and wetlands Section 6.4.4			✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to invertebrates, fish, and sharks Section 6.8.5	✓ Moderate inherent risk severity to marine fauna Section 1.0
Culturally significant species	Cetaceans			✓ Consequence Level 1 – minor local impacts to marine mammals Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine mammals Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 6.2.2	✓ Low inherent risk to marine fauna Section 6.2.2	✓ Low inherent risk to marine mammals Section 6.2.2		✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Moderate Risk Severity. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to cetaceans. Low Risk Severity. Section 6.6.4	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to cetaceans. Section 6.8.5	✓ Moderate inherent risk severity to marine fauna Section 1.0

Cultural feature of the environment relating to First Nations people's heritage sites and values	Environmental receptor where the cultural feature may exist	Planned Emissions - Light	Planned Emissions - Atmospheric	Planned Discharges – Drill Cutting and Fluids	Planned Discharges – Cement	Planned Discharges – Operational	Planned Discharges – Other	Unplanned Physical Presence – Interaction with Marine Fauna	Unplanned Discharge – LOC (Chemicals and Hydrocarbons)	Unplanned Discharge – Hazardous / Non-hazardous waste	Seabed Disturbance	GHG Emissions	Underwater Sound Emissions – Impulsive	Underwater Sound Emissions – Continuous	Introduction, Establishment and Spread of IMS	Accidental Hydrocarbon Release (vessel and LOWC)	Oil Spill Response
Culturally significant species	Pinnipeds			✓ Consequence Level 1 – minor local impacts to marine mammals Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine fauna Section 6.2.1	✓ Consequence Level 1 – minor local impacts to marine mammals Section 6.2.1	✓ Low inherent risk severity to marine fauna Section 6.2.2	✓ Low inherent risk to marine fauna Section 6.2.2	✓ Low inherent risk to marine mammals Section 6.2.2		✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4		✓ Consequence Level 2 – localised and short-term impacts to pinnipeds. Low Risk Severity. Section 6.6.4	✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to pinnipeds. Section 6.8.5	✓ Moderate inherent risk severity to marine fauna Section 1.0
Culturally significant species	Seabirds	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour Section 6.2.1						✓ Low inherent risk severity to marine fauna Section 6.2.2		✓ Low inherent risk to avifauna Section 6.2.2		✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4				✓ Moderate inherent risk severity to avifauna Section 6.8.5	✓ Moderate inherent risk severity to avifauna Section 1.0
Culturally significant species	Plankton associated with the productivity of Bonney Upwelling (Key Ecological Feature)	✓ Consequence Level 1 - temporary and localised change in marine fauna behaviour. Section 6.2.1		✓ Consequence Level 1 – minor local impacts to plankton Section 6.2.1				✓ Low inherent risk severity to marine fauna. Section 6.2.2	✓ Low inherent risk to marine water and sediment quality. Section 6.2.2			✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4	✓ Consequence Level 2 – localised and short-term impacts to plankton. Section 6.5.5	✓ Consequence Level 2 – localised and short-term impacts to plankton. Section 6.6.4	✓ Moderate inherent risk severity from IMS. Section 6.7.4	✓ Moderate inherent risk severity to plankton. Section 6.8.5	✓ Moderate inherent risk severity to marine fauna Section 1.0
Water quality	Offshore			✓ Consequence Level 1 – localised and temporary decrease	✓ Consequence Level 1 – minor local impacts to water quality	✓ Consequence Level 1 – localised and temporary decrease	✓ Consequence Level 1 – minor local impacts to water quality		✓ Low inherent risk to water and sediment quality	✓ Low inherent risk severity to water quality	✓ Consequence Level 1 – localised and temporary decrease					✓ Low inherent risk severity to water quality	

Cultural feature of the environment relating to First Nations people's heritage sites and values	Environmental receptor where the cultural feature may exist	Planned Emissions - Light	Planned Emissions - Atmospheric	Planned Discharges – Drill Cutting and Fluids	Planned Discharges – Cement	Planned Discharges – Operational	Planned Discharges – Other	Unplanned Physical Presence – Interaction with Marine Fauna	Unplanned Discharge – LOC (Chemicals and Hydrocarbons)	Unplanned Discharge – Hazardous / Non-hazardous waste	Seabed Disturbance	GHG Emissions	Underwater Sound Emissions – Impulsive	Underwater Sound Emissions – Continuous	Introduction, Establishment and Spread of IMS	Accidental Hydrocarbon Release (vessel and LOWC)	Oil Spill Response
				in water quality Section 6.2.1	Section 6.2.1	in water quality Section 6.2.1	Section 6.2.1		Section 6.2.2	Section 6.2.2	in water quality Section 6.3.4.4					Section 6.8.5	
Benthic habitats	Nearshore benthic habitats / reefs									✓ Low inherent risk severity to benthic habitats Section 6.2.2		✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4			✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Low inherent risk severity to benthic habitats Section 6.8.5	
Intertidal communities and shorelines	Mangroves, macroalgae, seagrass, coastal saltmarsh, rocky and sandy shorelines.											✓ Consequence Level 1 – minor impact on ecosystems. Section 6.4.4			✓ Moderate inherent risk severity from IMS Section 6.7.4	✓ Moderate inherent risk severity to shoreline habitats Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 1.0
Marine Park/ coastal reserves / wetlands	Wilsons Promontory, Ninety Mile Beach, Marengo Reef											✓ Consequence Level 1 – minor impact to freshwater rivers and wetlands Section 6.4.4				✓ Moderate inherent risk severity to coastal saltmarsh and wetlands Section 6.8.5	✓ Moderate inherent risk severity to shoreline habitats Section 1.0

8.3 Impact and Risk Evaluation

This section evaluates the potential disruption to the links between environment receptors and tangible and intangible cultural features described in Table 8-2. In doing so, this section considers the nature and scale of the planned activities and impacts and risks to relevant environment receptors outlined in Table 8-1.

8.3.1 Tangible and Heritage Sites

8.3.1.1 Coastal/ Island Places and Objects

Cultural heritage objects that may be found along the coast and islands within the monitoring area include shell middens, artefact scatters, and LDADs (the occurrence of stone artefacts at low densities) (Section 4.4.4.2). Shell middens and artefact scatters may be located close to the shoreline, whereas LDADs are typically found further inland (Biosis 2023).

Cultural heritage places located within the monitoring area that are significantly mentioned within relevant Country Plans or which have been identified through consultation include:

- The Convincing Ground
- Deen Maar
- Discovery Bay Coastal Park
- Wilsons Promontory
- Tyrendarra lava flow.

Potential disruption to cultural features

Cultural heritage objects and places have the potential to be exposed to shoreline hydrocarbons in an unlikely accidental hydrocarbon release event. Exposure of cultural heritage objects and places to hydrocarbons has the potential to degrade those objects and places, and their cultural value, and disrupt cultural practices, customs and traditions which may occur as associated with the object or place if those things are tainted or access to practice culture is restricted.

Figure 6-20and Figure 6-21 shows stochastic modelling predicting shorelines with the potential to be exposed to shoreline hydrocarbon. Shoreline accumulation will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA 1995). As a result, only coastal/island objects and places along the high tide mark have the potential to be exposure exposed to shoreline hydrocarbons. Cultural heritage objects and places located above the high tide mark are not expected to be exposed, and therefore, not expected to be impacted by shoreline hydrocarbons. Cultural heritage objects and places located below to low tide mark may have some limited exposure to hydrocarbons entrained in the water column.

The exposure of cultural heritage objects and places from shoreline hydrocarbons at the high tide mark could occur. Deen Maar Island, being a place considered by Traditional Owners to be linked to the transition of spirits from the earth, could be exposed to hydrocarbons around its rocky shores.

Deen Maar Island is not typically accessed but is a constant visual and spiritual link for First Nations peoples on the Mainland. Its cultural value in this respect would be unlikely to be disrupted by a spill of hydrocarbons of the nature and scale provided for within this plan. The topography of Deen Maar Island, and exposure to the ocean, provides a natural resilience against hydrocarbon spills; rocky shores lead into steep cliffs to the vegetated plateau high above the water. Due to the exposed location of Deen Maar Island, the highly volatile nature of the hydrocarbons associated with this

activity (light non-persistent), hydrocarbons accumulating on shorelines in the region, and potentially around cultural heritage objects and places, are likely to be readily removed in the presence of tidal and/or wave action. Beaches and rocky shores on the mainland, facing Deen Maar Island, and which may hold a place in ceremony and knowledge transfer also have the potential to be exposed to hydrocarbons, though modelling indicates that these areas (~77km north west of the operational area) may have the potential to be exposed to only Low concentrations of hydrocarbons; these levels of (light) hydrocarbons do not typically require intervention and are naturally dispersed over days and weeks.

The heritage value of cultural heritage objects and places temporarily exposed to shoreline hydrocarbons is not expected to change. The temporary exposure of cultural heritage objects and places to shoreline hydrocarbons may temporarily contaminate the objects or sites however, weathering of light non-persistent hydrocarbons will prevent long-term hydrocarbon exposure. Although this could disrupt cultural linkages to exposed components of the environment; this disruption would be temporary and recoverable. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Consultation with First Nations groups indicates that First Nations people would like to be engaged in the event of a spill, to be part of the recovery efforts (Consultation Day GMTOAC 17 February 2024, Ref: FN-GMTOAC-20240405-Email for Athena Supply Project - Athena Supply Project). This was re-affirmed by GLaWAC during consultation in the development of this EP (Event ID 2025 0828 141512 7349). The involvement of First Nations people would be expected to accelerate recovery of Country and avoid additional disruption to cultural heritage from response efforts. It would also facilitate cultural reconnection with Sea Country impacted by a potential spill, and acknowledge the significant relationship between First Nations people, Sea Country and the culturally significant species and ecosystems.

Relevant First Nations groups will be engaged in the event an accidental hydrocarbon release will expose cultural heritage objects and places to hydrocarbons as specified in Section 6.8.5 and the OPEP. Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. This list will be shared with the relevant state control agency.

The intrinsic link between coastal/island objects and places and First Nations people is expected to be maintained given values of the objects and places is not expected to change and First Nations people will be central to the management of these objects and places in the event of an accidental hydrocarbon release.

8.3.1.2 Submerged Sites

Sea Country is considered by First Nations Groups to extend beyond formally defined RAP areas to include sea and submerged lands to the edge of the continental shelf. Activity aspects with the potential to interact with the seabed are limited to within the Operational Area. The Operational Area may overlap areas that were above sea level, and inhabited around pervious glacial maxima, over 10,000 years ago. Amplitude Energy investigated the potential heritage landscapes identified as of particular significance during consultation and review of First Nations Country Plans. Of concern were the cultural values associated with Budj Bim which is established within the Tyrendarra Lava flow. Features of this nature do not occur within the operational area; please refer to Section 6.3.4.4 for further details including of newer volcanic features in the region.

Potential disruption to cultural features

Submerged sites have the potential to be impacted by Activity aspects that disturb the seabed. Disturbance to seabed within the operational area is expected to be localised and recoverable (Table 8-2). The area of impact is small compared to the extent and distribution of the substrate types within the operational area across the wider region (Sections 6.0 and 1.0, Table 8-2). No underwater cultural heritage sites, including other cultural artefacts, have been identified within the Operational Area.

The likelihood of identifying cultural artefacts within the operational area is considered low given the high energy nature of the ocean in the region, and the exposed, eroded seabed (Section 6.3.4.4). Consultation with Heritage Victoria indicated that the risk of the project impacting cultural heritage was low, given the limited footprints involved. Large scale impacts to submerged landscapes were also not expected given the limited seabed footprints involved in the Activity (pers comm Heritage Victoria 2024). However, impacts could still have the potential to occur. Given this, additional control measures have been designed into the EP (Section 6.3.4.4)

Given the operational area, and associated seabed disturbance is located away from reported landscape features of particular cultural significance (recent Tyrendarra Lava Flow and analogous lava flow complexes), the expected absence of artifacts, and that disturbance to cultural heritage (if it were unexpectedly found) is regulated to avoid damage (CM30: Underwater Cultural Heritage Disturbance Risk Management Measures), the intrinsic links between submerged sites and First Nations people are expected to be maintained.

An accidental release of hydrocarbons has the potential to impact on submerged sites, via contact with hydrocarbons entrained within the water column. However, given the limited volumes, and low persistence of the hydrocarbons associated with this activity, any hydrocarbon contact would be brief and would not be expected to change the nature or integrity of submerged features.

The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

8.3.2 Intangible Heritage Sites and Values

8.3.2.1 Sea Country

Sea Country is an intrinsic value to First Nations people. Sea Country may include parts of open ocean, beaches, land and freshwater on the coast, habitats, and may encompass all living things, beliefs, values, creation spirits and cultural obligations connected to an area. The operational area and monitoring area overlaps Sea Country as described by First Nations Groups respective Country Plans. Many First Nations groups have a close connection with the sea and its resources which are central to culture. It is a place of abundant resources and habitat to culturally significant flora and fauna. Caring for Sea Country is vitally important to First Nations groups of the Otway region. First Nations people's wellbeing and confidence is reliant on the authority to access and practice on Country (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023; Eastern Maar Aboriginal Corporation 2014).

Potential disruption to cultural features

Activity impacts and risks to the biological and physical components of sea country are described in Sections 6.0 and 1.0. First Nations intangible cultural heritage values associated with Sea Country including ecosystems and species are considered based on their ecological values, food sources or culturally significant totemic values. The First Nations people's values of marine ecosystems and species have the potential to change if there are impacts to ecosystem functioning and integrity or species population.

As summarised in Table 8-2, potential impacts and risks to fish, marine mammals and seabirds and shorebirds, and water and sediment quality are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), with no impacts at the population level, or which would manifest in disruption to a cultural feature. As an activity with limited nature and scale, close to existing offshore infrastructure, potential disruption to Sea Country values is expected to be negligible; energy infrastructure has previously been installed on the seabed as well as onshore, and continues to coexist with First Nations peoples values, memories and Songlines relating to Country (ACMI 2010; Biosis 2023).

The introduction, establishment and spread of IMS and accidental hydrocarbon release is a risk of up to Moderate severity, and could affect marine resources, including resources collected by First Nations peoples in Coastal Areas. With preventative and response controls in place, impacts and risks from these aspects are not expected to eventuate, nor result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity or species populations. Links between environment receptors and cultural features could be disrupted in the unlikely event of a major hydrocarbon spill, or remote event of IMS introduction and spread, but are expected to be recoverable. The risk severity is considered to be the same for the cultural feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

8.3.2.2 Creation/ Dreaming sites, Songlines, sacred sites and Ancestral beings

Creation/ Dreaming sites, Songlines, ceremonial sites link First Nations people to ancestors, culture, traditions, customs, traditional laws and Country. Songlines relating to the flooding gives significance to now submerged landscapes. Onshore, the Convincing Ground remains a place of ceremony for the Gunditjmara who gather at the site annually to reflect on the ongoing impacts of colonisation on their people (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023). Deen Maar is an important Dreaming site where Ancestors leave the earth. Karntubul (whales) are Ancestors of Gunditjmara and have featured in dreaming stories, ceremony, song and dance of Gunditjmara.

Potential disruption to cultural features

Activity impacts to seabed are limited to the operational area, offshore and are not associated with landscapes of particular cultural significance such as the Tyrendarra Lava Flow that occurs further west, or the submerged land bridge linked to Wilsons Promontory further east. Activity risks events have the potential to affect cultural features highlighted as of importance during consultation, including the Convincing Ground, Deen Maar, and whales. These Activity risks therefore have the potential to disrupt the intrinsic links between First Nations people and the values of Creation/Dreaming, songlines, sacred sites and Ancestral beings. As evaluated in Section 8.3.2.1, disturbance to seabed in the operational area is expected to be localised and recoverable (Table 8-2). The area of impact is small compared to the extent and distribution of substrate type identified within the Operational Area and its occurrence across the wider region (Sections 6.0 and 1.0, Table 8-2). Landscape scale impacts (submerged landscapes) were also not expected given the limited seabed footprints involved (*pers comm Heritage Victoria, 2024*). Energy infrastructure has previously been installed on the seabed as well as onshore, and continues to coexist with First Nations peoples values, memories and Songlines relating to Country (Biosis 2023). Given the changes to seabed from Activity aspects are localised, short-term and recoverable, and the absence of submerged landscapes, the intrinsic links between First Nations people and Songline values of benthic habitats is expected to be maintained.

Shoreline hydrocarbon exposure to The Convincing Ground and Deen Maar has the potential to change the intangible cultural heritage values (for example, Creation/ Dreaming sites, sacred sites and Ancestral beings) of these sites. As evaluated in Section 8.3.1.1, the (risk) temporary exposure of The Convincing Ground and Deen Maar to shoreline hydrocarbons is not expected to change the

heritage values of the site. The temporary exposure to shoreline hydrocarbons may temporarily contaminate the sites however, weathering of light non-persistent hydrocarbons will prevent long-term hydrocarbon contamination. Relevant First Nations groups will be notified in the event an accidental hydrocarbon release will expose The Convincing Ground and/or Deen Maar to hydrocarbons as specified in Section 6.8.5 and the OPEP. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. This list will be shared with the relevant state control agency. The intrinsic links between First Nations people and cultural heritage values (Creation/ Dreaming sites, sacred sites and Ancestral beings) of The Convincing Ground and Deen Maar is expected to be maintained given First Nations people will be central to the management of these sites in the event of an accidental hydrocarbon release.

As summarised in Table 8-2, potential impacts to whales from Activity aspects are mostly limited to localised and short-term impacts (Level 1 or 2 consequences), such as small, temporary changes to migratory or foraging behaviours (see Section 6.6.4), and which be managed to minimise behavioural disturbance to southern right whales and blue whales. The risk of vessels physically interacting with whales is Low and managed through the implementation of cautionary and no-approach zones around whales. These risks, though unlikely, if they were to eventuate, are not anticipated to impact population levels, distribution or local ecosystem function. With controls in place, impacts and risks to whales from Activity aspects are not expected to impact the intrinsic links between First Nations people and whales that are valued as Ancestral beings, and will not affect populations or distributions of whales to the extent that Gunditjmara practice of 'calling in' whales would be disrupted. As such, the intrinsic links between First Nations people and Ancestral beings (whales) is expected to be maintained. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy commits to CM05: Ongoing Consultation and Notification, to ensure First Nations people will be central to the management of First Nations people's heritage sites and values.

8.3.2.3 Cultural obligations to care for Country

First Nations people may be culturally obligated and inherently responsible to care, protect and heal Country for present and future generations. The roles held relating to taking care of Country and knowledge holding may vary amongst individuals and within clans and family groups. Roles include taking care of culturally significant species or habitats of significant species known to be important food resources (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023). The obligation to care for Country can be deep rooted in First Nations cultural laws and customs (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023). Caring for Country emphasises the protection and management of land, waters and plants and animals that reside in these areas and ensures they are preserved for future generations (Gunaikurnai Land and Waters Aboriginal Corporation 2015).

Potential disruption to cultural features

By sharing of information through consultation, Country Plans, and on Country teachings, First Nations people have articulated the particular values and sensitivities that are important to them, and which will require particular consideration within the assessment of impacts and risks and their management. This is consistent with their cultural ties to and inherent responsibility to care for Country. As evaluated in Section 8.3.2.1, Activity aspects are not expected to result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity or species

populations. Table 8-2 summarises how potential impacts and risks to marine wildlife, water and sediment quality, and cultural heritage are mostly limited to localised and short-term impacts (Level 1 or 2 consequences).

As an activity with limited nature and scale, close to existing infrastructure, potential disruption to Sea Country values is expected to be negligible; energy infrastructure has previously been installed on the seabed as well as onshore, and continues to coexist with First Nations peoples intangible cultural heritage values including memories and Songlines relating to Country (ACMI 2010; Biosis 2023).

The unplanned introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response have the potential for moderate risk to environment receptors. With controls in place impacts and risks to Sea Country are not expected to impact ecosystem functioning and integrity or species populations.

The exclusion of First Nations people from accessing Country or decision-making processes for Country may risk disrupting the intrinsic and important link between First Nations people and obligations to care for Country. Scenarios where First Nations people are restricted in their access to Country could occur in the event of an accidental hydrocarbon release for safety reasons. To maintain and ensure First Nations people are central to the management of the Country, relevant First Nations groups will be notified in the event an accidental hydrocarbon release as specified in Section 6.8.5 and the OPEP. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. First Nations people's and obligations to care for Country is expected to be respected and maintained given First Nations people will be central to the management of these sites in the event of an accidental hydrocarbon release which could impact them.

Amplitude Energy commits to CM05: Ongoing Consultation and Notification, to ensure First Nations people will be central to the management of First Nations people's heritage sites and values.

8.3.2.4 Knowledge systems

First Nations peoples ecological, spiritual, traditional and cultural knowledge may be passed from generation to generation using cultural practices (Dreaming stories, ceremony, song and dance) where knowledge holders (Elders) are the custodians of knowledge. This knowledge includes (but is not limited to) culturally significant species, and landscape features that hold Dreaming and creation stories or are events and ceremonial places critical for intergenerational knowledge sharing and cultural practice.

Receptors relevant to First Nations people knowledge systems include:

Culturally significant species including food resources, cetaceans, pinnipeds, seabirds and plankton (refer to Sections 8.3.3.1, 8.3.3.2, 8.3.3.3, and 8.3.3.4)

Cultural heritage places including benthic habitats, The Convincing Ground, Deen Maar, Discovery Bay Coastal Park, Wilson Promontory, and Tyrendarra lava flow (refer to Section 8.3.1.1 and Section 8.3.1.2).

Potential disruption to cultural features

Impacts and risks resulting in the exclusion of access to cultural heritage places or displacement/reduction in population of culturally significant species have the potential to disrupt the intrinsic link between environment receptors and knowledge systems.

Activity aspects are not expected to result in widespread long-term impacts to environment receptors (including those that are part of knowledge systems). Table 8-2 summarises how potential impacts and risks to environment receptors are mostly limited to localised and short-term impacts (Level 1 or 2 consequences). As an activity with limited nature and scale, and in close proximity to existing infrastructure, potential disruption to knowledge systems is expected to be negligible. Energy infrastructure has previously been installed on the seabed as well as onshore, and continues to coexist with First Nations peoples values, memories and Songlines relating to Country (ACMI 2010; Biosis, 2023).

The unplanned introduction, establishment and spread of IMS, accidental hydrocarbon release and spill response have the potential for moderate risk to environment receptors. If access to heritage places is restricted or if the value doesn't exist within the local area of Country, knowledge systems of that value can potentially be disrupted or lost.

The potential to exclude First Nations people from accessing Country may risk disrupting the intrinsic links between First Nations people and knowledge systems. Scenarios where First Nations people are restricted access to Country may occur in the event of an accidental hydrocarbon release for safety reasons. The temporary exposure of cultural heritage places to shoreline hydrocarbons may temporarily result in restricted access to cultural heritage places. Due to the highly volatile nature of the hydrocarbons (MDO and Condensate) as a light non-persistent hydrocarbon (see Section 6.8.3.2), shoreline hydrocarbons at cultural heritage places, are likely to be easily washed off in the presence of tidal and/or wave action. As a result, access restrictions (if any) would be temporary and not long-term. Relevant First Nations groups will be engaged in the event an accidental hydrocarbon release will expose cultural heritage places to hydrocarbons as specified in Section 6.8.5 and the OPEP. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations contacts who have expressed an interest in the protection of cultural heritage during such emergency events. The intrinsic links between environment receptors and First Nations peoples knowledge systems is expected to be maintained given First Nations people will be central to the management of these sites in the event of an accidental hydrocarbon release.

As summarised in Table 8-2, potential impacts and risks to culturally significant species such as fish, marine mammals and seabirds and shorebirds are mostly limited to localised and short-term impacts (Level 1 or 2 consequences). The introduction, establishment and spread of IMS and accidental hydrocarbon release has the potential for moderate inherent risk. With controls in place, impacts and risks from these aspects are not expected to result in impacts to species populations. As such, the intrinsic link between environment receptors and First Nations peoples is expected to be maintained.

Amplitude Energy commits to CM05: Ongoing Consultation and Notification, to ensure First Nations people will be central to the management of First Nations people's heritage sites and values.

8.3.2.5 Connection to Country

First Nations people may hold strong connections to the south-east marine region, as occupation of coastal areas dates back over at least 40,000 years (DoE 2015a). The Victorian coast is of significance

with respect to First Nations tangible and intangible cultural heritage. This includes areas where there may be no physical evidence of past cultural activities but includes places of spiritual or ceremonial significance, places where traditional plant or mineral resources occur or trade and travel routes (Aboriginal Victoria 2008).

Potential disruption to cultural features

Impacts and risks and restriction of access to Sea Country are potential risks to the intrinsic links between First Nations people and connection to Country.

As evaluated in Section 8.3.2.1, impacts and risks from Activity aspects are not expected to result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity or species populations. Table 8-2 summarises how potential impacts and risks to marine fauna, water and sediment quality, and cultural heritage are mostly limited to localised and short-term impacts (Level 1 or 2 consequences). As an activity with limited nature and scale, and in close proximity to existing infrastructure, potential disruption of Connections to Country is expected to be negligible; energy infrastructure has previously been installed on the seabed as well as onshore and continues to coexist with First Nations peoples intangible cultural heritage values, memories and Songlines relating to Country (ACMI 2010; Biosis 2023).

The introduction, establishment and spread of IMS and accidental hydrocarbon release has the potential for moderate inherent risk. With controls in place, impacts and risks to Sea Country are not expected to impact ecosystem functioning and integrity or species populations. As such, the intrinsic links between environment receptors and First Nations peoples connection to Country is expected to be maintained.

As evaluated in Section 8.3.2.5, restriction of access to Country may occur in the event of an accidental hydrocarbon release for safety reasons. The presence of shoreline hydrocarbons may temporarily result in restricted access to Country. Due to the nature of the hydrocarbons associated with the Activity (MDO and Condensate) being light and non-persistent (see Section 6.8.3.2), shoreline hydrocarbons are likely to be readily weathered and washed off in the presence of tidal and/or wave action. As a result, if access to Country is affected, it would be temporary and not long-term. Relevant First Nations groups will be engaged in the event an accidental hydrocarbon release will expose cultural heritage places to hydrocarbons as specified in Section 6.8.5 and the OPEP. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. The intrinsic link between the environment receptors and First Nations peoples connection to Country is expected to be maintained given First Nations people will be central to the management of these sites in the event of an accidental hydrocarbon release.

8.3.3 Ecosystems and Species

8.3.3.1 Culturally significant species and food resources

Culturally significant food resources occur in the Otway Region. Highlighted during consultation and cultural training were short-finned eels (Kooyang). Kooyang migrate through the Otway Region including State waters and the Commonwealth Marine Area to/from freshwater systems in Gunditjmara Country to/from spawning grounds in the Coral Sea. Gunditjmara engineered aquaculture systems from volcanic formations associated with the Tyrendarra Lava flow (circa. 30,000 years old) to create Budj Bim. Eels were captured, fattened up, harvested, smoked and traded.

Potential disruption to cultural features

Eels are an important resource for First Nations people as identified during consultation and review of relevant First Nations group Country Plans (Table 4-7). First Nations groups and specific individuals within the groups may have responsibility to care for eels and their habitats to ensure associated cultural practices, and ventures such as cultural education tourism, can continue for future generations (Table 4-7). Koster et al. (2024), and Church et al. (2021), identify conservation considerations for the short-finned eel. These include potential changes to river flows from climate change, and physical/anthropogenic habitat modification, both of which have the potential to affect the migratory success of populations, and therefore, affect the cultural practices associated with eel migration.

As summarised in Table 8-2, potential impacts to eels from Activity aspects are limited to Level 2 consequences of localised and short-term impacts to behaviour of individuals, but no population level impacts. There are no habitat modifications caused by the activity which would be expected to have an impact on migration to or from freshwater systems where they are harvested. This is because of the limited nature and scale of impacts to environment receptors, generally limited to the operational area and ecological thresholds for planned aspect of the activity, and the offshore location of the activity, away from freshwater habitats where the species migrates from and to, via a highly dispersed migration through the South East Marine Region.

Subsea noise generated by activity vessels and equipment has the potential to cause minor behavioural reactions in fish, including eels (i.e. possible brief changes to swimming speed / direction in the vicinity of Activity activities), which will not result in changes to eel migratory behaviour or success. The sources of noise, and potential affects effects on fish and eel is described in more detail in Section 6.5.4. There is negligible risk that planned aspects of the activity may either directly or indirectly impact on eel populations or migratory outcomes. As an existing activity with limited nature and scale, potential disruption to sea country values is expected to be negligible; energy infrastructure has previously been installed on the seabed as well as onshore, and continues to coexist with First Nations peoples values, memories and Songlines relating to Sea Country (ACMI 2010; Biosis, 2023).

The unplanned introduction, establishment and spread of IMS, and accidental hydrocarbon release from the activity carry moderate risk. With controls in place (described in Section 6.0 and 1.0.), these unplanned events are not expected to occur, or result in long term impacts to species populations. As such, the cultural ties and intrinsic links between environment receptors and First Nations peoples is expected to be maintained.

8.3.3.2 Culturally significant species – cetaceans

First Nations people around Australia have long had a strong connection to whales, which has significance as totemic ancestors to some groups. Karntubul (whales) in Sea Country hold deep cultural significance to the Gunditjmara and feature in Dreaming stories, ceremony, song and dance traditions.

Cetaceans are culturally significant species for the First Nations peoples as identified during consultation and review of relevant First Nations group Country Plans (Table 4-7). First Nations people have a cultural responsibility to ensure cetaceans that reside within and migrate through Sea Country are cared for and healthy and their habitat is sustained. Whales feature in Dreaming stories, ceremony, song and dance of some First Nations groups along the coasts of Australia. The protection of Karntubul (whale) species is paramount to Gunditjmara spiritual, physical wellbeing and it is the responsibility of Gunditjmara people to care for Sea Country and protect the species for present and future generations. Whales are also a resource, and Gunditjmara people still collect parts of beached

whales, as has been done for thousands of years (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023).

EPBC threatened and migratory cetaceans are present within the operational area and monitoring area during seasonal migrations. A Pygmy blue whale foraging BIA and a Southern right whale migration BIA and reproduction BIA overlaps the operational area. The monitoring area overlaps a foraging and distribution BIAs for the pygmy blue whale, migration and reproduction BIAs for the southern right whale, and foraging BIAs for the humpback whale (Section 4.4.2).

Potential disruption to cultural features

First Nations groups and specific individuals within the groups may have kinship and/or responsibility to care for culturally significant species and their habitats (see Table 4-7). It is considered that impacts to species at a population level may inhibit First Nations people's ability to perform their obligations to care for culturally significant species and their habitats.

There is potential that individual whales could be behaviourally affected or physically impacted by the presence/movement and noise of vessels which may occasionally be required for inspection and maintenance of the subsea facilities. Control measures have been established to minimise the risk of physical impact and behavioural disturbance. Therefore, the potential that overall whale occurrence nearby the coast, or the numbers of beached whales will be influenced by the activity is considered negligible.

As summarised in Table 8-2, potential impacts to cetaceans from Activity aspects are limited to Level 2 consequences of localised and short-term impacts to behaviour of individuals, but no population level impacts. These consequences are considered to be unlikely to occur, and the risk to whales is considered to be Low. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Low). This is considered appropriate as cultural practices incorporate the movement of populations of whales into the region. Whilst there may be low level impacts to individuals, these impacts are not expected to result in changes to whale migratory outcomes, impact population levels or change population distributions. An accidental hydrocarbon release carries moderate risks. With controls in place (described in Section 6.8 and 1.0), impacts and risks from these aspects are not expected occur, or to result in impacts to species populations. As such, the cultural ties and intrinsic links between environment receptors and First Nations peoples is expected to be maintained.

8.3.3.3 Culturally significant species – pinnipeds

Pinnipeds such as seals and sealions may be of significant value to First Nations people. The First Nations people of the Otway region have a profound relationship with Sea Country and seals feature in cultural practices and Dreaming stories and have been hunted as a valuable food resource. Koorn Moorn (seals) feature in song and dance of the Gunditjmara people and are also a food resource. There is evidence of the collection of seals within the Tarragal cave site that date back to 10,000 years (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023).

Important colonies and breeding habitats are found within the Monitoring Area and are in within proximity of the operational area (Figure 4-15).

Potential disruption to cultural features

First Nations groups and specific individuals within the groups may have kinship and/or responsibility to care for culturally significant species and their habitats (see Appendix 4 -). It is considered that impacts to species at a population level may inhibit First Nations people's ability to perform their obligations to care for culturally significant species and their habitats. If responsibilities have not

been met it could result in a sense of powerlessness to members of First Nation groups responsible for the protection and care of these species (Holcombe 2022).

As summarised in Table 8-2, potential impacts to pinnipeds from Activity aspects are limited to Level 1 consequences of minor and local to behaviour and possible temporary changes to habitat in the offshore environment, within or local to the operational area, and not within coastal environments where fauna are more likely to be encountered by people; no discernible disruption to cultural links would be expected. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Low).

Accidental hydrocarbon releases have the potential for moderate inherent risk wider afield, including in coastal areas. As described in Section 6.0, hydrocarbon exposure, of the potential nature and scale associated with Activity risks, would not be expected to result in changes to pinniped foraging and breeding behaviours or impact population levels. There is negligible risk that aspects of the Activity may either directly or indirectly impact on pinniped populations. With controls in place, these impacts and risks from these aspects are not expected to impact culturally significant species at a population level and hence are not expected to impact the value of culturally significant species. As such, the cultural ties and intrinsic links between environment receptors and First Nations peoples cultural heritage values is expected to be maintained.

8.3.3.4 Culturally significant species – seabirds

Seabirds may play a vital role in some First Nations cultural stories and traditions and birds and eggs are a source of food to many First Nations groups. Different avian species hold deep connections to lore and represent spiritual emblems or totems. The arrival of migratory seabirds and breeding seasons of seabirds are important markers for the different seasons observed by First Nations groups (Eastern Maar Aboriginal Corporation, 2014). Magpie gees and Cape Barren geese were harvested for food from wetland habitats (Gunditj Mirring Traditional Owners Aboriginal Corporation, 2023). For the Gunaikurnai people of Gippsland, sea birds play a role in their cultural stories and traditions. One notable story involves Borun, the pelican, who is a significant figure in their creation story. Borun is considered the ancestor of the Gunaikurnai people, highlighting the importance of sea birds in their cultural heritage (Gunaikurnai Land and Waters Aboriginal Corporation, 2015).

Seabirds are of significant value to some First Nations people. Foraging BIAs for nine seabird species overlap the Operational Area. Breeding, migration and aggregation areas can be found within the monitoring area (See Section 4.4.2, and Figure 4-8 to Figure 4-14).

Potential disruption to cultural features

First Nations groups and specific individuals within the groups may have kinship and/or responsibility to care for culturally significant species and their habitats (Appendix 4 -). It is considered that impacts to species at a population level may inhibit First Nations people's ability to perform their obligations to care for culturally significant species and their habitats. If responsibilities have not been met it may result in a sense of powerlessness to members of First Nation groups responsible for the protection and care of these species (Holcombe 2022).

As summarised in Table 8-2, potential impacts could result from temporary changes to the physical environment, such as via the introduction of a source of artificial light, which could be visible at distances up to ~48km from the operational area. As described in Section 6.0, impacts from planned Activity aspects such as light, are limited to Level 1 consequences of minor and local to behaviour, not resulting in population level impacts, or which change migratory outcomes.

Accidental hydrocarbon release is considered a Low risk for seabirds. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Low). With controls in place, these impacts and risks from these aspects are not expected to impact culturally significant species at a population level, as such, the cultural ties and intrinsic link between environment receptors and First Nations peoples cultural heritage values is expected to be maintained.

The unplanned introduction, establishment and spread of IMS, and accidental hydrocarbon release from the activity carry moderate risk. With controls in place (described in Section 6.0 and 1.0), these unplanned events are not expected to occur, or result in long term impacts to species populations. As such, the cultural ties and intrinsic links between environment receptors and First Nations peoples is expected to be maintained.

8.3.3.5 Bonney Upwelling - Key Ecological Feature

The Bonney Upwelling plays a crucial role for the ecosystems of the Otway region. The plankton that blooms with the Bonney Upwelling system supports many culturally significance species and are integral to the diets of culturally significant marine species such as whales, seals, fish and sea birds. The Gunditj Mirring people recognise the significance of the Bonney Upwelling as a dominant feature in the Otway marine region which brings cool nutrient rich water to the surface which supports plankton blooms.

Phytoplankton and zooplankton are widespread throughout oceanic environments and will occur within the operational area and monitoring area with a high level of diversity. Coastal krill swarms throughout the water column of continental shelf waters primarily in summer and autumn (linked to the Bonney Upwelling), feeding on microalgae and forming a fundamental component of the food chain that provides for culturally significant species.

Potential disruption to cultural features

First Nations groups and specific individuals within the groups may have kinship and/or responsibility to care for culturally significant species and their habitats (Appendix 4 -). Changes in the frequency or intensity of the Bonney Upwelling impacts the abundance of plankton which can have impacts on culturally significant species in the region such as whales, seals, fish and sea birds (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023).

In relation to the physical occurrence and characteristics of the Bonney Upwelling, Butler et al. (2004) identify climate change as a possible influence on its strength or frequency, though was not of serious concern. As summarised in Table 8-2, potential impacts to physical oceanographic processes are limited. The Activity contributes minor quantities of GHG emissions to Australia's carbon budget. There are no aspects of the Activity which may have a discernible effect on the occurrence, extent or productivity of the Bonney Upwelling. With regards the plankton that are associated with upwelling events, Activity aspects may have very localised and temporary impacts to negligible proportions of the plankton population (Table 8-2). These impacts will not result in changes to plankton local or regional diversity or productivity of plankton, or those fauna which rely on them as a food source. Therefore, the intrinsic links between these environment receptors and First Nations peoples cultural heritage values associated with plankton is expected to be maintained irrespective of the Activity activities.

8.3.3.6 Water quality

Water can be of particular cultural significance to First Nations peoples as an integral part Country, songs, ceremonies, hunting and collecting, and other activities that bind people to their Country and

each other. Aboriginal communities in Victoria maintain strong connections to waters and culture and may have knowledge of particular water sources. Water sources on Country may be culturally significant or archaeologically prospective. Water may be an intrinsic value to First Nations people, and it may include parts of Sea Country, beaches, land and freshwater habitats on the coast.

Potential disruption to cultural features

Planned discharges and unplanned releases have the potential to change water quality of offshore and coastal waters. The change in water quality has the potential to impact culturally significant species and harm Country. Community concerns from the Wadawurrung people on changes in water quality from pollution from industry and development has been noted (Wadawurrung Traditional Owners Aboriginal Corporation 2020).

As summarised in Table 8-2, potential impacts to water quality from planned Activity aspects are limited to Level 1 consequences of minor, temporary, and localised changes in the offshore environment. It is inferred that this level of impact in the offshore environment, would not cause disruption to the linkage between the environment receptor and First Nations peoples cultural practices. However, an accidental hydrocarbon release has the potential for more widespread reduction in water quality in Sea Country, and which could cause concern as to actual or perceived impacts to water quality. Relevant First Nations groups will be engaged in the event of an accidental hydrocarbon release as specified in Section 6.8.5 Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during such emergency events. With controls in place, the risks from an accidental hydrocarbon release are not expected to result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity, or species populations. As such, intrinsic links between First Nations people and cultural heritage values associated with water quality is expected not expected to be disrupted long term and would be recoverable.

8.3.3.7 Benthic habitats, intertidal communities, and shorelines

Benthic habitats may be valuable to First Nations people for their ecological values to sustain culturally significant species and for food resources. Benthic habitats within the Otway and Broader Bass Strait include sponge-dominated reef and sandy substrates. Within the operational area, patchy epifauna and presence of hard platform is consistent with the description of a KEF of the South-East bioregion, that is, shelf rocky reefs and hard substrates. Reefs provide habitat and shelter for fish and are important for aggregations of biodiversity and enhanced productivity (DoE, 2015). These are in deeper offshore waters and not accessible without a vessel suitable for offshore conditions and equipment that can reach the seabed in 60-80 m of water.

The operational area does not include an intertidal environment. Intertidal communities and shorelines include mangroves, macroalgae, seagrass, coastal saltmarsh, rocky and sandy shorelines. Intertidal reefs and sandy shorelines may be valued by First Nations people for their role in supporting culturally significant species. Intertidal communities and shorelines provide habitat and shelter to both marine and terrestrial fauna, including infauna and epifaunal invertebrates, fish and birds. Sea Country for Wadawurrung people includes coastal habitats such as seagrass and saltmarsh (Wadawurrung Traditional Owners Aboriginal Corporation 2020).

Potential disruption to cultural features

Impacts to benthic habitats, if at a widespread level, could disrupt intrinsic links between First Nations people and cultural heritage values of benthic habitats. Widespread changes have the potential to impact population levels of culturally significant species which might be available as a resource.

As evaluated in Section 8.3.1.2, change in benthic habitat in the operational area is expected to be localised, short-term and recoverable (Table 8-2). The area of impact is small compared to the extent and distribution of the benthic habitats identified within the Operational Area and wider region (Sections 6.0 and 1.0, and Table 8-2). Planned activity aspects will not impact on coastal benthic habitats; there would be no change to the level or diversity of resources available to First Nations people.

Changes to ecosystem functioning and integrity of intertidal communities and shorelines poses a potential risk to intrinsic links between First Nations people and the cultural heritage values of intertidal communities and shorelines. As summarised in Table 8-2, the introduction, establishment and spread of IMS has the potential for moderate inherent risk of either directly or indirectly impacting intertidal communities and shoreline habitats. With controls in place, impacts and risks from these aspects are not expected to result in widespread long-term impacts to intertidal communities and shorelines including ecosystem functioning and integrity. An accidental hydrocarbon release has the potential for more widespread impacts to benthic habitat within Sea Country and is more relevant in shallow coastal waters where there is higher potential for hydrocarbons to accumulate, and for benthic assemblages to be exposed over longer periods. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Relevant First Nations groups will be engaged in the event of an accidental hydrocarbon release as specified in Section 6.8.5 Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during and the recovery of Sea Country in such emergency events. With controls in place, the risks from an accidental hydrocarbon release are not expected to result in widespread long-term impacts to Sea Country or impacts to ecosystem functioning and integrity, or species populations. As such, intrinsic links between environment receptors and First Nations peoples cultural heritage values is expected not expected to be disrupted long term and would be recoverable.

8.3.3.8 Marine Park/ coastal reserves / wetlands

Marine Parks, Coastal Reserves, and wetlands are protected areas which are managed for the primary purpose of conserving the biodiversity found in them, while sometimes also allowing for sustainable use of natural resources. First Nations people may have strong cultural associations with Sea Country and have cultural responsibilities of Country within Marine Parks and Reserves. Some First Nations groups including the Gunaikurnai people jointly manage the Marine Parks and reserves on Country. The Marine parks and reserves around Wilsons Promontory and Ninety Mile Beach National Park were inhabited Gunaikurnai ancestors and are important for the Gunaikurnai people's connection to Country (Gunaikurnai Land and Waters Aboriginal Corporation 2015). The Marengo Reef Marine Park holds cultural significance for the Eastern Maar people and is a habitat for culturally significant marine species (Eastern Maar Aboriginal Corporation 2014).

Potential disruption to cultural features

Changes to ecosystem functioning and integrity of Marine Parks, coastal reserves and wetlands poses a potential risk to intrinsic links between First Nations people and the cultural heritage values of these places.

There is no overlap between the operational area and Marine Parks, Coastal Reserves and wetlands of International and National Importance, therefore, there is no direct risk to intrinsic links between First Nations people and cultural heritage values associated with Marine Parks, Coastal Reserves, and wetlands for planned Activity aspects.

As summarised in Table 8-2, the introduction, establishment and spread of IMS and accidental hydrocarbon release has the potential for moderate inherent risk of either directly or indirectly impacting Marine Park, coastal reserve, and wetlands. Relevant First Nations groups will be engaged in the event of an accidental hydrocarbon release as specified in Section 6.8.5. The risk severity is considered to be the same for the Cultural Feature as for the Environment Receptors that are the cultural feature, or form part of the cultural feature (Moderate).

Amplitude Energy maintains a list of key First Nations persons who have expressed an interest in playing a key role in the protection of cultural heritage during and the recovery of Sea Country in such emergency events. With controls in place to prevent and mitigate impacts if they were to occur, aspects are not expected to result in widespread long-term impacts to Marine Parks, Coastal Reserves, or to wetlands, when considering ecosystem functioning and integrity. As such, intrinsic links between environment receptors and First Nations peoples cultural heritage values is not expected to be disrupted long term and would be recoverable.

8.4 Control Measures, ALARP, and Acceptability

Table 8-3 provide a summary of the control measures and ALARP and Acceptability Assessment relevant to interactions with cultural features of the environment relating to First Nations people's heritage sites and values.

Table 8-3: First Nations Heritage Values and Sensitivities ALARP, Control Measures and Acceptability Assessment

First Nations Heritage Values and Sensitivities	
ALARP Decision Context and Justification	ALARP Decision Context: Type B ALARP decision context B has been applied in relation to First Nations people cultural heritage because the Activity carries residual (Moderate) risks and Level 4 consequences in relation to environment receptors that are linked to First Nations Cultural Heritage, cultural features. Controls to manage residual risks from the Activity upon physical, biological and social environment receptors have been considered and established in Sections 6.0 and 1.0. Additional Controls have been considered, and selected for aspects, specifically in relation to the protection and recovery of the intrinsic links between environment receptors and cultural heritage, for those risks which are of Moderate risk severity, these are: • Underwater sound emissions (Section 6.5.5 and 6.6.4) • Introduction, establishment and spread of IMS (Section 6.7.4) • Accidental hydrocarbon release (Section 6.8.5). • The additional Control Measures are described below.
Additional Control Measure	Source and Description of Control
CM30: Underwater Cultural Heritage Disturbance Risk Management Measures	Amplitude Energy Cultural Heritage Disturbance Risk Management Measures acknowledge legislative requirements and establishes the methods by which potential disturbance to cultural heritage is identified including via screening, consultation, and expert advice as required. The measures apply to the offshore Activity to ensure impacts and risks throughout the Activity remain within acceptable levels and are managed to ALARP. In accordance with advice from Heritage Victoria and DPC during Activity consultation, and in line with the UCH Guidelines (DCCEEW 2024d), prior to commencement of well construction activities a suitably qualified and

	experienced cultural heritage team will review geophysical data gathered during seabed surveys (refer CM16 Seabed Survey) for underwater cultural heritage and allow for the consideration of underwater cultural heritage and landscapes in final infrastructure locations so that it is avoided by the subsequent drilling activities, with a suitable exclusion area. The team will include a marine archaeologist and will also have familiarity with first Nations cultural landscapes and experience in identifying landscape features from geophysical data. Any subsequent management advice (e.g. exclusion zones) will be provided to Heritage Victoria and accounted for within Activity installation procedures. If cultural heritage is identified, it will be mapped, along with suitable exclusion area and its location integrated into Activity inductions and procedures to ensure it is avoided during Activity.
CM29: Engagement During Emergency Response	Engagement with relevant First Nations Representatives in the event of a loss of containment of hydrocarbons which may extend to coastlines to obtain advice on the management of cultural sensitivities which may be in the spill trajectory. Consultation in the event of a spill will ensure that relevant First Nations peoples are involved in the protection of cultural features that may be in the spill trajectory, and that government agencies support the protect and deflect strategy thus minimising potential impacts and risks to sensitivities. Engagement with relevant State Agencies and First Nations groups in the event of a spill, with information provided on an as-needed basis, to identify and protect cultural heritage sites from disturbance associated with spill response activities. The Eastern Maar, Gunditj Mirring, Wadawurrung and Gunaikurnai Indigenous groups were consulted. The Wadawurrung group felt that, given the location of the operation activities, further consultation was not required. The Eastern Maar and Gunaikurnai Aboriginal Corporations would like to be contacted in the event of a spill which could impact shorelines, to provide cultural heritage advice. Additionally, the Gunditj Mirring Traditional Owners Aboriginal Corporation requested to play a role in oil spill response activities.
Impact and Risk Summary	
Residual Impact Consequence	Level 2 - Localised short-term impacts to components of the environment which are linked to cultural values and sensitivities. *Planned activities and impacts will not disrupt cultural linkages with the environment.*
Residual Risk Consequence	• Underwater sound: Level 2 • Introduction and Spread of IMS: Level 4 • Accidental Hydrocarbon release: Level 3 • Spill Response: Level 3 • Unplanned discharges chemical and hydrocarbon LOC: Level 2 • Unplanned discharges waste: Level 2 • Interaction with marine fauna: Level 2
Likelihood	• Underwater sound: Possible (C) • Introduction and Spread of IMS: Remote (E) • Accidental Hydrocarbon release: Unlikely (D) • Unplanned discharges chemicals and hydrocarbons LOC: Unlikely (D) • Unplanned discharges waste: Unlikely (D) • Interaction with marine fauna: Unlikely (D).

Residual Risk	Moderate or lower for all aspects Potential long-term changes to cultural features associated with IMS and major hydrocarbon spills, though expected to be ultimately recoverable with involvement of First Nations peoples in the response to incidents, and repair of environment receptors and associated cultural features.
Demonstration of Acceptability	
Principles of ESD	Impacts from planned activities are assessed as having no greater than Level 2 consequence, which is not considered as having the potential to result in serious or irreversible environmental damage. In relation to intrinsic links to First Nations people's heritage sites and values; no disruption to these links are expected. Consequently, no further evaluation against the principles of ESD is required. The risk events associated with the activity are up to Moderate Severity, Level 4 consequence, though remote likelihood. Because of the Level 4 consequence, assessment against the principles of ESD is required. The level 4 consequence relates specifically to the risk of introducing, the spread and establishment of IMS. With the established processes in place, there is little residual uncertainty associated with the risk of IMS introduction, spread and establishment, as the activities are well known and well-practiced in the region, the cause pathways are well known, and risks are well regulated and managed under Australian biosecurity laws and guidance, and specific risk treatment measure (IMS Risk Management Protocol) developed by Amplitude Energy which operationalises the laws and guidance. Where ecosystem functions could be affected, and which could impact on resource distribution; these changes would be expected to be ultimately recoverable with involvement of First Nations peoples in the response to incidents, and repair cultural features of the environment. It is not considered that there is significant scientific uncertainty associated with this aspect. Therefore, the precautionary principle has not been applied beyond the precautionary measures already integrated into the IMS Risk Management Protocol.
Legislative and Conventions	• OPGGS Act • *Underwater Cultural Heritage Act 2018* • EPBC Act 1999 and EPBC Regulations 2000 • EPBC Act Listed Species Recovery Plans (including Blue Whale and Southern Right Whale), and species listing advice for Humpback whales • *Climate Change Act 2022* (Cwth) • *National Greenhouse and Energy Reporting Act 2007* (Cwth) • Paris Agreement • AMSA Marine Order 3 [Seagoing qualifications] • AMSA Marine Order 30 [Prevention of collisions] • AMSAs Marine Order 91 [Marine Pollution Prevention – oil] • OPGGS(E)R – Amplitude Energy Victorian OPEP (VIC-EPER-EMP-0001) • OPGGS(E)R- Amplitude Energy OSMP (VIC-ER-EMP-0002) • *Navigation Act 2014* - Notifications
Internal Content	Relevant management system processes adopted to implement and manage hazards to ALARP include: • Risk Management (MS03)

	• External Affairs, Investor Relations, Community and Stakeholder Management (MS05) • Technical Management (MS08) • Health Safety and Environment Management (MS09) • Supply Chain and Procurement Management (MS11) Activities will be undertaken in accordance with the Implementation Strategy of this EP.
External Context	• Gunditjmara Nyamat Mirring Plan 2023 – 2033 (Gunditjmara Sea Country Plan) (Gunditj Mirring Traditional Owners Aboriginal Corporation 2023) • Eastern Maar Meerreengeeye Ngakeeppoorryeeyt (Eastern Maar Aboriginal Corporation 2014) • Paleert Tjaara Dja Let's make Country good together 2020 – 2030 – Wadawurrung Country Plan (Wadawurrung Traditional Owners Aboriginal Corporation 2020) • Gunaikurnai Whole-of-Country Plan (Gunaikurnai Land and Waters Aboriginal Corporation 2015). • Underwater Cultural Heritage Guidelines for Offshore Developments (DCCEEW 2019) • Assessing and Managing Impacts to Underwater Cultural Heritage in Australian Waters. Guidelines on the application of the UCH Act 2018 (DCCEEW 2024d) • Consultation: All relevant persons, including First Nations Organisations and peoples have been identified, or provided the opportunity to self-identify, including, though not limited to, groups and individuals located in areas adjacent to the operational area, and areas which could be affected in the event of a hydrocarbon spill. Relevant persons, including First Nations peoples, have been provided with information on the activity, and where applicable, in a format requested by them. Amplitude Energy continues to provide opportunities to engage on the activities described in this plan. Section 11.0 provides a summary of all consultation undertaken for the activity. Feedback received during consultation which has informed this EP, and the management of impacts and risks includes: – Information from GMTOAC in relation to cultural heritage sites and values that are important to them; these were eel migration, whale migration, the Bonney Upwelling System and associated productivity, and Deen Maar. These sites and values align with the Gunditjmara Sea Country Plan. – Advice from Heritage Victoria and DPC was sought during consultation. Advice from Heritage Victoria related to the potential presence of UCH, the collection of seabed data, and reducing the uncertainty as to the presence of and impacts to cultural heritage. This has resulted in adapting control measures to provide for additional specialist UCH advice and review relevant seabed data prior to drilling, to reduce uncertainty.
Acceptability Outcome	Acceptable • The Activity aspects will not impact the intrinsic links of First Nations people to the Environment. The activity is not expected to have a significant impact (e.g. changes in population levels, ecosystem function, physical oceanography of the region) on cultural features of

	the environment (e.g. eels, whales, upwelling systems) relating to First Nations people's heritage sites, values, and cultural practices. • Whilst the activity will contact the seabed, the risk of disturbing potential cultural heritage is considered to be low given the offshore location of the activities and localised and temporary nature and scale. The (Low) risk of disturbing cultural heritage within the operational area is further reduced by recording, reporting and assessing any anomalies identified on the seabed before they are disturbed. • The potential risks of the activity associated with unplanned events including IMS introduction, establishment and spread, and accidental hydrocarbon release, are preventable. These risks are managed to ALARP, and any impact to intrinsic links are expected to be ultimately recoverable with the involvement of respective First Nations people, and acceptable if the adopted controls are implemented. To manage impacts to receptors to or below the defined acceptable levels the following EPOs have been applied: EPO23: No impact to underwater cultural heritage.

Table 8-4: Potential Impacts to Cultural Features - extended ALARP Assessment

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
Management of Knowledge and Change	Disruption to cultural link to, or practice associated with, a component of the environment	By continuing to enable engagement Amplitude Energy can modify control measures according to new information which may become available.	Yes	Administrative effort and travel	No new risks introduced	Implement. Refer to description of MOC process within the Implementation Strategy of this EP.
Record and Report Marine Mammal Observations	Disruption to cultural link to, or practice associated with, a component of the environment	Provides data which can be viewed by interested persons. May assist alleviate any concerns in relation to the activity affecting whale migration and links to cultural practices such as 'calling in whales'	Yes	Administrative effort	No new risks introduced	Implement. Refer to reporting requirements within the Implementation Strategy of this EP. This conclusion is responsive to consultation with GMTOAC for the approved Athena Supply Project Environment Plan (**Athena Supply Project**) and their particular interest in eel migration. Refer to consultation ID: FN-GMTOAC-20240214-Email This requirement has been included within

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						Implementation Strategy Section 12.12
Record and make available observations of culturally significant species to First Nations Groups	Disruption to cultural link to, or practice associated with, a component of the environment	May be of interest to First Nations Groups and their research partners, to build on existing knowledge.	N/A – not typically reported	Administrative effort	No new risks introduced	Implement. Added to reporting requirements within the Implementation Strategy of this EP. This conclusion is responsive to consultation with GMTOAC for the approved Athena Supply Project Environment Plan (**Athena Supply Project**) and their particular interest in eel migration. Refer to consultation ID: FN-GMTOAC-20240214-Email. This requirement has been included within Implementation Strategy Section 12.12.
Tag and track any eels observed by activity ROVs	Disruption to cultural link to, or practice associated with, a component of the environment	May be of interest to GMTOAC and their research partners, to build on existing knowledge of how and when eels	No precedents for activities of this nature/scale	Significant planning effort and field work and associated additional costs. Specialist researchers required to develop	Potential to cause harm to eels, and damage equipment. Not practicable in the offshore environment	Reject. Not possible.

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
		disperse through the Bass Strait.		and implement tagging program extending overall time of the activity offshore.	to capture and tag eels with ROV	
Engagement of First Nations peoples during Emergency Spill Response	Disruption to cultural link to, or practice associated with, a component of the environment.	By engaging First Nations peoples during spill response, the response can be managed to account for and protect cultural values and sensitivities in a culturally appropriate way.	Yes	Administrative effort to maintain contact details. Additional costs associated with meeting fees (as applicable) Additional cost to engage First Nations peoples during a spill response.	No new risks introduced	Implement. Included as a Control Measure within the OPEP. This conclusion is responsive to consultation with GMTOAC for the approved Athena Supply Project Environment Plan (**Athena Supply Project**) and their particular interest in recovery of Country in response to disasters. CM29 includes this requirement to engage with relevant First Nations Representatives in the event of a loss of hydrocarbons which may extend to coastlines to obtain advice on the

Additional Control Measures Considered	Related Risk Event	Benefit	Recognised Good Practice?	Sacrifice	Introduced Risks	Conclusion (Implement / Reject)
						management of cultural sensitivities. Refer to consultation ID: FN-GMTOAC-20240405-Email.
Project inductions to all relevant marine crew include information on the cultural links with elements of the environment that may be observed in the operational area, including whales.	Disruption to cultural link to, or practice associated with, a component of the environment.	By providing information on the cultural heritage aspects which may occur in the activity area the marine crews understanding of the importance and significance of these things may be enhanced and will be consistent across the team.	Yes	Administrative effort / travel to prepare / deliver inductions to marine crew.	Risk of sharing information that is culturally sensitive. Mitigation: only provide information that is publicly available.	Implement. Added to induction requirements within the Implementation Strategy of this EP.
Use of cultural heritage monitors on vessels to oversee implementation of controls protecting cultural values.	Disruption to cultural link to, or practice associated with, a component of the environment.	No benefit. Trained marine mammal observers will be established on vessels to implement MMO protocols. Risks to UWCH are considered Low given nature and scale of the activities (ref discussion with Heritage Victoria, 2024).	No precedents for activities of this nature/scale	Costs associated with training additional personnel for offshore work, medical checks, mobilisation.	Potential exceedance of vessel capacity (bed space). HSEC risks associated with working offshore.	Reject. Existing oversight and reporting established for the project is considered sufficient

9.0 Cumulative Impact Assessment

In the context of offshore petroleum activities cumulative environmental impacts are defined by the regulator, NOPSEMA, as successive, additive, or synergistic impacts of collectively significant activities or projects with material impacts on the environment that have the potential to accumulate over temporal and spatial scales (NOPSEMA Environment Plan Decision Making Guideline, N-04750-GL1721 A524696, Jan 2024).

The effects of past project activities, and currently operating activities, are captured when describing the existing condition of and any pressure or threats affecting the environment (refer to Section 4.0 Description of the Environment). This baseline condition and understanding of the capacity of the receiving environment and receptors to accommodate changes, considering existing pressures and threats, informs the environmental impact assessments conducted in Section 6.0.

The focus of the cumulative impact assessment is to build on these assessments by considering the potential impacts from the planned components of the proposed activity on key matters in conjunction with the potential impacts from other reasonably foreseeable future projects and activities. Impacts and risks from unplanned aspects have not been considered in the cumulative impact assessment. It is not reasonable to consider unplanned aspects for cumulative environmental effects, because of the low likelihood relating to unplanned events for the Annie-2 development well and other foreseeable future projects and activities.

The types of activities and projects typically considered in cumulative impact assessment (CIA) are large in scale and are of relevance in terms of potentially contributing to or compounding material impacts in the relevant project area. While an environmental value is at the centre of the CIA this doesn't mean that every potential impact of regional concern to that value needs to be addressed. For example, while loss of habitat to a threatened species may be of regional concern, there may be no reason to incorporate those potential impacts into a project-initiated CIA if the project under assessment does not contribute to long term habitat reduction (Minerals Council of Australia 2015). The scoping assessment is used to identify where the Annie 2 development well contributes to cumulative impacts which may be material.

In accordance with regulation 56 of the OPGGS(E)R (Sections 1.3.1and 2.0), this section of the EP refers to the accepted **ECSP OPP**. The accepted OPP is publicly available on the NOPSEMA website (Cooper Energy 2025). The OPP includes a cumulative impact assessment (CIA) of the ECSP Activities within Section 11 of the OPP (AEL 2025). Given the activities for the Annie-2 Development are a part of ECSP, the cumulative impact assessment (CIA) for the Activity within this EP is considered covered under the CIA detailed in the OPP.

The OPP identifies EPOs, control measures, EPSs, and measurement criteria that have been developed as part of a systematic approach to the management of environmental risks to address potential cumulative impacts. Amplitude Energy acknowledges the need for shared responsibility to manage cumulative impacts and will actively collaborate with other petroleum titleholders, share relevant data and promote coordinated efforts to ensure that all reasonably foreseeable activities adhere to acceptable environmental standards to mitigate cumulative impacts.

Amplitude Energy will communicate specific work programs with other the Otway Basin Petroleum Titleholders with the aim of minimising the potential for cumulative impacts associated with underwater sound, should activity timings potentially result in concurrent activities and overlap biologically important period (January to June) for blue whales (refer CM 11 and CM 15).

Any observation, incidents, and opportunities for improvement regarding the interaction with other users will be reported to other petroleum titleholders. This additional control has been adopted and

included against CM11: Titleholder Collaboration and CM15: Campaign Risk Review as updated in Section 10.0

9.1 Identify reasonably foreseeable future projects and activities

In accordance with CM27 within the OPP: *Each future EP resulting from the East Coast Project OPP will undertake a review for additional or significantly revised reasonably foreseeable projects. Additional or significantly revised projects will be assessed as per CIA methodology (Section 11.1 of the OPP). Any cumulative impacts from new, significantly revised or currently unknown activities that results in an unacceptable level of impact to receptors, will be subject to new or revised control measures within the appropriate EP to reduce cumulative impacts to ALARP.*

A review for additional or significantly revised reasonably foreseeable projects was undertaken in accordance with Section 11.1 of the OPP, refer Table 9-1. No additional or significantly revised reasonably foreseeable projects when compared with Section 11.2.1 of the OPP were identified as part of this review. As a result, the CIA in Section 11 of the OPP for the ECSP as a whole is considered a conservative, valid and appropriate CIA for the Activity within this EP.

Table 9-1: Reasonably foreseeable future projects or activities in the offshore Otway Basin.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Petroleum Activities					
Amplitude Energy [Cooper Energy]	Operations of the existing CHN facilities to the Athena Gas Plant since 2006 (CHN operations) (Cooper Energy, 2024). Includes regular vessel-based inspections, maintenance and repair; and well workovers using a MODU.	Existing	Ongoing End of field life ~2050	Yes – there is a potential temporal overlap of drilling the Annie 2 development well with CHN operations IMR campaigns. At the time of preparing this EP there is no planned IMR campaign concurrent with drilling activities. It is expected that future monitoring campaigns as described in this EP will be scheduled sequential with IMR campaigns for CHN Operations.	Yes – the Annie 2 development is adjacent to the existing CHN facilities, and will ultimately become part of the operating facilities. Light EMBA A 'localised (small radius of light glow around vessels)' assessed for Cooper's CHN activities (Cooper Energy, 2024a), could be entirely overlapped by the Annie 2 development well precautionary 49 km flaring EMBA. The CHN EMBA overlaps foraging BIAs for multiple bird species, including albatross and gannets. Sound EMBA Noise EMBAs (5.97 km marine mammal behaviour criteria during resupply) resulting from CHN Operation vessels overlap with those of this EP (refer Appendix 7 -). The CHN EMBA overlaps: • foraging BIAs for pygmy blue whale, including the annual high use area • migration BIA and reproduction BIA for southern right whale • distribution BIA for white shark (Cooper Energy, 2024a)
Beach Energy Limited	Operations of Halladale, Speculant, Geographe, Thylacine gas fields	Existing	Ongoing	Yes – potential temporal overlap of IMR campaigns schedule with timing of drilling	Yes – potential overlapping of Beach Otway operations underwater sound and light emissions EMBAs with Annie 2 development underwater sound and light emissions EMBAs.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
	to the Otway Gas Plant (Otway operations) (Beach, 2024). Includes regular vessel-based inspections, maintenance and repair. And well workovers using a MODU.		End of field life ~2037	Annie 2 development well and vessel campaigns, though there is also potential for activities to occur sequentially.	Light EMBA A precautionary 20 km light EMBA was applied by Beach (Beach, 2024), which could overlap Annie 2 development well precautionary 49 km flaring EMBA. The Beach light EMBA overlaps • foraging BIAs for multiple bird species, such as albatross, petrels, and shearwater species, • breeding BIAs for the wedge-tailed shearwater, and • roosting BIAs for little curlew, pin-tailed snipe, and swinhoe's snipe Sound EMBA Modelling predicted the furthest sound contour distance for Beach IMR activities as 7.5 km to reach the noise effect criteria for behavioural effects in marine mammals (Beach, 2024) and this overlaps with those of this EP (Appendix 7 -). The Beach noise EMBAs overlaps: • the migration BIA for the southern right whale, • the foraging BIAs for the pygmy blue whale, including the annual high use area (Beach, 2024).
Amplitude Energy [Cooper Energy]	Exploration Drilling	Accepted	2025-2029 (~60 days per well, max 3 wells)	There is no potential overlap of the drilling of Annie 2 development well and the East Coast Project drilling activities.	No overlap.
ConocoPhillips	Exploration Drilling	Accepted	2025-2028	Yes – potential overlap of ConocoPhillips drilling activities and vessel related activities of the	Yes – potential overlap of underwater sound and light emissions EMBAs between ConocoPhillips exploration drilling activities and vessel related activities described in this EP.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
			(typically, 30-40 days per well, max 6 wells)	Annie 2 development drilling activities. The Annie 2 development drilling activities will not occur concurrently with exploration drilling activities, however may occur sequentially.	The ConocoPhillips exploration drilling operational area (VICP/79 portion) is located adjacent to the Annie 2 development well operational area. Light EMBA A precautionary 49 km flaring associated light EMBA applied by ConocoPhillips (ConocoPhillips, 2024a) could overlap with a portion of the Annie 2 development drilling precautionary 20 km routine light EMBA. There will be no concurrent overlap of flaring EMBAs between the projects. Flaring for the drilling activity will be short-term (maximum of 100 hours), temporary and only required for 4 of the 6 proposed wells (ConocoPhillips, 2024a). ConocoPhillips flaring EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species • breeding BIAs for petrel, shearwater, penguin and cormorant species • migration route for the orange-bellied parrot (ConocoPhillips, 2024a). Sound EMBA Modelling for ConocoPhillips activities predicted the furthest sound contour distance for exploration drilling activities within the operational area was 12.6 / 22.8 km non-shelf / on shelf edge locations to reach the noise criteria threshold for behavioural effects in marine mammals (ConocoPhillips, 2024a). Annie 2 development drilling noise EMBA only overlaps shelf areas. ConocoPhillips noise EMBAs overlaps: • foraging BIA for the pygmy blue whale • migration BIA for the southern right whale

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					distribution BIA for the white shark (ConocoPhillips, 2024a).*
Woodside Energy	Minerva Decommissioning and Field Management	Accepted	2024-2025 Approximate duration is 90-120 days (Woodside, 2024).	The accepted EP describes the activities and being completed in 2025. The activity has not been completed at the time of preparing this EP, and Woodside are required to remove the remaining kit at the Minerva field on blocks VIC/L22 and VIC/PL33 by April 2028. Therefore there is potential for overlap of the Annie 2 development well activities with decommissioning at Minerva.	Yes – potential overlap of underwater sound and light emission EMBAs between Minerva decommissioning activities and Annie 2 development drilling activities. The Minerva decommissioning operational area is located adjacent to Annie 2 development drilling operational area. Light EMBA Woodside do not define a light EMBA outside of their operational area (Woodside, 2024). However, overlap associated with the light EMBAs for Annie 2 activities may occur due to the proximity of Minerva decommissioning operational area to Annie 2 development well. The precautionary 20 km routine light EMBA and/or the 49 km flaring EMBA for Annie 2 development drilling may overlap with the vessel activities within the Minerva decommissioning operational area. Woodside's operational area overlaps: • migratory route for the orange-bellied parrot • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species (Woodside, 2024). Sound EMBA Modelling for Woodside activities predicted the furthest sound contour distance for decommissioning activities within the operational area was 2.4 km (during equipment removal) to reach the noise criteria threshold for behavioural effects in marine mammals (Woodside, 2024). Noise EMBAs for the Annie 2 development well activities will not overlap those of the Minerva Decommissioning and Field Management activities.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					Woodsides noise EMBAs overlaps: • foraging BIA for the pygmy blue whale • migration BIA for the southern right whale (Woodside, 2024).
Woodside Energy	Minerva Plug and Abandonment	Accepted	2025 Approximate duration 40 – 160 days (Woodside, 2024)	No potential overlap, the Minerva Plug and Abandonment activities have been completed.	No potential overlap, the Minerva Plug and Abandonment activities have been completed.
Beach Energy Limited	Offshore Gas Victoria Drilling and P&A Activities	Proposed	2025-2028 Drilling: 30-40 days per well, max 5 wells P&A: 15-20 days per well, max 5 wells	Yes – potential overlap of planned impact EMBAs associated with Beach drilling and P&A activities and timings of Annie 2 development well activities (vessel campaigns). The drilling of Annie 2 development well will not occur concurrently with Beach Energy drilling and P&A activities, as the same MODU and vessels would be expected to be used for the respective	Yes – potential overlap of underwater sound and light emissions EMBAs between Beach drilling and P&A activities and Annie 2 development well activities. The Beach drilling and P&A operational area do not overlap with the Annie 2 development well operational area. Light EMBA A precautionary 20 km light EMBA applied by Beach (Beach, 2024a) could overlap with the Annie 2 development well precautionary 20 km routine light EMBA. There is no flaring allowed for under the Offshore Gas Victoria Drilling and P&A Activities EP (Beach, 2024a). Therefore, there will be no concurrent or consecutive overlap of flaring EMBAs. Therefore, concurrent overlap of the routine light EMBAs (20 km) is considered the main source for potential cumulative impact. Beach's light EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
				activities of each Titleholder. However, the activities may occur in sequence.	• likely migration route for the orange-bellied parrot • foraging BIA for the white shark (Beach, 2024a). Sound EMBA Modelling for Beach activities predicted the furthest sound contour distance for exploration drilling activities within the operational area was 19.6 km to reach the noise criteria threshold for behavioural effects in marine mammals (Beach, 2024a) and this overlaps with the noise EMBA for Annie 2 development drilling. Beach noise EMBAs overlaps: • foraging BIA for pygmy blue whale • migration BIA for southern right whale • distribution BIA for white shark (Beach, 2024a).
Beach Energy Limited	Geophysical/ Geotechnical Survey	Accepted	2024-2028	Yes – potential temporal overlap of planned impact EMBAs during geophysical survey and timing of Annie 2 development drilling activities. There is also potential for activities to occur sequentially.	Yes – potential overlapping of Beach Geophysical/Geotechnical surveys underwater sound and light emissions EMBAs with Annie 2 development drilling underwater sound and light emissions EMBAs. Light EMBA A precautionary 20 km light EMBA applied by Beach (Beach, 2024) could overlap the Annie 2 development drilling precautionary 49 km flaring EMBA. Beach's light EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species • breeding BIAs for the little penguin, white bellied sea eagle, and short-tailed shearwater, and • roosting BIAs for little curlew, pin-tailed snipe, and swinhoe's snipe (Beach, 2024).

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					Sound EMBA Modelling for Beach activities area predicted the furthest sound contour distance for geophysical surveys within the Otway operational area was 145 m to reach the noise criteria threshold for behavioural effects in marine mammals (Beach, 2023) and could overlap the noise EMBA for Annie 2 development drilling if activities occur concurrently. Beach's noise EMBAs overlaps: • migration BIA for the southern right whale, and • foraging BIAs for the pygmy blue whale, including the annual high use area (Beach, 2024).
CGG - Regia	Seismic Survey	Proposed	2024-2028 • 60 days acquisition • 90 days in field • One survey between November – May) or Two separate surveys April – June, and or September – November.	Yes – potential temporal overlap of planned impact EMBAs associated during seismic acquisition timeframe and timings of Annie 2 development drilling activities. There is also potential for the activities to occur sequentially.	Yes – potential overlapping of CGG-Regia underwater sound and light emissions EMBAs with Annie 2 development drilling underwater sound and light emissions EMBAs. Light EMBA The Annie 2 development drilling 49 km flaring associated light EMBA overlaps the precautionary 20 km light EMBA applied by CGG. CGG's light EMBA overlaps • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species (CGG, 2024). Sound EMBA Modelling for CGG activities predicted the sound contour distance to reach the noise criteria threshold for behavioural effects up to 44 km and overlap with the noise EMBA described in this EP. Results predicted a maximum distance of ~23 km for

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					pygmy blue whale, and ~15 km for southern right whale. CGG's noise EMBA overlaps: • the migration BIA for the southern right whale, • the distribution and foraging BIA (annual high use area) for the pygmy blue whale, and • the foraging BIA for the Australian Fur-seal.
Beach Energy	Development of Artisan and La Bella gas fields (Beach, 2021).	Accepted OPP Proposed	2024-ongoing • Seabed assessments: up to 30 days • Drilling activities for production wells: 70 to 90 days per well • Plugging wells: 30 days per well Inspections and modifications to existing seabed infrastructure: 30 - 120 days per field.	Yes – potential temporal overlap during the development of Artisan and La Bella gas fields with timings of Annie 2 development drilling activities. There is also potential for activities to occur sequentially.	Yes – potential overlapping of Artisan and La Bella development activities' underwater sound and light emissions EMBAs with Annie 2 development drilling underwater sound and light emissions EMBAs. Light EMBA The precautionary 20 km light EMBAs applied by Beach will overlap the Annie 2 development drilling 49 km flaring EMBA during flaring. Beach's light EMBA overlaps: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species (Beach, 2023). Sound EMBA Preliminary modelling for Beach predicted the furthest sound contour distance to reach the noise criteria threshold as <3-7 km for development activities (Beach, 2023). and this overlaps the predicted Annie 2 development drilling EMBA. Beach's sound EMBA overlaps: • foraging BIAs for pygmy blue whale, including annual high use area, • migration BIAs for southern right whale.
Offshore Wind					

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Alinta Energy and JERA Nex (Spinifex Offshore Wind)	Construction, operation, decommissioning and associated surveys and monitoring for multiple offshore wind farms. The licence area is ~285 km^2 in size and expected to be a 1GW+ development in size. It is located ~24 km from the East Coast Project operational area.	Feasibility licence	The licence was awarded in March 25. The project is in the pre-planning phase and as such no specific details are currently publicly available for this installation. Suggested dates are: Surveys – ~2025 – 2028; Turbine Installation – ~2031; Typical operation period of 25 years (DCCEEW 2025).	Yes – potential temporal overlap of the Spinifex Offshore Wind installation with timings of Annie 2 development drilling activity. There is also potential for activities to occur sequentially.	Yes – There is potential spatial overlap of underwater sound and light EMBAs associated with The Spinifex Offshore Wind installation and Annie 2 development drilling activities. Light EMBA Due to the early phase of development, no modelling has been completed to identify the light EMBA for The Spinifex Offshore Wind installation, however, the Annie 2 development well drilling activities predicted the light EMBAs to range from 20 - 49 km, depending on flaring, therefore an overlap could occur using a proxy 20 km EMBA. This proxy light EMBA for the licence area will overlap: • foraging BIAs for multiple bird species, such as several albatross, petrel, and shearwater species Sound EMBA Due to the early phase of development, there is no publicly available modelling to identify the sound EMBA for The Spinifex Offshore Wind installation. However, proxy modelling from comparative offshore windfarm designs (Norro et al., 2013) of ~20 km marine mammal behavioural threshold overlaps modelling for this EP. The Spinifex licence area overlaps: • foraging BIAs for pygmy blue whale, including annual high use area, • migration BIAs for southern right whale

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					Given the nature and scale of the Annie 2 development well activities, and the control measures in place (designed with consideration to relevant species recovery plans), the additive effect of the Annie Development drilling activities are expected to be negligible.
Commercial Fisheries					
Bass Strait Central Zone Scallop Fishery	Towed dredge fishing method with managed seasonal / area closures and total allowable catch controls.	Active	July to 31 December each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	No – The Annie 2 development well operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Annie 2 development well activities is not expected. Refer to Table 4-5 for further information on commercial fisheries.
Eastern Tuna and Billfish Fishery	Fishing conducted using pelagic longline, minor line (such as handline, troll, rod and reel) method.	Active	Season goes all year, commencing on 1 January each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	No – The Annie 2 development well operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Annie 2 development well activities is not expected. Refer to Table 4-5 for further information on commercial fisheries.
Small Pelagic Fishery	Midwater trawl, purse seine and jigging and mine line methods are permitted for fishing.	Active	12-month fishing season commences 1st May each year	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for	No – The Annie 2 development well operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Annie 2 development well activities is not expected.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
				activities to occur sequentially.	Refer to Table 4-5 for further information on commercial fisheries.
Southern and Eastern Scalefish and Shark Fishery – Commonwealth Gillnet and Shark Hook Sector	Fishing conducted using demersal gillnet, demersal longline and auto-longline methods.	Active	12-month fishing season commences 1st May each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Annie 2 development well operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. Light EMBA The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Annie 2 development well if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to range from 20 - 49 km, depending on flaring. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. Sound EMBA The localised sound EMBA around the fishing vessel may be overlapped by the Annie 2 development well if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. However, given the spatial area of the fishery the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					Refer to Table 4-5 for further information on commercial fisheries.
Southern and Eastern Scalefish and Shark Fishery – Commonwealth Scalefish Hook Sector	Multi-gear fishery.	Active	12-month fishing season commences 1st May each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Annie 2 development well operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. Light EMBA The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Annie 2 development well activities if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to range from 20 - 49 km, depending on flaring. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. Sound EMBA The localised sound EMBA around the fishing vessel may be overlapped by the Annie 2 development well if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery, the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-5 for further information on commercial fisheries.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Southern and Eastern Scalefish and Shark Fishery – Commonwealth Trawl Sector	Multi-gear fishery.	Active	12-month fishing season commences 1st May each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Annie 2 development well operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. Light EMBA The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Annie 2 development well if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to range from 20 - 49 km, depending on flaring. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. Sound EMBA The localised sound EMBA around the fishing vessel may be overlapped by the Annie 2 development well if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery, the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-5 for further information on commercial fisheries.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
Southern Blue Fin Tuna Fishery	Pelagic longline and purse seine fishing gear is used in this fishery.	Active	12-month fishing seasons commences 1st December each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	No – The Annie 2 development well operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Annie 2 development well is not expected Refer to Table 4-5 for further information on commercial fisheries.
Southern Squid Jig Fishery	Single method of jigging.	Active	12-month fishing seasons commences 1st December each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Annie 2 development well operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. Light EMBA The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Annie 2 development well if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to range from 20 - 49 km, depending on flaring. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. Sound EMBA The localised sound EMBA around the fishing vessel may be overlapped by the Annie 2 development well if fishing occurs within the sound EMBA. The fishery may overlap:

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					• foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery, the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-5 for further information on commercial fisheries.
Victorian Abalone Fishery	Hand collected by divers.	Active	12-month fishing season commences 1st April each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	No – The Annie 2 development well operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessel and the Annie 2 development well is not expected. Refer to Table 4-5 for further information on commercial fisheries in Victorian state waters.
Victorian Rock Lobster Fishery	Baited pot collection method. Season is split into male and female open seasons.	Active	Female open season: Nov 16-May 31. Male open season: Nov 16 – 16 Sept	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Annie 2 development well operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. Light EMBA The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Annie 2 development well if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to range from 20 - 49 km, depending on flaring. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					Sound EMBA The localised sound EMBA around the fishing vessel may be overlapped by the Annie 2 development well if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery, the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-5 for further information on commercial fisheries in Victorian state waters.
Victorian Giant Crab Fishery	Baited pot collection method with only one entrance and one chamber. Season is split into male and female open seasons.	Active	Female open season: Nov 16-May 29 Male open season: Nov 16 – 16 Sept	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Annie 2 development well operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. Light EMBA The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Annie 2 development well if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to range from 20 - 49 km, depending on flaring. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					Sound EMBA The localised sound EMBA around the fishing vessel may be overlapped by the Annie 2 development well if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-5 for further information on commercial fisheries in Victorian state waters.
Victorian Scallop Fishery	Using scallop dredge.	Active	12-month fishing season commencing 1st April.	Yes – potential temporal overlap of fishing vessel Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	No – The Annie 2 development well operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Annie 2 development well is not expected. Refer to 4.4.3 for further information on commercial fisheries in Victorian state waters.
Victorian Octopus Fishery	Baited pots collection method.	Active	Year-round season	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Annie 2 development well operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. Light EMBA

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
				activities to occur sequentially.	The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Annie 2 development well if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to range from 20 - 49 km, depending on flaring. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. Sound EMBA The localised sound EMBA around the fishing vessel may be overlapped by the Annie 2 development well if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to Table 4-5 for further information on commercial fisheries in Victorian state waters.
Victorian Sea Urchin Fishery	Hand collection.	Active	12-month fishing season commencing 1st July each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	No – The Annie 2 development well operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Annie 2 development well is not expected.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					Refer to Table 4-5 for further information on commercial fisheries in Victorian state waters.
Victorian Wrasse Fishery	Hook and line collection.	Active	Year-round season.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	Yes – There is a potential that fishing vessels associated with this fishery may be actively fishing within or in proximity to the Annie 2 development well operational area and therefore there is potential overlap of underwater sound and light emissions EMBAs. Light EMBA The localised (small radius of light glow) expected around fishing vessels may be overlapped by the Annie 2 development well if fishing occurs within the light EMBA. Modelling predicted the light EMBAs to range from 20 - 49 km, depending on flaring. The fishery may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. Sound EMBA The localised sound EMBA around the fishing vessel may be overlapped by the Annie 2 development well if fishing occurs within the sound EMBA. The fishery may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the fishery Figure 4-30 the overlap from the light and sound EMBAs will be relatively small compared to the area of available fishing grounds. Refer to

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					Table 4-5 for further information on commercial fisheries in Victorian state waters.
Bass Strait Central Zone Scallop Fishery	Towed dredge fishing method with managed seasonal / area closures and total allowable catch controls.	Active	July to 31 December each year.	Yes – potential temporal overlap of fishing vessel activities with timings of Annie 2 development well activities. There is also potential for activities to occur sequentially.	No – The Annie 2 development well operational area overlaps with the fishery management area, however based on current fishing activity presence of fishing vessels in the operational area is unlikely. Potential overlap of underwater sound and light emissions EMBAs between fishing vessels and the Annie 2 development well is not expected. Refer to Table 4-5 for further information on commercial fisheries.
Commercial Shipping					
Numerous shipping channels throughout the Otway Basin	The South-east Marine Region is one of the busiest shipping regions in Australia and Bass Strait is one of Australia's busiest shipping routes. The main shipping channel for vessels (e.g., cargo tankers) travelling between major Australian and foreign ports is located south of the Otway Development, about 75 km (40 nm) south of Warrnambool.	Active	All year round, about 3-4 vessels per day.	Yes – potential temporal overlap of shipping activities with timings of Annie 2 development drilling activities. There is also potential for activities to occur sequentially.	Yes – potential overlapping with underwater sound and light emissions. Light EMBA The localised (small radius of light glow) expected around shipping vessels may be overlapped by the Annie 2 development drilling activities if shipping comes within the light EMBA. Modelling predicted the light EMBAs to range from 20 - 49 km, depending on flaring. The Shipping activity throughout the Otway Basin may overlap: • foraging and breeding BIAs for multiple bird species, such as several albatross, petrel, and shearwater species. Sound EMBA The localised sound EMBA around the shipping vessel may be overlapped by the Annie 2 development drilling activities if

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
					shipping comes within the sound EMBA described in this EP. The Shipping activity throughout the Otway Basin may overlap: • foraging, distribution and migrations BIAs for marine fauna, including cetaceans, pinnipeds, and sharks. Given the spatial area of the shipping areas (Figure 4-42) the overlap from the light and sound EMBAs will be relatively small compared to the available shipping channels throughout the Otway Basin.
Defence					
King Island UXO	The King Island UXO was used during 1954 as an Air-to-Air Firing Range. This area is classed as slight potential.	Existing	Ongoing	N/A	No – the Annie Development Drilling activities do not intersect any UXO sites.
Bass Strait Sea Dumping UXO	The Bass Strait Sea Dumping UXO area was used for the dumping of ordnance and other items in 1998-1999.	Existing	Ongoing	N/A	No – the Annie Development Drilling activities do not intersect any UXO sites.
Swan Island Defence Precinct	The Swan Island training area is located in the eastern side of Swan Island, near to Queenscliff in Victoria. It is a join training	Existing	Ongoing	Yes – potential temporal overlap of Swan Island Defence Precinct activities with timings of Annie 2 development drilling activities. There	No – the Annie Development Drilling activities do not overlap with the Swan Island Defence Precinct. The large distance between the two areas prevents potential spatial overlap of underwater sound EMBAs.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap
	facility operated by the Australian Secret Intelligence Services.			is also potential for activities to occur sequentially.	

9.2 Scoping assessment to identify relevant key environmental matters

In accordance with regulation 56 of the OPGGS(E)R (Sections 1.3.1and 2.0), this section of the EP refers to the accepted **ECSP OPP**. The accepted OPP is publicly available on the NOPSEMA website (Cooper Energy 2025).

The OPP includes a cumulative impact assessment (CIA) of the ECSP Activities within Section 11 of the OPP (AEL 2025). Given the activities for the Annie-2 Development are a part of ECSP, the scoping assessment to identify relevant key environmental matters presented in Table 11-2 of the accepted **ECSP OPP** is appropriate to support this aspect of the cumulative impact assessment (CIA) for the Activity within this EP therefore considered covered under the CIA detailed in the OPP.

9.3 Detailed cumulative impact assessment

In accordance with regulation 56 of the OPGGS(E)R (Sections 1.3.1and 2.0), this section of the EP refers to the accepted **ECSP OPP**. The accepted OPP is publicly available on the NOPSEMA website (Cooper Energy 2025).

Given that there has been no change to the foreseeable future projects and activities that may overlap with the Annie 2 development well activities since the preparation and acceptance of the **ECSP OPP**, and that the Annie-2 development well activity description is concordant with the OPP activity description (refer Table 14-3) Section 11.3 of the **ECSP OPP** the cumulative impact assessment (CIA) covers for the CIA for the Annie 2 development well activities (this EP).

10.0 Environmental Performance Outcomes, Standards, and Measurement Criteria

This section summarises the EPOs, standards, and measurement criteria that have been developed as part of a systematic approach to the management of environmental risks as identified in Section 6.0.

The EPOs, standards and criteria related to the Activity activities are shown in . Also shown are key responsible and accountable personnel who will ensure the EP is implemented and records of implementation retained.

The following legislative and guideline definitions are used in this section:

- EPOs – a measurable level of performance required for the management of the environmental aspects of the activity to ensure the environmental impacts or risks will be of an acceptable level.
- EPSs – a statement of performance required of an adopted control measure.
- Measurement criteria – defines the measure by which environmental performance will be measured to determine whether the EPO has been met.

A summary of the EPOs are listed in Table 10-1.

The associated control measures, EPSs, measurement criteria are listed in Table 10-2.

Table 10-1: Environmental Performance Outcomes

Reference	Environmental Performance Outcome
EPO1	Manage atmospheric emissions generated by activities defined in this EP in accordance with MARPOL Annex VI (Prevention of Air Pollution from Ships) enacted in the Navigation Act 2012, with no impacts to amenity outside of the operational area.
EPO2	Undertake drilling discharges management processes to reduce as far as practicable the overall volumes of WBDF discharged to the marine environment.
EPO3	Only approved chemicals (which meet low ecotoxicity pre-screening criteria or are further justified as ALARP) will be discharged to sea within project discharges.
EPO4	Use solids control equipment, when drilling with riser installed, to recover and limit discharge of excess drilling fluids to the environment.
EPO5	Manage discharge of residual bulks materials to the marine environment in accordance with Amplitude Energy's residual bulks management process. No bulk discharge of SBDF.
EPO6	The selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts will: • Avoid areas of high relief outcrops, reefs, and sponge beds, where practicable. • Not disturb underwater heritage as defined under the Underwater Cultural Heritage Act 2018.
EPO7	Planned vessel/ MODU discharges will meet AMSA Discharge Standards for operating in Australian waters.
EPO8	Undertake Seabed Surveys to inform the selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts, including potential changes to seabed quality.
EPO9	Seabed disturbance is limited to the planned disturbance areas defined in this EP and within the operational area.
EPO10	Impacts to commercially targeted species will be limited to temporary[3] and localised[3] change in fauna behaviours.

Reference	Environmental Performance Outcome
	[3] Temporary and localised change in fauna behaviours for commercially targeted species limited to activity durations and seabed disturbance footprint defined in Section 6.3.2.
EPO11	Undertake Ongoing Engagement with relevant First Nations groups to ensure identified tangible and intangible cultural heritage and potential risks to cultural heritage values remains current and its protection is provided for within the EP for the Activity.
EPO12	Artificial light generated by the Activity will be managed to ensure biologically important behaviours of light-sensitive species that occur within the Activity light EMBA can continue while project activities are being undertaken, by applying relevant measures from the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023a), whilst meeting lighting requirements for safe navigation and work at night.
EPO13	Manage direct and indirect GHG emissions from the Activity consistent with Australia's international GHG emissions commitments, as outlined in the *Climate Change Act 2022* (Cwth). Emissions are to be determined based on the NGER scheme and managed by the Safeguard Mechanism.
EPO14	Impacts to marine fauna from underwater anthropogenic noise emissions will be limited to temporary* behavioural change localised** to the noise source. **Not exceeding the duration of the activity component (i.e. vessel campaign) (described in Section 6.5.2 and 6.6.2).* ***Not exceeding the noise EMBA defined for the activity (described in 6.5.2 and 6.6.2).*
EPO15	No death or injury[1] to EPBC Act listed threatened, migratory or cetacean species. *[1]Injury to cetaceans as defined as either auditory impairment (TTS or PTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (Houser 2021; Finneran 2024). Auditory injury may or may not result in a permanent threshold shift (PTS).*
EPO16	Project related underwater noise within biologically important areas[1] and habitat critical to the survival of relevant species will be managed through the implementation of Amplitude Energy Offshore Victoria Whale Disturbance Risk Management Process, such that: • Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. • Southern right whales are not prevented from utilising biologically important areas[2] or habitat critical to the survival of a species or cause auditory impairment[1]. • The risk of behavioural disturbance to southern right whales will be limited to temporary behavioural disturbance of individuals. *[1]Biologically important behaviours such as reproduction, feeding, migration and resting (DCCEEW, 2023a).* *[2]Injury to cetaceans as defined as either auditory impairment (TTS or PTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (2021; Finneran 2024). Auditory injury may or may not result in a permanent threshold shift (PTS).*
EPO17	For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.
EPO18	Implement Fisheries Damages Protocol to provide a compensation mechanism to fishers who damage fishing equipment on Activity infrastructure outside of the PSZ.
EPO19	No unplanned release of chemicals or hydrocarbons to the marine environment.
EPO20	No unplanned release of waste to the marine environment
EPO21	No introduction, establishment or spread of invasive marine species
EPO22	No vessel strike with EPBC Act listed threatened, migratory or cetacean species.
EPO23	No impact to underwater cultural heritage
EPO24	No unplanned interactions between the project vessels and other marine users.

*In addition to EPO11 and EPO23, all the other EPOs define the performance of Amplitude Energy in protecting First Nations Cultural Values and Sensitivities as identified in Section 4.4.4

Table 10-2: Environmental Performance Outcomes, Standards and Measurement Criteria

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO19 **EPO24**	CM01: Marine exclusion and caution zones	EPS1.1: Marine exclusion and caution zones will not exceed distances required for safe operations. These zones, where established, will extend only as far as:	Notice to Mariners request placed with AHO to notify mariners of project caution/exclusion zones. MODU Logs confirm vessel access/ ingress into the MODU 500m safety exclusion zone.	Activity Manager OIM
		• A temporary 3.5 km exclusion / cautionary zone around the MODU during the Activity, established via Notice to Mariners.		
		• A temporary 500 m safety exclusion zone around the MODU, established via Notice to Mariners. Access/ ingress into the 500 m safety exclusion zone shall be managed and monitored via the MODU.		
		• A 500 m PSZ gazetted around well, marked on navigational charts for awareness	PSZ gazetted for Annie-2 development well does not exceed 500 m.	
EPO19 **EPO24**	CM02: Pre-start notifications	EPS2.1: AHO will be notified of activities where vessels will be in the Operational Area no less than 4 weeks to allow generation of Notice to Mariners (NTM).	Email records confirm notification of Annie2 development well activities within 4 weeks of commencement.	Activity Manager
		EPS2.2: AMSA's JRCC will be notified 24–48 hours before operations commence to enable AMSA to distribute an AUSCOAST warning. AMSA JRCC will be notified at the end of activities.	Email records confirm AMSA notification for Annie-2 development well activities within appropriate timeframe.	Vessel Master
EPO12 **EPO19** **EPO24**	CM03: Marine Assurance Process	EPS3.1: The vessels and MODU will meet navigational safety requirements under the *Navigation Act 2012* and associated Marine Orders, including but not limited to: • AMSA MO 21: Safety and emergency arrangements gives effect to SOLAS regulations dealing with life-saving appliances and arrangements, safety of navigation and special measures to enhance maritime safety. • AMSA MO 27 - Safety of Navigation and Radio Equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. • AMSA MO 30 - Prevention of collisions requires that onboard navigation, radar equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. • AMSA MO 70 - Seafarer certification meets the requirements for qualifications and training.	Vessel inspection records demonstrate compliance with the *Navigation Act 2012* and Marine Orders. Vessel Inspection records show vessel certification is in date.	Activity Manager Vessel Master OIM
EPO19 **EPO24**		EPS3.2: The vessels and MODU will adhere to navigational safety requirements under the *Navigation Act 2012* and associated Marine Orders, including but not limited to: • AMSA Marine Order 31 - SOLAS and non-SOLAS certification requires that vessels undertaking Annie-2 development well activities will have in date certification in accordance with AMSA Marine Order 31 (Vessel surveys and certification). • AMSA MO Part 93: Marine Pollution Prevention – Noxious Liquid Substances – requires that vessels undertaking Annie 2 development well activities will have emergency plans to address pollution events (including containment and clean up) involving noxious liquids.	Vessel Inspection records demonstrate compliance with the *Navigation Act 2012* and Marine Orders Vessel Inspection records show vessel certification is in date.	
EPO1		EPS3.3: Vessels will comply with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution (appropriate to vessel class) for emissions from combustion of fuel including: • Hold a valid International Air Pollution Prevention (IAPP) certificate and have a current international energy efficiency certificate. • Have a Ship Energy Efficiency Management Plan (SEEMP) as per MARPOL 73/78 Annex VI. • Engine NOx emission levels will comply with Regulation 13 of MARPOL 73/78 Annex VI. • Sulphur content of diesel/fuel oil complies with Marine Order Part 97 and Regulation 14 of MARPOL 73/78 Annex VI.	Premobilisation checklist (or current OVIS or equivalent) confirms: • Valid IAPP certificate and current international energy efficiency certificate • SEEMP in place (as appropriate to class) • NOx emission levels comply with regulations • Bunker receipts verify use of low sulphur fuel.	
EPO7 **EPO19** **EPO20**		EPS3.4: All discharges will comply with relevant MARPOL 73/78, *Navigation Act 2012*, *Protection of the Sea (Prevention of Pollution) Act 1983* and subsequent Marine Order requirements (as appropriate for vessel classification): • 2017 Guidelines for the Implementation of MARPOL Annex V to assist shipowners, masters and crews in applying the Annex V discharge requirements. • AMSA MO 91 - Marine Pollution Prevention (Oil)	Pre-mobilisation checklist (or current OVIS or equivalent)/ inspection records for vessel and MODU (as appropriate for vessel class) confirms: • Current International Oil Pollution Prevention (IOPP) certificate • Oil record book maintained and current with all discharges and transfers	

EPO	Control	EPS	Measurement Criteria	Responsible Person
		• Bilge water treated via a MARPOL (or equivalent) approved oily water separator and only discharge if oil content less than 15 ppm.	• Oily water separator is present.	
		EPS3.5: In accordance with MARPOL Annex I and AMSA MO 91 [Marine Pollution Prevention – oil], a Shipboard Marine Pollution Emergency Plan (SMPEP) or Shipboard Oil Pollution Emergency Plan (SOPEP) (according to class) is required to be developed. To prepare for a spill event, the SMPEP/SOPEP details: • Response equipment available to control a spill event. • Review cycle to ensure that the SMPEP/SOPEP is kept up to date. • Testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP/SOPEP details: • Reporting requirements and a list of authorities to be contacted. • Activities to be undertaken to control the discharge of hydrocarbon. Bunkering / bulk liquids will be transferred in accordance with operational procedure(s) to reduce the risk of an unintentional release to sea during transfer.	Vessel Inspection records confirm approved SOPEP or SMPEP. Records of vessel spill exercises being completed as per schedule.	
		EPS3.6: The vessels and MODU will meet AMSA MO 95 - Marine Pollution Prevention (Garbage), MARPOL 73/78 Annex V which requires that a garbage management plan and garbage record book is in place and implemented to manage waste offshore. Requirements include: • Segregating waste on the MODU / vessels. • Storing solid wastes in designated areas before sending them to shore for recycling, disposal, or treatment. • Waste receptacles that contain light-weight, solid waste will be covered to prevent waste from blowing overboard. • No discharge of waste or plastic products from general operational or maintenance.	Pre-mobilisation checklist (or current OVIS or equivalent)/ inspection records for vessel and MODU (as appropriate for vessel class) confirms: • A Garbage Management Plan is on board marine vessels (as relevant to vessel class and type) that includes for the requirements in EPS3.6. • Current and completed Garbage Record Book outlining waste discharge in accordance with AMSA MO 95 (as relevant to vessel class and type).	
		EPS3.7: Vessels will comply with AMSA MO 96 - Marine Pollution Prevention (Sewage), Requirements for offshore discharge of sewage have been incorporated into the MARPOL 73/78 sewage discharge control measure. Sewage discharged at sea is done so only in accordance with AMSA discharge standards and treated via a MARPOL (or equivalent) approved sewage treatment system as applicable. Food waste only discharged in accordance with AMSA, MARPOL when: • Vessel is en route and >12 nm from land. • Food waste is comminuted or ground to <25 mm and vessel is en route and >3 nm from land. • Food waste is comminuted or ground to <25 mm and platform is >12 nm from land.	Pre-mobilisation checklist (or current OVIS or equivalent)/ inspection records for vessel and MODU (as appropriate for vessel class) confirms: • Valid International Sewage Pollution Prevention (ISPP) Certificate demonstrating the vessel has a MARPOL approved sewage treatment plant (as relevant to relevant to vessel class and type). • If there is no MARPOL approved sewage treatment plant, records of sewage treated using an approved comminuted and disinfecting system are maintained in an Official Log Book (or similar) that records discharge locations and volumes in accordance with AMSA MO 95 (as relevant to vessel class and type). • Certification documentation. • Vessel and MODU logs confirm location and grinding status / size of discharges.	
EPO20		EPS3.8: Vessel cargo will be loaded, stowed and secured in accordance with AMSA Marine Order 42 (Carriage, Stowage and Securing of Cargoes and Containers).	Vessel and rig inspection records confirm cargo appropriately stored.	
EPO19		EPS3.9: From 1 January 2026 applicable vessels will not use or store firefighting foams containing PFOS, as adopted by the International Maritime Organisation (IMO).	Pre-mobilisation vessel inspection records confirm firefighting foams do not contain PFOS.	
EPO7 **EPO19** **EPO20**		EPS3.10: Equipment used to treat discharges to AMSA standards is installed and operational on the Vessels and MODU (as relevant to class), or otherwise the respective discharges do not occur.	Pre-mobilisation vessel inspection records confirm compliance with EPS3.10.	
EPO1 **EPO7**		EPS3.11 : Premobilisation Marine Assurance inspection is completed and confirms that the vessel and MODU are, or will be, compliant with the relevant EP requirements before commencing the activity.	Premobilisation inspection checklist includes for all relevant EP commitments for offshore vessels and MODU	

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO12 **EPO19** **EPO20** **EPO24**				
EPO10 **EPO24**	CM04: Fisheries Damage Protocol	EPS4.1: A Fisheries Damage Protocol (developed with SETFIA) is in place to provide a compensation mechanism to fishers who damage fishing equipment on Activity infrastructure outside of a PSZ. The protocol was established in collaboration with SETFIA (fisheries peak body). The protocol includes: • An incident report form with prompts for details of fishing activities, sea state, details of any damaged gear, details of repairs required, photos, dates and times. • Commitment for initial response to claimant within 4 working days confirming details. • The mutually agreed process for selecting the Tribunal (an independent assessor), whose decision is final and binding. • Requirement for Tribunal to be formed within 21 days of initial notification to undertake assessment of evidence and determine fault and damages payable.	Consultation records show Fisheries Damage Protocol has been followed for fishers seeking compensation.	Chief Operating Officer
		EPS4.2: In event that the Tribunal determines compensation is payable under the Fisheries Damage Protocol: • Payment will be made within 14 days of that decision. • A deed of release is provided to the claimant where compensation is payable, in the form provided for in the Protocol (schedule 5).	Tribunal determination document outlining reasons for the determination. Records showing provision of deed of release. Record of payment.	
EPO18 **EPO19** **EPO24**	CM05: Ongoing consultation	EPS5.1: Further engagement will take place during the development and implementation of component EPs. This will include: • Details relating to notification of third-party stakeholders. • Engagement with other titleholders in the Otway with respect to each other's ongoing activities and potential cumulative impacts. • Relevant information received will be included within the EPs as appropriate.	Notification records demonstrate stakeholders are notified during development and implementation of this EP as per the Annie-2 EP stakeholder notifications register. Communication records with other Otway operators. Notification records follow the requirements of Section 12.12.	Activity Manager
		EPS5.2: Notification of activity commencement and completion to relevant stakeholders as per notifications register.	Consultation records demonstrate that relevant stakeholders have been notified prior to commencement and following completion of the activity as per the Annie-2 EP stakeholder notifications register.	
		EPS5.3: Any complaints received by Amplitude Energy from other marine users in relation to air quality will be investigated and outcomes shared with the person who made the complaint.	Incident records available for any air quality events. Consultation records with complainant include sharing of investigation outcomes and actions undertaken.	
		EPS5.4: Notifications for any on-water activities and ongoing consultations undertaken per Section 12.12.	Notification records follow the requirements of Section 12.12.	
		EPS5.5: Observation, incidents, and opportunities for improvement regarding the interaction with other marine users will be reported to other petroleum titleholders.	Notification records. Consultation records.	
EPO12	CM06: Light Management Measures	EPS6.1: MODU and vessel lighting will be limited to the minimum required with the exception of emergency events for navigational and safety requirements'. MODU and the vessels will implement light management measures developed with consideration to the National Light Pollution Guidelines for Wildlife, these include, but are not limited to: • Outward facing lights will be reduced to minimum levels required for a safe work environment. • Directions to minimise the use of non-essential lights (e.g. close blinds, turn off lights when leaving a room) will be included in MODU and vessel inductions. • Recording and reporting of any seabirds found on the MODU or vessels in need of care. • Procedures to manage and care for any seabirds found on board requiring care, including remote advice from Zoos Victoria Marine Response Unit (MRU) or equivalent. • Consideration of adaptive lighting controls to reduce unnecessary lighting in event vessel/ MODU activities overlap with biologically important periods for light sensitive listed species.	Induction pack for MODU and vessels includes light management measures and seabird reporting process. Seabird management procedure in place which includes care and response strategies. Daily vessel / MODU logs report seabirds found on vessels/ MODU. MRU or equivalent advice documented in event stranded seabird requires care. Assessment of potential for vessel/ MODU lighting to overlap with biologically important periods for light sensitive listed species.	OIM Vessel Master

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO11 **EPO12** **EPO13**	CM07: Well Testing Program	EPS7.1: Periods of flaring will not exceed 36 hours or flow rate of 60 MMscfd.	Operational log confirms periods of flaring do not exceed 36 hours and do not exceed rate of 60 MMscfd.	Activity Manager
		EPS7.2: Confirm flare tip is clear of birds prior to commencing flaring.	Completed flare watch check list records.	
		EPS7.3: Well Test Program will provide for: • A burner which atomises hydrocarbons to yield smoke free combustion will be used to burn-off gas and condensate returned from the well. • Burner & flare have redundant pilots.	Well Test Program uses smoke free combustion burner. Well Test Program uses burner and flare with redundant pilots. Equipment Design and Certification includes burner that results in smoke free combustion.	
		EPS7.4: Well Test Program will provide for: • The flare tip will be monitored while flaring occurs. • Burner pilots are ignited before and during flow back activities to minimise dropout from the flare. • Dedicated crew members will be on flare watch while flaring is undertaken to identify dropout and notify the well test team to cease or modify the well test to eliminate dropout.	Well Test Report confirms flaring activity is managed in accordance with EPS8.4.	
EPO1 **EPO13**	CM08: Planned Maintenance System	EPS8.1: Planned maintenance will be implemented throughout the activity. This ensures that critical equipment on vessels and MODU will be maintained in manufacturer's instructions and ongoing maintenance to ensure efficient operation including: • Combustion Equipment (Vessels).	Vessel PMS records confirm compliance with PMS for Combustion Equipment.	Vessel Master / OIM
EPO7		EPS8.2: Planned maintenance will be implemented throughout the activity. This ensures that critical equipment on vessels and MODU will be maintained in manufacturer's instructions and ongoing maintenance to ensure efficient operation including: • equipment involved in discharge management	HSE inspection records and daily logs show ongoing planned maintenance in compliance with PMS.	
EPO14 **EPO15** **EPO16**		EPS8.3: Equipment and propulsion systems generating impulsive or continuous sound emissions will be operated in accordance with manufacturer's instructions and ongoing maintenance in accordance with vessel and MODU's planned maintenance system, to ensure efficient operation.	HSE inspection records and daily logs show ongoing planned maintenance in compliance with PMS.	
EPO4	CM09: Offshore Equipment	EPS9.1: Solids control equipment (MODU) is installed and operational once BOP is in place on the well to enable recovery and re-use of drilling fluids, to reduce volumes discharged.	MODU inspection records confirm solids control equipment is in use when drilling through the BOP.	OIM
EPO3	CM10: Amplitude Energy Offshore Chemical Assessment Procedure	EPS10.1: The Amplitude Energy Offshore Chemical Assessment Procedure will be used to ensure that project chemicals with the potential to be discharged to sea are not of unacceptable risk. This will be done by: • preferentially selecting products that are on the current OSPAR PLONOR list, and/or • are rated Gold/Silver/E or D under the UK OCNS, and do not have a substitution warning, or, • have a completed a hazard assessment confirming they are not of unacceptable risk (toxic, very bioaccumulative (and bioavailable), and highly persistent), and are justified by technical need and analysis of alternatives.	Amplitude Energy Offshore Chemical Assessment Procedure. Completed and approved chemical assessment. Operational reports show discharge of only approved chemicals.	Activity Manager
		EPS10.2: An accepted chemical list will be issued to the offshore project team detailing which products may be discharged and in what circumstances.	Completed and approved chemical assessment and distribution records.	Activity Manager
EPO5	CM11: Titleholder Collaboration	EPS11.1: Amplitude Energy will continue to engage in industry collaboration efforts relating to the management of unused bulks.	Records which demonstrate Amplitude Energy involvement in industry collaboration efforts.	
EPO15 **EPO16**		EPS11.2: Amplitude Energy will share sightings data with other Titleholders in the Otway region and local research organisations to help inform each other's programs of work and respective risk reviews.	Data transfer records include sightings data.	
EPO2	CM12: Inventory Management	EPS12.1: Solids control equipment will be used as part of the drilling fluid circulation system when drilling with riser installed, to help condition the drilling fluid for reuse, and minimise the overall volumes of drilling fluid discharged. At the end of the Activity unused bulks (barite, bentonite, cement) will be managed in accordance with Figure 12-9. Upon completion of the activity excess dry bulks will be managed with one of the following: • retained onboard for future activity where acceptable by the subsequent operator or, • use up cement via increasing the volume used in the well, if design allows,	Pre-mobilisation MODU inspection records confirm solids control equipment present. Bulk transfer records demonstrate that the process outlined in Figure 12-9 was followed for the management of unused bulks. Waste/Materials transfer records show spare chemical additives are returned to shore, and excess dry bulk materials returned to shore where feasible. Execution phase risk assessment of returning cement to shore.	Activity Superintendent

EPO	Control	EPS	Measurement Criteria	Responsible Person
		• returned to shore where feasible, where considered ALARP after risk assessment during the execution phase, and where permitted by the MODU and vessel operator safe systems of work. Spare chemical additives will be retained on board where acceptable by the subsequent operator or returned to shore. In the event the re-use and return-to shore options are not feasible and ALARP then discharges of bulks will be: • Slurrified with water prior to release overboard to facilitate dispersion. • Limited to 50m^3 of dry bulk per batch of slurry released to facilitate dispersion. • Released no closer to shore, and in water depths no shallower than, the location of the well being constructed, to ensure impacts remain within the parameters assessed within the EP.	Discharge logs confirm location and volume of any released overboard.	
		EPS12.2: Barite concentrations will be at or below: • Mercury (Hg) – 1 mg/kg (1 ppm) dry weight in stock barite. • Cadmium (Cd) – 3 mg/kg (3 ppm) dry weight in stock barite.	Drilling muds inventory shows contaminant limits for Barite are not exceeded.	Vessel Master / OIM
		EPS12.3: Detailed cementing procedures will be developed and implemented before cementing activities commence.	Cementing Program / Cementing Plan of Action developed and implemented for all cementing operations.	Activity Superintendent
		EPS12.4: Actual cement use and discharge will be reconciled against planned quantities throughout the campaign.	Cementing reports will include: • Cement use, including excess, for each cement job. • Materials on location and used to make cement during the day.	
EPO6 **EPO9**	CM13: Offshore Operational Procedures	EPS13.1: Existing infrastructure will be protected from impact by mooring equipment via: • Mooring analysis and plan aligned to ISO Standard (ISO19901-7:2013 – Mooring Analysis) by mooring specialist which accounts for seabed survey data including any suspected UCH, sensitive benthic habitat and emergent features and the locations of existing infrastructure. • Anchor selection and placement to reduce potential for anchor drag. Further contingencies will be in place to minimise the potential for damage to existing infrastructure. Including: • Mooring design which includes an 8 to 12 anchor spread to provide additional redundancy for position keeping should a mooring fail. • Dynamic positioning – available in the event of mooring failure, where required for station keeping. Field entry / exit protocol – vessels will require approval from the Athena Gas Plant Person In Charge (PIC) to enter the field; asset risk management measures must be demonstrated for approval to be granted. Mooring analysis and plan to be completed ahead of the MODU entering the Operational Area.	Mooring plan demonstrates mooring analysis and planning is to be undertaken in accordance with EPS13.1. Pre-drill inspections confirm MODU Dynamic Positioning is available if required for station keeping. Completed field entry and exit forms.	Activity Manager
		EPS13.2: Mooring procedures will ensure: • Adequate tensioning of mooring is applied and maintained. • Mooring equipment is only installed or stored within the designed radius areas of the mooring spread. • Seabed relief and sensitive seabed features are considered based on seabed surveys, and sensitive features (i.e. areas of high relief) are avoided where practicable. • No equipment to be placed on the seabed within 20m radius of the identified anomalies as identified in Table 4-2.	MODU mooring procedures or supplementary instructions provide for each component of EPS13.2.	Activity Manager
EPO9		EPS13.3: Retrieval of mooring equipment, including transponders, from the sea floor prior to or at the completion of the activities.	Operations reports confirm retrieval of all mooring equipment and transponders	Vessel Master / OIM
EPO2		EPS13.4: Drilling Discharges Management processes minimise as far as practicable, the overall volumes of WBDF discharged to the marine environment. It does this by defining the: • Volumes of fluids required for safe execution of the activity, including contingency for well control. • Fluids storage arrangements and transfer capacities on the MODU and support vessels, and how storage capacity will be actively managed to facilitate re-use of WBDF. • Properties of the fluid required to be maintained throughout the different stages of well construction. • Fluid acceptability criteria for re-use. • The solids control equipment to enable re-use of fluids. These aspects of drilling fluids management are a direct result of the well design and technical requirements that are defined in the WOMP. Drilling and cementing procedures will define how each step of the well construction process is	NOPSEMA approved WOMP. Records demonstrate that drilling fluid management EPS13.4 have been implemented.	Activity Superintendent

EPO	Control	EPS	Measurement Criteria	Responsible Person
		to be completed in accordance with relevant standards (as defined in the WOMP) before the offshore activities take place.		
EPO14 **EPO16** **EPO22**		EPS13.5: Vessel operators shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8) and Victorian (Marine Mammals) Regulations within respective jurisdictions, as a minimum, and shall report vessel interactions with dolphins and whales. Caution zones will be extended to 500m around all whales. Helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on. Marine mammal sightings will be recorded and submitted to DCCEEW. Sightings will be reported within three months of the end of the activity.	Daily operations report details when whales and dolphins sighted, and the interaction management actions that were implemented, if required. Notification records reporting vessel interactions to reporting body (currently DCCEEW / DEECA at the time of writing). Helicopter flight records demonstrate restrictions adhered to. Records of whale sightings reports being made to DCCEEW within 3 months of campaign end.	Vessel Master
EPO19	CM14: MODU Material Transfer Process	EPS15.1: MODU will have a bulk fluid transfer process in place before commencing operations. The process will include: • MODU-to-vessel communication protocols. • Transfer hose integrity checks. • Transfer hose pressure testing. • Continuous visual monitoring while bunkering. • Tank volume monitoring while bunkering. • Avoidance of bulk hydrocarbon transfers at night, or otherwise artificial illumination of the of the operational areas on the MODU, vessel and water between them during the transfer. • Weather limitations for bulk transfers.	Pre-Transfer preparation checklist	OIM
		EPS14.2: Transfer hoses for hydrocarbons shall comprise sufficient floating devices and self-sealing weak-link couplings in the midsection of the hose string, in accordance with GOMO 0611-1401.	Records demonstrate transfer hoses meet GOMO 0611-1401 requirements.	OIM
EPO14 **EPO15** **EPO16** **EPO17**	CM15: Campaign Risk Review	EPS15.1: A Campaign Risk Review, as detailed in Figure 12-6 will be undertaken in the 6-months prior to a campaign activity commencing, to: • Model noise emissions for any additional activity scenarios not already provided for in this EP. • Integrate into modelling the latest relevant sound exposure thresholds to review previously discounted control measures against updated guidance and newly accepted EPs to ensure that risks are continually reduced to levels that are ALARP and are of an acceptable level. Focus on aspect: subsea noise, and risks to endangered whale species, specifically pygmy blue whales, and southern right whales. A risk review may also be triggered during the offshore campaign where DP nighttime triggers have been exceeded, if ≥ 3 sightings of blue whales or >3 sightings of southern right whales are recorded within the observation zone for 3 consecutive days, or if concerns are raised by a member of the project or community. Risk Reviews during the campaign will be informed by a panel including MFO's experienced in the region, Activity Manager (or delegate), Vessel master (or delegate) and Amplitude Energy HSEC Representative. Recommendations will be managed in accordance with the Amplitude Energy MOC process.	Pre-campaign Risk Review report dated 6-months prior to campaign and considers each of the points in EPS15.1. Log maintained of when risk review triggers were met, and review recommendations by the panel.	Activity Manager
EPO2 **EPO17**		EPS15.2: The Amplitude Energy Environmental Protocol describes how environmental impact and risk management, including risk assessments, is undertaken for activities including offshore campaigns. As part of pre-campaign planning a risk review (refer Figure 12-6) will be undertaken to re-assess campaign environmental impacts and risks to ensure acceptability criteria are met and that impacts and risks are reduced to ALARP. The risk review will consider aspects relevant to the campaign; where there is a risk that campaign discharges to sea may contain mercury, the risk review will consider the current best available techniques and environmental practices in order to control releases of mercury.	Pre-campaign Risk Review addresses the requirements of EPS16.2.	
EPO12		EPS15.3: Review analogue light modelling scenarios to ensure that the scenarios and thresholds remain appropriate for the activity.	Pre-campaign Risk Review report dated 6-months prior to campaign and confirms the analogues used for light modelling remain appropriate.	

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO19		EPS15.4: Review the LoC modelling scenarios to ensure that the modelled scenarios and thresholds are appropriate for the activity.	Pre-campaign Risk Review report dated 6-months prior to campaign and confirms scenarios used for LoC modelling remain appropriate.	
EPO17		EPS15.5: Each future EP resulting from the **East Coast Project OPP** will undertake a review for additional or significantly revised reasonably foreseeable projects. Additional or significantly revised projects will be assessed as per CIA methodology (Section 9.0). Any cumulative impacts from new, significantly revised or currently unknown activities that results in an unacceptable level of impact to receptors, will be subject to new or revised control measures within the appropriate EP to reduce cumulative impacts to ALARP.	This EP includes an assessment addressing EPS15.5.	
EPO6 **EPO8** **EPO9**	CM16: Seabed Survey	EPS16.1: Seabed surveys (geophysical, geotechnical, visual and contaminant sampling) will be undertaken for the purposes of collecting information to manage risks to the Shelf rocky reefs and hard substrates KEF values (high relief outcrops, reefs and sponge beds), sediment quality, underwater heritage, debris and hazards on the seafloor. Seabed surveys will be undertaken prior to finalising MODU position and associated location of mooring equipment (mooring analysis), finalising well location and subsea infrastructure locations. Seabed Survey data will be reviewed by an experienced benthic ecologist, and findings and recommendations considered as part of final well location selection process, avoiding sensitive seabed features where practicable. Relevant survey seabed findings (benthic environment, heritage, hazards) will be included in future EPs if available at the time of preparing EP. In the event unpredicted contaminants are detected Amplitude Energy will undertake a human health and environmental risk assessment to ensure ALs and EPOs are met.	Seabed survey report shows input from experienced benthic ecologist. Results of seabed survey incorporated into determining final well location, and layout of moorings to avoid sensitive seabed features where practicable. If unpredicted contaminants are detected a human health and environmental risk assessment is completed. *Note a seabed survey was undertaken in May and June 2025 (refer Section 4.3.1). The Annie-2 development well location avoids sensitive features such as reef structures of high relief and is considered a suitable location.*	
EPO10 **EPO14** **EPO15** **EPO16** **EPO22**	CM17: Offshore Victoria Whale Disturbance Risk Management Procedure	EPS17.1: Active DP thruster management: • MODU and vessel DP thrusters will not be operated with loading outside of DP system Activity Specific Operation Guideline (ASOG) (DP ASOG will require loading not to exceed 70% except as necessary to avoid an emergency).	MODU and Vessel DP ASOGs. MMO daily report shows DP thrusters did not exceed ASOG loading.	MODU Captain Vessel Master
		EPS17.2: Marine Mammal Monitoring and Prestart criteria: a) Plan for vessel arrival in field in daylight hours to allow sufficient time to complete EP prestart observations, or undertake pre-start observations from different platform (e.g. vessel, helicopter, plane) in daylight hours the day before vessel arrival to the field at night. b) 30-minute pre-start whale observation will be required within the DP observation zone for the activity, and the observation zone confirmed clear of blue whales and southern right whales before DP operations commence for the activity, or nighttime criteria is met for DP operations at night. To be completed by Dedicated MMO. c) In addition to the 30-minute prestart, during Southern Right Whale reproduction season (including reproductive shoulder periods), MMO prestart observations prior to MODU mooring hook-up activity must include at least one hour observation the day of, or day prior to the activity, and cover the area of overlap between the activity behavioural EMBA for the activity and the southern right whale reproductive BIA. This area must be confirmed clear of southern right whales prior to DP operations commencing for the activity. Where MODU hook-up operations are to commence at night, night-time criteria must be met for southern right whales over the areas of overlap between the behavioural noise contours for the hook-up activity and the southern right whale reproductive BIA. To be completed by Dedicated MMO. d) Ongoing monitoring for marine mammals throughout daylight hours across the monitoring network, with at least one dedicated MMO available offshore at all times whilst DP operations are happening.	Daily reports confirm MMO present offshore during DP. MMO reports confirm 30-minute MMO pre-watch completed / nighttime criteria met prior to DP operations. MMO reports confirm monitoring during daytime.	Activity Manager MODU Captain Vessel Master
		EPS17.3: DP Observation Zones The DP Observation Zones for the Activity are determined by specialist subsea noise modelling service provider and include: • 8.1 km during MODU on DP during mooring activities with AHTS. • 7.5 km during MODU drilling with AHTS on DP resupply. • 1.2 km during MODU drilling with AHTS on standby not on DP. • 500 m during vessel DP operations for all other vessel based activities.	MMO daily reports include correct DP observation zones for MODU and vessels.	Activity Manager

EPO	Control	EPS	Measurement Criteria	Responsible Person
		The above ranges are based on predicted maximum distances to the behavioural threshold for marine mammals as detailed in Table 6-28. To allow for in-field practicality, maximum distance values in Table 6-28 have been rounded up to the next 100 metres to inform the DP observation zones as listed above.		
		EPS17.4: Marine Mammal Observation Network The observer network for the Activity will comprise: • Dedicated MMO on support vessels, with two MMOs if daylight exceeds 12-hours (sunrise-sunset) to provide continuous observation in daylight hours. There will be at least one MMO within the DP Observation Zone at all times when DP Ops are happening. • Dedicated MMO on shore during MODU mooring hook-up activity to observe the area over overlap between the activity behavioural noise EMBA and the southern right whale reproductive BIA, as described EPS17.2(c). Communication channels between the shoreside MMO and vessel-based MMOs will be established to enable integration of shoreside MMO sightings into mitigation actions for the activity. • Officers of the Watch on support vessels observing as per normal vessel shift patterns and duties; the officer of the watch will provide coverage for the dedicated MMO during normal work breaks. If there is only one dedicated MMO offshore and that MMO is unable to complete their duties, then a second MMO will be mobilised to the DP Observation Zone before DP operations commence. • Officers of the Watch on MODU observing as per normal MODU shift patterns and duties. • Helicopter crew (personnel transfers from shore to the MODU) observing opportunistically during over-sea transit. • Observations from other operators working in the region where the information is shared. • Observations from publicly available Citizen Science.	Daily reports and MMO reports confirm the make-up of the observer network meet EPS17.4. During the activity, weekly summary of publicly available Citizen Science and other Operators (if available) working in the region, shared with MMOs.	Activity Manager
		EPS17.5: Observation uncertainty: Species confirmation criteria will be developed for blue whale and southern right whale ID, by an experienced MMO (5+ years' experience) and will be provided to the Activity Dedicated MMOs. For crew observers, dedicated MMOs will advise on species where there is uncertainty. Within the area of overlap between the activity behavioural noise EMBA and the southern right whale reproduction BIA, any sightings made which are reasonably suspected to be a southern right whale will be treated as a positive sighting.	MMO support materials include blue whale and southern right whale confirmation criteria.	Activity Manager
		EPS17.6: DP Suspension Actions: • Suspension of DP operations (if safe to do so) where a blue or southern right whale is observed within the relevant activity DP Observation Zone. • Suspension of DP operations (if safe to do so) before any whale is observed within the Activity DP TTS zone continuously for 20 hours. – Note 1 If a whale is observed within 30 minutes of sunrise in the TTS zone it should be assumed that the whale was present throughout the preceding night period unless there is clear evidence to the contrary. – Note 2 - If during DP operations any whale is observed within the Activity DP TTS zone prior to sunset, it should be assumed that the whale could remain within the DP TTS zone until sunrise unless there is clear evidence to the contrary, and the 20-hour time frame considers the inability to observe whale movement overnight. – *These situations are hypothetical and the measure is highly precautionary given the conservatism applied to the modelling of accumulated sound exposure levels which assumes no movement of the whale.* • Adopt favourable heading to reduce thruster load (and associated noise) and slowly increase separation from whale if safe to do so. • Apply 60-minute pre-start observation prior to recommencing activities, from the time the BW or SRW was last observed in the activity DP observation zone. • Night-time or low visibility criteria: DP operations will not commence at night (except to avoid or in response to an emergency) when: – 3 or more sightings of blue or southern right whales occurred in the DP Observation Zone within 3-hours prior to sunset (or low visibility), or	MMO reports detail: • If / when DP was suspended (due to whale presence). • If a favourable heading was adopted. • If a prestart observation was undertaken. • If night-time criteria were followed. • Instructions from the vessel master (or delegate) in relation to EPS17.6.	MODU Captain Vessel Master

EPO	Control	EPS	Measurement Criteria	Responsible Person
		– a blue whale or southern right whale is observed within the hour prior to sunset inside the observation zone and have not been observed leaving the zone. – Any whale observed as continuously present in the 24-hour TTS zone for 12-hours or more in the lead up to night fall. ***Whether it is safe to take action is determined by the person in command of the vessel (i.e. vessel master or their delegate). MMO reports will detail the reasons for any delay of DP suspension actions (in event required) for safe operation purposes, as instructed by the vessel master or their delegate.*		
		EPS17.7: Daily Reporting: A daily MMO report will be issued, consolidating all sightings and actions from across the monitoring network.	Daily MMO reports include sightings and actions from across the monitoring network.	Activity Manager
		EPS17.8: MMO Capacity and Competency: • Dedicated Lead MMO minimum experience / competency is multiple offshore campaigns as a marine mammal observer with experience observing blue whale and southern right whale within BIAs (or international equivalent). • At times of year when daylight hours exceed 12-hours, there will be a second dedicated MMO (minimum experience / competency is: at least one offshore campaign as a marine mammal observer, and familiar with the ID features for blue whales and southern right whales. • Dedicated MMOs shall have demonstrated prior experience in the ID of large baleen whales, distance estimation and systems of recording and reporting, and understand the Australian regulatory requirements. • MMOs shall be hired from service providers with expertise in marine mammal observing. • MMO experience and competency will be reviewed and confirmed by the MMO service provider and checked by Amplitude Energy prior to their mobilisation to monitor a DP Observation Zone. • Vessel Officers of the Watch: the dedicated MMO(s) will be supported by trained bridge crew. Bridge crews will be inducted into Activity requirements and whale ID and will have a high base level of observation experience and competency noting watchkeeping duties are a core competency, and marine mammal observation for collision avoidance and to minimise behavioural disturbance to endangered blue and southern right whales, is applicable to all offshore marine users. • Helicopter Crew: Helicopter crew will complete MMO Program Induction. • MMO Program Inductions - Dedicated MMOs, Vessel and MODU Officers of the Watch, and helicopter crews shall receive an induction including: – overview of the Activity – description of species that are the focus for the program and why – marine mammal monitoring and action requirements – ID criteria for endangered whales – reporting requirements.	MMO program induction pack includes the information outlined in EPS17.8. MMO program induction records for Helicopter Crew and Vessel and MODU Officers of the Watch. Pre-mobilisation checks of competency for DMMO's confirm they meet EPS17.8. Daily MMO report confirms at least minimum numbers of MMO's on vessels in line with EPS17.8.	Activity Manager
EPO15 **EPO16**		EPS17.9: The Whale Disturbance Risk Management Procedure will be implemented, assisting the implementation of CM17. Applicable Provisions within the procedure include: • Establishment of a communications protocol between observers, vessel master and project team. • Dedicated MMO for the hours of daylight (defined as sunset to sunrise). A 2nd MMO where necessary if daylight extends beyond 12-hr period. • Dedicated MMOs shall have demonstrated prior experience in the ID of large baleen whales, distance estimation and systems of recording and reporting. • Inducted crew observers to support dedicated MMO during rest breaks. • Reporting of any injured marine mammal to relevant response and regulatory agencies.	Activity specific behavioural disturbance distances from noise modelling report included in campaign specific procedure. Daily report confirms crew observers. MMO reports confirm presence of MMO/s. MMO training records demonstrate prior experience. Notification records are available for injured marine mammals.	Chief Operating Officer
EPO10 **EPO14** **EPO15** **EPO16**		EPS17.10: Resupply and Cargo Lifting Activities • The number of vessels in the operational area during resupply activities is limited to that required for safe operations.*	MMO reports record the number of vessels in the Operational re during resupply activities as well as detail the instructions by the vessel/ MODU master or their delegate in event EPS17.10 cannot be implemented given safety requirements.	MODU Captain Vessel Master

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO22		• If blue whales or southern right whales are observed in the DP observation zone during resupply activities, the resupply vessel will complete the current cargo activity and make the load safe before commencing DP suspension actions (EPS17.6) within 2 hours. **Whether it is safe to limit the number of vessels or cease cargo lifting operations due to whales is determined by the person in command of the vessel (i.e. vessel master or their delegate) & the MODU. MMO reports will detail the instructions by the vessel/ MODU master or their delegate in event EPS17.10 cannot be implemented given safety requirements.*		
EPO16	CM18: Other Detection Technologies	EPS18.1: Amplitude Energy will continue to seek other technologies for whale detection through discussions with specialist service providers, other titleholders, and/or participation in the AEP Marine Noise Working Group. Technologies that are identified will be assessed with the campaign risk review panel. Evaluation criterion will include technology readiness, the level of risk reduction (specific to the risk event) afforded by the technology, Activity integration feasibility and costs. Where detection technologies are used, they will be in addition to the MMO program and technology effectiveness will be shared with other operators in the region.	Records of engagement with other Titleholders, service providers and/or AEP Marine Noise working group. Completed risk review evaluates other detection technology.	Manager Environment and Sustainability
EPO7 **EPO20**	CM19: Waste Management Practices	EPS19.1: Vessels and MODU implement a garbage management plan. • The waste hierarchy is applied to project wastes. • Waste with potential to be windblown is contained and restrained. • Waste lost overboard is recorded and recovered if possible. • Waste transfers are recorded.	Garbage management plan includes garbage categories, storage and containment. Waste transfer records detail all waste transfers. Daily reports include incidents of waste overboard and details of recovery / attempts.	Vessel Master / OIM
EPO21	CM20: Amplitude Energy IMS Risk Management Protocol	EPS20.1: - Vessels and MODU will comply with the Australian biofouling management requirements and Australian ballast water management requirements. Vessels and MODU biofouling and ballast management histories are used to complete an IMS Risk assessment prior to the vessel arriving within the operational area. Subsequent risk management actions are completed in accordance with the Vessel Biofouling and Ballast Water Management Plans for Low-risk Vessels, or otherwise in accordance with recommendations of a qualified IMS inspector.	Completed IMS Risk Assessments for vessels and MODU, and equipment that may be deployed into the marine environment showing 'low risk'. Vessel Biosecurity Import Records.	Chief Operating Officer
EPO7 **EPO19**	CM21: Activity Fire Fighting Foam Screening and Quarantine Standard	EPS21.1: From 01 July 2025, firefighting foams for well construction activities (i.e. response standby Aqueous Film Forming Foam (AFFF) for the well test package) will not contain PFOS, PFOA, PFHxS and related substances in compliance with IChEMS (Schedule 7). Firefighting foam SDS will be screened for these substances; any firefighting foams that do not comply with this requirement as of 01 July 2025 will not be used or stored offshore, or, if any legacy products are found offshore, they will be quarantined.	Review records and SDS for activity firefighting foams. Evidence of activity firefighting foams being quarantined where they do not meet the requirements.	Activity Manager
EPO19	CM22: NOPSEMA Accepted WOMP	EPS22.1: A NOPSEMA-accepted WOMP addresses the integrity aspects of the well, ensuring no unplanned release of hydrocarbons throughout the wells life cycle. The WOMP includes, as applicable to the activity: • Amplitude Energy well management standards detailing how well integrity will be managed over the well life-cycle. • A description of well barriers. • Performance and testing criteria. Compliance with Performance and Testing Criteria is tracked throughout the activity, and any damage to, or failure of, well-related equipment that has led or could lead to a loss of integrity of the well (including under servicing/testing) is reported to NOPSEMA, or otherwise as required under the regulations and according to NOPSEMA guidance at the time (ref N-03000-GN1636, A462575).	Records confirm a NOPSEMA-accepted WOMP is in place. Implementation records confirm timely testing aligned with WOMP.	Activity Manager
EPO19	CM23: NOPSEMA Accepted Safety Cases	EPS23.1: Activities will be managed in accordance with the accepted safety case revisions.	Accepted Safety Cases in place. Implementation records confirm safety case control measures have been implemented.	Activity Manager
EPO19	CM24: Source Control Emergency Response Plan	EPS24.1: Source control capability is maintained in accordance with the SCERP. Source control response activities will be implemented in accordance with the SCERP.	Pre-campaign readiness records confirm source control capability is maintained as per SCERP requirements. Records confirm that emergency response activities have been implemented in accordance with the SCERP.	Activity Manager

EPO	Control	EPS	Measurement Criteria	Responsible Person
EPO19	CM25: Oil Pollution Emergency Plan (OPEP)	EPS25.1: Emergency spill response capability is maintained in accordance with the OPEP. Emergency response activities will be implemented in accordance with the OPEP.	Pre-campaign readiness records confirm spill response capability is maintained as per the OPEP requirements. Records confirm that emergency response activities have been implemented in accordance with the OPEP.	Chief Corporate Services Officer
EPO19	CM26: Operational and Scientific Monitoring Plan (OSMP)	EPS26.1: Operational and scientific monitoring will be implemented in accordance with the OSMP.	OSMP is in place. Records confirm that operational and scientific monitoring have been implemented in accordance with the OSMP.	Chief Corporate Services Officer
EPO9	CM27: Amplitude Energy Decommissioning Protocol	EPS27.1: Amplitude Energy will meet the requirements of Section 572 ('Maintenance and removal of property etc. by titleholder') of the OPGGS Act: • If Annie-2 development well does not access a commercially viable resource following well testing, it will be abandoned at the time of well evaluation and within the well activity duration of this EP • The Annie-2 development well will be permanently abandoned within 3 years in the event the well is not tied into the existing CHN pipeline, or as accepted in the governing WOMP where integrity can be demonstrated as per regular inspection and / or monitoring activities. • Annie-2 will be permanently abandoned within 3 years of permanently ceasing production or as accepted in the governing WOMP where integrity can be demonstrated as per regular inspection and/ or monitoring activities. • All well equipment on the seabed will be recovered.	Amplitude Energy Decommissioning Protocol. Survey records confirming no equipment on seabed.	Chief Operating Officer
EPO9 **EPO20**	CM28: Retrieval of dropped objects were practicable	EPS28.1: If practicable to do so, objects accidentally dropped to the seabed will be retrieved.	Dropped object recorded as an incident, and location of dropped object recorded if practicable. Daily reports demonstrate retrieval of dropped object.	Vessel Master OIM
EPO23	CM29: Engagement During Emergency Response	EPS29.1: Engagement with relevant First Nations Representatives in the event of a loss of containment of hydrocarbons which may extend to coastlines to obtain advice on the management of cultural sensitivities which may be in the spill trajectory.	Engagement Records show engagement with First Nations representatives.	Chief Corporate Services Officer
	CM30: Underwater Cultural Heritage Disturbance Risk Management Measures	EPS30.1: Amplitude Energy will ensure the activity is compliant with the *Underwater Cultural Heritage Act 2018* (Underwater Heritage Act) by: • Seabed survey data will be reviewed prior to well construction activities and used to inform equipment laydown locations and not impact underwater cultural heritage. • Review of relevant seabed survey data will be conducted by a suitably qualified and experienced cultural heritage team. The team will include a marine archaeologist, have familiarity with First Nations cultural landscapes and experience in identifying landscape features from geophysical data. • If cultural heritage is identified, it will be mapped, along with suitable exclusion zone and its location integrated into Activity inductions and procedures to ensure it is avoided during Activity. • UCH Review Report will be provided to relevant RAP. • Implementing a process for reporting and managing unexpected finds during the activity, including reporting of any new suspected underwater cultural heritage to DCCEEW (or delegate) within 21 days of discovery.	Pre-campaign risk review communications confirm equipment laydown areas to avoid any UCH identified within Geophysical survey reports. UCH Review Report interprets geophysical data and maps findings with exclusion zones. Activity inductions and procedures include identified UCH and controls. Email / meeting records show distribution of UCH review report. Notification and Reporting Records demonstrate new UCH reported to DCCEEW (or delegate) within 21 days of discovery.	Activity Manager
Environment Plan Implementation : The below control measures are included from Section 12.0 – Implementation, and relate to the implementation of the EP, thereby facilitate meeting all the EPOs for the Activity.				
NA	CM31: Training and Competency	EPS31.1: Amplitude Energy personnel involved in the activity have the appropriate competencies to perform the tasks required of their roles. This requires that competencies for specific roles are defined, that adequate training and supervision is provided.	CVs and training records demonstrate personnel have required competencies and training for their role.	Activity Manager
NA	CM32: Activity EP Induction	EPS32.1: An Environment Plan induction will be delivered to all MODU and vessel personnel.	Training records confirm personnel involved in the Activity have completed the induction Activity EP Induction Pack	Activity Manager Vessel Master OIM
NA	CM33: Contractor Engagement	EPS33.1: Contractors involved in the offshore activity define the competency and training requirements necessary to ensure that contractor personnel have the relevant knowledge and skills relevant to perform the role.	Contractor training and competency requirements described in the relevant contract documentation	Activity Manager Vessel Master OIM

**Contingent activity

11.0 Consultation

11.1 Summary

Amplitude Energy is committed to engaging with relevant persons (as that term is defined in regulation 25 of the OPGGS(E)R) in a transparent, genuine and meaningful way, through our consultation process. We recognise that our consultation process must be robust and systematic, so that it is consistently and demonstrably compliant with the applicable regulatory requirements. Amplitude Energy consulted with relevant persons in the course of preparing this EP in accordance with our consultation process, and applicable regulations and guidelines. Amplitude Energy's consultation process sought to acknowledge that any consultation process must also have a degree of adaptability, as it is a "real world" activity in a dynamic environment, that will vary depending on the nature of the authority, persons or organisations to be consulted. This is because the purpose of consultation is to inform Amplitude Energy's understanding of the environment, including the social, cultural and heritage values of features that may be impacted by our EP activities.

This section sets out how Amplitude Energy has carried out consultation for the ECSP: Annie-2 Development Well EP, in accordance with the OPGGS(E)R, and having regard to the published guidance materials from NOPSEMA. Amplitude Energy commenced consultation from as early as December 2024, with select stakeholders, including those that had communicated a specific need for early engagement on such projects. The broader consultation process, with the majority of stakeholders, commenced mid-May 2025 and ran until prior to the submission date of this EP. The design of our consultation process ensured that relevant persons were identified and provided sufficient information and a reasonable time period to make an informed assessment of the potential impacts of our EP activities. Given the broad range and geographical spread of relevant persons, a variety of engagement methods were used to ensure they were provided with sufficient information, and opportunities to obtain further information. These engagement methods included phone calls, emails, SMS messages, social media advertisements, newspaper advertisements, radio advertisements, a dedicated consultation website, audio-video presentations, community information sessions (online and in-person), tailored meetings and tailored information sheets.

Overall, there were limited enquiries, claims or objections raised in the consultation process by relevant persons. For the limited concerns raised, Amplitude Energy carefully assessed the merits of the claims or objections on a case-by-case basis, and (where appropriate) adopted new or changed control measures to reduce the relevant risks or impacts to an acceptable level and ALARP, and consistent with the principles of ecologically sustainable development. This is described further in sections 6.0 and 1.0.

Where Amplitude Energy has received input from Relevant Persons in consultations undertaken in the course of preparing other environment plans, it has considered and applied that input in the course of preparing this EP and included where appropriate.

Consultation in the course of preparing this EP has been completed in accordance with the regulatory and legal requirements for such consultation. This EP demonstrates that Amplitude Energy's consultation process has met or exceeded the requirements of the OPGGS(E)R. Should Amplitude Energy receive any further concerns or feedback regarding this EP after the EP has been accepted by NOPSEMA, these will be managed as described in section 12.12.

11.2 Regulatory Compliance – Summary of Requirements

Regulatory compliance has been achieved, and this EP demonstrates that:

- Per **regulation 25(1) of the OPGGS(E)R**, identification of, and consultation with, relevant persons has occurred (see Section 11.3).
- Per **regulation 25(2) of the OPGGS(E)R**, sufficient information has been provided to relevant persons to enable them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities (see Section 11.3.2).
- Per **regulation 25(3) of the OPGGS(E)R**, a reasonable period for consultation has been provided to each relevant person to consider the information, make their assessment and provide feedback if they wish to do so (see Section 11.3.3).
- Per **regulation 25(4) of the OPGGS(E)R**, relevant persons have been advised that they may request that particular information provided during consultation not be published, and ensuring that such information is not published (see Section 11.3.4).
- Based on the information and feedback acquired through the consultation process, appropriate measures have been adopted to reduce the impacts and risks associated with the activity (See Appendix 8 -

This EP sets out the following information pursuant to regulation 24(b) OPGGS(E)R (see Appendix 8 - and the Sensitive Information file):

- A summary of each response made by a relevant person.
- Our assessment of the merits of any objection or claim about the adverse impacts of any activity to which the EP relates.
- Our response, or proposed response, to each objection or claim.
- Any measures adopted as a result of consultation.
- Copies of the full text of any responses given by a relevant person.

Amplitude Energy continuously reviews and improves its policies and procedures, to reflect changes in law, regulator guidelines, judicial decisions and industry standards. Additionally, following the appeal decision of *Santos NA Barossa Pty Ltd v Tipakalippa* [2022] FCAFC 193, Amplitude Energy has conducted an extensive review of its methodology for identifying and consulting with relevant persons, for the purposes of preparing this EP.

The following NOPSEMA guidelines were also considered in planning and delivering our consultation process:

- GL2086 – Consultation in the course of preparing an environment plan – May 2024.
- GN1344 – Environment plan content requirements – July 2025.
- GN1488 – Oil pollution risk management- July 2021.
- GN1785 – Petroleum activities and Australian Marine Parks – January 2024.
- GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2024.

Table 11-1: OPGGS(E) Regulation Consultation Requirements

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
34 Criteria for acceptance of environment plan. ***Regulation 34 provides that the criteria for acceptance of an environment plan are that the plan demonstrates that:*** • ***(g)(i) the titleholder has carried out the consultations required by section 25; and*** • ***(g)(ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate.***	Regulation 25 establishes a duty on titleholders to carry out consultation in the course of preparing an environment plan. In order to accept an environment plan under regulation 33, NOPSEMA must be reasonably satisfied (as per regulation 34) that the environment plan demonstrates the duty (to carry out consultation with relevant persons required by regulation 25) has been discharged and that the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate. Consultation should be a genuine and meaningful two-way dialogue in which relevant persons are given sufficient information and time to allow them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities. The consultation process used for different activities may vary depending on a range of factors, certain key principles should be evident in the environment plan.	This EP demonstrates that these requirements were met: The below summary rows setting out how the consultations required by regulation 25 were carried out; and Adopting measures as a result of consultation: Report on Consultation in Appendix 8.
25(1) Consultation with relevant authorities, persons and organisations etc. ***In the course of preparing an environment plan (including a revised environment plan referred to in Division 5)***	Titleholders are required to identify and consult with each authority, person or organisation who falls within the categories of relevant persons set out in regulation 25. Titleholders must clearly identify in their environment plan who is a relevant person and the rationale the titleholder has used to determine who they consider falls within that definition. Environment plans should set out the processes that have been applied to identifying and determining who are relevant persons, as well as the process undertaken for consultation. Authorities, persons and organisations are to be identified on a case-by-case basis. Factors such as the nature of the activity, the environment in which the activity is being undertaken and the possible impacts and risks of the activity should be taken into account when determining	This EP sets out how Amplitude Energy satisfied the requirements of this regulation in section 11.3.1. This section identifies each relevant person identified for the purpose of this EP and the methodology adopted to identify such relevant persons.

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
a titleholder must consult each of the following (a relevant person): • ***Each Commonwealth, State or Northern Territory agency or authority to which the activities to be carried out under the environment plan may be relevant.*** • ***If the plan relates to activities in the offshore area of a State—the Department of the responsible State Minister.*** • ***If the plan relates to activities in the Principal Northern Territory offshore area—the Department of the responsible Northern Territory Minister.*** • ***A person or organisation whose functions, interests or activities may be affected by the***	whether the activity may be relevant to authorities, or determining who has functions, interests or activities that may be affected. Regulation 25, like most statutory consultation provisions, imposes an obligation that must be capable of practicable and reasonable discharge by the titleholder. It also involves 'some decisional choice' that the titleholder must make in identifying relevant persons and in how the consultation is undertaken. Processes for the identification of relevant persons must provide for sufficiently broad capture of ascertainable persons and organisations who may have their functions, interests or activities affected or that may be affected by the activity. Publication in appropriate media forms may be a reasonable tool to assist in the identification of relevant persons and inform the delivery of more targeted notices to potentially relevant persons. It is recognised that in any community consultation there will inevitably be persons within a group who could not participate for various reasons, however the absence of their participation would not invalidate the process provided reasonable efforts were made to identify the relevant persons and to consult with them. The process should include reference to multiple sources of information, such as publicly available materials, review of databases and registers, published guidance, previous history, as well as advice from authorities and other relevant persons. In some cases, relevant persons have developed guidance detailing their functions, interests or activities and how and when they wish to be consulted on activities. Titleholders should take this guidance into account in developing consultation processes with relevant persons. Titleholders may also consider how they can create awareness of their activities to encourage potentially relevant persons to make themselves known to the titleholder.	

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
activities to be carried out under the environment plan. • ***Any other person or organisation that the titleholder considers relevant.***		
25(2) Consultation with relevant authorities, persons and organisations etc. ***For the purpose of the consultation, the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.***	Information provided must be sufficient to allow an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person. Again, the titleholder has a "decisional choice" to make in how information will be given to allow the "relevant person" to make the assessment contemplated by regulation 25(2). Titleholders should consider the functions, interests or activities of relevant persons and the impacts and risks that affect them when determining information requirements. The environment plan must demonstrate that the duty (to carry out consultation with relevant persons) has been discharged and that the consultation provided sufficient information about the environment and impacts on the environment. The level of information necessary is likely to vary for different relevant persons and may depend on the degree to which a relevant person is affected. Different consultation processes may be required for relevant persons and organisations depending on information requirements. What constitutes sufficient information as part of a consultation processes may differ depending on the relevant person(s) and the environment plan should demonstrate that the process was suited to the type of relevant person. Generic, targeted electronic mailouts or links to a webpage may not be sufficient. Information should be in a form that is readily accessible and appropriate for the relevant person being consulted. Materials provided may include written forms, pictorial or other graphics, verbal briefings or presentations, and the use of other technologies. Information may well need to be provided in an iterative manner, as finer detail and precision is developed through the consultation process. Titleholders are encouraged to discuss expectations around the type and level of detail of information required with relevant persons early when commencing consultation.	Section 11.3.2 sets out the methodology adopted to preparing and presenting sufficient information to relevant persons, along with the different types of information prepared for relevant persons.
25(3) Consultation with relevant authorities,	Titleholders must provide a "reasonable period" for the relevant person to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities and so they are able to respond with any concerns. The nature, scale and complexity of an	Section 11.3.3 sets out Amplitude Energy's approach to ensuring that relevant persons

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
persons and organisations etc ***The titleholder must allow a relevant person a reasonable period for the consultation.***	activity, as well as the extent and severity of potential impacts and risks on a relevant person's functions, interests or activities may inform what makes a reasonable period for consultation. Relevant persons may have also provided the titleholder with their views of what constitutes reasonable timeframes, their availability and or accessibility issues that should be taken into account. Therefore, what is a reasonable period for consultation should be considered on a case-by-case basis.	were provided with reasonable periods for consultation.
25(4) Consultation with relevant authorities, persons and organisations etc. ***The titleholder must tell each relevant person the titleholder consults that:*** ***(a) the relevant person may request that particular information the relevant person provides in the consultation not be published; and*** ***(b) information subject to such a request is not to be published under this Part.***	-	See Section 11.3 Appendix 8 - and the Sensitive Information file.
24 Other information in environment plan. ***The environment plan must contain the following:***	The consultation process should be documented within the environment plan through the titleholder report on consultation and the sensitive information report. Under regulation 24(b) of the Environment Regulations, the environment plan must contain a report on the consultation which provides: i. a summary of each response made by a relevant person	See Appendix 8 - for the Report on Consultation.

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
• ***A statement of the titleholder's corporate environmental policy.*** • ***A report on all consultations under section 25 of any relevant person by the titleholder, that contains:*** – ***A summary of each response made by a relevant person.*** – ***An assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates.*** – ***A statement of the titleholder's response, or proposed response, if any, to each objection or claim.***	ii. an assessment of the merits of any objection or claim about adverse impact of each activity to which the environment plan relates iii. a statement of the titleholder's response, or proposed response, if any, to each objection or claim iv. a copy of the full text of any response by a relevant person. NOPSEMA expects the environment plan to also provide descriptions of the consultation processes, and the rationale used to determine who and how to consult with relevant persons, including the approach to provision of sufficient information and how a reasonable period for the consultation was determined. This will assist to provide a basis for NOPSEMA to form a reasonable satisfaction view that the titleholder has carried out the consultations required by regulation 25. The consultation process should also assist the titleholder to meet its obligation under section 280 or 460 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 which requires that it must carry out the petroleum or greenhouse gas activity respectively in a manner that does not interfere with navigation, fishing, conservation of resources of the sea and seabed, other offshore electricity infrastructure and petroleum activities, and the enjoyment of native title rights and interests (within the meaning of the Native Title Act 1993) to a greater extent than is necessary for the reasonable exercise of the titleholder's rights and obligations. Titleholders should ensure that a summary containing the main matters raised in each response made by a relevant person is included in the consultation report. Assist the titleholder to meet its obligation under section 280 or 460 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 which requires that it must carry out the petroleum or greenhouse gas activity respectively in a manner that does not interfere with navigation, fishing, conservation of resources of the sea and seabed, other offshore electricity infrastructure and petroleum activities, and the enjoyment of native title rights and interests (within the meaning of the Native Title Act 1993) to a greater extent than is necessary for the reasonable exercise of the titleholder's rights and obligations. Titleholders should ensure that a summary containing the main matters raised in each response made by a relevant person is included in the consultation report. The report on consultation should not include the full text or extracts of the full text of any response by a relevant person. Under regulation 26(8), this information must be contained in the sensitive information part of the environment plan and not anywhere else in the plan. The report on consultation should also include clear and precise identification of claims and objections presented, an assessment of the merit of	

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
– ***A copy of the full text of any response by a relevant person.*** – ***Details of all reportable incidents in relation to the proposed activity.***	each objection or claim with sufficient rationale provided to support that assessment, and a demonstration of the suitability of any measures adopted as a result of the consultation. Full text (source) records must be provided to verify the accuracy of the summary of the consultation. NOPSEMA interprets the term "full text" to mean an unedited version of the correspondence received without redacted or modified text. Titleholders will need to document in written form all communications undertaken between themselves and relevant persons. This may require documenting the minutes of meetings, undertaking written communications wherever practicable and requesting that responses from relevant persons be provided in writing where practical.	
22(15) and (16) Implementation strategy for environment plan ***(15) The implementation strategy must provide for appropriate consultation with:*** ***(a) relevant authorities of the Commonwealth, a State or a Territory; and*** ***(b) other relevant interested persons or organisations.*** ***(16) The implementation strategy must comply with the Act, this instrument, any other regulations made under***	Demonstrating in an environment plan that ongoing consultation is a part of a titleholder's implementation strategy as required by regulation 22(15), is separate to demonstrating that requirements for relevant persons consultation outlined in this guideline have been met.	See section 12.12 of the Implementation section.

OPGGS(E)R Regulation	NOPSEMA Guideline	How requirements were met
the Act, and any other environmental legislation applying to the activity.		

11.3 Consultation with Relevant Authorities, Persons and Organisations - Regulation 25 OPGGS(E)R

11.3.1 Identifying Relevant Persons – 25(1)

In properly discharging our consultation obligations for identifying relevant persons under regulation 25(1)(a), (b), (c), (d) and (e) of the OPGGS(E)R, we have adopted a methodology that is reasonable, pragmatic and factors in the practical aspects of the consultation process, while remaining compliant with applicable law. This methodology is consistent with NOPSEMA's Guidelines and demonstrates Amplitude Energy's cognisance of:

- the planned activities
- the geographical extent to which the environment may be impacted by unplanned activities, risks and impacts.

The below graphic sets out an overview of the process undertaken by Amplitude Energy to identify relevant persons.

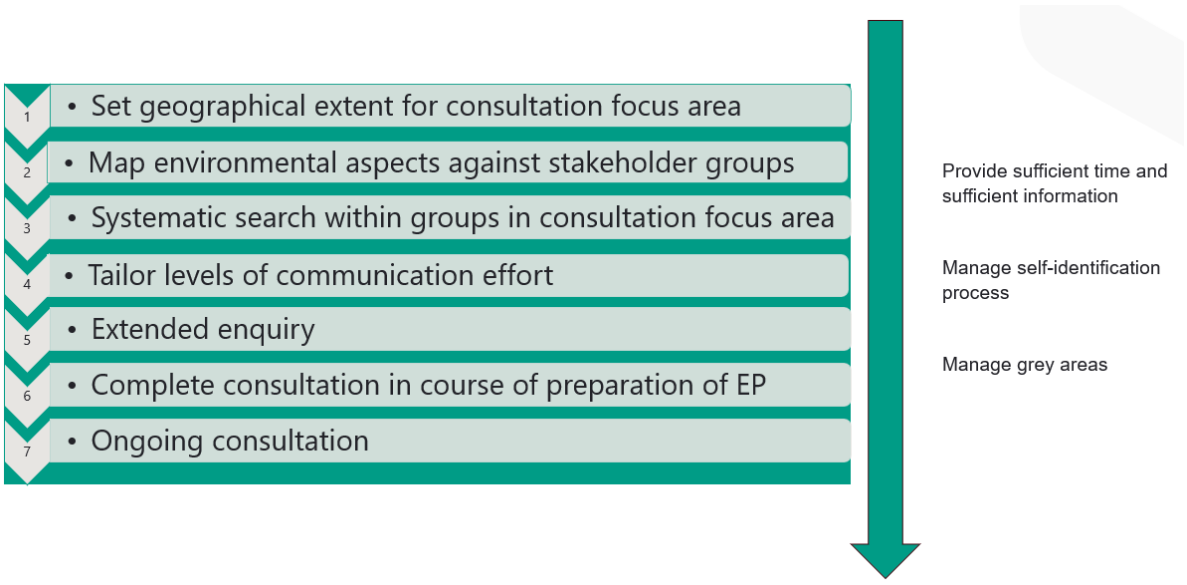


Figure 11-1: Process Steps

11.3.1.1 Geographical Extent for Consultation Focus Area

The purpose of consultation is to gain input from individuals, groups and authorities who are potentially affected by the activities under the EP, so that these risks and impacts can be assessed and reduced to an acceptable level and ALARP.

The first phase of our methodology for identifying relevant persons was to overlay the extent of potential impacts from our planned and unplanned activities with persons or organisations whose interests, activities or functions could be impacted.

Our methodology and rationale for this approach is set out further below.

Planned activities

We considered the largest spatial area where a person's interests, activities or functions could be impacted by the planned activities and determined this to be the flaring EMBA. We refer to this as the Activities EMBA.

The persons that may be affected by planned activities do not necessarily reside proximate to the activities, but have functions, interests or activities that potentially overlap with the Activities EMBA.

For example, a person with fishing quota overlapping the Activities EMBA, or a conservation organisation with an interest in protecting marine mammals transiting the area, may be based outside of the Activities EMBA but nonetheless be a relevant person for the purpose of Amplitude Energy's consultation.

Unplanned activities

Of the potential unplanned activities, the one that carries the highest level of public interest and potential consequences is a hydrocarbon spill.

We used quantitative spill modelling for a loss of containment whilst drilling, to determine the total geographic area that could potentially be impacted by a hydrocarbon spill. We use the EMBA (identified in Section 4.2)to guide where to focus consultation efforts and to delineate a Consultation Focus Area (CFA)[12]. We do this because whilst the EMBA (and therefore CFA) is large, and impacts are unlikely, it provides conservatism in how broadly we seek relevant persons.

Our impact and risk assessment at Section 6.8 notes that in the unlikely event of a spill there is some potential for social affects beyond the CFA. However, as described in section 6.8.5.4, exposure concentrations are not uniform to the outer extent of these thresholds. Rather, exposure levels are lower outside the EMBA, and therefore the potential consequences are generally of lower severity and scale, and the risk of occurrence is more remote. Having regard to this, we consider that the ecological impacts boundary depicted by the EMBA represents a natural and reasonable point at which to transition from direct identification of relevant persons, to the extended enquiry process described in section 11.3.1.5.

Through our extended enquiry process, sufficiently broad capture and reasonable opportunity was provided for self-identification by relevant persons outside the CFA. We undertook broad coverage advertising of consultation on this EP in national, state-wide and regional press, and we also made enquiries with the ~290 relevant persons that we consulted with, as to whether there were any other potentially interested persons they thought we should contact. Further advertising via radio, social and regional press media was run to advertise our community sessions and webinars, and subsequently to notify the public of the pending closing of consultation, all of which created additional opportunities for self-identification.

Overall, by using in combination

[12] *Sometimes stochastic oil spill modelling will generate small sections of an EMBA that outlie the contiguous EMBA. These outliers are reviewed and treated on a case-by-case basis as to whether we extend the CFA to encompass them. We consider the modelled exposure concentrations at specific locations, the likelihood of exposure, brevity of exposure, and the types of persons and organisations in those areas that could be impacted, as well as previous consultation in those areas. In this instance our existing environment and impact and risk assessments have been informed by two recently accepted EPs in the Gippsland region and one in the Otway region. These EPs also address the potential impacts from a L2/3 hydrocarbon spill. In all cases, any outliers to the CFA are well covered by expansive extended enquiry, as well as direct identification of potentially affected PBCs/RAPs in eastern Victoria.*

- a CFA that identified and concentrated efforts on persons who might have functions, interests or activities within the EMBA
- an extensive extended enquiry process with a sufficiently broad capture to seek out and allow for self-identification of persons outside the CFA.

Amplitude Energy has been able to discharge its consultation requirements in a practical and reasonable manner, that supports the objects of the OPGGS(E)R.

For this EP, in addition to completing direct enquiry within and adjacent to the CFA, we undertook additional direct enquiry for the following locations that are proximal to the CFA:

- The whole LGA coastal area if any part of the LGA is adjacent to the EMBA (full coastal extent of Glenelg, Moyne, Warrnambool, Corangamite and Colac-Otway LGA areas).
- The offshore area adjacent to those LGA areas (to capture relevant fisheries, both state and Commonwealth, to determine relevant persons from the fishing sector).

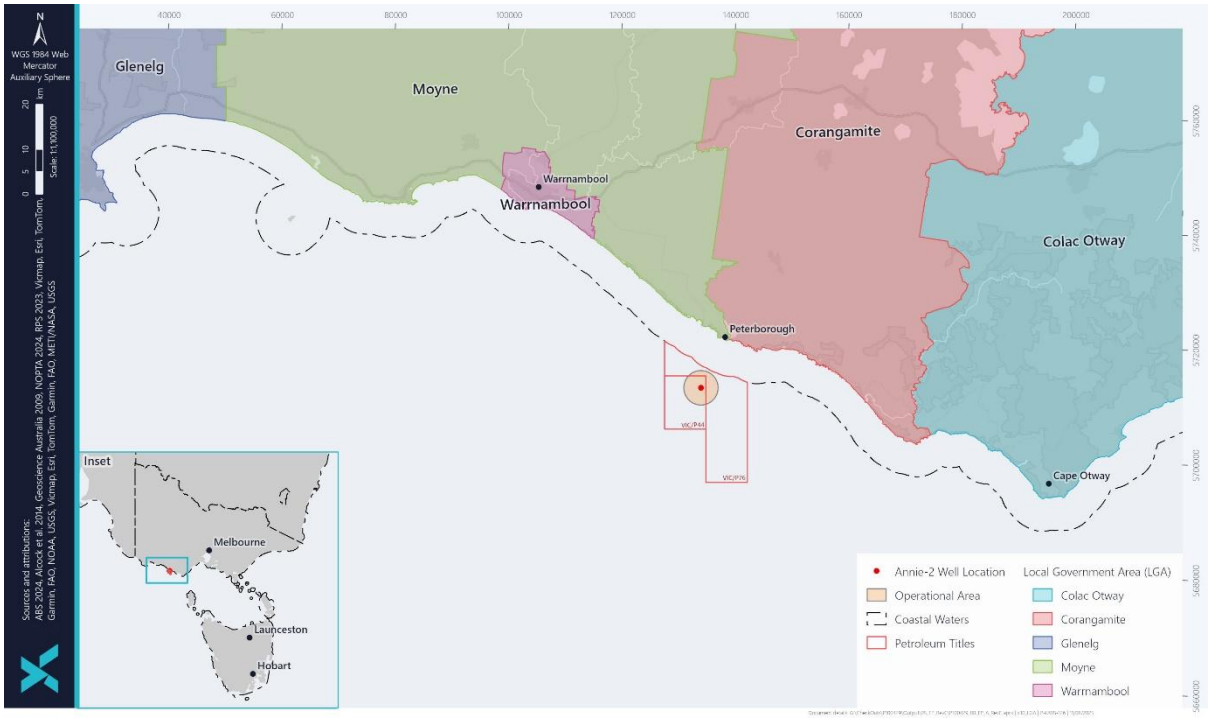


Figure 11-2: Consultation Focus Area LGAs

11.3.1.2 Defining Relevant Person Categories

The second phase of our methodology for identifying relevant persons was to assess the categories of relevant persons who might have their functions, interests or activities affected by our activities under the EP. By mapping these categories of relevant persons, we were then able to perform more detailed searches and research for identification purposes.

Consistent with the objects of the OPGGS(E)R, a broad approach was taken to the 'relevant persons' concept and this included government departments and agencies, private sector organisations and individuals. The "interests" of relevant persons were not confined to legal interests in land or

property, but also included environmental values and sensitives in connection with the sea and marine resources that may be affected.

To support identification of groups of relevant persons that may be affected, they were mapped against environmental aspects to determine how their functions, interests or activities may be affected by our activities. This mapping is shown in Table *11-2*.

Commonwealth and State government departments and agencies are not included in this mapping table. Rather, in their case we considered whether the activities may be relevant to their roles and responsibilities, and reviewed:

- GL1887 - Consultation with Commonwealth agencies with responsibilities in the marine area.
- GN1785 - Petroleum activities and Australian Marine Parks.
- Amplitude Energy's prior consultation in the Otway Basin.
- Desktop analysis to identify any agency or department changes.

Appendix 8 - of the EP provides lists of the relevant persons that were identified, and our rationale for their inclusion in the list.

Table 11-2: Aspects, and Groups of Relevant Persons

Group of Relevant Person	Indicative level of effort	Physical presence		Planned emissions				Planned discharges			Unplanned interaction				Accidental release
		Displacement	Seabed disturbance	Light	Underwater sound	Atmospheric	Greenhouse gas	Subsea operational	Surface operational	Routine from vessel	Marine fauna	IMS introduction	Dropped object	Waste	Hydrocarbons
Business, industry and research															
Marine based businesses	2	X										X			X
Energy operators	2	X			X						X	X			X
Other infrastructure	2	X	X										X		X
Research	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tourism	2	X									X				X
First Nations															
Eastern Maar	1		X	X	X		x	X			X				X
Gunditjmara	1		X	X	X		x	X			X				X
Wadawurrung (have previously advised they only wish to be informed)	2		X	X	X		x	X			X				X
Bunurong	1						x				X				X
Gunaikurnai	1						x				X				X
Other First Nations peoples (if identified)	1		X	X	X		x	X			X				X
Fisheries licence holders or representatives															
Fishers – major peak bodies – SIV and SETFIA	1	X	X		X			X			X	X			X
Fishers- other	2														
Recreational fishers	2	X	X		X			X			X	X			X
Aquaculture operators	2		X		X			X			X	X			X
Interest groups															
Conservation & environment	2		X	X	X	X	X	X	X	X	X	X	X	X	X
Marine recreation	2	X									X				X
Coastal community interest groups	2			X		X	X				X				X
Government															
Local government authorities (also manage ports in CFA)	2			X		X									X

11.3.1.3 Search within Relevant Persons Categories

A systematic search was undertaken across each group for relevant persons within the CFA, using the following tools:

- Amplitude Energy's established and ongoing operational presence in the area for 8 years, and previous consultation undertaken for this and other activities in the region.
- Web searches
- Review of other operators' EPs in same general area for comparable projects
- Asking known relevant persons
- Asking other stakeholders who may not be relevant persons themselves
- Reviewing NOPSEMA guideline – consultation with Commonwealth agencies with responsibilities in the marine area.

This search effort placed maximum weight on known functions, interests or activities that fall within the Activities EMBA (i.e. state/national conservation groups, fishing licence holders, peak bodies), as these may be affected by impacts and risks known to be present. The secondary, but still substantial, search effort targeted identified groups in the CFA.

We have operated in this area for many years, so most of the relevant persons with functions, interests or activities within the Activities EMBA were already known to us, as were many with functions, interests or activities more generally within the CFA.

As new groups of relevant persons were identified they were added to Table 11-2 and were subject to the systematic search for members of that group.

11.3.1.4 Tailoring Communications to Relevant Person Categories

Genuine and reasonable efforts were made to elicit a response from relevant persons identified in Appendix 8. This level of effort varied from multiple emails to multiple attempts via multiple channels (if other channels for contacting a relevant person were ascertainable). This was based on a qualitative, case-by-case assessment, that sought to achieve a balance between overwhelming relevant persons and providing reasonable prompts and opportunities to those wishing to be consulted. We considered factors such as:

- The relevant person's administrative maturity (with shire councils, NGOs, and businesses assumed to have mature communication practices).
- Whether they were represented by other organisations (such as peak bodies or Registered Aboriginal Parties (RAPs)/Prescribed Body Corporates (PBCs)).
- Whether they could be resource poor and potentially not monitoring communications.
- The likelihood, extent or severity of potential risks and impacts to the relevant person's functions, activities and interests.

Our general approach was to implement at least the minimum level effort described in Table 11-3 for each type of stakeholder.

Table 11-3 Levels of Effort Examples

Relevant person	Minimum Level of effort (1 being highest)	Rationale
RAP or PBC	1	Can be under-resourced. Important conduit to community.
Fishing peak body- SIV, TA and SETFIA – cover the majority of potentially impacted fishers	1	Important conduit to members.
Individual fisher-not represented	2	Experience tells us they do not like to be over-engaged and will respond if wish to engage.
Individual fisher-represented	None	If clearly represented, they generally would not wish to be contacted.
Fishers – smaller representative bodies such as local co-ops and sub-regional groups	2	Reasonable maturity, monitor correspondence as a primary function, and represented by peak body.
Local conservation group	2	Typically responsive in the Otway region when a project of interest.
Business	2	Monitoring correspondence is a critical business function.
Local government authority	2	High level of administrative capability.

Table 11-4 Levels of Effort

Level of effort	Description of minimum follow up to initial contact
1	Multiple calls and emails to elicit a response if none received. Email notification advising consultation closing with respect to the relevant person
2	Email to notify the relevant person that we were approaching the time of submission of the EP to NOPSEMA. (Not required if already in dialogue) For unrepresented fishers, SMS reminders sent where contact numbers were ascertainable to better suit their complex work hours.

11.3.1.5 Extended Enquiry

The majority of relevant persons were expected to be ascertainable through the systematic search described in Section 11.3.1. However, we considered that some relevant persons might be missed due to factors including geographic location or inadequate communication from their representative bodies. Through extended enquiry, reasonable additional efforts were made to contact these persons.

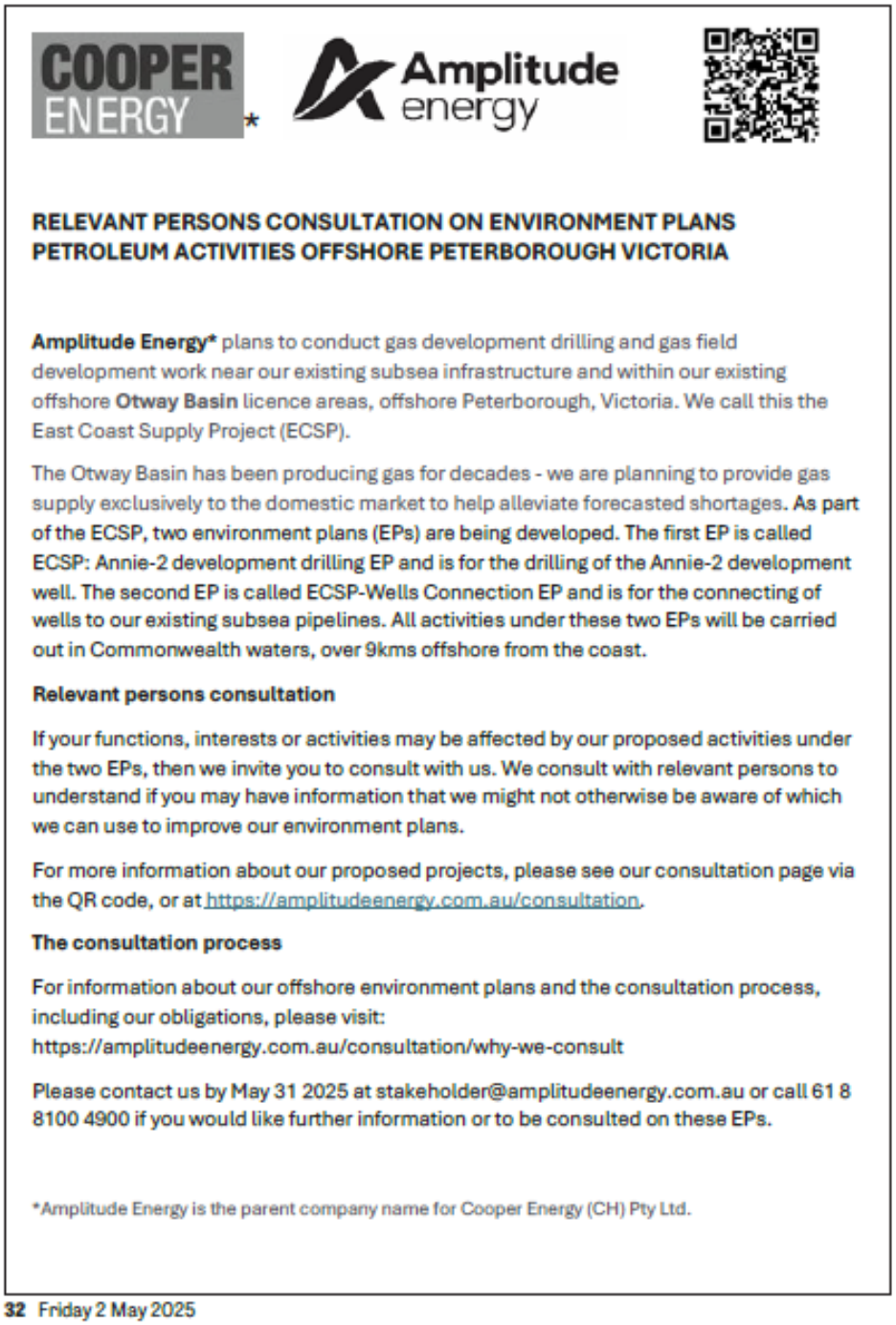
Extended enquiry comprised media advertisements in late April/early May 2025 (with some added late May 2025 and mid-July 2025 – see Figure 11-3 and Figure 11-4) inviting consultation through:

- Coastal regional press over the CFA and extended east to Southern NSW, west to Robe SA, and south to King Island (see map in Figure 11-6).

- Melbourne metropolitan (state-wide) press – *The Herald Sun.*
- National Indigenous media - *Koori Mail* and *National Indigenous Times.*
- National press through *The Australian.*

A link to the consultation web pages was also provided on our Amplitude Energy website.

Examples of posted advertisements are below:



COOPER ENERGY* Amplitude energy

RELEVANT PERSONS CONSULTATION ON ENVIRONMENT PLANS PETROLEUM ACTIVITIES OFFSHORE PETERBOROUGH VICTORIA

Amplitude Energy* plans to conduct gas development drilling and gas field development work near our existing subsea infrastructure and within our existing offshore **Otway Basin** licence areas, offshore Peterborough, Victoria. We call this the East Coast Supply Project (ECSP).

The Otway Basin has been producing gas for decades - we are planning to provide gas supply exclusively to the domestic market to help alleviate forecasted shortages. As part of the ECSP, two environment plans (EPs) are being developed. The first EP is called ECSP: Annie-2 development drilling EP and is for the drilling of the Annie-2 development well. The second EP is called ECSP-Wells Connection EP and is for the connecting of wells to our existing subsea pipelines. All activities under these two EPs will be carried out in Commonwealth waters, over 9kms offshore from the coast.

Relevant persons consultation

If your functions, interests or activities may be affected by our proposed activities under the two EPs, then we invite you to consult with us. We consult with relevant persons to understand if you may have information that we might not otherwise be aware of which we can use to improve our environment plans.

For more information about our proposed projects, please see our consultation page via the QR code, or at https://amplitudeenergy.com.au/consultation.

The consultation process

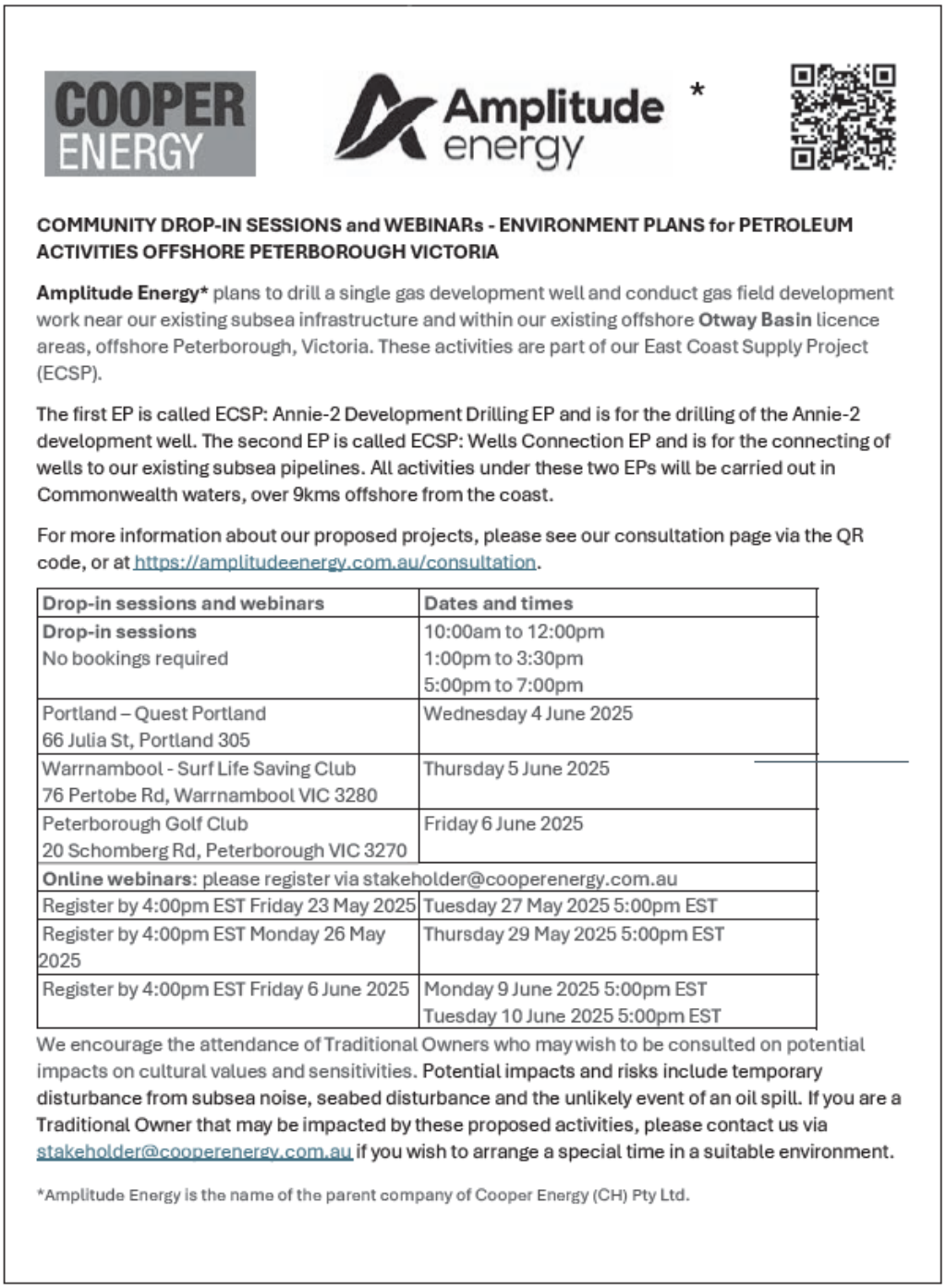
For information about our offshore environment plans and the consultation process, including our obligations, please visit: https://amplitudeenergy.com.au/consultation/why-we-consult

Please contact us by May 31 2025 at stakeholder@amplitudeenergy.com.au or call 61 8 8100 4900 if you would like further information or to be consulted on these EPs.

*Amplitude Energy is the parent company name for Cooper Energy (CH) Pty Ltd.

32 Friday 2 May 2025

Figure 11-3: Torquay Surf Coast Times (*2 May 2025*)



COOPER ENERGY

Amplitude energy *

COMMUNITY DROP-IN SESSIONS and WEBINARs - ENVIRONMENT PLANS for PETROLEUM ACTIVITIES OFFSHORE PETERBOROUGH VICTORIA

Amplitude Energy* plans to drill a single gas development well and conduct gas field development work near our existing subsea infrastructure and within our existing offshore **Otway Basin** licence areas, offshore Peterborough, Victoria. These activities are part of our East Coast Supply Project (ECSP).

The first EP is called ECSP: Annie-2 Development Drilling EP and is for the drilling of the Annie-2 development well. The second EP is called ECSP: Wells Connection EP and is for the connecting of wells to our existing subsea pipelines. All activities under these two EPs will be carried out in Commonwealth waters, over 9kms offshore from the coast.

For more information about our proposed projects, please see our consultation page via the QR code, or at https://amplitudeenergy.com.au/consultation.

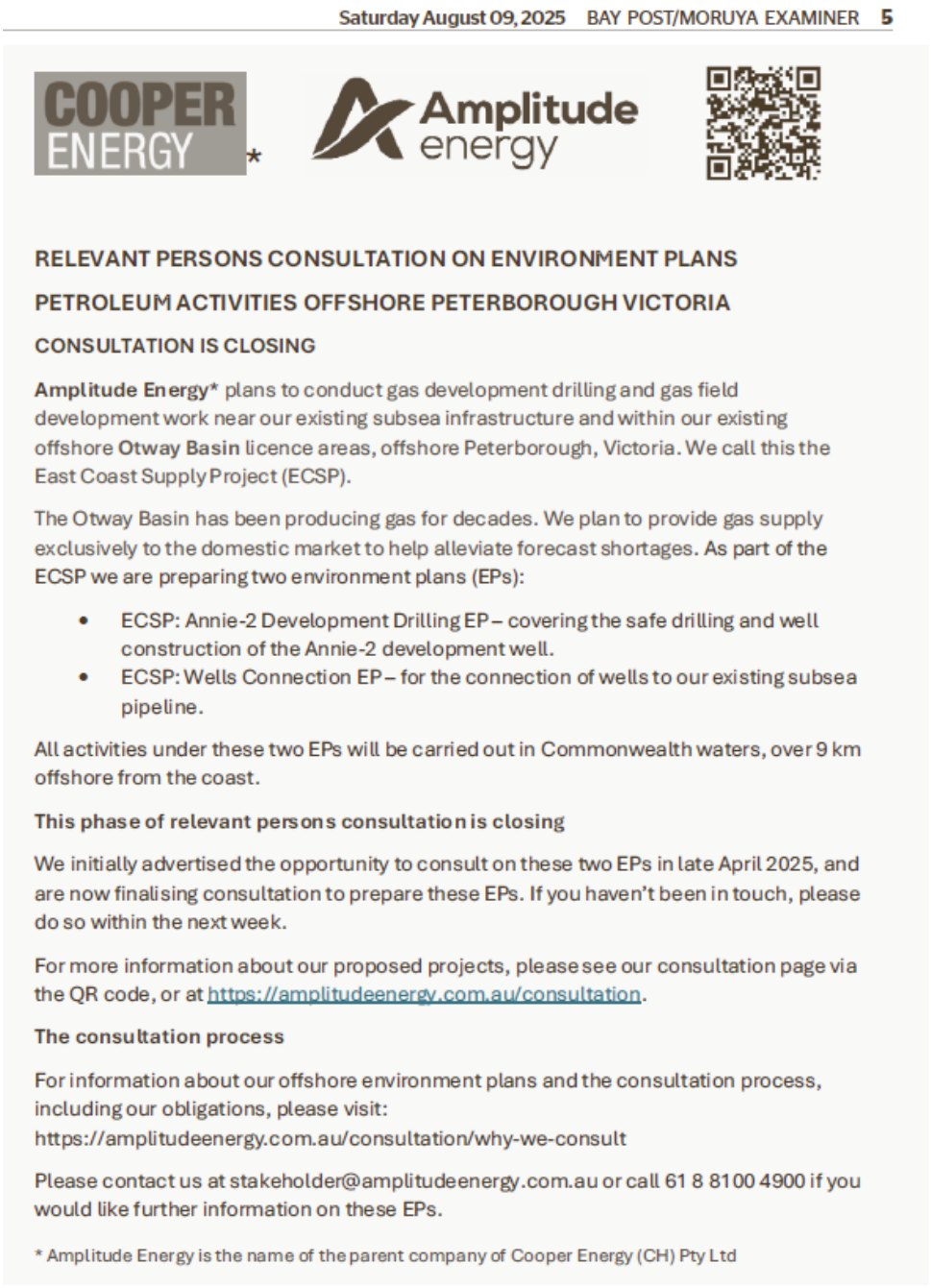
Drop-in sessions and webinars	Dates and times
Drop-in sessions No bookings required	10:00am to 12:00pm 1:00pm to 3:30pm 5:00pm to 7:00pm
Portland – Quest Portland 66 Julia St, Portland 305	Wednesday 4 June 2025
Warrnambool - Surf Life Saving Club 76 Pertobe Rd, Warrnambool VIC 3280	Thursday 5 June 2025
Peterborough Golf Club 20 Schomberg Rd, Peterborough VIC 3270	Friday 6 June 2025
Online webinars: please register via stakeholder@cooperenergy.com.au	
Register by 4:00pm EST Friday 23 May 2025	Tuesday 27 May 2025 5:00pm EST
Register by 4:00pm EST Monday 26 May 2025	Thursday 29 May 2025 5:00pm EST
Register by 4:00pm EST Friday 6 June 2025	Monday 9 June 2025 5:00pm EST Tuesday 10 June 2025 5:00pm EST

We encourage the attendance of Traditional Owners who may wish to be consulted on potential impacts on cultural values and sensitivities. Potential impacts and risks include temporary disturbance from subsea noise, seabed disturbance and the unlikely event of an oil spill. If you are a Traditional Owner that may be impacted by these proposed activities, please contact us via stakeholder@cooperenergy.com.au if you wish to arrange a special time in a suitable environment.

*Amplitude Energy is the name of the parent company of Cooper Energy (CH) Pty Ltd.

www.koorimail.com

Figure 11-4: Koori Mail - Drop-in Sessions (21 May 2025)



Saturday August 09, 2025 BAY POST/MORUYA EXAMINER 5

COOPER ENERGY * Amplitude energy

RELEVANT PERSONS CONSULTATION ON ENVIRONMENT PLANS

PETROLEUM ACTIVITIES OFFSHORE PETERBOROUGH VICTORIA

CONSULTATION IS CLOSING

Amplitude Energy* plans to conduct gas development drilling and gas field development work near our existing subsea infrastructure and within our existing offshore **Otway Basin** licence areas, offshore Peterborough, Victoria. We call this the East Coast Supply Project (ECSP).

The Otway Basin has been producing gas for decades. We plan to provide gas supply exclusively to the domestic market to help alleviate forecast shortages. As part of the ECSP we are preparing two environment plans (EPs):

- ECSP: Annie-2 Development Drilling EP – covering the safe drilling and well construction of the Annie-2 development well.
- ECSP: Wells Connection EP – for the connection of wells to our existing subsea pipeline.

All activities under these two EPs will be carried out in Commonwealth waters, over 9 km offshore from the coast.

This phase of relevant persons consultation is closing

We initially advertised the opportunity to consult on these two EPs in late April 2025, and are now finalising consultation to prepare these EPs. If you haven't been in touch, please do so within the next week.

For more information about our proposed projects, please see our consultation page via the QR code, or at https://amplitudeenergy.com.au/consultation.

The consultation process

For information about our offshore environment plans and the consultation process, including our obligations, please visit:
https://amplitudeenergy.com.au/consultation/why-we-consult

Please contact us at stakeholder@amplitudeenergy.com.au or call 61 8 8100 4900 if you would like further information on these EPs.

* Amplitude Energy is the name of the parent company of Cooper Energy (CH) Pty Ltd

Figure 11-5 Bay Post/Moruya Examiner – Consultation Closing (9 August 2025)

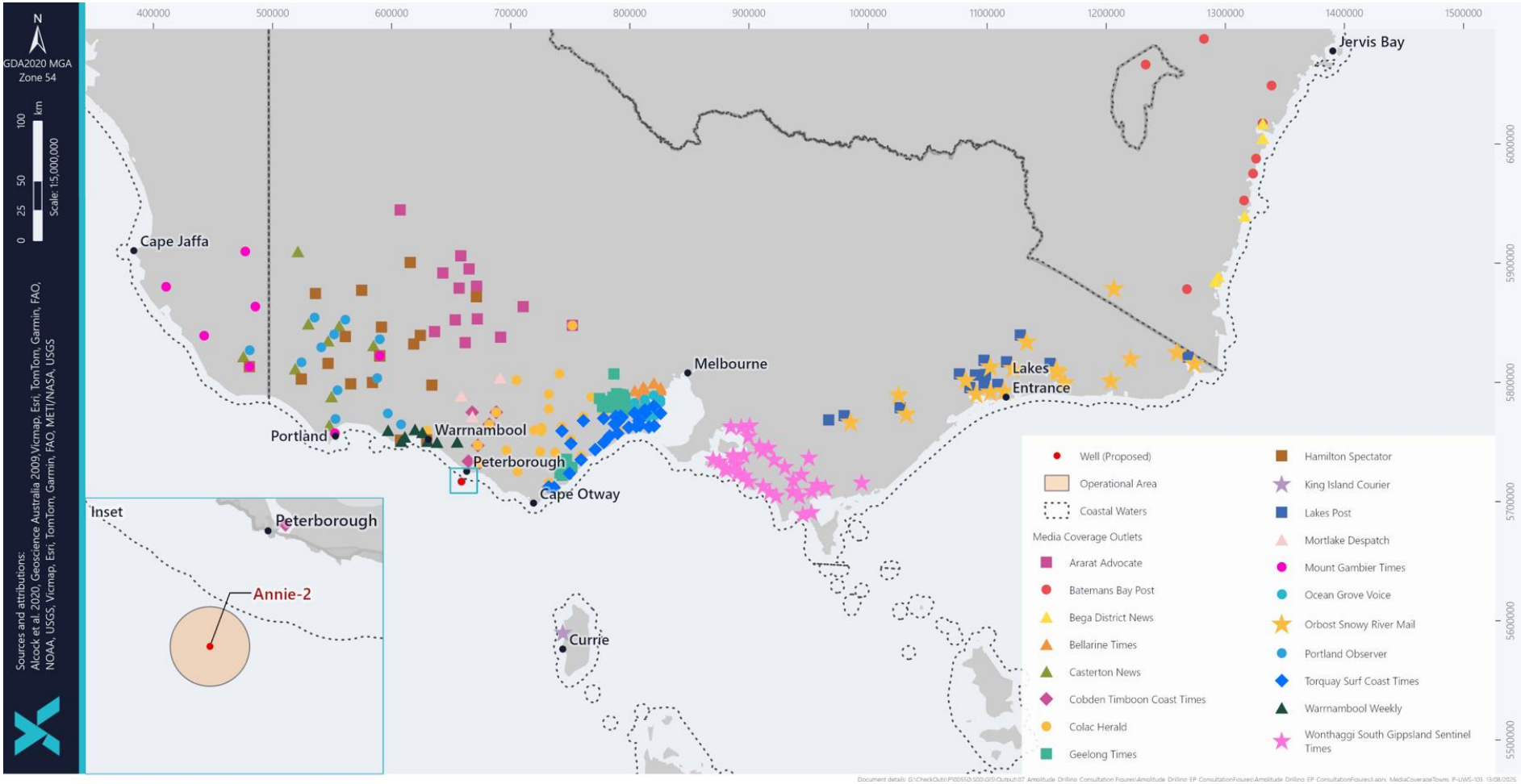


Figure 11-6 Distribution of Advertisements in Regional Press

In addition to using the above efforts and tools to identify relevant persons, we also ran a further radio, social media and print media campaign to promote the community drop-in sessions and webinars which comprised the following:

- Regional newspaper over western Victoria that also provided good coverage over the EMAC, GMTOAC and WTOAC RAP areas.
- Radio advertisements on local radio stations (Coast FM, 37B FM, Mixx FM, 3HA FM) in areas covering the CFA between 2 June 2025 and 6 June (4 x 30 sec per day for 5 days).
- Geo-targeted Facebook advertisements designed to specifically target the area in and around the CFA published between 21 May 2025 to 31 May 2025.
- A dedicated page on the Amplitude Energy website.
- A link to that page on the corporate website home page.

A recording of the webinar was also posted on the consultation website to allow any interested person access to information about the proposed activities.

11.3.1.6 Summary of media used

Table 11-5: Summary of Advertisements Run

Media	Invitation to consult	Drop-in sessions	Closing consultation
Koori Mail	7 May 2025	21 May 2025	13 August 2025
National Indigenous Times	5 May 2025 (for 7 days)		
The Australian	1 May 2025		7 August 2025
The Herald Sun	1 May 2025		7 August 2025
Ararat Advocate		23 May 2025	
Batemans Bay Post	19 July 2025		9 August 2025
Bellarine Times	2 May 2025		8 August 2025
Bega District News	19 July 2025		9 August 2025
Casterton News	29 April 2025	20 May 2025	5 August 2025
Cobden Timboon Coast Times	30 April 2025	21 May 2025	6 August 2025
Colac Herald	2 May 2025	21 May 2025	6 August 2025
Geelong Times	2 May 2025		8 August 2025
Hamilton Spectator	2 May 2025	23 May 2025	8 August 2025
Lakes Post	14 May 2025		6 August 2025
King Island Courier	29 May 2025		7 August 2025
Mortlake Dispatch	1 May 2025	22 May 2025	7 August 2025
Mt Gambier Times	2 May 2025		8 August 2025
Ocean Grove Voice	2 May 2025		8 August 2025
Orbost Snowy River Mail	23 July 2025		6 August 2025
Portland Observer	2 May 2025	23 May 2025	8 August 2025
Torquay Surf Coast Times	2 May 2025		8 August 2025
Warrnambool Weekly	2 May 2025	23 May 2025	8 August 2025

Wonthaggi South Gippsland Sentinel Times	13 May 2025		5 August 2025
Facebook	7 May 2025 (14 days)	21 May 2025 (10 days)	18 August 2025 (1 month)
Instagram	7 May 2025 (14 Days)	21 May 2025 (10 days)	18 August 2025 (1 month)
Radio 3YB FM & Coast FM	2 May 2025 (5 days)	2 June 2025 (5 days)	13 August 2025 (18 days)

11.3.1.7 Community Drop-in Sessions

Community drop-in sessions were broadly advertised as described in Section 11.3.1.5,

Amplitude Energy made specific efforts to ensure that the 9 community drop-in sessions it held were widely advertised (as described in Table 11-5), easily accessible, and provided at a range of times and dates, so as to maximise opportunities for relevant persons to participate in the consultation process. Traditional Owners were specifically encouraged to attend these sessions, and were encouraged to notify us if they had any specific requirements (e.g. for special times or separate spaces to other community members).

The 9 community drop-in sessions conducted are listed in Table 11-6.

Table 11-6 Community Drop-in Sessions

Session	Date	Location
1.	10.00am – 12.00pm, Wednesday 4 June 2025	Quest Portland, 66 Julia St, Portland
2.	1.00pm – 3.30pm, Wednesday 4 June 2025	Quest Portland, 66 Julia St, Portland
3.	5.00pm – 7.00pm, Wednesday 4 June 2025	Quest Portland, 66 Julia St, Portland
4.	10.00am – 12.00pm, Thursday 5 June 2025	Warrnambool Surf Life Saving Club, 76 Pertobe Rd, Warrnambool
5.	1.00pm – 3.30pm, Thursday 5 June 2025	Warrnambool Surf Life Saving Club, 76 Pertobe Rd, Warrnambool
6.	5.00pm – 7.00pm, Thursday 5 June 2025	Warrnambool Surf Life Saving Club, 76 Pertobe Rd, Warrnambool
7.	10.00am – 12.00pm, Friday 6 June 2025	Peterborough Golf Club, 20 Schomberg Rd, Peterborough
8.	1.00pm – 3.30pm, Friday 6 June 2025	Peterborough Golf Club, 20 Schomberg Rd, Peterborough
9.	5.00pm – 7.00pm, Friday 6 June 2025	Peterborough Golf Club, 20 Schomberg Rd, Peterborough

11.3.1.8 Webinars

Opportunities were provided to join 6 separate webinars (Table 11-7). Sessions 1-4 were broadly advertised in Western Victoria as described in Section 11.3.1.5. Invitations to join these webinars were sent via email to all non-government relevant persons as identified at that time. Amplitude

Energy made specific efforts to spread these webinar dates across a range of dates, to maximise opportunities for participation.

This provided another opportunity for relevant persons to self-identify, and to receive sufficient information to understand how their functions, interests or activities may be impacted by our activities.

Table 11-7: Webinars

Session	Date	Details
1.	Tuesday 27 May 2025 5:00pm EST	Advertised in regional press, social media and radio.
2.	Thursday 29 May 2025 5:00pm EST	
3.	Monday 9 June 2025 5:00pm EST	Advertised in regional press, social media and radio, and invitations sent to non-government relevant persons as identified at the time.
4.	Tuesday 10 June 2025 5:00pm EST	
5.	Wednesday 18 June 2025 5:00pm EST	Invitations sent to non-government relevant persons as identified at the time.
6.	Thursday 19 June 2025 5:00pm EST	

A webinar recording was posted on our website and made available from 18 June 2025 up until submission of this EP.

11.3.1.9 Self-Identification

In addition to relevant persons that were identified by us, other relevant persons were able to self-identify at any time.

Our approach was not to impose any unnecessary barriers to being considered a relevant person. However, the person would need to demonstrate more than a general interest, and instead advise how their functions, interests or activities may be affected by our activities and provide full contact details to be thereafter included in consultation as a relevant person (if they wished to be included).

Once confirmed as relevant persons, any self-identified relevant persons were consulted in accordance with the process already described in section 11.3. Levels of effort to communicate described in section 11.3.1.4 were designated as level 2, as once such a relevant person had indicated a willingness to engage and provided contact details, it was reasonable to assume any follow up correspondence was received and no further effort was needed to pursue a response.

Two individuals self-identified as relevant persons during community drop-in sessions in Warrnambool, having seen the advertising via social media. Another person from Glenelg Shire self-idented in response to our advertising of the community sessions and attended one of our webinars.

11.3.2 Providing Relevant Persons Sufficient Information – 25(2)

To satisfy regulatory requirements, Amplitude Energy must give each relevant person sufficient information to allow them to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities. Amplitude Energy has prepared and provided information to relevant persons with these requirements and applicable guidelines in mind.

Our approach was to build information flow from the simple to the complex, so relevant persons could gain the depth of information needed relative to their category, and likelihood and degree to which they could be impacted. Noting many relevant persons either have limited time to read through correspondence and/or are experiencing consultation fatigue, our approach to providing sufficient information to relevant persons, was typically to:

- First, capture the relevant person's attention that their functions, interests or activities may be affected by our activities under the EP.
- Second, bring key risks and impacts to their further attention.
- Third, draw them to our website where more detailed information was available, and ensure pathways for additional information were clear.

Table 11-8 Information Provided

Information type	Purpose	Key content
Project webpage	The project webpage on the consultation website provides information specific to this EP.	• Why we plan to drill the well • Description of proposed activities • Link to information sheet with • Map • Diagrams and images • Activity detail • Simple layout of high-level impacts and risks • Easy links to areas of interest • Activity detail • Environmental impacts and risks • Easy links to specific high-level impacts and risks • Interaction with other marine users • Seabed disturbance • Underwater sound • Greenhouse gas emissions • Other atmospheric emissions • Light emissions • Planned discharges • Invasive marine species • Unplanned interactions with marine fauna • Accidental or uncontrolled hydrocarbon release • Loss of Materials or Waste Overboard • Easy links to tailored information for the following groups: • Research • Marine recreation • Conservation and environment • Recreational fishing • Commercial fishing • Coastal community

Information type	Purpose	Key content
		• Coastal business • First Nations • Contact form.
Consultation pages	The consultation pages and the corporate website provide an overview of different activities, and other useful information for relevant persons and other stakeholders.	• Amplitude Energy's general activities and maps of offshore titles • Link to NOPSEMA's community consultation brochure • Amplitude Energy's consultation obligations • Purpose of consulting with relevant persons • Description of an environment plan • Overview of the different activities that might occur in the exploration and production lifecycle • Decommissioning • Oil spill preparedness.
Bulk email # 1	Invited relevant persons to consult on the proposed activities	• Noted location of proposed activities. • Provided background information of the existing CHN fields and the need for additional gas supply. • Purpose of consultation. • Why we consult with relevant persons. • Described the development activities proposed. • Provided overview of timing and duration of proposed activities. • Downloadable information sheet with maps and diagrams • Link to consultation webpage where they could find tailored information. • Queried as to whether they knew other relevant persons. • Link to NOPSEMA brochure "Consultation on offshore petroleum environment plans – information for the community". • Asked that if an organisation they share information with members or other relevant persons. • Provided an indicative consultation timeline with flexibility noted. • Provided "quick response table" to make responding easier. • Provided clear contact details. • Noted that they should advise if any information they provided was not to be published. • Offered to meet in a matter that meet the relevant person's needs.
Bulk email # 2	Advised non-government relevant persons of community	• Invited attendance at community consultation drop-in sessions and/or webinars.

Information type	Purpose	Key content
	consultation drop-in sessions and webinars.	
Bulk email #3	Advised that this phase of consultation was closing	• Noted this phase of consultation was closing. • EP is being prepared for submission to NOPSEMA. • Requested that if they had not already done so, they contact by the end of the following week. • Noted that ongoing consultation would continue for the life of the project.

Our website was structured so a person could access broad information, but with highlighted pathways to areas of particular interest. This allowed the website user to navigate easily to specific areas, while ensuring all other topics were visible, in case they had wider interests than would be immediately obvious to us. The website provided broader, contextual information about the activities (e.g. that the gas will be supplied into the East Coast market where there is an expected shortfall of gas supply in future etc), to provide transparency to relevant persons, and explain why we are undertaking these activities, and how they fit into our future plans.

A clear point of contact was provided on the website, and in all correspondence, for relevant persons to direct their communications, seek additional information or clarifications, or request meetings (as applicable).

A link to the NOPSEMA brochure "Consultation on offshore petroleum environment plans – Information for the community" was also included on the website, to ensure relevant persons understood what to expect with the consultation process and how to participate effectively.

The Amplitude Energy website was continuously updated during the consultation process to include relevant information. A video presentation used for webinars was uploaded for general access via the consultation website.

We did not provide our draft EP or draft chapters to relevant persons prior to submission to NOPSEMA, and no requests for such were made by relevant persons. We considered that sharing any early drafts of the EP would be unproductive, as it would not capture the full learnings or benefits of the consultation process.

In addition to the reasonable general information that was provided to all relevant persons, Amplitude Energy also provided information responsively to relevant persons. When responding to relevant persons, specific inquiries were made to confirm whether there was any further information required for those relevant persons to consider the potential impact of the activities on their functions or interests.

11.3.3 Providing Relevant Persons Reasonable Period – 25(3)

To satisfy regulatory requirements, Amplitude Energy must provide relevant persons a reasonable period to identify the possible consequences of the proposed activity on their functions, interests or activities and to respond. The time required for this to occur depends on factors such as the hours available to the relevant person, complexity of issues that may be raised and, in the case of organisations, whether members and/or management are to be consulted. Noting that complex issues may arise in consultation, and it is an iterative process, reasonable time must be given to both the relevant person and Amplitude Energy to review and respond to each other's feedback and/or

requests. These reasonable timeframes should be determined on a case-by-case basis and appropriately communicated.

With this in mind, Amplitude Energy commenced consultation with one Traditional Owner group in December 2024, in line with their consultation protocol that requested early engagement. This resulted in a positive meeting in April 2025 with members of the PBC. Consultation also commenced in April 2025 with the closest RAP to the proposed activities, to ensure they would have sufficient time to call a properly notified and conducted meeting in accordance with the rules of their organisation, should that be their decision.

For the majority of relevant persons, consultation commenced later in May 2025, with a mailout containing sufficient information for a relevant person to determine whether their functions, interests or activities might be affected. Weblinks included in the email took them to specific locations on the website, and the website was designed so they could find the information that might be most relevant to their specific interests. Consultation information and opportunities were provided up until late August 2025. Throughout this period, we invited relevant persons to contact us if they required further information or wished to discuss any potential impacts or risks that might affect their functions, interests or activities.

We also provided significant flexibility in when, where and how we could discuss feedback, which included phone calls, online meetings and exchange of correspondence up until late August 2025. We had regard to any material provided to us by relevant persons setting out how they wished to be consulted when engaging with those relevant persons. We also informed relevant persons of our planned consultation schedule (per Figure 11-7), whilst allowing for variations to that schedule based on their reasonable input.

As a general rule, we considered 30 days to be a reasonable period for relevant persons to either raise initial issues or signal their intention to consult and potentially request additional time or information to do so. Notwithstanding this general view, we took an adaptive approach to the period of time and number of contact attempts made for relevant persons and sought to ensure they were given reasonable opportunities to raise any concerns or queries they had about the proposed activities.

The indicative base timeline for consultation is as follows:

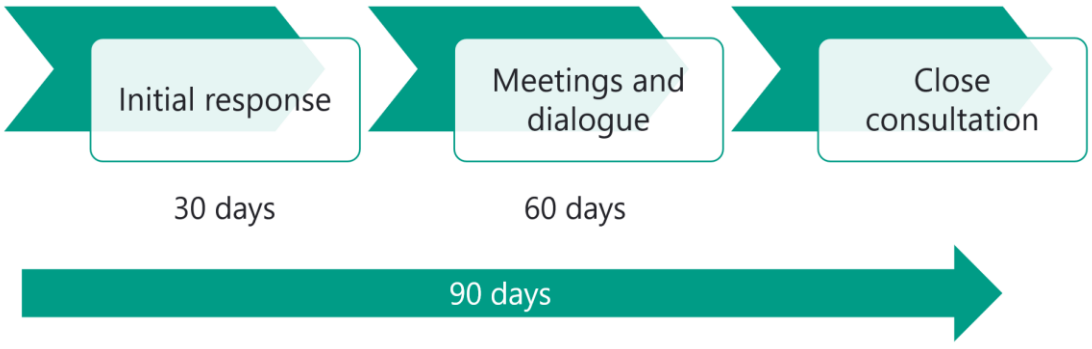


Figure 11-7: Indicative Timeline

The timeline could be extended based on individual relevant person's reasonable requests.

Other factors we considered in deciding whether a relevant person had been provided with a reasonable period for consultation, were whether during dialogue with the relevant person, a point

was reached where either no new issues were being raised for consideration, or they became unresponsive.

As described in Section 11.4, for First Nations groups, consultation periods were extended beyond target dates and benchmarked against other relevant legislative processes.

No relevant person indicated to Amplitude Energy that they considered that insufficient time for consultation was provided.

Amplitude Energy considers that a reasonable period of time was afforded to all relevant persons who wished to be consulted in the course of the preparation of this EP.

11.3.4 Sensitive Information – 25(4)

In accordance with regulation 25(4) of the OPGGS(E)R, when engaging in consultation, Amplitude Energy advised relevant persons that they may request that particular information provided during consultation not be published, and that information subject to that request will not be published in the Environmental Plans. See Table 11-8 wherein the initial email noted that respondents could request that sensitive information not be published.

11.4 Consultation Approach with Traditional Owners

Amplitude Energy is committed to carrying out respectful and effective consultation with relevant Traditional Owners and building positive and ongoing relationships. In planning, developing and implementing its consultation process with Traditional Owners, we have been cognisant of:

- NOPSEMA's consultation guideline (GL2086 – Consultation in the course of preparing an environment plan – May 2024).
- Recent judicial decisions, namely Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193, Cooper v NOPSEMA (No 2) [2023] FCA 1158 and Munkara v Santos NA Barossa Pty Ltd (No 3) [2024] FCA 9.
- Applicable legislation including the Aboriginal Heritage Act 2006 (Vic) that recognises Registered Aboriginal Parties (RAPs) and the Native Title Act 1993 (Cth) that recognises native titleholders.

It is clear from the Full Federal Court's decision in the *Tipakalippa* appeal (and further reflected in NOPSEMA's consultation guidelines for Regulation 25) that some reasonable limits must be applied to titleholder's duty to consult with relevant persons, to ensure that the process is workable. To this end, a titleholder's obligation to consult under regulation 25 of the OPGGS(E)R may be discharged without:

- Accommodating every extension of time or other request made by a particular consultee.
- Obtaining consent from the consultee to the activity.
- Obtaining confirmation from the consultee, that the process has been carried out to their subjective preferences or individual satisfaction.
- What the titleholder must do is provide:
  - Sufficient information to enable the relevant person to make an informed assessment of the possible consequences of the activity on their functions, interests or activities.
  - A reasonable period of time for the relevant person to provide feedback, and for the titleholder to assess their objections or claims, and action the assessment and response.

While Amplitude Energy identified both RAPs and PBCs and individual Traditional Owners as relevant persons, Amplitude Energy had regard to the rule books and stated preferences of RAPs and PBCs that those organisations were the nominated representative entities to engage in consultation. Amplitude Energy specifically inquired with relevant RAPs and PBCs as to whether they were aware of other groups or individuals with whom Amplitude Energy should consult, to ensure that it was inclusive and wide-reaching in its consultation with Traditional Owners.

Individual Traditional Owners and Traditional Owners who may not be affiliated with a RAP or PBC were able to self-identify as relevant persons throughout the consultation process, and extended enquiry, webinars and drop-in sessions afforded additional opportunities for any such relevant persons to engage with Amplitude Energy in consultation (using the methodology set out above).

11.4.1 Consultation Approach with Traditional Owners Representative Groups

Having regard to the above, our consultation with RAPs and PBCs has included the following key actions:

1. Undertaking desktop research to identify RAPs and PBCs overlapping the CFA.
2. Providing each of the identified RAPs and PBCs with reasonable information in plain English about the activities covered by this EP.
3. Explaining to each of the identified RAPs and PBCs the purpose of consultation, and how cultural values and heritage are important to the preparation of the EP.
4. Reviewing published literature/sources (e.g. consultation guidelines, protocols or Sea Country plans) for each identified RAP and PBC, to improve our understanding of the cultural features and heritage values overlapping with the operational area or EMBA.
5. Reviewing published rules, constitutions and other material to identify specific requirements of organisations for consultation (e.g. notice requirements, preferences for how material is prepared, decision making processes).
6. Enquiring how each of these identified RAP/PBCs wish to be consulted.
7. Enquiring directly with each identified RAP/PBC as to whether they have any information they wish to provide on their cultural values and heritage.
8. Enquiring directly with each identified RAP/PBC as to whether they are authorised to consult on behalf of their members.
9. Requesting that each identified RAP/PBC shares consultation information with their members and any other person they consider relevant.
10. Informing identified RAPs/PBCs of our targeted end date for carrying out consultation, but that we can also accommodate reasonable requests for extensions of time.

If there was no response from the RAP/PBC to our initial communication, we followed up at least 4 times, and (where possible) via multiple communication channels. This demonstrates a reasonable level of effort, respecting that participation in consultation is voluntary (for the relevant person), that the activity may not be a concern or priority for some RAP/PBCs (as some RAP/PBCs have expressly confirmed), and that ‘spamming’ such organisations may lead to ‘consultation fatigue’.

Where a RAP/PBC responded seeking further engagement, we used best endeavours to conduct consultation in accordance with their expressed preferences and requirements. For example, where they requested a face-to-face meeting or presentation, then (where practicable) it was conducted at their chosen time and location, in their preferred format (including pre-approved agendas, topics and PowerPoint slides) and with their nominated attendees. We also offered and provided financial assistance to cover the associated transportation and meeting costs (as appropriate). Additionally,

where a RAP/PBC provided specific guidance as to how it preferred consultation to occur, significant efforts were made to tailor our consultation process accordingly. From the outset of consultation, we also sought to communicate clearly to those relevant persons, the steps we had already taken to tailor the process to their stated preferences, and where there might be further opportunities to do so.

For any meetings or presentations conducted with RAP/PBCs, special care was taken to ensure that we used materials that were tailored to the interests of the relevant RAP/PBC, were in plain language suitable for an audience with a non-technical background and incorporated extensive visual elements to aid understanding. In preparing consultation material specific to Traditional Owners, Amplitude Energy reviewed the RAP organisation's own published materials to get a feel for the communication style with their members and seek to emulate it and invited their feedback on the materials provided. We also engaged an external consultant to review consultation material for Traditional Owners, to ensure that it was fit-for-purpose and culturally appropriate and sought to adhere to specific preferences and protocols provided by any Traditional Owner groups, to the extent reasonably possible.

Our subject matter experts also attended meetings and presentations to Traditional Owner groups, so that they could hear feedback directly, and respond promptly and accurately to any questions. We also invited and answered questions throughout the meeting, to facilitate a two-way dialogue. This allowed the audience to provide relevant information to us, and to ask questions to get any further information they required, or fill any gaps in understanding, which they may have had. It also demonstrated to us that our audience was clearly engaging with, and understanding, the content of our presentation, based on their considered, detailed and extensive questions.

Where a RAP/PBC requested additional time to conduct a meeting with members, we considered 42 days to be a reasonable timeframe for calling and preparing for that meeting. This timeframe reflects that 21 days is often the minimum notice period provided in PBCs' Rule Books and then allows for a further 21 days to perform the associated administrative tasks. We did not rigidly enforce a 42-day time limit but treated it as a useful reference in discussions with the RAP/PBCs and were willing to accommodate reasonable extensions of time.

In determining whether we had provided a reasonable period of time for consultation with RAP/PBCs, we benchmarked this against other relevant legislative processes, for example:

- Regulation 30 of the OPGGS(E)R, which sets out a public consultation period of 30 days.
- The Department of Mines and Petroleum "Guidelines for Consultation with Indigenous People by Mineral Explorers" (Department of Mines, Industry Regulation and Safety, 2004)**[1]** which directs a period of 21- 30 days of consultation with Traditional Owners.
- While repealed, guidance taken from the Aboriginal Cultural Heritage Act 2021—Consultation Guidelines (Government of Western Australia, 2023) suggests that up to 12 weeks may be a reasonable period of time to allow identification, contact, and response, from Traditional Owners (subject to any alternative timeframe being agreed through co-design of consultation).
- Recent DCCEEW consultation on offshore wind zone (Southern Ocean) in the same general offshore region as this project allowed for 2 months.

Amplitude Energy notes that in *Tipakalippa*, at paragraph 136, Lee J commented that "…it must be taken to be the regulatory intention that the consultation requirement cannot be one that is incapable of being complied with in a reasonable time." In line with this reasoning and having regard to the benchmarks referred to above, Amplitude Energy considers that the total period of time provided to RAP/PBCs for consultation is reasonable, even on a highly conservative view.

11.4.2 Consultation Approach with Individual Traditional Owners

Our primary efforts to proactively consult with Traditional Owners were made through engagement with the RAP/PBCs as described in the section above. In adopting this approach to consultation with Traditional Owner groups, we were cognisant of:

- The United Nations Declaration of the Rights of Indigenous People which encourages consultation to be undertaken with Indigenous peoples' through their chosen representative entity.
- The Aboriginal Heritage Act 2006 (Vic) which recognises RAPs as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage and the primary source of advice relating to Aboriginal places and objects in the appointed region.
- The published rules and constitutions of such RAP/PBCs, and whether their objectives and powers indicated that they were the appropriate authority to engage with in respect of such matters, on behalf of their members.

We also recognised that by approaching individual members of a RAP/PBC directly, we may be perceived to be undermining their nominated representative body and circumventing its proper processes. This could be perceived as disrespectful, cause division within those communities, and may not actually be effective in establishing what cultural features, values or beliefs are held by the relevant peoples, as a people. This was particularly the case where PBCs and RAPs responded to Amplitude Energy confirming that they considered their organisation to be the correct body to be consulting with for the purpose of the regulations.

Notwithstanding the above, broader efforts were also made to consult with any interested individual Traditional Owners through the following key actions:

1. Placing public notice advertisements in selected local, state and national newspapers to facilitate the opportunity for First Nations persons to self-identify and consult with us. This included the Koori Mail and the National Indigenous Times).
2. Requesting that identified RAP/PBCs distribute consultation information to their members and any other individuals they consider to be relevant, to enable them to self-identify and consult with us.
3. Requesting that identified RAP/PBCs identify any individuals that should be consulted, so that we could contact them directly.
4. Requesting that other First Nations organisations that were not relevant persons identify individuals that should be consulted so that we could contact them directly.

Where we consulted with any Traditional Owners, we provided information on the activities covered by the EP, an explanation of the purpose of consultation, and how cultural values and heritage are important to the preparation of the EP. We would also advise them if we were already in contact with their representative body (if that was not already apparent), so they could determine for themselves whether to engage with us directly or allow their representative body to do so.

In considering how to ensure that we reached Traditional Owners, through our extended enquiry methods, we had specific regard to:

- The public notification process provided under section 66 of the Native Title Act, where the Registrar notifies the general public through the Koori Mail and a local newspaper in the area.

- The content of our advertisements – which were specifically designed to be easily understood and to make it easy to seek further information (i.e. through our consultation website) or engagement with us (i.e. through a designated contact person).

Amplitude Energy has held regular internal meetings with environment and community engagement team members, to discuss this EP and in particular, our consultation process. As part of these meetings, we regularly reviewed and challenged the soundness of our consultation methodology and considered other opportunities to consult with individual Traditional Owners and/or RAP/PBCs. Some of the opportunities considered (but ultimately dismissed for the reasons outlined below) included:

- Requesting evidence from the RAP/PBCs that they had shared consultation information with their members and other persons they considered relevant, as per our repeated requests and since we did not have a line of sight to this. This option was ultimately discounted, as there has been nothing to suggest that any of the RAP/PBCs would not, or had not, fulfilled their role and responsibilities to members (e.g. by sharing information and complying with any member consultation requests). Therefore, it would have been inappropriate for us to question this, or to ask to review their communications, and this would be inconsistent with how we treat other organisations that represent communal interests.
- Attempting to contact members of RAP/PBCs directly, notwithstanding they had not self-identified and expressed interest in consultation directly with Amplitude Energy. This was ultimately considered to be inappropriate, given the strong rationale described above for treating RAP/PBCs as the primary point of contact, and appropriate authority to speak to the cultural values and sensitivities held by the group (rather than the beliefs of an individual). Additionally, Amplitude Energy was cognisant of the risk that seeking to identify and then contact individual RAP/PBCs members, may be intrusive and unlawful from a privacy perspective, given that the members' contact details were not readily available from a public source or offered by the RAP/PBC itself.
- Attempting to speak with RAP/PBCs directly, by visiting their offices without having scheduled a formal meeting in advance. We determined that this would be inappropriate, as it would be inconsistent with our aim of engaging with Traditional Owners in a voluntary, respectful and productive way.

11.5 Reasonable Opportunity

In *Tipakalippa*, the Federal Court when considering the requirements for consultation under regulation 25 (then regulation 11A), had regard to case law concerning the requirements under the Native Title Act 1993 to provide a 'reasonable opportunity' to participate in decision-making. The Court indicated that under the Native Title Act, reasonable notice should be provided to relevant native title group members, but exhaustive communications with each and every person are not required. This approach has been endorsed by NOPSEMA in the context of regulation 25 consultation and can be found in the NOPSEMA guidelines.

Amplitude Energy considers that it provided all relevant persons a reasonable opportunity to participate in consultation through the process described in this EP.

11.6 Assessment of Merits of Claims or Objections

Amplitude Energy assessed the merit of any claims or objections raised by relevant persons during consultation (including ongoing consultation) in line with the following process.

For a claim to have merit, it must first and foremost be relevant to the EP and the activities captured by the EP. After passing this relevancy test, the objection or claim should have a reasonable and credible basis for related effects or impacts to occur. This test does not need to be exhaustive, as a proper construction of the Regulations requires that all reasonable matters should be assessed.

Once a claim or objection is considered both relevant and reasonable, Amplitude Energy responds as follows:

1. If the claim or objection raised by the Relevant Person is already addressed in the EP, Amplitude Energy will respond to the Relevant Person by outlining how the claim or objection has been considered and captured in the EP.
2. If, following Amplitude Energy's evaluation of the claim or objection, it results in new risks/impacts being identified and/or additional controls being developed, then the Amplitude Energy Management of Change Process is applied, and the outcomes are shared with the Relevant Person.

The above steps may comprise an iterative process, and there may be a point at which consultation on an issue is concluded (and the relevant obligations discharged) without the Relevant Person being satisfied with the outcome.

Amplitude Energy must have fully considered matters raised and demonstrate that impacts and risks of the activity are reduced to ALARP and an acceptable level.

In the case of Traditional Owners interests including intangible cultural heritage issues, Amplitude Energy will work with the Relevant Person to gain an appropriate understanding of the relevant claims or objections and aims to work collaboratively to manage and mitigate impacts and risks, where reasonably practicable.

As noted above, Amplitude Energy has satisfied its obligations under section 25 of the Regulations. Amplitude Energy acknowledges that relevant persons may have different views as to whether the consultation obligations have been discharged.

11.7 Compliance with Consultation Requirements

Section 11.2 sets out in comprehensive detail the steps that have been undertaken to ensure there has been full compliance with the consultation requirements for this EP.

This compliance can be summarised as follows:

- The steps outlined in section 11.3.1 had been followed, and resulting in reasonably ascertainable relevant persons being identified in Appendix 8 - .
- Sufficient information had been provided as described in section 11.3.2.
- Sufficient time had been provided as per section 11.3.3.
- The merits of objections or claims raised by relevant persons (if any) had been considered, and resultant measures (if any) proposed to address those impacts and risks had been communicated to the respective relevant persons and captured in the EP, as described in Appendix 8 - .
- The date that the current and potentially final phase of consultation was closing had been communicated to any relevant persons with whom an active dialogue had been established.

We consider that we have met the required statutory criteria for consultation for the EP, and in some cases engaged with relevant persons in a manner that has exceeded those criteria.

11.8 Report on Consultation – Regulation 24(b) OPGGS(E)R

The report on all consultations under regulation 25 of the OPGGS(E)R of any relevant person, which is provided in Appendix 8, includes:

- A summary of information provided to relevant persons.
- A summary of each response made by a relevant person, as required under regulation 24(b)(i) of the OPGGS(E)R.
- Our assessment of the merits of any objection or claim about the adverse impact of each activity, as required under regulation 24(b)(ii) of the OPGGS(E)R.
- Our response, or proposed response, to each objection or claim, as required under regulation 24(b)(iii) of the OPGGS(E)R.

12.0 Implementation

12.1 Amplitude Energy Management System (AEMS)

The AEMS is Amplitude Energy's integrated system which consolidates all of Amplitude's business processes into one system of management, to manage every aspect of Amplitude Energy's business (such as HSEC, Operations, Well Construction, Engineering and Finance) in accordance with a set of core concepts (Table 12-1).

The AEMS document hierarchy is shown in Figure 12-1 with the AEMS standards listed in Table 12-2 and Amplitude Energy's Health, Safety and Environment (HSE) Policy shown Figure 12-2.

Table 12-1: Amplitude Energy's Management System Core Concepts

Core Concepts	
People	How we organise (line and function) Which roles we need Which skills we need How we build and sustain capability
Culture	Why we exist What we value How we work together How we communicate
Process	What we do How we do it How we learn How we continuously improve
Technology	Which tools we use How we use them How we support people to perform their role
Governance	How we manage risk How we make decisions How we ensure safety, quality and technical integrity

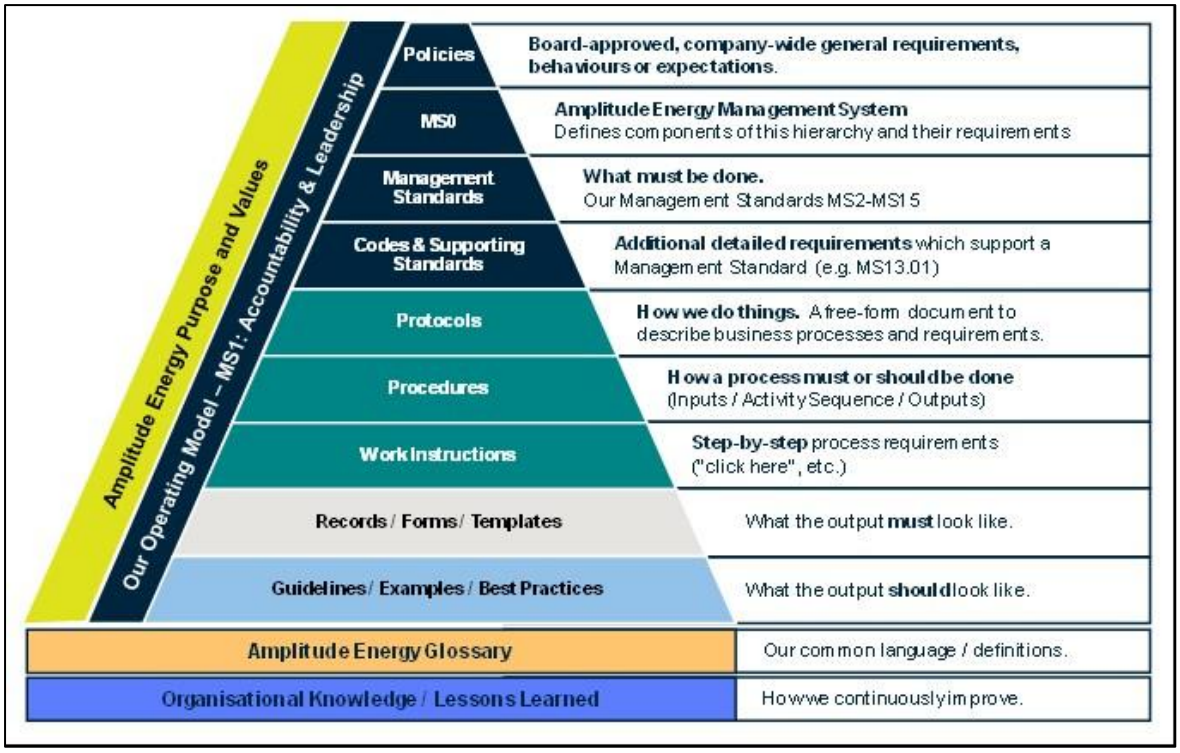


Figure 12-1: AEMS Document Hierarchy

Table 12-2: CEMS Standards

AEMS Standard	Focus Area
MS00	Statement of Intent and Expectations
MS01	Accountability and Leadership
MS02	People Management
MS03	Risk Management
MS04	Strategy and Planning Management
MS05	External Affairs, Investor Relations, Community and Stakeholder Management
MS06	Information Systems
MS07	Operations Management
MS08	Technical Management
MS09	Health, Safety and Environment Management
MS10	Incident and Crisis Management
MS11	Supply Chain and Procurement Management
MS12	Technical Assurance and Compliance Management
MS13	Financial Management
MS14	Commercial Marketing and Economics Management
MS15	Asset Lifecycle Management

Health, Safety and Environment Policy

AEMS | Health & Safety | Policy

This policy describes our approach to managing Health, Safety and Environmental risks at Amplitude Energy

Our Commitment

Amplitude Energy is committed to taking all reasonably practicable steps to protect the health and safety of our workers, contractors, partners, and the communities in the areas where we operate.

In addition, we will ensure our business is conducted in an environmentally responsible manner.

Our Actions

We will:

- **Integrate** health, safety and environmental requirements into our daily work, our business planning and our decision making
- **Comply** with all relevant health, safety and environmental laws and regulations
- **Provide** resources and systems to enable delivery of our health, safety and environmental objectives
- **Identify, control and monitor** risks that have the potential to harm people and the environment to as low as reasonably practical
- **Empower** our people, regardless of position, to "Stop the Job" if they consider it necessary to prevent harm to themselves, others or the environment
- **Consult, communicate and promote participation** of our workforce to build and maintain a strong health, safety and environment culture
- **Ensure** all employees and contractors are trained, competent and suitably supervised so that works are undertaken in a safe and environmentally responsible manner
- **Collaborate** proactively with our stakeholders and the communities where we operate
- **Investigate and learn** from our incidents and from those in our industry
- **Set, measure and monitor** health, safety and environmental targets to drive continuous improvement in our performance
- **Report** publicly and transparently on our health, safety and environmental performance

Governance

The HSE Improvement Forum has oversight of this policy. The Managing Director is accountable for communicating this Policy and for ensuring compliance with its undertakings. All Executive Leadership Team members and Managers shall ensure the effective implementation, management and monitoring of our HSE Management System and its subsequent outcomes.

All Staff are responsible for compliance with our policy, standards, and procedures.

This policy will be reviewed at appropriate intervals and revised as necessary to keep it current.

Policy authorised by

Jane Norman
Managing Director & CEO
Date: 11 February 2025 Review Date: 13 July 2026

Figure 12-2: Amplitude Energy's Health, Safety and Environment Policy

12.2 Asset Integrity Management

The integrity of all Amplitude Energy Assets is managed in line with MS08: Technical Management. Well integrity is planned and assured through adhering to the requirements of the Well Integrity Management Protocol. These requirements inform the development of a Well Operations Management Plan (WOMP).

An accepted WOMP is required for the entire well life cycle and must be in place before drilling can commence. The WOMP describes the well integrity management, controls, verification, and maintenance for well activities. Well integrity is demonstrated through the maintenance of a primary and a secondary well barrier envelope. The WOMP details the well barrier elements and performance standards and their implementation through the well life cycle.

Amplitude Energy manages the integrity of the well through every phase of the well construction cycle. The overall strategy of the integrity management plan is to maintain the assets as close to their design condition as possible. Accordingly, the integrity of the well is maintained and monitored in several ways throughout their life cycle, until the well is plugged and abandoned. The integrity management elements include:

- design, pressure containment and primary protection functions:
  - design basis and documentation
  - protection and support structures
  - corrosion protection system
  - restriction and safety zone systems
  - intervention procedures
  - well integrity reviews.
- monitoring and inspection:
  - marine activity monitoring
  - weather (exceedance) monitoring
  - ROV visual and CP inspection
  - relevant persons engagement (facility awareness).

12.3 Activity Planning

The development and ongoing management of offshore facilities is planned and executed in accordance with MS15: Asset Lifecycle Management. Amplitude Energy uses a gated process; the process workflow is divided into phases (Figure 12-3). Each phase is subject to assurance processes and a gate review, the outcomes of which include continue, stop, hold, or recycle.

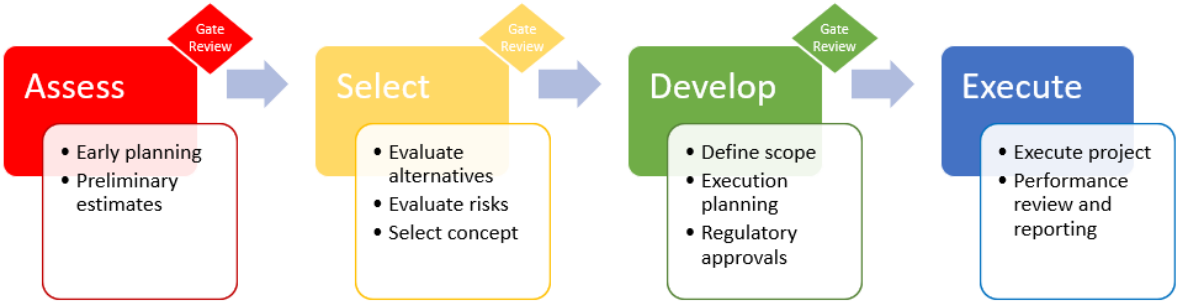


Figure 12-3: Activity Workflow

12.3.1 Decommissioning Planning

Decommissioning of an asset involves well plugging, deconstruction and removal (base case) in a safe and environmentally responsible manner, processing of materials, reagents, waste and infrastructure associated with the operations, and rehabilitation of the area.

The well covered by this EP has been assessed as having the potential to be utilised for future evaluation, appraisal, or development. The well will be completed, temporarily suspended following drilling, and monitored as per the activities in Section 3.4 prior to any future tie-in and development activities.

In this event, well decommissioning activities, also referred to as well plug and abandonment (P&A) activities, will be covered by a future EP that is submitted prior the term of EP has ended. P&A activities have only been included within this EP as a contingency case, in the unlikely event that the well is not used for future production. In this event the well will be P&A'd within the term of this EP and conducted as per Section 3.4.6.

Section 572(3) of the OPGGS Act requires titleholders to remove all equipment and other property in their title area that is neither used, nor to be used, in connection with operations. This obligation is ongoing and covers both the removal of equipment and property at the end of production and the removal of disused infrastructure at appropriate points throughout the life of an asset.

Amplitude Energy's Decommissioning Protocol acknowledges legislative requirements and illustrates the company's management system for integrating decommissioning planning across operations. The Protocol outlines roles and responsibilities, along with requirements for decommissioning planning for onshore and offshore assets and associated financial provisions.

The objectives of this protocol are to:

- Define the requirement for decommissioning as part of the lifecycle of assets.
- Define the requirement for a decommissioning plan to be developed and maintained for each asset, or group of assets within an operational area. The decommissioning plan must consider, where practical, progressive decommissioning of assets when equipment is not intended to be returned to operation
- Define the requirements for financial provisions to ensure decommissioning is completed in accordance with the decommissioning plan and that appropriate provisions are allocated for non-operated assets.

Options for other than the complete removal of all property may be considered, in which case the decommissioning plan must demonstrate that the alternative delivers equal or better environmental outcomes compared to complete removal, and that the approach complies with all other legislative and regulatory requirements. Therefore, for the purposes of planning, full removal must be the base case until an alternative end-state is accepted by the regulator.

Where onshore treatment and disposal of wastes is to be undertaken as a component of decommissioning, management of this waste must be in accordance with the respective legislation of the States or Territory. Depending on the remaining operational life, this may require specific plans for:

- waste management
- Licensing and regulation of waste transport, storage, treatment, resource recovery and disposal.

12.4 Contractor Management

The Supply Chain and Procurement Management Standard details Amplitude Energy's contractor management system, which provides a systematic approach for the selection and management of contractors to ensure any third party has the appropriate safety and environment management system and structures in place to achieve HSEC performance in accordance with Amplitude Energy's expectations.

This standard applies to sub-contractors, Third Party Contractors (TPCs) and suppliers conducting work at Amplitude Energy sites or providing services to Amplitude Energy. The Standard addresses operational HSEC performance of all contractors while working under an Amplitude Energy contract or in an area of Amplitude Energy responsibility or which may be covered under the HSEC Management System. The key HSEC steps include:

- Planning – HSEC assessment of potential contractors, suppliers and / or TPCs.
- Selection – submission and review of contractors and/or TPCs HSEC management data.
- Implementation – onsite contractors and/or TPCs HSEC requirements including induction and training requirements.
- Monitoring, review and closeout – ongoing review of contractors and/or TPCs HSEC performance including evaluation at work handover.
- Prior to Contractor commencement of operations, contractors must have in place a Amplitude Energy approved HSE Management System that meets minimal regulatory requirements and ensures compliance with this EP.

Amplitude Energy will undertake an on-hire inspection of the relevant vessel against EP requirements. Amplitude Energy shall also provide primary contractors with this EP and EP commitments register, inclusive of the EPOs and EPSs established in this plan. This is one of a number of means to ensure contractors are aware of, and comply with, EP requirements. Also see Section 12.6

12.5 Organisational Structure, Roles and Responsibilities

As required by Section 22(3) of the OPGGS(E)R this section outlines the chain of command (Figure 12-4) and roles and responsibilities (Table 12-3) of employees and contractors in relation to the implementation, management and review of this EP.

The emergency response structure for the activity is detailed in the Offshore Victoria OPEP (VIC-ER-ERP-0001).

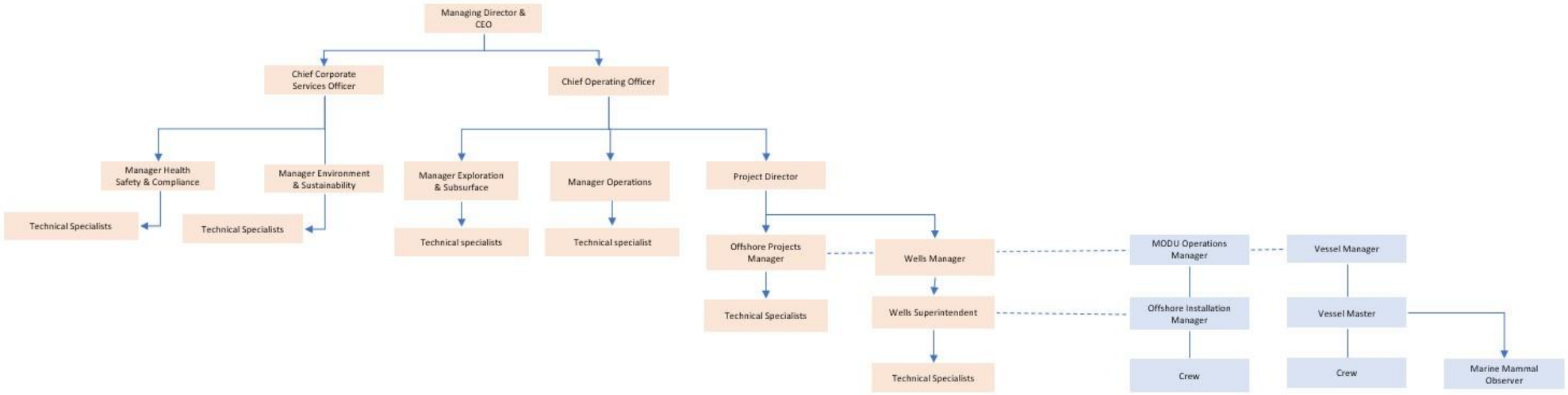


Figure 12-4: Amplitude Energy Offshore Operational Organisational Structure

Table 12-3: Amplitude Energy Environmental Roles and Responsibilities

Role	Responsibilities
Amplitude Energy	
Managing Director & CEO	The Managing Director & CEO is accountable for ensuring a framework has been established through which the Management System requirements will be met.
Chief Operating Officer	Ensures: • Compliance with the Amplitude Energy HSEC Policy and Management System. • Audits and inspections to verify HSEC and integrity performance are scheduled and undertaken. • Adequate resources are in place to meet the requirements within the EP and OPEP. • Adequate emergency response capability is in place. • Incidents and non-conformances are recorded, reported and investigated.
Chief Corporate Services Officer	Ensures: • Amplitude Energy's Emergency Response preparedness is appropriate for the risks posed by the activity. • Emergency Response Training, Competency and Testing is commensurate to the risks associated with the current offshore activity.
Manager Environment & Sustainability	Ensures: • Environmental (including decommissioning) regulatory requirements are embedded within the Amplitude Energy Management System. • Compliance with relevant statutory and Amplitude Energy Management System requirements. • Specialist environment input and support is provided to implement the EP during the activity, Management and Board as required. • Identify and communicate relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP and OPEP to the activities. • Develop the environmental component of inductions. • Environmental incidents are investigated in accordance with Amplitude Energy requirements and learnings are disseminated appropriately. • An in-depth and up to date knowledge of the legal and statutory Environmental obligations for is maintained. • Environmental performance is monitored, evaluated and reported as appropriate at all levels in the organisation. • Review of environmental monitoring records to ensure compliance with the requirements (EPOs, EPS's and processes described in Section 11.0 of the EP. • Assess environmentally relevant changes as per the MOC process. • Review any non-conformances relevant to environment performance to ensure corrective actions are appropriate to prevent recurrence. • Prepare and submit environmental incident reports and performance reports to regulators.
Manager Health Safety & Compliance	Coordinates: • Amplitude Energy's approach to Emergency Response and Preparedness. • Emergency Response Training.

Role	Responsibilities
	• Competency and testing commensurate to the risks associated with the current offshore activity. • Maintain and test oil spill response arrangements.
Project Director	Ensures: • Compliance with the Amplitude Energy HSEC Policy and Management System components applicable to the Activity. • Compliance with relevant statutory and Amplitude Energy Management System requirements. • Provides resources for management for Activity execution • Promotes a high level of HSE performance and drives improvement opportunities
Activities Manager / Well Manager / Manager Exploration & Subsurface	Ensures in relation to respective area of responsibility (Exploration, Drilling, Operations): • Compliance with the Amplitude Energy HSEC Policy and Management System components applicable to the Activity. • Compliance with this EP and controls implemented. • Contractor prequalification and qualification processes are undertaken. • Personnel are inducted with EP requirements and are aware of their environmental responsibilities. • Response arrangements in the OPEP are in place and tested commensurate to the risks associated with the current offshore activity. • Environmentally relevant changes are assessed and approved by Amplitude Energy. • Environmental incidents are reported internally and externally, and investigations undertaken. • Inspections and audits undertaken. • Actions from environmental audits and incidents are tracked to completion. • Relevant persons engagement is undertaken. • Review any non-conformances relevant to environment performance to ensure corrective actions are appropriate to prevent recurrence. • Well integrity management plans are developed, maintained and implemented • Provides technical capability to support the development and review of decommissioning plans for the well.
Wells Superintendent	Ensures: • Roles and Responsibilities are communicated to offshore personnel. • Compliance with EP commitments (EPOs/EPSs) for the offshore activity. • Implementation of risk assessment processes and management of change for the offshore activity. • Environmentally relevant changes are assessed and approved by Amplitude Energy. • Appropriate source control resources are available and maintained, relevant to the activity. • Relevant plans are implemented.
Contractors	
MODU Operations Manager / Vessel Manager	Ensures in relation to respective area of responsibility: • Compliance with the Amplitude Energy HSEC Policy. • Compliance with this EP and controls are implemented.

Role	Responsibilities
	• Support implementation of whale disturbance risk management measures described in this EP. • Personnel are inducted with EP requirements and are aware of their environmental responsibilities. • Response arrangements in the OPEP are in place and tested. • Environmentally relevant changes are assessed and approved by Amplitude Energy. • Environmental incidents are reported internally and externally, and investigations undertaken. • Inspections and audits undertaken. • Actions from environmental audits and incidents are tracked to completion.
Offshore Installation Manager	Ensures: • Compliance with relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP. • Inductions are completed, and record of attendance maintained. • Chemicals that have the potential to be discharged to the marine environment are assessed and approved using the Amplitude Energy's Offshore Chemical Assessment Procedure. • Environmentally relevant changes are assessed and approved by Amplitude Energy • Incidents are reported to the Amplitude Energy Project Manager. • Monitoring and other records are collated and provided to the Amplitude Energy Project Manager on completion of the program. • HSEC inspections are undertaken throughout the offshore activity to ensure ongoing compliance with the EP requirements. • Corrective actions identified from incidents or inspections are implemented.
Vessel Master	Ensure compliance with relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP where relevant to their role.
Marine Mammal Observer	• Support implementation of whale disturbance risk management measures described in this EP. • Observe for Marine Mammals in accordance with EP requirements. • Record and report all marine mammal sighting events.
Offshore Crews	Ensure compliance with relevant environmental legislative requirements, performance outcomes, control measures, performance standards, measurement criteria and requirements in the implementation strategy in this EP where relevant to their role.

12.6 Training and Awareness

OPGGS(E)R Section 22(4) requires that the implementation strategy detail measures to ensure each employee or contractor working on, or in connection with, the activity is aware of their responsibilities in relation to this EP, including during emergencies or potential emergencies.

12.6.1 Amplitude Energy Personnel

Amplitude Energy personnel competency and training requirements are outlined in position descriptions and reviewed during the recruitment process. Competencies and training are initiated as defined in the Training and Development Procedure.

Personnel training records are maintained internally in accordance with MS06 Information and Systems Management (refer CM31, Table 10-2).

12.6.2 Contractor Personnel

Contractors engaged to work on the activity are assessed and engaged in accordance with the requirements of the MS11 Supply Chain and Procurement Management.

Competency of contractors is assessed as part of the pre-qualification and qualification process and requires contractors to define the competency and training requirements necessary to ensure that contractor personnel have the relevant knowledge and skills relevant to their role (refer CM33, Table 10-2).

12.6.3 Environmental Induction

Amplitude Energy and contractor personnel who work on the activity will complete an induction.

The environmental component of the induction will include information as detailed in Table 12-4. Records of personnel that complete the induction will be maintained internally in accordance with MS06 Information and Systems Management (refer CM32, Table 10-2).

Table 12-4: Environmental Components to be included in Environmental Inductions

Component	**Offshore**	**Onshore**
	Vessel / MODU	Activity Management
Description of the environmental sensitivities and conservation values of the operations area and surrounding waters. Information on the cultural links with elements of the environment that may be observed in the operational area, including whales.	✓	✓
Controls to be implemented to ensure impacts and risks are ALARP and of an acceptable level.	✓	✓
Requirement to follow procedures and use risk assessments/job hazard assessments to identify environmental impacts and risks and appropriate controls.	✓	✓
Procedures for responding to and reporting environmental hazards or incidents.	✓	✓
Overview of emergency response and spill management procedures.	✓	✓
Megafauna sighting and vessel interaction procedures.	✓	X

12.7 Emergency Response

12.7.1 General Response

Amplitude Energy manages emergencies from offshore Victoria activities in accordance with its Incident Management Plan (IMP). The purpose of the IMP is to provide the Amplitude Energy Incident Management Team (IMT) with the necessary information to respond to an emergency affecting operations or business interruptions. The IMP:

- Describes the Emergency Management Process.
- Details the response process.
- Lists the roles and responsibilities for the IMT members.
- Includes a communications management instructions outlining the types of communications which should occur and by whom within Amplitude Energy. Amplitude Energy maintains an Emergency Contacts Directory which lists Stakeholders relevant to different types of incidents.

12.7.2 Oil Pollution Emergency Plan

In accordance with Commonwealth OPGGS(E)R Section 22(8) and (9), the implementation strategy must include an OPEP/Emergency Response Plan (ERP) and arrangements for testing the response arrangements within these plans.

The Amplitude Energy Offshore Victoria OPEP and Offshore Victoria Operational and Scientific Monitoring Plan (OSMP) provide for oil spill response and monitoring arrangements for this activity. These documents are submitted with this EP.

Roles and responsibilities for maintaining oil spill response capability and preparedness, testing and review arrangements and oil spill response competency and training requirements are detailed in the OPEP. The OPEP also includes Section 2.4 outlining Notification and Ongoing Consultation requirements in the event of a spill requiring OPEP activation.

Vessels will operate under the vessel's SMPEP (or equivalent appropriate to class) or spill clean-up procedures to ensure timely response and effective management of any vessel-sourced oil spills to the marine environment. The SMPEP (or equivalent) is routinely tested. The SMPEP (or equivalent) is designed to ensure a rapid and appropriate response to any vessel oil spill and provides guidance on practical information that is required to undertake a rapid and effective response, and reporting procedures in the event of a spill.

12.7.3 Source Control Emergency Plan

A Source Control Emergency Response Plan (SCERP) is developed for offshore well activities in the unlikely event of a loss of containment from a well. The SCERP aligns with industry and regulatory guidelines and provides for each of the key source control response strategies outlined in this EP.

Roles and responsibilities for maintaining source control response capability and preparedness, testing and review arrangements and source control response competency and training requirements are detailed in the SCERP and summarised in Table 12-5.

Table 12-5: SCERP Content

Response Options	Topics Addressed
Site Survey	• Arrangements for the provision of the Source Control IMT personnel (numbers, competency, capability for the duration of the response).
Debris Removal	

Intervention Pressure Control Equipment	• Arrangements for the provision of equipment and material supplies. • Arrangements for equipment and personnel monitoring and tracking. • Activation and mobilisation plans, including activation and expenditure authority and regulatory approval processes. • Logistics plans and providers. • SIMOPS planning process. • Deployment and installation plans. • Well kill and shut-in plans.
Capping	
Subsea Dispersant (if Applicable)	
Relief Well Drilling	

12.8 Chemical Assessment and Selection

Amplitude Energy's Offshore Chemical Assessment Procedure requires that all relevant chemicals planned for use offshore for a project and operations that will be or have the potential to be discharged to the environment are assessed and approved prior to use. This process is used to ensure:

- All relevant chemicals are assessed in accordance with the process
- All assessments are logged and made available on the Offshore Environment Chemical Environment Assessment (OECEA) database
- The OECEA is reviewed on an annual basis to ensure compliance with active Environment Plans (EPs) and ongoing activities.
- The acceptance or rejection of chemicals that require ALARP justification is elevated to the relevant Amplitude Energy Project Manager and/or senior technical representative.
- If there is no Offshore Chemical Notification Scheme (OCNS) or Eco-toxicity data available, and environmental assessment of the chemical is not possible, the discharge of the product offshore will not be approved.

The evaluation process uses a series of steps to assess chemicals by first screening chemicals against public databases. Where necessitated by the screening, such as where public data shows a chemical to have toxicity, bioaccumulation or biodegradation outside of defined thresholds, an ALARP justification is completed. This ALARP justification includes consideration of alternatives, and a detailed technical justification is required to approve the chemical. The ALARP Justification must be approved by the Project Manager. Where technical justification for the chemical cannot be provided, the chemical is not accepted for use.

A summary of the evaluation process is detailed in Table 12-6.

Table 12-6: Amplitude Energy Offshore Chemical Assessment Procedure Steps to Propose a New Chemical

Step	Evaluation	Input	Outcomes
1	Characterise proposed chemical.	Confirm the following: • chemical name & supplier • chemical Function/purpose • formulation, where available • CAS number, where available • eco toxicity, where available	Proceed to Step 2.

Step	Evaluation	Input	Outcomes
		• estimated use, dosage and discharge.	
2	Identify sensitive factors	Chemical assessment is only required for chemicals which are to be discharged to the marine environment. If a chemical is used within a closed system or will remain downhole or stored onboard the MODU/vessel, the chemical can be accepted as 'Zero Discharge'. Refer to EP to determine proximity to priority sensitivities. Sensitive factors may include: • Species endemicity/ uniqueness • Species diversity • Biological productivity including benthic primary productivity, and • The social/cultural value of an area.	Where chemical is to be used in an entirely closed loop system no further action is required. Where chemical is to be discharged - proceed to Step 3.
3	Decision: Check PLONOR List.	Refer to OSPAR PLONOR List.	Where the chemical is listed the chemical is approved at Step 3. Where the chemical Is not listed go to Step 4.
4	Decision: Check OCNS Definitive Ranked Lists of Registered Substances.	Search the OCNS Definitive Ranked Lists of Registered Substances for the product name or equivalent branding.	Is the chemical is listed on the OCNS Definitive Ranked List? If yes go to Step5. Where the chemical is not listed go to Step 6.
5	Determine the OCNS Hazard Quotient	Use the OCNS Definitive Ranked Lists of Registered Substances to determine the Risk Banding. Where applicable use the Chemical Hazard Assessment and Risk Management calculator (CHARM) to rank the chemical.	No further action is needed for chemicals with a HQ band Gold, Silver, or OCNS grouped E or D, with no product or SUB warnings. Where chemicals have a HQ colour banded white, blue, orange or purple, or OCNS grouped C, B or A go to step 8
6	Determine OCNS Substitution or Product Warning.	Use OCNS Definitive Ranked Lists of Registered Substances or obtain from the current CEFAS template. Always use the latest version.	Where the chemical does not have a product or substitution warning no further action is required and chemical is approved. Where the chemical has a product or substitution warning reasonable effort should be made to seek an alternative replacement. go to Step 7.

Step	Evaluation	Input	Outcomes
7	Consider an alternative or complete ALARP justification.	Chemical assessor and chemical requestor work together to seek alternative. If no alternatives are available (based on technical requirements, HSE risk and chemical availability) technical justification is required to proceed with selected chemical.	Where there is no technical justification for the chemical it is not accepted for use. Where there is a technical justification an ALARP Justification must be approved by the Project Manager.

Where a chemical is not included on the OCNS Definitive Ranked List, an Eco-toxicity assessment is undertaken. If the use is short term use (< 6 months) and no eco toxicity data for the exact chemical (product) is available, eco-toxicity data from a chemically similar product may be accepted for assessment.

12.9 Invasive Marine Species Risk Assessment

Amplitude Energy's Invasive Marine Species Risk Management Process (CMS-EN-PRO-0002) was developed to:

- Integrate Australian IMS management requirements into Amplitude Energy's offshore operations.
- Prevent the introduction, establishment or spread of a known or potential invasive marine species (attributable to Amplitude Energy activities) within Australian waters.
- Ensure appropriate reporting in the event of identification of a marine pest, to enable a response in accordance with the Australian Marine Pest Emergency Plan.

The procedure details the actions to be undertaken during the contracting phase for a vessel, MOU and submersible equipment (e.g. ROVs) for an Activity within an Amplitude Energy operational area (as defined under the EP for the activity). The procedure incorporates key considerations from IMO Biofouling Guidelines (IMO, 2023), Australian Government (2009) biofouling guidelines, and Australian Biofouling Management Requirements (DAFF, 2023); the inputs, decision points and general flow of the of IMS risk management actions are shown in Figure 12-5.

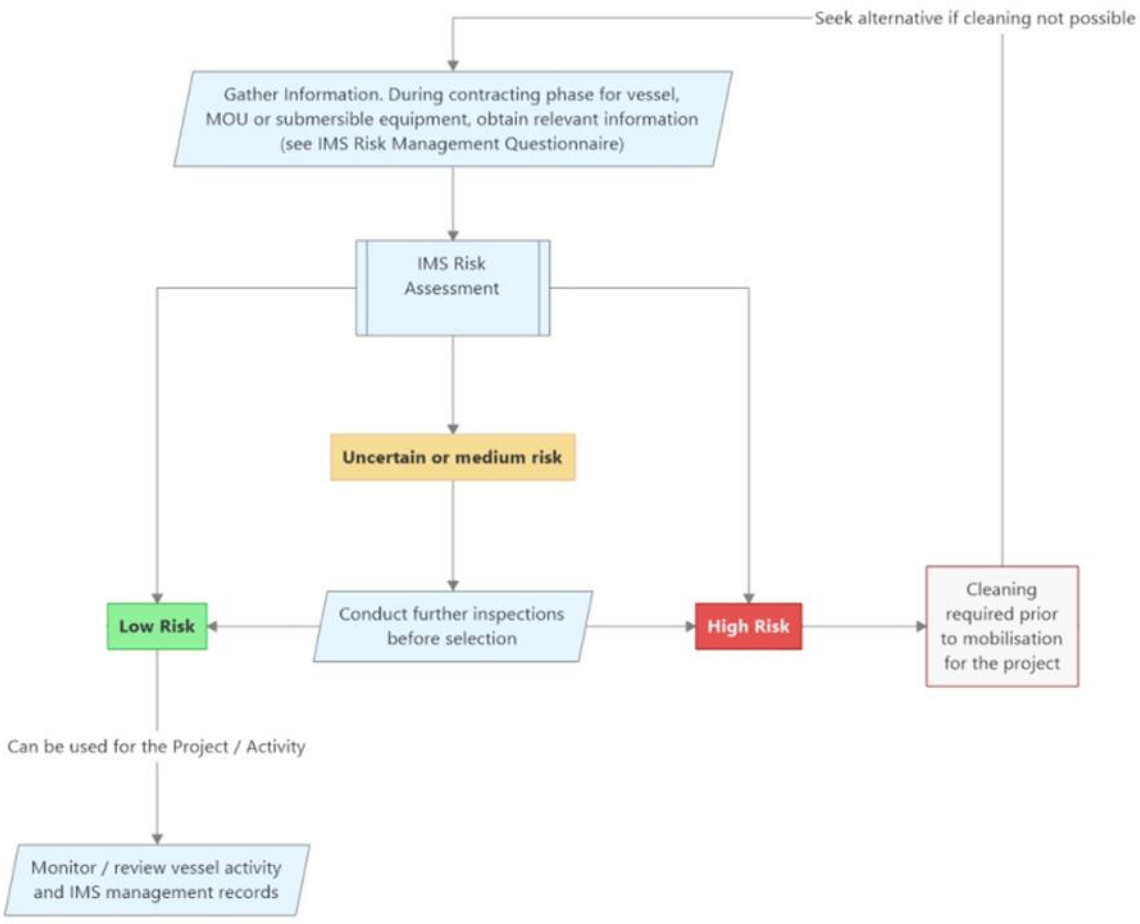


Figure 12-5: Amplitude Energy IMS Risk Management Flow

12.10 Marine Mammal Risk Review and Management

Amplitude Energy implements risk reviews prior to undertaking offshore activities.

The Offshore Victoria Whale Disturbance Risk Management Procedure is designed to reduce impacts and risks to as low as reasonably practicable, and to acceptable levels. The procedure specifically deals with risks of physical interaction (vessel strike), and behavioural disturbances (because of subsea noise) to whales, and other marine mammals. Focus is given to the two Endangered Whale Species (EWS) which undertake important behaviours within both the Otway and the Gippsland Regions.

The procedure communicates how whale interaction and disturbance risks are to be managed by offshore project teams, and crews on offshore vessels involved in offshore projects, in both the Otway and Gippsland regions. The procedure is informed by the respective offshore activity EPs, relevant government guidelines and species conservation management plans. The risk review framework addressing campaign timing in relation to seasonal sensitivities (pygmy blue whale and southern right whale important behaviours) is shown in Figure 12-6.

Figure 12-7 illustrates the monitoring network that will be implemented for the Activity, and Figure 12-8 shows the process that will be followed by the MMOs, MODU and vessels operating on the Activity, as described in Section 6.6 and CM17.

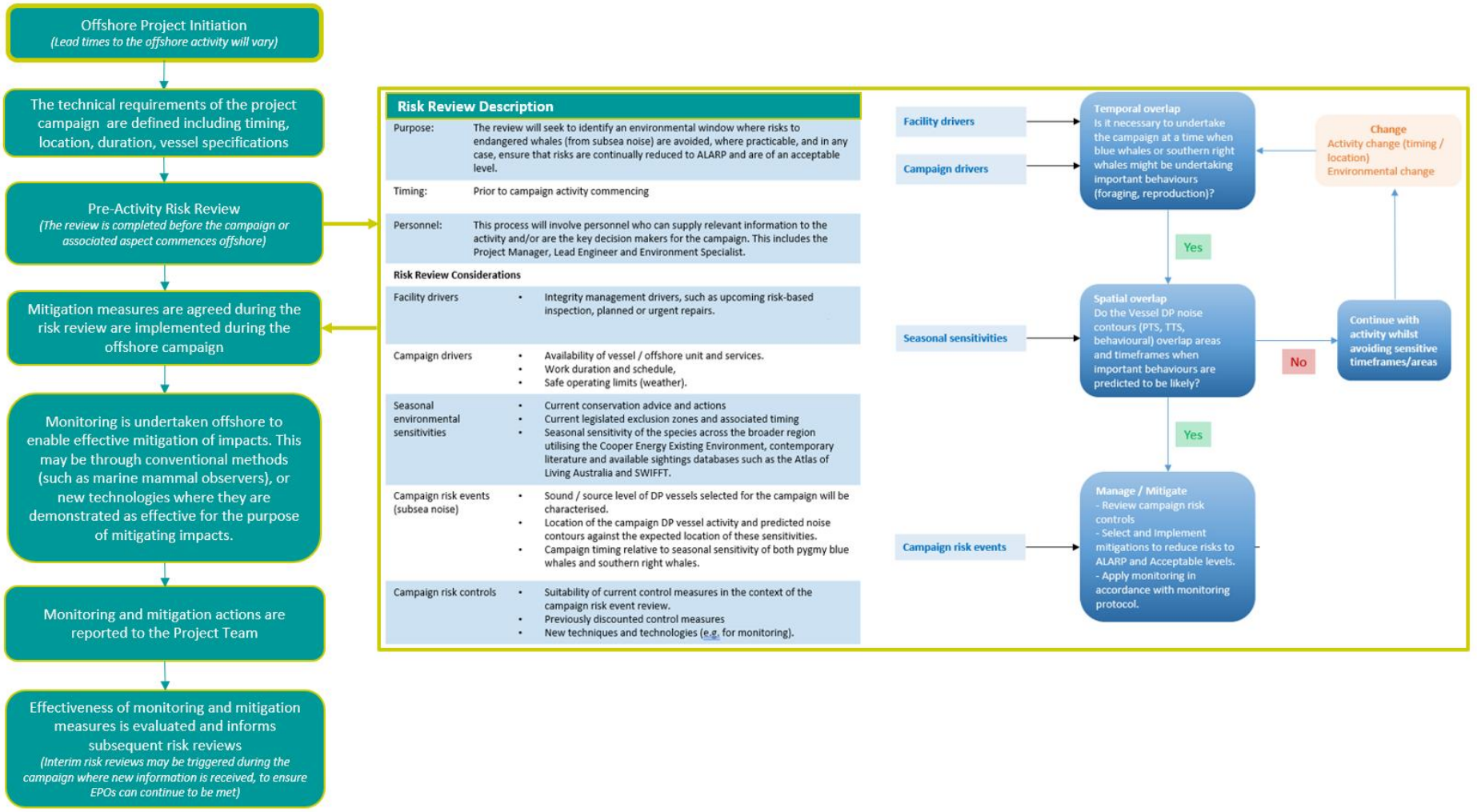
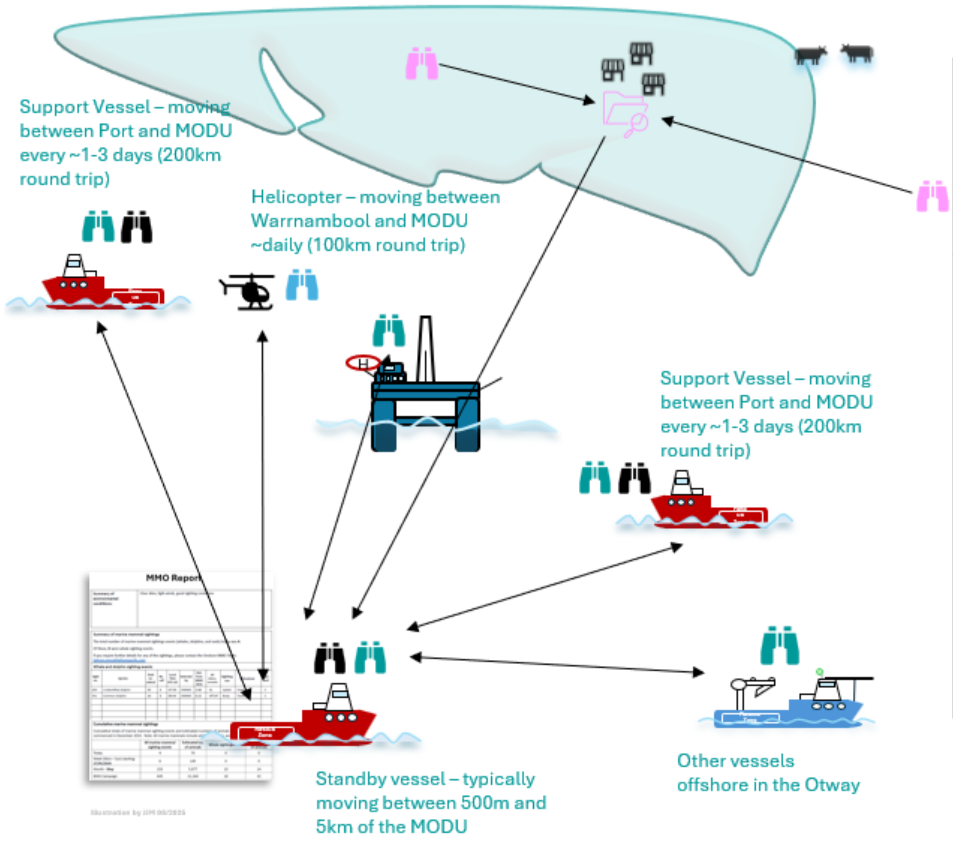


Figure 12-6: Campaign Risk Review Framework



Key	Observers	Platform	Effort	Field of view	Effectiveness for project mitigation
	Dedicated MMOs Officers of the Watch	Support Vessel 1, 2 and 3	12+ hours dedicated and opportunistic	Large	High Moderate
	Officers of the Watch	MODU	12+ hours opportunistic	Moderate	Moderate
	Crew	Helicopter	~30 minutes daily opportunistic	Large *Limited observation window*	Low
	Officers of the Watch	Other Operators	Assume opportunistic *Likely dedicated if operating under OPGGS*	Large	Low
	Citizen Scientists	Citizen Science	Opportunistic	Broad coastal	Low

**effectiveness of different monitoring platforms is based on experience from MMO program offshore Victoria across 2023 - 2024 which recorded > 1100 observations, including >300 toothed and baleen whale observations over an ~18-month period (Kennedy et al. 2024). Effectiveness for project mitigation also considers BMG Offshore Aerial survey report (2023) and DECCEW 2024 survey guidelines in the context of weather conditions offshore Otway.*

Figure 12-7: Marine Mammal Monitoring Network

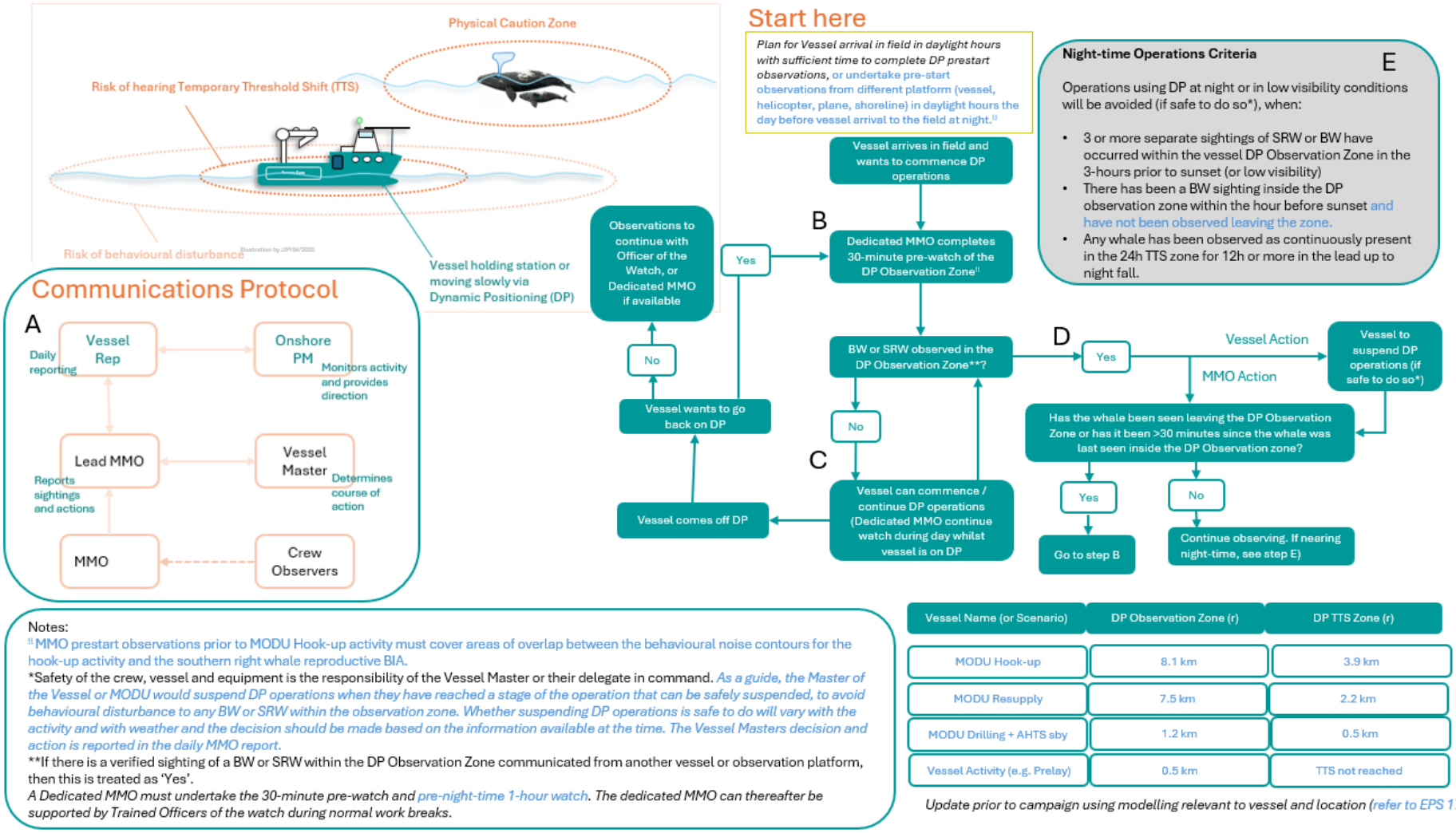


Figure 12-8: Marine Mammal Monitoring and Action Flow Chart

12.11 Inventory Management

Following the completion of well construction activities, residual bulks (barite, bentonite and cement) will be managed in accordance with Figure 12-9. Amplitude Energy's preference will be to transfer unused bulk products to the next client utilising the MODU, however if this is not possible an unused bulks management process (Figure 12-9) has been developed to allow for consideration of management options.

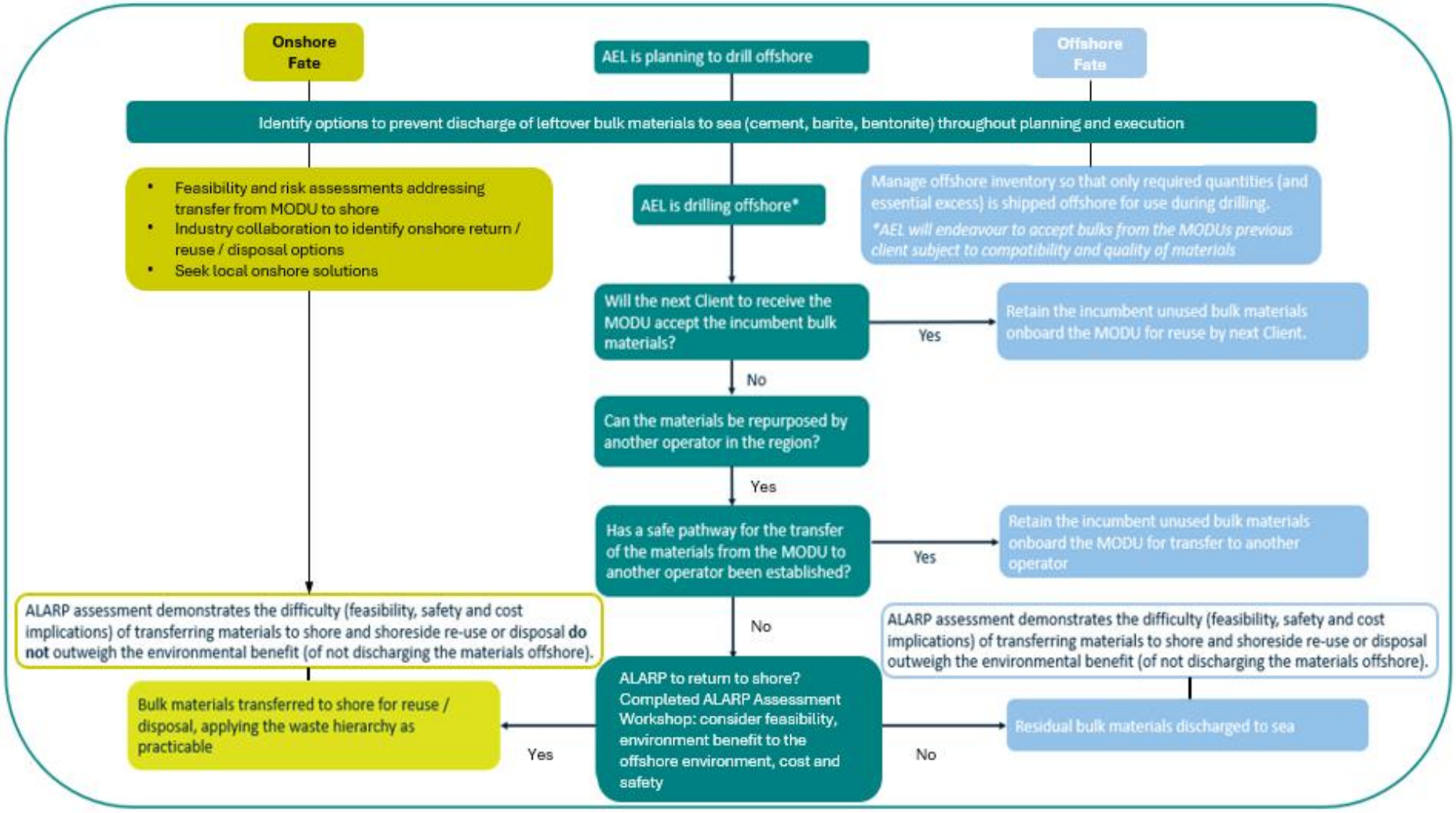


Figure 12-9: Process for Management of Residual Bulk Materials

12.12 Ongoing Consultation – Regulation 22(15)

Ongoing consultation is that which occurs following the final submission of the environment plan to NOPSEMA prior to acceptance and during the implementation phase. Ongoing consultation supports the following:

- Implementation of commitments made during consultation such as:
  - Notifications of milestones as agreed.
  - Follow ups that may be agreed (e.g. commitments to data sharing).
  - Consultation in preparation of emergency events that ensures emergency preparedness is maintained.
- Consultation with newly identified relevant persons to:
  - Capture new comments or concerns.
  - Assess if significant new impacts or risks arise, or any opportunity for continuous improvement.
  - Provide feedback on assessment of issues or concerns raised, and any resultant improvements made to the EP.
- Consultation with existing relevant persons to:
  - Consider any changes to impacts or risks where that change might affect those relevant persons' functions, interest or activities.
  - Assess the merits of any objection or claim raised about those changes.
  - Respond to each objection or claim.
  - Incorporate any new measures to be adopted as a result of this consultation via MOC process outlined in this EP.

To support ongoing consultation, Amplitude Energy will monitor for new relevant persons and maintain the Annie-2 EP stakeholder notifications register noting triggers for any agreed notifications or follow ups.

This consultation process has been developed considering the OPGGS(E)R, guidance and case law, and Amplitude Energy company values. However, consultation is a "real world" activity in a dynamic environment and grey areas may appear. Where this occurs, we will manage the change in accordance with our MOC process considering the above. Where unresolved, the objects of the OPGGS(E)R will further guide the MOC process.

12.13 Management of Change

MS08 Technical Management and Management of Change (MoC) General Protocol (CMS-TS-PRO-0002) describes the requirements for dealing with change management. The objective of the MoC process is to ensure that changes do not increase the risk of harm to people, assets or the environment; and to ensure impacts remain at an acceptable level. This includes:

- Deviation from established corporate processes.
- Changes to offshore operations and/or status of infrastructure.
- Deviation from specified safe working practice or work instructions/procedures.
- Implementation of new systems.
- Significant change of HSEC-critical personnel.

Environmentally relevant changes include:

- New activities, assets, equipment, processes or procedures proposed to be undertaken or implemented that have the potential to impact on the environment and have not been:
  - Assessed for environmental impact previously, in accordance with the relevant standard.
  - Authorised in the existing management plans, procedures, work instructions or maintenance plans.
- Proposed changes to activities, assets, equipment (including change of well or infrastructure status that may be undertaken under another EP), processes or procedures that have the potential to impact on the environment or interface with the environmental receptor.
- Changes to the existing environment including (but not limited to) fisheries, tourism and other commercial and recreational uses, and any changes to protective matter requirements, and information which may be shared by traditional owners (e.g., through consultation).
- Changes to the requirements of an existing external approval (e.g. changes to conditions of environmental licences).
- Changes, updates or environmental performance improvement identified from incident investigations, emergency response activities or emergency response exercises, and annual audits.
- Inclusion of any additional, or the improvement of, existing control measures to ensure avoidance of impacts to underwater cultural heritage values that are identified visually during offshore activities.

For any MoC with identified environmental impacts or risks, an impact/risk assessment will be undertaken to ensure that impacts and risks from the change can be managed to meet the nominated EPOs set out in the accepted EP as well as be ALARP and of an acceptable level.

Depending on the nature of the change, an MOC may be completed for a single change (e.g. associated with a discrete offshore campaign), or for a series of changes (e.g. following annual EP review and update). In either case, where an MOC is raised, the change(s) are evaluated against Regulatory criteria (Section 12.13.3) and the EP revised and/or resubmitted where required.

12.13.1 Identifying Change

Environmentally relevant changes will be identified via activity and baseline reviews, after action reviews and on an ad-hoc basis. Reviews will seek to identify both internal and external changes which might result in deviations from the impact and risk profiles provided for within the accepted EP. The reviews include a number of elements:

- Regular review of new and upcoming regulatory and policy change via access to weekly alerts coving changes across legislation and guidelines. This process also assists with the identification and evaluation of relevant government sustainability targets such as emissions reduction targets.
- Involvement with industry associations such as Australian Energy Producers (AEP) and Carbon Market Institute (CMI).
- Monthly review and reporting of recordable incidents; this includes investigation of incidents and may initiate the change assessment process depending on the nature of the incident.

- Review of seabed survey data to identify the presence of underwater cultural heritage receptors that may initiate the implementation of additional control measures to ensure the nominated EPOs set out in the accepted EP are met.

Annual EP audits (refer to Section 12.15.3) with findings and actions tracked to closure via Synergi.

Annual EP review and update; this process involves:

- Update of relevant legislation, integrating changes identified via the regular review process (if changes have not already triggered an interim update).
- Check of environmental baseline via review of publicly available government databases including PMST search application and UCH database.
- Inclusion of additional or updated environmental baseline relevant to the EP, from sources such as EPBC management plans, and data acquired from seabed surveys undertaken prior to well construction activities.
- Pre-activity reviews. During the planning phase for offshore vessel/MODU activities, the campaign components are reviewed in the context of the accepted EP to ensure the activities and associated impacts and are provided for.
- After-activity reviews or lessons learned reviews following offshore campaigns; these reviews provide a means to identify, share and act upon opportunities for improvement in relation to the management of impacts and risks.
- Engagement with relevant persons (refer to Section 11.0).

Environmentally relevant changes identified through these processes are recorded and tracked through to integration within relevant documents (e.g. plans, protocols etc.) and implementation within the business.

The regulatory requirement to revise and resubmit an EP is described in Section 12.13.3.

12.13.2 Changes to Titleholders and Nominated Liaison Person

Section 1.6 details the titleholders and nominated liaison person and contact details. Any change in these details is required to be notified to NOPSEMA as soon as possible.

12.13.3 Revisions to the EP

In the event that the proposed change introduces a significant new environmental impact or risk, results in a significant increase to an existing risk, or through a cumulative effect of a series of changes there is a significant increase in environmental impact or risk, this EP will be revised for re-submission to NOPSEMA in line with the MOC process described herein.

Where a change results in the EP being updated, the change/s are to be logged within the document revision description (Appendix 1 -).

In addition the titleholder is obligated to ensure that all specific activities, tasks or actions required to complete the activity are provided for in the EP. Section 39(1) of the OPGGS(E)R require that where there is a significant modification or new stage of the activity a proposed revision of the EP will be submitted to NOPSEMA.

In addition, a revised EP will be submitted in the circumstances outlined in Section 12.13.1.

12.14 Incident Reporting and Recording

Amplitude Energy's Incident and Crisis Management Protocol and Incident Investigation and Reporting Protocol provide for a systematic method of incident reporting and investigation and a process for monitoring close out of preventative.

The incident reporting and investigation documentation defines the:

- Method to record, report, investigate and analyse accidents and incidents.
- Legal reporting requirements to the regulators within mandatory reporting timeframes.
- Process for escalating reports to Amplitude Energy senior management and the Amplitude Energy Board.
- Methodology for determining root cause.
- Responsible persons to undertake investigations.
- Classification and analysis of incidents.

Any complaints received from third parties relevant to the activities are managed in accordance with the Amplitude Energy Incident Investigation and Reporting Protocol. If complaints are received, they are recorded in Amplitude Energy's incident management system (Synergi) with appropriate corrective actions assigned. Where appropriate, feedback on corrective actions is also provided to the complainant. Where complaints may relate to fisheries, such as an equipment damage claim, this is managed in accordance with both Amplitude Energy Incident Investigation and Reporting Protocol and the Fisheries Damages Protocol.

Notification and reporting requirements for environmental incidents to external agencies are listed in Table 12-7. Notification and reporting requirements for oil spills (Level 2/3) are detailed in the OPEP.

Table 12-7: External Incident Reporting Requirements

Incident Type	Description	Requirement	Timing	Contact
Recordable Incident	OPGGS(E)R: An incident arising from the activity that breaches an EPO or EPS in the EP that applies to the activity that is not a reportable incident.	As a minimum, the written monthly recordable report must include a description of: • All recordable incidents occurred during the calendar month. • All material facts and circumstances concerning the incidents that the operator knows or is able to reasonably find out. • Corrective actions taken to avoid or mitigate any adverse environmental impacts of the incident. • Corrective actions that have been taken, or maybe taken, to prevent a repeat of similar incidents occurring.	Before the 15th day of the following calendar month.	Written Notification: NOPSEMA - submissions@nopsema.gov.au
Reportable Incident	OPGGS(E)R: An incident arising from the activity that has caused, or has the potential to cause, moderate to significant environmental damage. For Amplitude Energy, reportable incidents include, but are not limited to, those that have been identified through the risk assessment process as having an inherent impact consequence Level 3, 4 or 5, or at a	Verbal Notification: The notification must contain: • All material fact and circumstances concerning the incident. • Any action taken to avoid or mitigate the adverse environmental impact of the incident. • The corrective action that has been taken or is proposed to be taken to stop control or remedy the portable incident. • This must be followed by a written record of notification as soon as possible after notification.	Commonwealth Waters Within 2 hours of notification of the incident	Verbal Notification: NOPSEMA – Phone 1300 674 472 Written Notification: NOPSEMA - submissions@nopsema.gov.au NOPTA – reporting @nopta.gov.au
		Written Notification: Verbal notification of a reportable incident to the regulator must be followed by a written report. As a minimum, the written incident report will include: • The incident and all material facts and circumstances concerning the incident. • Actions taken to avoid or mitigate any adverse environmental impacts.	Commonwealth Waters Within 3 days of notification of the incident	Written Notification: NOPSEMA - submissions@nopsema.gov.au

Incident Type	Description	Requirement	Timing	Contact
	minimum, the following incidents: • A level 2/3 spill incident. • IMS Introduction.	• The corrective actions that have been taken, or may be taken, to prevent a recurrence of the incident. • The action that has been taken or is proposed to be taken to prevent a similar incident occurring in the future.		
		Written reports to be submitted to National Offshore Petroleum Titles Administrator (NOPTA) and DJSIR (for incidents in Commonwealth waters).	Within 7 days of written report submission to NOPSEMA	Written Notification: NOPTA – reporting@nopta.gov.au
Reportable incident - in the event an AMP may be exposed to hydrocarbons		Notification must be provided to the Director of National Parks and include: • titleholder details • time and location of the incident (including name of marine park likely to be affected) • proposed response arrangement • Confirmation of providing access to relevant monitoring and evaluation reports when available. • Contact details for the response coordinator.	As soon as possible	Verbal Notification: Marine Park Compliance Duty Officer – Phone 0419 293 465
Reportable Incident – Invasive Marine Species		Suspected or confirmed IMS Introduction.	Before the 15th day of the following calendar month.	Written Notification: NOPSEMA – submissions@nopsema.gov.au
			Immediate written notification (following phone call to NOPSEMA). Incident report* emailed within 3	Written Notification: NOPTA: reporting @nopta.gov.au

Incident Type	Description	Requirement	Timing	Contact
			days of the incident. *Complete relevant sections of NOPSEMA incident reporting form FM0831.	
			As soon as possible	Verbal Notification DAFF - Phone 1800 900 090
Reportable Incident - Injury or Death to Fauna		Impacts to MNES, specifically injury to or death of EPBC Act-listed species. **https://www.environment.gov.au/biodiversity/threatened/listed-species-and-ecological-communities-notification**	Within 7 days	Written Notification: Email: EPBC.Permits@environment.gov.au
		Impact to cetacean/s in or beyond the Australian Whale Sanctuary resulting in death, injury or harassment. **https://www.dcceew.gov.au/environment/marine/marine-species/cetaceans/notification-interactions**	Within 7 days	DCCEEW Phone: 1800 920 528 Email: EPBC.Permits@environment.gov.au
		Vessel strike with cetacean.	Within 72 hours of incident.	DCCEEW – National Ship Strike Database **https://data.marinemammals.gov.au/report/shipstrike**

12.15 Environmental Performance Monitoring and Reporting

Amplitude Energy implements a range of measures aiming to ensure that for the duration of the activity:

- The environmental impacts and risks of the activity continue to be identified and reduced to a level that is ALARP and acceptable.
- Control measures detailed in the EP are effective in reducing the environmental impacts and risks of the activity to ALARP and an acceptable level.
- Emissions and discharges are monitored.
- Environmental performance outcomes and standards set out in the EP are being met.

These measures are integrated throughout this EP and key assurance processes are summarised in Table 12-8.

Table 12-8: Summary of Assurance Processes

Process	Frequency & Responsibility
Change management reviews	See Section 12.11
Tracking of Emissions and Discharges	See Section 12.15.1
Audit and Inspections	See Section 12.15.3
Management of non-conformance	See Section 12.11

12.15.1 Emissions and Discharges

Quantitative monitoring, record-keeping and reporting of emissions and discharges is undertaken for all activities within the scope of this EP. Emissions and discharge monitoring and records required for MODU and vessel-based activities are detailed in Table 12-9. These are used to validate inputs and assumptions to the impact assessments within the EP, ensuring impact profiles remain within defined acceptable levels. Copies of emission and discharge records will be retained in accordance with Section 12.16.

Record logs of vessel discharges are retained in accordance with MARPOL.

Table 12-9: Emissions and Discharge Monitoring

Aspect	Monitoring	Monitoring Frequency	Records
Site Surveying			
Project chemical discharges to marine environment	Chemical name Chemical type Chemical use Chemical volume	Weekly	Offshore Reports
Treated bilge	Volume Location Vessel Speed	As required	Oil Record Book
Food scraps	Volume Location	As required	Garbage Record Book
Sewage and greywater	Volume Location	As required	Garbage Record Book

Aspect	Monitoring	Monitoring Frequency	Records
Spill	Volume Chemical / Oil type	As required	Daily Report
Fuel use	Volume	Daily	Incident Report
GHG Emissions	Volume (Fuel usage)	Daily	Daily Report
Well Construction			
Project chemical discharges to marine environment	Chemical name Chemical type Chemical use Chemical volume	Weekly	Offshore Reports
Drill Fluids Discharge	Fluid type Fluid volume % oil on cuttings	As required	Daily Report
Drill Cuttings Discharge	Cutting type Cutting volume	As required	Daily Report
Cementing discharges	Nature of discharge Volume Location	As required	Daily Report
Waste	Volume sent ashore	As required	Garbage Record Book or Waste Manifest
Spill	Volume Chemical / Oil type	As required	Daily Report
Fuel use	Volume	Incident Report	Daily Report
GHG emissions	Volume (Fuel usage) Volume / Rate (Flaring)	Daily	Daily Report
Support Activities and Well Integrity Monitoring			
Project chemical discharges to marine environment	Chemical name Chemical type Chemical use Chemical volume	Weekly	Offshore Reports
Routine release of hydraulic fluid		As required	Offshore Reports
Deck drainage and treated bilge	Volume Location Vessel Speed	As required	Oil Record Book
Food scraps	Volume	Daily	Daily Report
Sewage and greywater	Volume Location	As required	Garbage Record Book
Cooling water and brine	Volume Location	As required	Offshore Reports
Fuel use	Volume	Daily	Daily Report
Ballast water discharge	Volume Location	As required	Ballast Water Record System.
GHG Emissions	Volume (Fuel usage)	Daily	Daily Report
Contingent Well Abandonment			

Aspect	Monitoring	Monitoring Frequency	Records
Cementing discharges	Nature of discharge Volume Location	As required	Daily Report
Treated seawater	Volume discharged Volume sent to shore	As required	Offshore reports
Drill Fluids Discharge	Fluid type Fluid volume % oil on cuttings	Daily	Daily Report
Completions fluids	Volume discharged Volume sent to shore	Daily	Daily Report

12.15.2 Activity Commencement and Cessation Notifications

Activity notification requirements are detailed in Section 12.12 (Ongoing Consultation – Regulation 22(15)) and maintained in the Annie-2 EP stakeholder notifications register. The register includes the regulation 54 and 55 start and end of activities notifications, at least 10 days prior and within 10 days after respectively.

12.15.3 Annual Performance Report

As required by Section 51 (1) OPGGS(E)R, Amplitude Energy will submit an annual EP performance report to the regulator (NOPSEMA). This report will provide sufficient detail to enable the Regulator to determine whether the environmental performance outcomes and standards in the EP have been met.

The report will be submitted annually, by 31 December each year.

12.15.4 Fauna Reporting

Cetacean observation data will be submitted to the DCCEEW, within 3 months of the completion of an activity.

Observation data in relation to culturally significant species will be made available to First Nations Groups where requested.

12.15.5 Audit and Inspection

Environmental performance of offshore operations and activities will be audited and reviewed in several ways to ensure that:

- Environmental performance standards to achieve the EPOs are being implemented and reviewed.
- Potential non-compliances and opportunities for continuous improvement are identified.
- Environmental monitoring requirements are being met.

Non-conformance with the environmental performance standards outlined in this EP will be managed as per Section 12.15.6.

Opportunities for improvement or non-compliances noted will be communicated to relevant personnel at the time of the review/inspection/audit to ensure adequate time to implement

corrective actions. The findings and recommendations of inspections or audits will be documented and distributed to relevant personnel for comment, and any actions tracked until completion.

12.15.5.1 EP Compliance

An annual audit will be conducted and used to inform the annual EP performance report (see section 12.15.3) submitted to NOPSEMA.

The Audit scope will include the performance outcomes and performance standards contained in the EP and the requirements detailed in the implementation strategy, to ensure that the environmental performance outcomes and environmental performance standards are being met.

Any environmentally relevant changes and opportunities to improve environmental performance will be assessed as described in Section 12.13 and incorporated into EP revisions as required.
Offshore Vessel and MODU Activities

The following arrangements review the environmental performance of offshore vessel and MODU activities:

- A premobilisation Marine Assurance inspection will be undertaken for offshore vessels and MODU to ensure they can meet the requirements of the EP and OPEP.
- An Activity-wide pre-start readiness review to ensure controls measures are in place, resourced and communicated to enable compliance.
- HSEC inspections will be undertaken throughout the offshore activity at least fortnightly to ensure ongoing compliance with relevant EP requirements. The scope of the inspections will include (but is not limited to) a range of marine and Activity assurance checks:
  - Spill readiness (i.e., provision spill kits and drills in accordance with vessel SOPEP/SMPEP).
  - Waste management in accordance with the EP, EPOs and EPSs.
  - Control measure performance for project activities occurring on the MODU and vessels.
  - Chemical Inventory checks to ensure campaign chemicals are accepted via the Offshore Chemical Assessment Procedure.
  - Maintenance checks for equipment identified within an EP EPS (e.g. oily water separator).

Non-compliance and improvement opportunities will be communicated to Amplitude Energy HSEC onshore for advice, tracking and reporting in accordance with Section 11.15.6.

12.15.6 Management of Non-Conformance

In response to any EP audit and inspection non-compliances, corrective actions will be implemented and tracked to completion as per the Incident Investigation and Reporting Protocol (CMS-ER-PRO-0001).

Corrective actions will specify the remedial action required to fix the breach and prevent its reoccurrence and is delegated to the person deemed most appropriate to fulfil the action. The action is closed out only when verified by the appropriate Manager and signed off. This process is maintained through the Amplitude Energy corrective action tracking system.

Where more immediacy is required, non-compliances will be communicated to relevant personnel and responded to as soon as possible. Where relevant the results of these actions will be communicated to the offshore crew during daily toolbox meetings or at daily or weekly HSEC meetings.

Amplitude Energy will carry forward any non-compliance items for consideration in future operations to assist with continuous improvement in environmental management controls and performance outcomes.

12.16 Records Management

In accordance with the Section 52 of the OPGGS(E)R, Amplitude Energy will store and maintain documents or records relevant to the EP in accordance with the Technical Information Management Procedure (CMS-IM-PCD-0002).

13.0 References

Aboriginal Victoria. 2008. Heritage Publications – Aboriginal Cultural Heritage Mini-Poster Series. Victorian Government. Available from: **http://www.vic.gov.au/aboriginalvictoria/heritage/heritage-tools-and-publications/heritage-publications.html. Accessed 28 Sep 2017**.

Accomando, A.W., J.J. Finneran, E. Henderson, K. Jenkins, S. Kotecki, C. Martin, J. Mulsow, and M. Zapetis. 2025. Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase 4) Revision 2025.1. Report by NIWC Pacific and National Marine Mammal Foundation for the US Navy. **https://www.nepa.navy.mil/Portals/20/Documents/aftteis4/Criteria%20and%20Thresholds%20for%20U.S.%20Navy%20Acoustic%20and%20Explosive%20Effects%20Analysis%20(Phase%20IV).pdf**.

AAD. 2020. Short-tailed shearwater. Australian Antarctic Division. **http://www.antarctica.gov.au/aboutantarctica/wildlife/animals/flying-birds/petrels-and-shearwaters/short-tailed-shearwater**

ACMI. 2010. Deen Maar: Past, Present and Future. Accessed 2024 **https://www.acmi.net.au/works/116955--** deen-maar-past-present-future/

Afonso P, McGinty N, Graça G, Fontes J, Inácio M, Totland A, et al. 2014. Vertical Migrations of a Deep-Sea Fish and Its Prey. PLoS ONE 9(5): e97884.

AFMA. 2023. Droplines. Accessed Feb 2025.

AHO. 2021. Mariner's Handbook for Australian Waters Edition 5.0. Australian Hydrographic Office, Canberra.

AIATSIS. 2020. AIATSIS Code of Ethics for Aboriginal and Torres Strait Islander Research. Australian Institute of Aboriginal and Torres Strait Islander Studies.

ALA. 2025. Atlas of Living Australia (ALA). Available at: **https://www.ala.org.au/**

AMSA. 2013 Rescuing Oiled wildlife – What can you do!. Available at: **https://www.amsa.gov.au/environment/maritime-environmental-emergencies/national-plan/General-Information/oiled-wildlife/rescuing-wildlife/index.asp**.

AMSA. 2015. Technical guidelines for preparing contingency plans for marine and coastal facilities. Australian Maritime Safety Authority, Canberra, Australia. Accessed at **https://www.amsa.gov.au/sites/default/files/np-gui-012-technical-guidelines-contingency-plans-15082023_0.pdf**

AMSA–CSIRO (2016). Environmental Hazard Assessment of Subsea Dispersant Use (Dasic Slickgone NS). Prepared for the Australian Maritime Safety Authority.

AMSA. 2020. NATPLAN. Australian Maritime Safety Authority. Canberra.

AMSA. 2023. Collisions between vessels and marine fauna. Australian Maritime Safety Authority. Canberra. Available: **https://www.amsa.gov.au/collisions-between-vessels-and-marine-fauna**

AMSA. 2024. Register of oil spill control agents. Online resource. Available at: **https://www.amsa.gov.au/marine-environment/pollution-response/register-oil-spill-control-agents**.

AMSA. 2024. Annual Report 2023–24. Australian Maritime Safety Authority (AMSA). Available at: **https://www.amsa.gov.au/annual-report-2023-24**

Andrews-Goff V, Gales N, Childerhouse SJ, Laverick SM, Polanowski AM, Double MC (2023) Australia's east coast humpback whales: Satellite tag-derived movements on breeding grounds, feeding grounds and along the northern and southern migration. Biodiversity Data Journal 11: e114729. **https://doi.org/10.3897/BDJ.11.e114729**

APSC. 2022. First Nations Vocabulary – using culturally appropriate language and terminology. Commonwealth of Australia. Australian Public Service Commission. Canberra.

Arranz, P., Aguilar de Soto, N., Madsen, P.T. and Sprogis, K.R. 2021. Whale-watch vessel noise levels with applications to whale-watching guidelines and conservation. Marine Policy, 134: 104776.

Atlas of Living Australia. 2025. Occurrence records. Available at: **https://biocache.test.ala.org.au/search#tab_simpleSearch**

Austin, M.E., Warner, G.A. and McCrodan, A. 2012. Underwater Sound Propagation Acoustics Technical Report: Maersk Oil Kalaallit Nunaat A/S 2012 3D Seismic Program Block 9 (Tooq). Version 2.0. Technical report by JASCO Applied Sciences for Golder Associates A/S and Golder Associates Ltd.

Australia ICOMOS Burra Charter. 2013. The Burra Charter – The Australia ICOMOS Charter for Places of Cultural Significance. Australia International Council on Monuments and Sites.

Australian Government. 2019. Map of marine pests in Australia. Commonwealth of Australia. Department of Agriculture, Fisheries and Forestry. Canberra. Accessed June 2025. Available at: **https://www.marinepests.gov.au/pests/map**.

Australian Government EPBC Act Reports – Otway & Gippsland Biologically Important Areas for Southern Right Whales.

Australian Museum. (2020). Orange-bellied Parrot (Neophema chrysogaster). **https://australianmuseum.net.au/learn/animals/birds/orange-bellied-parrot-neophema-chrysogaster/**

AU News (2025): Carloads of Aussies flock to waters edge as 'exciting' ancient ritual begins. By M Dahlstrom, May 2025. Available at: https://au.news.yahoo.com/carloads-of-aussies-flock-to-waters-edge-as-exciting-ancient-ritual-begins-022014986.html?guccounter=1

Backhouse, G., O'Connor, J., & Jackson, J. (2008). National Recovery Plan for the Australian Grayling (Prototroctes maraena). Department of Sustainability and Environment, Melbourne.

Baker, B and Hamilton, S (2013). South-east Marine Region — Review of Biologically Important Areas [for EPBC-listed seabirds], Reports I and II. Unpublished reports to the Department of Sustainability, Environment, Water, Population and Communities, Latitude 42 Environmental Consultants Pty Ltd, Hobart.

Baker, C., Potter, A., Tran, M., Heap, A.D. 2008. Sedimentology and geomorphology of the northwest marine region: a spatial analysis (Geoscience Australia Record No. 2008/07). Geoscience Australia, Canberra.

Bailey, H, Mate, BR, Palacios, DM, Irvine, L, Bograd, SJ, Costa, DP (2009). A type of foraging behaviour (observed in tagged blue whales) involving area restricted searches (ARS) was reported by Bailey et al. (2009). Endangered Species Research. Endang Species Res. Available: **https://www.whoi.edu/cms/files/BaileyPreprint_BlueWhale_57185.pdf**.

Balcazar, NE, Joy S. Tripovich, Holger Klinck, Sharon L. Nieukirk, David K. Mellinger, Robert P. Dziak, Tracey L. Rogers, Calls reveal population structure of blue whales across the southeast Indian Ocean and the southwest Pacific Ocean, Journal of Mammalogy, Volume 96, Issue 6, 24 November 2015, Pages 1184–1193, **https://doi.org/10.1093/jmammal/gyv126**

Benshmesh, J. 2007. National Recovery Plan for Malleefowl. Department for Environment and Heritage, South Australia.

Best, P.B., & Schell, D.M. (1996). Stable isotopes in southern right whale baleen as indicators of seasonal movements and feeding. Marine Mammal Science.

Biosis. 2023. Otway Exploration Cultural heritage desktop assessment prepared for ConocoPhillips Australia Pty Ltd by Biosis.

Boyce, J. A. 2015. *Stratigraphy, geochemistry and origin of products of complex volcanic centres, newer volcanics basaltic field, Victoria* (Doctoral dissertation, Monash University).

Blumer, M. 1971. Scientific Aspects of the Oil Spill Problem. Boston College Environmental Affairs Law Review 1(1) 54-73.

BP. 2013. Shah Deniz 2 Project Environmental & Socio-Economic Impact Assessment. Section 9 Drilling and Completion Environmental Impact Assessment, Mitigation and Monitoring. BP Development Pty Ltd.

BoM and CSIRO. 2024. Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation. State of the Climate 2024. **bom.gov.au/state-of-the-climate/2024/documents/2024-state-of-the-climate.pdf**

Bonn Agreement. 2009. Bonn Agreement Aerial Operations Handbook. Part 3, Annex A, The Bonn Agreement Oil Appearance Code.

Branch, T. A., Matsuoka, K. and Miyashita, T. 2004. Evidence for increases in Antarctic blue whales based on Bayesian modelling. Marine Mammal Science 20(4): 726-754.

BRS. 2007. Designated Exchange Areas Project – Providing Informed Decision on the Discharge of Ballast Water in Australia (Phase II). Eds. Knight E, Barry S, Summerson R, Cameron S and Darbyshire R. Report for the Bureau of Rural sciences.

Builth, H. 2004. Mt Eccles Lava Flow and the Gunditjmara Connection: A Landform for all Seasons. Proceedings of the Royal Society of Victoria 116(1):165-184

Bunurong Land Council Aboriginal Corporation. 2024. Our Business. Bunurong Land Council Aboriginal Corporation.

Bureau of Infrastructure and Transport (2023). Bureau of Infrastructure and Transport Research Economics Statistical Report. Accessed June 2025. Available at: **https://www.bitre.gov.au/sites/default/files/documents/bitre-yearbook-2023.pdf**.

Burnell SR (2001) Aspects of the Reproductive Biology, Movements and Site Fidelity of Right Whales Off Australia. J. Cetacean Res. Manage., 89-102. DOI: **https://journal.iwc.int/index.php/jcrm/article/view/272**.

atsonButler, A., Althaus, F., Furlani, D. and Ridgway, K. 2002. Assessment of the conservation values of the Bass Strait sponge beds area. A component of the Commonwealth Marine Conservation Assessment Program 2002-2004. Report to Environment Australia. December 2002.

Cai, W. and Cowan, T. 2006. SAM and regional rainfall in IPCC AR4 models: Can anthropogenic forcing account for southwest Western Australian winter rainfall reduction? Geophysical Research Letters 33. **https://doi.org/10.1029/2006GL028037**.

Carroll, D. and Harvey-Carroll, J. 2023. The influence of light on elasmobranch behavior and physiology: a review. Frontiers in Marine Science. Volume 10.

Castellote, M., Clark, C.W. and Lammers, M.O. 2012. Acoustic and behavioural changes by fin whales (Balaenoptera physalus) in response to shipping and airgun noise. Biological Conservation, 147(1): 115-122.

Chapman, C.C., Lea, M.A., Meyer, A., Sallée, J.B. and Hindell, M., 2020. Defining Southern Ocean fronts and their influence on biological and physical processes in a changing climate. Nature Climate Change, 10(3), pp.209-219.

Chapuis, L., Collin, S.P., Yopak, K.E., McCauley, R.D., Kempster, R.M., Ryan, L.A., Schmidt, C., Kerr, C.C., Gennari, E., Egeberg, C.A. and Hart, N.S. 2019. The effect of underwater sounds on shark behaviour. Science Rep, 9: 6924. **https://doi.org/10.1038/s41598-019-43078-w**

Chevillon, L., Tourmetz, J., Dubos, J., Soulaimana-Mattoir, Y., Hollinger, C., Pinet, P., Couzi, F. X., Riethmuller, M., & le Corre, M. (2022). 25 years of light-induced petrel groundings in Reunion Island: Retrospective analysis and predicted trends. Global Ecology and Conservation, 38, e02232. Available: **https://www.sciencedirect.com/science/article/pii/S2351989422002347?utm_source=chatgpt.com**

Charlton, C., Ward, RD., Brownell Jr, K.L., Kent, CS., Burnell S. 2019. Southern Right Whale (Eubalaena Australis), Seasonal Abundance and Distribution at Head of Bight, South Australia. Aquatic Conservation, 29, 4, 576-588. **https://doi.org/10.1111/mms.12611**.

Church, JA., Hunter, JR., Mcinnes, K., White, NJ. (2006). Sea-level rise around the Australian coastline and the changing frequency of extreme events. Australian Meteorological Magazine 55, 253–260. **https://doi.org/10.1016/j.gloplachs.2006.04.00**.

Cintron, G., Lugo, A.E., Marinez, R., Cintron, B.B., and Encarnacion, L. (1981). Impact of oil in the tropical marine environment. Technical Publication, Division of Marine Research, Department of Natural Resources, Puerto Rico.

Circular Ecology, 2023. Embodied Carbon Footprint Database. Circular Ecology. URL **https://circularecology.com/embodied-carbon-footprint-database.html**. Accessed 8 Oct 2023.

Clark R. 1984. Impacts of oil pollution on seabirds. Environmental Pollution Series: Ecology and Biology. 33: 1–22.

Clean Energy Regulator. 2023. Amendments to national greenhouse and energy reporting legislation. Accessed 31.01.25 at **www.cleanenergyregulator.gov.au/NGER/Legislation/Measurement-Determination**

CoA. 2007. National Recovery Plan for the South-Eastern Red-tailed Black-Cockatoo Calyptorhynchus banksii graptogyne. Commonwealth of Australia. Department of Environment and Water Resources, Canberra.

CoA. 2013. Recovery Plan for the Australian Sea Lion (Neophoca cinereal). Commonwealth of Australia. Department of Climate change, Energy, the Environment and Water. Canberra.

CoA. 2015a. Wildlife Conservation Plan for Migratory Shorebirds. Commonwealth of Australia. Department of Climate change, Energy, the Environment and Water. Canberra.

CoA. 2015b. Recovery Plan for Three Handfish Species: Spotted Handfish (*Brachionichthys hirsutus*), Red Handfish (*Thymichthys politus*), and Ziebell's Handfish (*Branchiopsilus ziebelli*). Commonwealth of Australia, Department of the Environment, Canberra.

CoA. 2015c. South-east Marine Region Profile: A description of the ecosystems, conservation values and uses of the South-east Marine Region. Commonwealth of Australia.

CoA. 2016. National Recovery Plan for the Plains-wanderer (*Pedionomus torquatus*). Commonwealth of Australia. Department of the Environment. Canberra.

CoA. 2017a. Recovery Plan for Marine Turtles in Australia 2017-2027. Commonwealth of Australia. Department of the Environment and Energy, Canberra.

CoA. 2017b. National Strategy for Reducing on Cetaceans and other Marine Megafauna. Commonwealth of Australia. Department of the Environment and Energy, Canberra.

CoA. 2018. The Threat Abatement Plan for the impacts of Marine Debris on Vertebrate Wildlife of Australia's Coasts and Ocean. Commonwealth of Australia. Department of the Environment and Energy, Canberra.

CoA. 2020. Wildlife conservation Plan for Seabirds. Commonwealth of Australia. Department of Climate change, Energy, the Environment and Water. Canberra.

CoA. 2022. National Recovery Plan for Albatrosses and Petrels. Commonwealth of Australia. Department of Climate change, Energy, the Environment and Water. Canberra.

CoA. 2023. Australian Government Style Manual. Commonwealth of Australia.

Colefax, A.P., Kelaher, B.P., Pagendam, D.E., Butcher, P.A. 2020. Assessing White Shark (Carcharodon carcharias) Behavior Along Coastal Beaches for Conservation-Focused Shark Mitigation. 7. Accessed June 2025. Available at: **https://www.frontiersin.org/articles/10.3389/fmars.2020.00268**.

Connell, D.W., and Miller, G.J. 1981. Petroleum hydrocarbons in aquatic ecosystems –behaviour and effects of sublethal concentrations. CRC Report: Critical Reviews in Environmental Controls.

Connell, S.C., M.W. Koessler, and C.R. McPherson. 2021. BMG Wells Plug and Abandonment Activities: Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Document 02381, Version 1.0. Technical report by JASCO Applied Sciences for Cooper Energy Limited.

Connell, S.C., M.W. Koessler, A. M. Muellenmeister and C.R McPherson. 2023. Cooper Energy Otway Subsea Noise Modelling: Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Document 02764, Version 2.0. Technical report by JASCO Applied Sciences for Cooper Energy Limited.

Connell, S.C., and M.W. Koessler. 2025. Amplitude Energy Otway Subsea Noise Modelling: Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Document 02764, Version 3.0. Technical report by JASCO Applied Sciences for Cooper Energy Limited.

Cooper Energy. 2019. Otway Basin Exploration Drilling: Environment Plan Summary. Cooper Energy, Perth.

Cooper Energy. 2024. Otway Basin. Cooper Energy. Accessed April 2024.

Cooper Energy. 2025. East Coast Supply Project OPP. Cooper Energy (CH) Pty Ltd and Cooper Energy (MGP) Pty Ltd. Available: **https://www.nopsema.gov.au/**.

Crecelius E, Trefry J, McKinley J, Lasorsa B and Trocine R. 2007 Study of barite solubility and the release of trace components to the marine environment. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OC5 Study MMS 2007-061. 176 pp.

CSIRO. 2017. Cape Grim Greenhouse Gas Data. Available from: **http://www.csiro.au/greenhousegases**.

CSIRO. 2021. Australia's abalone disease outbreak. Commonwealth Scientific and Industrial Research Organisation. Accessed May 2024.

Currie, D. R and Isaacs, L. R. 2005. Impact of exploratory offshore drilling on benthic communities in the Minerva gas field, Port Campbell, Australia. Marine Environmental Research, 59. 217–233.

DAFF. 2009. National biofouling management guidelines for the petroleum production and exploration industry. Commonwealth of Australia. Marine Pest Sectoral Committee, Department of Agriculture and Water Resources, Canberra.

DAFF. 2023. Australian Biofouling Management Requirements, Version 2. Department of Agriculture, Fisheries and Forestry, Canberra.

DAFF. 2024. Recreational Fishing. Department of Agriculture, Fisheries and Forestry. Accessed February 2025.

Dai, A., 2013. Increasing drought under global warming in observations and models. Nature climate change 3, 52.

Department of Agriculture, Water and the Environment (DAWE). 2021b. Approved Conservation Advice for *Thymichthys politus* (red handfish). Department of Agriculture, Water and the Environment.

DAWE. 2020a. Australian Ballast Water Management Requirements – Version 8. Accessed June 2025. Available at: **https://www.agriculture.gov.au/sites/default/files/documents/australian-ballast-water-management-requirements.pdf**.

DAWE. 2020b. National Recovery Plan for the Australian Fairy Tern (Sternula nereis nereis). Department of Agriculture, Water and the Environment, Canberra.

DAWE. 2021a. Guidance on key terms within the Blue Whale Conservation Management Plan. Department of Agriculture, Water and the Environment, Canberra.

DAWE. 2021b. National Recovery Plan for the Painted Honeyeater (Grantiella picta). Department of Agriculture, Water and the Environment.

DAWE. 2022a. Conservation advice for Callocephalon fimbriatum (Gang-gang Cockatoo). Department of Agriculture, Water and the Environment, Canberra.

DAWE. 2022b. Conservation Advice for Pycnoptilus floccosus (Pilotbird). Department of Agriculture, Water and the Environment, Canberra.

DAWR. 2018. Marine Pest Plan 2018–2023: the National Strategic Plan for Marine Pest Biosecurity. Department of Agriculture and Water Resources, Canberra. May. CC BY 4.0.

DCCEEW. 2015a. Conservation Advice Calidris ferruginea curlew sandpiper. Accessed in 2025 at: **https://environment.gov.au/biodiversity/threatened/species/pubs/856-conservation-advice.pdf**.

DCCEEW. 2015b. Marine Key Ecological Features. Commonwealth of Australia, Australian Government Department of Climate Change, Energy, the Environment and Water

DCCEEW. 2016. Ecological Communities of National Environmental Significance database. Department of Climate Change, Energy, the Environment and Water, Canberra. Commonwealth of Australia

DCCEEW. 2020. Wildlife Conservation Plan for Seabirds, Commonwealth of Australia, Department of Climate Change, Energy, the Environment and Water, Canberra. Acessed October 2025.

Available: **https://www.dcceew.gov.au/sites/default/files/documents/wildlife-conservation-plan-for-seabirds.pdf** DCCEEW, 2021. Australia State of the Environment 2021. Assessed in 2022 at **https://soe.dcceew.gov.au**

DCCEEW. 2022a. Conservation Advice for Calyptorhynchus lathami lathami (South-eastern Glossy Black Cockatoo). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2022b. National Recovery Plan for the Australian Painted Snip (Rostratula australis). Department of Climate Change, Energy, the Environment and Water, Canberra

DCCEEW. 2023a. National Light Pollution Guidelines for Wildlife. Commonwealth of Australia. Department of Climate change, Energy, the Environment and Water. Canberra.

DCCEEW. 2023b. Conservation Advice for Galaxiella pusilla (dwarf galaxias). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023c. Conservation Advice for Nannoperca obscura (Yarra pygmy perch). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023d. Conservation Advice for Ardenna grisea (sooty shearwater). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023e. Conservation Advice for Neophema chrysostoma (blue-winged parrot). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023f. Conservation Advice for Acanthiza pusilla magnirostris (King Island brown thornbill). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023g. Conservation Advice for Acanthornis magna greeniana (King Island scrubtit). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023h. Conservation Advice for Aphelocephala leucopsis (southern whiteface). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023i. Conservation Advice for Climacteris picumnus victoriae (brown treecreeper (south-eastern). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023j.Conservation Advice for Melanodryas cucullata cucullata (hooded robin (south-eastern). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023k. Conservation Advice for Stagonopleura guttata (diamond firetail). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023l. Conservation Advice for Numenius madagascariensis (far eastern curlew). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023m. Conservation Advice for Calidris ferruginea (Curlew Sandpiper). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2023n. National Recovery Plan for the Australasian Bittern (Botaurus poiciloptilus). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW 2023o. Conservation Advice for Numenius madagascariensis (Far Eastern Curlew). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024a. Biologically Important Areas for protected marine species (BIAs). Department of Climate Change, Energy, the Environment and Water, Canberra. Accessed August 2024.

DCCEEW. 2024b. National Recovery Plan for the Southern Right Whale. Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024c. National Recovery Plan for the Swift Parrot (Lathamus discolor). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024d. Assessing and Managing Impacts to Underwater Cultural Heritage in Australian Waters - Guidelines on the application of the Underwater Cultural Heritage Act 2018. Accessed July 2025. Available from: chrome-**https://www.dcceew.gov.au/sites/default/files/documents/guidelines-assessing-managing-impacts-underwater-cultural-heritage.pdf**.

DCCEEW. 2024e. Australia's emissions projections 2024. November 2024. Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024f. Approved Conservation Advice for Calidris canutus (Red Knot). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024g. Approved Conservation Advice for Calidris tenuirostris (Great Knot). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024h. Approved Conservation Advice for Calidris acuminata (sharp-tailed sandpiper). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024i. Approved Conservation Advice for Xenus cinereus (Terek sandpiper). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024j. Approved Conservation Advice for Pluvialis squatarola (grey plover). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024k. Conservation Advice for Limosa lapponica baueri (Alaskan bar-tailed godwit). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024l. National Recovery Plan for the Swift Parrot (Lathamus discolor). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024m. Conservation Advice for Tringa nebularia (common greenshank). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024n. Conservation Advice for Limosa limosa (black-tailed godwit). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024o. Conservation Advice for Gallinago hardwickii (Latham's snipe). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024p. Conservation Advice for Arenaria interpres (ruddy turnstone). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2024q. Ramsar Wetlands of Australia. Australian Government Department of Climate Change, Energy, the Environment and Water

DCCEEW. 2025a. Great Ocean Road and Scenic Environs, Great Ocean Rd, Apollo Bay, VIC, Australia. Accessed October 2024.

DCCEEW. 2025b. Conservation Advice for Sternula albifrons (little tern) (DCCEEW, 2025a). Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2025c. Norfolk Island Region Threatened Species Recovery Plan. Department of Climate Change, Energy, the Environment and Water, Canberra.

DCCEEW. 2025d. Australian Marine Parks. Australian Government Department of Climate Change, Energy, the Environment and Water

DCCEEW. 2025e. Marine and Terrestrial - Collaborative Australian Protected Areas Database (CAPAD). Australian Government Department of Climate Change, Energy, the Environment and Water

DCCEEW. 2025f. World Heritage Areas. Commonwealth of Australia, Australian Government Department of Climate Change, Energy, the Environment and Water

DCCEEW. 2025g. Commonwealth Heritage List Spatial Database (CHL). Commonwealth of Australia, Heritage Branch of the Australian Government Department of Climate Change, Energy, the Environment and Water

DCCEEW. 2025h. National Heritage List Spatial Database (NHL). Commonwealth of Australia, Heritage Branch of the Australian Government Department of Climate Change, Energy, the Environment and Water

DEC. 2006. Gould's Petrel (*Pterodroma leucoptera leucoptera*) Recovery Plan. Department of Environment and Conservation (NSW). Hurstville. NSW.

DECC. 2008. Lord Howe Island biodiversity management plan. Department of Environment and Climate Change (NSW).

DEH. 2003. Sub-Antarctic Fur Seal and Southern Elephant Seal Recovery Plan 2004-2009. Commonwealth of Australia. Department of the Environment and Heritage, Canberra.

DELWP. 2016. National Recovery Plan for the Orange-bellied Parrot, Neophema chrysogaster. Department of Environment, Land, Water and Planning, Canberra.

Deleau M.J.C, White P.R., Peirson G., Leighton T.G., Kemp P.S. 2019. The response of anguilliform fish to underwater sound under an experimental setting. River Res Applic. 2020;36:441–451. **https://doi.org/10.1002/rra.3583**.

Department of Agriculture. 2015. 2015 Anti-Fouling and In-Water Cleaning Guidelines for Australia and New Zealand.

DeRuiter, S.L. and Doukara, K.L. 2012. Loggerhead turtles dive in response to airgun sound exposure. Endangered Species Research, 16: 55-63. doi: 10.3354/esr00396.

Dernie, K.M., M.J. Kaiser, and R.M. Warwick. 2003. “Recovery rates of benthic communities following physical disturbance.” Journal of Animal Ecology, 72, 1043-1056.

DEWHA. 2008a. Approved Conservation Advice for Dermochelys coriacea (Leatherback Turtle). Department of the Environment, Water, Heritage and the Arts, Canberra.

DEWHA. 2008b. EPBC Act Policy Statement 2.1- Interaction between offshore seismic exploration and whales, Department of Environment, Water, Heritage & the Arts, Canberra.

DEWHA. 2009. Approved Conservation Advice for Thalassarche chrysostoma (Grey-headed Albatross). Department of the Environment, Water, Heritage and the Arts, Canberra.

DEWHA. 2010a. Norfolk Island Region Threatened Species Recovery Plan. Department of the Environment, Water, Heritage and the Arts, Canberra.

DEWHA. 2010b. Approved Conservation Advice for Ceyx azureus diemenensis (Tasmanian Azure Kingfisher). Department of the Environment, Water, Heritage and the Arts, Canberra.

DEWHA. 2010c. Approved Conservation Advice for Tyto novaehollandiae castanops (Tasmanian Masked Owl). Department of the Environment, Water, Heritage and the Arts, Canberra.

DEWHA. 2013. Significant Impact Guidelines 1.1 – Matters of National Environmental Significance. Department of the Environment, Water, Heritage and the Arts, Canberra.

di Iorio L, Clark CW. 2010. Exposure to seismic survey alters blue whale acoustic communication. Biol Lett 6:334–335.

Di Toro D.M., McGrath J.A., Stubblefield W.A. 2007. Predicting the toxicity of neat and weathered crude oil: toxic potential and the toxicity of saturated mixtures. Environmental Toxicology and Chemistry 26, 24–36. doi:10.1897/06174R.1.

Director of National Parks. 2025. Director of National Parks, South-east Marine Parks Network Management Plan 2025.

DoA. 2015. Anti-fouling and In-water Cleaning Guidelines. Commonwealth of Australia. Department of Environment, Department of Agriculture, Canberra, CC BY 3.0.

DoE. 2013. EPBC Act Policy Statement 1.1 – Significant Impact Guidelines – MNES. Department of the Environment. Canberra.

DoE. 2014. Recovery Plan for the Grey Nurse Shark (Carcharias taurus). Commonwealth of Australia, Department of the Environment, Canberra.

DoE. 2015a. Conservation Management Plan for the Blue Whale - A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia, Department of the Environment, Canberra.

DoE. 2015b – South-east marine region profile. A description of the ecosystems, conservation values and uses of the South-east Marine Region. CoA. 2015.

DoE. 2015c. Approved Conservation Advice for the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community. Commonwealth of Australia, Department of the Environment, Canberra.

DoE. 2016. National Recovery Plan for the Regent Honeyeater (Anthochaera Phrygia). Commonwealth of Australia, Department of the Environment, Canberra.

DoE. 2018a. Approved Conservation Advice (including Listing Advice) for the Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community. Commonwealth of Australia, Department of the Environment and Water, Canberra.

DoE. 2018b. Conservation advice (incorporating listing advice) for the Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community. Commonwealth of Australia, Department of the Environment and Water, Canberra.

DoE. 2024. Species Profile and Threats Database. Commonwealth of Australia, Department of Climate Change, Energy, the Environment and Water, Canberra.

DoE. 2025. Species Profile and Threats Database. Commonwealth of Australia, Department of Climate Change, Energy, the Environment and Water, Canberra.

DoEE. 2019. Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases. **https://www.environment.gov.au/climate-change/climate-solutions-package**

Double MC, Andrews-Goff V, Jenner KCS *et al* (2014). Migratory movements of pygmy blue whales (*Balaenoptera musculus brevicauda*) between Australia and Indonesia as revealed by satellite telemetry. *PLOS ONE*. DOI:**10.1371/journal.pone.0093578**

DPIPWE. 2012. King Island Biodiversity Management Plan. Department of Primary Industries, Parks, Water and Environment, Hobart.

DSEWPaC. 2011a. Background Paper, Population Status and Threats to Albatrosses and Giant Petrels Listed as Threatened under the Environment Protection and Biodiversity Conservation Act

1999, Commonwealth of Australia, Department of Sustainability, Environment, Water, Population and Communities, AAD, Hobart, accessed October 2022.

DSEWPaC. 2011b. Approved Conservation Advice for Sternula nereis nereis (Fairy Tern). Department of Sustainability, Environment, Water, Population and Communities. Canberra

DSEWPaC. 2012a. Conservation Management Plan for the Southern Right Whale. A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 2011-2021. Department of Sustainability, Environment, Water, Population and Communities. Canberra.

DSEWPaC. 2012b. Approved Conservation Advice for Giant Kelp Marine Forests of South East Australia. Department of Sustainability, Environment, Water, Population and Communities. Canberra.

DSEWPaC. 2012c. Approved Conservation Advice for Epinephelus daemelii (black cod). Department of Sustainability, Environment, Water, Population and Communities. Canberra.

DSEWPaC. 2012d. Approved Conservation Advice for Thymichthys politus (Red Handfish). Department of Sustainability, Environment, Water, Population and Communities. Canberra.

DSEWPaC. 2013a. Recovery Plan for the White Shark (Carcharodon carcharias). Department of Sustainability, Environment, Water, Population and Communities. Canberra.

DSEWPaC. 2013b. Approved Conservation Advice for Rostratula australis (Australian painted snipe). Department of Sustainability, Environment, Water, Population and Communities. Canberra.

DSEWPaC. 2013c. Conservation Advice for SUBTROPICAL AND TEMPERATE COASTAL SALTMARSH. Department of Sustainability, Environment, Water, Population and Communities. Canberra.

DSEWPaC. 2013d. Issues Paper for the Australian Sea Lion (Neophoca cinerea). Department of Sustainability, Environment, Water, Population and Communities. Canberra.

Duke NC, Kovacs JM, Griffiths AD, Preece L, Hill DJE, van Oosterzee P, Mackenzie J, Morning HS and Burrowa D. 2017. Large-scale dieback of mangroves in Australia's Gulf of Carpentaria: a severe ecosystem response, coincidental with an unusually extreme weather event. Marine and Freshwater Research http://dx.doi.org/10.1071/MF16322

Duncan, A.J., Gavrilov, A., and Fan, L. 2009. Acoustic propagation over limestone seabeds, in Zander, A.C., and Howard, C.Q., (ed), Australian Acoustical Society, Nov 23-25 2009, pp. 1-6. Adelaide, Australia: University of Adelaide.

Duncan, A.J., Gavrilov, A.N., McCauley, R.D., Parnum, I.M. and Collis, J.M. 2013. Characteristics of sound propagation in shallow water over an elastic seabed with a thin cap-rock layer. J. Acoust. Soc. Am:134, pp. 207-215.

Dunlop, M., Hilbert, D., Ferrier, S., House, A., Liedloff, A., Prober, S., Smyth, A., Martin, T., Harwood, T., Williams, K., Fletcher, C., Murphy, H., 2012. The Implications of Climate Change for Biodiversity,

Conservation and the National Reserve System: Final Synthesis. CSIRO Climate Adaptation Flagship. **https://doi.org/10.4225/08/5850384d796c6**

Carroll, A.G., Przeslawski, R., Duncan, A., Gunning, M. and Bruce, B. 2017. A critical review of the potential impacts of marine seismic surveys on fish & invertebrates. *Marine Pollution Bulletin*, *114*(1), pp.9-24.

Dunlop, R.A., Noad, M.J., McCauley, R.D., Kniest, E., Slade, R., Paton, D. and Cato, D.H. 2017. The behavioural response of migrating humpback whales to a full seismic airgun array. Proceedings: Biological Science, 284(1869): 20171901. doi: 10.1098/rspb.2017.1901.

Dunlop RA, Noad MJ, McCauley RD, Kniest E, Slade R, Paton D, Cato DH. 2018. A behavioural dose-response model for migrating humpback whales and seismic air gun noise. Mar Pollut Bull 133:506–516.

Durbach, I.N., Harris, C.M., Martin, C., Helble, T.A., Henderson E.E., Ierley, G., Thomas, L., Martin, S.W. 2021. Changes in the Movement and Calling Behaviour of Minke Whales (Balaenoptera acutorostrata) in Response to Navy Training. Frontiers in Marine Science, 8.

DWH (Deepwater Horizon) Natural Resource Damage Assessment Trustees, 2016. Deepwater Horizon Oil Spill: Final Programmatic Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement

Eastern Maar Aboriginal Corporation. 2014. Eastern Maar Meerreengeeye ngakeepoorryeeyt. Eastern Maar Aboriginal Corporation. Native Title Services Victoria, National Landcare Programme, North Melbourne, Victoria.

Edgar, GJ, Barrett, NS and Morton, AJ. 2004. Patterns of fish movement on eastern Tasmanian rocky reefs, Environmental Biology of Fishes, 70: 273–284.

EMSA. 2016. The Management of Ship-Generated Waste On-board Ships. European Maritime Safety Agency.

Erbe, C., Bowles, A., Houser, D., Jolliffe, C., Madhusudhana, S., Marley, S.A., Recalde Salas, A., Salgado-Kent, C., Schoeman, R., Senigaglia, V. and Tollefsen, C. 2025. Behavioral Responses to Underwater Noise. In Marine Mammal Acoustics in a Noisy Ocean (pp. 611-698). Cham: Springer Nature Switzerland.

Ferreira, L.C., Jenner, C., Jenner, M., Udyawer, V., Radford, B., Davenport, A., Moller, L., Andrews-Goff, V., Double, M., and Thums, M. 2024. Predicting suitable habitats for foraging and migration in Eastern Indian Ocean pygmy blue whales from satellite tracking data. Movement Ecology, 12 (42) (2024).

Ferreira, L. C., et al. (2024). Habitat use and foraging behavior of pygmy blue whales in the Bonney Upwelling. Marine Ecology Progress Series, 720, 45–62.

Field, C.D., 1995. Impact of expected climate change on mangroves. Hydrobiologia 295, 75–81. **https://doi.org/10.1007/BF00029113**.

Finneran JJ, Henderson EE, Houser DS, Jenkins K, Kotecki S and Mulsow J. 2017. Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III). Technical report by Space and Naval Warfare Systems Center Pacific (SSC Pacific). 183 p. **https://apps.dtic.mil/dtic/tr/fulltext/u2/a561707.pdf**.

Fodrie, F.J., Heck, K.L., 2011. Response of coastal fishes to the Gulf of Mexico oil disaster. PloS ONE 6: e21609. Doi:10.1371/journal.pone.0021609.

Fraser, M.W., J. Short, G. Kendrick, D. McLean, J. Keesing, M. Byrne, M.J. Caley, et al. 2017. Effects of dredging on critical ecological processes for marine invertebrates, seagrasses and macroalgae, and the potential for management with environmental windows using Western Australia as a case study. Ecological Indicators, 78:229-242.

Friligos, N. 1985. Turnover time of waters in a deep basin in the Aegean Sea. Estuarine, Coastal and Shelf Science. 21: 879-894.

Fugro. 2020. Cooper Energy OP3D Environmental Survey Results Report. Project no. 318000966.

Fugro. 2020a. Survey Results Report. Otway Pipeline / Umbilical Route Survey. VOB-SV-REP-4900-0002.

Gagnon, M.M. and Rawson, C. 2011. Montara Well Release, Monitoring Study S4A – Assessment of Effects on Timor Sea Fish. Curtin University, Perth, Australia.

Game Fishing Association Australia, 2025a. Angling Rules Equipment. Accessed Feb 2025.

Game Fishing Association Australia, 2025b. Australian Game Fishing Records. Accessed Feb 2025.

Geiling N. 2014. Arctic Shipping: Good for Invasive Species, Bad for the Rest of Nature. Smithsonian. Available at: **https://www.smithsonianmag.com/science-nature/global-warmings-unexpectedconsequence-invasive-species-180951573/**

Geraci JR and St. Aubin DJ (1988) 'Synthesis of Effects of Oil on Marine Mammals', Report to US Department of the Interior, Minerals Management Service, Atlantic OCS Region, OCS Study Ventura, California.

Gill, P.C., Morrice, M.G., Page, B., Pirzel, R., Levings, A.H. and Coyne, M. 2011. Blue whale habitat selection and within-season distribution in a regional upwelling system off southern Australia. Marine Ecology Progress Series, 421: 243-263.

Gill, P. C., et al. (2011). Blue whale habitat selection and distribution off southern Australia. Journal of Cetacean Research and Management, 11(2), 163–172.

Gill, P.C., Pirzl, R., Morrice, M.G. and Lawton, K. 2015. Cetacean diversity of the continental shelf and slope off southern Australia. The Journal of Wildlife Management, 79(4).

Gilmour, J., Speed, C.W., Babcock, R., 2016. Coral reproduction in Western Australia. PeerJ 4, e2010. **https://doi.org/10.7717/peerj.2010**

Glenelg Shire Council (2025). Whale Watching. Available at: https://www.glenelg.vic.gov.au/Discover-Our-Shire/Tourism/Whale-Watching

GMTOAC (Gunditj Mirring Traditional Owners Aboriginal Corporation) and Members Consultation Day, 17 February 2024. Record of Meeting.

Goldbogen, J.A., Southall, B.L., DeRuiter, S.L., Calambokidis, J., Friedlaender, A.S., Hazen, E.L., Falcone, E.A., Schorr, G.S., Douglas, A., Moretti, D.J., Kyburg, C., McKenna, M.F., Tyack, P.L. 2013. Blue whales respond to simulated mid-frequency military sonar. Proceedings: Biological Science, 280(1765):20130657. doi: 10.1098/rspb.2013.0657.

Goldbogen, J. A., Hazen, E. L., Friedlaender, A. S., Calambokidis, J., DeRuiter, S. L., Stimpert, A. K., & Southall, B. L. (2015). Prey density and distribution drive the functional response in blue whale feeding behavior. **https://doi.org/10.1111/1365-2435.12395**

Gunaikurnai Land and Waters Aboriginal Corporation. 2015. Gunaikurnai Whole-of-Country Plan. Gunaikurnai Land and Waters Aboriginal Corporation. Native Title Services Victoria, National Landcare Programme, Bairnsdale, Victoria.

Gunditj Mirring Traditional Owners Aboriginal Corporation. 2023. Gunditjmara Nyamat Mirring Plan 2023 – 2033. Gunditj Mirring Traditional Owners Aboriginal Corporation, Gunditjmara Country.

Hamacher D., Nunn P., Gantevoort M., Taylor R., Lehman G., Law K.H.A., Miles M. 2023. The archaeology of orality: Dating Tasmanian Aboriginal oral traditions to the Late Pleistocene. Journal of Archaeological Science, Volume 159, 2023, 105819, ISSN 0305-4403. Accessed **https://doi.org/10.1016/j.jas.2023.105819**.

Hartley, J.P. 1996. Environmental monitoring of offshore oil and gas drilling discharges – A caution on the use of barium as a tracer. Mar. Pollut. Bull. 32:727-733.

Hartley J, Trueman R, Anderson S and Neff JM. 2003. Drill Cuttings Initiative, Food Chain Effects Literature Review. Report to UKOOA.

Hawkins, A.D., Roberts, L. and Cheesman, S. 2014. Responses of free-living coastal pelagic fish to impulsive sounds. The Journal of Acoustical Society of America, 35(5): 3101-3016. doi: 10.1121/1.4870697.

Hazel, J., Lawler, I.R., Marsh, H. and Robson, S. 2007. Vessel speed increases collision risk for the green turtle Chelonia mydas. Endangered Species Research 3: 105-113.

Hazen, E. L., Friedlaender, A. S., & Goldbogen, J. A. (2015). Blue whales optimize foraging efficiency by balancing oxygen use and energy gain. **https://www.science.org/doi/pdf/10.1126/sciadv.1500469**

Helm RC, Costa DP, DeBruyn TD, O'Shea TJ, Wells RS and Williams TM. 2014. Overview of Effects of Oil Spills on Marine Mammals. Handbook of Oil Spill Science and Technology, 455-475.

Hester MW and Mendelssohn IA (2000) 'Long-term recovery of a Louisiana brackish marsh plant community from oil spill impact: Vegetation response and mitigating effects of marsh surface elevation', Marine Environmental Research, 49: 233–254.

Hewitt, C.L., Martin, R.B., Sliwa, C., McEnnulty, F.R., Murphy, N.E., Jones, T. and Cooper, S. (eds). 2002. National introduced marine pest information system. Available online: **http://www.marinepests.gov.au/Pages/default.aspx**.

Hjermann, D.Ø., Melsom, A., Dingsør, G.E., Durant, J.M., Eikeset, A.M., Røed, L.P., Ottersen, G., Storvik, G., Stenseth, N.C., 2007. Fish and oil in the Lofoten–Barents Sea system: synoptic review of the effect of oil spills on fish populations. Marine Ecology Progress Series 339: 283–299

Hinwood, J.B., Poots, A.E., Dennis, L.R., Carey, J.M., Houridis, H., Bell, R.J., Thomson, J.R., Boudrea, P., Ayling, A.M. 1994. Drilling activities, In: Swan, J.M., Neff, J.M., Young, P.C. (eds) Environmental Implications of offshore oil and gas development in Australia: findings of an independent scientific review. Australian Petroleum Production and Exploration Association, Canberra, pp 123-207.

HEPA. 2025. PFAS National Environmental Management Plan Version 3.0, Heads of EPA Australia and New Zealand 2025. Accessed April 2025.

Hoegh-Guldberg, O., 1999. Climate change, coral bleaching and the future of the world's coral reefs. Marine and freshwater research 50, 839–866.

Hoegh-Guldberg, O., Jacob, D., Taylor, M., Bindi, M., Brown, S., Camilloni, I., Diedhiou, A., Djalante, R., Ebi, K.L., Engelbrecht, F., Guiot, J., Hijioka, Y., Mehrotra, S., Payne, A., Seneviratne, S.I., Thomas, A., Warren, R., Zhou, G., 2018. Impacts of 1.5oC Global Warming on Natural and Human Systems, in: Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty.

Holcombe, S. 2022. Integrating Intangible Impacts into Cultural Heritage Management. University of Queensland. Accessed December 2023.

Hook, S., Osborn, H. 2012. Comparison of toxicity and transcriptomic profiles in a diatom exposed to oil, dispersants, dispersed oil. Aquatic Toxicology 124-125:139-151.

Hook, S. and Lee, K. 2015. A review of the ecotoxicological implications of oil dispersant use in Australian waters. CSIRO Oceans and Atmosphere Report, Lucas Heights, NSW, Australia.

Hook, S., Batley, G., Holoway, M., Irving P. and Ross, A. 2016. Oil Spill Monitoring Handbook. CSIRO Publishing.

Huang, Z, and Hua X Wang. 2019. 'Mapping the spatial and temporal variability of the upwelling systems of the Australian south-eastern coast using 14-year of MODIS data'. Remote Sensing of Environment, 90-109.

Hughes, L. 2003. Climate change and Australia: Trends, projections and impacts. Austral Ecology 28, 423–443. **https://doi.org/10.1111/j.1442-9993.2003.tb00266.x**

Hughes, L. 2011. Climate change and Australia: key vulnerable regions. Reg Environ Change 11, 189–195. **https://doi.org/10.1007/s10113-010-0158-9**

Huisman JM. 2000. Marine Plants of Australia. University of Western Australia Press.

Hüppop, O., Hüppop, K., Dierschke, J., Hill, R., 2016. Bird collisions at an offshore platform in the North Sea. Bird Study 63, 73–82. Accessed June 2025. Available at: **https://www.researchgate.net/publication/294723644_Bird_collisions_at_an_offshore_platform_in_the_North_Sea**

IMCRA. 1998. Interim Marine and Coastal Regionalisation for Australia: an ecosystem-based classification for marine and coastal environments. Version 3.3. IMCRA Technical Group. Environment Australia, Commonwealth Department of the Environment. Australia.

IMO. 2017. International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM). Accessed June 2025. Available at: **https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-%28BWM%29.aspx**

IMO. 2023. 2023 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species. International Maritime Organisation, London.

IMO. 2025a. Ballast Water Management. Accessed June 2025. Available at: **https://www.imo.org/en/OurWork/Environment/Pages/BallastWaterManagement.aspx**.

IMO. 2025b. Biofouling. Accessed June 2025. Available at: **https://www.imo.org/en/OurWork/Environment/Pages/Biofouling.aspx**.

Institute for Marine and Antarctic Studies, University of Tasmania. 2020. National Survey for Recreational Fishing for Southern Bluefin Tuna. Institute for Marine and Antarctic Studies, University of Tasmania.

IPCC. 2021. Climate Change 2021: The Physical Science Basis. International Panel on Climate Change. **https://www.ipcc.ch/report/ar6/wg1/** .

IPCC. 2023. Climate Change 2023: ArR6 Synthesis Report. International Panel on Climate Change. **https://www.ipcc.ch/report/ar6/syr/**.

IPIECA. 1993. Report Series No. 4. Biological Impacts of Oil Pollution: Mangroves. International Petroleum Industry Environmental Conservation Association (IPIECA). **https://www.amn.pt/DCPM/Documents/Mangroves.pdf**.

IPIECA. 1994. Report Series No 6: Biological Impacts of Oil Pollution: Saltmarshes. International Petroleum Industry Environmental Conservation Association (IPIECA).

IPIECA. 1995. Biological Impacts of Oil Pollution: Rocky Shores. IPIECA. London.

IPIECA. 2014. Wildlife response preparedness. Report 516, International Association of Oil & Gas Producers

IPECA. 2015. Dispersants: surface application - Good practice guidelines for incident management and emergency response personnel. IOGP report 532.

IPIECA. 2002. Guidelines on Biological Impacts of Oil Pollution. International Petroleum Industry Environmental Conservation Association. London.

ITOPF. 2011a. Effects of oil pollution on the marine environment (Technical Information Paper No. 13). International Tanker Owners Pollution Federation Limited, London

ITOPF. 2011b. Fate of marine oil spills, Technical Information Paper. International Tanker Owners Pollution Federation.

ITOPF. 2014. 'Technical Information Paper 2 - Fate of Marine Oil Spills', International Tankers Owners Pollution Federation td, UK.

Irving, P., and Lee, K. 2015. Improving Australia's Dispersant Response Strategy. Proceedings of the Thirty-Eighth AMOP Technical Seminar, Environment Canada, Ottwa, ON, pp. 973-987, 2025.

IWC. 2020. Global Numbers of Ship Strikes: An Assessment of Collisions Between Vessels and Cetaceans Using Available Data in the IWC Ship Strike Database. International Whaling Commission.

JASCO. 2021. Empirical estimation of underwater noise and effect from survey equipment. Memo for Cooper Energy. Document Number: P001595-001. Jasco Applied Sciences.

Jenkins, G. and McKinnon, L. 2006. Port Phillip Bay Channel Deepening Project: supplemental environmental effects statement – aquaculture and fisheries.

Jiménez-Arranz G, Banda N, Cook S, Wyatt R. 2020. Review on existing data on underwater sounds produced by the oil and gas industry. Holsworthy (UK): Joint Industry Programme on E&P Sound and Marine Life. 182 p.

Johnson, A. 2018. The Effects of Turbidity and Suspended Sediments on ESA-Listed Species from Projects Occurring in the Greater Atlantic Region. Greater Atlantic Region Policy Series 18-02. NOAA Fisheries Greater Atlantic Regional Fisheries Office.

Jones, F.V., C. Hood, and G. Moiseychenko. 1996. International methods of evaluating the discharge of drilling fluids in marine environments. SPE 46825. In: 1998 SPE International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production. Caracas, Venezuela, 7-10 June 1998. Society of Petroleum Engineers, Inc. Richardson, TX. 18 pp.

Jones. R., Wakeford. M., Currey-Randall. L., Miller. K., Tonin. H. 2021. Drill cuttings and drilling fluids (muds) transport, fate and effects near a coral reef mesophotic zone, Marine Pollution Bulletin, Volume 172, 2021, 112717, ISSN 0025-326X, **https://doi.org/10.1016/j.marpolbul.2021.112717**

Kailola, P.J., Williams, M.J., Stewart, P.C., Reighelt, R.E., McNee, A., and Grieve, C. 1993. Australian Fisheries Resources, Published by the Bureau of Resource Sciences, Department of Primary Industries and Fisheries and the Fisheries Research and Development Corporation, Canberra, Australia

Kennedy, J., Donnelly, D., Fulton, S. and Flynn, A. 2024. Cooper Energy BMG Decommissioning Campaign – Marine Mammal Observations. Report to Cooper Energy by Fathom Pacific Pty Ltd.

Kennish, M.J. 1996. Practical Handbook of Estuarine and Marine Pollution. CRC Press. Florida.

Kirkham H. 1997. Seagrasses of Australia, Australia: State of the Environment, Technical Paper Series (Estuaries and the Sea). Environment Australia, Commonwealth of Australia.

Koster, W.M., Aarestrup, K., Birnie-Gauvin, K. et al. First tracking of the oceanic spawning migrations of Australasian short-finned eels (Anguilla australis). Sci Rep 11, 22976 (2021). https://doi.org/10.1038/s41598-021-02325-9.

Kukert, H. 1991. In situ experiments on the response of deep sea macrofauna to burial disturbance. Pacific Science, 45-95.

Kuiter, Rudie. 2000. Seahorses, Pipefishes and their relatives: A comprehensive guide to Syngnathiformes. TMC Publishing: Chorleywood, UK.

Kvadsheim PH, DeRuiter S, Sivle LD, Goldbogen J, Roland-Hansen R, Miller PJO, Lam F-PA, Calambokidis J, Friedlaender A, Visser F, Tyack PL, Kleivane L, Southall BL. 2017. Avoidance responses of minke whales to 1-4 kHz naval sonar. Mar Pollut Bull 121:60–68.

Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M. 2001. Collisions between ships and whales. Marine Mammal Science, 17: 35-75.

Lewis M and Pryor R (2013) 'Toxicities of oils, dispersants and dispersed oils to algae and aquatic plants: Review and database value to resource sustainability', Env, Poll, 180: 345–367.

Mate, B.R., et al. (2011). Satellite-monitored movements of southern right whales. Journal of Cetacean Research and Management.

Marangoni, L. F. B., Davies, T., Smyth, T., Rodríguez, A., Hamann, M., Duarte, C., Pendoley, K., Berge, J., Maggi, E., and Levy, O. 2022. Impacts of artificial light at night in marine ecosystems—A review. Global Change Biology, 28, 5346–5367. https://doi.org/10.1111/gcb.16264.

Matthews, L.P. and Parks, S.E. 2021. An overview of North Atlantic right whale acoustic behavior, hearing capabilities, and responses to sound. Marine Pollution Bulletin, 173.

McCafferty, D.J., Walker, T.R. and Boyd, I.L. (2004). Using time-depth-light recorders to measure light levels experienced by a diving marine mammal. Marine Biology, 146, pp.191-199.

McCauley, R.D., Fewtrell, J., Duncan, A.J, Jenner, C., Jenner, M.N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J., et al. 2000. Marine seismic surveys: Analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid. Report Number R99-15. Prepared for Australian Petroleum Production Exploration Association by Centre for Maine Science and Technology, Western Australia. 198 p.

McCauley, R.D., Gavrilov, A.N., Jolliffe, C.D., Ward, R. and Gill, P.C. 2018. Pygmy blue and Antarctic blue whale presence, distribution and population parameters in southern Australia based on passive acoustics. Deep-Sea Research Part II: In press. https://doi.org/10.1016/j.dsr2.2018.09.006

McClatchie S, Middleton J, Pattiaratchi C, Currie D and Kendrick G. 2006. The South-west Marine Region: Ecosystems and Key Species Groups. Department of the Environment and Water Resources. Australian Government.

McGurk, M.D. 1986. Natural mortality of marine pelagic fish eggs and larvae: role of spatial patchiness. Mar. Ecol. Prog. Ser. 34:227-242.

McInnes, K., 2015. Wet Tropics Cluster Report, in: Ekström, M., Whetton, P., Gerbing, C., Grose, M., Webb, L., Risbey, J. (Eds.), Climate Change in Australia Projections for Australia's Natural Resource Management Regions: Cluster Reports. CSIRO and Bureau of Meteorology, Australia.

McKenna, M.F. 2011. Blue Whale Response to Underwater Noise from Commercial Ships. PhD Thesis. doi: 10.13140/RG.2.2.32775.60321.

McLean D, Speed CW, Birt MJ, Colquhoun J, Case M, Stowar M, Bond T, Ierodiaconou D, Whitmarsh SK, Taylor MD, Wines S, Booth DJ, Fowler AM and Vaughan BI, (2022). Habitat value of subsea wells and pipelines for fishery target species in Australia. Front. Mar. Sci. 9:960496. doi: 10.3389/fmars.2022.960496.

McPherson, C, and Koessler, M. 2021. Empirical estimation of underwater noise and effect from survey equipment. Memo, Capalaba, Queensland, Australia: JASCO Applied Sciences.

Melcon, M.L., Cummins, A.J, Kerosky, S.M., Roche, L.K, Wiggins, S.M. and Hildebrand, J.A. 2012. Blue Whales Respond to Anthropogenic Noise. Plose One, 7(2): e32681.

MMA Offshore, 2025b. "Amplitude Pacific Crest Geophysical Survey – Final Geophysical Report, Doc Number 13665-O-RP-03."

MMA Offshore, 2025b. "Amplitude Pacific Crest Geophysical Survey – Final Environmental Report, Doc Number 13665-O-RP-02."

MESA. 2015. Mangroves of Australia – Distribution and Diversity. Marine Education Society of Australasia. Available from: **http://www.mesa.edu.au/mangroves/mangroves01.asp**.

Morrice, M (2014). Fine-scale foraging habitat and behavioural responses of pygmy blue whales. Deakin University. Thesis. **https://hdl.handle.net/10536/DRO/DU:30066239**

Morrisey, D., Cameron, M., Newcombe, E. 2018. Effects of moorings on different types of marine habitat. Marlborough District Council. Cawthron Report No. 3098. 41 p. plus appendix.

Möller, L, Attard, C., Bilgmann, K., Andrews-Goff, V., Jonsen, I., Paton, D. and Double, M. 2020. "Movements and behaviour of blue whales satellite tagged in an Australian upwelling system." Sci Rep 3;10(1):21165. doi:10.1038/s41598-020-78143-2.

Mrosovsky, N., Ryan, G.D., James, M.C., 2009. Leatherback turtles: the menace of plastic. Marine pollution bulletin 58: 287–289.

Murphy, F., Russell, M., Ewins, C., Quinn, B. 2017. The uptake of macroplastic & microplastic by demersal & pelagic fish in the Northeast Atlantic around Scotland. Marine Pollution Bulletin 122: 353–359.Neff, J.M. 2005. Composition, environmental fates, and biological effects of water based drilling muds and cuttings discharged to the marine environment: a synthesis and annotated bibliography. Report prepared for the Petroleum Environmental Research Forum, American Petroleum Institute, Washington, DC.

Neff, J. M. 2002. Bioaccumulation in Marine Organisms. Effects of Contaminants from Oil Well Produced Water. Elsevier Science Publishers, Amsterdam. 452 pp

Neff, J.M. 2005. Composition, environmental fates, and biological effects of water-based drilling muds and cuttings discharged to the marine environment: a synthesis and annotated bibliography. Report prepared for the Petroleum Environmental Research Forum (PERF). Washington DC: American Petroleum Institute.

Neff, J.M. 2010. Fate and effects of water-based drilling muds and cuttings in cold water environments, prepared for Shell E&P Company.

Negri, A.P., Brinkman, D.L., Flores, F., Botte, E.S., Jones, R.J. and Webster, N.S. 2016. Acute ecotoxicology of natural oil and gas condensate on coral reef larvae. Scientific Reports, 6, 21153. https://doi.org/10.1038/srep21153

Neo, Y.Y., Seitz, J., Kastelein, R.A., Winter, H.V., Ten Cate, C. and Slabbekoorn, H. 2014. Temporal structure of sound affects behavioural recovery from noise impact in European seabass. Biological Conservation, 178, 65–73. **https://doi.org/10.1016/j.biocon.2014.07.012**.

NERA. 2017. Environment Plan Reference Case, Planned discharge of sewage, putrescible waste and grey water. National Energy Resources Australia (NERA), Kensington, WA. Accessed August 2023.

NERA. 2018. Environmental Plan Reference Case: Anchoring of Vessels and floating facilities. Department of Industry, Innovation and Science, Australia Government. Accessed December 2022.

NMFS. 2005. Scoping Report for NMFS EIS for the National Acoustic Guidelines on Marine Mammals. National Marine Fisheries Service.

NMFS. 2018. 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum. National Marine Fisheries Service (U.S.) NMFS-OPR-59. 167 p.

NMFS. 2024. Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0): Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum. National Marine Fisheries Service (U.S.)

NOAA. 2002. Environmental Sensitivity Index Guidelines: Version 3 March 2002, National Oceanic and Atmospheric Administration, Washington.

NOAA. 2005. Endangered Fish and Wildlife; Notice of Intent to Prepare an Environmental Impact Statement., Federal Register 70: 1871-1875.

NOAA. 2010. Oil and sea turtles: biology planning and response. US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response and Restoration.

NOAA. 2013. Deepwater Horizon Oil Spill: Assessment of Potential Impacts on the Deep Soft-bottom Benthos. Interim data summary report. NOAA Technical Memorandum NOS NCCOS 166. NOAA. Washington.

NOAA. 2014. Oil Spills in Mangroves – Planning and Response Considerations. US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response and Restoration. **https://response.restoration.noaa.gov/sites/default/files/Oil_Spill_Mangrove.pdf**.

NOAA Technical Memorandum NMFS-NE-247, 2018. Right Whale Migration and Behavior.

NOAA. 2021. Oil and Sea Turtles: Biology, Planning and Response. US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response and Restoration. **https://response.restoration.noaa.gov/sites/default/files/Oil_Sea_Turtles_2021.pdf**.

Noad, M.J, Dunlop, R.A., Paton, D. Cato, D.H. et al. 2011. Absolute and relative abundance estimates of Australian east coast humpback whales. Journal of Cetacean Research and Management, Special issue 3: 243-252.

Noad, M.J, Cato, D.H. 2007. Swimming speeds of singing and non-singing humpback whales during migration. Journal of Marine Mammal Science. Issue 3: 481-495.

Nocera, A.C., Dumont, D.Schloss, I.R. 2020. A zooplankton diel vertical migration parameterization for coastal marine ecosystem modelling. Biogeosciences Discuss. **https://doi.org/10.5194/bg-2020-10**, 2020

NOO. 2002. Sea Country – an Indigenous Perspective; The South-east Regional Marine Plan Assessment Reports. National Oceans Office. Commonwealth of Australia

NOPSEMA. 2019. Environmental Bulletin: Oil Spill Modelling. Document number: A652993. April 2019. National Offshore Petroleum Safety and Environmental Management Authority. Available from: **https://www.nopsema.gov.au/sites/default/files/documents/2021-04/A652993.pdf**.

NOPSEMA. 2020. Reduce marine pest biosecurity risks through good practice biofouling management. Document number: N-04750-IP1899 A715054.

NOPSEMA. 2021. Reconciliation Action Plan: December 2021- December 2022. NOPSEMA, Reconciliation Action Plan.

NOPSEMA, 2024. Environment Plan content requirement. Document number: N-04750-GN1344 A339814.

NOPSEMA. 2024a. Environment Plan decision making guideline. Document number: N-04750-GL1721 A524696.

NOPSEMA. 2024b. Decommissioning Compliance Strategy 2024 – 2029. NOPSEMA, Decommissioning Compliance Strategy.

NRDA 2012. April 2012 Status Update for the Deepwater Horizon Oil Spill. A WWW publication. Natural Resource Damage Assessment. Accessed at: **http://www.gulfspillrestoration.noaa.gov**

Nunn, P.D. and Reid, N.J. 2016. Aboriginal Memories of Inundation of the Australian Coast Dating from More than 7000 Years Ago. Australian Geographer, 47:1,11-47, Doi: 10.1080/00049182.2015.1077539

O'Brien, P.Y. and Dixon, P.S. 1976. The effects of oils and oil components on algae: A review. British Phycological Journal, 11:2, 115-142, Doi:10.1080/00071617600650161.

OEH. 2012. National Recovery Plan for Eastern Bristlebird Dasyornis brachypterus. Office of Environment and Heritage, Department of Premier and Cabinet (NSW), Sydney.

OGUK (Oil and Gas UK). 2014. Guidance on risk decision making. Issue 2.

Origin. 2018. Offshore Environment Plan Summary Otway. VIC 9000 ENV PLN, CDN/ID 17275058.

OSPAR (2019). Assessment of the disturbance of drill cuttings during decommissioning - Offshore Oil & Gas Industry Series. The Convention for the Protection of the Marine Environment of the North-East Atlantic – OSPAR, London. ISBN 978-1-911458-85-2. Publication Number:745/2019

OSPAR. 2021. OSPAR List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment (PLONOR) – Updated 2021. OSPAR Commission.

Owen, K, C.S Jenner, and MN. N Jenner. 2016. "A week in the life of a pygmy blue whale: migratory dive depth overlaps with large vessel drafts." Animal Biotelemetry 4, 17.

Owen, K., et al. (2016). Migration and foraging ecology of pygmy blue whales in the eastern Indian Ocean. Endangered Species Research, 30, 31–43.

Pangerc, T., Robinson, S., Theobald, P., and Galley, L., 2016. Underwater sound measurement data during diamond wire cutting: First description of radiated noise. Proc. Mtgs. Acoust. 27, 040012 (2016); **https://doi.org/10.1121/2.0000322**.

Papale, E., Prakash, S., Singh, S., Batibasaga, A., Buscanino, G. and Piovano, S. 2020. Soundscape of green turtle foraging habitats in Fiji, South Pacific. PLOS ONE, 15(8) e0236628. **https://doi.org/10.1371/journal.pone.0236628**.

Parks S.E., Johnson. M., Nowacek. D., and Tyack. P. L. 2010. Individual Right Whales Call Louder in Increased Environmental Noise. Biology Letters.7, 1. **https://royalsocietypublishing.org/doi/10.1098/rsbl.2010.0451**

Parks, S.E., et al. (2019). Acoustic ecology of right whales: implications for conservation. Endangered Species Research.

Parks Victoria. 2019. Aboriginal Heritage Identification Guide. Parks Victoria Available from **https://soln.org/cb_pages/files/Aboriginal%20Heritage%20Identification%20Guide%20.pdf**

Parks Victoria. 2023. Parks. State of Victoria, Parks Victoria, Melbourne. Accessed December 2023.

Parks Victoria. 2025. Marine Pests. Accessed June 2025. Available at: **https://www.parks.vic.gov.au/get-into-nature/conservation-and-science/conserving-our-parks/marine-pests**

Patil, J., Gunasekera, R., McEnnulty, F. and Bax, N. 2004. Development of genetic probes for rapid assessment of the impacts of marine invasive species on native biodiversity – Maoricolpus roseus. Department of Environment and Heritage. CSIRO.

Paulay, G. Kirkendale, L. Lambert, G. and Meyer, C. 2002. Anthropogenic biotic interchange in a coral reef ecosystem: A case study from Guam. Pacific Science 56(4): 403–422.

Pendoley Environmental Pty Ltd. 2020. Dorado FPSO Light Modelling. Technical report by Pendoley Environmental Pty Ltd for CDM Smith.

Pineda, M.C., A. Duckworth, and N. Webster. 2016. " Appearance matters: sedimentation effects on different sponge morphologies." Journal of the Marine Biological Association of the United Kingdom 96, 481-492.

Popper A.N., Hawkins A.D., Fay R.R., Mann D.A., Bartol S., Carlson T.J., Coombs S., Ellison W.T., Gentry R.L., Halvorsen M.B. and Løkkeborg S. 2014. Sound exposure guidelines for fishes and sea turtles. Springer Briefs in Oceanography. DOI, 10(1007), pp.978-3.

Price, CA. **Short-tailed shearwater, Ardenna tenuirostris, trophic levels, lag, longitudinal study, seabird harvest**. University Of Tasmania. Thesis. https://doi.org/10.25959/23250506.v1Poroch, N., Arabena, K., Tongs, J., Larkin, S., Fisher, J. and Henderson, G. 2009, Spirituality and Aboriginal People's Social and Emotional Wellbeing: A Review, Discussion Paper No. 11, Cooperative Research Centre for Aboriginal Health, Darwin.

Richardson, A.J., Eriksen, R., Moltmann, T., Hodgson-Johnston, I. and Wallis, J.R. 2020. State and Trends of Australia's Ocean Report, Integrated Marine Observing System, Hobart.

Richardson, W. J., Greene, C. R., Maime, C. I. and Thomson, D. H. 1995. Marine Mammals and Noise. Academic Press, San Diego, California.

Rider, M.J., Kirsebom, O.S., Gallagher, A.J., Staaterman, E., Ault, J.S., Sasso, C.R., Jackson, T., Browder, J.A. and Hammerschlag, N. 2021. Space use patterns of sharks in relation to boat activity in an urbanized coastal waterway. Marine Environmental Research, 172: 105489.

Rennie, S. J., Hanson, C., Mccauley, R. D., Pattiaratchi, C., Burton, C., Bannister, J., Jenner, C., & Jenner, M. N. (2009). Physical properties and processes in the Perth Canyon, Western

Australia: Links to water column production and seasonal pygmy blue whale abundance. Journal of Marine Systems, 77(1-2), 21-44. https://doi.org/10.1016/j.jmarsys.2008.11.008

Roberts, D., A. Davis, and S. Cummins. 2006. "Experimental manipulation of shade, silt, nutrients and salinity on the temperate reef sponge Cymbastela concentrica." Marine Ecology Progress Series 307:143-154.

Rodríguez, A., Burgan, G., Dann, P., Jessop, R., Negro, JJ., Chiaradia, A. 2014. Fatal attraction of short-tailed shearwaters to artificial lights. PloS One, 9, 10, e110114. https://doi.org/10.1371/journal.pone.0110114

Rolland, R.M., Parks, S.E., Hunt, K.E., Castellote, M., Corkeron, P.J., Nowacek, D.P., Wasser, S.K. and Kraus, S.D. 2012. Evidence That Ship Noise Increases Stress in Right Whales. Proceedings of the Royal Society B 279, 2363-2368.

RPS. 2023. Annie-2 - Oil Spill Modelling. Report Ref: MAQ1222J. Rev 2. 15 February 2023. Report prepared for Cooper Energy. RPS Group, Brisbane.

RPS. 2024. East Coast Gas Supply – Oil Spill Modelling. MAQ1314J. Rev 2, 10 January 2024. Report prepared for Cooper Energy.

Saddlier, S., Jackson, J. and Hammer, M. 2010a. National Recovery Plan for the Dwarf Galaxias (Galaxiella pusilla). State Government of Victoria. Department of Sustainability and Environment, Melbourne.

Saddlier, S. and Hammer, M. 2010b. National recovery plan for the Variegated Pygmy Perch (Nannoperca variegata). State Government of Victoria. Department of Sustainability and Environment, Melbourne.

Saddlier, S. and Hammer, M. 2010c. National Recovery Plan for the Yarra Pygmy Perch (Nannoperca obscura). State Government of Victoria. Department of Sustainability and Environment, Melbourne.

Salerno J., Little B., Lee J., Hamdan L. J. (2018). Exposure to crude oil and chemical dispersant may impact marine microbial biofilm composition and steel corrosion. Front. Mar. Sci. 5:196. 10.3389/fmars.2018.0019.

Santos. 2004. Casino Gas Field Development Environment Report. Prepared by Enesar Consulting Pty Ltd, for Santos Ltd.

Sanzone, D., Neff, J., Lewis, D., Vinhateiro, N., and Blake, J. 2016. Environmental Fates and Effects of Ocean Discharge of Drill Cuttings and Associated Drilling Fluids From Offshore Oil and Gas Operations. International Association of Oil and Gas Producers, Report 543.

Schaanning M, Ruus A, Bakke T, Hylland K and Olsgard F. 2002. Bioavailability of heavy metals in drilling muds. Report SNO 4571-2022 by Norwegian Institute for Water Research, Oslo. https://niva.brage.unit.no/niva-xmlui/bitstream/handle/11250/211815/4571_72dpi.pdf?sequence=2

Sears R & Perrin WF (2018). Blue whale. In Würsig, B., Thewissen, J.G.M. & Kovacs, K.M. (Eds.), Encyclopedia of Marine Mammals, 3rd edition (pp. 110-114). London (UK): Academic Press.

Seiche Environmental. 2020. Marine Mammal Monitoring Report: SeaBird 2D Seismic Survey Otway Basin, Australia. SeaBird Exploration, Norway. Accessed from: https://www.nopsema.gov.au/sites/default/files/documents/06.%20A774175%20-%20Memo%20-%20Information%20from%20Schlumberger%20-%20Otway%20Basin%202DMC%20MSS_0.pdf.

Skira, I. 1991. The Short-tailed Shearwater: A review of its biology. Australian Bird Reviews – Number 3, Department of Parks, Wildlife and Heritage, Hobart. 15(2): 45-52.

Shell. 2009. Prelude Floating LNG Project Draft Environmental Impact Statement. EPBC 2008/4146.

Shell 2020. Crux Project - Offshore Project Proposal.

Shigenaka, Gary. (2011). Effects of Oil in the Environment. Oil Spill Science and Technology. 985-1024. 10.1016/B978-1-85617-943-0.10027-9.

Short, M. 2011. Pacific Adventurer Oil Spill: Big Birds, Sea Snakes and a Couple of Turtles. International Oil Spill Conference Proceedings: March 2011.

Slotte, A., Hansen, K., Dalen, J. and Ona, E. 2004. Acoustic mapping of pelagic fish distribution and abundance in relation to a seismic shooting area off the Norwegian west coast. Fisheries Research, 67(2), pp.143-150.

Smyth and Bahrdt Consultants. 2004. Kooyong sea Country Plan. Developed in response to action 3.11.2 of the South-east Regional Marine Plan. Report prepared by Smyth and Bahrdt Consultants on behalf of the Framlingham Aboriginal Trust and Winda Mara Aboriginal Corporation.

Smyth, L., Egan, H. and Kennet, D. 2018. Livelihood values of Indigenous customary fishing. Accessed 2025: **https://aiatsis.gov.au/sites/default/files/research_pub/livelihood_values_of_indigenous_customary_fishing_2.pdf**

Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A, E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L. 2019. Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals, 45(2): 125-232.

Southall B.L., Allen A.N., Calambokidis J., Casey C., DeRuiter S.L., Fregosi S., Friedlaender A.S., Goldbogen J.A., Harris C.M., Hazen E.L., Popov V., Stimpert A.K. 2023. Behavioural responses of fin whales to military mid-frequency active sonar. R Soc Open Sci 10(12):231775.

Southeast Australia Whale Sightings Program (2025), Whale sightings and map. Available at: **https://www.swifft.net.au/cb_pages/team_southern_right_whale_south_eastern_australia_monitoring.php#2025%20sightings**.

State of Victoria DTP. 2024. State Maritime Emergencies (Non-search and Rescue) Sub-Plan Edition 3 Department of Transport and Planning (DTP). Available from: **https://www.emv.vic.gov.au/**

Steffen, W., Burbidge, A.A., Hughes, L., Kitching, R., Lindenmayer, D., Musgrave, W., Staford Smith, M., Werner, P., 2009. Australia´s biodiversity and climate change: A strategic assessment of vulnerability of Australia´s biodiversity to climate change. A report to the Natural resource Management Ministerial Council commissioned by Australian Government. CSIRO Publishing.

Spalding, M.D., Brown, B.E., 2015. Warm-water coral reefs and climate change. Science 350, 769–771.

Sprogis, K.R., Videsen, S. and Madsen, P.T. 2020. Vessel noise levels drive behavioural responses of humpback whales with implications for whale-watching. eLife, 9: e56760.

Sprogis, K. R., et al. (2023). Habitat use and migration corridors of pygmy blue whales in the eastern Indian Ocean. Marine Ecology Progress Series, 710, 1–18. https://doi.org/10.3354/meps14236

Steffen, W., Burbidge, A.A., Hughes, L., Kitching, R., Lindenmayer, D., Musgrave, W., Staford Smith, M., Werner, P., 2009. Australia´s biodiversity and climate change: A strategic assessment of vulnerability of Australia´s biodiversity to climate change. A report to the Natural resource Management Ministerial Council commissioned by Australian Government. CSIRO Publishing.

Stamation, K., Watson, M., Moloney, P., Charlton, C., Bannister, J. 2020. Population estimate and rate of increase of southern right whales Eubalena australis in southeastern Australia. Endangered Species Research, 41, 373-383.

Tetra Tech Coffey. 2024. Draft Diesel Particulate Matter (DPM) Exposure Monitoring Report – Occupational Air Monitoring. Cooper Energy. Reference: 754-PEREN345934-R01.

The University of Adelaide. 2023. Sea Country. Available from: **https://storymaps.arcgis.com/stories/4a5c0beda383452889d5c0b37bf9d539. Accessed 29.06.23**.

Threatened Species Section. 2006. Threatened Tasmanian Eagles Recovery Plan 2006-2010. Department of Primary Industries and Water, Hobart.

Tillin H., Houghton A., Saunders J., Hull S. 2011. Direct and indirect impacts of marine aggregate dredging. Marine ALSF Science Monograph Series No. 1. MEPF 10/P144. Edited by R.C. Newell and J. Measures. 41 p

TSSC. 2014. Approved Conservation Advice for Thinornis rubricollis (Hooded Plover, Eastern). Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015a. Conservation Advice Balaenoptera borealis sei whale. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015b. Conservation Advice Balaenoptera physalus fin whale. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015c. Conservation Advice Rhincodon typus whale shark. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015d. Conservation advice Calidris ferruginea Curlew Sandpiper. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015e. Conservation Advice Halobaena caerulea blue petrel. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015f. Conservation Advice Pachyptila turtur subantarctica fairy prion (southern). Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015g. Conservation Advice Pterodroma heraldica Herald petrel. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015h. Conservation Advice Pterodroma mollis (Soft-plumaged Petrel). Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015i. Conservation Advice Anthochaera phrygia regent honeyeater. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015j. Conservation Advice Grantiella picta painted honeyeater. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015k. Conservation Advice Pedionomus torquatus plains-wanderer. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015l. Conservation Advice Platycercus caledonicus brownii green rosella (King Island). Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2015m. Conservation Advice Strepera fuliginosa colei black currawong (King Island). Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2016a. Conservation Advice Charadrius leschenaultii Greater sand plover. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2016b. Conservation Advice Charadrius mongolus Lesser sand plover. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2016c. Conservation Advice Lathamus discolor swift parrot. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2016d. Conservation Advice Pezoporus occidentalis night parrot. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2016e. Conservation Advice Mirounga leonina southern elephant seal. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2019a. Conservation Advice Botaurus poiciloptilus Australasian Bittern. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2019b. Conservation Advice Hirundapus caudacutus White-throated Needletail. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2020a. Conservation Advice Thalassarche cauta Shy Albatross. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2020b. Conservation Advice Falco hypoleucos Grey Falcon. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2020c. Conservation Advice Neophoca cinerea Australian Sea Lion. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2021. Conservation Advice Prototroctes maraena Australian Grayling. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

TSSC. 2022. Listing Advice Megaptera novaeangliae Humpback Whale. Threatened Species Scientific Committee. Department of Climate change, Energy, the Environment and Water. Canberra.

Verfuss UK, Gillespie D, Gordon J, Marques TA, Miller B, Plunkett R, Theriault JA, Tollit DJ, Zitterbart DP, Hubert P, Thomas L. 2018. Comparing methods suitable for monitoring marine mammals in low visibility conditions during seismic surveys. Mar Pollut Bull. 2018 Jan;126:1-18. doi: 10.1016/j.marpolbul.2017.10.034. Epub 2017 Nov 7. PMID: 29421075.

VFA. 2017. Short-finned eel: A guide to the inland angling waters of Victoria. Victorian Fisheries Authority. Accessed **https://vfa.vic.gov.au/education/fish-species/short-finned-eel**

Victoria State Government, 2023. Victoria's 2035 emissions reduction target. Accessed at: **https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0028/635590/Victorias-2035-Climate-Target_Driving-Real-Climate-Action.pdf**.

Victorian DELWP (Department of Environment, Land, Water and Planning). 2025. Victorian Biodiversity Atlas. Available at: **https://vba.biodiversity.vic.gov.au/vba**.

VFA. 2022. Commercial Fisheries. Victoria State Government. Victorian Fisheries Authority, Melbourne. Accessed July 2025.

VFA. 2022b. Short-finned eel: A guide to the inland angling waters of Victoria. Victorian Fisheries Authority. Accessed **https://vfa.vic.gov.au/education/fish-species/short-finned-eel**

Victorian Aboriginal Heritage Council. 2021. Strategic Plan 2021 – 2026. State Government of Victoria, Victorian Aboriginal Heritage Council, Melbourne.

Volkman, J.K., Miller, G.J., Revill, A.T., and Connell, D.W. (1994). Environmental implications of offshore oil and gas development in Australia – oil spills. In: Swan, J.M., Neff, J.M. and Young, P.C. (eds). Environmental implications of offshore oil and gas development in Australia: The findings of an independent scientific review. Australian Petroleum Exploration Association, Sydney.

Wadawurrung Traditional Owners Aboriginal Corporation. 2020. Wadawurrung Traditional Owners Aboriginal Corporation 2020 – 2030 – Wadawurrung Country Plan. Accessed February July 2024.

Wardrop, JA. 1987. The effects of oils and dispersants on mangroves: a review and bibliography. Centre for Environmental Studies, the University of Adelaide. Adelaide.

Watson, M., Stamation, K. and Charlton, C. 2021. Calving rates, long-range movements and site fidelity of southern right whales (Eubalaena australis) in south-eastern Australia. Journal of Cetacean Research Management, 22, pp.17-28. **https://doi.org/10.47536/jcrm.v22i1.210**.

Wadawurrung Traditional Owners Aboriginal Corporation. 2020. - let's make Country good together 2020-2030 – Wadawurrung Country Plan. Geelong, Victoria.

Welch, S.J., Matthews, M.N. R., Stroot, D.H., Muellenmeister, A.M., and McPherson, C.R. 2023. Otway Exploration Drilling Program: Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Document 02760, Version 3.0 FINAL. Technical report by JASCO Applied Sciences for Xodus Group.

WDCS. 2006. Vessel collisions and cetaceans: What happens when they don't miss the boat. Whale and Dolphin Conservation Society, United Kingdom.

Wiese, F.K., Montevecchi, W.A., Davoren, G.K., Huettmann, F., Diamond, A.W., and Linke, J. 2001. Seabirds at risk around offshore oil platforms in the North-west Atlantic. Marine Pollution Bulletin 42: 1285 - 1290.

Wilcox, C., Van Sebille, E., Hardesty, B.D. 2015. Threat of plastic pollution to seabirds is global, pervasive, and increasing. Proceedings of the National Academy of Sciences 112: 11899–11904.

Wood, J.D., Southall, B.L., and Tollit, D.J. 2012. PG&E offshore 3-D Seismic Survey Project Environmental Impact Report–Marine Mammal Technical Draft Report. Report by SMRU Ltd. 121 p.

Wood, M.A. and C.R. McPherson. 2019. Supplemental modelling results for Otway Basin Geophysical Operations Acoustic Modelling: Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Technical note by JASCO Applied Sciences for Lattice Energy. Appendix D of Beach Energy Environment Plan, Otway Geophysical and Geotechnical Seabed Assessment.

Woodside Energy Ltd. 2014. Browse FLNG Development, Draft Environmental Impact Statement. EPBC 2013/7079. November 2014. Woodside Energy, Perth, Western Australia.

Woodside Energy Ltd. 2024. Minerva Plug and Abandonment Environment Plan. December 2024. Woodside Energy Limited.

Xodus. 2023. T/49P Otway Drilling EP- T/49P Light Emissions and Line of Sight Modelling. Prepared for ConocoPhillips by Xodus Group.

Zieman, J.C, Orth, R.J., Phillips, R.C., Thayer, G.W. and Thorhaug, W. 1984. The effects of oil spills on seagrass ecosystems. In Restoration of Habitats Impacted by Oil Spills. Edited by Carins, J. and Builema, A. Butterworth Publ. Mass.

14.0 Appendices

Appendix 1 - Concordance with the OPP

The Cooper Energy Pty Ltd, **East Coast Supply Project Offshore Project Proposal (ECSP OPP)** (Cooper Energy 2025) outlines the scope of the development and its activities in sufficient detail to enable a thorough evaluation of environmental impacts and risks, as well as the establishment of appropriate Environmental Performance Outcomes (EPOs).

Offshore Project Proposals are developed at an early stage of project planning, before the detailed planning of specific activities is completed. Consequently, more detailed descriptions of these activities and their associated impacts and risks are expected to be provided in subsequent Environment Plans (EPs) as project/activity definition matures (NOPSEMA Guidance Note: Offshore project proposal content requirements N-04790-GN1663 A473026). Following the acceptance of an OPP and prior to the submission of EPs, refinements or modifications to the methods or timing of individual project activities may occur. These refinements or modifications to the accepted project cannot be new activities and cannot significantly change the overall environmental impacts and risks of the project as described in the accepted OPP (NOPSEMA Guidance Note: Offshore project proposal content requirements N-04790-GN1663 A473026).

With the above requirements in mind, the Annie-2 Development Drilling EP has been assessed against the **ECSP OPP** to confirm that there are no new activities or significant changes to the environmental impacts or risks in this EP.

Table 14-1 presents the results of that assessment and presents a comparison of Environmental Performance Outcomes (EPOs) between the **ECSP OPP** and this EP (of relevance to the scope of this EP) and evaluates the significance of any changes.

Table 14-1: Comparison of Annie-2 Development Drilling EP EPOs and those of the East Coast Supply Project OPP

Aspect	ECSP OPP EPO	Annie-2 Development Drilling EP EPO	Evaluation of Change (where applicable)
Atmospheric Emissions	EPO1: Manage atmospheric emissions generated by activities defined in this OPP in accordance with MARPOL Annex VI (Prevention of Air Pollution from Ships) enacted in the Navigation Act 2012, with no impacts to amenity outside of the operational area.	EPO13: Manage atmospheric emissions generated by activities defined in this EP in accordance with MARPOL Annex VI (Prevention of Air Pollution from Ships) enacted in the Navigation Act 2012, with no impacts to amenity outside of the operational area.	No change in the EPO wording - vessel activity is a key activity of the Annie-2 drilling EP.
Drilling Discharges	EPO2: Undertake drilling discharges management processes to reduce as far as practicable the overall volumes of WBDF discharged to the marine environment.	EPO2: Undertake drilling discharges management processes to reduce as far as practicable the overall volumes of WBDF discharged to the marine environment.	No change in the EPO wording.
	EPO3: Contingent use of SBDF only where technically required.	Not included.	This EPO is not included in the EP, as the activity description does not describe the use or contingent use of SBDF. There is no requirement to use SBDF for drilling the Annie-2 well.
	EPO4: Only approved chemicals (which meet low ecotoxicity pre-screening criteria or are further justified as ALARP) will be discharged to sea within project discharges.	EPO3: Only approved chemicals (which meet low ecotoxicity pre-screening criteria or are further justified as ALARP) will be discharged to sea within project discharges.	No change in the EPO wording. This is an Amplitude Energy standard.
	EPO5: Use solids control equipment, when drilling with riser installed, to recover and limit discharge of excess drilling fluids (and SBDF on cuttings) to the environment.	EPO4: Use solids control equipment, when drilling with riser installed, to recover and limit discharge of excess drilling fluids to the environment.	EPO remains the same The Activity description precludes the use of SBDF (refer Table 6-2 – Planned discharges) for the Activity, so reference to SBDF has been removed from the EPO as it is not relevant to the Activity. This EPO is equivalent to the OPP.
	EPO6: Manage discharge of residual bulks materials to the marine environment in accordance with Cooper Energy's residual bulks management process.	EPO5: Manage discharge of residual bulks materials to the marine environment in accordance with Amplitude	EPO remains the same The Activity description precludes the use of SBDF (refer Table 6-2 – Planned discharges) for

Aspect	ECSP OPP EPO	Annie-2 Development Drilling EP EPO	Evaluation of Change (where applicable)
		Energy's residual bulks management process. No bulk discharge of SBDF.	the Activity, so reference to SBDF has been removed from the EPO as it is not relevant to the Activity. This EPO is equivalent to the OPP.
	EPO8: No unplanned release of chemicals or hydrocarbons to the marine environment.	EPO19: No unplanned release of chemicals or hydrocarbons to the marine environment.	No change in the EPO wording.
	EPO10: The selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts will: • avoid areas of high relief outcrops, reefs, and sponge beds, where practicable; • not disturb underwater heritage as defined under the Underwater Cultural Heritage Act 2018.	EPO6: The selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts will: • avoid areas of high relief outcrops, reefs, and sponge beds, where practicable; • not disturb underwater heritage as defined under the Underwater Cultural Heritage Act 2018.	No change in the EPO wording.
	EPO11: Undertake Seabed Surveys to inform the selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts, including potential changes to seabed quality.	EPO8: Undertake Seabed Surveys to inform the selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts, including potential changes to seabed quality.	No change in the EPO wording. *Note - The seabed survey was undertaken in May and June 2025 (refer Section 4.3.1). The Annie-2 development well location avoids sensitive features such as reef structures of high relief, and is considered a suitable location.*
	EPO12: Seabed disturbance is limited to the planned disturbance areas defined in this OPP and within the Operational Area.	EPO9: Seabed disturbance is limited to the planned disturbance areas defined in this EP and within the operational area.	No change in the EPO wording. This is first activity under the OPP with an estimated disturbance of 1.32km^2. This is less than the total disturbance estimated for the Project - 20.4km^2. The disturbance areas included in Table 6-6 for this activity are equivalent for disturbance as described in the OPP - Table 8-63.

Aspect	ECSP OPP EPO	Annie-2 Development Drilling EP EPO	Evaluation of Change (where applicable)
Operational Discharges	EPO4: Only approved chemicals (which meet low ecotoxicity pre-screening criteria or are further justified as ALARP) will be discharged to sea within project discharges.	EPO3: Only approved chemicals (which meet low ecotoxicity pre-screening criteria or are further justified as ALARP) will be discharged to sea within project discharges.	No change in the EPO wording. This is an Amplitude Energy standard.
	EPO7: Planned vessel/ MODU discharges will meet AMSA Discharge Standards for operating in Australian waters.	EPO7: Planned vessel/ MODU discharges will meet AMSA Discharge Standards for operating in Australian waters.	No change in the EPO wording. Vessel and MODU activity is a key activity of the Annie-2 drilling EP.
	EPO8: No unplanned release of chemicals or hydrocarbons to the marine environment.	EPO19: No unplanned release of chemicals or hydrocarbons to the marine environment.	No change in the EPO wording.
Seabed Disturbance	EPO10: The selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts will: • avoid areas of high relief outcrops, reefs, and sponge beds, where practicable; • not disturb underwater heritage as defined under the *Underwater Cultural Heritage Act 2018*.	EPO6: The selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts will: • avoid areas of high relief outcrops, reefs, and sponge beds, where practicable; • not disturb underwater heritage as defined under the *Underwater Cultural Heritage Act 2018*.	No change in the EPO wording.
	EPO11: Undertake Seabed Surveys to inform the selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts, including potential changes to seabed quality.	EPO8: Undertake Seabed Surveys to inform the selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts, including potential changes to seabed quality.	No change in the EPO wording. *Note - The seabed survey was undertaken in May and June 2025 (refer Section 4.3.1). The Annie-2 development well location avoids sensitive features such as reef structures of high relief, and is considered a suitable location.*
	EPO12: Seabed disturbance is limited to the planned disturbance areas defined in this OPP and within the Operational Area.	EPO9: Seabed disturbance is limited to the planned disturbance areas defined in this OPP and within the Operational Area.	No change in the EPO wording. This is first activity under the OPP with an estimated disturbance of 1.32km^2. This is less

Aspect	ECSP OPP EPO	Annie-2 Development Drilling EP EPO	Evaluation of Change (where applicable)
			than the total disturbance estimated for the Project - 20.4km^2. The disturbance areas included in Table 6-6 for this activity are equivalent for disturbance as described in the OPP - Table 8-63.
	EPO13: No unplanned release of waste to the marine environment.	EP20: No unplanned release of waste to the marine environment.	No change in the EPO wording.
	EPO14: No introduction, establishment or spread of invasive marine species.	EPO21: No introduction, establishment or spread of invasive marine species.	No change in the EPO wording.
	EPO19: Impacts to commercially targeted species will be limited to temporary[3] and localised[3] change in fauna behaviours. [3] *Temporary and localised change in fauna behaviours for commercially targeted species limited to activity durations and seabed disturbance footprint defined in Section 8.8.2 (of the OPP).*	EPO10: Impacts to commercially targeted species will be limited to temporary[3] and localised[3] change in fauna behaviours. [3] *Temporary and localised change in fauna behaviours for commercially targeted species limited to activity durations and seabed disturbance footprint defined in Section 6.3.2.*	No change in the EPO wording.
	EPO24: No impact to underwater cultural heritage	EPO23: No impact to underwater cultural heritage.	No change in the EPO wording.
	EPO25: Undertake Ongoing Engagement with relevant First Nations groups to ensure identified tangible and intangible cultural heritage and potential risks to cultural heritage values remains current and its protection is provided for within EPs for the activity.	EPO11: Undertake Ongoing Engagement with relevant First Nations groups to ensure identified tangible and intangible cultural heritage and potential risks to cultural heritage values remains current and its protection is provided for within EPs for the activity.	No change in the EPO wording.
Light Emissions	EPO9: Artificial light generated by the Activity will be managed to ensure biologically important behaviours of light-sensitive species that occur within the Activity light EMBA can continue while project activities are being undertaken, by applying relevant measures from	EPO12: Artificial light generated by the Activity will be managed to ensure biologically important behaviours of light-sensitive species that occur within the Activity light EMBA can continue while project activities are being undertaken, by applying relevant measures from the	No change in the EPO wording.

Aspect	ECSP OPP EPO	Annie-2 Development Drilling EP EPO	Evaluation of Change (where applicable)
	the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023k), whilst meeting lighting requirements for safe navigation and work at night.	National Light Pollution Guidelines for Wildlife (DCCEEW 2023), whilst meeting lighting requirements for safe navigation and work at night.	
GHG Emissions	EPO15: GHG emissions related to the Project, including (scope 1 [Inside Project Boundary], scope 1* [Outside Project Boundary] and scope 3) emissions are consistent with Australia's international GHG emissions commitments, as outlined in the Climate Change Act 2022. Emissions are to be determined based on the NGER scheme and managed by the Safeguard Mechanism.	EPO13: : Manage direct and indirect GHG emissions from the Activity consistent with Australia's international GHG emissions commitments, as outlines in the Climate Change Act 2022 (Cwth). Emissions are to be determined based on the NGER scheme and managed by the Safeguard Mechanism.	Revised nomenclature aligns with the assessment approach in this EP, i.e. direct and indirect..
Underwater Sound Emissions (Impulsive & Continuous)	EPO16: Impacts to marine fauna from underwater anthropogenic noise emissions will be limited to temporary* behavioural change localised** to the noise source. **Not exceeding the duration of the activity component (i.e. vessel campaign) (described in Section 4.1.2 of the OPP)* ***Not exceeding the noise EMBA defined for the activity (described in in Section 8.1.5 and 8.2.5 of the OPP)*	EPO14: Impacts to marine fauna from underwater anthropogenic noise emissions will be limited to temporary* behavioural change localised** to the noise source. **Not exceeding the duration of the activity component (i.e. vessel campaign) (described in Section 3.2).* ***Not exceeding the noise EMBA defined for the activity (described in Sections 6.5 and 6.6)*	No change.
	EPO17: No death or injury[1] to EPBC Act listed threatened, migratory or cetacean species. [1]*Injury to cetaceans as defined as either auditory impairment (TTS or PTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy*	EPO15: No death or injury[1] to EPBC Act listed threatened, migratory or cetacean species. [1]*Injury to cetaceans as defined as either auditory impairment (TTS or PTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (Houser 2021; Finneran*	No change in the EPO wording.

Aspect	ECSP OPP EPO	Annie-2 Development Drilling EP EPO	Evaluation of Change (where applicable)
	(Houser 2021; Finneran 2024). Auditory injury may or may not result in a permanent threshold shift (PTS).	*2024). Auditory injury may or may not result in a permanent threshold shift (PTS).*	
	EPO18: Project related underwater noise within biologically important areas[1] and habitat critical to the survival of relevant species will be managed through the implementation of Cooper Energy Offshore Victoria Whale Disturbance Risk Management Process, such that: • Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. • Southern right whales are not prevented from utilising biologically important areas[2] or habitat critical to the survival of a species or cause auditory impairment[1]. • The risk of behavioural disturbance to southern right whales will be limited to temporary behavioural disturbance of individuals. [1]*Biologically important behaviours such as reproduction, feeding, migration and resting (DCCEEW, 2023).* [2]*Injury to cetaceans as defined as either auditory impairment (TTS or PTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (Houser 2021; Finneran 2024). Auditory injury may or may not result in a permanent threshold shift (PTS).*	EPO16: Project related underwater noise within biologically important areas[1] and habitat critical to the survival of relevant species will be managed through the implementation of Amplitude Energy Offshore Victoria Whale Disturbance Risk Management Process, such that: • Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. • Southern right whales are not prevented from utilising biologically important areas[2] or habitat critical to the survival of a species or cause auditory impairment[1]. • The risk of behavioural disturbance to southern right whales will be limited to temporary behavioural disturbance of individuals. [1]*Biologically important behaviours such as reproduction, feeding, migration and resting (DCCEEW 2023).* [2]*Injury to cetaceans as defined as either auditory impairment (TTS or PTS) (DAWE 2021) or auditory injury (AUD INJ) i.e. Damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy (Houser 2021; Finneran 2024). Auditory injury may or may not result in a permanent threshold shift (PTS).*	No change in the EPO wording.

Aspect	ECSP OPP EPO	Annie-2 Development Drilling EP EPO	Evaluation of Change (where applicable)
	EPO20: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.	EPO17: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable.	No change in the EPO wording. Sections 6.5 and 6.6 of the EP has been based on activity specific modelling undertaken to support the development of this EP. Where undertaken, the modelling includes for appropriate scenarios and thresholds to determine the worst case potential impacts to marine fauna.
Interaction with Other Marine Users	EPO22: Implement Fisheries Damages Protocol to provide a compensation mechanism to fishers who damage fishing equipment on East Coast Project infrastructure outside of the PSZ.	EPO18: Implement Fisheries Damages Protocol to provide a compensation mechanism to fishers who damage fishing equipment on Activity infrastructure outside of the PSZ.	EPO remains the same This EP is specific to the Annie-2 development well and xmas tree. The EPO has been amended accordingly. This is the equivalent of the OPP EPO – which describes East Coast Project infrastructure.
	EPO23: No unplanned interactions between the project vessels and other marine users.	EPO24: No unplanned interactions between the project vessels and other marine users.	No change in the EPO wording.
Loss of Material or Waste Overboard	EPO8: No unplanned release of chemicals or hydrocarbons to the marine environment.	EPO19: No unplanned release of chemicals or hydrocarbons to the marine environment.	No change in the EPO wording.
Interaction with Marine Fauna	EPO21: No vessel strikes with EPBC Act listed threatened, migratory or cetacean species	EP22: No vessel strikes with EPBC Act listed threatened, migratory or cetacean species	No change in the EPO wording.
Introduction, Establishment & Spread of IMS	EPO14: No introduction, establishment or spread of invasive marine species	EPO21: No introduction, establishment or spread of invasive marine species	No change in the EPO wording.
Accidental Release MDO	EPO8: No unplanned release of chemicals or hydrocarbons to the marine environment.	EPO19: No unplanned release of chemicals or hydrocarbons to the marine environment.	No change in the EPO wording.
	EPO20: For activity specific environment plans undertake review of modelling and impact/ risk	EPO17: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure	No change in the EPO wording.

Aspect	ECSP OPP EPO	Annie-2 Development Drilling EP EPO	Evaluation of Change (where applicable)
	assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable	modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable	Section 6.8 of the EP has been based on activity specific modelling undertaken to support the development of this EP. Where undertaken, the modelling includes for appropriate scenarios and thresholds to determine the worst case potential impacts to marine fauna.
Accidental Release LOWC	EPO8: No unplanned release of chemicals or hydrocarbons to the marine environment.	EPO11: No unplanned release of chemicals or hydrocarbons to the marine environment.	No change in the EPO wording.
	EPO20: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable	EPO17: For activity specific environment plans undertake review of modelling and impact/ risk assessment to ensure modelled scenarios, applied thresholds, and impacts and risks to marine fauna provide valid and appropriate predictions, and demonstrate that the levels of impact will be acceptable	No change in the EPO wording. Section 6.8 of the EP has been based on activity specific modelling undertaken to support the development of this EP. Where undertaken, the modelling includes for appropriate scenarios and thresholds to determine the worst case potential impacts to marine fauna.
First Nations Cultural Heritage Values and Sensitivities	EPO10: The selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts will: • avoid areas of high relief outcrops, reefs, and sponge beds, where practicable. • not disturb underwater heritage as defined under the Underwater Cultural Heritage Act 2018.	EPO6: The selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts will: • Avoid areas of high relief outcrops, reefs, and sponge beds, where practicable. • Not disturb underwater heritage as defined under the Underwater Cultural Heritage Act 2018.	No change in the EPO wording.
	EPO11: Undertake Seabed Surveys to inform the selection of the location for wells, flowline paths, mooring and other infrastructure and associated	EPO8: Undertake Seabed Surveys to inform the selection of the location for wells, flowline paths, mooring and other infrastructure and associated planned impacts, including potential changes to seabed quality.	No change in the EPO wording. *Note - The seabed survey was undertaken in May and June 2025 (refer Section 4.3.1). The Annie-2 development well location avoids*

Aspect	ECSP OPP EPO	Annie-2 Development Drilling EP EPO	Evaluation of Change (where applicable)
	planned impacts, including potential changes to seabed quality.		*sensitive features such as reef structures of high relief, and is considered a suitable location.*
	EPO12: Seabed disturbance is limited to the planned disturbance areas defined in this OPP and within the Operational Area.	EPO20: Seabed disturbance is limited to the planned disturbance areas defined in this EP and within the operational area.	No change in the EPO wording. This is first activity under the OPP with an estimated disturbance of 1.32km^2. This is less than the total disturbance estimated for the Project - 20.4km^2. The disturbance areas included in Table 6-6 for this activity are equivalent for disturbance as described in the OPP - Table 8-63.
	EPO24: No impact to underwater cultural heritage	EPO23: No impact to underwater cultural heritage	No change in the EPO wording.
	EPO25: Undertake Ongoing Engagement with relevant First Nations groups to ensure identified tangible and intangible cultural heritage and potential risks to cultural heritage values remains current and its protection is provided for within EPs for the activity.	EPO11: Undertake Ongoing Engagement with relevant First Nations groups to ensure identified tangible and intangible cultural heritage and potential risks to cultural heritage values remains current and its protection is provided for within the EP for the Activity.	No change in the EPO wording.

Table 14-2: Comparison of Annie-2 Development Drilling EP Control Measures and those of the East Coast Supply Project OPP

Annie 2 Development EP		**Equivalent CM described in the East Coast Supply Project OPP**	**Comments**
Control	**EPS**		
CM01: Marine exclusion and caution zones	EPS1.1: Marine exclusion and caution zones will not exceed distances required for safe operations. These zones, where established, will extend only as far as: • A temporary 3.5 km exclusion / cautionary zone around the MODU during the Activity, established via Notice to Mariners. • A temporary 500 m safety exclusion zone around the MODU, established via Notice to Mariners. Access/ ingress into the 500 m safety exclusion zone shall be managed and monitored via the MODU. • A 500 m PSZ gazetted around well, marked on navigational charts for awareness.	CM12: Marine exclusion, caution and petroleum safety zones May include: • A temporary 3 km cautionary zone around the MODU during the drilling program. • A temporary 500 m exclusion/caution zones to be established via Notice to Mariners around vessels undertaking petroleum activities. • PSZs will be gazetted around wells and other equipment where required for equipment integrity management. Subsea infrastructure will be marked on navigational charts for awareness.	Both include application of: • exclusion / cautionary zone around the MODU, and PSZ • temporary 500m safety zone around activity vessels (including MODU) • PSZ around Annie 2 development well once drilling completed. The cautionary zone for Annie-2 Development well, extends to 3.5km, given the mooring spread from the MODU and a 1km buffer. The control measure for 500m exclusion/caution zones to be established via Notice to Mariners around vessels undertaking petroleum activities. A PSZ will be in place for Annie 2 well once the MODU departs.
CM02: Pre-start notifications	EPS2.1: AHO will be notified of activities where vessels will be in the Operational Area no less than 4 weeks to allow generation of Notice to Mariners (NTM). EPS2.2: AMSA's JRCC will be notified 24–48 hours before operations commence to enable AMSA to distribute an AUSCOAST warning. AMSA JRCC will be notified at the end of activities.	CM12: Marine exclusion, caution and petroleum safety zones May include: • A temporary 500 m exclusion/caution zones to be established via Notice to Mariners around vessels undertaking petroleum activities.	Both include notifications to AHO and AMSA - Notice to Mariners & AUSCOAST warning. Note: EP includes an uplift through: • EPS2.1 to notify AHO no less than 4 weeks ahead of vessels entering the Operational area • EPS2.2 for timings and specifics of JRCC notifications
CM03: Marine Assurance Process	EPS3.1: The vessels and MODU will meet navigational safety requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to:	CM1: Marine Assurance Process. The vessels and MODU will adhere to navigational safety requirements under the	CM1 encompasses the relevant controls that vessels (including MODU) implement to meet the requirements of the Navigation Act 2012, and AMSA Marine Orders as

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	• AMSA MO 21: Safety and emergency arrangements gives effect to SOLAS regulations dealing with life-saving appliances and arrangements, safety of navigation and special measures to enhance maritime safety. • AMSA MO 27 - Safety of Navigation and Radio Equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards • AMSA MO 30 - Prevention of collisions requires that onboard navigation, radar equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. • AMSA MO 70 - Seafarer certification meets the requirements for qualifications and training.	Navigation Act 2012 and associated Marine Orders, including but not limited to: • AMSA MO 21 – Safety and Emergency Arrangements • AMSA MO 27 - Safety of Navigation and Radio Equipment • AMSA MO 30 - Prevention of Collisions. • AMSA MO 31: SOLAS and non-SOLAS certification The MODU and vessels operating in the operational area will be required to adhere to navigations safety requirements. AMSA Marine Orders 21 and 30 for the safety of navigation and prevention of collisions require that onboard navigation, watchkeeping, radar equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards.	relevant to the size of the vessels. Each EPS pertains to different controls from the Navigation Act 2012, and AMSA Marine Orders that manage potential environment risk associated with this Activity. EPS 3.1 aligns with the OPP.
	EPS3.2: The vessels and MODU will adhere to navigational safety requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • AMSA Marine Order 31 - SOLAS and non-SOLAS certification requires that vessels undertaking Annie 2 development well activities will have in date certification in accordance with AMSA Marine Order 31 (Vessel surveys and certification). • AMSA MO Part 93: Marine Pollution Prevention – Noxious Liquid Substances –	CM1: Marine Assurance Process All vessels contracted will meet survey, maintenance and certification of regulated Australian vessels as per AMSA MO 91 and MO 93.	EPS 3.2 aligns with the OPP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	requires that vessels undertaking Annie 2 development well activities will have emergency plans to address pollution events (including containment and clean up) involving noxious liquids.		
	EPS3.3: Vessels will comply with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution (appropriate to vessel class) for emissions from combustion of fuel including: • Hold a valid International Air Pollution Prevention (IAPP) certificate and have a current international energy efficiency certificate. • Have a Ship Energy Efficiency Management Plan (SEEMP) as per MARPOL 73/78 Annex VI. • Engine NOx emission levels will comply with Regulation 13 of MARPOL 73/78 Annex VI. • Sulphur content of diesel/fuel oil complies with Marine Order Part 97 and Regulation 14 of MARPOL 73/78 Annex VI.	CM1: Marine Assurance Process Vessels and MODU operating in the operational area will comply with AMSA Marine Order 97 Marine Pollution Prevention – Air Pollution (appropriate to vessel class) for emissions from combustion of fuel including: • Hold a valid International Air Pollution Prevention (IAPP) certificate. • Engine NOx emission levels will comply with Regulation 13 of MARPOL 73/78 Annex VI. • Sulphur content of diesel/fuel oil complies with Marine Order Part 97 and Regulation 14 of MARPOL 73/78 Annex VI • Hold a current international energy efficiency certificate. • Have a Ship Energy Efficiency Management Plan (SEEMP) as per MARPOL 73/78 Annex VI. .	EPS 3.3 aligns with the OPP.
	EPS3.4: All discharges will comply with relevant MARPOL 73/78, Navigation Act 2012, Protection of the Sea (Prevention of Pollution) Act 1983 and subsequent Marine Order requirements (as appropriate for vessel classification):	CM1: Marine Assurance Process All wastewater discharges will comply with relevant MARPOL 73/78, Navigation Act 2012, Protection of the Sea (Prevention of Pollution) Act 1983 and subsequent Marine Order requirements (as appropriate for vessel classification):	EPS 3.4 aligns with the OPP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	• 2017 Guidelines for the Implementation of MARPOL Annex V to assist shipowners, masters and crews in applying the Annex V discharge requirements. • AMSA MO 91 - Marine Pollution Prevention (Oil) • AMSA MO Part 93: Marine Pollution Prevention – Noxious Liquid Substances • Bilge water treated via a MARPOL (or equivalent) approved oily water separator and only discharge if oil content less than 15 ppm.	• AMSA MO 91 - Marine Pollution Prevention (Oil) • AMSA MO Part 93: Marine Pollution Prevention – Noxious Liquid Substances • AMSA MO 96 - Marine Pollution Prevention (Sewage).	
	EPS3.5: In accordance with MARPOL Annex I and AMSA MO 91 [Marine Pollution Prevention – oil], a Shipboard Marine Pollution Emergency Plan (SMPEP) or Shipboard Oil Pollution Emergency Plan (SOPEP) (according to class) is required to be developed. To prepare for a spill event, the SMPEP/SOPEP details: • Response equipment available to control a spill event. • Review cycle to ensure that the SMPEP/SOPEP is kept up to date. • Testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP/SOPEP details: • Reporting requirements and a list of authorities to be contacted. • Activities to be undertaken to control the discharge of hydrocarbon.	CM1: Marine Assurance Process Vessels shall meet the AMSA Marine Order (MO) requirements, including: • AMSA MO Part 91: Marine Pollution Prevention – Oil In accordance with MARPOL Annex I and AMSA MO 91 [Marine Pollution Prevention – oil], a SMPEP or SOPEP (according to class) is required for each vessel and MODU. Response equipment will be available in accordance with the SMPEP / SOPEP. Training and testing will be undertaken in accordance with the SMPEP/SOPEP exercise schedule. In the event of a spill, the SMPEP/SOPEP details: • Reporting requirements and a list of authorities to be contacted. • Activities to be undertaken to control the discharge of hydrocarbon.	EPS 3.5 aligns with the OPP, and incorporates the requirements detailed in CM1 and CM2 of the OPP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	Bunkering / bulk liquids will be transferred in accordance with operational procedure(s) to reduce the risk of an unintentional release to sea during transfer.	CM2: Offshore Operational Procedures In accordance with MARPOL Annex I and AMSA MO 91 [Marine Pollution Prevention – oil], a Shipboard Marine Pollution Emergency Plan (SMPEP) or Shipboard Oil Pollution Emergency Plan (SOPEP) (according to class) is required to be developed. To prepare for a spill event, the SMPEP/SOPEP details: • response equipment available to control a spill event. • review cycle to ensure that the SMPEP/SOPEP is kept up to date and • review cycle to ensure that the SMPEP/SOPEP is kept up to date and • testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP/SOPEP details: • reporting/ notification requirements and a list of authorities to be contacted. • activities to be undertaken to control the discharge of hydrocarbon. Bunkering / bulk liquids will be transferred in accordance with operational procedure(s) to reduce the risk of an unintentional release to sea during transfer.	

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	EPS3.6: The vessels and MODU will meet AMSA MO 95 - Marine Pollution Prevention (Garbage), MARPOL 73/78 Annex V which requires that a garbage management plan and garbage record book is in place and implemented to manage waste offshore. Requirements include: • segregating waste on the MODU / vessels • storing solid wastes in designated areas before sending them to shore for recycling, disposal, or treatment • waste receptacles that contain light-weight, solid waste will be covered to prevent waste from blowing overboard • no discharge of waste or plastic products from general operational or maintenance.	CM1: Marine Assurance Process MODU and vessels will comply with relevant MARPOL Commonwealth requirements and subsequent Marine Orders for waste management practices.	EPS 3.6 aligns with the OPP.
	EPS3.7 : Vessels will comply with AMSA MO 96 - Marine Pollution Prevention (Sewage), Requirements for offshore discharge of sewage have been incorporated into the MARPOL 73/78 sewage discharge control measure. Sewage discharged at sea is treated via a MARPOL (or equivalent) approved sewage treatment system prior to discharge. Food waste only discharged when: • Vessel is en route and >12 nm from land. • Food waste is comminuted or ground to <25 mm and vessel is en route and >3 nm from land. • Food waste is comminuted or ground to <25 mm and platform is >12 nm from land.	CM1: Marine Assurance Process All wastewater discharges will comply with relevant MARPOL 73/78, Navigation Act 2012, Protection of the Sea (Prevention of Pollution) Act 1983 and subsequent Marine Order requirements (as appropriate for vessel classification): • AMSA MO 91 - Marine Pollution Prevention (Oil) • AMSA MO Part 93: Marine Pollution Prevention – Noxious Liquid Substances • AMSA MO 96 - Marine Pollution Prevention (Sewage).	EPS 3.7 aligns with the OPP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	EPS3.8 : Vessel cargo will be loaded, stowed and secured in accordance with AMSA Marine Order 42 (Carriage, Stowage and Securing of Cargoes and Containers).	CM2: Offshore Operational Procedures In accordance with Marine Order 42 (Carriage, stowage and securing of cargoes and containers), where relevant, to ensure cargo is packed, loaded, stowed and secured throughout each voyage.	Given this control relates to AMSA marine orders, it has been incorporated into CM03 in this EP.
	EPS3.9 : From 1 January 2026 applicable vessels will not use or store firefighting foams containing PFOS, as adopted by the International Maritime Organisation (IMO).		Additional control incorporated from the approved Athena Supply Project EP.
	EPS 3.10: Equipment used to treat discharges to AMSA standards is installed and operational on the Vessels and MODU (as relevant to class), or otherwise the respective discharges do not occur.		Additional control incorporated from the approved Athena Supply Project EP.
	EPS3.11 : Premobilisation Marine Assurance inspection is completed and confirms that the vessel and MODU are, or will be, compliant with the relevant EP requirements before commencing the activity.		Additional control incorporated in response to NOPSEMA RFFI #1 received 14 October 25.
	All of the above EPS.	CM8: Emissions and Discharges Standards Prior to commencing the offshore activity, the following will be verified, as relevant to vessel class: • 2017 Guidelines for the Implementation of MARPOL Annex V to assist shipowners, masters and crews in applying the Annex V discharge requirements. • Bilge water treated via a MARPOL (or equivalent) approved oily water separator and only discharge if oil content less than 15 ppm.	The OPP commits to checking relevancy of AMSA, MARPOL and state requirements for discharge of bilge water, sewage and food waste for project. Each of the requirements described in CM08 are encompassed in the EPS for CM03. Therefore the CM is not a separate CM in this EP. The 2017 guidelines are incorporated to EPS 3.4. EPS 3.7 incorporates the relevant requirements for sewage discharge.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
		• Sewage discharged at sea is done so only in accordance with AMSA discharge standards and treated via a MARPOL (or equivalent) approved sewage treatment system as applicable. • Food waste only discharged in accordance with AMSA, MARPOL and relevant State discharge standards.	EPS 3.7 ensures discharge of food waste requirements are met.
CM04: Fisheries Damage Protocol	EPS4.1: A Fisheries Damage Protocol is in place to provide a compensation mechanism to fishers who damage fishing equipment on Activity infrastructure outside of a PSZ. The protocol was established in collaboration with SETFIA (fisheries peak body). The protocol includes: • an incident report form with prompts for details of fishing activities, sea state, details of any damaged gear, details of repairs required, photos, dates and times. • commitment for initial response to claimant within 4 working days confirming details. • the mutually agreed process for selecting the Tribunal (an independent assessor), whose decision is final and binding • requirement for Tribunal to be formed within 21 days of initial notification to undertake assessment of evidence and determine fault and damages payable.	CM11: Fisheries Damages will be in place to provide a compensation mechanism to fishers who damage fishing equipment on East Coast Project infrastructure outside of the PSZ	OPP provided future provision for a compensation mechanism to fishers who damage fishing equipment on East Coast Project infrastructure outside of the PSZ. Given that following the completion of Annie-2 well, a PSZ will be placed around the well and tree it is unlikely that fishers will damage their property as the protocol excludes for damage within the PSZ. This control is conservatively included in event fishers may damage their equipment should they enter the precautionary zone & damage their equipment on the moorings/ anchors for the MODU when the MODU is drilling. EPS 4.1 if focused on the protocol itself and EPS 4.2 is the PS required in event compensation is payable to fishers.
	EPS4.2: In event that the Tribunal determines compensation is payable under the Fisheries Damage Protocol:		

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	• payment will be made within 14 days of that decision. • a deed of release is provided to the claimant where compensation is payable, in the form provided for in the Protocol (schedule 5).		
CM05: Ongoing consultation	EPS5.1: Further engagement will take place during the development and implementation of component EPs. This will include: • details relating to notification of third-party stakeholders, • engagement with other titleholders in the Otway with respect to each others ongoing activities and potential cumulative impacts. Relevant information received will be included within the EPs as appropriate.	CM13: Ongoing Engagement Further engagement will take place during the development and implementation of component EPs. This will include: • details relating to notification of third-party stakeholders, • engagement with other titleholders in the Otway with respect to each others ongoing activities and potential cumulative impacts. Relevant information received will be included within the EPs as appropriate.	EPS 5.1 aligns with the OPP.
	EPS5.2: Notification of activity commencement and completion to relevant stakeholders as per notifications register.		EPS 5.2 is a requirement under the Regulations.
	EPS5.3: Any complaints received by Amplitude Energy from other marine users in relation to air quality will be investigated and outcomes shared with the person who made the complaint.		The EP has introduced an additional EPS to the management of atmospheric emissions relating to investigating and responding to complaints.
	EPS5.4: Notifications for any on-water activities and ongoing consultations undertaken per Section 12.12.		EPS5.4 aligns with the intent of CM13 in the OPP.
	EPS5.5: Observation, incidents, and opportunities for improvement regarding the interaction with other marine users will be reported to other petroleum titleholders.		Amplitude meets with other Operators in the Otway to share information in regards their petroleum activities.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
CM06: Light Management Measures	EPS6.1: MODU and vessel lighting will be limited to the minimum required with the exception of emergency events for navigational and safety requirements'. MODU and the vessels will implement light management measures developed with consideration to the National Light Pollution Guidelines for Wildlife, these include, but are not limited to: • Outward facing lights will be reduced to minimum levels required for a safe work environment. • Directions to minimise the use of non-essential lights (e.g. close blinds, turn off lights when leaving a room) will be included in MODU and vessel inductions. • Recording and reporting of any seabirds found on the MODU or vessels in need of care. • Procedures to manage and care for any seabirds found on board requiring care, including remote advice from Zoos Victoria Marine Response Unit (MRU) or equivalent. • Consideration of adaptive lighting controls to reduce unnecessary lighting in event concurrent vessel/ MODU activities overlap with biologically important periods for light sensitive listed species.	CM4: Light Management Measures MODU and the vessels will implement light management measures developed with consideration to the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023k), these include, but are not limited to: • Outward facing lights will be reduced to minimum levels required for a safe work environment. • Requirement to minimise the use of non-essential lights (e.g. close blinds, turn off lights when leaving a room) will be included in MODU and vessel inductions. • Recording and reporting of any seabirds found on the MODU or vessels in need of care. • Procedures to manage and care for any seabirds found on board requiring care, including remote advice from Zoos Victoria Marine Response Unit (MRU) or equivalent. • Adaptive management will be detailed in the light management measures to be included in future EPs under this OPP when scheduling of the activity is known in greater detail, including the potential for concurrent vessel/ MODU activities and overlap with biologically important periods.	The control measure in the EP is equivalent to that described in the OPP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
CM07: Well Testing Program	EPS7.1: Periods of flaring will not exceed 36 hours or flow rate of 60 MMscfd	CM21: Well Flowback Program - Clean-up and flowback criteria will be defined within the flowback program. The flowback criteria will establish the rates and volumes to be produced from the well to gather sufficient information to characterise the reservoir and fluid, and clean-up the well. Flow from the well will cease once sufficient information has been gathered. Flared volumes of gas will not exceed a rate of 60 MMscf/day, or duration of 60 hours per well.	The EP and OPP both commit to flaring volumes of gas not exceeding a rate of 60 MMscf/day for a period of 60 hours. It is expected that the flaring for well testing Annie-2 will not exceed 36 hours (which is a shorter duration than that described in the OPP).
	EPS7.2: Confirm flare tip is clear of birds prior to commencing flaring	No equivalent in the OPP.	The commitments in EPS 7.2 – 7.4 are in addition to those described in the OPP and included to reduce the potential impacts to birds associated with the flare, as well as reduce the GHG and atmospheric emissions associated with the flaring.
	EPS7.3: Well Test Program will provide for: • A burner which atomises hydrocarbons to yield smoke free combustion will be used to burn-off gas and condensate returned from the well. • Burner & flare have redundant pilots		
	EPS7.4: Well Test Program will provide for: • The flare tip will be monitored while flaring occurs. • Burner pilots are ignited before and during flow back activities to minimise dropout from the flare. • Dedicated crew members will be on flare watch while flaring is undertaken to identify dropout and notify the well test team to cease or modify the well test to eliminate dropout.		
	EPS8.1: Planned maintenance will be implemented throughout the activity. This	CM1: Marine Assurance Process Power generation and propulsion systems on	CM08 describes for the planned maintenance of systems (that manage for

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
CM08: Planned Maintenance System	ensures that critical equipment on vessels and MODU will be maintained in manufacturer's instructions and ongoing maintenance to ensure efficient operation including: • Combustion Equipment (Vessels).	vessels will be operated in accordance with manufacturer's instructions and ongoing maintenance in accordance with vessel planned maintenance system, to ensure efficient operation.	emissions and discharges) on board vessels and MODU to ensure that they operate to required specifications.
	EPS8.2: Planned maintenance will be implemented throughout the activity. This ensures that critical equipment on vessels and MODU will be maintained in manufacturer's instructions and ongoing maintenance to ensure efficient operation including: • equipment involved in discharge management		The EP includes an additional CM to the maintenance of equipment involved in discharge management above the OPP.
	EPS8.3: Equipment and propulsion systems generating impulsive or continuous sound emissions will be operated in accordance with manufacturer's instructions and ongoing maintenance in accordance with vessel and MODU's planned maintenance system, to ensure efficient operation.	CM1: Marine Assurance Process - Equipment generating impulsive sound emissions will be operated and maintained in accordance with manufacturer's instructions to ensure efficient operation.	EP and OPP both commit to equipment and propulsion systems being operated and maintained in accordance with manufacturer requirements.
CM09: Offshore Equipment	EPS9.1: Solids control equipment (MODU) is installed and operational once BOP is in place on the well to enable recovery and re-use of drilling fluids, to reduce volumes discharged. Equipment used to treat discharges to AMSA standards is installed and operational on the Vessels and MODU, or otherwise the respective discharges do not occur.	CM7: Offshore Equipment Additional equipment, such as solids equipment, will be available on the MODU. Equipment will assist with recovering and reducing the discharge of excess fluids and reduce the volume of SBDF on cuttings.	OPP and EP commit to solids control equipment on the MODU to recover and reduce the volume of discharged fluids. Note that the reference to SBDF is removed, given no SBDF is used in this Activity. The EP commits to have equipment to treat discharges to AMSA standards on the vessels and MODU, or otherwise the respective discharges do not occur.
CM10: Amplitude Energy Offshore Chemical	EPS10.1: The Amplitude Energy Offshore Chemical Assessment Procedure will be used to ensure that project chemicals with the	CM6: Cooper Energy Offshore Chemical Assessment Procedure.	Both the EP and OPP commit to applying the company chemical assessment procedure to manage impacts through

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
Assessment Procedure	potential to be discharged to sea are not of unacceptable risk. This will be done by: • preferentially selecting products that are on the current OSPAR PLONOR list, and/or • are rated Gold/Silver/E or D under the UK OCNS, and do not have a substitution warning, or, • have a completed a hazard assessment confirming they are not of unacceptable risk (toxic, very bioaccumulative (and bioavailable), and highly persistent) and are justified by technical need and analysis of alternatives.	Project chemicals will meet the requirements of the Cooper Energy Offshore Chemical Assessment Procedure. This process is used to ensure the lowest toxicity, most biodegradable and least bioaccumulative chemicals are selected which meet the technical requirements, where their function necessitates discharge to sea. The process consults public chemical assessment repositories such as PLONOR list, OCNS Definitive Ranked List, OSPAR and OCNS listings for those chemicals to be discharged. Eco-toxicity is evaluated with any required control measures defined. Chemicals that are highly toxic, have high bioaccumulation potential, and have high persistence in organisms are screened out during the assessment process. Only chemicals that meet low ecotoxicity pre-screening criteria or are further justified as ALARP can be approved for discharge. An accepted chemical list is issued to the offshore project team detailing which products may be discharged and in what circumstances.	potential discharge to sea unacceptable risk.
	EPS10.2: An accepted chemical list will be issued to the offshore project team detailing which products may be discharged and in what circumstances.		
CM11: Titleholder Collaboration	EPS11.1: Amplitude Energy will continue to engage in industry collaboration efforts relating to the management of unused bulks.	Described in Figure 12-7 of the OPP.	The EP includes this as a specific CM to continue engagements relating to the management of unused bulks building on the OPP reference to industry collaboration (Section 8.6.2.1).
	EPS11.2: Amplitude Energy will share sightings data with other Titleholders in the Otway region and local research organisations to help	Described in Figure 12-5 of the OPP.	The EP includes this as a specific CM to share sightings data and demonstrate

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	inform each other's programs of work and respective risk reviews.		implementation of the Whale Disturbance Risk Management Process.
CM12: Inventory Management	EPS12.1: Solids control equipment will be used as part of the drilling fluid circulation system when drilling with riser installed, to help condition the drilling fluid for reuse, and minimise the overall volumes of drilling fluid discharged. At the end of the Activity unused bulks (barite, bentonite, cement) will be managed in accordance with Figure 12-9. Upon completion of the activity excess dry bulks will be managed with one of the following: • retained onboard for future activity where acceptable by the subsequent operator or, • use up cement via increasing the volume used in the well, if design allows, • returned to shore where feasible, where considered ALARP after risk assessment during the execution phase, and where permitted by the MODU and vessel operator safe systems of work. Spare chemical additives will be retained on board where acceptable by the subsequent operator or returned to shore. In the event the re-use and return-to shore options are not feasible and ALARP then discharges of bulks will be: • Slurrified with water prior to release overboard to facilitate dispersion • Limited to 50m^3 of dry bulk per batch of slurry released to facilitate dispersion	CM25: Inventory Management Aligned to Minimata Convention, quality control limits for barite will be applied: • Mercury (Hg) – 1 mg/kg (1 ppm) dry weight in stock barite. • Cadmium (Cd) – 3 mg/kg (3 ppm) dry weight in stock barite. At the end of the Project unused bulks will be managed in accordance with Figure 12-7. Upon completion of the activity, excess dry bulks will be managed with one of the following: • retained onboard for future activity where acceptable by the subsequent operator • use up cement via increasing the volume used in the well, if design allows • returned to shore where feasible, where considered ALARP after risk assessment during the execution phase, and where permitted by the MODU and vessel operator safe systems of work. Spare chemical additives will be retained on board where acceptable by the subsequent operator or returned to shore.	OPP and EP align on inventory management control measures.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	• Released no closer to shore, and in water depths no shallower than, the location of the well being constructed, to ensure impacts remain within the parameters assessed within the EP.		
	EPS12.2: Barite concentrations will be at or below: • Mercury (Hg) – 1 mg/kg (1 ppm) dry weight in stock barite. • Cadmium (Cd) – 3 mg/kg (3 ppm) dry weight in stock barite.		
	EPS12.3: Detailed cementing procedures will be developed and implemented before cementing activities commence		
	EPS12.4: Actual cement use and discharge will be reconciled against planned quantities throughout the campaign.		
CM13: Offshore Operational Procedures	EPS13.1: Existing infrastructure will be protected from impact by mooring equipment via: • Mooring analysis and plan aligned to ISO Standard (ISO19901-7:2013 – Mooring Analysis) by mooring specialist which accounts for seabed survey data including any suspected UCH, sensitive benthic habitat and emergent features and the locations of existing infrastructure. • Anchor selection and placement to reduce potential for anchor drag. Further contingencies will be in place to minimise the potential for damage to existing infrastructure. Including:	No equivalent in the OPP.	Additional control incorporated from the approved Athena Supply Project EP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	• Mooring design which includes an 8 to 12 anchor spread to provide additional redundancy for position keeping should a mooring fail. • Dynamic positioning – available in the event of mooring failure, where required for station keeping. Field entry / exit protocol – vessels will require approval from the Athena Gas Plant Person In Charge (PIC) to enter the field; asset risk management measures must be demonstrated for approval to be granted. Mooring analysis and plan to be completed ahead of the MODU entering the Operational Area.		
	EPS13.2: Mooring procedures will ensure: • Adequate tensioning of mooring is applied and maintained. • Mooring equipment is only installed or stored within the designed radius areas of the mooring spread. Seabed relief and sensitive seabed features are considered based on seabed surveys, and sensitive features (i.e. areas of high relief) are avoided where practicable. • No equipment to be placed on the seabed within 20m radius of the identified anomalies as identified in Table 4-2.	CM2: Offshore Operational Procedures Mooring procedures for the MODU will reduce overlap/disturbance by ensuring: • Adequate tensioning of mooring for the MODU is applied and maintained. • Mooring equipment for the MODU is only installed or stored within the designed radius areas of the mooring spread. The final selection of well locations, flowline paths, mooring and other infrastructure will consider survey observations to ensure: • Areas of seabed habitat types including high relief outcrops, reefs and sponge beds will be avoided, or overlap with the Project footprint is reduced, where practicable.	OPP and EP align on mooring procedure control measures with both EPS 13.2 and EPS 16.1 (in relation to underwater heritage, debris and hazards on the seafloor).

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
		• Underwater heritage, debris and hazards on the seafloor will be avoided and not overlapped with the Project footprint.	
	EPS13.3: Retrieval of mooring equipment, including transponders, from the sea floor prior to or at the completion of the activities.	No equivalent in the OPP.	Aligns with OPP commitment to remove
	EPS13.4: Drilling Discharges Management processes minimise as far as practicable, the overall volumes of WBDF discharged to the marine environment. It does this by defining the: • volumes of fluids required for safe execution of the activity, including contingency for well control. • fluids storage arrangements and transfer capacities on the MODU and support vessels, and how storage capacity will be actively managed to facilitate re-use of WBDF. • properties of the fluid required to be maintained throughout the different stages of well construction. • fluid acceptability criteria for re-use. • the solids control equipment to enable re-use of fluids. These aspects of drilling fluids management are a direct result of the well design and technical requirements that are defined in the WOMP. Drilling and cementing procedures will define how each step of the well construction process is to be completed in accordance with relevant	CM2: Offshore Operational Procedures Drilling Discharges Management processes minimise as far as practicable, the overall volumes of WBDF discharged to the marine environment. It does this by defining the: • volumes of fluids required for safe execution of the activity, including contingency for well control. • fluids storage arrangements and transfer capacities on the MODU and support vessels, and how storage capacity will be actively managed to facilitate re-use of WBDF. • properties of the fluid required to be maintained throughout the different stages of well construction. • fluid acceptability criteria for re-use. • the solids control equipment to enable re-use of fluids. These aspects of drilling fluids management are a direct result of the well design and technical requirements that are defined in the WOMP. Drilling and cementing procedures will define how each step of the well	OPP and EP align on the Drilling Discharges Management processes. This activity will not use SBDF therefore control measures related to SBDF are not carried into this EP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	standards (as defined in the WOMP) before the offshore activities take place.	construction process is to be completed in accordance with relevant standards (as defined in the WOMP) before the offshore activities take place. SBDF may be used where technical requirements preclude the use of WBDF (contingent), only once the riser between the well and MODU is installed. This ensures SBDF is circulated in a closed loop and no bulk SBDF fluids are discharged overboard. Drill cuttings recovered with the SBDF will be processed on the MODU to recover and reduce residual SBDF content prior to overboard discharge. There will be no bulk discharge of SBDF.	
	EPS13.5: Vessel operators shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8) and Victorian (Marine Mammals) Regulations within respective jurisdictions, as a minimum, and shall report vessel interactions with dolphins and whales. Caution zones will be extended to 500m around all whales. Helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on. Marine mammal sightings will be recorded and submitted to DCCEEW. Sightings will be reported within three months of the end of the activity.	CM2: Offshore Operational Procedures All vessels will adhere to the distances and vessel management practices of EPBC Regulations (Part 8 Division 8.1 interacting with cetaceans) as a minimum. All helicopters and vessels will adhere to the distances and vessel management practices of EPBC Regulations (Part 8 Division 8.1 interacting with cetaceans).	This control measure is aligned between the EP and OPP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
CM14: MODU Material Transfer Process	EPS14.1: MODU will have a bulk fluid transfer process in place before commencing operations. The process will include: • MODU-to-vessel communication protocols. • Transfer hose integrity checks. • Transfer hose pressure testing. • Continuous visual monitoring while bunkering. • Tank volume monitoring while bunkering. • Avoidance of bulk hydrocarbon transfers at night, or otherwise artificial illumination of the of the operational areas on the MODU, vessel and water between them during the transfer. • Weather limitations for bulk transfers.	CM29: MODU Material Transfer Process MODU will have a bulk fluid transfer process in place before commencing operations. The process will include: • MODU-to-vessel communication protocols. • Transfer hose integrity checks. • Transfer hose pressure testing. • Continuous visual monitoring while bunkering. • Tank volume monitoring while bunkering. • Avoidance of bulk hydrocarbon transfers at night, or otherwise artificial illumination of the of the operational areas on the MODU, vessel and water between them during the transfer. • Weather limitations for bulk transfers.	This control measure is aligned between the EP and OPP.
	EPS14.2: Transfer hoses for hydrocarbons shall comprise sufficient floating devices and self-sealing weak-link couplings in the midsection of the hose string.	No equivalent in the OPP.	Additional control incorporated from the approved Athena Supply Project EP.
CM15: Campaign Risk Review	EPS15.1: A Campaign Risk Review, as detailed in Figure 12-6 will be undertaken in the 6-months prior to a campaign activity commencing, to: • Model noise emissions for any additional activity scenarios not already provided for in this EP. • Integrate into modelling the latest relevant sound exposure thresholds to review previously discounted control measures against updated guidance and newly accepted EPs to ensure that risks are	CM22: Modelling Review Modelling studies used to inform the Activity Environment Plan will use scenarios that are representative of the activity, and current, published thresholds that are suitable for sensitive receptors.	The CM for noise emissions modelling review is incorporated as step within the Campaign Risk review. This control measure is aligned between the EP and OPP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	continually reduced to levels that are ALARP and are of an acceptable level. The assessment of environmental impacts and risks will focus on aspect: subsea noise, and risks to endangered whale species, specifically pygmy blue whales, and southern right whales. A risk review may also be triggered during the offshore campaign where DP nighttime triggers have been exceeded, if ≥ 3 sightings of blue whales or >3 sightings of southern right whales are recorded within the observation zone for 3 consecutive days, or if concerns are raised by a member of the project or community. Risk Reviews during the campaign will be informed by a panel including MFO's experienced in the region, Activity Manager (or delegate), Vessel master (or delegate) and Amplitude Energy HSEC Representative. Recommendations will be managed in accordance with the Amplitude Energy MOC process.		
	EPS15.2: The Amplitude Energy Environmental Protocol describes how environmental impact and risk management, including risk assessments, is undertaken for activities including offshore campaigns. As part of pre-campaign planning a risk review (refer Figure 12-6) will be undertaken to re-assess campaign environmental impacts and risks to ensure acceptability criteria are met and that impacts and risks are reduced to ALARP. The risk review will consider aspects relevant to the campaign; where there is a risk that campaign discharges	CM20: Campaign Risk Review The Cooper Energy Environmental Protocol describes how environmental impact and risk management, including risk assessments, is undertaken for activities including offshore campaigns. As part of pre-campaign planning a risk review (refer Figure 12-5 of the OPP) will be undertaken to re-assess campaign environmental impacts and risks to ensure acceptability criteria are met and that impacts and risks are reduced to ALARP. The assessment of	

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	to sea may contain mercury, the risk review will consider the current best available techniques and environmental practices in order to control releases of mercury.	environmental impacts and risks will focus on aspect: subsea noise, and risks to endangered whale species, specifically pygmy blue whales, and southern right whales	
	EPS15.3: Review analogue light modelling scenarios to ensure that the scenarios and thresholds remain appropriate for the activity.	CM22: Modelling Review Modelling studies used to inform the Activity Environment Plan will use scenarios that are representative of the activity, and current, published thresholds that are suitable for sensitive receptors.	This control measure is aligned between the EP and OPP.
	EPS15.4: Review the LoC modelling scenarios to ensure that the modelled scenarios and thresholds are appropriate for the activity.	CM22: Modelling Review Modelling studies used to inform the Activity Environment Plan will use scenarios that are representative of the activity, and current, published thresholds that are suitable for sensitive receptors.	This control measure is aligned between the EP and OPP.
	EPS15.5: Each future EP resulting from the East Coast Project OPP will undertake a review for additional or significantly revised reasonably foreseeable projects. Additional or significantly revised projects will be assessed as per CIA methodology (Section 9.0). Any cumulative impacts from new, significantly revised or currently unknown activities that results in an unacceptable level of impact to receptors, will be subject to new or revised control measures within the appropriate EP to reduce cumulative impacts to ALARP.	CM27: Each future EP resulting from the East Coast Project OPP will undertake a review for additional or significantly revised reasonably foreseeable projects. Additional or significantly revised projects will be assessed as per CIA methodology (Section 11.1). Any cumulative impacts from new, significantly revised or currently unknown activities that results in an unacceptable level of impact to receptors, will be subject to new or revised control measures within the appropriate EP to reduce cumulative impacts to ALARP.	This control measure is aligned between the EP and OPP. Section 9.0 of the EP reviews potential future projects as part of the CIA.
CM16: Seabed Survey	EPS16.1: Seabed surveys (geophysical, geotechnical, visual and contaminant sampling) will be undertaken for the purposes of	CM22: Modelling Review Modelling studies used to inform the Activity Environment Plan will use	This control measure is aligned between the EP and OPP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	collecting information to manage risks to the Shelf rocky reefs and hard substrates KEF values (high relief outcrops, reefs and sponge beds), sediment quality, underwater heritage, debris and hazards on the seafloor. Seabed surveys will be undertaken prior to finalising MODU position and associated location of mooring equipment (mooring analysis), finalising well location and subsea infrastructure locations. Seabed Survey data will be reviewed by an experienced benthic ecologist, and findings and recommendations considered as part of final well location selection process, avoiding sensitive seabed features where practicable. Relevant survey seabed findings (benthic environment, heritage, hazards) will be included in future EPs if available at the time of preparing EP. In the event unpredicted contaminants are detected Amplitude Energy will undertake a human health and environmental risk assessment to ensure ALs and EPOs are met.	scenarios that are representative of the activity, and current, published thresholds that are suitable for sensitive receptors. Seabed surveys for fields where the seabed has not been characterised will be undertaken prior to well construction activities being undertaken, this will form an input into the Risk Review process described in Section 12.9.	The seabed survey was undertaken in May and June 2025 (refer Section 4.3.1). The Annie-2 development well location avoids sensitive features such as reef structures of high relief, and is considered a suitable location.
CM17: Offshore Victoria Whale Disturbance Risk Management Procedure	EPS17.1: Active DP thruster management: • MODU and vessel DP thrusters will not be operated with loading outside of DP system Activity Specific Operation Guideline (ASOG) (DP ASOG will require loading not to exceed 70% except as necessary to avoid an emergency).	CM22: Modelling Review Modelling studies used to inform the Activity Environment Plan will use scenarios that are representative of the activity, and current, published thresholds that are suitable for sensitive receptors.	The EP includes detailed EPS to reflect the implementation of both the modelling review, the campaign risk review and Amplitude Energy's Offshore Victoria Whale Disturbance Risk Management Process. The control measures are aligned between the EP and OPP.
	EPS17.2: Marine Mammal Monitoring and Prestart criteria:		

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	a) Plan for vessel arrival in field in daylight hours to allow sufficient time to complete EP prestart observations, or undertake pre-start observations from different platform (e.g. vessel, helicopter, plane) in daylight hours the day before vessel arrival to the field at night. b) 30-minute pre-start whale observation will be required within the DP observation zone for the activity, and the observation zone confirmed clear of blue whales and southern right whales before DP operations commence for the activity, or nighttime criteria is met for DP operations at night. To be completed by Dedicated MMO. c) In addition to the 30 minute prestart, during Southern Right Whale reproduction season (including reproductive shoulder periods), MMO prestart observations prior to MODU mooring hook-up activity must include at least one hour observation the day of, or day prior to the activity, and cover the area of overlap between the activity behavioural EMBA for the activity and the southern right whale reproductive BIA. This area must be confirmed clear of southern right whales prior to DP operations commencing for the activity. Where MODU hook-up operations are to commence at night, night-time criteria must be met for southern right whales over the areas of overlap between the behavioural noise contours for the hook-up activity and the southern right	CM3: Cooper Energy Offshore Victoria Whale Disturbance Risk Management Process. The Cooper Energy Offshore Victoria Whale Disturbance Risk Management Process provides for the environment performance requirements that apply to the East Coast Project which are described in Section 8.2.7 of the OPP. The process provides a framework for minimising noise impacts to whales and details specific measures to be implemented that will ensure impacts and risks meet acceptable levels described in the OPP. The process acknowledges legislative requirements and establishes the criteria and methods by which potential disturbance to relevant whale species is identified. The process identifies management measures for different types of offshore activity, accounting for nature and scale of the potential impacts and risks, to ensure they remain within acceptable levels, and are managed to ALARP. Provisions within the process include: • Consideration for vulnerable species during sensitive life stages most susceptible to noise emissions via a planning-phase risk review, integrating latest published Government Plans and scientific literature. This will	Both the EP and OPP commit to applying a monitoring program, adaptive management processes informed by subsea noise modelling and effective communications protocol. The EP further commits to active DP thruster loading aligned with ASOG. The EP includes specific activity detail on specific adaptive management and DP suspension measures of the process. [Including: night time criteria, distances, durations, resourcing, communication, reporting, MMO competency]

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	whale reproductive BIA. To be completed by Dedicated MMO.	consider scheduling of activities outside of higher sensitivity period where practicable, and review of control measures to ensure levels of impact and risk remain ALARP. The Whale Disturbance Risk Management Process acknowledges legislative requirements and establishes the criteria and methods by which potential disturbance to relevant whale species is identified. The process identifies management measures for different types of offshore activity, accounting for nature and scale of the potential impacts and risks, to ensure they remain within acceptable levels, and are managed to ALARP. Provisions within the process include consideration for vulnerable species during sensitive life stages most susceptible to noise emissions via a planning phase risk review, integrating latest published Government Plans and scientific literature. This risk review: • will consider scheduling of activities outside of higher sensitivity period where practicable, and review of control measures to ensure levels of impact and risk remain ALARP. • requires the identification and selection of control measures, including new techniques and	
	EPS17.3: DP Observation Zones The DP Observation Zones for the Activity are determined by specialist subsea noise modelling service provider and include: • 8.1 km during MODU on DP during mooring activities with AHTS. • 7.5 km during MODU drilling with AHTS on DP resupply. • 1.2 km during MODU drilling with AHTS on standby not on DP. • 500 m during vessel DP operations for all other vessel based activities. • The above ranges are based on predicted maximum distances to the behavioural threshold for marine mammals as detailed in Table 6-28. To allow for in-field practicality, maximum distance values in Table 6-28 have been rounded up to the next 100 metres to inform the DP observation zones as listed above.		
	EPS17.4: Marine Mammal Observation Network The observer network for the Activity will comprise: • Dedicated MMO on support vessels, with two MMOs if daylight exceeds 12-hours (sunrise-sunset) to provide continuous observation in daylight hours. There will be at least one MMO within the DP		

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	Observation Zone at all times when DP Ops are happening. • Dedicated MMO on shore during MODU mooring hook-up activity to observe the area over overlap between the activity behavioural noise EMBA and the southern right whale reproductive BIA, as described EPS17.2(c). Communication channels between the shoreside MMO and vessel-based MMOs will be established to enable integration of shoreside MMO sightings into mitigation actions for the activity. • Officers of the Watch on support vessels observing as per normal vessel shift patterns and duties; the officer of the watch will provide coverage for the dedicated MMO during normal work breaks. If there is only one dedicated MMO offshore and that MMO is unable to complete their duties, then a second MMO will be mobilised to the DP Observation Zone before DP operations commence • Officers of the Watch on MODU observing as per normal MODU shift patterns and duties. • Helicopter crew (personnel transfers from shore to the MODU) observing opportunistically during over-sea transit. • Observations from other operators working in the region where the information is shared. • Observations from publicly available Citizen Science.	technologies, where their use is proven, provides benefit, and is practicable for the campaign. The use of new techniques and technologies is informed by research, engaging engagement with expert third parties such as specialist consultants, and participation in industry forums such as the AEP marine noise working group. Section 12.9 (of the OPP) provides a holistic overview of how the process is applied on a campaign-by-campaign basis to ensure that acceptable levels of impact are not exceeded during that campaign, and accounts for new information, practices and requirements. The process also provides details on: • level of whale observation effort • triggers for actions • actions to be taken to avoid injuring whales and avoid behavioural disturbance to endangered whale species (blue whales and southern right whales), • actions to be taken to ensure any southern right whale is not prevented from utilising BIA's or HCTS • actions to be taken to reduce the risk of displacement of a foraging blue whale, and minimise the risk of disturbance to a southern right whale	

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	EPS17.5: Observation uncertainty: Species confirmation criteria will be developed for blue whale and southern right whale ID, by an experienced MMO (5+ years' experience) and will be provided to the Activity Dedicated MMOs. For crew observers, dedicated MMOs will advise on species where there is uncertainty. Within the area of predicted overlap between the activity behavioural noise EMBA and the southern right whale reproduction BIA, any sightings made which are reasonably suspected to be a southern right whale will be treated as a positive sighting.	in a migration and/or reproduction area. The Whale Disturbance Risk Management Process communicates how whale interaction and disturbance risks are to be managed by offshore project teams, and crews on offshore vessels involved in offshore projects. The procedure provides details on the level of whale observation effort, triggers for actions and the actions to be taken to manage potential impacts to whales. This includes caution and no approach zones which meet or exceed regulatory standards under the EPBC Act. Reporting of vessel strike incidents in the National Vessel Strike Database is required and described in Section 12.13. Where there is a risk of TTS or AUD INJ to whales, or a risk of behavioural disturbance to southern right whales or blue whales, the following adaptive management provisions apply: • The extent of potential TTS, Injury and behavioural disturbance are defined through subsea noise modelling by subsea acoustics specialist. • A monitoring program is established to observe for whales within the potential impact areas defined by the modelling.	
	EPS17.6: DP Suspension Actions: • Suspension of DP operations (if safe to do so) where a blue or southern right whale is observed within the relevant activity DP Observation Zone. • Suspension of DP operations (if safe to do so) before any whale is observed within the Activity DP TTS zone continuously for 20 hours. Note 1 - If a whale is observed within 30 minutes of sunrise in the TTS zone it should be assumed that the whale was present throughout the preceding night period unless there is clear evidence to the contrary. Note 2 - If during DP operations any whale is observed within the Activity DP TTS zone prior to sunset, it should be assumed that the whale could remain within the DP TTS		

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	zone until sunrise unless there is clear evidence to the contrary, and the 20 hour time frame considers the inability to observe whale movement overnight. *These situations are hypothetical and the measure is highly precautionary given the conservatism applied to the modelling of accumulated sound exposure levels which assumes no movement of the whale.* • Adopt favourable heading to reduce thruster load (and associated noise) and slowly increase separation from whale if safe to do so. • Apply 60-minute pre-start observation prior to recommencing activities, from the time the BW or SRW was last observed in the activity DP observation zone. • Night-time or low visibility criteria: DP operations will not commence at night (except to avoid or in response to an emergency) when: – 3 or more sightings of blue or southern right whales occurred in the DP Observation Zone within 3-hours prior to sunset (or low visibility), or – a blue whale or southern right whales are observed within the hour prior to sunset inside the observation zone and have not been observed leaving the zone.	• Monitoring informs activity modification (where safe to do so) to prevent the occurrence of unacceptable levels of impact and reduce the risk of their occurrence. • Monitoring is implemented through conventional methods such as marine mammal observation by trained and competent marine mammal observers, or by other methods and technologies where they have been demonstrated as being effective for mitigation purposes. • Establishment of a communications protocol between monitoring team, vessel master and project team.	

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	– Any whale observed as continuously present in the 24-hour TTS zone for 12-hours or more in the lead up to night fall. ***Whether it is safe to take action is determined by the person in command of the vessel (i.e. vessel master or their delegate). MMO reports will detail the reasons for any delay of DP suspension actions (in event required) for safe operation purposes, as instructed by the vessel master or their delegate.*		
	EPS17.7: Daily Reporting: A daily MMO report will be issued, consolidating all sightings and actions from across the monitoring network.		
	EPS17.8: MMO Capacity and Competency: • Dedicated Lead MMO minimum experience / competency is multiple offshore campaigns as a marine mammal observer with experience observing blue whale and southern right whale within BIAs (or international equivalent). • At times of year when daylight hours exceed 12-hours, there will be a second dedicated MMO (minimum experience / competency is: at least one offshore campaign as a marine mammal observer, and familiar with the ID features for blue whales and southern right whales. • Dedicated MMOs shall have demonstrated prior experience in the ID of large baleen whales, distance estimation and systems of		

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	recording and reporting, and understand the Australian regulatory requirements. • MMOs shall be hired from service providers with expertise in marine mammal observing. • MMO experience and competency will be reviewed and confirmed by the MMO service provider and checked by Amplitude Energy prior to their mobilisation to monitor a DP Observation Zone. • Vessel Officers of the Watch: the dedicated MMO(s) will be supported by trained bridge crew. Bridge crews will be inducted into Activity requirements and whale ID and will have a high base level of observation experience and competency noting watchkeeping duties are a core competency, and marine mammal observation for collision avoidance and to minimise behavioural disturbance to endangered blue and southern right whales, is applicable to all offshore marine users. • Helicopter Crew: Helicopter crew will complete MMO Program Induction. • MMO Program Inductions - Dedicated MMOs, Vessel and MODU Officers of the Watch, and helicopter crews shall receive an induction including: – overview of the Activity – description of species that are the focus for the program and why – marine mammal monitoring and action requirements		

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	– ID criteria for endangered whales – reporting requirements.		
	EPS17.9: The Whale Disturbance Risk Management Procedure will be implemented, assisting the implementation of CM17. Applicable Provisions within the procedure include: • Establishment of a communications protocol between observers, vessel master and project team. • Dedicated MMO for the hours of daylight (defined as sunset to sunrise). A 2nd MMO where necessary if daylight extends beyond 12-hr period. • Dedicated MMOs shall have demonstrated prior experience in the ID of large baleen whales, distance estimation and systems of recording and reporting. • Inducted crew observers to support dedicated MMO during rest breaks. • Reporting of any injured marine mammal to relevant response and regulatory agencies.		
	EPS17.10: Resupply and Cargo Lifting Activities • The number of vessels in the operational area during resupply activities is limited to that required for safe operations. * • If blue whales or southern right whales are observed in the DP observation zone during resupply activities, the resupply vessel will complete the current cargo activity and make the load safe before commencing DP suspension actions (EPS17.6) within 2 hours.		

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	**Whether it is safe to limit the number of vessels or cease cargo lifting operations due to whales is determined by the person in command of the vessel (i.e. vessel master or their delegate) & the MODU. MMO reports will detail the instructions by the vessel/ MODU master or their delegate in event EPS17.10 cannot be implemented given safety requirements.*		
CM18: Other Detection Technologies	EPS18.1: Amplitude Energy will continue to seek other technologies for whale detection through discussions with specialist service providers, other titleholders, and/or participation in the AEP Marine Noise Working Group. Technologies that are identified will be assessed with the campaign risk review panel. Evaluation criterion will include technology readiness, the level of risk reduction (specific to the risk event) afforded by the technology, Activity integration feasibility and costs. Where detection technologies are used, they will be in addition to the MMO program and technology effectiveness will be shared with other operators in the region.	Described in Figure 12-5 of the OPP.	The EP includes this as a specific CM to demonstrate implementation of the Whale Disturbance Risk Management Process.
CM19: Waste Management Practices	EPS19.1: Vessels and MODU implement a garbage management plan. • The waste hierarchy is applied to project wastes. • Waste with potential to be windblown is contained and restrained. • Waste lost overboard is recorded and recovered if possible.	CM1: Marine Assurance Process MODU and vessels will comply with relevant MARPOL Commonwealth requirements and subsequent Marine Orders for waste management practices.	This CM aligns with the OPP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	• Waste transfers are recorded.		
CM20: Amplitude Energy IMS Risk Management Protocol	EPS20.1: - Vessels and MODU will comply with the Australian biofouling management requirements and Australian ballast water management requirements. Vessels and MODU biofouling and ballast management histories are used to complete an IMS Risk assessment prior to the vessel arriving within the operational area. Subsequent risk management actions are completed in accordance with the Vessel Biofouling and Ballast Water Management Plans for Low-risk Vessels, or otherwise in accordance with recommendations of a qualified IMS inspector.	CM15: Cooper Energy IMS Risk Management Process The Cooper Energy IMS Risk Management Process acknowledges legislative requirements and the different sources of IMS risk for different types of project activity. The Process details the regulatory and any additional company requirements to manage biofouling and ballast water risks to levels that are acceptable and ALARP.	Both the EP and OPP commit to implementing the IMS risk management process. The EP commits to completing this prior to the vessel arriving within the operational area and completing actions in alignment with the Vessel Biofouling and Ballast Water Management Plans. Section 12.9 and Figure 11.5 in the EP describe IMS Risk Management.
CM21: Activity Fire Fighting Foam Screening and Quarantine Standard	EPS21.1: From 01 July 2025, firefighting foams for well construction activities (i.e. response standby Aqueous Film Forming Foam (AFFF) for the well test package) will not contain PFOS, PFOA, PFHxS and related substances in compliance with IChEMS (Schedule 7). Firefighting foam SDS will be screened for these substances; any firefighting foams that do not comply with this requirement as of 01 July 2025 will not be used or stored offshore, or, if any legacy products are found offshore, they will be quarantined.	Not described in OPP.	Additional control incorporated from the approved Athena Supply Project EP.
CM22: NOPSEMA Accepted WOMP	EPS22.1: A NOPSEMA-accepted WOMP addresses the integrity aspects of the well, ensuring no unplanned release of hydrocarbons throughout the wells life cycle. The WOMP includes, as applicable to the activity:	CM14: Facility Safety and Integrity Management Plans Under Part 5 of the OPGGS (Resource Management and Administration) Regulations 2011, a NOPSEMA accepted WOMP (including Cooper Energy Well Management System) and a Safety Case is required before well	OPP and EP align on the control measure of accepted WOMP.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	• Amplitude Energy well management standards detailing how well integrity will be managed over the well life cycle. • A description of well barriers. • Performance and testing criteria. • Compliance with Performance and Testing Criteria is tracked throughout the activity, and any damage to, or failure of, well-related equipment that has led or could lead to a loss of integrity of the well (including under servicing/testing) is reported to NOPSEMA, or otherwise as required under the regulations and according to NOPSEMA guidance at the time (ref N-03000-GN1636, A462575).	activities can be undertaken. The WOMP details the well barriers and the integrity testing that will be in place for the activity.	
CM23: NOPSEMA Accepted Safety Cases	EPS23.1: Activities will be managed in accordance with the accepted safety case revisions.	CM14: Facility Safety and Integrity Management Plans A NOPSEMA accepted safety case is required before any development activities can be undertaken. All activities will be managed in accordance with accepted safety cases.	OPP and EP align on the control measure of accepted Safety Case Revisions.
CM24: Source Control Emergency Response Plan	EPS24.1: Source control capability is maintained in accordance with the SCERP. Source control response activities will be implemented in accordance with the SCERP.	CM19: Source Control Emergency Response Plan The Cooper Energy source control emergency response plan (SCERP) acknowledges legislative requirements and provides in detail the company's plans, equipment and personnel provisions to enable a source control response, commensurate to the risk at each stage of a wells life cycle from initial drilling to closing off the reservoir.	OPP and EP include control measure of a SCERP for the drilling activity.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
CM25: Oil Pollution Emergency Plan (OPEP)	EPS25.1: Emergency spill response capability is maintained in accordance with the OPEP. Emergency response activities will be implemented in accordance with the OPEP.	CM17: OPEP Under the Regulations, the petroleum activity must have an accepted Oil Pollution Emergency Plan (OPEP) in place before the activity commences. In the event of a subsea LOWC, the OPEP will be implemented. Cooper Energy acknowledges that any response will be implemented in accordance with the requirements described within the OPEP.	The OPEP is attached to the EP submission. The EP includes an assessment of the proposed oil spill response strategies for the activity (refer Section 7).
CM26: Operational and Scientific Monitoring Plan (OSMP)	EPS26.1: Operational and scientific monitoring will be implemented in accordance with the OSMP.	CM16: OSMP Cooper Energy's OSMP details the arrangements and capability in place for: • operational monitoring of a hydrocarbon spill to inform response activities • scientific monitoring of environmental impacts of the spill and response activities	OPP and EP align on the OSMP.
CM27: Amplitude Energy Decommissioning Protocol	EPS27.1: Amplitude Energy will meet the requirements of Section 572 ('Maintenance and removal of property etc. by titleholder') of the OPGGS Act. • If Annie-2 development well does not access a commercially viable resource following well testing, it will be abandoned at the time of well evaluation and within the well activity duration of this EP • The Annie 2 development well will be permanently abandoned within 3 years in the event the well is not tied into the existing CHN pipeline, or as accepted in the governing WOMP where integrity can be	CM10: Implement Cooper Energy's Decommissioning Protocol The Cooper Energy Decommissioning Protocol acknowledges legislative requirements and illustrates the company's management system for integrating decommissioning planning and provisioning through a project's life cycle.	OPP commits to implementation of the Decommissioning Protocol to integrate decommissioning planning to projects. EP CM29 EPS8 commits to meeting Section 572 of the OPGGS Act unless an alternative is accepted.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	demonstrated as per regular inspection and/ or monitoring activities. • Annie-2 will be permanently abandoned within 3 years of permanently ceasing production or as accepted in the governing WOMP where integrity can be demonstrated as per regular inspection and/ or monitoring activities. • All well equipment on the seabed will be recovered.		
CM28: Retrieval of dropped objects were practicable	EPS28.1: If practicable to do so, objects accidentally dropped to the seabed will be retrieved.	Not described in OPP.	Additional control incorporated from the approved Athena Supply Project EP.
CM29: Engagement During Emergency Response	EPS29.1: Engagement with relevant First Nations Representatives in the event of a loss of containment of hydrocarbons which may extend to coastlines to obtain advice on the management of cultural sensitivities which may be in the spill trajectory.	Not described in OPP.	Additional control incorporated from the approved Athena Supply Project EP.
CM30: Underwater Cultural Heritage Disturbance Risk Management Measures	EPS30.1: Amplitude Energy will ensure the activity is compliant with the Underwater Cultural Heritage Act 2018 (Underwater Heritage Act) by: • Seabed survey data will be reviewed prior to well construction activities and used to inform equipment laydown locations and not impact underwater cultural heritage. • Review of relevant seabed survey data will be conducted by a suitably qualified and experienced cultural heritage team. The team will include a marine archaeologist, have familiarity with First Nations cultural	CM9: Underwater Cultural Heritage Disturbance Risk Management Measures Cooper Energy Cultural Heritage Disturbance Risk Management Measures acknowledge legislative requirements and establishes the methods by which potential disturbance to cultural heritage is identified including via screening, consultation, and expert advice as required. The measures apply to the offshore project to ensure impacts and risks throughout the project remain within	OPP and EP align on Underwater Cultural Heritage Disturbance risk management.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
	landscapes and experience in identifying landscape features from geophysical data. • If cultural heritage is identified, it will be mapped, along with suitable exclusion zone and its location integrated into Activity inductions and procedures to ensure it is avoided during Activity. • UCH Review Report will be provided to relevant RAP. • Implementing a process for reporting and managing unexpected finds during the activity, including reporting of any new suspected underwater cultural heritage to DCCEEW (or delegate) within 21 days of discovery.	acceptable levels and are managed to ALARP. Cooper Energy will ensure the activity is compliant with the Underwater Cultural Heritage Act 2018 (Underwater Heritage Act) by: • Seabed survey data will be reviewed prior to well construction activities and used to inform equipment laydown locations to avoid impacts to underwater cultural heritage. • Review of relevant seabed survey data will be conducted by a suitably qualified and experienced cultural heritage team. The team will include a marine archaeologist, have familiarity with First Nations cultural landscapes and experience in identifying landscape features from geophysical data. • If cultural heritage is identified, it will be mapped, along with suitable exclusion zone and its location integrated into Activity inductions and procedures to ensure it is avoided during Activity. • UCH Review Report will be provided to relevant RAP. • Implementing a process for reporting and managing unexpected finds during the activity, including reporting of any new suspected underwater cultural heritage to DCCEEW (or delegate) within 21 days of discovery.	

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
CM31: Training and Competency	EPS31.1: Amplitude Energy personnel involved in the activity have the appropriate competencies to perform the tasks required of their roles. This requires that competencies for specific roles are defined, that adequate training and supervision is provided.		Additional CM and EPS included in this EP, in response to NOPSEMA RFI #1 received 14 October 25
CM32: Activity EP Induction	EPS32.1: An Environment Plan induction will be delivered to all MODU and vessel personnel.		Additional CM and EPS included in this EP, in response to NOPSEMA RFI #1 received 14 October 25
CM33: Contractor Engagement	EPS33.1: Contractors involved in the offshore activity define the competency and training requirements necessary to ensure that contractor personnel have the relevant knowledge and skills relevant to perform the role.		Additional CM and EPS included in this EP, in response to NOPSEMA RFI #1 received 14 October 25
Control Measures not incorporated into the Annie 2 Development Drilling EP (This EP)			
CM5: Cooper Energy Emissions Management Process	Not Applicable to the Annie 2 Development EP	CM5: Cooper Energy Emissions Management Process. The Cooper Energy Emissions Management Process acknowledges legislative requirements and establishes a systematic process to identify, assess and implement GHG emissions reduction opportunities throughout a project's life cycle. The process sets a continual improvement cycle such that new technologies and approaches can be incorporated as they are developed. The objectives of the Emissions Management Process are to: • Identify requirements relating to GHG emissions reduction.	These controls are relevant to the Operations phase of the East Coast Supply Project, and will be incorporated accordingly in the revision to the Otway Operations Environment Plan ahead of production from Annie-2 development well.

Annie 2 Development EP		Equivalent CM described in the East Coast Supply Project OPP	Comments
Control	**EPS**		
		• Provide a framework for identifying, assessing and implementing emissions reduction opportunities. • Align emissions reduction activities with other business processes.	
	Not Applicable to the Annie 2 Development EP	CM23: Safeguard Mechanism Monitoring Direct and indirect GHG emissions will be monitored throughout the project lifecycle against the threshold established by the Safeguard Mechanism. Liaison with the Clean Energy Regulator will be undertaken if the likelihood of triggering the Safeguard Mechanism becomes apparent.	
	Not Applicable to the Annie 2 Development EP	CM26: NGER Scheme Reporting Operational control-based reporting as part of the national reporting framework for greenhouse gas emissions, energy consumption and energy production to meet the objectives of the NGER Act.	

Table 14-3 summarises the concordance of the proposed Annie-2 development well activities with the activities described in **ECSP OPP**.

The East Coast Project described and approved in the **ECSP OPP**, comprises up to 8 incremental gas development opportunities with associated wells, flowlines and manifolds, which will tie-in to the existing Otway Casino-Henry-Netherby (CHN) Development (known as the 'existing CHN facilities').

The Annie-2 development well EP includes the following phases as described in the OPP (refer Section 4 of **ECSP OPP**):

- Well construction – activities include Mobile Offshore Drilling Unit (MODU) positioning, all drilling operations, blowout preventer (BOP) installation, cementing, subsea trees and completions, clean-up and flowback, well suspension and logging. Only one well is drilled at a time. Multi-well drilling campaigns involve one MODU which drills each well, one well after another (section 4.3.2 of the **ECSP OPP**).
- Support activities – including MODU operations, vessel operations, remotely operated vehicle (ROV) and helicopter operations. Vessel types include saturation diving support vessel, installation vessels, heavy lift vessels (HLV's) and general support vessels for Inspection, Maintenance and Repair (IMR) type activities or supporting the engineering or execution programs. ROV operations may also include autonomous underwater vehicles (AUVs) (section 4.3.6 of the **ECSP OPP**).
- Surveys – activities include geophysical and geotechnical surveys of the proposed locations (section 4.3.1 of the **ECSP OPP**).
- Decommissioning – activities include well abandonment and the decommissioning of infrastructure (contingency in event Annie 2 is not tied into CHN facilities) (Section 4.3.5 of the **ECSP OPP**).

Table 14-3: Concordance of East Coast Supply Project OPP Activity Description and Annie-2 Development Drilling EP Activity Description

Activity	EP Concordance
Location/ Operational Area	Annie is a confirmed resource described in the OPP. Annie 2 is within the operational footprint described in the **ECSP OPP**, refer Section 4.1.1 of the **ECSP OPP**. The cautionary zone in the EP has been increased from 3km as described in the EP to 3.5km. This is based on the 2.5km anchor/ mooring spread, and a 1km buffer. The increase in the size does not change the risk described for in the OPP in regards potential impacts to other marine users, given that the cautionary zone issued via AusCoast warning from AMSA is typically set at 2.5nM (4.6km).
Activity Duration and Timing	The timing described in Section 3.2 of the EP is consistent with Section 4.1.2 of the **ECSP OPP**. Amplitude Energy are progressing with the development of the Annie field as described in the **ECSP OPP**. Annie 2 will be drilled as early as Q2 2026, the **ECSP OPP** Figure 4-3 indicates activities in 2026.
Direct Disturbance Corridor	Table 6-6 of the EP is consistent with Section 4.1.2 of the **ECSP OPP**. Activity durations depicted in Figure 4-2 of the **ECSP OPP** are consistent with Figure 3-3 of the EP.

Production & Field Characteristics	The reservoir conditions and gas components for the Annie field and proposed Annie 2 well are consistent, refer Table 4-3 of the **ECSP OPP** and Table 3-3cof this EP.
Description of Activities	Section 3.4 of the EP described the key activities for the Annie 2 development well, which is one of the 15 subsea production wells described for in section 4.2.2 of the **ECSP OPP**. This EP does not include for installation of flowline and umbilical systems (section 4.2.3 & 4.2.4 of the **ECSP OPP**), installation of other subsea infrastructure (section 4.2.5 of the **ECSP OPP**), the tie in, commissioning and operation of the subsea facilities, these will be the subject of future environment plans. The activity description is consistent with the **ECSP OPP**, with this being a single well campaign with an estimated duration of 60 days (section 4.3.2 of the **ECSP OPP**). As described in the **ECSP OPP**, if successful, once completed the Annie-2 development well will be suspended and monitored in accordance with the WOMP ahead of tie in, commissioning and operations activities (separate environment plans). The drilling of Annie-2 well does not require the contingent use of Synthetic Based drilling fluids (SBDF), as such commitments for the use and management of SBDF have not been included in this EP. Support activities described in Section 3.4.5 of the EP are consistent with those described in section 4.3.6 of the **ECSP OPP**. Section 3.4.6 of the EP is consistent with section 4.3.5 of the **ECSP OPP** in regards plug and abandonment of the Annie 2 well.

Appendix 2 - EP Change Register

Date	Rev	Originator	Section Changed	Change	MOC#	Trigger Resubmission?
11.09.25	0	SM	n/a	Original submission	n/a	No
14.11.25	1	SM	Throughout	To address RFFWI#1	n/a	Yes
17/12/25	2	SM	Throughout	To address RFFWI#2	n/a	Yes