

Victorian Desalination Project

WATERSURE

Environmental Risk Register

Document No: ENV-000-PL-003

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OPERATION & MAINTENANCE
ENVIRONMENTAL RISK REGISTER

Risk #	O&M Activity	Potential Hazard (resulting from activity)	Potential Impact (Receptor)	Project Design Controls	Likelihood	Severity		Raw Risk (After Design Controls)	O&M Controls: implemented during O&M activities to ensure obligations are met	Effectiveness	Likelihood	Severity		Residual Risk (After O&M Controls)
Definitions for raw risk, residual risk, severity, likelihood, risk scoring and control effectiveness can be found on Definitions tab														
Desalination Plant														
1	Start up and operation of Seawater Lift Pumps	Suction of seawater through marine intake structures potentially entraining marine flora and fauna.	Potential loss of marine flora and fauna individuals or biodiversity through entrainment into the marine intake structures. Includes changes to recruitment and marine community structure in the immediate vicinity of the marine intake structures.	DP1-0001 - Area 1 Design Brief, DP1-0035 - Intake Structures and DP1-0005 - Seawater Lift Pump Station - Pumps: <ul style="list-style-type: none">• Design, install and verify intake static screens with grill size at 50mm precludes marine mammals and other large marine organisms from entering the marine intake structures.• Design, install and verify the Seawater Lift Pump system allows for flows with associated velocity no greater than 0.15m/s across the intake static screens.	E	2	E2	Low	<ul style="list-style-type: none">• Manage and maintain the intake structure as specified in the Computerised Maintenance Management System (CMMS) 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including cleaning static screens and ensuring they are in place during operation to prevent entrainment of marine flora or fauna into the marine intake structure.• Marine monitoring (refer to Environmental Monitoring Schedule - Operational Marine Monitoring Program (OMMP) and Baseline Marine Monitoring Program (BMMP)).• O&M Manual #01: Intake structure and tunnel refers.	VG	E	2	E2	Low
2	Start up and operation of Seawater Lift Pumps and associated valves	Seawater Lift Pumps creating an airborne noise source.	Potential noise source that impacts upon neighbourhood amenity.	DP1-0001 - Area 1 Design Brief, DP2-0001 - Plant Process Design Concept, DP1-0005 - Seawater Lift Pump Station - Pumps and DP0-0200 - Project Wide noise control: <ul style="list-style-type: none">• Design, install and verify selection and location of pumps ensure that there is no airborne noise emitted during operation.• Design, install and verify surrounding sand dunes and concrete cover over the Seawater Lift Pump Station that reduces noise emission generated.	E	1	E1	Low	<ul style="list-style-type: none">• Ensure pumps are within designated chambers of the Seawater Lift Pump Station.• Manage and maintain the Seawater Lift Pumps in accordance with the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Monitor noise (refer to Environmental Monitoring Schedule - noise and vibration monitoring).• O&M Manual #05: Seawater Lift Pump Station refers.	VG	E	1	E1	Low
3	Start up and operation of Seawater Lift Pumps and associated valves	Seawater Lift Pumps creating an underwater noise source.	Potential discomfort to recreational users and marine cetaceans.	DP1-0001 - Area 1 Design Brief, DP2-0001 - Plant Process Design Concept, DP1-0005 - Seawater Lift Pump Station - Pumps and DP0-0200 - Project Wide noise control: <ul style="list-style-type: none">• Design, install and verify a selection of pumps to ensure compliance with performance requirement for underwater noise.	E	2	E2	Low	<ul style="list-style-type: none">• Ensure pumps are within designated chambers of the Seawater Lift Pump Station.• Manage and maintain Seawater Lift Pumps in accordance with the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Monitor noise (refer to Environmental Monitoring Schedule - noise and vibration monitoring).• O&M Manual #05: Seawater Lift Pump Station refers.	VG	E	2	E2	Low
4	Seawater Lift Pumps - Intake and DMPF shock chlorination process	Malfunction of equipment leading to leak of diluted sodium hypochlorite into the ocean through marine intake or outlet structures.	Potential for adverse effects to marine flora and fauna in the immediate vicinity of marine intake and outlet structures.	DP1-0001 - Area 1 Design Brief and DP2-0001 - Plant Process Design Concept: Design focus on maximising safety and minimising potential to cause environmental impact, including: <ul style="list-style-type: none">• Design, install and verify the operation of an automated, closed loop, controlled dosing equipment associated with on-line analysers that stops dosing system if there is an instrument or control failure.	E	3	E3	Moderate	<ul style="list-style-type: none">• Leak check prior to operation.• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including inspecting system for leaks. <p>Response:</p> <ul style="list-style-type: none">• Automatic shutdown of the system to prevent sodium hypochlorite reaching outfall chamber.• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures for shock chlorination.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified.• O&M Manual #02: Intake and DMPF Chlorination refers.	VG	E	2	E2	Low

Operation and Maintenance - Environmental Risk Register

Risk #	O&M Activity	Potential Hazard (resulting from activity)	Potential Impact (Receptor)	Project Design Controls	Likelihood	Severity		Raw Risk (After Design Controls)	O&M Controls: implemented during O&M activities to ensure obligations are met	Effectiveness	Likelihood	Severity		Residual Risk (After O&M Controls)
5	Seawater Lift Pumps - Running of pumps	Leaks from pumps could potential slowly discharge to the marine environment (e.g. ~8.6L of food grade oil in seal chamber of each pump) through Seawater Lift Pump station by-pass and marine outlet structures.	Potential for adverse effects to marine flora and fauna in the immediate vicinity of marine outlet structures.	DP1-0001 - Area 1 Design Brief, DP2-0001 - Plant Process Design Concept and DP1-0005 - Seawater Lift Pump Station - Pumps: Design focus on maximising safety and minimising potential to cause environmental impact, including: • Design, install and verify Seawater Lift Pumps that contain limited quantity of oil in sealed chamber of pumps. • Design, install and verify Seawater Lift Pumps equipped with oil/water sensor connected to on-line alarm.	E	2	E2	Low	<ul style="list-style-type: none"> Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including: <ul style="list-style-type: none"> verifying of operation of oil/water sensors with pump seal chamber verifying hard interlock of oil/water sensor within pump seal chamber which stops the pump and triggers an alarm. Response: <ul style="list-style-type: none"> Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures for Seawater Lifting Pumps Automatic shutdown of process or system as required Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. O&M Manual #05: Seawater Lift Pump Station refers. 	VG	E	2	E2	Low
6	Seawater Drum Screen screenings disposal via the dewatering screw and skips	Odour from screenings due to prolonged presence on-site in skip bins.	Potential impact on local community and complaints.	DP2-0001 - Plant Process Design Concept and DP2-0007 - Screening and Feed Pump station Process Mechanical, Piping: • Design of screenings treatment process (alternative option provided - maceration and mixing with DMPF sludge or segregation with on-site dewatering) in order to minimise the volume of screenings produced.	D	2	D2	Low	<ul style="list-style-type: none"> Ensure procedure and service agreement are in place with EPA Licensed sub-contractor for when screenings are segregated and dewatered on-site, to limit the time screenings skip bins remain on site. Use covered skips to minimise risk of offensive odours during transport. Manage and maintain Seawater Drum Screens and macerators as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to ensure skips are removed to prevent any possible odour. Monitor waste generation (refer to Environmental Monitoring Schedule - Resource Efficiency). O&M Manual #06: Seawater Drum Screens and macerators refers. 	VG	E	2	E2	Low
7	Disposal of screenings	Inappropriate offsite waste management including: • Inappropriate handling, loading and transport of screenings not in accordance with the EPA Waste Management Policies • Unforeseen contamination due to inappropriate or illegal disposal of waste.	Potential contamination of environment by waste, impact on land or water at location of disposal, and increase in truck traffic impacting of local amenity.	DP2-0001 - Plant Process Design Concept and DP2-0007 - Screening and Feed Pump station Process Mechanical, Piping: • Design of screenings treatment process (alternative option provided - maceration and mixing with DMPF sludge or segregation with on-site dewatering) in order to minimise the volume of screenings produced.	D	3	D3	Moderate	<ul style="list-style-type: none"> Ensure procedure and service agreement are in place with EPA Licensed sub-contractor for when screenings are segregated and dewatered on-site, to limit the time screenings skip bins remain on site. Use covered skips to minimise risk of offensive odours during transport. Manage and maintain Seawater Drum Screens and macerators as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to ensure skips are removed to prevent any possible odour. Monitor waste generation (refer to Environmental Monitoring Schedule - resource efficiency). O&M Manual #06: Seawater Drum Screens and macerators refers. 	VG	D	2	D2	Low
8	Seawater Drum Screen screenings disposal via the dewatering screw and skips	Leaks from the dewatering screw or skip.	Potential runoff of seawater onto the ground resulting in local contamination of soil and subsequent potential contamination of groundwater/surface water systems.	DP2-001 - Plant Process Design Concept: Design, install and verify the dewatering screw and skip within a concrete hardstand which slopes toward a sump. Water is collected in the sump is pumped back to the screen and feed diffuser.	D	2	D2	Low	<ul style="list-style-type: none"> Ensure the dewatering screw and skips remain located inside concrete hardstand area and sumps are clear of debris. Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. Response: <ul style="list-style-type: none"> Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures for Seawater Drum screens and macerators (containment and clean up). Automatic shutdown of process or system as required. Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan. O&M Manual #06: Seawater Drum Screens and macerators refers. O&M Manual #36: Buildings and roads refers. 	VG	E	2	E2	Low

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9	Transport of bulk chemicals (general)	Accident during transport (off site) - chemical spill on road	Potential impacts on local community and road users and complaints, potential localised contamination of soils or groundwater/surface water systems and potential adverse impacts on flora and fauna	DP2-0001 - Plant Process Design Concept: • Process designed to optimise and reduce use of chemicals.	D	3	D3	Moderate	<ul style="list-style-type: none"> Ensure supply agreements are in place with recognised chemical suppliers who are able to document their compliance with road safety regulation, dangerous goods transportation regulation, quality systems and incident response. Notify CFA of expected route of chemical delivery. <p>Response:</p> <ul style="list-style-type: none"> Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. 	G	E	2	E2	Low
10	Transport of bulk chemicals (general)	Accident during transport (within site boundaries) - chemical spill on road within site.	Potential localised contamination of soils or groundwater/surface water systems affecting surface water and groundwater systems downstream of Desalination Plant.	DP2-0001 - Plant Process Design Concept: • Transport of chemicals via expected routes. • Design, install and verify closed catchment drainage system. • Design, install and verify internal roads and pavement in accordance with codes.	D	3	D3	Moderate	<ul style="list-style-type: none"> Ensure supply agreements are in place with recognised chemical suppliers who are able to document their compliance with road safety regulation, dangerous goods transportation regulation, quality systems and incident response. Notify CFA of expected route of chemical delivery. Ensure designated chemical delivery route within site boundaries and speed limitation. Inductions for delivery drivers. Provide spill kits and appropriate level of training for site operators to respond to spills. Ensure chemical spill response arrangements including suitable service providers and equipment suppliers are detailed in emergency preparedness plans, operational plans and/or procurement systems for chemical removal, cleaning and disposal. <p>Response:</p> <ul style="list-style-type: none"> Incident Management Plan as specified – All incidents will be contained, material disposed of, and then investigated in accordance with appropriate operating procedures. 	G	E	2	E2	Low
11	Transport of bulk chemicals (general)	Failure during chemical delivery - chemical spill in delivery bays.	Potential localised contamination of soils or groundwater/surface water systems affecting surface water and groundwater systems downstream of Desalination Plant.	DP2-0001 - Plant Process Design Concept: • Design, install and verify chemical delivery areas (bunds), including hydro/leak testing. • Truck will be located within designated unloading bund during the unloading operation • Bund for truck unloading area is designed to contain volume of tanker compartment.	D	3	D3	Moderate	<ul style="list-style-type: none"> Manage and maintain bunded areas as specified the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. Ensure bunded areas are clear of debris and functioning correctly. Provide spill kits and appropriate level of training for site operators to respond to spills. Inductions for delivery drivers. Ensure chemical spill response arrangements including suitable service providers and equipment suppliers are detailed in emergency preparedness plans, operational plans and/or procurement systems for chemical removal, cleaning and disposal. <p>Response:</p> <ul style="list-style-type: none"> As specified in the Incident Management Plan - Any incident will be contained; materials disposed of, and then investigated in accordance with appropriate operating procedures. Any spills or leaks from within the bund will be captured, assessed and disposed of in accordance with O&M Manuals #02, 07, 08, 09, 13, 15, 20, 21 and 26. O&M Manuals #02, 07, 08, 09, 13, 15, 20, 21 and 26 refer. 	VG	E	2	E2	Low
12	Storage of bulk chemicals (general)	Failure of chemical storage - chemical spill in storage area.	Potential localised contamination of soils or groundwater/surface water systems affecting surface water and groundwater systems downstream of Desalination Plant.	DP2-0001 - Plant Process Design Concept: Design, install and verify chemical delivery areas (bunds), including hydro/leak testing: • Storage of chemicals in accordance with designated areas • Each chemical storage tank used on the plant is contained within a dedicated bunded area. • Tanks have level transmitter and high level switches to interlock feed system and prevent overfilling. • Storage tanks are within bunded area so overflow will be contained • Bunded area equipped with level sensor to detect leakage.	D	2	D2	Low	<ul style="list-style-type: none"> Manage and maintain bunded areas as specified the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. Ensure bunded areas are clear of debris and functioning correctly. Provide spill kits and appropriate level of training for site operators to respond to spills. Inductions for delivery drivers. Ensure chemical spill response arrangements including suitable service providers and equipment suppliers are detailed in emergency preparedness plans, operational plans and/or procurement systems for chemical removal, cleaning and disposal. <p>Response:</p> <ul style="list-style-type: none"> As specified in the Incident Management Plan - Any incident will be contained; materials disposed of, and then investigated in accordance with appropriate operating procedures Any spills or leaks from within the bund will be captured, assessed and disposed of in accordance with O&M Manuals #02, 07, 08, 09, 13, 15, 20, 21 and 26. O&M Manuals #02, 07, 08, 09, 13, 15, 20, 21 and 26 refer. 	VG	E	2	E2	Low

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13	Transfer and dosing of bulk chemicals	Leak on injection line - diluted chemical leak in chemical culvert.	Potential localised contamination of soils or groundwater/surface water systems affecting surface water and groundwater systems downstream of Desalination Plant.	DP2-0001 - Plant Process Design Concept: Design, install and verify chemical culverts, including hydro/leak testing: <ul style="list-style-type: none">• Transfer and dosing of chemicals in accordance with designated areas (chemical culverts).• Flow meter to detect any leakage.	E	2	E2	Low	<ul style="list-style-type: none">• Manage and maintain chemical culverts as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Ensure chemical culverts are clear of debris and functioning correctly.• Provide spill kits and appropriate level of training for site operators to respond to spills.• Inductions for delivery drivers.• Ensure chemical spill response arrangements including suitable service providers and equipment suppliers are detailed in emergency preparedness plans, operational plans and/or procurement systems for chemical removal, cleaning and disposal. <p>Response:</p> <ul style="list-style-type: none">• As specified in the Incident Management Plan - Any incident will be contained; materials disposed of, and then investigated in accordance with appropriate operating procedures.• Any spills or leaks from within the bund will be captured, assessed and disposed of in accordance with O&M Manuals #02, 07, 08, 09, 13, 15, 20, 21 and 26. <p>• O&M Manuals #02, 07, 08, 09, 13, 15, 20, 21 and 26 refer.</p>	VG	E	1	E1	Low
14	Waste management (general)	Inappropriate waste management including: <ul style="list-style-type: none">• Inappropriate handling, loading and transport of waste, not in accordance with the EPA Waste Management Policies• Unforeseen contamination due to inappropriate or illegal disposal of waste.	Potential localised contamination of soils or groundwater/surface water systems and potential adverse impacts on flora and fauna.	DP2-001 - Plant Process Design Concept: Design avoids and minimises the waste, and establishes designated storage and handling areas.	D	3	D3	Moderate	<ul style="list-style-type: none">• Characterisation of waste prior to off-site disposal, as per EPA IWRG 631 and IWRG701• Use of a EPA Licensed transporter and landfill for the disposal of all Industrial Waste• Procedure and service agreement with EPA Licensed sub-contractor, which limits the time skip bins remain on site• All waste disposal to occur in accordance with EPA guidelines• Copies of EPA waste transport certificates to be retained and filed for the transport of Prescribed Industrial Waste• Ensure sufficient resources are available for waste pickup• Make use of skips, covered transport, waste transport certificates and receipts• Trucks to use major roads where possible (not backstreets) and adhere to designated route.• Manage and maintain Seawater Drum Screens and macerators as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Monitor waste generation (refer to Environmental Monitoring Schedule - resource efficiency).	VG	E	2	E2	Low
15	Start up and operation of the Dual Media Pressure Filtration feed pumps and Front Face valves	Feed pumps and Front Face valve create airborne noise source.	Potential noise source that impacts upon neighbourhood amenity.	DP2-0001 - Plant Process Design Concept and DP0-0200 - Project Wide noise control: <ul style="list-style-type: none">• Design, install and verify pumps to minimise noise emissions. Location of pump within building to ensure that there is no airborne noise impacts during operation• Noise assessment completed during commissioning.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain DMPF and DMPF backwash systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to ensure optimal operation.• Monitor noise (refer to Environmental Monitoring Schedule - noise and vibration monitoring). <p>• O&M Manual #10: Pre-treatment - DMPF and O&M Manual #11: Pre-treatment - DMPF Backwash refer.</p>	VG	E	2	E2	Low
16	Production of sludge from Dual Media Pressure Filtration	Odour from sludge due to prolonged presence in on-site skip bins.	Potential impact on local community and complaints.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• Sludge system ensures the sludge has low organic content, that it is thickened, dewatered and then loaded out.• Sludge is contained in covered skips and located within the sludge building to minimise fugitive emissions.• Sludge skips equipped with level sensor to prevent overloading.• Odour assessment during commissioning.	D	2	D2	Low	<ul style="list-style-type: none">• Dispose of sludge in a timely manner as specified.• Ensure procedure and service agreement in place with EPA Licensed sub-contractor for when screenings are segregated and dewatered on-site, to limit the time screenings skip bins remain on site.• Manage and maintain DMPF and DMPF backwash systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Monitor waste generation and air quality (refer to Environmental Monitoring Schedule - Resource Efficiency and Air Quality). <p>• O&M Manual #10: Pre-treatment - DMPF and O&M Manual #11: Pre-treatment - DMPF Backwash refer.</p>	VG	E	2	E2	Low

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17	Production of sludge from Dual Media Pressure Filtration	Failure of sludge clarification system (Densadeg) leading to excess of suspended solids in supernatant sent to Brine and to marine outlet.	Potential adverse effects to marine flora and fauna in the immediate vicinity of the marine outlet structures.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• Chemical use to promote coagulation, flocculation and sedimentation of suspended solids within the Densadeg.• Turbidity of the clarified water from the Densadeg is continuously measured and controlled by regulating the injection of chemicals . Online monitoring associated with warning level that triggers a system response, and alarms levels which trigger an operator response and corrective action procedures (see O&M Manual).• Dosing of chemicals into the Sludge Treatment system is automatically controlled according to the required flow rate and dosing rate.• Control loop will slow down the chemical feed pump automatically if there is excess chemical flow.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the polymer and sludge systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. <p>Response on detection:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures• Automatic shutdown of the system as specified.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <ul style="list-style-type: none">• O&M Manual #25:Polymer system (lime and sludge), O&M Manual #26: Sludge - Ferric sulphate and O&M Manual #25: Sludge Process - Densadeg (thickening) refer.	VG	E	2	E2	Low
18	Disposal of sludge waste	Inappropriate offsite waste management including: <ul style="list-style-type: none">• Inappropriate handling, loading and transport of backwash sludge not in accordance with the EPA Waste Management Policies.• Unforeseen contamination due to inappropriate or illegal disposal of waste.	Potential contamination of environment by waste, impact on land or water at location of disposal, and increase in truck traffic impacting of local amenity.	DP2-0001 - Plant Process Design Concept: <ul style="list-style-type: none">• Design minimises waste production and provides designated on-site storage and handling areas.	D	3	D3	Moderate	<ul style="list-style-type: none">• Characterisation of waste prior to off-site disposal, as per EPA IWRG 631 and IWRG701• Use of a EPA Licensed transporter and landfill for the disposal of all Industrial Waste• Procedure and service agreement with EPA Licensed sub-contractor, which limits the time skip bins remain on site• All waste disposal to occur in accordance with EPA guidelines• Copies of EPA waste transport certificates to be retained and filed for the transport of Industrial Waste• Ensure sufficient resources are available for waste pickup• Make use of skips, covered transport, waste transport certificates and receipts• Trucks to use major roads where possible (not backstreets) and adhere to designated route.• Manage and maintain the sludge dewatering and load out system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Monitor waste generation (refer to Environmental Monitoring Schedule - resource efficiency). <ul style="list-style-type: none">• O&M Manual #28: Sludge - Dewatering and load out refers	VG	E	2	E2	Low
19	Disposal of sludge waste (noise)	Increased truck traffic on local roads. Inappropriate use of local roads.	Potential noise source that impacts upon neighbourhood amenity.	DP2-0001 - Plant Process Design Concept and DP0-0200 - Project Wide Operational noise control: <ul style="list-style-type: none">• Design, install and verify internal road network, dunes and location of sludge loading area.• Design minimises waste production and associated traffic.	D	3	D3	Moderate	<ul style="list-style-type: none">• Manage and maintain the sludge dewatering and load out system in accordance with the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Supply agreement with recognised waste disposal suppliers able to document their compliance with road safety regulation, dangerous goods transportation regulation, quality systems and incident response.• Trucks to use major roads where possible (not backstreets) and adhere to designated route.• Develop and implement a traffic management plan for movements to and from site.• Ensure trucks use designated roads within site.• Ensure drivers are inducted and aware of the traffic management plan.• Where practicable limit sludge removal to normal daytime operating hours.• Monitor noise (refer to Environmental Monitoring Schedule - noise and vibration monitoring). <ul style="list-style-type: none">• O&M Manual #28: Sludge - Dewatering and load out refers.	G	D	2	D2	Low

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20	Reverse Osmosis chemical dosing	Potential for incorrect chemical dosing (antiscalant, caustic soda) leading to off specification brine sent to outfall.	Potential for adverse effects to marine flora and fauna and breach of discharge licence.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• Dosing of chemicals is under an automatically controlled closed-loop (flow rate and dose rate), which reduces chemical use when a set point is approached and stops chemical dose when a control set point is breached.• Flow settings have warning levels that trigger a system response.• Flow settings have alarms levels which trigger an operator response and corrective action procedures.• On-line monitoring of effluent prior to entering the outlet tunnel.	E	2	E2	Low	<ul style="list-style-type: none">• Manage and maintain the Reverse Osmosis and Stabilisation ponds systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Marine monitoring (refer to Environmental Monitoring Schedule – Operational Marine Monitoring Program and Baseline Marine Monitoring Program). <p>Response:</p> <ul style="list-style-type: none">• Automatic shutdown of the system will prevent off specification brine being sent to outfall.• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #13 to #17: Reverse Osmosis, O&M Manual #29: Stabilisation ponds and Neutralisation tanks, and O&M Manual #04: Outlet, Off specs and RO Sodium Bisulphite refer.</p>	VG	E	2	E2	Low
21	Reverse Osmosis 1st and 2nd pass pump start up and operation	Pumps create airborne noise source.	Potential noise source that impacts upon neighbourhood amenity.	DP2-0001 - Plant Process Design Concept and DP0-0200 - Project Wide noise control: <ul style="list-style-type: none">• Design and selection of pumps and design and location of Reverse Osmosis building ensure that there is no airborne noise impacts during start up and operation.• Noise assessment completed during commissioning.	E	2	E2	Low	<ul style="list-style-type: none">• Manage and maintain the Reverse Osmosis and Stabilisation CIP systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to ensure optimal operation of pumps.• Monitor noise (refer to Environmental Monitoring Schedule - noise and vibration monitoring). <p>• O&M Manual #14: RO 1st pass, O&M Manual #16: RO 2nd pass and O&M Manual #17: RO CIP and preservation refer .</p>	VG	E	2	E2	Low
22	Production of brine (concentrate) from Reverse Osmosis	Production of out of specification brine and / or incorrect dilution factor at mixing zone	Potential for adverse effects to marine flora and fauna and breach of discharge approval	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• Dosing is under an automatically controlled closed-loop to the flow rate, including Seawater Lift Pump station by-pass to provide sufficient flow for mixing.• Flow settings have warning levels that trigger a system response.• Flow settings have alarms levels which trigger an operator response and corrective action procedures.	D	3	D3	Moderate	<ul style="list-style-type: none">• Manage and maintain the Reverse Osmosis and Outlet systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Marine monitoring (refer to Environmental Monitoring Schedule - Operational Marine Monitoring Program and Baseline Marine Monitoring Program). <p>Response:</p> <ul style="list-style-type: none">• Automatic shutdown of the system will prevent out of specification brine reaching outfall chamber.• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #14, #16 and #17: Reverse Osmosis, O&M Manual #29: Stabilisation ponds and Neutralisation tanks, and O&M Manual #04: Outlet, Off specs and RO Sodium Bisulphite refer.</p>	VG	E	2	E2	Low
23	Discharge of brine (concentrate) via outlet structures	Discharge of out of specification brine, incorrect dilution via outfall nozzles or leaking of outlet structures.	Potential for adverse effects to marine flora and fauna and breach of discharge approval.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• Installation and verification of outlet structures. Confirmation of velocity from outfall nozzles.• Dosing is under an automatically controlled closed-loop to the flow rate, including Seawater Lift Pump station by-pass to provide sufficient flow for mixing.• Flow settings have warning levels that trigger a system response.• Flow settings have alarms levels which trigger an operator response and corrective action procedures.	D	3	D3	Moderate	<ul style="list-style-type: none">• Manage and maintain the Reverse Osmosis and Outlet systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Regularly inspect outlet structures.• Marine monitoring (refer to Environmental Monitoring Schedule - Operational Marine Monitoring Program and Baseline Marine Monitoring Program). <p>Response:</p> <ul style="list-style-type: none">• Automatic shutdown of the system will prevent out of specification brine reaching outfall chamber.• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #14, #16 and #17: Reverse Osmosis, O&M Manual #29: Stabilisation ponds and Neutralisation tanks, and O&M Manual #04: Outlet, Off specs and RO Sodium Bisulphite refer.</p>	VG	E	2	E2	Low

Risk #	O&M Activity	Potential Hazard (resulting from activity)	Potential Impact (Receptor)	Project Design Controls	Likelihood	Severity		Raw Risk (After Design Controls)	O&M Controls: implemented during O&M activities to ensure obligations are met	Effectiveness	Likelihood	Severity		Residual Risk (After O&M Controls)
24	Cleaning of Reverse Osmosis membrane	Disposal Cleaning In Place (CIP) effluent to concentrate outlet.	Potential for adverse effects to marine flora and fauna and breach of discharge approval.	DP2-0001 - Plant Process Design Concept: Design, install and verify that CIP fluid is neutralised within neutralisation tank and associated piping loop, sent to stabilisation ponds for further treatment (including further neutralisation if required) prior to disposal to concentrate outlet.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the Reverse Osmosis CIP and Stabilisation ponds systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Marine monitoring (refer to Environmental Monitoring Schedule - Operational Marine Monitoring Program and Baseline Marine Monitoring Program). <p>Response:</p> <ul style="list-style-type: none">• Automatic shutdown of the system will prevent concentrate reaching outlet chamber.• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #17: Reverse Osmosis CIP and preservation, O&M Manual #29: Stabilisation ponds and Neutralisation tanks refer.</p>	VG	E	2	E2	Low
25	Cleaning of Reverse Osmosis membrane	Leak from stabilisation pond leading to discharge of CIP effluent to land.	Potential localised contamination of soils or groundwater/surface water systems.	DP2-0001 - Plant Process Design Concept: Design, install and verify stabilisation pond and drainage system design.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain Stabilisation ponds and neutralisation systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. <p>Response:</p> <ul style="list-style-type: none">• Automatic shutdown of the system will prevent out of specification effluent reaching outlet chamber• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures• Automatic shutdown of the system as specified• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #29: Stabilisation ponds and Neutralisation tanks refers.</p>	VG	E	2	E2	Low
26	Post Treatment disposal of water through out off specification line	Off specification water containing chlorine sent to concentrate outlet through off specification line.	Potential for adverse effects to marine flora and fauna and breach of discharge approval.	DP2-0001 - Plant Process Design Concept: Design, install and verify automatically controlled sequence for opening the off specification line requires chlorine dosing to stop prior to opening the valve and for sodium bisulphite (SBS) dosing to neutralises the-chlorine content.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the chlorination and treated water tank systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. <p>Response:</p> <ul style="list-style-type: none">• Automatic shutdown of the system will prevent out of specification water reaching outlet chamber.• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures.• Automatic shutdown of the system as specified.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #21: Post treatment – Chlorination, O&M Manual #22: Potabilisation Process - Balancing towers and Treated Water Storage Tanks, and O&M Manual #04: Outlet, Off specs and RO Sodium Bisulphite refer.</p>	VG	E	2	E2	Low
27	Storage of treated water	Overflow of drinking water from Treated Water Storage Tanks during operation.	Potential adverse effects on downstream biological communities in adjacent wet lands.	DP2-0001 - Plant Process Design Concept: Design, install and verify automatically controlled water level regulation in the Treated Water Storage Tanks, with overflow design through stone gabion cascade.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the Balancing Towers and Treated Water systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Monitoring surface water quality (refer to Environmental Monitoring Schedule - Surface Water Quality). <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures.• Automatic shutdown of process or system as required.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #22: Balancing Towers and Treated Water Storage Tanks refers.</p>	VG	E	2	E2	Low

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28	Plant services chilled water plant	Failure of chilled water plant leading to release of Ammonia.	Potential adverse effects on local community, and flora and fauna.	DP2-0001 - Plant Process Design Concept and DP2-0241 - Chilled water plant: Design, install and verify appropriate containment.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the HVAC and Chilled Water systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures• Automatic shutdown of process or system as required• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <ul style="list-style-type: none">• O&M Manual 43: HVAC and Chilled Water Plant refers.	VG	E	2	E2	Low
29	Plant services electrical transformers	Failure of electrical transformer leading to oil leak or spill	Potential for local adverse effects on groundwater/surface water systems, and flora and fauna.	DP2-0001 - Plant Process Design Concept: Design, install and verify electrical transformers are contained within dedicated bunded areas.	E	2	E2	Low	<ul style="list-style-type: none">• Manage and maintain the electrical systems as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures• Automatic shutdown of process or system as required.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified.• Implement Incident Management Plan as specified - Any incident will be contained, material disposed of, and investigation initiated in accordance with appropriate operating procedures.• Ensure chemical spill response arrangements including suitable service providers and equipment suppliers are detailed in emergency preparedness plans, operational plans and/or procurement systems for chemical removal, cleaning and disposal. <ul style="list-style-type: none">• O&M Manual #30: Electrical System refers.	VG	E	2	E2	Low
30	Plant services waste water collection	Failure of the waste water collection system leading to release of untreated waste water to land.	Potential for local adverse effects on groundwater/surface water systems, and flora and fauna.	DP2-0001 - Plant Process Design Concept and DP2-0111 - Site wide sewer: Design, install and verify waste water system contained within site drainage.	D	2	D2	Low	<ul style="list-style-type: none">• Operate the systems as specified in O&M Manual #41: Drainage and sewer system.• Manage and maintain the sewer system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures.• Automatic shutdown of process or system as required.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified.• Implement Incident Management Plan as specified - Any incident will be contained, material disposed of, and investigation initiated in accordance with appropriate operating procedures.• Ensure chemical spill response arrangements including suitable service providers and equipment suppliers are detailed in emergency preparedness plans, operational plans and/or procurement systems for chemical removal, cleaning and disposal.	VG	E	2	E2	Low
31	Laboratory activities	Incorrect disposal of laboratory chemical into sink connected to concentrate outlet.	Potential for adverse effects to marine flora and fauna and breach of discharge approval.	DP2-0001 - Plant Process Design Concept: Design, install and verify all sinks connected to concentrate outlet are appropriately identified, with on-line monitoring before reaching the outfall that has warning levels which trigger a system response, and alarm levels which trigger an operator response and corrective action procedures.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain laboratory system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'. <p>Ensure correct handling and disposal of laboratory chemicals, and the training of laboratory staff in the procedures.</p> <p>Response:</p> <ul style="list-style-type: none">• Automatic shutdown of the system will prevent out of specification water reaching outlet chamber• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures• Automatic shutdown of the system as specified• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>O&M Manual #35: Laboratory and O&M Manual #04: Outlet, Off specs and RO Sodium Bisulphite refer.</p>	VG	E	2	E2	Low
32	Operational lighting of facilities	Spill of light offsite.	Potential impact on visual amenity and flora and fauna.	DP2-0001 - Plant Process Design Concept and DP0-0300 - Project Wide lighting: Design, install and verify appropriate site lighting.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the lighting system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to ensure all lighting remains shielded and pointing in the correct direction.• Monitoring flora and fauna (refer to Environmental Monitoring Schedule - Flora and Fauna). <ul style="list-style-type: none">• O&M Manual #45: Lighting, Security / CCTV refers.	VG	E	2	E2	Low

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33	Inspection and maintenance of marine structures	Extended exclusion zone required for maintenance works, and pest plants and animals	Potential introduction and/or spread of marine pests and disruption to recreational activities, such as diving, surfing and fishing.	DP2-0001 - Plant Process Design Concept and DP3-0050 - Transfer System Overview: Design, install and verify Desalination Plant and Transfer Pipeline that provide all the necessary infrastructure to operate and maintain the DWSS.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the intake and outlet system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including:<ul style="list-style-type: none">- Maintenance to occur within the exclusion zone agreed with relevant authorities (e.g. Transport Safety Victoria).- Marine pest inspection and certification of vessels before mobilisation onto project. Certification must be received from the final port of call.- All applicable vessels to comply with the current version of the "Protocol for Environmental Management – Domestic Ballast Water Management in Victorian State Waters", EPA Publication and all applicable vessels to comply with the current version of the "Australian Ballast Water Management Requirements", AQIS.- Communicate with local community.• Monitoring flora and fauna (refer to Environmental Monitoring Schedule - Flora and Fauna).• Marine biosecurity procedure implemented. <p>• O&M Manual #01: Intake structure and tunnel and O&M Manual #03 Outlet structure and tunnel refer.</p>	VG	D	1	D1	Low
34	Operation and routine maintenance of the Desalinated Water Supply System	Operation at different flow rates or routine maintenance impacting on the efficient and effective operation of the Desalinated Water Supply System.	Potential impact on resource use and waste generation.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• A modular Desalinated Water Supply System that uses water efficiently during operation at a range of flow rates.• Equipment sized to ensure efficiency at different/variable flow rates and during maintenance activity.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to optimise the process and maintain efficient operation.• Monitor resource use (refer to Environmental Monitoring Schedule - resource efficiency). <p>• O&M Manual #00: System overview refers.</p>	VG	E	2	E2	Low
35	Operation of the Desalinated Water Supply System	Inefficient operation of plant process resulting in excessive waste generation, including consumable such as cartridge filters and Reverse Osmosis membranes.	Potential impact on resource use and efficiency and excessive waste generation.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• Optimisation of system processes. Dosing of chemicals is under an automatically controlled closed-loop (flow rate and dose rate), which reduces chemical use when a set point is approached and stops chemical dose when a control set point is breached• Flow settings have warning levels that trigger a system response• Flow settings have alarms levels which trigger an operator response and corrective action procedures• On-line monitoring of effluent prior to entering the outlet tunnel.	E	2	E2	Low	<ul style="list-style-type: none">• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to optimise the process and maintain efficient operation.• Monitor resource use (refer to Environmental Monitoring Schedule - resource efficiency). <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures• Automatic shutdown of process or system as required• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #13 to #17: Reverse Osmosis, O&M Manual #29: Stabilisation ponds and Neutralisation tanks, and O&M Manual #04: Outlet, Off specs and RO Sodium Bisulphite refer.</p>	VG	E	2	E2	Low
36	Operation of the Desalinated Water Supply System	Excessive use of water.	Potential waste of water resources.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• A modular Desalinated Water Supply System that uses water efficiently during operation at a range of flow rates.• Equipment sized to ensure efficiency at different/variable flow rates and during maintenance activity.	D	2	D2	Low	<ul style="list-style-type: none">• Operate the Desalinated Water Supply System to minimise water use, and reuse or recycle water (e.g. harvesting rainwater and stormwater).• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to optimise the process and maintain efficient operation.• Monitor water use (refer to Environmental Monitoring Schedule - resource efficiency) and assess Project's reporting obligations under relevant legislation during operation. <p>• O&M Manual #00: System overview refers.</p>	VG	D	2	D2	Low

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37	Operation of the Desalinated Water Supply System	Inefficient use of chemicals resulting in excessive consumption.	Potential impact on resource consumption and efficient use of chemicals.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• Optimisation of system processes. Dosing of chemicals is under an automatically controlled closed-loop (flow rate and dose rate), which reduces chemical use when a set point is approached and stops chemical dose when a control set point is breached.• Flow settings have warning levels that trigger a system response.• Flow settings have alarms levels which trigger an operator response and corrective action procedures.• On-line monitoring of effluent prior to entering the outlet tunnel.	E	2	E2	Low	<ul style="list-style-type: none">• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to optimise the process and maintain efficient operation.• Monitor resource use (refer to Environmental Monitoring Schedule - resource efficiency). <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures• Automatic shutdown of process or system as required.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <ul style="list-style-type: none">• O&M Manual #13 to #17: Reverse Osmosis, O&M Manual #29: Stabilisation ponds and Neutralisation tanks, and O&M Manual #04: Outlet, Off specs and RO Sodium Bisulphite refer.	VG	E	2	E2	Low
38	Operation of the Desalinated Water Supply System	Excessive use of electrical energy.	Potential excessive greenhouse gas production.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• A modular Desalinated Water Supply System that uses energy efficiently during operation at a range of flow rates.• Equipment sized to ensure efficiency at different/variable flow rates and during maintenance activity.	D	3	D3	Moderate	<ul style="list-style-type: none">• Operate the Desalinated Water Supply System to minimise energy use, including achieving a specific energy consumption for the desalination process that is less than the contractual target on an annual average basis.• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to optimise the process and maintain efficient operation.• Monitor energy use (refer to Environmental Monitoring Schedule - resource efficiency) and assess project's reporting obligations under relevant greenhouse legislation during operation (e.g. NGERS). <ul style="list-style-type: none">• O&M Manual #00: System refers.	A	E	1	E1	Low
39	O&M traffic - deliveries, waste collection and vehicle movements	Increased use of roads.	Potential impacts on local amenity and road users and complaints.	DP2-0001 - Plant Process Design Concept and DP2-0115 - Site wide roadworks and pavement: Design, install and verify appropriate road access and designated areas, including for deliveries, waste collection and car parking facilities for the workforce and expected visitors. Process designed to optimise / reduce the use of chemicals and production of waste (and associated vehicular traffic).	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Use designated roads and areas, including for deliveries, waste collection and car parks (onsite traffic).• Supply agreement with recognised chemical suppliers able to document their compliance with road safety regulation, dangerous goods transportation regulation, quality systems and incident response.• Minimise vehicle movements during the night time and on weekends.• Adhere to speed limit on access roads.• Educate staff and contractors inductions and toolbox talks.• Communicate with local community. <p>Response:</p> <ul style="list-style-type: none">• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <ul style="list-style-type: none">• O&M Manual #36: Building and roads (onsite) refers.	VG	E	2	E2	Low
40	Waste management (Ecological Reserve)	Inappropriate waste management in Ecological Reserve. Littering from human use of Ecological Reserve facilities.	Potential localised contamination of soils or groundwater/surface water systems and potential adverse impacts on flora and fauna.	DP2-001 - Plant Process Design Concept: Design avoids and minimises the waste, and establishes designated storage and handling areas DP2-0156 -Site Wide Landscape Design: Feature Landscape works.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the parkland as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Use an EPA Licensed collector, transporter and landfill for the disposal of all waste.• Ensure rubbish disposal facilities are available, maintained and emptied on a regular basis.• Ensure sufficient resources are available for waste removal.• Monitor waste generation (refer to Environmental Monitoring Schedule - resource efficiency). <p>Response:</p> <ul style="list-style-type: none">• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <ul style="list-style-type: none">• O&M Manual #38: Ecological Reserve refers.	VG	D	1	D1	Low

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41	Asset management maintenance activity	Accidental release of maintenance fluid or product to the environment.	Potential for local adverse effects on groundwater/surface water systems, and flora and fauna.	DP2-0001 - Plant Process Design Concept: Design, install and verify designated maintenance areas.	D	2	D2	Low	<ul style="list-style-type: none"> Ensure all staff and contractors conducting maintenance work are trained in appropriate use and disposal of maintenance fluids and products. Manage and maintain the parkland as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including relevant maintenance procedures for the correct handling and disposal of maintenance fluids and products. <p>Response:</p> <ul style="list-style-type: none"> Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <ul style="list-style-type: none"> O&M Manuals #00 - #46 (Volume 3) refers. 	VG	E	2	E2	Low
42	Asset management workshop	Workshop creates airborne noise source.	Potential noise source impacts upon neighbourhood amenity.	DP2-0001 - Plant Process Design Concept and DP0-0200 - Project Wide noise control: Design, install and verify the location of workshops and noise controls to ensure that there is no airborne noise impacts during operation.	D	2	D2	Low	<ul style="list-style-type: none"> Undertake all maintenance activities as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including: <ul style="list-style-type: none"> Construction works and major maintenance Maintenance activities in designated areas Procedures for asset management workshop activities Staff and contractors trained in relevant procedures. Monitor noise (refer to Environmental Monitoring Schedule - Noise and Vibration). 	VG	E	2	E2	Low
43	Asset management Ecological Reserve (maintenance)	Disturbance to known sensitive areas.	Potential impact on known Aboriginal cultural heritage, heritage, coastal areas and/or flora and fauna.	DP2-0001 - Plant Process Design Concept: Design, install and verify DWSS to avoid disturbance to known sensitive areas DP2-0156 -Site Wide Landscape Design: Feature Landscape works, ecological works (terrestrial) and ecological works (aquatic).	C	2	C2	Moderate	<p>Due to the variable nature of works, as specified in the O&M EMP a Work Pack will be developed, which will include:</p> <ul style="list-style-type: none"> An assessment of environmental requirements, including all Commonwealth and State environmental requirements and the relevant Project Deed Performance Requirements Work method statement – a high level, activity-specific risk assessment and step by step planning tool, which details all steps involved in a particular construction activity along with their respective risk control measures. This will identify key environmental risks and include appropriate controls. Procedures – detailed task specific work instructions that are used to control specific activities. Job safety and environmental analysis – a medium level, activity-specific risk assessment and planning tool which will identify the specific environmental management measures. Site environmental plan – where there are significant environmental issues to be managed, a site environmental plan may be developed to detail practical measures to be implemented. <ul style="list-style-type: none"> O&M Manual #38: Ecological Reserve refers. 	VG	D	2	D2	Low
44	Asset management Ecological Reserve (maintenance)	Unnecessary clearing of native vegetation.	Potential impact on flora and fauna.	DP2-0001 - Plant Process Design Concept: Design, install and verify DWSS to avoid, minimise and offset disturbance to native vegetation and listed threatened flora, fauna and communities DP2-0156 -Site Wide Landscape Design: Feature Landscape works, ecological works (terrestrial) and ecological works (aquatic).	C	2	C2	Moderate	<p>The unnecessary clearing of native vegetation will be avoided.</p> <ul style="list-style-type: none"> O&M Manual #38: Ecological Reserve refers. 	VG	E	2	E2	Low
45	Asset management Ecological Reserve (maintenance)	Incorrect storage, use and handling of chemicals, such as pesticides.	Potential for local adverse effects on groundwater/surface water systems, and flora and fauna.	DP2-0001 - Plant Process Design Concept: Design, install and verify designated chemical storage areas DP2-0156 -Site Wide Landscape Design - ecological works (terrestrial) and ecological works (aquatic).	E	2	E2	Low	<ul style="list-style-type: none"> Manage and maintain the parkland as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including maintenance procedures for the correct handling and disposal of maintenance fluids and products. Chemicals to be stored in designated areas. Procedures for appropriate storage, use and disposal of chemicals. Staff and contractors trained in relevant procedures. Response to incidents as specified in the emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan. <ul style="list-style-type: none"> O&M Manual #38: Ecological Reserve refers. 	VG	E	2	E2	Low
46	Asset management Ecological Reserve (maintenance)	Pest plants and animals.	Potential for local adverse impacts on flora and fauna.	DP2-0001 - Plant Process Design Concept: Design, install and verify designated maintenance areas. DP2-0156 -Site Wide Landscape Design - ecological works (terrestrial) and ecological works (aquatic).	D	3	D3	Moderate	<ul style="list-style-type: none"> Manage and maintain the parkland as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' and/or Environmental Monitoring Schedule (Ecological Reserve and environmental performance monitoring). Conduct weed control and pest animal control as required. Staff and contractors trained in relevant procedures when maintaining Ecological Reserve. Response to incidents as specified in the emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan. <ul style="list-style-type: none"> O&M Manual #38: Ecological Reserve refers. 	VG	E	2	E2	Low

Risk #	O&M Activity	Potential Hazard (resulting from activity)	Potential Impact (Receptor)	Project Design Controls	Likelihood	Severity		Raw Risk (After Design Controls)	O&M Controls: implemented during O&M activities to ensure obligations are met	Effectiveness	Likelihood	Severity		Residual Risk (After O&M Controls)
47	Asset management Ecological Reserve	Disturbance of acid sulfate soils / production and migration of acid leachate via surface water.	Potential for local adverse effects on groundwater/surface water systems, and flora and fauna.	DP2-0113 - Site Wide Drainage: Design, install and verify a closed catchment drainage system and surface water monitoring program. DP2-0156 - Site Wide Landscape Design: Feature Landscape works.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the parkland as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including:<ul style="list-style-type: none">- Inspect and maintain the designed closed catchment drainage system that allows for capture and treatment of stormwater if required.- Implement and maintain an appropriate groundwater / surface water monitoring program (refer to Environmental Monitoring Schedule - acid sulfate soils).- Staff and contractors trained in relevant procedures when maintaining Ecological Reserve.• O&M Manual #38: Ecological Reserve refers.	VG	E	2	E2	Low
48	Construction defect rectification and close out works, construction works and major maintenance necessary for O&M activities	Construction works on the desalination plant site and marine structures.	Potential for local adverse effects on marine environment, groundwater/surface water systems, flora and fauna, Aboriginal cultural heritage and/or historic heritage.	DP2-0001 - Plant Process Design Concept and DP3-0050 - Transfer System Overview: Design, install and verify the Desalination Plant and Transfer Pipeline provide all the necessary infrastructure to operate and maintain the DWSS.	C	2	C2	Moderate	<ul style="list-style-type: none">• Manage any construction works necessary for O&M Activities or construction defect rectification through the Watersure Permit to Work System.• An appointed Watersure Representative required to assess and authorise all works prior to a PTW being issued.• All works must be appropriately risk assessed (including environmental aspects), planned and controlled.• All personnel conducting the work must be inducted, appropriately trained for the task and understand the permit conditions approved by Watersure.• Environmental controls relevant to the works will be identified during the permit, risk assessment and planning processes and implemented using any of the following tools appropriate to the work:<ul style="list-style-type: none">- Job safety and environmental analysis.- Pre-construction surveys.-Work method statement.- Procedures.- Site environmental plan.• If required by Watersure, a Work Pack may be developed which will include an assessment of environmental obligations, including identifying all Commonwealth and State environmental requirements (legislation, approvals, licences, permits and policies) and the relevant Project Deed Performance Requirements. Relevant O&M Manuals will be consulted for information on existing conditions.• The Environment Manager is required to consult with the permit office and review permit applications with identified high environmental risks prior to the permit being issued and works commencing.• The Environment Manager or delegate will monitor and inspect any works in accordance with the any relevant environmental requirements, including permit conditions, relevant Project Deed Performance Requirements.• All permits and associated documents will be maintained in accordance with the Watersure Integrated Management System.	VG	E	2	E2	Low
Transfer Pipeline														
49	Transfer Pumps and Booster Pumps start up and operation	Pumps create airborne noise and vibration source.	Potential noise and vibration source impacts upon neighbourhood amenity.	DP3-0050 - Transfer System Overview, DP0-0200 Project Wide noise control, DP3-0553 - TPS Process, hydraulics and mechanical and DP3-0557 - BPS Process, hydraulics and mechanical: Design, install and verify selection and location of pumps ensure that there is no airborne noise or vibration impacts during start up and operation Noise monitoring (verification) completed during commissioning.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the transfer pumps and booster pumps in accordance with the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' to ensure efficient operation.• Monitor noise (refer to Environmental Monitoring Schedule - noise and vibration monitoring).• O&M Manual #23: Transfer Pumps & Booster Pumps refers.	VG	E	2	E2	Low
50	Transfer System air valve operation	Valves create airborne noise source.	Potential that noise source impacts upon neighbourhood amenity.	DP3-0050 - Transfer System Overview, DP0-0200 Project Wide noise control and DP3-0511 - Typical Air, Scour & Isolation Valve Details: Design, install and verify selection and location of valves ensure that there is no airborne noise impacts during start up and operation. Noise monitoring (verification) completed during commissioning.	D	2	D2	Low	<ul style="list-style-type: none">• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'to ensure efficient operation.• Monitor resource use (refer to Environmental Monitoring Schedule - resource efficiency). <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures.• Automatic shutdown of process or system as required.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified.• O&M Manual #24: Pipeline, Delivery Points and Pipe Surge protection refers.	VG	E	2	E2	Low

Risk #	O&M Activity	Potential Hazard (resulting from activity)	Potential Impact (Receptor)	Project Design Controls	Likelihood	Severity		Raw Risk (After Design Controls)	O&M Controls: implemented during O&M activities to ensure obligations are met	Effectiveness	Likelihood	Severity		Residual Risk (After O&M Controls)
51	Operation of the Transfer System One Way Surge Tanks	Overflow of drinking water from One Way Surge Tanks during operation.	Potential adverse effects on groundwater/surface water systems and flora and fauna.	DP3-0050 - Transfer System Overview and DP3-0566 - Surge Station Mechanical, Electrical and piping: Design, install and verify automatically controlled water level regulation in the One Way Surge Tanks, with overflow design.	C	2	C2	Moderate	<ul style="list-style-type: none">• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Monitor resource use (refer to Environmental Monitoring Schedule - resource efficiency). <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures.• Automatic shutdown of process or system as required.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #24: Pipeline, Delivery Points and Pipe Surge protection refers.</p>	VG	E	2	E2	Low
52	Transfer of Pipeline Water	Unplanned discharge of drinking water from Transfer System during operation.	Potential adverse effects on groundwater/surface water systems, and flora and fauna.	DP3-0050 - Transfer System Overview: Design, install and verify Transfer System is to a rating higher than the operating requirements.	D	2	D2	Low	<ul style="list-style-type: none">• Detection of loss through Loss Water Calculation.• Staff trained in the appropriate management of unplanned discharges and response in accordance with the Incident Management Plan as specified.• Online monitoring of the One Way Surge Tank Water levels.• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Monitor surface water quality (refer to Environmental Monitoring Schedule - Surface Water Quality). <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring triggers alarm levels that require an operator response, implement investigation and corrective procedures• Automatic shutdown of process or system as required.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #24: Pipeline, Delivery Points and Pipe Surge protection refers</p>	VG	E	2	E2	Low
53	Inspection and maintenance of the transfer pipeline	Introduction or spread of weeds, pests and disease, including the declared potato cyst nematode control area at Koo Wee Rup.	Potential impact on flora and fauna, and agricultural productivity.	DP2-0001 - Plant Process Design Concept and DP3-0050 - Transfer System Overview: Reinstatement of transfer pipeline corridor.	C	2	C2	Moderate	<p>Due to the variable nature of works, as specified in the O&M EMP a Work Pack will be developed, which will include:</p> <ul style="list-style-type: none">• An assessment of environmental requirements, including all Commonwealth and State environmental requirements and the relevant Project Deed Performance Requirements.• Work method statement – a high level, activity-specific risk assessment and step by step planning tool, which details all steps involved in a particular construction activity along with their respective risk control measures. This will identify key environmental risks and include appropriate controls.• Procedures – detailed task specific work instructions that are used to control specific activities.• Job safety and environmental analysis – a medium level, activity-specific risk assessment and planning tool which will identify the specific environmental management measures.• Site environmental plan – where there are significant environmental issues to be managed, a site environmental plan may be developed to detail practical measures to be implemented. <p>Response:</p> <ul style="list-style-type: none">• Where the monitoring detects evidence of spread of weeds, pests or diseases, appropriate notifications will be made as per the Environmental Incident Response Plan and remedial/corrective actions will be implemented.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #24: Pipeline, Delivery Points and Pipe Surge protection refers.</p>	VG	E	2	E2	Low
54	Planned discharge from pipeline	Pipeline water sent to environment.	Potential adverse effects on groundwater/surface water systems, and flora and fauna.	DP3-0050 - Transfer System Overview and DP3-0511-Typical Air, Scour & Isolation Valve Details: Design, install and verify scour and air valves along the transfer pipeline.	D	3	D3	Moderate	<ul style="list-style-type: none">• All discharge to be in accordance with SEPP (Waters) or other parameters agreed with regulatory agencies.• Water testing to be conducted prior to discharge to determine acceptable limits - this includes both in pipe and receiving waters.• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.• Monitor discharge for compliance (refer to Environmental Monitoring Schedule - surface water quality). <p>Response:</p> <ul style="list-style-type: none">• Monitoring of discharge to occur.• Immediate shutdown of the discharge if alarm levels reached.• Where monitoring triggers alarm levels or exceeds agreed discharge parameters the Environmental Incident Response Plan will be enacted and investigations and corrective procedures implemented.• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #24: Pipeline, Delivery Points and Pipe Surge protection refers.</p>	VG	E	2	E2	Low

Risk #	O&M Activity	Potential Hazard (resulting from activity)	Potential Impact (Receptor)	Project Design Controls	Likelihood	Severity		Raw Risk (After Design Controls)	O&M Controls: implemented during O&M activities to ensure obligations are met	Effectiveness	Likelihood	Severity		Residual Risk (After O&M Controls)
55	Implementation of the Transfer System remediation plan	Pipeline water sent to environment.	Potential adverse effects on groundwater/surface water systems, and flora and fauna.	DP3-0050 - Transfer System Overview and DP3-0511-Typical Air, Scour & Isolation Valve Details: Design, install and verify scour and air valves along the transfer pipeline.	D	3	D3	Moderate	<ul style="list-style-type: none">Minimise and control any necessary discharge, including by closing isolation valves.Implement appropriate remediation plan in consultation with relevant stakeholders.Staff trained in the appropriate management of discharges and respond in accordance with the remediation plan.Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report'.Monitor implementation of the remediation plan (refer to Environmental Monitoring Schedule - surface water quality). <p>Response:</p> <ul style="list-style-type: none">Monitoring of discharge to occur.Immediate shutdown of the discharge if alarm levels reached.Where monitoring triggers alarm levels or exceeds agreed discharge parameters the Environmental Incident Response Plan will be enacted and investigations and corrective procedures implemented.Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #24: Pipeline, Delivery Points and Pipe Surge protection refers.</p>	VG	E	2	E2	Low
56	Construction defect rectification and close out works, construction works and major maintenance necessary for O&M activities	Construction works on the pipeline and associated assets.	Potential for local adverse effects on groundwater/surface water systems, flora and fauna, Aboriginal cultural heritage and/or historic heritage.	DP2-0001 - Plant Process Design Concept and DP3-0050 - Transfer System Overview: Design, install and verify the Desalination Plant and Transfer Pipeline provide all the necessary infrastructure to operate and maintain the DWSS.	C	2	C2	Moderate	<p>Due to the variable nature of works, as specified in the O&M EMP a Work Pack will be developed, which will include:</p> <ul style="list-style-type: none">An assessment of environmental requirements, including all Commonwealth and State environmental requirements and the relevant Project Deed Performance Requirements.Work method statement – a high level, activity-specific risk assessment and step by step planning tool, which details all steps involved in a particular construction activity along with their respective risk control measures. This will identify key environmental risks and include appropriate controls.Procedures – detailed task specific work instructions that are used to control specific activities.Job safety and environmental analysis – a medium level, activity-specific risk assessment and planning tool which will identify the specific environmental management measures.Site environmental plan – where there are significant environmental issues to be managed, a site environmental plan may be developed to detail practical measures to be implemented. <p>• Monitoring and inspection of any works in accordance with the any relevant environmental requirements (refer to Attachment 4: O&M Environmental Monitoring Schedule – Construction works necessary for O&M activities).</p>	VG	E	2	E2	Low
57	Replacement or unscheduled maintenance of the Transfer System components (including pipe sections or valves)	Excavation of spoil, disturbance of acid sulfate soils.	Potential adverse effects on groundwater/surface water systems, and flora and fauna.	DP3-0050 - Transfer System Overview and DP3-0511-Typical Air, Scour & Isolation Valve Details: Design, install and verify scour and air valves along the transfer pipeline.	D	2	D2	Low	<p>Due to the variable nature of works, as specified in the O&M EMP a Work Pack will be developed, which will include:</p> <ul style="list-style-type: none">An assessment of environmental requirements, including all Commonwealth and State environmental requirements and the relevant Project Deed Performance Requirements.Work method statement – a high level, activity-specific risk assessment and step by step planning tool, which details all steps involved in a particular construction activity along with their respective risk control measures. This will identify key environmental risks and include appropriate controls.Procedures – detailed task specific work instructions that are used to control specific activities.Job safety and environmental analysis – a medium level, activity-specific risk assessment and planning tool which will identify the specific environmental management measures.Site environmental plan – where there are significant environmental issues to be managed, a site environmental plan may be developed to detail practical measures to be implemented. <p>• Monitoring and inspection of any works in accordance with the any relevant environmental requirements (refer to Attachment 4: O&M Environmental Monitoring Schedule – Construction works necessary for O&M activities).</p>	VG	E	2	E2	Low

Risk #	O&M Activity	Potential Hazard (resulting from activity)	Potential Impact (Receptor)	Project Design Controls	Likelihood	Severity		Raw Risk (After Design Controls)	O&M Controls: implemented during O&M activities to ensure obligations are met	Effectiveness	Likelihood	Severity		Residual Risk (After O&M Controls)
All O&M Activities - Potential Emergencies and Abnormal Events														
58	Operation of the DWSS in an area prone to bushfires	Bushfire resulting in fire within the DWSS and destruction of assets.	Potential for air quality impacts on sensitive receptors from damage to DWSS Potential flora and fauna mortality on the plant.	DP2-0001 - Plant Process Design Concept: Design, install and verify Plant Site Fire Services DP2-0003 - Site wide fire protection.	B	1	B1	Moderate	<ul style="list-style-type: none">Fire protection system within buildings and areas of higher risk will be in operation (e.g. cable chambers).Storage of flammable liquids/substances away from sources of extreme heat and or sparks.Appropriate signage restricting smoking on site, along with designated 'smoking' areas with approved disposal bins.Regular updates on forecast storm conditions, to inform site supervisors of potential fire hazards from lightning.Supply of suitable fire extinguishing equipment and training of relevant staff in fire fighting techniques.Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including:<ul style="list-style-type: none">Hand-held plant that may cause a spark are used according to site safety protocols and usage is restricted or forbidden on total fire ban days (hot works permit). <p>Response:</p> <ul style="list-style-type: none">Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan. <p>O&M Manual #42: Fire Protection refers.</p>	VG	E	2	E2	Low

Risk #	O&M Activity	Potential Hazard (resulting from activity)	Potential Impact (Receptor)	Project Design Controls	Likelihood	Severity		Raw Risk (After Design Controls)	O&M Controls: implemented during O&M activities to ensure obligations are met	Effectiveness	Likelihood	Severity		Residual Risk (After O&M Controls)
59	Movement of machinery and vehicles on site	Collision with machinery or vehicles.	Potential fauna mortality within site.	DP2-0001 - Plant Process Design Concept: Design, install and verify designated roads and carparks.	B	2	B2	High	<ul style="list-style-type: none">• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report.• Use designated roads and car parks.• Minimise vehicle movements during the night time.• Minimise vehicle movement through areas with significant fauna habitat.• Adhere to speed limit on access roads.• Maintain site fencing to prevent stock or other fauna from entering site.• Educate staff and contractors inductions and toolbox talks.• Monitor flora and fauna (refer to Environmental Monitoring Schedule - Flora and Fauna). <p>Response:</p> <ul style="list-style-type: none">• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual # #00: System and #36: Building and roads overview refer.</p>	G	E	2	E2	Low
60	Use of hazardous substance	Hazardous substance spill resulting from a procedural failure.	Potential contamination of soils or groundwater/surface water systems, potential harm / injury to personnel, flora and fauna.	DP2-0001 - Plant Process Design Concept: Design, install and verify hazardous substance delivery and storage areas, including that each hazardous storage area on the plant is contained within an appropriate dedicated bunded area. Any spills or leaks from within the bund will be captured, assessed and disposed of in accordance with O&M Manual.	C	2	C2	Moderate	<ul style="list-style-type: none">• As specified chemical management controls include that the transport, storage and handling of hazardous materials and dangerous goods will be in accordance with EPA requirements.• Specific staff and contractor training in hazardous material spill. <p>Response:</p> <ul style="list-style-type: none">• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified.	VG	E	2	E2	Low
61	Use of flammable or combustible liquid or material	Unexpected ignition of flammable or combustible liquid or material during normal O&M activities.	Potential contamination of soils or groundwater/surface water systems, potential harm / injury to personnel, flora and fauna.	DP2-0001 - Plant Process Design Concept, DP2-0003 - Site wide fire protection, DP0-0500-Project Wide Safety and Statutory Signage, and DP2-0113 - Site wide drainage: Design, install and verify <ul style="list-style-type: none">• Diesel storage tank for generator in bunded compound and separated from other building in accordance with Australian Standard.• Diesel generators are located in buildings separate to other facilities.• Diesel engine driven pumps for fire fighting are housed in a separate building.• Fire warning and fighting system.	B	2	B2	High	<ul style="list-style-type: none">• Fire protection system within buildings and areas of higher risk will be in operation (e.g. cable chambers).• Storage of flammable liquids/substances away from sources of extreme heat and or sparks.• Appropriate signage restricting smoking on site, along with designated 'smoking' areas with approved disposal bins.• Regular updates on forecast storm conditions, to inform site supervisors of potential fire hazards from lightning.• Supply of suitable fire extinguishing equipment and training of relevant staff in fire fighting techniques.• The transport, storage and handling of flammable or combustible materials will be in accordance with EPA requirements.• Manage and maintain the system as specified in the CMMS 'Equipment Projected Preventative Maintenance Work Orders Schedule Report' including:<ul style="list-style-type: none">- Hand-held plant that may cause a spark are used according to site safety protocols and usage is restricted or forbidden on total fire ban days (hot works permit). <p>Response:</p> <ul style="list-style-type: none">• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. <p>• O&M Manual #42: Fire Protection refers.</p>	VG	E	2	E2	Low
62	Use of hazardous or dangerous substances	Incorrect separation and segregation of hazardous and / or dangerous substances.	Potential contamination of soils or groundwater/surface water systems, potential harm / injury to personnel, flora and fauna.	DP2-0001 - Plant Process Design Concept, DP0-0500-Project Wide Safety and Statutory Signage, and DP2-0113 - Site wide drainage: Design, install and verify: <ul style="list-style-type: none">• Hazardous and / or dangerous substances (such as bulk chemicals) are stored in designated bunded areas appropriately separated.• All truck unloading areas are designed to capture any spills from the unloading operation.• Pipe works outside buildings are in culverts or double contained if direct buried.• Fire warning and fighting system.	D	2	D2	Low	<ul style="list-style-type: none">• As specified the chemical management controls include that the transport, storage and handling of hazardous materials and dangerous goods will be in accordance with EPA requirements. <p>Response:</p> <ul style="list-style-type: none">• Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified.	VG	E	2	E2	Low

Risk #	O&M Activity	Potential Hazard (resulting from activity)	Potential Impact (Receptor)	Project Design Controls	Likelihood	Severity		Raw Risk (After Design Controls)	O&M Controls: implemented during O&M activities to ensure obligations are met	Effectiveness	Likelihood	Severity		Residual Risk (After O&M Controls)
63	Operation and Maintenance of the DWSS	Extreme storm event.	Potential to cause harm to personnel, the environment and/or equipment.	DP2-0001 - Plant Process Design Concept: Design, install and verify: <ul style="list-style-type: none">• Desalination Plant and roads above the 1 in 100 year flood level.• Drainage design accommodates storm events.• Marine structures design provides for storm events• Hazardous and / or dangerous substances (such as bulk chemicals) are stored in designated bunded areas.	C	2	C2	Moderate	Response: <ul style="list-style-type: none">• The Initiate emergency procedures, Incident Management Plan and/or Environmental Incident Response Plan as specified. For storm events this will include monitoring warning forecasts and communicating this to personnel, and implementation of contingency measures.	VG	E	1	E1	Low

DO NOT REMOVE

DO NOT REMOVE

A
B
C
D
E

Low
Moderate
High
Extreme

DO NOT REMOVE

A	Absolute
VG	Very Good
G	Good
F	Fair
N	No Change

DO NOT REMOVE

1
2
3
4
5

Almost Certain	A	The event is expected to occur in most circumstances.
Likely	B	The event will probably occur in most circumstances.
Moderate	C	The event should occur at some time.
Unlikely	D	The event could occur at some time.
Rare	E	The event may occur only in exceptional circumstances.
Negligible	1	No environmental effects
Minor	2	Theoretically could affect the environment or people but unlikely. Public complaints unlikely. Unlikely to affect legal compliance.
Moderate	3	Water, soil or air likely to be affected, probably in the short term. No damage to flora or fauna. Public complaints unlikely. Prosecution unlikely. Damage costs less than \$5,000.
Major	4	Water, soil or air affected badly, possibly in the long term. Damage or death to limited numbers of flora or fauna. Public complaints likely. Damage or relocation of archaeological/heritage property. Likely prosecution. Damage costs between \$5,000 and \$50,000.
Extreme	5	Long-term damage to water, soil or air. Damage or death to significant numbers of flora or fauna. Many public complaints, possible evacuation. Destruction of archaeological/heritage property. Almost certain environmental prosecution. Damage costs exceeding \$50,000.

Risk Register - Definitions

Term	Defintion
Raw risk	The initial risk recognises the existing project design controls, such as engineered preventative and control measures
Residual risk	The residual risk considers the risk after the planned O&M Controls are implemented
Severity	The severity of the potential hazard is considered in accordance with the categories in Table 1
Likelihood	The likelihood of the potential hazard is considered in accordance with the categories in Table 2
Risk scoring	The risk scoring is based on the consequence and probability matrix in Table 3

Table 1: Severity

Severity Level		1 - Negligible	2 - Minor	3 - Moderate	4 - Major	5 - Extreme
Category	Sub Category	<i>Minimal impact in a localised area within natural variability</i>	<i>Low impact in a localised or regional area with a functional recovery within less than 1 year</i>	<i>Medium impact in a localised or regional area with a functional recover of 1 to 5 years</i>	<i>High impact in a localised or regional area with a functional recovery within 5 to 10 years</i>	<i>Very high impact in a regional area with functional recover in greater than 10 years if at all</i>
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.

Operation and Maintenance - Environmental Risk Register

	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.

Table 2: Likelihood

Level	Descriptor	Example of description
A	Almost Certain	More than once per year (Design context) 1 occurrence every month (Operational context) Is expected to occur in most circumstances
B	Likely	Once every 2 years (Design context) 1 occurrence in 1 year (Operational context) Will probably occur in most circumstances
C	Possible	Once every 5 years (Design context) 1 occurrence in 5 years (Operational context) Might occur or should occur at some time
D	Unlikely	Once every 20 years (Design context) 1 occurrence in 10 years (Operational context) Could occur at some time
E	Rare	Once every 100 years (Design context) 1 occurrence in 30 years (Operational context) May occur only in exceptional circumstances

Table 3: Risk scoring matrix

Risk Scoring Matrix		1 (Negligible)	2 (Minor)	Severity 3 (Moderate)	4 (Major)	5 (Extreme)
Likelihood	A (Almost certain)	Moderate	High	Very High	Very High	Very High
	B (Likely)	Moderate	High	High	Very High	Very High
	C (Possible)	Low	Moderate	High	Very High	Very High
	D (Unlikely)	Low	Low	Moderate	High	Very High
	E (Rare)	Low	Low	Moderate	High	High

Table 4: Effectiveness of O&M controls

A	Absolute
VG	Very Good
G	Good
F	Fair
N	No Change