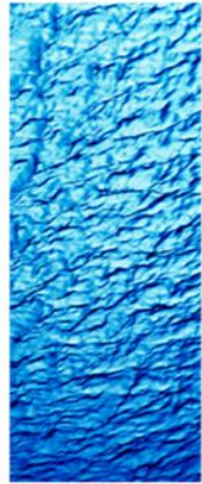


Victorian Desalination Project



D&C Marine Area EMP - Attachment C - Environmental Risk Register

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ATTACHMENT C

ENVIRONMENTAL RISK REGISTER - MARINE AREA

Activity / Construction Method	Performance Criteria / Performance Requirement SUBJECT	Potential Hazard (Environmental Aspect & Impact Pathway)	At Risk (Potential Impact)	Probability (Table 2)	Consequence (Table 3)	Inherent Risk (Before Controls)	Controls: current or planned prior to work to ensure obligations (including performance requirements and performance criteria) are met (Table 4 - reference specific option)	Control effectiveness (Table 5)	Probability (Table 2)	Consequence (Table 3)	Residual Risk (After Controls)
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Definitions for consequence, probability and other abbreviations in this register can be found in the Risk (Aspects) Register and Risk Matrix

Design

Marine Structures: * Siting design * Intake and Outlet design	Coastal Processes Coastal Integrity	* Failure of design to meet PC&PR * Intake of sand * Disruption or change to sand movements	* Natural coastal processes (sand movements, wave patterns and currents) * Integrity of the coastal assets * Habitat quality	C	4	C4	Extreme	Attachment I1.1 Coastal Processes and Activities Sub Plan & Control Measures Hydrodynamic Modelling (DP1-0003) Riser structural design (DP1-0019, DP1-0035)	VG	E	3	E3	Moderate
Marine Structures: * Siting design * Intake and Outlet design	Marine flora and fauna - general Marine flora and fauna – intake Marine flora and fauna – outlet	* Failure of design to meet PC&PR * Failure of Marine Monitoring Program to correctly inform siting design	High biodiversity areas including: * Areas of localised high productivity (primary and secondary) * Areas of high larval production, high larval transport or high larval settlement * Areas of localised upwelling * Areas of localised high conservation or high biodiversity value * Areas of localised high significance to protected or threatened species * Beneficial uses	C	5	C5	Extreme	Attachment I4.1 Marine Flora and Fauna Sub Plan & Control Measures DP1-0003 Biology assessment for siting design	VG	D	3	D3	Moderate
Marine Structures: * Siting design * Intake and Outlet design	Marine flora and fauna - general Marine flora and fauna – intake Marine flora and fauna – outlet	* Failure of design to meet PC&PR * Outlet design and outlet plume * Failure of design to achieve adequate mixing * Salinity effects in PR sensitivity areas and/or marine parks	High biodiversity areas including: * Areas of localised high productivity (primary and secondary) * Areas of high larval production, high larval transport or high larval settlement * Areas of localised upwelling * Areas of localised high conservation or high biodiversity value * Areas of localised high significance to protected or threatened species * Beneficial uses	C	5	C5	Extreme	Attachment I4.1 Marine Flora and Fauna Sub Plan & Control Measures DP1-0003 Biology assessment for siting design	VG	D	3	D3	Moderate
Marine Structures: * Siting design * Intake and Outlet design	Marine flora and fauna - general Marine flora and fauna – intake Marine flora and fauna – outlet	* Failure of design to meet PC&PR * Entrainment of marine biota * Disruption to larval transport	* Flora and fauna (general) * Flora and fauna recruitment (particularly within locally recruiting species)	C	5	C5	Extreme	Attachment I4.1 Marine Flora and Fauna Sub Plan & Control Measures Hydrodynamic Modelling (DP1-0003) Riser structural design (DP1-0019, DP1-0035)	VG	D	3	D3	Moderate

GENERAL SHIPPING

General shipping, vessel movements	Marine amenity – recreational Commercial fishing and marine tourism Marine Navigation	* Interference of local recreational and commercial users by project vessels	* Marine recreational activities including diving, surfing, fishing and marine boating * Commercial fishing and marine tourism activities (due to restrictions)	D	3	D3	Moderate	Attachment I1.1 Coastal Processes and Activities Sub Plan & Control Measures Communication protocols Exclusion zone Marine Pests and Pathogen Management Sub Plan Underwater Noise Sub Plan	G	D	2	D2	Low
General shipping, vessel movements	Marine amenity – recreational Commercial fishing and marine tourism Marine Navigation	* Interference of local recreational and commercial users by project vessels	* Safe passage of non-Project vessels along the coast	E	3	E3	Moderate	Attachment I1.1 Coastal Processes and Activities Sub Plan & Control Measures Communication protocols Exclusion zone Marine Pests and Pathogen Management Sub Plan Underwater Noise Sub Plan	G	E	2	E2	Low
General shipping, vessel movements	Underwater Noise and Vibration	* Underwater noise	* Impact to sensitive marine fauna (specifically whales)	C	2	C2	Moderate	Attachment I7.1 Underwater Noise Sub Plan & Control Measures MMOs and response procedures Exclusion zone Short period of activity Construction schedule	VG	E	2	E2	Low

Activity / Construction Method	Performance Criteria / Performance Requirement SUBJECT	Potential Hazard (Environmental Aspect & Impact Pathway)	At Risk (Potential Impact)	Probability (Table 2)	Consequence (Table 3)		Inherent Risk (Before Controls)	Controls: current or planned prior to work to ensure obligations (including performance requirements and performance criteria) are met (Table 4 - reference specific option)	Control effectiveness (Table 5)	Probability (Table 2)	Consequence (Table 3)		Residual Risk (After Controls)
General shipping, vessel movements	Underwater Noise and Vibration	* Underwater noise	* Marine divers and recreational users	C	2	C2	Moderate	Attachment I7.1 Underwater Noise Sub Plan & Control Measures MMOs and response procedures Exclusion zone Short period of activity Construction schedule	VG	E	2	E2	Low
General activities (offshore)	Coastal Processes Coastal Integrity	* Presence of project or works in coastal zone	* Physical integrity of the dune system, beach and intertidal zone	E	3	E3	Moderate	Attachment I1.1 Coastal Processes and Activities Sub Plan & Control Measures Induction programs for project personnel: Includes education regarding sensitive areas, conservation exclusion zones, transport methods, monitoring and the detection of integrity status and reporting of events.	VG	D	2	D2	Low
General shipping, vessel movements	Marine flora and fauna - general	* Collisions with sensitive fauna resulting in mortality or injury	* Marine fauna	E	3	E3	Moderate	Attachment I7.1 Underwater Noise Sub Plan & Control Measures Compliance with Wildlife (Marine Mammal) Regulations MMOs	VG	E	3	E3	Moderate
General shipping, vessel movements, small vessels, vessels originating from Victorian waters	Marine Pests	* Introduction/translocation of marine pests and pathogens	* Reef communities and recreational and commercial abalone diving in the region	D	4	D4	High	Attachment I6.1 Marine Pest and Pathogen Management Sub Plan & Control Measures Pre-entry risk assessment Vessel inspections and cleaning Biosecurity protocols - Diver declaration of clean status Marine pest monitoring program	G	E	3	E3	Moderate
General shipping, vessel movements - mobilisation of JUB and OSV to site	Marine Pests	* Introduction/translocation of marine pests and pathogens	* Reef communities and recreational and commercial abalone diving in the region	C	4	C4	Extreme	Attachment I6.1 Marine Pest and Pathogen Management Sub Plan & Control Measures Pre-entry risk assessment Vessel inspections and cleaning JUB leg cleaning Marine pest monitoring	G	D	4	D4	High
Fuel storage, bunkering, refuelling, vessel movements	Hazardous Materials	Small hazardous material spill to the ocean. e.g: * Hazardous material storage and disposal * Incorrect separation and segregation of hazardous materials * Careless/negligent act leading to a spill to the ocean * General operation of shipping (JUB, OSV etc)	* Localised impact on marine biota and ecosystems, benthic habitats, sea birds, mammals etc	C	2	C2	Moderate	Attachment I2.1 Hazardous Materials Sub Plan & Control Measures Hazardous materials storage requirements Refuelling at harbour or on land where possible EIRP Equipment checks and maintenance Inspections and checklists	VG	D	2	D2	Low
Fuel storage, bunkering, refuelling, vessel movements	Hazardous Materials	Medium or significant hazardous material spill to the ocean, e.g: * Tank rupture * Bund failure/inadequate design * Incorrect separation and segregation of hazardous materials * General operation of shipping (JUB, OSV etc)	* Pollution of foreshore, receiving waters or potential harm / injury to personnel * Impact on marine parks * Impact on flora and fauna (marine biota and ecosystems, benthic habitats, sea birds, mammals etc) * Damage to habitat * Reduced survival or reproductive success	D	4	D4	High	Attachment I2.1 Hazardous Materials Sub Plan & Control Measures Scuppers and oil interceptors on larger vessels Bunding assessment and design EIRP JUB Spill response up to 1000L Inspections and checklists Communication protocols	VG	E	3	E3	Moderate
Fuel storage, bunkering, refuelling, vessel movements	Hazardous Materials	Significant hazardous material spill to the ocean, e.g: * Navigation operations including supply ships and support vessels * Transportation of bulk hazardous materials and dangerous substances * Collisions at sea	* Pollution of foreshore, receiving waters or potential harm / injury to personnel * Impact on marine parks * Impact on flora and fauna (marine biota and ecosystems, benthic habitats, sea birds, mammals etc) * Damage to habitat * Reduced survival or reproductive success.	E	5	E5	High	Attachment I2.1 Hazardous Materials Sub Plan & Control Measures Navigation and handling procedures Bunkering procedure Scuppers and oil interceptors on larger vessels EIRP JUB Spill response up to 1000L Correct storage Inspections and checklists Communication protocols	VG	E	3	E3	Moderate
Diving operations	Marine Pests	* Introduction/translocation of marine pests and pathogens	* Ecological impacts to reef communities and adversely impact on the recreational and commercial abalone diving in the region	D	4	D4	High	Attachment I6.1 Marine Pest and Pathogen Management Sub Plan & Control Measures Inspections and cleaning Biosecurity protocols - Diver declaration of clean status Marine pest monitoring	G	E	3	E3	Moderate

Activity / Construction Method	Performance Criteria / Performance Requirement SUBJECT	Potential Hazard (Environmental Aspect & Impact Pathway)	At Risk (Potential Impact)	Probability (Table 2)	Consequence (Table 3)	Inherent Risk (Before Controls)	Controls: current or planned prior to work to ensure obligations (including performance requirements and performance criteria) are met (Table 4 - reference specific option)	Control effectiveness (Table 5)	Probability (Table 2)	Consequence (Table 3)	Residual Risk (After Controls)	
General activities (offshore)	Resource Efficiency	<ul style="list-style-type: none"> * Inefficiencies/Excessive use of energy including for lights, air conditioning and office use * Inefficiencies/Excessive use of fuel for vessels, vehicles, plant and generators * Inefficiencies/Excessive use of water for construction and personal site use * Inefficiencies/Excessive use of construction materials and failure to manage the minimization of losses (e.g. due to re-work and off-cuts). 	<ul style="list-style-type: none"> * Increased resource consumption (particularly electricity, fuel, water and construction materials) * Increased greenhouse gas production due to increased resource consumption * Depletion of resources 	C	2	C2	Moderate Attachment I3.1 Resource Efficiency Sub Plan & Control Measures Waste Management and Pollution Control Procedure NGERS reporting Induction Inspections and checklists	F	D	2	D2	Low
General activities (offshore)	Waste - General	<ul style="list-style-type: none"> * Inadequate onsite or on vessel waste management infrastructure * Waste becoming dispersed into the environment (windblown, lack of available receptacles) 	<ul style="list-style-type: none"> * Entanglement of wildlife * Water quality 	D	3	D3	Moderate Attachment I3.1 Resource Efficiency Sub Plan & Control Measures Waste Management and Pollution Control Procedure Labelling and signage Covered bins Segregated waste facilities Inspections and checklists Garbage record book	G	D	2	D2	Low
General activities (offshore)	Waste - General	<ul style="list-style-type: none"> * Inappropriate handling of waste not in accordance with the EPA Waste Management Policies * Unforeseen contamination due to inappropriate or illegal disposal of waste 	<ul style="list-style-type: none"> * Contamination of marine environment by waste * Impact to land or water at location of disposal * Pollution * Entanglement of wildlife 	D	2	D2	Low Attachment I3.1 Resource Efficiency Sub Plan & Control Measures Waste Management and Pollution Control Procedure Labelling and signage Covered bins Segregated waste facilities Inspections and checklists Garbage record book Suitable sub contractor Waste transport certificates and receipts	VG	D	2	D2	Low
General activities (offshore)	Waste - General	<ul style="list-style-type: none"> * Failure to identify and divert reusable/recyclable materials 	<ul style="list-style-type: none"> * Unnecessary transport of waste to landfill (due to failure to implement waste hierarchy), and from the combustion or decomposing of this waste during treatment/disposal * Increased Air Pollution * Increased greenhouse gas emissions 	C	2	C2	Moderate Attachment I3.1 Resource Efficiency Sub Plan & Control Measures Waste Management and Pollution Control Procedure Labelling and signage Covered bins Segregated waste facilities Inspections and checklists Garbage record book Suitable sub contractor Waste transport certificates and receipts	VG	D	2	D2	Low
Offshore Marine Area Site - General Construction Works	Marine flora and fauna - general Marine flora and fauna – intake Marine flora and fauna – outlet	<ul style="list-style-type: none"> * Anchors and/or shipping resulting in damage to key value areas 	<ul style="list-style-type: none"> * Key value features * PR sensitivity area * High biodiversity areas * Other vulnerable flora and fauna 	C	3	C3	High Attachment I4.1 Marine Flora and Fauna Sub Plan & Control Measures DP1-0003 Biology assessment for siting design Navigation and general handling procedures JUB tow and positioning procedure SEPs Anchor and vessel "no go zones" Observations and sightings Inspections and checklists Dynamic Positioning (DP) class 2 offshore support vessel Inspections and checklists	VG	D	3	D3	Moderate
JUB and support vessels stationed offshore	Marine flora and fauna - general	<ul style="list-style-type: none"> * Use of lights on JUB, OSV and other support vessels leading to injury, mortality, reduced survival, interruption of migration 	<ul style="list-style-type: none"> * Marine fauna * Sea birds 	C	2	C2	Moderate Attachment I4.1 Marine Flora and Fauna Sub Plan & Control Measures Construction schedule to avoid key migration seasons Inspections and checklists	G	D	2	D2	Low
JUB Mobilisation												

Activity / Construction Method	Performance Criteria / Performance Requirement SUBJECT	Potential Hazard (Environmental Aspect & Impact Pathway)	At Risk (Potential Impact)	Probability (Table 2)	Consequence (Table 3)	Inherent Risk (Before Controls)	Controls: current or planned prior to work to ensure obligations (including performance requirements and performance criteria) are met (Table 4 - reference specific option)	Control effectiveness (Table 5)	Probability (Table 2)	Consequence (Table 3)	Residual Risk (After Controls)	
JUB mobilisation at Westernport	Marine Pests	* Introduction/translocation of marine pests and pathogens	* Westernport RAMSAR reef communities * Recreational and commercial abalone diving in the region	C	4	C4	Extreme Attachment I6.1 Marine Pest and Pathogen Management Sub Plan & Control Measures Pre-entry risk assessment Vessel inspections and cleaning JUB leg cleaning Marine pest monitoring	G	D	4	D4	High
Use of hydraulic equipment	Hazardous Materials	* Burst hydraulic hoses	* Westernport RAMSAR water quality.	C	2	C2	Moderate Attachment I2.1 Hazardous Materials Sub Plan & Control Measures EIRP Equipment checks and maintenance Inspections and checklists Spill kits	VG	D	2	D2	Low
Seabed disturbance under JUB footings	Marine flora and fauna - general	* Localised clearance of seabed	* Sandy habitat	C	1	C1	Low Attachment I4 Marine Flora and Fauna sub plan and control measures Jack up site selection (previously used for other jack up operations, away from coast and sensitive areas)	VG	C	1	C1	Low
JUB Supply and deck preparation	Marine flora and fauna - general	* Overboard loss of supplies, structures etc	* Waterquality and/or * Westernport RAMSAR	D	3	D3	Moderate Appropriate material handling procedures/work method statements Correct crane capacity JUB premobilisation procedure Attachment I2 Hazardous Materials Sub Plan & Control Measures Attachment I3 Resource Efficiency and Waste Management Sub Plan and control measures EIRP Equipment checks and maintenance Inspections and checklists Spill kits	VG	E	2	E2	Low
PERSONNEL TRANSFER												
Helicopter operations	Coastal flora and fauna	* Helicopter operations in sensitive areas or near sensitive fauna	Disturbance to sensitive fauna: * Hooded Plovers (i.e. disrupting/reducing breeding success etc) * Cetaceans (including causing stress/changes in behaviour etc) * Disturbance of local amenity	C	3	C3	High Attachment I5.1 Helicopter Management Sub Plan & Control Measures Fly-neighbourly area Wildlife regulations Flight plans and logs SEPs	G	D	3	D3	Moderate
STRUCTURES LOAD OUT - PORT OF BURNIE / GEELONG												
Use of hydraulic equipment	Hazardous Materials	* Burst hydraulic hoses	* Localised water quality.	C	2	C2	Moderate Attachment I2.1 Hazardous Materials Sub Plan & Control Measures EIRP Equipment checks and maintenance Inspections and checklists Spill kits	VG	D	2	D2	Low
SEABED PREPARATION												
Seabed Preparation	Marine flora and fauna - general	* Clearing of seabed, sandy or reef habitat (intake and outlet riser locations) * JUB establishment and movement	* Loss of high/moderate quality habitat and/or sensitive seabed/reef * Loss of biogenic habitat – seaweeds and sessile invertebrates * Intermediate to deeper benthic communities * Changes to physical structure – reduced relief and the production of rubble * Sand and sediment disturbance	B	3	B3	High Attachment I4.1 Marine Flora and Fauna Sub Plan & Control Measures Use of grout bags to avoid need for mechanical preparation DP1-0003 Biology assessment for siting design Minimise area of disturbance - accurate positioning of JUB and anchors JUB towing and positioning procedure Inspections and checklists	VG	D	3	D3	Moderate

Activity / Construction Method	Performance Criteria / Performance Requirement SUBJECT	Potential Hazard (Environmental Aspect & Impact Pathway)	At Risk (Potential Impact)	Probability (Table 2)	Consequence (Table 3)	Inherent Risk (Before Controls)	Controls: current or planned prior to work to ensure obligations (including performance requirements and performance criteria) are met (Table 4 - reference specific option)	Control effectiveness (Table 5)	Probability (Table 2)	Consequence (Table 3)	Residual Risk (After Controls)	
Seabed preparation works	Underwater Noise and Vibration	* Underwater noise	* Sensitive marine fauna (specifically whales)	C	2	C2	Moderate Attachment I7.1 Underwater Noise Sub Plan & Control Measures Use of grout bags to avoid need for mechanical preparation Noise monitoring Equipment selection Exclusion zone Short period of activity Construction schedule	VG	E	2	E2	Low
Seabed preparation works	Underwater Noise and Vibration	* Underwater noise	* Marine divers and recreational users	C	2	C2	Moderate Attachment I7.1 Underwater Noise Sub Plan & Control Measures Use of grout bags to avoid need for mechanical preparation Noise monitoring Equipment selection Exclusion zone Short period of activity Construction schedule	VG	E	2	E2	Low
Use of hydraulic equipment	Hazardous Materials	* Burst hydraulic hoses	* Localised water quality.	C	2	C2	Moderate Attachment I2.1 Hazardous Materials Sub Plan & Control Measures EIRP Equipment checks and maintenance Inspections and checklists Spill kits	VG	D	2	D2	Low
DRILLING												
Drilling	Marine Flora and Fauna Waste - General (including spoil management)	* Deposition of spoil on seabed – changed physical structure and scour and rumbling of seabed	Habitats, water quality and flora and fauna resulting from deposition of material on the seabed * physical damage, smothering * loss or damage to biota * scour of seabed	C	3	C3	High Attachment I3.1 Resource Efficiency Sub Plan & Control Measures Drilling Procedure Plume modelling Designated spoil disposal sites Adjustable discharge hose (height and range) Cuttings greater than 60mm retained ROV monitoring Plume Monitoring Seawater flushing Stop - start measures	VG	B	2	B2	High
Drilling	Marine Flora and Fauna Waste - General (including spoil management)	* Production of turbid plume	Habitats, water quality and flora and fauna resulting from release of finer sediments into water column: * light attenuation * reduction in survival	C	2	C2	Moderate Attachment I3.1 Resource Efficiency Sub Plan & Control Measures Drilling Procedure Plume modelling Designated spoil disposal sites Adjustable discharge hose (height and range) Cuttings greater than 60mm retained ROV monitoring Plume Monitoring Seawater flushing Stop - start measures	VG	E	1	E1	Low
Drilling	Underwater Noise and Vibration	* Underwater noise	* Sensitive marine fauna (specifically whales)	C	2	C2	Moderate Attachment I7.1 Underwater Noise Sub Plan & Control Measures Drill caisson PTR mounted on JUB Slow grinding drill method Noise monitoring MMOs and response procedures Exclusion zone Short period of activity Construction schedule	VG	E	2	E2	Low

Activity / Construction Method	Performance Criteria / Performance Requirement SUBJECT	Potential Hazard (Environmental Aspect & Impact Pathway)	At Risk (Potential Impact)	Probability (Table 2)	Consequence (Table 3)	Inherent Risk (Before Controls)	Controls: current or planned prior to work to ensure obligations (including performance requirements and performance criteria) are met (Table 4 - reference specific option)	Control effectiveness (Table 5)	Probability (Table 2)	Consequence (Table 3)	Residual Risk (After Controls)	
Drilling	Underwater Noise and Vibration	* Underwater noise	* Marine divers and recreational users	C	2	C2	Moderate Attachment I7.1 Underwater Noise Sub Plan & Control Measures Drill caisson PTR mounted on JUB Slow grinding drill method Noise monitoring MMOs and response procedures Exclusion zone Short period of activity Construction schedule	VG	E	2	E2	Low
Use of hydraulic equipment	Hazardous Materials	* Burst hydraulic hoses	* Localised water quality.	C	2	C2	Moderate Attachment I2.1 Hazardous Materials Sub Plan & Control Measures Hazardous materials storage requirements Refuelling at harbour or on land where possible EIRP Equipment checks and maintenance Inspections and checklists	VG	D	2	D2	Low
STRUCTURES INSTALLATION												
Use of hydraulic equipment	Hazardous Materials	* Burst hydraulic hoses	* Localised water quality.	C	2	C2	Moderate Attachment I2.1 Hazardous Materials Sub Plan & Control Measures Hazardous materials storage requirements Refuelling at harbour or on land where possible EIRP Equipment checks and maintenance Inspections and checklists	VG	D	2	D2	Low
Grouting Operations	Marine Flora and Fauna Waste - General (including spoil management)	* Release of grout to marine environment and deposition on the sea bed * Wash out into the water column	* Benthic Flora and Fauna and/or water column biota * Water quality through dispersal * Localised reef biota and ecosystems	B	1	B1	Moderate Attachment I3.1 Resource Efficiency Sub Plan & Control Measures Grouting procedure Inspection and checklists OSV and diver surveillance Optimise grout quants in mixing tub towards end of job Dipose of close to seabed Grout anti-washout agents Thermocouples to monitor grout levels	F	B	1	B1	Moderate
Riser installation works (structures, JUB footings, seabed disturbance, anchors/clump weights)	Marine Pests	* Introduction/translocation of marine pests and pathogens * Creation of disturbed areas or installation of structures that present colonising opportunities for marine pests	* Reef communities and recreational and commercial abalone diving in the region	B	4	B4	Extreme Attachment I6.1 Marine Pest and Pathogen Management Sub Plan & Control Measures JUB towing and positioning procedure Minimise areas of disturbance Marine pest monitoring	G	D	4	D4	High
COMPLETIONS												
Use of hydraulic equipment	Hazardous Materials	* Burst hydraulic hoses	* Localised water quality.	C	2	C2	Moderate Attachment I2.1 Hazardous Materials Sub Plan & Control Measures Hazardous materials storage requirements Refuelling at harbour or on land where possible EIRP Equipment checks and maintenance Inspections and checklists	VG	D	2	D2	Low
Anchor laying	Marine flora and fauna - general Marine flora and fauna – intake Marine flora and fauna – outlet	* Anchors and/or shipping resulting in damage to key value areas	* Key value features * PR sensitivity area * High biodiversity areas * Other vulnerable flora and fauna	C	2	C2	Moderate Attachment I4.1 Marine Flora and Fauna Sub Plan & Control Measures DP1-0003 Biology assessment for siting design Navigation and genral handling progedures SEPs Anchor and vessel "no go zones" Observations and sightings Inspections and checklists Small vessel (~20m) and respective anchors	VG	D	2	D2	Low

Activity / Construction Method	Performance Criteria / Performance Requirement SUBJECT	Potential Hazard (Environmental Aspect & Impact Pathway)	At Risk (Potential Impact)	Probability (Table 2)	Consequence (Table 3)		Inherent Risk (Before Controls)	Controls: current or planned prior to work to ensure obligations (including performance requirements and performance criteria) are met (Table 4 - reference specific option)	Control effectiveness (Table 5)	Probability (Table 2)	Consequence (Table 3)		Residual Risk (After Controls)
Tunnel flooding	Marine flora and fauna - general Marine flora and fauna - intake	Entrainment and entrapment of marine biota	Reduced marine larvae population	D	4	D4	High	Filter cage with 50mm spacing. Flooding valve 12" diameter Controlled filling rate e.g. 6-8 hrs for each tunnel	VG	E	2	E2	Low

ATTACHMENT C - ENVIRONMENTAL CONSEQUENCE LEVEL DEFINITIONS



Consequence Level		1 - Negligible	2 - Minor	3 - Moderate	4 - Major	5 - Extreme
Category	Sub Category	Minimal impact in a localised area within natural variability	Low impact in a localised or regional area with a functional recovery within less than 1 year	Medium impact in a localised or regional area with a functional recover of 1 to 5 years	High impact in a localised or regional area with a functional recovery within 5 to 10 years	Very high impact in a regional area with functional recover in greater than 10 years if at all
Environmental	Ecosystem Function (need to consider resilience and resistance)	Alteration or disturbance to ecosystem interactions in the localised area, if any, unlikely to be detectable and within expected natural seasonal variation / occurrence.	Alteration or disturbance to ecosystem interaction in the localised or regional area, may be detectable but within expected natural annual variation / occurrence. Functional recovery within less than 1 year.	Alteration or disturbance to ecosystem interactions in the localised or regional area, detectable but within expected natural short-term variation / occurrence. Functional recovery within 1 to 5 years.	Alteration or disturbance to ecosystem interactions in the localised or regional area, detectable and beyond expected natural variation / occurrence. Functional recovery within 5 to 10 years.	Alteration or disturbance to ecosystem interactions in the regional area, substantially beyond expected natural variation / occurrence to irreversible. Functional recovery in greater than 10 years if at all.
	Fauna and Flora Communities and Species	Loss of individuals not apparent and without reduction in localised population viability (e.g. Mortality likely to be no greater than population experiences within natural annual variability).	Loss of small number of individuals without reduction in viability of population in the localised or regional area (e.g. Mortality likely to be no greater than population experiences within natural annual variability). Functional recovery within less than 1 year.	Loss of individuals leads to reduction in viability of population in the localised or regional area. Functional recovery within 1 to 5 years.	Loss of large number of individuals leads to a high impact on populations in the localised or regional area. Functional recovery within 5 to 10 years.	Long-term impact on populations in the regional area that may not be recoverable. Functional recovery in greater than 10 years if at all.
Social	Aboriginal Heritage Sites	No measurable impact on indigenous heritage sites in the project area.	Partial removal of one or more indigenous archaeological sites of low significance.	Complete or partial disturbance to between one and five indigenous archaeological sites of low to moderate significance.	Complete or partial disturbance to six or more indigenous archaeological sites of low-moderate significance.	Complete or partial disturbance to one or more indigenous archaeological sites of high significance.
	Historical Heritage Sites	No measurable impact on historical heritage sites.	Detectable impact to state or Commonwealth significant site with heritage values remaining largely intact.	Partial reduction in heritage value intrinsic to state or Commonwealth significant site.	Substantial reduction in heritage value intrinsic to state or Commonwealth significant site.	Complete loss of heritage value intrinsic to state or Commonwealth significant site.
	Maritime Heritage Sites	No measurable impact on maritime heritage sites.	Detectable impact to state or Commonwealth significant site with heritage values remaining largely intact.	Partial reduction in heritage value intrinsic to state or Commonwealth significant site.	Substantial reduction in heritage value intrinsic to state or Commonwealth significant site.	Complete loss of heritage value intrinsic to state or Commonwealth significant site.
	Health and Safety	Injury or illness treatable by basic first aid - no lasting effects on health.	Injury or illness requires professional medical assistance to treat.	Injury or illness requires admittance to hospital to treat.	Serious injury or illness requiring long term medical treatment.	Fatality or permanent disability as a result of injury or illness.
	Recreation	Temporary and localised impacts on recreation - no lasting effects.	Short term impacts on recreational activities within the localised area or regional area. Functional recovery within less than 1 year.	Impacts on recreational activities within the localised area or regional area that negatively impact on access to recreation opportunities and/or participation rates. Functional recovery within 1 to 5 years.	Impacts on recreational activities within the localised area or regional area that significantly negatively impact on access to recreation opportunities and/or participation rates. Functional recovery within 5 to 10 years.	Access to recreational activities within the regional area permanently reduced. Functional recovery in greater than 10 years if at all.
	Amenity (Physical factors e.g. Noise, air and water etc.)	Temporary localised impacts on amenity - no lasting effects.	Short term impacts on amenity to the localised area or regional area. Functional recovery within less than 1 year.	Impacts on amenity to the localised area or regional area that negatively alter perceptions of the area. Functional recovery within 1 to 5 years.	Impacts on amenity to the localised area or regional area that significantly negatively alter perceptions of the area. Functional recovery within 5 to 10 years.	Amenity of the regional area permanently negatively altered. Functional recovery in greater than 10 years if at all.
	Tourism	Limited and short-term reduction in tourist visitation not outside usual variation. No significant impact on tourism businesses. Region still seen as attractive place to visit. No recovery necessary.	Short-term reduction in tourism use. Recovery within less than 1 year.	Reduction in tourism use. Recovery within 1 to 5 years.	Large reduction of tourism uses. Business viability compromised across wide range of sectors with substantial business failure in both direct and flow-on sectors. Recovery within 5 to 10 years.	Permanent loss of iconic tourism assets of regional significance. Large flow-on effects to supporting businesses. Functional recovery in greater than 10 years if at all.
	Commercial Fishing	Limited and short-term reduction in activity within the localised area. No significant impact on businesses. No recovery necessary.	Short-term reduction in commercial activity, in the localised area or regional area. Functional recovery within less than 1 year.	Reduction of 5 - 30% in sustainable yield of the fishery in the localised area or	Reduction of 30 - 90% in sustainable yield of the fishery in the localised area or regional area. Functional recovery within 5 to 10 years.	Commercial fishing completely and permanently prohibited or destroyed in the regional area. Functional recovery in greater than 10 years if at all.
	Labour Markets	Limited and short-term impact on labour markets. No significant impact on business operations. No recovery necessary.	Short-term reduction in available local labour. Functional recovery within less than 1 year.	Medium-term reduction in available local labour. Functional recovery within 1 to 5 years.	Large reduction in available local labour. Business viability compromised across wide range of sectors. Functional recovery within 5 to 10 years.	Permanent loss of local labour. Large flow on effects to local businesses. Functional recovery in greater than 10 years if at all.