

Alkimos Seawater Desalination Plant

Construction Marine Environmental Management Plan
(CMEMP)

February 2023





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Review

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0	G. Griffith	Client Review	13/06/2019
1	J Phillips, R Smith	Client Review	24/08/2022
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Corporate endorsement

I hereby certify that to the best of my knowledge, the content of this Alkimos Seawater Desalination Plant Construction Marine Environmental Management Plan is true and correct.

Name: Scott Moorhead

Signed:

Designation: Manager - Integrated Water
Cycle Planning - Asset Investment Planning
Metro

Date:



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Acronyms

Abbreviation	Definition
ASDP	Alkimos Seawater Desalination Plant
BCH	Benthic communities and habitat
DBCA	Department of Biodiversity, Conservation and Attractions
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
ERD	Environmental Review Document
EV	Environmental Value
GL	Gigalitre
GPS	Global Positioning System
IMS	Introduced marine species
IWSS	Integrated Water Supply Scheme
km	Kilometre
L	Litre
CMEMP	Construction Marine Environmental Management Plan
m	Metre
mg/L	Milligrams per litre
ML	Megalitre
QA/QC	Quality assurance / quality control
SAP	Sampling and analysis plan
TSS	Total suspended solids
WWTP	Wastewater Treatment Plant



Executive Summary

Proposal name	Alkimos Seawater Desalination Plant (ASDP)	
Proponent name	Water Corporation	
Ministerial Statement number	N/A	
Purpose of the EMP	<p>This Construction Marine Environmental Management Plan (CMEMP) is submitted in support of Water Corporation’s application to construct and operate the ASDP under the provisions of Section 38 of the <i>Environmental Protection Act 1986</i>. The CMEMP has been developed according to the EPA’s objective-based provisions described in EPA (2021a). It describes the management procedures that will be implemented during the ASDP marine construction phase, which requires tunnelling and drilling procedures to secure the intake and outlet structures to the seabed. The CMEMP provides the overarching strategies to prevent and/or minimise impacts to the EPA’s key environmental factors during the ASDP marine construction phase.</p>	
Key Environmental Factors, Objectives	Key Environmental Factor	Environmental Objective
	Marine Environmental Quality	To maintain the quality of water, sediment and biota so that environmental values are protected.
	Benthic Communities and Habitats	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.
	Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.
	Social Surroundings	To protect social surroundings from significant harm.
Condition clauses (if applicable)	N/A	
Proposed construction date	TBC	
EMP required pre-construction?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	



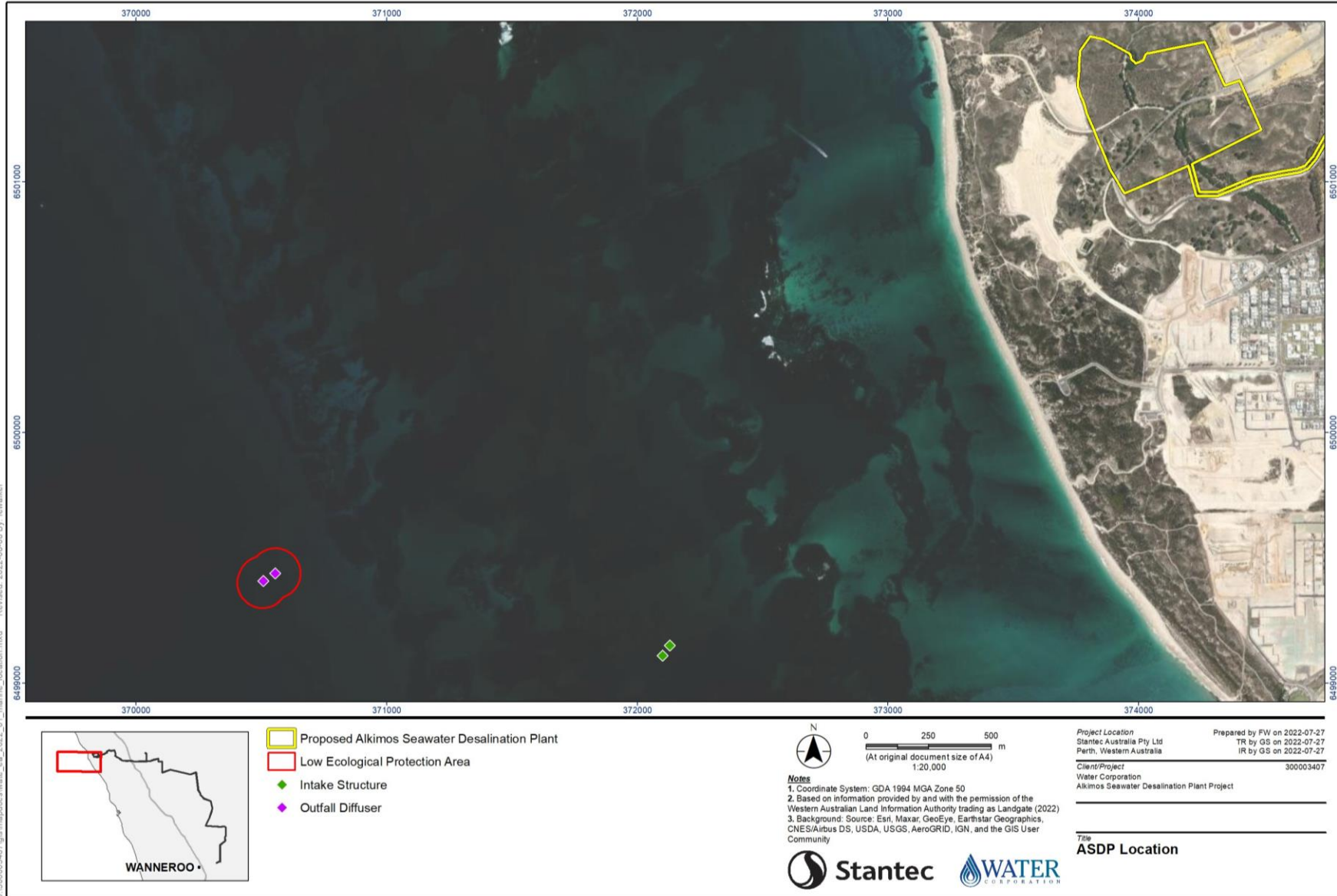
1. Introduction

1.1 Proposal

Due to a combination of drying climate and increasing demand, Water Corporation is moving to secure Perth's potable water supply, via the construction and operation of the Alkimos Seawater Desalination Plant (ASDP) and Eglinton Groundwater Treatment Plant. The proposed Plants will be located adjacent to the existing Alkimos Wastewater Treatment Plant (WWTP) and within Water Corporation's 'Alkimos Water Precinct' at Alkimos, Western Australia (**Figure 1.1**).

The construction of the ASDP requires tunnelling and drilling for the installation of the subterranean pipework, marine risers, intake and outlet diffusers (**Figure 1.1**). Two 3.5 m diameter tunnels (one for the intake and one for the outlet) will be driven southwest from the ASDP site at a minimum horizontal depth of 8 m beneath the seabed. The marine risers, intake structures, and the outlet diffusers, require the drilling of four 2 m diameter shafts to a depth of approximately 14 m. The outlet and intake structures will be installed on the shafts, where they will occupy 7.0 x 7.0 m and 8.5 x 8.5 m of seafloor, respectively (or a maximum 10 m radius).

This Construction Marine Environmental Management Plan (CMEMP) is submitted in support of the application to construct and operate the ASDP under the provisions of Section 38 of the *Environmental Protection Act 1986*. The CMEMP has been developed according to the EPA's objective-based provisions described in EPA (2021a). It describes the management procedures that will be implemented during the ASDP marine construction phase, which requires tunnelling and drilling and to secure the intake and outlet structures to the seabed. The CMEMP provides the overarching strategies for preventing and/or minimising impacts to the EPA's key environmental factors of marine environmental quality, benthic communities and habitats, marine fauna and social surroundings during the ASDP marine construction phase.



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Figure 1.1 Proposed Alkimos Seawater Desalination Plant marine infrastructure



1.2 Key environmental factors

The EPA’s key environmental factors are listed in ‘Statement of Environmental Principles, Factors and Objectives’ (EPA 2021b). The factors and associated environmental objectives relevant to this CMEMP are summarised in **Table 1.1**. All the factors relate to the EPA’s ‘sea’ and ‘people’ themes, given activities associated with the marine construction phase will have a negligible impact on the EPA’s remaining themes of inland waters, air and land.

Table 1.1 Key environmental factors and objectives

EPA Theme	EPA Factor	Environmental Objective
Sea	Marine Environmental Quality	To maintain the quality of water, sediment and biota so that environmental values are protected.
	Benthic Communities and Habitats	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.
	Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.
People	Social Surroundings	To protect human health from significant harm.

1.3 Condition requirements

This CMEMP is submitted in support of an application to construct and operate the ADSP by Water Corporation pursuant to the provisions of Section 38 of the *Environmental Protection Act 1986*.

1.4 Rationale and Approach

1.4.1 Key environmental impacts

Risks associated with the ASDP marine construction phase, encompassing the activities described above, are detailed in the Environmental Review Document (Water Corporation 2022). Those deemed to pose a moderate (or higher) risk to the marine environment (**Table 1.2**) will be managed using **objective-based provisions** described in EPA (2021a).

Table 1.2 Potential marine construction phase environmental impacts

Impact / Risk	Driver
Direct removal BCH	Drilling, placement of intake and outlet configurations
Noise	Construction vessels, particularly Large Anchor Handlers
Turbidity	Drilling
Smothering	Turbidity, sedimentation
Marine fauna injury	Vessel movement / strike
Introduction marine pests	Work vessels, jack up barges
Hydrocarbon spills	Vessels

2.4.1 Survey and study findings

The outcomes of the investigations with respect to the risks identified in **Table 1.2** are described in the subsequent sections.



Direct removal of benthic communities and habitats

The potential for impacts to BCH during the laying of the pipeline infrastructure was eliminated by the use of tunnelling over trenching. Direct impacts to BCH are therefore limited to the foundations required to accommodate the intake and outlet structures, at 7.0 x 7.0 m and 8.5 x 8.5 m respectively (**Figure 1.2**). The potential for direct losses of BCH is therefore limited to infauna and macrofauna communities residing within the footprint needed for the intake and diffuser structures, which are conservatively estimated to occupy no more than a 10 m radius. Impacts to seagrass and macroalgal communities will be avoided by ensuring the foundations for the intake and outlet structures are positioned as far as reasonably practicable from the nearest communities.

The potential for direct losses of BCH is considered manageable under the EPA’s objective-based provisions, provided the avoidance strategies described above are implemented.

Noise

The ASDP marine infrastructure will be constructed in stages that will generate noise of varying magnitude and duration. The sources of noise with the greatest potential for impact are seabed drilling and infrastructure laydown, the latter of which requires the placement of the intake and outlet using a Large Anchor Handler (LAH) vessel. During these activities, noise will be generated during drilling of the bedrock and during operation of the LAH positioning propellers.

The maximum underwater sound pressure during the construction phase is estimated at between 184 and 196 dB re 1 μ Pa².S (GHD 2022). Marine mammals are considered at greatest risk of noise related impacts. Acoustic modelling of the construction activities determined that the impact zones for permanent threshold shift (PTS) and temporary threshold shift (TTS) in marine mammals is expected to be restricted to a maximum radius of 50 m and <500 m from the source of the noise, respectively.

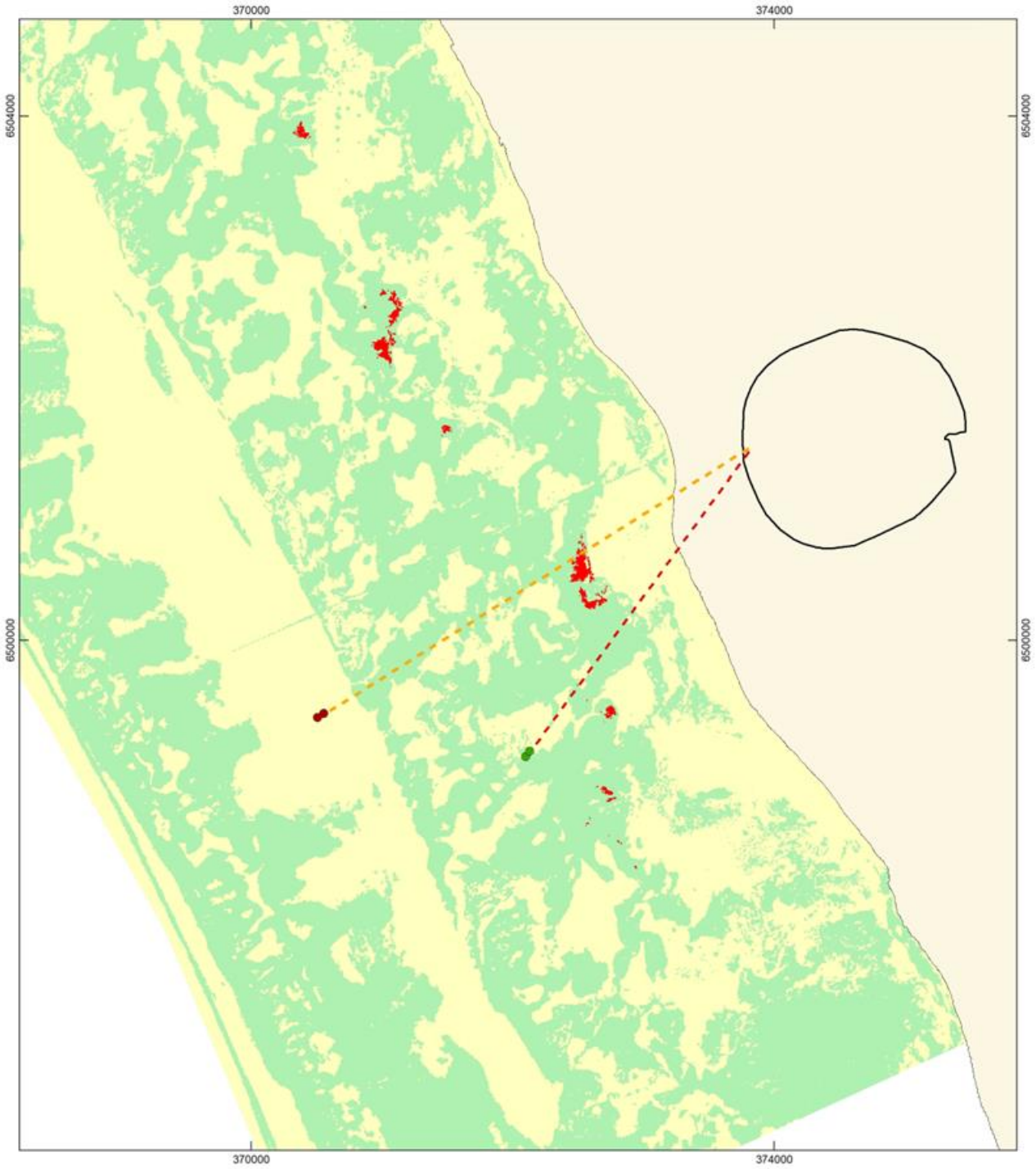
The potential for behavioural disturbance is significantly greater than the zones of PTS and TTS. Behavioural responses may manifest as changes in feeding, migration, breeding behaviour, and/or avoidance behaviour, leading to or long-term avoidance of areas that may be important for feeding, reproduction or sheltering. The zones of impact for behavioural responses varied in radii from 4.5 km to 5.0 km during the installation of the marine intake and outlet structures, and from 6.9 km and 3.3 km during vessel transit; the latter of which will be restricted to days rather than weeks.

The potential for noise-related impacts is considered manageable under the EPA’s objective-based provisions provided activities are outside the May–November migration period for key marine mammals OR, if the migration period *cannot* be avoided, via management based on enforcement of a suitable marine mammal exclusion zone as described in the Marine Mammal Management Plan (Appendix A).

These strategies, together with the short-term nature of the construction phase, suggest noise is unlikely to significantly impact marine fauna in the Proposal area.

Turbidity

The potential for impacts to the marine environment following an increase in turbidity was investigated using a desktop assessment (Water Corporation 2022). During drilling, the mobilisation of drill cuttings (total suspended solids (TSS)) may cause a temporary increase in turbidity near the drilling sites. Unusually high concentrations of TSS may lead to direct and indirect impacts to marine fauna if they persist for long periods. Direct effects may be abrasion or the clogging of filtration mechanisms. Indirect effects may stem from increased turbidity leading to altered light regimes and resultant changes in feeding efficiency and behaviour.



<p>Coordinate System: GDA 1994 MGA Zone 50</p>	Legend <ul style="list-style-type: none"> ● ASDP Outfall Diffuser ● ASDP Intake Structure WaterCorp Lot Boundary ASDP Intake ASDP Outfall 	Benthic Habitat <ul style="list-style-type: none"> Bare Reef Non BCH BCH 	
	<p>Date: 26.06.2019</p> <p>G:\SpatialData\Client\WaterCorp\1334_11A\Niros EIA\005_ModelingSummary\GIS_Requests\005_03\1334_11_005_02\ahabitat4_20190626.mxd</p> <p>© 2019. Whilst every care has been taken to prepare this map, BMT makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.</p> <p>Client: Water Corporation, 6/2019. Created by: BMT</p>		<p>environment.env@bmtglobal.com www.bmt.org</p>

Figure 1.2 Proposed marine infrastructure relative to BCH



The mobilisation of up to 175 m³ of drill cuttings is low in comparison to capital dredging programs, which have typically resulted in the mobilisation of higher volumes of sediment over a longer period, without imparting a detectable impact on the marine environment. The low magnitude and short duration of the drilling program at Alkimos is commensurate with winter storm events (Orpin et al. 2004).

The potential for turbidity-related impacts during the ASDP construction phase will be managed using strategies and/or other techniques to ensure TSS plume and cuttings remain within predicted dispersion patterns and concentrations (e.g. use of extended casings when drilling to manage the dispersal of drill cuttings). These measures will be detailed in the **Project Execution Plan** after the contractor has been appointed.

The potential for impacts due to short-term increases in turbidity is therefore considered low and manageable under the EPA’s objective-based provisions.

Smothering

The potential for smothering of BCH was assessed using the results from a simple numerical model, together with published ‘burial’ thresholds for motile marine invertebrates. The potential for impacts is related to the ‘thickness’ of the sedimentation layer. For the motile BCH (e.g. invertebrates) an organism’s tolerance is based on its ability to escape burial (Nichols et al. 1978, Miller et al. 2003). The potential for burial due to sedimentation at the drilling sites was estimated under two scenarios: (1) mobilisation of particles sizes less than 130 µm, and (2) mobilisation of larger particles sizes, between 130 and 10,000 µm.

The modelling predicted a maximum sedimentation thicknesses of 2 and 200 mm per m² (accumulated over a 5-day period) for scenarios 1 and 2, respectively. Over the 5-day duration of drilling, sedimentation averages 0.4 mm and 40 mm per m² per day for scenarios 1 and 2, respectively. Sedimentation rates of ≤1 mm per m² per day are well within the escape thresholds for most marine invertebrates, but some burial is expected at rates >5 mm per m² per day (Nichols et al. 1978; Miller et al. 2003). It is conservatively estimated that smothering of motile marine invertebrates will be restricted to within a 10 m radius of the drilling sites.

Water Corporation will work with the drilling contractor to establish a set of procedures and objective-based provisions to reduce the potential for smothering, which may include use of extended casings when drilling to manage the dispersal of drill cuttings and/or other techniques to ensure TSS plume and cuttings remain within the predicted dispersion footprint.

The potential for impacts due to smothering is therefore considered low and manageable under the EPA’s objective-based provisions.

Marine fauna injury

The potential for injury to marine fauna (particularly threatened or migratory species) during the ASDP construction phase was examined from the perspective of the risks posed by construction vessels and jack up barges. Risks are considered low due to the low occurrence of marine mammals in the area, together with the nature of the construction vessels, which will be stationary or slow moving during the construction phase. The potential for injury will be managed during the construction phase via the enforcement of a 300 m marine mammal exclusion zone, by trained marine mammal observers.

The potential for injury to marine mammals through vessel strike is therefore considered low and manageable under the EPA’s objective-based provisions.



Introduced marine species

A desktop assessment suggests the primary mechanism for IMS incursion is through biofouling of vessel hulls and equipment entering the construction area from international or interstate waters. Introduction of IMS has been identified as a potential risk given the increased number of vessel movements during the ASDP construction phase. The risk of IMS incursion will be quantified following a ballast water risk assessment and managed using appropriate monitoring and reporting procedures, documented in the IMS section of the contractors **Project Execution Plan**.

The potential introduction of IMS is therefore considered low and manageable under the EPA’s objective-based provisions.

Hydrocarbon spills

The potential for significant hydrocarbon spills is considered low (Water Corporation 2022). Any spills, if they occur at all, are expected to be limited to small volumes of oil, lubricants or diesel fuel. Hydrocarbon use will be managed carefully under the International Maritime Organisation’s (IMO) International Convention for the Prevention of Pollution from Ships (MARPOL). Best practice approaches for managing the use of hydrocarbons and responding to spill events during the ASDP construction phase, will be documented in the contractors **Project Execution Plan**.

The potential for impacts due to unplanned hydrocarbon spill events is therefore considered manageable under the EPA’s objective-based provisions.

1.5 Objective-based management framework

Objective-based provisions are used when outcome-based measures, comprising of triggers and thresholds are not practicable, but where management actions are still required to ensure the EPA’s key environmental factors are protected. Objective-based EMPs are not prescriptive about management practices, allowing opportunities for proponents to be pragmatic and innovative about how to achieve environmental outcomes. The management-based approach contained herein is appropriate given the short-term nature of the proposed construction activities and predicted low risk of impact.

1.6 Rationale for choice of indicators and/or management actions

This objective-based CMEMP was prepared according to the EPA’s (2021a) *Instructions for preparing Environmental Protection Act (1986) Part IV Environmental Management Plans (EMP)*. As an objective-based EMP, it includes a set of management targets, management actions, and monitoring and reporting requirements, which together form a holistic approach to protecting the marine environment during the ASDP construction phase.

It provides high-level details of the types of monitoring and reporting that that will be implemented at the commencement of the construction phase. It is also pragmatic because it allows for the proponent to confirm the details of the monitoring program (under the Project Execution Plan) once the contractor has been appointed, and the exact approach to the installation of the marine infrastructure has been agreed upon.



2. CMEMP Components

An objective-based framework comprising management targets, management actions, monitoring and reporting has been developed to achieve the environmental objectives and ensure the associated environmental values are protected during the ASDP marine construction phase (**Table 2.1**).

Under this framework, **management actions** are the identified actions needed to meet the environmental objective/s. Management actions generally relate to the ‘minimise’ and ‘rehabilitate’ steps of the mitigation hierarchy. Management actions include auditable timelines, clear identification of record-keeping and reporting against actions and be prioritised using a risk-based approach (EPA 2021a).



Table 2.1 Objective-based provisions for marine construction

EPA Factor	Benthic Communities and Habitats			
Management target	Management action	Monitoring	Timing / Frequency of actions	Reporting/evidence
<ul style="list-style-type: none"> Position marine infrastructure as far from seagrass and macroalgal communities as reasonably practicable. Direct removal of BCH (including 'bare sand') shall be restricted to within a 10 m radius of the proposed drilling sites. 	Direct removal BCH <ul style="list-style-type: none"> Wherever practicable, ensure the intake and outlet arrays are positioned as far from the nearest seagrasses and macroalgal communities as reasonably practicable. Limit the footprint of the intake and outlet infrastructure to a 10 m radius. 	<ul style="list-style-type: none"> During construction, use GPS and GIS technologies to map the location of drilling activities relative to seagrass and macroalgal communities. 	Daily during the ASDP construction phase.	<ul style="list-style-type: none"> Detailed field logs, showing the placement of infrastructure relative to local seagrass and macroalgal communities, followed by a Summary Report at the completion of construction.
	Turbidity / Smothering <ul style="list-style-type: none"> Establish a set of procedures for reducing the potential for smothering when drilling by managing the dispersal of drill cuttings; and/or implementing other techniques to ensure TSS plume and cuttings remain within predicted dispersion patterns and concentrations. 	<ul style="list-style-type: none"> During drilling, conduct hourly observations and document the zone of influence, based on visual cues, GPS and TSS measurements. 	Hourly during drilling.	<ul style="list-style-type: none"> Contractor to prepare an appropriate Project Execution Plan documenting the monitoring and reporting procedures for managing the potential impacts of turbidity. Detailed field logs, followed by a Summary Report at the completion of construction.
EPA Factor	Marine Environmental Quality			
Management target	Management action	Monitoring	Timing / Frequency of actions	Reporting/evidence
<ul style="list-style-type: none"> Ensure all activities comply with the International Maritime Organisation International Convention for the Prevention of Pollution from Ships Implement appropriate strategies to avoid accidental hydrocarbon spills wherever practicable. 	Hydrocarbon spills <ul style="list-style-type: none"> Prior to the commencement of the construction activities, the contractor shall prepare a Project Execution Plan, documenting the agreed responses / management actions in the event of a spill. In the event of an unplanned spill, implement an appropriate management response to minimise impacts to the marine environment Implement procedures to maintain clean and tidy work areas, including the safe storage of all potentially hazardous substances. Ensure contractors have access to and know how to use hydrocarbon spill kits; and maintain access to all necessary materials for mitigation of accidental spill events. 	<ul style="list-style-type: none"> In the event of a spill, the contractor shall document the spatial extent of the hydrocarbon spill using visual cues and GPS. 	Hourly in the event of a spill.	<ul style="list-style-type: none"> Contractor to prepare an appropriate Project Execution Plan documenting refuelling, chemical storage and management procedures together with the management responses that will be implemented in the event of a spill. In the event of a spill, the contractor shall submit a Summary Report to the DWER documenting the spatial extent of the spill, and the outcomes of the management response.



EPA Factor	Marine Fauna			
Management target	Management action	Monitoring	Timing / Frequency of actions	Reporting/evidence
<ul style="list-style-type: none"> Implement appropriate risk mitigation strategies to minimise potential noise-related impacts. Construction will be conducted outside of the May – November marine mammal migration periods, OR within an appropriate marine mammal exclusion zone wherever practicable as described in the Marine Mammal Monitoring and Management Plan (Appendix A). 	Marine mammal strike <ul style="list-style-type: none"> Vessel masters to hold appropriate licences or undergo training, including marine mammal behaviour and actions, as per the EPBC Regulations 2000 – Part 8 Division 8.1: Interacting with cetaceans. Prior to commencement, contractor to develop a marine mammal observation procedure, to be implemented during construction. Prior to construction, ensure contractors and marine mammal observers, reach a common understanding on the procedures in the event of marine fauna interaction. 	<ul style="list-style-type: none"> Implement a process for detection of dead or injured marine fauna; documenting any disturbance or impacts to marine mammals; including date, number of individuals, corrective actions undertaken. During construction, document all marine fauna interactions. 	Before construction commences. Hourly during construction.	<ul style="list-style-type: none"> Contractor to prepare an appropriate Project Execution Plan documenting the monitoring and reporting procedures, and the management responses that will be implemented in the event of an interaction. At the completion of construction contractor to submit a Summary Report to the DWER and DCCEEW documenting the number of marine mammal interactions, details of the interactions and the outcome of the management response.
	Noise <ul style="list-style-type: none"> Construction activities will be conducted, wherever practicable, outside the May–November marine mammal migration periods, OR Develop an appropriate alternative management strategy based on enforcement of a suitable marine mammal safety zone as described in the ASDP Marine Mammal Management Plan (Appendix A). Prior to construction, ensure contractors and the proponent, have a common understanding of the management procedures for marine mammal interactions, and (if necessary) the extent of the marine mammal safety zone as described in the ASDP Marine Mammal Management Plan (Appendix A). 	<ul style="list-style-type: none"> During construction, document all marine fauna interactions. 	Hourly during construction activities.	<ul style="list-style-type: none"> In the event it is necessary to install the marine infrastructure during or overlapping the May – November marine mammal migration period, contractor to manage the potential impacts to marine mammals, via the enforcement of an appropriate safety zone as described in the ASDP Marine Mammal Monitoring and Management Plan (Appendix A). At the completion of the construction phase, contractor to submit a Summary Report to DWER and DCCEEW documenting the outcomes of the mitigation strategies.
	Introduced marine species (IMS) <ul style="list-style-type: none"> Ensure all construction vessels, including the jack-up barges, obtain a low-risk rating based on DPIRD’s risk assessment tool, prior to arriving on site. Ensure all vessels comply with the relevant ballast water management requirements. Minimise the residence time of visiting vessels 	<ul style="list-style-type: none"> Prior to the commencement of the construction activities, the contractor shall prepare a Project Execution Plan, documenting the approach to inspection, for DPIRD for approval. 	Before construction commences.	<ul style="list-style-type: none"> Contractor to prepare an appropriate Project Execution Plan documenting the monitoring and reporting procedures, and the management responses that will be implemented in the event IMS are detected. As part of the Project Execution Plan, submit the outcomes of the risk assessment procedure, required to meet the ballast water protocols Submit the IMS section of the Project Execution Plan to DPIRD for approval. At the completion of construction, submit a Summary Report to the DWER and DPIRD detailing the number and the taxonomy of the observed marine pests, together with the outcomes of the management response.



EPA Factor	Social Surroundings			
Management Target	Management Action	Monitoring	Timing / Frequency of Actions	Reporting / evidence
Ensure that any changes to regional aesthetics and/or access are avoided or otherwise minimised during construction activities.	Aesthetics <ul style="list-style-type: none"> Conduct all activities with due regard to the management actions for marine environmental quality, benthic communities and habitats, and marine fauna, recognising that by protecting the marine environment, the environmental objective for social surroundings will also be achieved. 	<ul style="list-style-type: none"> During the drilling phase, conduct hourly observations and document the zone of influence, based on visual cues, GPS and TSS measurements. 	Hourly during the drilling phase.	<ul style="list-style-type: none"> At the completion of the construction phase, submit a Summary Report to the DWER documenting the findings of the visual assessment and a summary of any comments received via the public complaints register, together with the outcomes of the management response.
	Access <ul style="list-style-type: none"> Obtain and implement a Temporary Notice to Mariners permit, from the appropriate regulatory authority. 			<ul style="list-style-type: none"> At the beginning of the construction phase, submit evidence to the DWER that the approved Temporary Notice to Mariners was appropriately communicated.

Notes: BCH = Benthic Communities and Habitats; EPBC = Environment Protection and Biodiversity Conservation Act 1999; GPS = Global Positioning System; TSS = Total Suspended Sediments. NB: Drilling refers to construction of the intake and outlet infrastructure, not drilling of the marine tunnels below the seabed.



3. Adaptive Management and Review of this CMEMP

Adaptive management is a systematic approach to improving environmental results and management practices during project implementation through the application of learning from monitoring of outcomes and management actions. Although the ASDP construction phase is anticipated to be short, the Proponent may update the CMEMP if it results in better management outcomes. Any significant changes to this CMEMP will be passed onto DWER for approval.

3.1 CMEMP implementation

This CMEMP, including its management targets and actions, will be implemented as per the timelines indicated in **Table 2.1**, noting that some of the actions require submission of a **Project Execution Plan** to the EPA prior to commencement for approval.

3.2 Roles and responsibilities

The proponent, Water Corporation, is responsible for implementing this CMEMP and maintaining compliance with its provisions.

3.3 Reporting and auditing

At the end of the ASDP construction phase, the proponent or contractor will prepare a **Summary Report** documenting the outcomes of the CMEMP, including the extent to which the management targets and actions were met and implemented, respectively. The report will be submitted to the relevant regulatory bodies including, but not necessarily limited to, DWER, DPIRD and the DoT.

4. Stakeholder Consultation

The Proponent has undertaken stakeholder consultation during the development of the Environmental Review Document (Water Corporation 2022) for the ASDP Proposal. This consultation has included relevant regulatory, industry and community stakeholders. Stakeholder consultation will continue on an as-required basis, through the approvals, design, construction and operation phases of the Proposal. For further description of the stakeholder consultation process refer to Section 4 of the Environmental Review Document (Water Corporation 2022).



5. References

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Appendix A – Marine Mammal Management Plan

Alkimos Seawater Desalination Plant

Marine Mammal Management Plan (MMMP)

February 2023





Document history

Revision	Author	Organisation	Recipients	Organisation	Format	Date
A	M Lourey	Water Corporation	J Phillips R Smith	Water Corporation	1 x pdf	23/01/2023

Review

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Acronyms

Abbreviation	Definition
ASDP	Alkimos Seawater Desalination Plant
CMEMP	Construction Marine Environmental Management Plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
km	Kilometre
L	Litre
m	Metre
MMMP	Marine Mammal Management Plan
PTS	Permanent threshold shift
TTS	Temporary threshold shift



Executive Summary

Proposal name	Alkimos Seawater Desalination Plant (ASDP)	
Proponent name	Water Corporation	
Ministerial Statement number	N/A	
Purpose of the EMP	This Marine Mammal Management Plan (MMMP) is submitted in support of Water Corporation’s application to construct and operate the ASDP under the provisions of Section 38 of the <i>Environmental Protection Act 1986</i> . The MMMP has been developed according to the objective-based provisions described in EPA (2021a). It describes the approach to managing the potential impacts to key marine mammals, via the enforcement of an appropriate safety zone if the migration period for key marine mammals cannot be avoided.	
Key Environmental Factors, Objectives	Key Environmental Factor	Environmental Objective
	Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.
Condition clauses (if applicable)	N/A	
Proposed construction date	TBC	
EMP required pre-construction?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	



1. Introduction

1.1 Proposal

Water Corporation is moving to secure Perth’s potable water supply via the construction and operation of the Alkimos Seawater Desalination Plant (ASDP) and Eglinton Groundwater Treatment Plant within Water Corporation’s ‘Alkimos Water Precinct’ at Alkimos, Western Australia. The construction of the ASDP requires marine tunnelling and drilling for the installation of the subterranean pipework, marine risers, intake and outlet diffusers; these construction activities will generate noise that has the potential to impact on marine fauna.

A Construction Marine Environmental Management Plan (CMEMP) was submitted in support of the application to construct and operate the ASDP under the provisions of Section 38 of the *Environmental Protection Act 1986*. The CMEMP described an objective-based framework (EPA 2021a) that will be implemented during the ASDP marine construction phase to prevent and/or minimise impacts to the EPA’s marine fauna key environmental factor.

The potential for impacts to marine fauna (specifically marine mammals) during the ASDP marine construction phase are proposed to be managed under the EPA’s objective-based provisions by restricting construction to the non-migration period for key marine mammals or development of a management strategy based on the enforcement of a suitable marine mammal safety zone.

This Marine Mammal Management Plan (MMMP) describes the approach to managing the potential impacts to marine mammals via the enforcement of a suitable safety zone and is triggered if the migration period for key marine mammals cannot be avoided.

1.2 Key environmental factors

The EPA’s key environmental factors are listed in ‘Statement of Environmental Principles, Factors and Objectives’ (EPA 2021b). The factors and associated environmental objectives relevant to this MMMP are summarised in **Table 1.1**; the only relevant factor for this MMMP is the EPA’s ‘Sea’ theme.

Table 1.1 Key environmental factors and objectives

EPA Theme	EPA Factor	Environmental Objective
Sea	Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.

1.3 Condition requirements

This MMMP is submitted in support of an application to construct and operate the ADSP by Water Corporation pursuant to the provisions of Section 38 of the *Environmental Protection Act 1986*.



1.4 Rationale and Approach

1.4.1 Key environmental impacts

Risks to marine mammals during the ASDP marine construction phase are detailed in the Environmental Review Document (Water Corporation 2022) and those deemed to pose a moderate (or higher) risk to the marine environment (**Table 1.2**) will be managed using **objective-based provisions** described in EPA (2021a). The potential for noise-related impacts to marine fauna are proposed to be managed (see the CMEMP) by restricting construction to the non-migration period for key marine mammals or via a management strategy based on the enforcement of a suitable marine mammal safety zone. This MMMP is triggered if the migration period for key marine mammals (see **Table 1.3**) cannot be avoided and management via the enforcement of a suitable marine mammal safety zone is required.

Table 1.2 Potential marine construction phase environmental impacts

Impact / Risk	Driver
Noise	Construction vessels, particularly Large Anchor Handlers

Table 1.3 Migration periods for key marine mammals

Species	Common Name	Period of potential encounter
<i>Balaenoptera musculus</i>	Blue Whale	Low likelihood of encounter at any time
<i>Eubalaena australis</i>	Southern Right Whale	May-November ¹
<i>Megaptera novaeangliae</i>	Humpback Whale	May-November ²

Notes:

1. Jenner et al. (2001)
2. Bannister (2001)

1.4.2 Survey and study findings

The ASDP marine infrastructure will be constructed in stages that will generate noise of varying magnitude and duration. The sources of noise with the greatest potential for impact are seabed drilling and infrastructure laydown, the latter of which requires the placement of the intake and outlet using a Large Anchor Handler vessel. During these activities, noise will be generated during drilling of the bedrock and during operation of the Large Anchor Handler positioning propellers.

The maximum underwater sound pressure during the construction phase is estimated at between 184 and 196 dB re 1µPa².S (GHD 2022). Marine mammals are considered at greatest risk of noise related impacts. Acoustic modelling of the construction activities determined that the impact zones for permanent threshold shift (PTS) and temporary threshold shift (TTS) in marine mammals is expected to be restricted to a maximum radius of 50 m and <500 m from the source of the noise, respectively.

The potential for behavioural disturbance is significantly greater than the zones of PTS and TTS. Behavioural responses may manifest as changes in feeding, migration, breeding behaviour, and/or avoidance behaviour, leading to or long-term avoidance of areas that may be important for feeding, reproduction or sheltering. The zones of impact for behavioural responses varied in radii from 4.5 km to 5.0 km during the installation of the marine intake and outlet structures, and from 6.9 km and 3.3 km during vessel transit; the latter of which will be restricted to days rather than weeks.



1.5 Objective-based management framework

Objective-based provisions are used when outcome-based measures, comprising of triggers and thresholds are not practicable, but where management actions are still required to ensure the EPA's key environmental factors are protected. Objective-based EMPs are not prescriptive about management practices, allowing opportunities for proponents to be pragmatic and innovative about how to achieve environmental outcomes. The management-based approach contained herein is appropriate given the short-term nature of the proposed construction activities and predicted low risk of impact.

1.6 Rationale for choice of indicators and/or management actions

This objective-based MMMP was prepared according to the EPA's (2021a) *Instructions for preparing Environmental Protection Act (1986) Part IV Environmental Management Plans (EMP)*. As an objective-based EMP, it includes a set of management targets, management actions, and monitoring and reporting requirements, which together form a holistic approach to protecting key marine mammals during the ASDP construction phase.

Indicators and management actions are based on those developed for managing underwater piling noise by the South Australian Government (DPTI 2012) and seismic surveys described in *EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales*. The proposed safety zone approach is the standard management and mitigation procedure for high intensity (piling and seismic surveys) noise generating activities. The policy statement is primarily based on received sound energy levels that are estimated to lead to a temporary threshold shift (TTS) and is not intended to prevent behavioural changes in response to detectable, but nontraumatic sound levels. Behavioural avoidance in response to the sound is relied upon to discourage fauna from approaching the area and mitigate against acoustic injury from intense or prolonged sound exposure. Temporary displacements are considered unlikely to result in any real biological cost to the animals. A conservative marine mammal safety zone of 1 km radius from the source of the noise is proposed, which is twice the maximum radius within which TTS in marine mammals is expected to be restricted (refer to Section 1.4.2).

Within the proposed safety zone, observation and shutdown areas are proposed. The observation area will encompass the entire 1 km radius safety zone and the movement of marine mammals will be monitored to determine whether they are approaching or entering the shutdown area. The shutdown area is 500 m and encompasses maximum radius within which TTS in marine mammals is expected to be restricted. When a marine mammal is sighted within or appears to enter the shutdown area, construction activities will be stopped as soon as reasonably practical. The shutdown will allow sufficient time to move away from the noise source thereby reducing the likelihood of hearing injury to occur.



2. MMMP Components

An objective-based framework comprising management targets, management actions, monitoring and reporting has been developed to achieve the environmental objectives and ensure the associated environmental values are protected during the ASDP marine construction phase (**Table 2.1**).

Under this framework, **management actions** are the identified actions needed to meet the environmental objective/s. Management actions generally relate to the ‘minimise’ and ‘rehabilitate’ steps of the mitigation hierarchy. Management actions include auditable timelines, clear identification of record-keeping and reporting against actions and be prioritised using a risk-based approach (EPA 2021a).



Table 2.1 Objective-based provisions for marine construction

EPA Factor	Marine Fauna			
Management target	Management action	Monitoring	Timing / Frequency of actions	Reporting/evidence
<ul style="list-style-type: none"> Avoid physical and behavioural impacts of noise on listed threatened and migratory Southern Right Whales (<i>Eubalaena australis</i>) and Humpback Whales (<i>Megaptera novaeangliae</i>) 	<ul style="list-style-type: none"> Implement the following safety zones around the noise source: <ul style="list-style-type: none"> a 500 m shutdown area a 1 km observation area Only commence construction activities if no whales have been sighted within the 1 km observation area during the pre-start-up visual observations If possible, initiate with a “soft start” by gradually increasing noise intensity over a 30-minute period If whales are sighted within the 500 m shutdown area at any time, cease any drilling or infrastructure laydown activities as soon as safely possible Drilling or infrastructure laydown activities must not recommence until whales are observed to have moved outside the 500 m shutdown area Drilling or infrastructure laydown activities may continue during low visibility or night operations provided that there have not been 3 or more whale instigated shutdown situations during the preceding 24-hour period 	<ul style="list-style-type: none"> Prior to start-up – visual observations for marine fauna must be undertaken, where visibility allows, to the extent of the 1 km observation area by at least one qualified Marine Mammal Observer for at least 30 minutes before the commencement of impact During construction activities – visual observations of 1 km observation area must be maintained, by at least one qualified Marine Mammal Observer, to identify if any whales are present 	<ul style="list-style-type: none"> During drilling of the marine intake and outlet structures and/or intake/outlet infrastructure laydown activities if it occurs between 1 May and 30 November, inclusive, in any year 	<ul style="list-style-type: none"> At the completion of the marine construction phase, contractor to submit a Summary Report documenting (at a minimum): <ul style="list-style-type: none"> the location, date and start time of the construction activities name, qualifications and experience of any Marine Mammal Observers the location, times and reasons when observations were hampered by poor visibility or high winds the location and time of any start-up delays or stop work procedures instigated as a result of whale sightings the location, time and distance of any whale sighting including species where possible the date and time of construction activities completion. The Summary Report is to be submitted to DCCEEW within two months of completion of the marine construction phase, as per the instructions at: https://www.dcceew.gov.au/environment/epbc/publications/epbc-act-policy-statement-21-interaction-between-offshore-seismic-exploration-and-whales

Notes:
 “Drilling” refers to drilling for construction of the intake and outlet infrastructure and does not include the tunnelling below the seabed.



3. Adaptive Management and Review of this MMMP

Adaptive management is a systematic approach to improving environmental results and management practices during project implementation through the application of learning from monitoring of outcomes and management actions. The Proponent may update the MMMP if it results in better management outcomes. Any significant changes to this MMMP will be passed onto the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for approval.

3.1 MMMP implementation

This MMMP, including its management targets and actions, will be implemented as per the timelines indicated in **Table 2.1**.

3.2 Roles and responsibilities

The proponent, Water Corporation, is responsible for implementing this MMMP and maintaining compliance with its provisions.

3.3 Reporting and auditing

At the end of the ASDP marine construction phase, a **Summary Report** documenting the outcomes of the MMMP as described in **Table 2.1** will be submitted to the DCCEEW.

4. Stakeholder Consultation

The Proponent has undertaken stakeholder consultation during the development of the Environmental Review Document (Water Corporation 2022) for the ASDP Proposal. This consultation has included relevant regulatory, industry and community stakeholders. Stakeholder consultation will continue on an as-required basis, through the approvals, design, construction and operation phases of the Proposal. For further description of the stakeholder consultation process refer to Section 4 of the Environmental Review Document (Water Corporation 2022).



5. References

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