



Environmental
Protection
Authority

Alkimos Seawater Desalination Plant

Water Corporation

Report 1739
May 2023

This assessment report has been prepared by the Environmental Protection Authority (EPA) under s. 44 of the *Environmental Protection Act 1986* (WA). It describes the outcomes of the EPA's assessment of the Alkimos Seawater Desalination Plant proposal by Water Corporation.

The Alkimos Seawater Desalination Plant was determined under the Commonwealth *Environment Protection and Biodiversity Act 1999* to be a controlled action and to be assessed by the EPA under an accredited process. This document is also the result of the EPA's accredited assessment process.

This assessment report is for the Western Australian and Commonwealth Ministers for Environment and sets out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment
- an assessment of the matters of national environmental significance
- the EPA's recommendations as to whether or not the proposal may be implemented and, if it recommends that implementation be allowed, the conditions and procedures, if any, to which implementation should be subject
- other information, advice and recommendations as the EPA thinks fit.



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Summary

Proposal

The Alkimos Seawater Desalination Plant is a proposal to construct and operate a 100 gegalitre (GL) per annum seawater desalination plant and a 4.9 GL per annum groundwater treatment plant. The proposal is located within the Alkimos Water Precinct (Lot 3000 on Plan 415979) in the suburb of Alkimos, approximately 40 kilometres (km) north of Perth, in Western Australia.

The proponent for the proposal is Water Corporation.

The proposal involves the construction of a water treatment facility comprising a seawater desalination plant, groundwater treatment plant, access roads, and support buildings, marine infrastructure that includes seawater intake and brine outfall pipelines with associated vertical risers, and a terrestrial integration pipeline to transport treated water to the integrated water supply scheme distribution network.

The proposal was determined under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to be a controlled action and to be assessed by the EPA under an accredited process.

Context

The proposal occurs within the Swan Coastal Plain (SCP) Interim Biogeographic Regionalisation of Australia (IBRA) bioregion. The Alkimos Water Precinct, the site of the water treatment facility, is situated within the Quindalup dune system, around 550 m east of the Indian Ocean.

The proposed seawater inlet and brine outfall sites are situated within Perth's coastal waters approximately 13 km north of the Marmion Marine Park. The seawater intake and brine outfall are located 2.9 km and 4.4 km offshore respectively between two reef lines.

The water treatment facility is located within the Alkimos Water Precinct – an area zoned Public Purposes and Urban Deferred in the Metropolitan Region Scheme (MRS). The Precinct comprises the proponent's existing wastewater treatment plant and a 600 m odour buffer. Portions of the wastewater treatment plant Public Purposes reservation have been set aside to be managed for conservation purposes to protect the integrity, function, and environmental value of the bushland. The areas identified in Ministerial Statement 722 as areas 9a, 10a, and 10b are to be used for conservation, landscape, and complementary purposes. Ministerial Statement 722 allows for the installation of minor infrastructure in these areas providing the work is undertaken in accordance with a management plan approved by the EPA.

The pipeline route intersects several areas with different zoning including for urban development, rural, parks and recreation and state forest.

Environmental values

Flora and Vegetation, Terrestrial Fauna, Landforms, Social Surroundings, Marine Environmental Quality, Benthic Communities and Habitats, Marine Fauna and Greenhouse Gas Emissions are the key environmental factors that may be impacted by the proposal.

Consultation

The EPA published the proponent's referral information for the proposal on its website for 7-day public comment. The EPA also published the proponent's environmental review document on its website for public review for 4 weeks (from 28 September to 25 October 2022). The EPA considered the comments received during these public consultation periods in its assessment.

Mitigation hierarchy

The mitigation hierarchy is a sequence of proposed actions to reduce adverse environmental impacts and emissions. The sequence commences with avoidance, then moves to minimisation, rehabilitation, and offsets are considered as the last step in the sequence.

The proponent considered the mitigation hierarchy in the development and assessment of its proposal, and as a result:

- has avoided disturbance to three individuals of threatened flora species *Melaleuca* sp. Wanneroo (G. J. Keighery 16705)
- will avoid clearing the threatened ecological community '*Banksia attenuata* woodland over species rich dense shrublands' (community FCT20a) if it occurs
- has avoided impacting Registered Aboriginal heritage sites
- will avoid higher intensity underwater noise emissions through the use of tunnel boring machines
- has minimised the extent of native vegetation clearing by aligning the pipeline route along existing roads, tracks, and other cleared areas as much as possible
- will construct the water treatment facility in a manner to minimise impacts associated with operational noise
- will construct an earthen berm on the western boundary of the water treatment facility to minimise impacts to visual amenity
- will revegetate or rehabilitate all areas temporarily cleared for construction purposes
- will reinstate and recontour dune areas temporarily removed/excavated
- will implement construction methods to minimise disturbance and turbidity generation within the marine environment
- will position marine intake and outfall structures to minimise direct and indirect impacts to benthic communities and habitats

- will avoid impacts to marine fauna by restricting underwater drilling during the whale migration period where practicable
- will minimise greenhouse gas emissions through efficient design and equipment technologies
- has committed to achieve net-zero emissions for construction and operation over the lifetime of the proposal through the provision of renewable energy to the South West Interconnected System and by providing offsets for emissions not otherwise mitigated.

Assessment of key environmental factors

The EPA has identified the key environmental factors (listed below) in the course of the assessment. For each factor, the EPA has assessed the residual impacts of the proposal on the environmental values and considered whether the environmental outcomes are likely to be consistent with the EPA environmental factor objectives.

Flora and Vegetation

Residual impact or risk to environmental value	Assessment finding
<p>Clearing of listed conservation significant ecological communities:</p> <ul style="list-style-type: none"> • <i>Melaleuca huegelii</i> - <i>Melaleuca systema</i> shrublands on limestone ridge (Gibson et al. 1994 type 26a) threatened ecological community (TEC) • Banksia woodlands of the Swan Coastal Plain ecological community • Tuart (<i>Eucalyptus gomphocephala</i>) woodlands and forest of the Swan Coastal Plain. 	<p>The proposal will impact 1.03 ha of <i>Melaleuca huegelii</i> – <i>Melaleuca systema</i> shrublands on limestone ridge TEC. All occurrences are considered critical habitat. The proposal will not result in the loss of a consolidated occurrence, nor will it fragment a consolidated occurrence. The proposal will result in a significant residual impact to this TEC.</p> <p>The proposal will impact up to 1.7 ha of Banksia Woodland of the Swan Coastal Plain community. The proposal will not result in the loss of a consolidated patch, nor will it fragment a consolidated patch. The proposal will result in a significant residual impact to this TEC.</p> <p>The proposal will impact a total of 1.16 ha of Tuart (<i>Eucalyptus gomphocephala</i>) woodlands and forest of the Swan Coastal Plain ecological community across several small areas. The proposal will not result in fragmentation of a consolidated patch. The proposal will result in a significant residual impact to this TEC.</p> <p>The EPA advises that this residual impact should be subject to reasonable implementation conditions (recommended condition B1) to ensure the environmental outcome is consistent with the EPA objective for flora and vegetation.</p> <p>The EPA advises that offsets should be imposed to counterbalance the significant residual impacts of the proposal on the ecological communities (recommended condition B8).</p>
<p>Potential for impact to threatened ecological community <i>Banksia attenuata</i> woodland over species rich dense</p>	<p>The proposal has the potential to impact 0.40 ha of the FCT20a TEC. The proponent has committed to undertake further work to confirm the presence of the community and to avoid any impact if assessment confirms its occurrence.</p>

shrublands' (floristic community type (FCT) 20a) TEC.	The EPA advises that this commitment should be subject to reasonable implementation conditions (recommended condition B1-2) to confirm the presence of the community and to avoid impact should its occurrence be confirmed.
<p>Clearing of significant ecological communities:</p> <ul style="list-style-type: none"> Northern Spearwood shrublands and woodlands ('floristic community type 24') priority ecological community (PEC) Acacia shrublands on taller dunes, Southern SCP ('floristic community type 29b') PEC. 	<p>The proposal will impact 1.55 ha of Spearwood Shrublands PEC and 28.1 ha of Acacia Shrublands PEC. The extent of impact to the Spearwood Shrublands PEC is spread along the length of the pipeline development envelope (DE) and would not result in the loss of a single substantial patch or result in the isolation of any patch representing this community.</p> <p>The impact to the Acacia Shrublands PEC is mitigated to some extent through the revegetation of a berm that will be constructed west of the plant site and revegetation of dune formation that are temporarily cleared for construction purposes.</p> <p>The EPA advises that this residual impact should be subject to reasonable conditions to limit the extent of impact (recommended condition B1) to ensure the environmental outcome is consistent with the EPA objective for flora and vegetation.</p>
Clearing of regionally significant vegetation within Bush Forever sites.	<p>The proposal intersects eight Bush Forever (BF) sites and will result in clearing of up to 9.4 ha of vegetation, of which approximately 5.7 ha is considered regionally significant due to its condition and being representative of conservation significant ecological communities.</p> <p>The EPA considers that approximately 3.7 ha of vegetation proposed to be cleared in BF sites 295, 324, and 382 is not regionally significant vegetation and can be considered an acceptable impact.</p> <p>The EPA noted that the area proposed to be cleared within BF site 383 has been previously cleared by others. The EPA further noted that the terrestrial development envelope (DE) intersects a vegetated area of Neerabup National Park. The EPA advises that recommended condition B1-1(4) should be imposed to ensure there is no adverse impact to native vegetation within Neerabup National Park as a result of the proposal.</p> <p>The EPA advises that the residual impact should be subject to reasonable conditions (recommended condition B1) to ensure the environmental outcome is consistent with the EPA objective for flora and vegetation.</p> <p>The EPA advises that offsets should be imposed to counterbalance the significant residual impacts of the proposal on approximately 5.7 ha of vegetation within BF sites 136, 290, 293, and 471 (recommended condition B8).</p>
Potential impact to threatened flora species.	One individual of the threatened flora species <i>Melaleuca</i> sp. Wanneroo (G. J. Keighery 16705) (endangered) occurs within the terrestrial DE and two were recorded adjacent to the DE. The proponent has committed to avoiding impact to this species.

	The EPA advises that this commitment should be subject to reasonable conditions (recommended condition B1-1(1) to ensure no adverse impacts to the species.
Indirect impacts associated with the introduction and spread of weeds and disease, and changes to hydrological changes.	<p>The proposal has the potential to result in indirect impacts, including from the spread of weeds and disease (dieback) and hydrological changes from the movement of people and equipment and trenching activities during construction of the terrestrial components of the proposal. The implementation of the proponent's mitigation and management measures are likely to ensure the EPA's objective for Flora and Vegetation can be met.</p> <p>The EPA advises this residual impact should be subject to reasonable implementation conditions (recommended condition B1) to ensure the environmental outcome is consistent with the EPA objective for Flora and Vegetation.</p>

Terrestrial Fauna

Residual impact or risk to environmental value	Assessment finding
<p>Clearing of habitat suitable for two species of listed black cockatoo:</p> <ul style="list-style-type: none"> • Carnaby's cockatoo • forest red-tailed black cockatoo. 	<p>The proposal will impact 52.1 ha of high-quality foraging habitat for Carnaby's cockatoo and 49.8 ha of high-quality foraging habitat for forest red-tailed black cockatoo.</p> <p>The proposal will result in a significant residual impact to two species of listed black cockatoo.</p> <p>The EPA advises this residual impact should be subject to reasonable implementation conditions (recommended condition B2-1) to ensure the environmental outcome is consistent with the EPA objective for terrestrial fauna.</p> <p>The EPA advises that offsets should be imposed to counterbalance the significant residual impacts of the proposal on the two species (recommended condition B8).</p>
Loss of black cockatoo potential nesting trees.	<p>The proposal will impact 104 black cockatoo potential nesting trees, eight of which have suitable hollows.</p> <p>The proposal will result in a significant residual impact to two species of black cockatoo.</p> <p>The EPA advises this residual impact should be subject to reasonable implementation conditions (recommended condition B2-1 and condition B2-2) to ensure the environmental outcome is consistent with the EPA objective for Terrestrial Fauna.</p> <p>The EPA advises that offsets should be imposed to counterbalance the significant residual impacts of the proposal on black cockatoos (recommended condition B8).</p>
Potential impact to terrestrial fauna species from construction.	<p>The proposal has the potential to impact terrestrial fauna species during construction as a result of trenching.</p> <p>The proposal will result in a residual impact to terrestrial fauna.</p> <p>The EPA advises this residual impact should be subject to reasonable conditions (recommended condition B2-2) to</p>

	ensure the environmental outcome is consistent with the EPA objective for this factor.
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Landforms

Residual impact or risk to environmental value	Assessment finding
Disturbance to the area defined as the Alkimos Dune Complex geoheritage site.	<p>The proposal will result in the loss of 1.9 ha of the Quindalup second phase parabolic dune (Q2) and 16.6 ha of the Quindalup third phase parabolic dune (Q3) within the area defined as the Alkimos Dune Complex geoheritage site.</p> <p>The proponent proposes to reinstate and recontour dune areas that would be temporarily disturbed. A berm on the western boundary of the plant development envelope (plant DE) would be constructed and rehabilitated to reconnect northern and southern dunes.</p> <p>The EPA advises this residual impact should be subject to reasonable implementation conditions (recommended conditions B3) to ensure the environmental outcome is consistent with the EPA objective for landforms.</p>
Direct impact to an area within Public Purpose Zone that is to be managed for conservation.	<p>The proposal will directly impact 5.2 ha of an area that is to be managed for conservation within an area zoned Public Purpose in the Metropolitan Region Scheme, known as area 10b.</p> <p>The proponent proposes to reinstate and recontour dune areas that would be temporarily disturbed and to rehabilitate temporarily cleared areas of area 10b to their pre-construction vegetation condition.</p> <p>The EPA advises this residual impact should be subject to reasonable implementation conditions (recommended condition B3) to ensure the environmental outcome is consistent with the EPA objective for Landforms.</p>
Potential indirect impacts to coastal dunes from aeolian erosion, destabilisation, or disruption of sediment flow.	<p>The proposal has the potential to result in indirect impacts to dune landforms as a result of disruption associated with construction activities.</p> <p>The EPA advises this residual impact should be subject to reasonable implementation conditions (recommended condition B3) to ensure the environmental outcome is consistent with the EPA objective for Landforms. The proponent will be required to prepare and implement an environmental management plan (condition B3-4) to ensure the proposal is managed to meet the environmental outcome.</p>

Social Surroundings

- Following consultation with Whadjuk representatives, the proponent amended the proposal to avoid impacting two known heritage places.

- The proposal is likely to have residual impacts on amenity values of noise and vibration during construction.
- The EPA advises that the potential residual impacts can be subject to other statutory decision-making processes if required to ensure the environmental outcome is consistent with the EPA objective for Social Surroundings.

Marine Environmental Quality

Residual impact or risk to environmental value	Assessment finding
Potential impacts to marine biota due to toxicity and/or osmotic stress resulting from the discharge of brine.	<p>A high level of ecological protection will be maintained 100 m from the point of discharge.</p> <p>There is a level of uncertainty regarding the number of dilutions required to achieve a high level of ecological protection for brine containing 'clean in place' chemicals compared to brine without these chemicals.</p> <p>The discharge and diffuser performance will need to be managed to ensure sufficient dilutions to achieve the 99% species protection levels determined through whole of effluent testing and under the full range of operating conditions.</p> <p>The EPA advises the residual impact should be subject to reasonable implementation conditions (recommended condition B-4) to ensure the environmental outcome is consistent with the EPA objective for marine environmental quality. The proponent will be required to prepare and implement a Commissioning and Operations Marine Environmental Management Plan that includes monitoring, management and reporting protocols and provision for further whole of effluent toxicity testing of brine containing clean in place chemicals.</p>
Potential impacts on marine biological communities through increased density stratification and reduced dissolved oxygen exchange resulting from the discharge of brine.	<p>A high level of ecological protection will be maintained 100 m from the point of discharge and beyond.</p> <p>The residual uncertainty about effects of the predicted near-permanent stratification on dissolved oxygen levels of the water column near the seabed in the far-field can be improved during the commissioning phase.</p> <p>The discharge and diffuser performance will need to be managed to ensure dissolved oxygen levels meet relevant criteria in the far-field (in the High Ecological Protection Areas (HEPA)) under the full range of operating conditions.</p> <p>The EPA advises the residual impact should be subject to reasonable implementation conditions (recommended condition B-4) to ensure the environmental outcome is consistent with the EPA objective for Marine Environmental Quality. The proponent will be required to prepare and implement a Commissioning and Operations Marine Environmental Management Plan that includes monitoring, management and reporting protocols and remodelling of density stratification and dissolved oxygen concentrations in</p>

	bottom waters to inform adaptive/preemptive management actions.
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Benthic Communities and Habitats

Residual impact or risk to environmental value	Assessment finding
The permanent loss of up to 0.13 ha of benthic communities and habitats due to sediment deposition from drill cuttings and the direct impacts of construction of the intake and out take structures.	<p>The impacts of construction activities can be managed to limit the permanent (irreversible) loss of benthic communities and habitats to within 10 m of each of the four drilling points.</p> <p>The EPA advises the residual impact should be subject to reasonable implementation conditions (recommended condition B-5) to limit the extent of irreversible loss to ensure the environmental outcome is consistent with the EPA objective for benthic communities and habitats.</p>
The disturbance of up to 8.39 ha of benthic communities and habitats due to the indirect impacts of construction activities.	<p>Non-permanent (recoverable) impacts on benthic communities and habitats can be managed to ensure they are confined to the marine development envelope.</p> <p>The EPA advises the residual impact should be subject to reasonable implementation conditions (recommended condition B-5) to confine temporary impacts to within the marine development envelope to ensure the environmental outcome is consistent with the EPA objective for Benthic Communities and Habitats.</p>

Marine Fauna

Residual impact or risk to environmental value	Assessment finding
Potential impacts to marine fauna during construction from underwater noise and vessel strike.	<p>Marine construction activities that have the potential to impact marine fauna (e.g. underwater drilling and operation of large anchor handling vessels) will be short-term, temporary and any impacts are likely to be localised.</p> <p>The proponent has incorporated fauna observation protocols into a preliminary Marine Mammal Management Plan to minimise impacts during construction.</p> <p>The EPA advises the residual impact should be subject to reasonable implementation conditions (recommended condition B-6) to establish marine fauna exclusion zones, noise management measures, and fauna observations and reporting to ensure the environmental outcome is consistent with the EPA objective for Marine Fauna.</p>
Potential impacts to marine fauna due to toxicity and/or osmotic stress resulting from the discharge of brine	<p>A high level of ecological protection will be maintained 100 m from the point of discharge.</p> <p>There is a level of uncertainty regarding the number of dilutions required to achieve a high level of ecological protection for brine containing 'clean in place' chemicals.</p> <p>The discharge and diffuser performance will need to be managed to ensure sufficient dilutions to achieve the 99%</p>

	<p>species protection levels determined through whole of effluent testing and under the full range of operating conditions.</p> <p>The EPA advises the residual impact should be subject to reasonable implementation conditions (recommended condition B6-1) to ensure the environmental outcome is consistent with the EPA objective for Marine Fauna.</p> <p>The proponent will be required to prepare and implement a Commissioning and Operations Marine Environmental Management Plan that includes monitoring, management and reporting protocols, remodelling of density stratification and dissolved oxygen concentrations in bottom waters to inform adaptive/preemptive management actions, and provision for further whole of effluent toxicity testing of brine containing clean in place chemicals.</p>
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Greenhouse Gas Emissions

- With proposed mitigation, implementation of a greenhouse gas management plan, and implementation of the EPA's recommended conditions (condition B-7):
 - scope 1 and 2 construction emissions will be up to 36,214 tonnes CO₂-e
 - scope 1 and 2 commissioning emissions will be up to 40,674 tonnes CO₂-e
 - scope 1 and 2 operations emissions will be up to 169,318 tonnes CO₂-e per annum at the commencement of the proposal (expected 2028), decreasing over time in line with a gradual reduction in the emission intensity in the South West Interconnected System to net zero by 2050
 - total scope 1 and 2 emissions for the life of the proposal is expected to be 2,047,573 tonnes CO₂-e over 100 years.

Holistic assessment

The EPA considered the connections and interactions between relevant environmental factors and values to inform a holistic view of impacts to the whole environment. The EPA formed the view that the holistic impacts would not alter the EPA's conclusions about consistency with the EPA factor objectives.

Conclusion and recommendations

The EPA has taken the following into account in its assessment of the proposal:

- environmental values which may be significantly affected by the proposal
- residual impacts, emissions, and effects in relation to the key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- likely environmental outcomes (and taking into account the EPA's recommended conditions), and the consistency of these outcomes with the EPA objectives for the key environmental factors
- the EPA's confidence in the proponent's proposed mitigation measures

- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment
- principles of the *Environmental Protection Act 1986* (EP Act).

The EPA has recommended that the proposal may be implemented subject to conditions recommended in Appendix A.

1 Proposal

The proposal is for the construction and operation of a 100 GL per annum seawater desalination plant and a 4.9 GL per annum Groundwater Treatment Plant. The proposal is located 40 km from Perth, in the Alkimos Water Precinct (Lot 3000 on Plan 415979) within the suburb of Alkimos in Western Australia (see Figure 1).

Seawater would be sourced from the marine environment directly west of the desalination plant site via a marine intake and underground pipeline. By-products of the desalination process will be returned to marine environment via a separate pipeline and marine outlet.

The proposal also includes construction and operation of a 33.5 km pipeline to distribute the desalinated water to the Wanneroo Reservoir and other distribution points along the pipeline route.

The proponent for the proposal is the Water Corporation. The proponent referred the proposal to the EPA on 12 April 2019. The referral information was published on the EPA website for 7-day public comment. On 12 June 2019, the EPA decided to assess the proposal at the level Public Environmental Review.

The proposal was determined under the *Environment Protection and Biodiversity Conservation Act 1999* to be a controlled action and to be assessed by the EPA under an accredited process.

The EPA published the environmental review document (Water Corporation 2022) on its website for 4 weeks public review from 28 September 2022 to 25 October 2022.

The elements of the proposal which have been subject to the EPA's assessment are included in Table 1.

Table 1: Proposal content document (proponent reference)

Proposal element	Location	Maximum extent or range
<i>Construction elements</i>		
<i>Total development envelope (DE)</i>	Figure 2	<i>141.6 ha, including marine infrastructure DE of 11.45 ha and terrestrial DE of 130.15 ha.</i>
Marine infrastructure	Figure 2	Marine DE of 11.45 ha including subsurface tunnelling to Plant Site boundary to the vertical riser disturbance footprint, comprising: <ul style="list-style-type: none"> 3.06 ha tunnel footprint <ul style="list-style-type: none"> 2.6 km seawater intake pipeline length 4.5km outlet pipeline length 8.39 ha vertical risers (intake and outfall) disturbance footprint.

Proposal element	Location	Maximum extent or range
		<ul style="list-style-type: none"> Disturbance of up to 4.09 ha of vegetated Benthic Communities and Habitats (BCH) within the Marine Development Envelope (DE).
Water treatment facility	Figure 3	<p>The water treatment facility DE of up to 31.75 ha including, and not limited to the following infrastructure:</p> <ul style="list-style-type: none"> Seawater Desalination Plant (SDP) infrastructure (Site earthworks and western berm construction, marine tunnel boring machine launch pit, water treatment buildings and water storage tanks the Groundwater Treatment Plant (GWTP) infrastructure access roads and support buildings. <p>Construction includes disturbance of up to 26.89 ha of native vegetation.</p>
Integration pipeline	Figure 3	<p>The Pipeline DE from the Plant Site boundary to the Wanneroo Reservoir, into the integrated water supply scheme (IWSS), with a spur pipeline to the Carabooda Tank.</p> <p>The Pipeline DE comprises of the following attributes:</p> <ul style="list-style-type: none"> Pipeline DE area of 98.4 ha Pipeline DE corridor width of 30 m Pipeline DE Length of 32.93 km Pipeline Disturbance Footprint area of 52.15 ha Pipeline Disturbance Footprint Corridor width of 16 m Pipeline diameter of 1600 mm <p>disturbance of up to 24.28 ha of native vegetation within the 16 m wide disturbance footprint corridor.</p>
Operational elements		
<i>Seawater intake</i>	Figure 2	<p>Two approximately 8.5m diameter screened intake:</p> <ul style="list-style-type: none"> 360 ML/d (at 50 GL/a) up to 720 ML/d (at 100 GL/a) Maximum velocity 0.15 m/sec
<i>SDP Outlet</i>	Figure 2	<p>Two approximately 7m diameter rosette diffuser:</p>

Proposal element	Location	Maximum extent or range
		<ul style="list-style-type: none"> 210 ML/d (at 50 GL/a) up to 420 ML/d (at 100 GL/a) with a maximum salinity of 75,200 mg/L
<i>Drinking water production</i>	NA	Seawater desalination: <ul style="list-style-type: none"> 100 GL/a ultimate drinking water production capacity (Stage 1 – 50 GL/a in 2 x 25 GL/a treatment trains. Stage 2 – 50 GL/a in 2 x 25 GL/a treatment trains) Groundwater treatment: <ul style="list-style-type: none"> 4.9 GL/a (excluding abstraction)
<i>Proposal elements with greenhouse gas emissions</i>		
<i>Construction elements</i>		
Scope 1	NA	<ul style="list-style-type: none"> Land clearing: 13,784.7 t CO₂-e (between 2023 – 2027) Plant and equipment: 18,962 t CO₂-e (between 2023–2025)
Scope 2	NA	Tunnel Construction: 3,468 t CO ₂ -e (2023–2027)
<i>Operational elements</i>		
Scope 1 (100GL Plant)	NA	<ul style="list-style-type: none"> Operational commissioning: 635 t CO₂-e (2027-2028) Operations: 421 t CO₂-e (2028 onwards)
Scope 2 (100GL Plant)	NA	<ul style="list-style-type: none"> Operational commissioning: 40,040 t CO₂-e (2027–2028) Operations (treatment): 133,251 t CO₂-e (2028 onwards) Operations (clearwater pumping): 35,645 t CO₂-e (2028 onwards)
Water Corporation proposes to achieve net zero Scope 1 & 2 greenhouse gas emissions for construction and operations of the project.		
<i>Rehabilitation</i>		
<p>A berm to the west of the Alkimos water precinct will be stabilised to prevent wind erosion and revegetated with native vegetation.</p> <p>All cleared land outside the required 5 m wide maintenance corridor along the terrestrial pipeline to the Wanneroo Reservoir will be revegetated with native vegetation following completion of the pipeline.</p>		
<i>Commissioning</i>		
<p><i>Seawater Desalination Plant (SDP)</i></p> <p>Operational commissioning of the SDP is expected to occur for up to 12 months. During commissioning, water will be sourced through the seawater intake and discharged through the outfall.</p>		

Proposal element	Location	Maximum extent or range
Pipeline Once constructed, the pipeline will be pressure tested in sections and disinfected. Water will be sourced from potable supply and neutralised prior to discharge to the terrestrial environment.		
<i>Other elements which affect extent of effects on the environment</i>		
Proposal time	Estimated Construction phase (subject to State water source requirements)	<ul style="list-style-type: none"> Stage 1 – 2023-2028 (first 50 GL capacity plant and proposal infrastructure) Stage 2 – 2029-2032 (second 50 GL capacity plant and integration works)
	Operations phase	<ul style="list-style-type: none"> 2028 onwards
	Decommissioning phase	<ul style="list-style-type: none"> Decommissioning of original facility by 2128.

Units and abbreviations

ha – hectare
t CO₂-e – tonnes (t) of carbon dioxide (CO₂) equivalent (e)
GL/a – gigalitres per annum
ML/d – megalitres per day
ha – hectares
km – kilometres
m – metres
mm – millimetres
sec – seconds

Proposal amendments

The original proposal is set out in section 2 of the proponent's environmental review document (ERD) (Water Corporation 2022), which is available on the EPA website.

During the assessment process, the EPA encouraged the proponent to identify avoidance and mitigation measures for the proposal in addition to those included in the original proposal.

The proponent requested changes to the original proposal during the assessment. The changes were assessed to be unlikely to significantly increase any impacts of the proposal and some reduced potential impacts on the environment. The EPA Chair's notice of 7 March 2023, consenting to the change is available on the EPA website.

The consolidated and updated elements of the proposal which has been subject to the EPA's assessment is included in Table 1.

Proposal alternatives

As part of Water Corporation's Dry Season Response activities, the proponent applied a multi-criteria assessment (MCA) process to a number of alternatives including:

- upgrading existing seawater desalination plants

- new seawater desalination plants (including Perth Desalination 2 and this proposal)
- new groundwater schemes
- groundwater replenishment (water recycling) (Water Corporation 2022).

This proposal option was selected as one of two preferred desalination plant options due to its efficient location to service the growing northern suburbs of the Perth region and to replace current groundwater sources from the Gnangara groundwater system. The co-location of the proposed desalination plant and groundwater treatment plant offer both efficiencies and potentially reduced impacts by consolidating these two plants in one area.

The proponent investigated several pipeline routes and assessed these options against a number of main constraints including future and existing infrastructure (roads, rail, services, etc.) and developments (residential, commercial, etc.), existing services, native vegetation, and traffic before referring the selected pipeline route to the EPA (Water Corporation 2022).

Proposal context

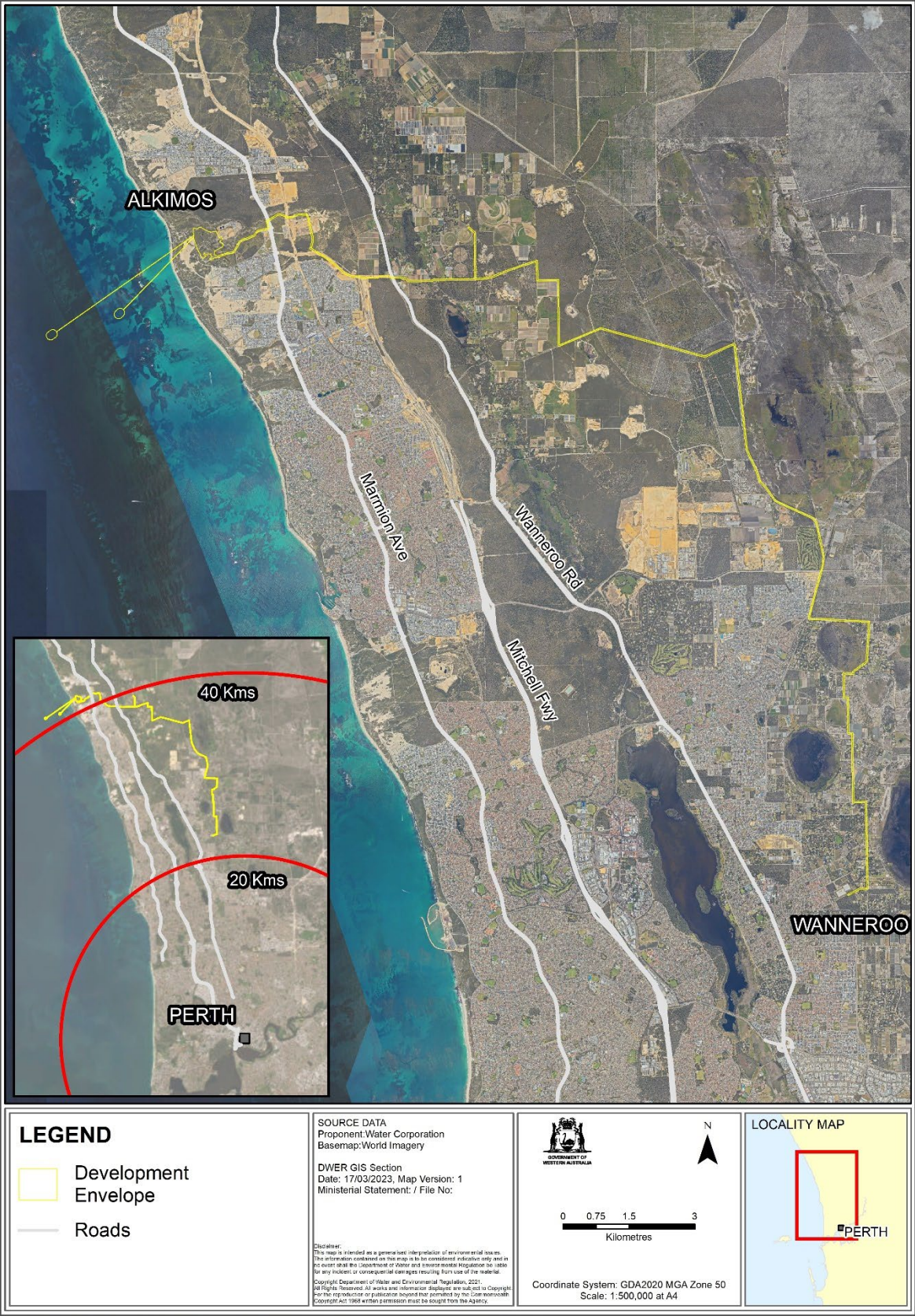
The proposal is located around 40 km north of Perth's Central Business District within the City of Wanneroo. The proposal occurs within the Swan Coastal Plain (SCP) Interim Biogeographic Regionalisation of Australia (IBRA) bioregion.

The proposed seawater inlet and brine outfall sites are situated within Perth's coastal waters approximately 13 km north of the Marmion Marine Park. The seawater inlets are located 2.9 km offshore within the lagoon, and the outlet diffuser structures are located 4.4 km offshore, connected via underground pipelines to the onshore water treatment facility plant development envelope (plant DE).

The plant DE is located about 550 m inland of the coastal waterline, within the Alkimos Dune Complex – a recognised geo-heritage site within the Quindalup dune system. The proponent already operates a wastewater treatment plant at this location within an area referred to as the Alkimos Water Precinct (Lot 3000 on Plan 415979).

Within the Alkimos Water Precinct and adjoining the plant DE are several other areas zoned Public Purpose under the Metropolitan Region Scheme (MRS) and required to be managed for conservation purposes. These areas were recommended for conservation during the EPA's assessment of Alkimos-Eglinton Metropolitan Region Scheme Amendment No. 1029/33 (EPA Bulletin 1207) in 2005, and subsequently incorporated into the MRS in accordance with Ministerial Statement 722. These conservation areas were intended to conserve the environmental values of the Alkimos-Eglinton area. Those specifically relevant to this proposal are areas 9a, 10a and 10b.

The terrestrial pipeline DE runs from the plant DE east for around 50% of its length, then south for the remainder of its length, ending at the Wanneroo Reservoir just west of Lake Jandabup. The pipeline DE intersects several areas with different zoning including for urban development, rural, parks and recreation and state forest.



S:\Projects\EIAs\382010_1555379674060_AlkimosSeawaterDesalinationPlant3_Assessment\643a2023021020230310_AlkimosSeawaterDesalinationPlant_543A_Regional_Map_V1.mxd

Figure 1: Project location

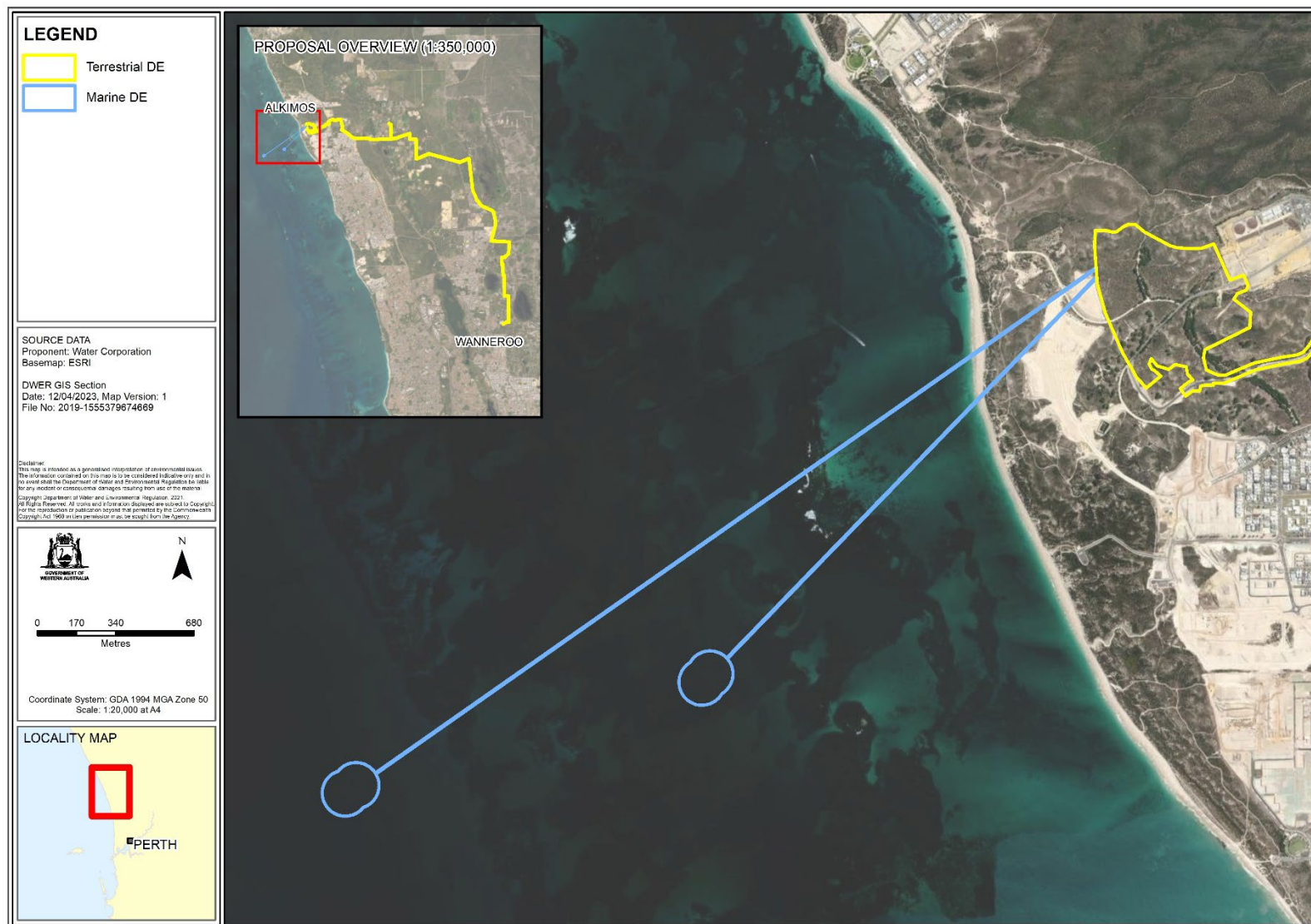


Figure 2: Marine development envelope

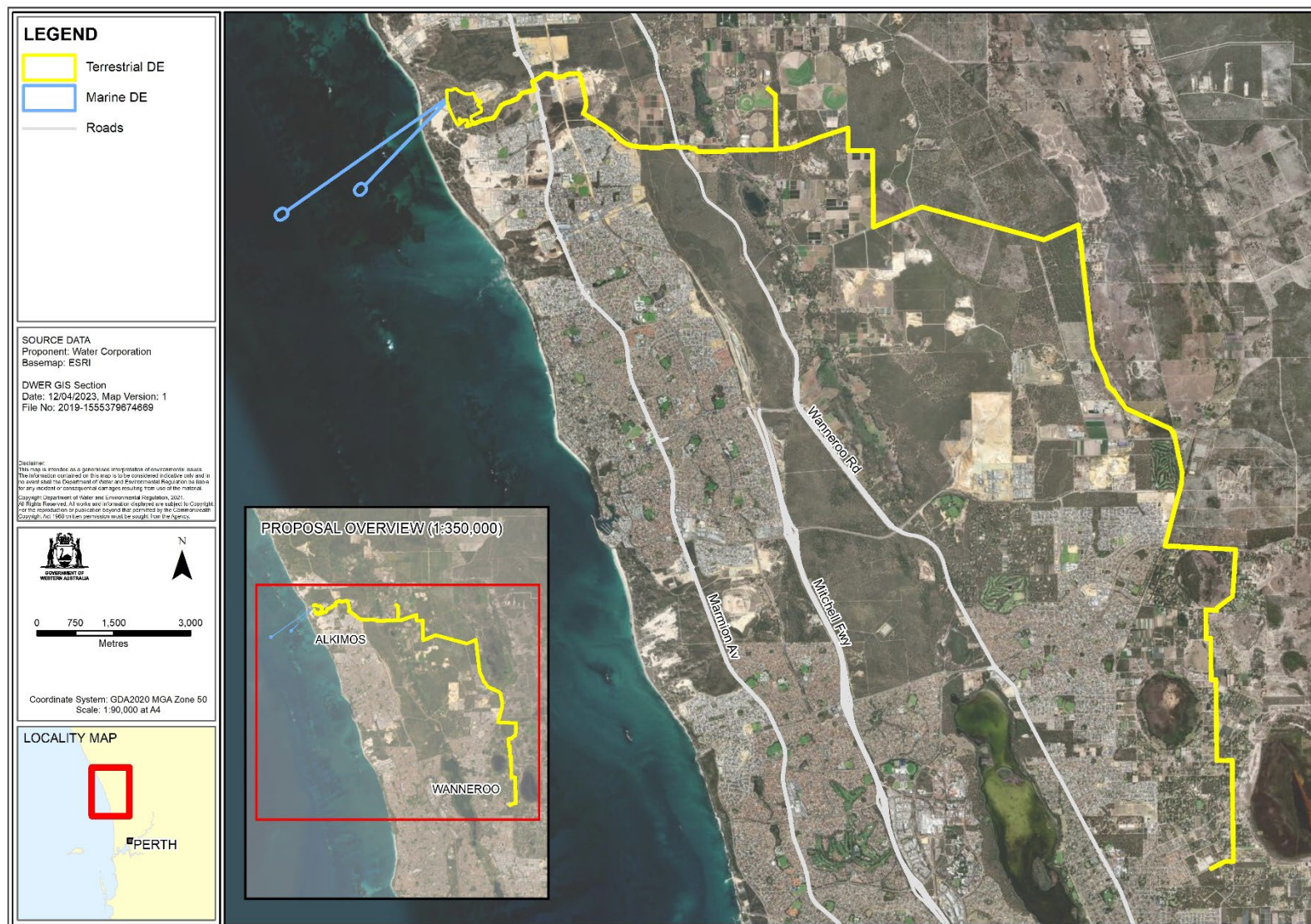


Figure 3: Terrestrial development envelope

2 Assessment of key environmental factors

This section includes the EPA's assessment of the key environmental factors. The EPA also evaluated the impacts of the proposal on other environmental factors and concluded these were not key factors for the assessment. This evaluation is included in Appendix D.

2.1 Flora and Vegetation

2.1.1 Environmental objective

The EPA environmental objective for flora and vegetation is *to protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2016b).

2.1.2 Investigations and surveys

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to flora and vegetation:

- Alkimos Flora and Vegetation Survey - Spring 2016 (Strategen 2017)
- Ecological Assessment - Alkimos SDP Pipeline Integration Memorandum (AECOM 2018a)
- Flora, Vegetation and Fauna Assessment - Spring 2017 (AECOM 2018b)
- CW03472 Eglinton Groundwater Investigations Flora, Vegetation, Fauna, and Dieback Survey: Site 2 (Ecoscape 2018)
- Alkimos Seawater Desalination Plant: Flora and Vegetation Consolidation Report (Appendix J of the Environmental Review Document) (Stantec 2021)
- Alkimos Seawater Desalination Plant and Pipeline Project – Biological Survey (Attachment K of the response to submissions supporting document) (SLR Consulting 2022)
- Flora and Vegetation Survey. East Wanneroo Proposed Alignment (Attachment K of the response to submissions supporting document) (Anders Environmental Consulting 2023)
- Alkimos Seawater Desalination Plant Project Pipeline Survey – Species Specific Targeted Flora Survey (Attachment K of the response to submissions supporting document) (SLR Consulting 2023)
- FCT Definition Survey, McLennan Road to Wesco Road (Attachment K of the response to submissions supporting document) (GHD 2023)
- Alkimos Seawater Desalination Plant Project Pipeline Survey – Vegetation Community Type Assessment (additional information submitted 5 May 2023) (360 Environmental / SLR 2023b).

The earlier fauna surveys pre-dating the Stantec 2021 consolidation report were mostly consistent with the *Technical guidance – Flora and vegetation surveys for*

environmental impact assessment (EPA 2016h); however, where inconsistencies or gaps remained, further surveys were undertaken by the proponent (Appendix K of the response to submissions documentation). At the request of the EPA, a further survey was undertaken in May 2023 to confirm the extent of impacts.

The EPA has also had regard to its previous assessments:

- EPA Report 1634 – Yanchep Rail Extension: Part 1 Butler to Eglinton
- EPA Report 1656 – Yanchep Rail Extension: Part 2 Eglinton to Yanchep

2.1.3 Assessment context – existing environment

The terrestrial DE comprises the seawater desalination plant, groundwater treatment plant and the terrestrial pipeline and is around 130.2 ha, within which up to 51.2 ha of native vegetation is proposed to be cleared (Water Corporation 2023a).

The proposal occurs within the Perth subregion of the SCP IBRA bioregion. The plant DE is in a largely vegetated area of coastal dunes. The terrestrial pipeline DE has been located primarily along existing tracks and road reserves, with areas traversing private property and State Forest. The pipeline DE includes vegetated and heavily disturbed areas.

The vegetation within the terrestrial DE ranges in condition from Excellent to Completely Degraded. The majority being in Completely Degraded (65.0 ha, 50%) or Very Good (34.3 ha, 26%) condition (Water Corporation 2023a). The plant DE is largely in a Very Good condition. The terrestrial pipeline DE includes areas in Excellent condition. On average, weed density is high along the terrestrial pipeline DE (Stantec 2021).

The plant DE comprises one vegetation complex, the Quindalup Complex. The terrestrial pipeline DE comprises the Cottesloe Complex Central and South, Herdsman Complex, Karrakatta Complex Central and South, and Pinjar Complex. Of these, the Karrakatta Complex Central and South retains less than 30% of its pre-European vegetation extent in the SCP Bioregion but greater than 10% within the constrained Perth Metropolitan Region (Government of Western Australia 2019).

Five threatened ecological communities (TEC) or priority ecological communities (PEC) are represented within the terrestrial DE (Water Corporation 2023a):

- Banksia woodlands of the Swan Coastal Plain ecological community (Banksia Woodlands community) – endangered (EPBC Act), Priority 3 (DBCA)
- Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain (Tuart Woodlands community) – critically endangered (EPBC Act), Priority 3 (DBCA)
- *Melaleuca huegelii* - *Melaleuca systena* shrublands on limestone ridge (Gibson et al. 1994 type 26a) (Melaleuca Shrubland TEC) – endangered (*Biodiversity Conservation Act 2016* (BC Act))
- Northern Spearwood shrublands and woodlands ('floristic community type (FCT) 24') (Spearwood Shrublands PEC) – Priority 3 (DBCA)

- Acacia shrublands on taller dunes, Southern SCP ('floristic community type (FCT) 29b') (Acacia Shrublands PEC) – Priority 3 (DBCA).

The State has aligned its consideration of the characteristics and indicative location of the Banksia and Tuart woodland communities with that prescribed under the EPBC Act. The EPA has therefore considered the State PEC and Commonwealth TEC as the same community for the purposes of this accredited assessment. Matters of national environmental significance are dealt with in section 5.

One additional state listed TEC may occur within the terrestrial pipeline DE, being the '*Banksia attenuata* woodland over species rich dense shrublands' (community FCT20a)) (endangered). The proponent notes that a small portion of the southern extent of the terrestrial pipeline DE has not undergone floristic analysis to determine the potential occurrence of this community (Water Corporation 2023a).

The terrestrial pipeline DE intersects eight Bush Forever (BF) sites including Neerabup National Park (part of BF site 383) and Gngara-Moore River State Forest (BF site 136).

One individual of the threatened flora species *Melaleuca* sp. Wanneroo (G. J. Keighery 16705) which is listed as endangered under the BC Act was recorded within the terrestrial pipeline DE but outside the development footprint. A further two individuals were recorded adjacent to the terrestrial pipeline DE (SLR Consulting, 2023). The DE also includes one record each of priority flora species *Banksia dallanneyi* subsp. *pollostia* (P3) and *Jacksonia sericea* (P4) (SLR Consulting 2023; Stantec 2020).

2.1.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the proponent's response to submissions documentation (Water Corporation 2023b).

Public consultation on the proposal raised concerns about:

- the extent of native vegetation clearing required within the highly cleared SCP
- impacts to BF sites and conservation significant ecological communities (Water Corporation 2023b)
- the risk of spreading *Phytophthora* sp. (other than *Phytophthora cinnamomi*) and *Armillaria luteobubalina* pathogenic fungus.

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.1.5, 2.1.6, 2.1.7, 2.1.8 and 2.1.9. It is also noted that the offset measures described under section 4 are relevant to the above concerns, noting that they relate to counterbalancing the impacts to Bush Forever sites and conservation significant ecological communities.

2.1.5 Potential impacts from the proposal

The proposal has the potential to significantly impact on flora and vegetation from:

- clearing vegetation associated with the following conservation significant ecological communities (extent within an indicative disturbance footprint):
 - 1.03 ha of the Melaleuca Shrubland TEC
 - 1.7 ha of the Banksia Woodlands community of which 0.11 ha is potentially representative of the '*Banksia attenuata* woodland over species rich dense shrublands' TEC (FCT20a)
 - 1.16 ha of the Tuart Woodlands community
 - 1.55 ha of the Spearwood Shrublands PEC
 - 28.08 ha of the Acacia Shrublands PEC
- clearing of up to 9.4 ha of native vegetation within Bush Forever Sites 290, 293, 136, 324, 382, 295 and 471
- clearing of one priority flora species, *Jacksonia sericea* (Priority 4)
- potential indirect impacts to surrounding vegetation from the introduction and/or spread of weeds and dieback, altered hydrological regimes, sedimentation, and acid sulphate soils.

2.1.6 Avoidance measures

The proponent has committed to the following flora and vegetation impact avoidance measures (Water Corporation 2023a):

- avoid clearing the three recorded individuals of threatened flora species *Melaleuca* sp. Wanneroo (G. J. Keighery 16705)
- avoid clearing any areas identified as FCT20a.

The EPA recommends conditions B1-1(1) and B1-2 to ensure the above commitments are adhered to.

The issue raised during the public consultation about potential impacts to conservation significant ecological communities has been partially addressed through the proposed avoidance of FCT20a.

2.1.7 Minimisation measures (including regulation by other DMAs)

The proponent has undertaken/committed to the following flora and vegetation impact minimisation measures (Water Corporation 2023a, Water Corporation 2022, Water Corporation 2023c):

- reducing the extent of native vegetation clearing required through reducing the terrestrial pipeline construction corridor width to 16 m
- setting limits on the extent of clearing and disturbance of conservation significant communities to no more than 1.7 ha of Banksia Woodland community, 1.16 ha of the Tuart Woodland community, and 1.03 ha of the Melaleuca Shrubland TEC

- aligning the proposed terrestrial pipeline DE with road reserves, tracks and other existing cleared areas as much as possible.

The issue raised during public consultation about potential impacts to conservation significant ecological communities, has been partially addressed through the proponent setting limits on the extent of disturbance to TECs and PECs, and through minimising the clearing of native vegetation, generally through aligning significant portions of the terrestrial pipeline DE with existing cleared areas, including cleared tracks, firebreaks and within road reserves.

The proponent has committed to manage the introduction and spread of invasive weeds and dieback through the control of Declared Pests, establish clean on entry and exit points, and allow only certified weed and dieback free soil to be brought on site. This commitment addresses concerns raised during public submissions in relation to the introduction and spread of diseases.

2.1.8 Rehabilitation measures

The proponent proposes to revegetate a berm on the west side of the plant DE within the Alkimos Water Precinct with native vegetation to prevent wind erosion (at the plant site). The proponent has also committed to revegetating with native vegetation all cleared land outside the required 6 m wide maintenance corridor along the terrestrial pipeline following construction (Water Corporation 2023a).

Submissions relating to the extent of clearing required on the SCP and within BF sites have been partially addressed through the commitment to revegetate with native vegetation all cleared areas outside the required 6 m wide terrestrial pipeline maintenance corridor.

2.1.9 Assessment of impacts to environmental values

The EPA considers that the potential impacts to the Melaleuca Shrubland TEC, Banksia Woodlands community, Tuart Woodlands community and BF sites are likely to be significant residual impacts of the proposal and are assessed further in this section.

The EPA also considered that the proposal has the potential to result in residual impacts to PECs and conservation significant flora species, and as a result of indirect impacts and these are assessed further in this section.

In assessing this proposal, the EPA has had regard to the combined and cumulative effect that surrounding approved and proposed projects may have on this factor. The EPA recognises that the cumulative loss of native vegetation from infrastructure developments is a key threat to flora and vegetation values on the SCP.

Conservation Significant Ecological Communities

Melaleuca Shrubland TEC

This TEC comprises species-rich thickets, heaths and scrubs dominated by *Melaleuca huegelii*, *Melaleuca systema* and *Banksia sessilis*. The interim recovery

plan lists the key threatening processes to this community as including clearing, urban, amenities, road, and track development, weed invasion, inappropriate fire regimes and disturbance due to recreational use or maintenance activities (Luu and English 2005).

All known occurrences of this community are habitat critical, and all occurrences are important (Luu and English 2005). Further, similar habitat within 200 m of known occurrences is considered critical habitat as it provides habitat for natural range extension. In addition, remnant native vegetation that surrounds or links several occurrences that provides habitat for pollinators and allows them to move between occurrences is considered habitat critical for this TEC (Luu and English 2005). The EPA is aware that many of the known occurrences of this TEC occur in areas protected for conservation (Gnangara-Moore River State Forest, Neerabup National Park, and Yanchep National Park) or are proposed for retention.

According to DBCA data, the clearing of up to 1.03 ha of this TEC represents around 0.5% of its total mapped extent (201.46 ha), and around 1.0% of its mapped extent within the north-west corridor of the Perth Metropolitan Region. The identified occurrences in the terrestrial DE are newly identified occurrences. These occurrences are considered locally significant as relatively few other occurrences are known within the local area.

In considering that all known occurrences of this TEC are important, and its endangered status, the EPA considers that all reasonable efforts to avoid where possible and otherwise minimise impacts should be applied. In the case of this proposal, the EPA notes the proponent has undertaken all reasonable efforts to align the pipeline with cleared areas and to restrict impacts to the linear edges of occurrences alongside an existing track and Wesco Road. As a result, the proposal will not result in the loss of a consolidated patch, nor would it result in the fragmentation of a consolidated patch.

The EPA advises that the clearance of 1.03 ha of Melaleuca TEC is a significant residual impact that should be subject to implementation conditions (condition B1) and counterbalanced by offsets (condition B8), to ensure the proposal is consistent with the EPA objective for this factor. See also section 4.

The EPA notes that modifications to this TEC would likely require authorisation under section 45 of the BC Act.

Banksia Woodlands community

The Banksia Woodlands community supports a rich and diverse array of flora and fauna species and is largely restricted to the Perth and Dandaragan subregions of the SCP. This proposal is within the Perth subregion. The key threats to this community include clearing for development, fragmentation, dieback, invasive weeds, feral animals, changes to fire regimes and hydrological changes (including groundwater changes) (TSSC, 2016).

The clearing of up to 1.7 ha of the Banksia Woodlands community equates to the loss of around 0.01% of the mapped occurrences of this community within 50 km of

the proposal, where about 13,228 ha is known to occur according to DBCA data. Around 81,800 ha of the Banksia Woodlands community (25% of the total estimated extent) is estimated to occur within reserves across its range (TSSC 2016).

While the proposal would result in a relatively small impact to the mapped extent of this community, the EPA considers the impact to the Banksia Woodlands community is significant given the threat of ongoing clearing to representative patches in the Perth Subregion. The residual impact on this community aligns with the definition of significant residual impact in the WA Environmental Offset Guidelines, which includes areas that are already defined as being critically impacted in a cumulative context (Government of Western Australia 2014).

The EPA has considered the hierarchy of protect, restore, and offset as set out in the Approved Conservation advice for this community. The EPA has also had consideration for the proponent's reasonable efforts to minimise impacts to this community by aligning the pipeline with existing cleared areas where possible and committing to clear no more than 1.7 ha of the larger 142.5 ha of the community recorded in the survey area.

The EPA also considered that the 1.7 ha impact to this TEC occurs over several relatively small segments across the terrestrial pipeline DE and will not result in the fragmentation or loss of a consolidated patch.

The EPA therefore considers that this significant residual impact can be appropriately regulated through conditions and counterbalanced through the provision of offsets.

The proponent will be required to update their offset strategy that includes acquisition for conservation and management in perpetuity of an area of currently unprotected land that contains this community. The EPA considers that this would align with the approved conservation advice which states that a perpetual change in land tenure for conservation with ongoing threat abatement and monitoring can provide a substantial net conservation benefit for the community (TSSC 2016). The EPA has therefore recommended condition B1-1(2) to set clearing limits, and condition B8 to require adequate offsets, to ensure that the environmental outcome is consistent with the EPA objective for this factor.

Tuart Woodlands community

The Tuart Woodlands community occurs from Jurien to near Busselton. The distribution of the ecological community is limited by the distribution of tuart trees (*Eucalyptus gomphocephala*) as its defining species (TSSC 2019). Key threats to the community include land clearing, changes to climate and availability of water; invasion by weeds, and non-native animals, and unsuitable burning (TSSC 2019).

The clearing of up to 1.16 ha of this community is approximately 0.02% of the mapped 6,158 ha within a 50 km radius of the proposal. Of the remaining estimated extent (29,863 ha), around 5,700 ha (22%) is in existing reserves (Department of Environment and Energy 2017). The community is very restricted with an overall

median patch size of 5.2 ha, and around 64% of its known extent comprising patches of less than 10 ha (TSSC 2019).

While the proposal would result in a relatively small overall impact to the total mapped extent of this community, the EPA has assessed the impact to this community as significant given the threat of ongoing clearing of already fragmented patches on the SCP. The residual impact to this community aligns with the definition of significant residual impact which includes areas that are already defined as being critically impacted in a cumulative context (Government of Western Australia 2014).

The EPA has considered the hierarchy of protect, restore, communicate and research as set out in the approved conservation advice for this community. The EPA is aware that the approved conservation advice for the Tuart woodland community sets out that offsets should be proposed as a last resort to compensate for damage to the community that cannot be avoided and that all options for avoidance and mitigation should be explored fully before the use of an offset is considered.

In accordance with the approved conservation advice, the EPA has had consideration for the proponent's efforts to minimise impacts to this community by aligning the pipeline with existing cleared areas where possible and committing to clear no more than 1.16 ha of the 1.78 ha within the terrestrial DE and the 18.7 ha recorded in the survey area. The EPA also took into consideration that the 1.16 ha impact to this TEC occurs across several small areas within the DE and will not result in the fragmentation of a consolidated patch.

The EPA therefore considers that this significant residual impact can be appropriately regulated through reasonable conditions and counterbalanced through the provision of offsets.

The proponent will be required to update their offset strategy that includes acquisition for conservation and management in perpetuity of an area of currently unprotected land that contains this community. The EPA considers that this would align with the approved conservation advice which states that in the central and northern extent of the community's range, offset activities should generally be planned to increase the security of tenure of remnants through the creation of formal reserves and application of covenants, or by restoring degraded patches to meet condition classes for national protection (TSSC 2019). The EPA has therefore recommended condition B1-1(2) to set clearing limits, and condition B8 to require adequate offsets, to ensure that the environmental outcome is consistent with the EPA objective for this factor.

Banksia attenuata woodland over species rich dense shrublands (FCT20a)

The EPA notes that a 0.40 ha portion of the area identified as the Banksia Woodlands community at the southern extent of the terrestrial pipeline DE (0.11 ha within the proposed development footprint), has not been subject to floristic community analysis and that it may be representative of FCT20a. FCT20a is one of the communities that make up the broader Banksia Woodland community discussed

above, however it is also considered separately as a DBCA listed TEC (endangered).

FCT20a is very restricted in distribution and regionally rare with remaining areas comprising highly fragmented occurrences. The proponent has committed to undertaking floristic analysis of the area potentially representing FCT20a and if confirmed to avoiding its occurrence. The EPA recommends condition B1-2 to ensure this commitment is adhered to, to ensure that the environmental outcome is consistent with the EPA objective for this factor.

Priority Ecological Communities

Two priority ecological communities were recorded as occurring within the Terrestrial DE. The Spearwood Shrublands PEC comprise heathlands of *Banksia sessilis*, *Calothamnus quadrifidus*, and *Schoenus grandiflorus* with scattered *Eucalyptus gomphocephala* occurring on deeper soils north from Woodman Point. The *Acacia* Shrublands PEC stretches from Seabird to south of Mandurah and is dominated by *Acacia* shrublands or mixed heaths on the larger dunes.

The clearing of up to 1.55 ha of the Spearwood Shrublands PEC represents around 0.15% of its total mapped extent (1,009.5 ha). The extent of impact is spread throughout the long, linear pipeline DE, and the proposal would not result in the removal of a single substantial patch or result in the isolation of a patch representing this community.

The *Acacia* Shrublands PEC is relatively locally common within the proposal area, with 46 known locations, 20 of which occur within DBCA managed lands. Clearing of 28.1 ha of this community is required for the construction of plant infrastructure. In considering the significance of the residual impact to this community, the EPA has taken into account the proponent's commitment to revegetate a berm within the plant DE for dune stabilisation measures, and to revegetating areas temporarily cleared for construction purposes.

Having regard to the relevant EP Act principles, the environmental objective for this factor, the extent of known occurrences of both PECs in the DBCA estate, and the relatively minimal extent of impact locally and regionally, the EPA considers that the residual impact to the PECs is not likely to be significant, subject to recommended condition B1-1 to set clearing limits. This will ensure the environmental outcome is consistent with the EPA objective for this factor.

Bush Forever Sites

The proposal would directly impact approximately 9.4 ha of vegetation across eight Bush Forever (BF) sites ranging in condition from Completely Degraded to Excellent.

In relation to impacts to BF, the EPA has had consideration for State Planning Policy (SPP) 2.8 and the general presumption against the clearing of regionally significant bushland identified for protection. The EPA has had regard for the proponent's efforts to minimise impacts to regionally significant bushland within BF sites by aligning the terrestrial pipeline route with existing cleared tracks and within or

adjacent to road reserves to the extent possible. By doing so, the proponent has ensured that the proposal would not exacerbate the fragmentation of any single BF site and would largely result in the clearing of mostly degraded vegetation along existing edges.

The EPA has also had regard for the proponent's commitment to revegetate temporarily cleared areas and to implement management measures to minimise indirect impacts to areas adjacent to the terrestrial DE.

Where the terrestrial DE crosses site 383, the proponent has aligned the disturbance footprint with areas recently cleared and disturbed. While a small, vegetated area of the Neerabup National Park (a part of BF site 383) is intersected by the terrestrial DE, no clearing for construction of the pipeline is required within the national park boundary. The EPA is recommending condition B1-1(4) to ensure there is no adverse impact to vegetation within the Neerabup National Park as a result of implementation of the proposal.

The EPA formed the view that no clearing of vegetation that could be considered regionally significant bushland would occur within BF sites 295, 324, or 382. The clearing of approximately 3.7 ha, if required, within these sites comprises vegetation primarily in Degraded-Completely Degraded condition, overall constitutes a small incremental loss, and would not significantly alter their value as Bush Forever sites. Therefore, the EPA considers that clearing of vegetation within BF 295, 324, and 382 is an acceptable impact.

The EPA considers that the approximately 5.7 ha of vegetation proposed to be cleared within BF sites 136, 290, 293, and 471 can be considered regionally significant bushland based on it being in Degraded or better condition and its general intactness as part of the larger BF sites within which it is located. SPP 2.8 acknowledges that some proposals may result in an unavoidable adverse impact on bushland and considers that all reasonable steps should be taken to avoid and minimise impacts to bushland.

The EPA considers that the proponent has undertaken best efforts to minimise impacts to these BF sites. However, the EPA is of the opinion that the proposal would result in a significant residual impact to 5.7 ha of vegetation within BF sites 136, 290, 293, and 471. The EPA considers that the significant residual impact to BF sites can be regulated through conditions and counterbalanced by offsets.

The EPA notes that the vegetation proposed to be cleared within BF sites 136, 290, 293, and 471 are likely associated with conservation significant ecological communities with some areas in Excellent condition, and that the vegetation is contiguous with intact vegetation. The EPA therefore considers that the vegetation can be considered to have a very high conservation significance and thus consistent with previous assessments any offset requirement should provide a net gain of at least 2:1 of like-for-like vegetation.

The EPA recommends condition B1-1(2) to set clearing limits, and condition B8 to require adequate offsets, to ensure the environmental outcome is consistent with the EPA objective for this factor.

Threatened and priority flora

The terrestrial DE includes one threatened and two priority flora species:

- *Melaleuca* sp. Wanneroo (G. J. Keighery 16705) (endangered) – one individual within the pipeline DE and two individuals adjacent.
- *Jacksonia sericea* (Priority 4) – there are three clustered records of this species within the pipeline DE, which are considered to comprise one population.
- *Banksia dallanneyi* subsp. *pollostia* (Priority 3) – one record within the DE, however, the portion of the terrestrial pipeline DE which overlaps this record has been previously (recently) cleared as part of a separate development. Therefore, the proposed clearing is not likely to impact on this species.

The proponent has committed to retaining the *Melaleuca* sp. Wanneroo (G. J. Keighery 16705) individuals. The EPA recommends condition B1-1(1) to ensure no adverse impacts to this species and to ensure that the environmental outcome is consistent with the EPA's objective for this factor. The EPA acknowledges the requirement for the proponent to obtain a section 40 authorisation under the BC Act for operations within 50 m of threatened flora, to cover inadvertent impacts, including to seed.

Jacksonia sericea is known from 88 records between Bunbury and Alkimos. Five populations containing 332 individuals were recorded within the proposal survey area. The EPA considers that the proposed clearing of three individuals of this species is not likely to impact on its conservation status or local or regional extent. Therefore, the EPA considers that it is not a residual impact that requires a condition to ensure the environmental outcome is consistent with the EPA objective for this factor.

Indirect impact to flora and vegetation

The EPA considers that there are potential residual impacts to flora and vegetation associated with the introduction and spread of weeds and disease, hydrological change, and acid sulfate soils (ASS).

The terrestrial pipeline DE is subject to varying degrees of weed invasion and dieback associated with *Phytophthora* spp. has been recorded within the survey area. The pipeline runs adjacent to several wetlands where trenching for pipeline construction has the potential to result in short-term changes to the water availability of nearby vegetation. Trenching also has the potential to disturb ASS.

The proponent has committed to implementing a range of management measures to ensure indirect impacts to flora and vegetation are minimised to the greatest extent possible, including (Water Corporation 2023c):

- pre-construction weed and dieback mapping
- control of declared pests or weeds of national significance prior to clearing
- management and quarantining of weed contaminated topsoil and disposal of any cleared material containing weeds

- weed monitoring and control as necessary during construction
- development and implementation of a dieback management plan and an ASS management plan
- trenching in 50 m lengths to limit any zone of influence associated with dewatering
- dewatered effluent will be reinfiltrated within 50 m of the dewatering site.

Noting the proponent's proposed management measures, the EPA is of the view that the proposal is not likely to result in an increased risk of weed or disease spread to surrounding native vegetation above what currently exists or result in adverse impacts from hydrological change or disturbance of ASS.

The EPA recommends condition B1-1(3) to ensure that there are no adverse impacts to native vegetation within 20 m outside the terrestrial DE. The EPA also recommends condition B1-3 to ensure appropriate dieback management. These conditions should ensure that the environmental outcome is consistent with the EPA objective for this factor.

The EPA considers that potential impacts associated with disturbance of ASS are not likely to be significant and does not require a condition to ensure the environmental outcome is consistent with the EPA objective for this factor.

Cumulative impact assessment

The EPA has considered the existing and reasonably foreseeable cumulative impacts to conservation significant ecological communities occurring in the vicinity of the proposal and across developments in Perth's northern Swan Coastal Plain corridor (between Wanneroo and Yanchep).

The cumulative impacts of the adjacent Yanchep Rail Extension Part 1 and Part 2 projects which were approved under Ministerial Statements 1100 and 1129 respectively, are particularly relevant noting the impacts to local occurrences of several of the ecological communities being impacted by this proposal. The EPA notes that these projects comprise linear infrastructure running north-south, and the proposal subject to this assessment includes linear infrastructure running east-west.

The impacts to conservation significant ecological communities from these projects include:

- Yanchep Rail Extension Part 1
 - 0.73 ha of Melaleuca Shrublands TEC
 - 14.34 ha of the Banksia Woodland community
 - 16.05 ha of Spearwood Shrublands PEC.
- Yanchep Rail Extension Part 2
 - 0.05 ha of Melaleuca Shrublands TEC
 - 9.7 ha of the Banksia Woodland community

- 2.1 ha of Tuart Woodland community
- 13.7 ha of Spearwood Shrublands PEC.

The EPA acknowledges that the proposal will have the effect of reducing the known local and regional extents of these communities. The EPA notes that most recorded occurrences of the communities within the DE occur as small patches along the long linear pipeline DE and vary considerably in vegetation condition.

The EPA considers that cumulatively, the impacts to these communities are small relative to the extent of their mapped occurrence and that the cumulative impacts of this project with other projects would not have the effect of creating smaller, discrete, and unviable patches of any of the above communities within Perth's northern Swan Coastal Plain corridor.

The proposal will result in a relatively small incremental loss of native vegetation representative of these conservation significant ecological communities. The EPA therefore considers that, subject to recommended condition B1-1(2) set clearing limits and require appropriate offsets (condition B8), the environmental outcome is consistent with the EPA objective for Flora and Vegetation.

Riparian vegetation

The terrestrial pipeline DE intersects a number of mapped SCP geomorphic wetland. The areas of intersection with these wetlands are heavily disturbed and comprise Degraded or Completely Degraded vegetation that occurs along existing fully or partially cleared areas. Therefore, the EPA considers that the proposed clearing of this vegetation is not a residual impact that requires a condition to ensure the environmental outcome is consistent with the EPA objective for this factor.

2.1.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on flora and vegetation environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 2 below.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (Appendix A).

The EPA has also had regard to its conclusions in other recent assessments, including the Yanchep Rail Extension: Part 1 – Butler to Eglinton Project and Yanchep Rail Extension: Part 2 – Eglinton to Yanchep.

Table 2: Summary of assessment for flora and vegetation

	Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1	<p>Clearing of the following conservation significant ecological communities:</p> <ul style="list-style-type: none"> • 1.7 ha of Banksia Woodlands community • 1.16 ha of the Tuart Woodlands community • 1.03 ha of the Melaleuca Shrubland TEC. 	<p>The EPA advises that the proposed clearing of these ecological communities is a significant residual impact.</p> <p>The EPA advises that this significant residual impact can likely be regulated through reasonable conditions that require clearing extent limitations and counterbalanced by offsets so that the environmental outcome is consistent with the EPA objective for this factor.</p>	<p>Condition A1 (Limitations and extent of proposal).</p> <p>Condition B1 (Flora and vegetation) Disturbance limits to conservation significant ecological communities.</p> <p>Condition B8 (Offsets) Requirement of an adequate offset strategy and management plan.</p>
2.	<p>Clearing of the following conservation significant ecological communities:</p> <ul style="list-style-type: none"> • 1.55 ha of the Spearwood Shrublands PEC • 28.08 ha of the Acacia Shrublands PEC. 	<p>The EPA advises that this significant residual impact can likely be regulated through reasonable conditions that require clearing extent limitations.</p>	<p>Condition B1 (Flora and vegetation) Disturbance limits to conservation significant ecological communities.</p>
3.	<p>Potential impact to FCT20a.</p>	<p>The EPA advises that this residual impact can likely be regulated through reasonable conditions that require floristic community analysis of the potential patch of this community, and avoidance if found, so that the environmental outcome is consistent with the EPA objective for this factor.</p>	<p>Condition B1 (Flora and vegetation) Floristic community analysis prior to clearing and avoidance if FCT20a occurrence is determined.</p>
4.	<p>Clearing of 9.4 ha within Bush Forever Sites of which 5.7 ha is considered regionally significant bushland.</p>	<p>The EPA advises that the proposed clearing of regionally significant bushland within Bush Forever sites is a significant residual impact.</p> <p>The EPA advises that this significant residual impact can likely be regulated through reasonable conditions that require clearing extent limitations and counterbalanced by offsets so</p>	<p>Condition B1 (Flora and vegetation) Disturbance limits to Bush Forever.</p> <p>Condition B8 (Offsets) Requirement of an adequate offset strategy and management plan.</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	that the environmental outcome is consistent with the EPA objective for this factor.	
5. Indirect impact to flora and vegetation from weeds, disease, and changes to hydrological regimes.	The EPA advises there is unlikely to be significant residual impacts from the introduction and spread of weeds and disease or altered hydrological regimes subject to recommended conditions requiring no adverse impacts. Therefore, the environmental outcome is consistent with the EPA objective for this factor.	Condition B1 (Flora and vegetation) Environmental outcomes ensuring there are no project attributable adverse impacts from the introduction or spread of weeds, groundwater drawdown and undertake dieback hygiene measures.

2.2 Terrestrial Fauna

2.2.1 Environmental objective

The EPA environmental objective for terrestrial fauna is *to protect terrestrial fauna so that biological diversity and ecological integrity are maintained* (EPA 2016g).

2.2.2 Investigations and surveys

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to terrestrial fauna:

- Ecological Assessment - Alkimos SDP Pipeline Integration Memorandum (AECOM 2018a)
- Flora, Vegetation and Fauna Assessment - Spring 2017 (AECOM 2018b)
- CW03472 Eglinton Groundwater Investigations Flora, Vegetation, Fauna, and Dieback Survey: Site 2 (Ecoscape 2018)
- Alkimos Flora and Vegetation Survey - Spring 2016 (Strategen 2017)
- Alkimos Seawater Desalination Plant: Terrestrial Fauna Consolidation Report (Appendix K of the ERD) (Stantec 2021)
- Mariginiup Road and Old Yanchep Road Terrestrial Vertebrate Fauna Survey and Black Cockatoo Habitat Assessment (Biologic 2023)
- Alkimos Seawater Desalination Plant and Pipeline Project – Biological Survey (Neves Road and Rousset Road route) (360 / SLR Consulting 2022)
- Alkimos Pipeline Corridor Black Cockatoo Hollow Inspection (360 / SLR Consulting 2023).

The earlier fauna surveys pre-dating the Stantec 2021 consolidation report were mostly consistent with the *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020b). The EPA notes some surveys

were undertaken outside of the optimal survey periods and Commonwealth black cockatoo guidelines had been updated since. The Stantec 2021 consolidation report outlined the limitations of the earlier surveys and aimed to resurvey previously surveyed areas and to fill knowledge gaps.

At the request of the EPA, additional surveys were completed in 2023 (SLR Consulting) to confirm impacts to black cockatoo potential nesting trees. These surveys were consistent with the *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020b). The proponent also re-scored black cockatoo habitat in accordance with the updated Commonwealth black cockatoo guidelines (DAWE 2022).

The EPA is aware that only desktop surveys (no on-ground surveys) were completed for short-range endemics which is not consistent with the *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020b). The EPA decided it would proceed with its assessment given the risk of significant impacts is likely to be low based on the linear nature of the potential impacts and continuity of potential short-range endemic habitats with equivalent habitats outside of the development envelope.

The EPA has also had regard to its previous assessment of the Yanchep Rail Extension Part 1 – Butler to Eglinton, EPA Report 1634.

2.2.3 Assessment context – existing environment

The proposal is located on the Swan Coastal Plain IBRA region towards the northern extremity of the Perth Metropolitan Region. The plant and pipeline development envelopes combined (130.1 ha) contain 68.4 ha of fauna habitat. The remainder being highly modified or cleared.

The proponent's fauna surveys identified six habitat types within the development envelope including: 'heath and shrubland', 'parkland, planted vegetation and gardens', 'pine plantation regrowth', 'scattered trees', 'woodland', 'wetlands and riparian vegetation'.

Of the 351 vertebrate species identified during desktop surveys, the proposal has the potential to impact two conservation listed species:

- Carnaby's cockatoo (*Zanda latirostris*) (Endangered, BC Act and EPBC Act)
- forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) (Vulnerable, BC Act and EPBC Act).

These black cockatoo species are considered Matters of National Environmental Significance for the Commonwealth assessment.

2.2.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the proponent's response to submissions document (Water Corporation 2023a). Public submissions raised concerns about the further loss of black cockatoo

habitat on the Swan Coastal Plain and the increasing regional significance of foraging resources for northern flocks of Carnaby's in the context of cumulative impacts.

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.2.7, 2.2.8 and 2.2.9.

2.2.5 Potential impacts from the proposal

The proposal has the potential to significantly impact on terrestrial fauna from:

- clearing of 52.1 ha of high-quality foraging habitat for Carnaby's cockatoo and 49.8 ha of high-quality foraging habitat for forest red-tailed black cockatoo
- loss of 104 black cockatoo potential nesting trees of which 8 currently have suitable hollows
- potential indirect impacts (root disturbance) to potential nesting trees
- potential indirect impact to fauna habitat from introduction and spread of *Phytophthora cinnamomi* (dieback).

2.2.6 Avoidance measures

The proponent did not propose avoidance measures.

2.2.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed measures to minimise impacts to terrestrial fauna (Water Corporation 2023a, Water Corporation 2022, Water Corporation 2023c):

1. aligning the pipeline with existing cleared roads and tracks to the extent possible
2. clearing to be undertaken outside of the typical breeding season for black cockatoos where possible, or pre-clearing inspection of hollows to occur and avoidance of any trees until resident chicks have naturally fledged
3. demarcation of clearing areas and daily inspection of barriers to avoid potential indirect impacts to black cockatoo trees and habitat
4. pre-clearance inspections of habitat and relocation of fauna using licensed fauna spotters and/or directional clearing to allow fauna to self-relocate into adjoining habitat
5. inspections of any trenches during construction and measures to avoid ground dwelling fauna becoming trapped.

2.2.8 Rehabilitation measures

The proponent proposes to revegetate areas to pre-disturbance levels that are temporarily cleared and not needed for ongoing maintenance/access. These areas are likely to provide suitable habitat for fauna.

2.2.9 Assessment of impacts to environmental values

The EPA considers that the key environmental values for terrestrial fauna likely to be impacted by the proposal are Carnaby's and forest red-tailed black cockatoos.

Black cockatoos

The EPA has considered the likely residual impacts of the proposal on black cockatoos to be the loss of foraging and potential breeding habitat, potential indirect impacts to cockatoo trees and/or spread or introduction of dieback to susceptible adjoining habitat.

These residual impacts may exacerbate some of the threatening processes as outlined in the Recovery Plans for each species (Department of Environment and Conservation 2008; Department of Parks and Wildlife 2013).

Foraging and breeding habitat

The EPA notes that the proponent has minimised impacts to potential nesting trees and hollows through the application of the mitigation hierarchy during the pipeline alignment selection process prior to referral, and further refinements to the proposal via section 43A during the assessment.

Residual impacts from the proposal would be from the loss of 52.1 ha of high-quality foraging habitat for Carnaby's cockatoo, 49.8 ha of high-quality foraging habitat for forest red-tailed black cockatoo, 104 trees including 96 trees with the potential to develop breeding hollows and eight trees with suitable breeding hollows.

The EPA notes that the majority of the proposed impact to black cockatoo foraging habitat is within the plant DE which contains about 30 ha of consolidated 'heath and shrubland' utilised by both Carnaby's and forest red-tailed black cockatoos. The remainder of the impacts to both foraging and breeding habitat occur within the pipeline DE and are therefore not consolidated habitat but largely linear clearance of scattered trees or bushland edges of Banksia/Eucalyptus woodlands.

The EPA notes that the areas retained within the Public Purpose zoned area for conservation purposes and the Parks & Recreation reserves near to the plant DE are likely to provide habitat for both species of cockatoo. Yanchep National Park is located within about 5 km of the north of the proposal and contains black cockatoo foraging habitat and confirmed breeding and roosting sites for Carnaby's cockatoo. Neerabup National Park is located central to the pipeline route and contains black cockatoo foraging habitat and potential breeding habitat. There are also several Bush Forever sites within close proximity of the pipeline that are likely to provide habitat suitable to both species of black cockatoo.

While the areas mentioned above contain relatively large amounts of foraging and breeding habitat in comparison to the proposals impacts, the EPA considers that incremental impacts to high-quality habitat within the northern Swan Coastal Plain are likely to be regionally significant, particularly to local flocks of Carnaby's cockatoo. The EPA considers the impacts to foraging and breeding habitat from this

proposal are significant residual impacts given the cumulative loss of habitat across the species range. Cumulative impacts to black cockatoos are further discussed below.

Cumulative impacts

The EPA has considered the existing and reasonably foreseeable cumulative impacts to black cockatoos occurring in the vicinity of the proposal and across several developments in Perth's northern Swan Coastal Plain corridor (between Wanneroo and Yanchep). The EPA notes that the Alkimos City Centre, Alkimos Coastal Node, Mitchell Freeway extension, Romeo Road extension, Wanneroo Road duplication, Yanchep rail extension, Eglinton Estates and Eglinton/South Yanchep residential developments would all contribute to cumulative impacts to black cockatoos.

Along with loss of nesting trees and foraging habitat along the pipeline DE, the clearing at the plant DE would result in the loss of a consolidated 30 ha of 'heath and shrubland', adding to the cumulative loss of this habitat type in the northern metropolitan area for black cockatoos.

The EPA further notes that the ongoing harvesting of the Gnangara-Pinjar pine plantation (located ~20 km south-east of the proposal) is contributing to increasing pressure on Carnaby's cockatoo foraging and roosting habitat (EPA 2019). The loss of this resource is likely to increase the significance of native foraging habitat, particularly for northern flocks of Carnaby's cockatoos.

Historically, land acquisition has been the most common offset used to counterbalance impacts to black cockatoos (EPA 2019). The EPA advises that while securing high quality habitat for black cockatoos is important and consistent with recovery actions for the species, this alone is unlikely to be a sustainable long-term strategy. Given the context of cumulative impacts and pressures on black cockatoos, the EPA considers that replacement of habitat through revegetation along with land acquisition is necessary to ensure impacts are counterbalanced. The EPA has therefore considered a range of offset options that include short-, medium- and long-term strategic outcomes. This is discussed further in the EPA's assessment of offsets (section 4 and condition B9).

The EPA advises that the significant residual impacts to foraging and potential breeding habitat can be regulated through reasonable conditions (condition B2) and counterbalanced by offsets (condition B9) so that black cockatoos are protected, and the environmental outcome is likely to be consistent with the EPA's objective for terrestrial fauna.

The issue raised during the public consultation regarding further loss of black cockatoo habitat on the Swan Coastal Plain and the increasing regional significance of foraging resources for northern flocks of Carnaby's in the context of cumulative impacts has been further considered through the EPA's assessment of offsets (section 4).

Potential indirect impacts

There are 79 potential nesting trees within the development envelope but outside the disturbance footprint which could be subject to indirect impacts during clearing if their rootzones were disturbed by trenching for the pipeline.

There is also a minor residual risk to black cockatoos inside the disturbance footprint if clearance of hollow trees were to occur during active breeding.

The EPA also notes that nearby black cockatoo habitat could be prone to disease if this risk is not adequately managed during construction.

The EPA considers these residual risks and potential indirect impacts are likely to be manageable in accordance with the proponent's mitigation measures but should also be subject to implementation conditions. The EPA has recommended conditions B2-2 and B1-3 to ensure black cockatoos are protected and the environmental outcome is consistent with EPA's objective for terrestrial fauna.

2.2.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on terrestrial fauna environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 3.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 3: Summary of assessment for terrestrial fauna

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1. Loss of 52.1 ha and 49.8 ha of high-quality foraging habitat for Carnaby's cockatoo and forest red-tailed black cockatoo respectively; and 104 potential nesting trees.	<p>The proposal would result in the loss of habitat and potential nesting trees for Carnaby's and forest red-tailed black cockatoos.</p> <p>The EPA advises that subject to the recommended limitations on clearing extents, and the application of offsets the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.</p>	<p>Condition A1 (Limitations and extent of proposal).</p> <p>Condition B2 (Terrestrial Fauna) Sets limits for residual impacts to black cockatoo habitat and trees.</p> <p>Condition B8 (Offsets)</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
2. Indirect impacts to black cockatoos potentially breeding inside the disturbance footprint.	<p>The proposal has the potential to indirectly impact breeding black cockatoos during clearing.</p> <p>The EPA advises that subject to the recommended conditions required for pre-clearance surveys and measures to protect breeding cockatoos, the outcome is likely to be consistent with the EPA objective for terrestrial fauna.</p>	<p>Condition B2-2 (Terrestrial Fauna) Prescriptive condition to require pre-clearance surveys of hollows during black cockatoo breeding times.</p>
3. Indirect impacts to black cockatoo trees, from rootzone disturbance, within the development envelope but outside the disturbance footprint.	<p>The proposal has the potential to indirectly impact black cockatoo trees within the development envelope but outside the disturbance footprint during excavation.</p> <p>The EPA advises that subject to the recommended conditions to limit the extent of tree clearing, the outcome is likely to be consistent with the EPA objective for terrestrial fauna.</p>	<p>Condition B2 (Terrestrial Fauna) Sets limits for residual impacts to black cockatoo habitat and trees.</p>
4. Indirect impacts to adjoining black cockatoo habitat from introduction or spread of disease.	<p>The proposal has the potential to indirectly impact adjoining black cockatoo habitat from introduction or spread of disease.</p> <p>The EPA advises that subject to the recommended conditions requiring hygiene protocols, the outcome is likely to be consistent with the EPA objective for terrestrial fauna.</p>	<p>Condition B1-3 (Flora and Vegetation) Prescriptive condition to require implementation of <i>Phytophthora cinnamomi</i> hygiene protocols during construction.</p>

2.3 Landforms

2.3.1 Environmental objective

The EPA environmental objective for landforms is *to maintain the variety and integrity of significant physical landforms so that environmental values are protected*.

2.3.2 Investigations and surveys

The EPA advises the following surveys and reports were used to inform the assessment of the potential impacts to landforms:

- MRS Amendment 1029/33 Environmental Review (ATA Environmental, 2003)
- A description of the coastal and marine zones of the Alkimos area (Semeniuk et al, 2004)
- Alkimos Coastal Node Local Structure Plan – Local Environmental Impact Assessment and Management Strategy (RPS 2016).

The EPA has also had regard to previous assessments:

- EPA Report 1634 – Yanchep Rail Extension: Part 1 Butler to Eglinton, May 2019
- EPA Bulletin 1207 – Alkimos – Eglinton Metropolitan Region Scheme Amendment No. 1029/33, November 2005
- EPA Report 1239 – Wastewater Treatment Plant Site B.

2.3.3 Assessment context – existing environment

The plant DE is located within the area referred to as the Alkimos Dune Complex, a defined area within the Quindalup dune system. The pipeline DE also intersects the Alkimos Dune Complex as well as the Spearwood and Bassendean dune systems from west to east.

At Alkimos, the Quindalup dunes are approximately 2 km wide and extend a relatively short distance inland (4 km) compared to other areas of the Quindalup dune system which extend some 10 km inland (Gozzard 2007). Given this short distance and the representativeness of the four phases of the Quindalup dune system, the Alkimos Dune Complex is considered to hold educational value for secondary and tertiary students, as well as the broader community. It is for this reason that the Alkimos Dune Complex is a listed geoheritage site. As mapped by the Department of Mines, Industry Regulation, and Safety (2021) the Alkimos Dune Complex covers an area of 634 ha of which about 622 ha contained pre-European extents of the dunes phases of Quindalup dune system.

The EPA in its *Environmental Factor Guideline – Landforms* (EPA 2018) acknowledges that the Alkimos Dune Complex is considered to have national and world significance as an excellent example of parabolic dunes. The EPA has previously recognised that the Alkimos Dune Complex is an important geoheritage site that demonstrates all phases of the Quindalup dune formation in a contiguous landform.

Having regard to existing knowledge and criteria for determining if a landform is significant in the *Environmental Factor Guideline – Landforms*, the EPA considers that the Alkimos Dune Complex would be a 'significant' landform because it provides evidence of past geological processes and is of recognised scientific interest as a reference site or an example of where important natural processes are operating.

The plant DE intersects an area within the Alkimos Water Precinct reserved for Public Purposes under the Metropolitan Region Scheme. In accordance with Ministerial Statement 722, and following the appeals process, portions of this reserve that overlap the plant DE (referred to as Area 10b) are to be protected and managed for conservation purposes to protect the integrity, function, and environmental value of the bushland to the requirements of the WAPC on advice of the EPA, and shall only be used for conservation, landscape, and complementary purposes. Minor infrastructure may be installed within these areas, providing the work is undertaken in accordance with a Management Plan approved by the EPA.

During the EPA's assessment of the Alkimos Wastewater Treatment Plant Site B (Assessment 1529), the proponent stated that they would continue to manage areas within the Alkimos Water Precinct identified for conservation purposes, with a caveat that they would be able to traverse area 10b for the installation of essential linear infrastructure (pipes and power) and access roads not being compromised. The proponent further committed to sensitive route planning, minimal disturbance, and rehabilitation where practicable to maximise conservation values.

The EPA recommended condition 7 of Ministerial Statement 755 requiring the proponent to ensure the ongoing stability of the dunal system outside the area of disturbance. Note 8 to Ministerial Statement 755 sets out that the conditions in that Statement (755) do not in any way remove the proponent's obligation to comply with all relevant conditions contained within Ministerial Statement 722, particularly in respect of the proponent's responsibility to develop and implement management plans for the implementation of minor infrastructure on the land known as areas 9a, 10a, and 10b.

Areas 9a and 10a, as defined in the MRS are located to the north of the plant DE, area 10b is bisected by the pipeline DE directly south of the plant DE (Figure 4).

The EPA has had regard for the conditions set out in Ministerial Statement 722 and 755 during its assessment.

2.3.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the proponent's response to submissions document (Water Corporation 2023a). Public consultation on the proposal raised concerns about cumulative impacts to the geoheritage site, impacts to the integrity of the dunefield, the need for management of the conservation zone to protect the dunes, and the need to maintain the natural processes of dune migration and erosion.

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.3.9, 2.3.10 and section 4 (Offsets).

2.3.5 Potential impacts from the proposal

The proposal has the potential to significantly impact landforms from:

- disturbance to 35.1 ha within the area defined as the Alkimos Dune Complex geoheritage site including the loss of:
 - 1.9 ha of the Quindalup second phase parabolic dune (Q2)
 - 16.6 ha of the Quindalup third phase parabolic dune (Q3)
- direct impact to 5.17 ha of area 10b
- potential indirect impacts from aeolian erosion/destabilisation (blowouts) or disruption of sediment flow.

2.3.6 Avoidance measures

During assessment, the proponent amended the proposal to avoid impacts to area 9a. Area 9a provides protection of a significant east-west parabolic dune within the Alkimos Dune Complex.

2.3.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed measures to minimise impacts to landforms:

1. minimising the size of the plant development envelope as much as possible
2. use of tunnelling to install the marine intake and outlet pipeline to minimise direct impacts to the dune system
3. implementing erosion controls.

2.3.8 Rehabilitation measures

The proponent proposes to reinstate and recontour dune areas that would be temporarily removed/excavated. A berm on the western boundary of the plant development envelope would be constructed and rehabilitated to reconnect northern to southern dunes.

The proponent has committed to the rehabilitation of temporarily cleared areas within Area 10b to their pre-construction vegetation condition.

2.3.9 Assessment of impacts to environmental values

The EPA considered that the key environmental values for Landforms likely to be impacted by the proposal is the disturbance of phases of the Alkimos Dune Complex.

Direct impacts to Alkimos Dune Complex

In considering whether a landform is significant, the EPA has had regard for the six criteria outlined in its *Environmental Factor Guideline – Landforms* (EPA 2018) being variety, integrity, ecological importance, scientific importance, rarity, and social importance. The EPA considers the proposal has the potential to impact on the integrity, variety, and scientific importance of the Alkimos Dune Complex given its representation of the four major dune phases of the Quindalup dune system formation within a relatively short distance, and for its research and educational value.

The Alkimos Dune Complex has been cumulatively impacted by several proposals and urban developments (Figure 4). The proponent estimates that approximately 66% (413 ha of 622 ha) of the pre-European extent of the Alkimos Dune Complex is either already cleared or is proposed to be cleared by reasonably foreseeable activities (Water Corporation 2023a). Of this, 35.1 ha of the Alkimos Dune Complex is proposed to be cleared by this proposal, including portions of the Q2 and Q3 major phases of Quindalup dune system.

The EPA notes that following implementation of the proposal and other approved proposals¹ in the immediate area, representation of all major dune phases (from oldest Q1 to youngest Q4) would remain in quantities greater than 30% and up to 100% of their pre-European extents (Table 4). The EPA considers this to be essential in order to protect the *integrity, variety, and scientific importance* of the landform.

Table 4: Cumulative impacts to Alkimos Dune Complex phases

Quindalup dune phases	Alkimos Dune Complex pre-European extent (ha)	Proposal impacts to the Alkimos Dune Complex (ha)	Extent of cumulative impacts from existing and reasonably foreseeable including the proposal (ha) ²	Extent remaining after existing and reasonably foreseeable cumulative impacts (ha)	Proportion of pre-European extent remaining after existing and reasonably foreseeable cumulative impacts (%)
Q1	42.6	0	19.21	23.39	54.9
Q2	104.4	1.85	69.18	35.22	33.7
Q3	192	16.58	118.85	73.15	38.1
Q4	33.6	0	0	33.6	100.0

(adapted from Water Corporation 2023a)

¹ Proposals that have been included in the calculation of cumulative impacts: Alkimos City Centre Development, Alkimos Coastal Village, and all other existing land development within the Alkimos area (calculated using aerial imagery as reference).

² as per above (¹)

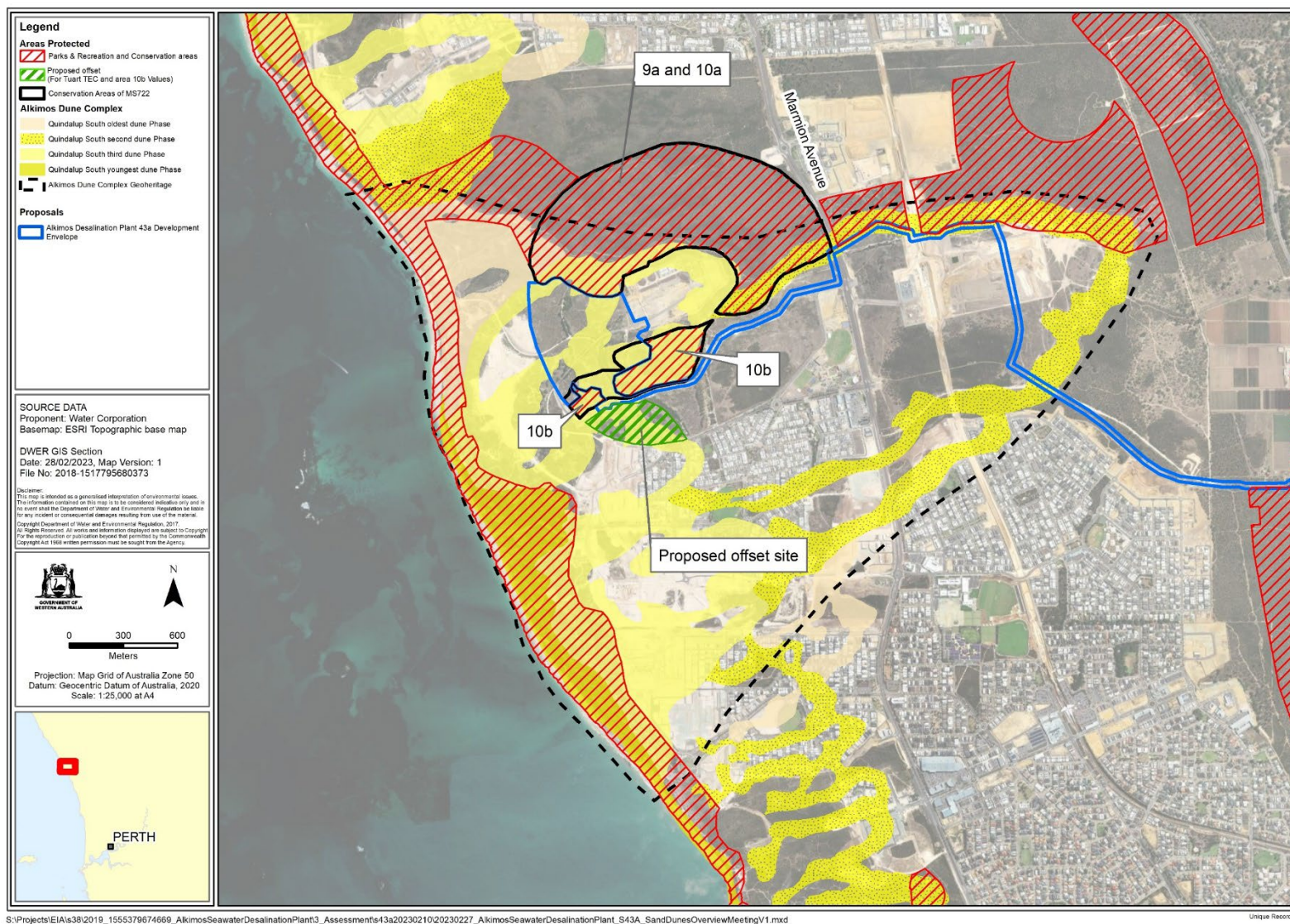


Figure 4: Cumulative impacts and protected areas within the Alkimos Dune Complex

Importantly, the remnants of the major phases of the Alkimos Dune Complex would persist within a number of protected areas (see Figure 4) including:

- a largely continuous east-west area containing 'parks & recreation' reserve and areas 9a and 10a,
- a 'parks & recreation' reserve from north to south along the foredune, and
- area 10b.

The EPA therefore considers the landform would not be significantly compromised by the proposal as the major dune phases of the Alkimos Dune Complex would remain representatively intact within protected areas. The EPA has recommended condition B3 to limit the extent of disturbance to Alkimos Dune Complex and ensure there are no adverse impacts beyond these limits. In considering the direct impacts in the context of the landform remaining within protected areas after implementation of the proposal and cumulative impacts, the EPA considers the proposal is likely to be consistent with the EPA's objective for landforms.

The concerns raised during the public consultation regarding cumulative loss of the Alkimos Dune Complex have been considered through the EPA's assessment. While the EPA does not consider the impacts to the Alkimos Dune Complex would be so significant as to require counterbalancing by way of offsets, the EPA advises the proponent's proposed offset site (Figure 4) for Tuart Woodland environmental values would also increase the quantity of protected tenure containing landform-related environmental values.

Area 10b

Area 10b is approximately 18 ha of which 5.17 ha is proposed to be directly impacted by this proposal. The EPA has noted that the proponent would minimise impacts to area 10b, rehabilitating a number of areas temporarily cleared during construction (3.52 ha), such that the permanent loss of area 10b would be reduced to 1.65 ha. The EPA considers this impact to be relatively minor given it is small in extent and that the majority of the Alkimos Dune Complex's remnant areas would be contained within protected areas including areas 9a and 10a, the remainder of area 10b and within the 'parks & recreation' reserves as defined in the MRS (Figure 4).

After considering the application of the mitigation hierarchy and the small extent of the residual impact to area 10b, the EPA considers the permanent loss of 1.65 ha of area 10b is unlikely to be significant. However, the EPA has recommended conditions B3-1 and B3-2 to ensure that the proposal does not cause further adverse impacts beyond disturbance limits and that any disturbed areas are rehabilitated. With the implementation of the recommended conditions and subject to environmental outcomes being met, the EPA considers the proposal is likely to be consistent with the EPA's objective for Landforms.

Potential indirect impacts

In addition to direct impacts, the EPA also notes that construction work and the berm on the western side of the plant DE may create risks of indirect impacts from erosion and dust mobilisation given the high-wind coastal environment. Further to this,

placement of permanent infrastructure has the potential to interrupt natural sediment flow affecting geomorphological processes.

The EPA notes that the westerly-facing berm is proposed to be rehabilitated and recontoured to tie into the dunes north and south of the plant DE to minimise impacts, and erosion control where necessary. Given the EPA considers the *integrity* of the dune system surrounding the proposal to be a significant value of the landform, it therefore recommends condition B3-2 to ensure the proposal is constructed to achieve the environmental objective of rehabilitated dunes that are not prone to erosion or a source of dust emissions, and that there are no impacts beyond disturbance limits. Condition B3-4 would require an environmental management plan to ensure the proposal is managed to meet this environmental outcome.

Matters raised during public consultation regarding impacts to the integrity of the dunefield, the need for management to protect the dunes, and the need to maintain the natural processes of dune migration and erosion have been addressed through recommended condition B3.

2.3.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on landform values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 5. The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 5: Summary of assessment for landforms

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1.	Disturbance of 35.1 ha within the defined Alkimos Dune Complex geoheritage area, including disturbance to 5.2 ha of conservation area 10b.	<p>The proposal would result in the loss of 35.1 ha within the Alkimos Dune Complex geoheritage area. The impact includes the loss of 1.9 ha of Q2 and 16.6 ha of Q3.</p> <p>The EPA advises that in considering cumulative impacts from existing and reasonably foreseeable activities, and the continuing representation of all four major dune phases outside the development envelope, the loss of 35.1 ha is likely to be</p>	<p>Condition A1 (Limitations and extent of proposal)</p> <p>Condition B3-1(1) Disturbance limit for Alkimos Dune Complex and a sub-limit for conservation area 10b.</p>

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
		consistent with the EPA's objective for landforms.	
2.	Indirect impacts from potential erosion/destabilisation of dunes.	<p>The proposal has the potential to result in indirect impacts to the Alkimos Dune Complex from potential erosion/destabilisation of dunes and potential source of dust emissions.</p> <p>The EPA advises that subject to the recommended outcome being met through active management, the outcome is likely to be consistent with the EPA's objective.</p>	<p>Condition B3 (Landforms)</p> <p>Environmental objective, including an environmental management plan, to require rehabilitated dunes that are stable and not prone to erosion or a source of dust emissions.</p>

2.4 Social Surroundings

2.4.1 Environmental objective

The EPA environmental objective for social surroundings is *to protect social surroundings from significant harm*.

2.4.2 Investigations and surveys

The proponent has relied on a number of surveys and investigations to inform the potential impacts to Aboriginal heritage and culture which are listed in Table 12-2 and 12-5 of the ERD.

The proponent commissioned an Aboriginal heritage and archaeological survey in January and February 2022. An additional Aboriginal heritage survey was undertaken in January 2023 to inform the potential impacts within the pipeline DE that was realigned via section 43A:

- Report of an Aboriginal Heritage Survey of the proposed Alkimos Seawater Desalination & Groundwater treatment plants and trunk main to the Wanneroo reservoir: Wanneroo, Western Australia (Brad Goode & Associates 2022)
- Addendum to the Report on an Archaeological Survey of the Alkimos Seawater Desalination Plant (Cw03474) And Integrated Trunk Main (Cw03601) Project Areas, Western Australia (Brad Goode & Associates 2023).

The surveys were undertaken in consultation with representatives endorsed by South West Aboriginal Land and Sea Council (SWALSC) to speak on behalf of the Whadjuk People Indigenous Land Use Agreement group.

The Aboriginal archaeology survey (Brad Goode & Associates 2022) included on-site visits with Traditional Owners to the plant site, and visits to Honey Possum site ID 3503 and Marrynginup place ID 22160.

A number of studies were commissioned by the proponent to inform the assessment of potential noise, visual and amenity impacts:

- Alkimos Seawater Desalination Plant Social Impact Assessment – Final Report (Environmental Resources Management Australia Pty Ltd (ERM) 2018).
- Alkimos Seawater Desalination Plant Environmental Approvals Inputs (Jacobs 2020)
- Environmental Noise Assessment: proposed Alkimos Desalination Plant – Revised Topography (Herring Storer Acoustics 2021).

The final detailed design of the proposed desalination plant was not available to inform the noise assessment. However, the EPA considers that the proxy noise data obtained from the previous projects such as Southern Seawater Desalination Plant, East Rockingham Wastewater Treatment Plant and Beenyup Advanced Water Recycling Plant has appropriately informed the modelling inputs.

2.4.3 Assessment context: existing environment

Aboriginal heritage

The proposal is within the Whadjuk People Indigenous Land Use Agreement area WI2017/015, which is currently represented by the SWALSC.

Desktop surveys indicated that there are six Registered sites and eight other heritage places within the broader proposal area (Tables 12-6 and 12-17 of the ERD). One site is considered relevant to this assessment:

- Alkimos Waugal place ID 23053 (stored data/not a site).

Amenity

The immediate area adjoining the plant site and the existing wastewater treatment plant comprises a 600 m odour buffer which is zoned Public Purpose (the Alkimos Water Precinct). A large portion of this area contains the amenity of natural areas which are required to be managed for conservation purposes in accordance with the MRS (area 9a, 10a and 10b as discussed in section 2.3).

The plant site itself is a natural sand dune landscape where noise, vibration and light from human activities are naturally low. Noise and disturbance from human activities increases with distance from the plant site associated with urban development. The existing residential areas are located to the north, south, and east of the plant site, with the closest within about 600 m. Future residential areas are planned to the west and north, with the closest within 300 m west of the plant site boundary.

2.4.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the proponent's response to submissions document (Water Corporation 2023a). The key matters raised during consultation included issues about the proposal's pipeline route intersecting two registered Aboriginal heritage sites.

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.4.6, 2.4.7 and 2.4.8.

2.4.5 Potential impacts from the proposal

The proposal has the potential to impact on social surroundings from:

- Potential impacts to Aboriginal heritage, the Alkimos Waugal place ID 23053 and/or cultural values.
- Temporary impacts to amenity from dust, noise, and vibration from construction of the plant and tunnel boring for the marine intake and outlet pipelines.
- Potential impacts to amenity values to residential and recreational areas in proximity to the desalination plant from operational noise.

2.4.6 Avoidance measures

At the time of referral one registered site (Honey Possum site ID 3503) and one other heritage place (Marrynginup place ID 22160) were proposed to be directly impacted by the proposal. In response to consultation with Whadjuk representatives, the proponent sought to amend the proposal during assessment in order to avoid impacts to both sites. Given that direct or indirect impacts to these sites are no longer proposed, these sites are not discussed further.

Matters raised during the consultation on the proposal regarding impacts to these sites have been resolved through this avoidance measure.

2.4.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed measures to minimise impacts to social surroundings:

1. positioning of the plant site in a naturally low-lying area with elevated dunes on the north, south and eastern sides of the site, and excavating the ground level in-line with the existing wastewater treatment plant to minimise impacts to noise and visual amenity
2. construction of a berm on the western side of the plant site to attenuate noise and mitigate potential visual amenity impacts to the future residential area
3. presence of Traditional Owner observers during vegetation clearing and excavation, and procedures for unexpected finds of known or suspected Aboriginal heritage material if uncovered during construction
4. implementation of work measures to minimise noise and vibration as much as possible, and construct the proposal in accordance with environmental noise practices set out in section 4 of the *AS 2436-2010 Guide to noise and vibration*

control on construction, maintenance and demolition sites and the Environmental Protection (Noise) Regulations 1997

5. use of lowest-noise work practices and equipment where practical when operating within proximity to sensitive noise receptors
6. use of dust suppression measures to minimise mobilisation of dune material and dust following clearing and excavation
7. undertake a noise assessment of the final detailed design of the plant and incorporation of best practice acoustic treatments and operational noise management mitigation as outlined in Table 12-14 of the ERD.

2.4.8 Assessment of impacts to environmental values

The EPA considered that the key social surroundings values likely to be impacted by the proposal are Aboriginal cultural heritage, noise, and visual amenity.

Aboriginal cultural heritage

The EPA considers the residual risks of the proposal to be potential impacts to the Alkimos Waugal place ID 23053 (not currently a registered site) and potential indirect impacts from unintended disturbance of Aboriginal heritage material at unknown sites during excavation.

Alkimos Waugal place ID 23053

The Alkimos Waugal Place ID 23053 was originally recorded in a previous survey for the Alkimos wastewater treatment plant as being mythological, a natural feature (trees, limestone ridges and dunes) and a water source (Brad Goodes & Associates 2022). This 'Other heritage place' comprises a series of seven polygons and could potentially be affected by the proposal.

The EPA notes that the Alkimos Waugal Place ID 23053 has been assessed by the Aboriginal Cultural Materials Committee as 'stored data/not a site' under section 5 of the *Aboriginal Heritage Act 1972* (resolution 5402) (Brad Goodes & Associates 2022).

The EPA notes that the proponent has committed to ongoing consultation with Whadjuk Noongar representatives to ensure that risks or potential impacts to Aboriginal cultural heritage are minimised.

Indirect impacts

Other potential indirect impacts to Aboriginal cultural heritage include the risk of unintentionally uncovering or disturbing Aboriginal cultural heritage material or human remains during excavation. The EPA notes that the proponent proposes to have Traditional Owner site monitors present during clearing and excavation and would implement procedures to ensure any unexpected heritage finds or human remains are appropriately handled.

Traditional Owners did not raise concerns with the construction or operation of the marine intake/outlet, except for recommending that excavated dune material and tunnel borings are not disposed of as waste. The EPA notes that the proponent intends to maximise reuse of dune material in the construction of the bund and for future local urban development if it is considered suitable.

The EPA considers that the residual risk to Aboriginal cultural heritage from potential indirect impacts is unlikely but, in the event, cultural heritage materials, human remains, or unknown sites are uncovered or disturbed, can be subject to other statutory decision-making processes in accordance with the *Aboriginal Heritage Act 1972*. The EPA therefore considers the environmental outcome is likely to be consistent with the EPA's objective for social surroundings.

Amenity

The EPA has considered the potential residual impacts to amenity to be from construction noise, vibration and visual impacts at the plant site, and operational noise from the desalination plant.

Construction noise, vibration, and visual amenity

Noise and visual impacts may cause disturbance to the surrounding existing residential areas and potentially recreational beach/ocean users during the estimated four-year construction period, particularly those located close to the plant site.

The EPA considers the proposed early construction of the bund to the west of the plant site combined with natural dunes to the north, south and east would minimise noise and visual impacts from construction. Any visual impacts during the bund construction would be relatively minor and short-term. Regarding above ground construction noise, the EPA notes that these construction activities would be conducted in accordance with the *Environmental Protection (Noise) Regulations 1997*.

Underground construction activities during tunnel-boring for marine intake and outfall tunnels would occur outside of 'normal working hours', continuously and at night. The EPA notes the only relevant sensitive receptors where night-time noise and vibration limits could be exceeded would be the future residential areas located to the west above the marine tunnel. The EPA considers these impacts are unlikely to be an issue as the proponent intends to complete the tunnel-boring before these residential areas are developed. The EPA further notes that in the unlikely event the tunnel boring was delayed, and the residential areas were built, the proponent would be required to prepare a noise management plan and obtain a licence from the Department of Water and Environmental Regulation.

The EPA advises that the potential residual impact to residents from construction noise and vibration can be subject to other statutory decision-making processes (if required) to ensure any potential noise or vibration impacts are managed so that the environmental outcome is likely to be consistent the EPA's objective for social surroundings.

Operational noise

The desalination plant is proposed to operate 24-hours a day generating noise from pumps, process equipment and auxiliary systems. The results of noise modelling indicate that night-time noise has the potential to impact local amenity at nearby residential receptors, particularly those planned future residences located to the west.

The operational noise modelling considered the 'worst-case scenarios' (wind conditions) and combined noise from the desalination plant, the existing wastewater treatment plant and future groundwater treatment plant within the Alkimos Water Precinct. In considering the proposed west-facing noise bund, the surrounding north, east and south dune topography, and other proposed mitigation measures as outlined in the ERD, the EPA notes that operational noise is predicted to comply with night-time noise levels prescribed under the *Environmental Protection (Noise) Regulations 1997*. In addition, the proponent intends to conduct a noise assessment of the final design prior to construction to ensure operational noise limits can be met.

Noting the modelled predictions, the EPA advises there is unlikely to be residual impacts from operational noise if the proposal is implemented in accordance with the proposed mitigation measures. The EPA has therefore concluded that the proposal is likely to be consistent with its objective for social surroundings.

2.4.9 Summary of key factor assessment and recommended regulation

The EPA is of the opinion that there is unlikely to be residual risks or impacts to social surroundings from the proposal that would need to be subject to implementation conditions. The EPA therefore considers conditions are not required, and other decision-making processes can ensure consistency with the EPA factor objective. The EPA's assessment findings are presented in Table 6.

Table 6: Summary of assessment for social surroundings

Residual impact or risk to environmental value		Assessment finding	Recommended conditions and DMA regulation
1.	Potential residual impact to future residents from construction noise and vibration.	The EPA advises that this residual impact is unlikely due to the construction being undertaken before residential development in areas that may be impacted by noise and vibration. If required, this can be regulated through <i>Environmental Protection (Noise) Regulations 1997</i> .	Complementary regulation and approval (if required) of noise management plan for construction outside of prescribed hours.

2.5 Marine Environmental Quality

2.5.1 Environmental objective

The EPA environmental objective for marine environmental quality is *to maintain the quality of water, sediment, and biota so that environmental values are protected* (EPA 2016c).

2.5.2 Investigations and surveys

The EPA advises the following investigations and peer reviews were used to inform the assessment of the potential impacts to marine environmental quality:

- Alkimos Hydrodynamic Modelling, Scenario Report (Appendix H of the response to submissions supporting document) (DHI 2022)
- Summary of Potential Discharge Plume Interactions (Appendix U of the environmental review document) (DHI 2022)
- Alkimos Peer Review Panel Final Report (Appendix F of the environmental review document) (Lord et al. 2019).

The investigations were generally consistent with the *Technical Guidance: Protecting the quality of Western Australia's Marine Environment* (EPA 2016i).

The EPA determined it could proceed with its assessment despite the paucity of salinity data in the immediate vicinity of the outfall diffusers. This is because relevant data from adjacent areas were available which suggest it is unlikely that salinity at different sites within the area, including in the immediate vicinity of the outfall diffusers, will exhibit significant and persistent spatial differences. In addition, the proponent has committed to undertaking a comprehensive monitoring program to resolve the spatial and temporal characteristics of the salinity regime in the vicinity of the outfall diffusers and at reference sites, prior to the commencement of discharge.

2.5.3 Assessment context – existing environment

The proposed seawater inlet and brine outfall sites are situated within Perth's coastal waters approximately 13 km north of the Marmion Marine Park. The marine environment is characterised by a north-south running coastline with a relatively shallow (<12 m) sheltered lagoonal area inshore of two reef structures running parallel to the coast. The seawater inlets are located 2.9 km offshore within the lagoon, and the outlet diffuser structures are located 4.4 km offshore within an approximately 23 m depression bounded to the east and west by reefs. Moving west from the outermost reef line the seabed exhibits a gentle downward slope from 20 m on the reef to over 50 m further offshore.

The inshore lagoonal area is characterised by a complex range of benthic communities and habitats. Seagrass assemblages are primarily associated with unconsolidated sandy substrates and macroalgal communities on more stable substrates such as high- and low-relief reefs and reef pavements. The deeper channels between the offshore reef lines are predominantly unvegetated (bare) sand.

The benthic communities are productive and diverse, supporting a number of recreationally and commercially important finfish, and invertebrate species such as western rock lobster (*Panulirus cygnus*) and Roe's abalone (*Haliotis roei*). The marine waters in the vicinity of the proposed inlet and outlet are used for a range of recreational activities that include primary and secondary contact and harvesting seafood.

The EPA has an Environmental Quality Management Framework (EQMF) for ensuring long-term protection of the quality of marine waters of Western Australia, which is described in its *Technical guidance – Protecting the quality of Western Australia's marine environment* (EPA 2016i). This framework requires relevant environmental values to be identified and spatially defined in the form of an environmental quality plan (EQP) and includes determining appropriate levels of ecological protection for the value 'ecosystem health' (see Table 3 of EPA 2016a).

The EPA has established an environmental quality management framework and EQP for waters immediately south of the proposed inlets and outlets based on extensive community consultation (EPA 2000). Although levels of ecological protection for the ecological value 'ecosystem health' have not been formally established for the marine environment where the proposal is located, the default position of the EPA is that these waters be designated a high level of ecological protection and that all social values apply. The proponent proposed the following:

- a low level of ecological protection would apply within a 100 m radius of the outlets
- a high level of ecological protection, and all social values, would apply in all the proximal coastal waters outside of the low level of ecological protection proposed in the vicinity of the outlets.

2.5.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the response to submissions document (Water Corporation 2023a).

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.5.5, 2.5.7 and 2.5.9.

2.5.5 Potential impacts from the proposal

The proposal to discharge by-products of the seawater desalination process (brine) through ocean outfalls has the potential to significantly impact marine environmental quality. The potential impact pathways include the effects of physical stressors such as temperature and salinity, and direct toxicity associated with the components of the brine discharge (including chemical additives) near the point of discharge (the near-field), and indirect effects of the high-density brine discharge on water column stratification and associated dissolved oxygen drawdown in the water column near the seabed in the far-field.

2.5.6 Avoidance measures

No avoidance measures in relation to this factor were proposed by the proponent.

2.5.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed measures to minimise impacts to marine environmental quality:

- implementing construction methods including using a tunnel boring machine to minimise disturbance and turbidity generation within the marine environment associated with installing the inlet and outlet pipelines
- designing and positioning outfall diffusers to optimise mixing and minimise water column stratification
- implementing measures in accordance with a Construction Marine Environmental Management Plan (Water Corporation 2023d) and a Commissioning and Operations Marine Environmental Management Plan (Water Corporation 2023e) to ensure the proposal meets the objective of maintaining ecosystem integrity and meeting specific levels of ecological protection during construction and operation phases, respectively.

2.5.8 Rehabilitation measures

Rehabilitation measures are not a relevant mitigation in relation to this environmental factor.

2.5.9 Assessment of impacts to environmental values

The construction of the marine infrastructure required to extract seawater and to discharge wastewater is proposed to be managed to ensure minimal disturbance to the seabed and the overlying water column. Impacts to marine environmental quality from drilling and associated infrastructure installation activities are likely to be localised and of short duration when appropriate management measures, such as those identified in the draft Construction Marine Environmental Management Plan (Water Corporation 2023d), are implemented. Construction related activities are not considered further under the factor MEQ.

The operation of the marine infrastructure, specifically the discharge of brine, has the greatest potential to impact marine environmental quality. The EQP proposed for the area requires that the wastewater discharge be managed to achieve a high level of ecological protection 100 m from the point of discharge and beyond (shown in Figure 2-1 of the response to submissions supporting document). This requires the 99% species protection level for physical stressors and for toxicants, as defined by ANZG (2018), to be achieved within 100 m of the discharge point. This also requires the effects of density stratification in the far-field to be managed so that there is adequate oxygen replenishment to ensure that dissolved oxygen concentrations do not fall to levels that cause measurable impacts on marine communities (including benthic communities and habitats and marine fauna) in the affected areas.

The EPA has considered the information presented in the ERD (Water Corporation 2022) and in the proponent's responses to submission document (Water Corporation 2023a) and notes the following with respect to '*physical stressors*', '*toxicity*' and '*stratification*'.

Physical stressors

The key physical stressors within the discharge are salinity and temperature. Both of these can be readily measured in the waste stream and in the field and managed to achieve relevant environmental quality guidelines at the edge of the low ecological protection area (LEPA) and beyond.

Toxicity

Toxicity testing of a similar desalination plant discharge revealed that a sample of brine containing 'clean in place' chemicals (CIP) required 29.4 dilutions and brine without CIP required 21.7 dilutions to meet the required 99% species protection level. The outfall diffusers of the proposal are designed to achieve 30 dilutions at a distance of 70 m from the point of discharge.

Stratification

Simulation modelling found that the introduction of excess salinity via the proposed discharge is likely to result in the formation of a near-permanent area of stratification. Simulation modelling of the effects of stratification on dissolved oxygen (DO) levels showed an increase in the total area of oxygen depletion when the outfall is operating compared to when it is not. The effects on DO levels occurred at kilometre-scale distances from the outfall (~2.5 km north and 7 km south). The predicted severity and extent of the brine-induced stratification, and DO concentrations, were based on predictive modelling which in turn was based on a number of assumptions. Although the EPA considers many of the assumptions were reasonable and well-founded (particularly for the hydrodynamics) there is residual uncertainty, for example with respect to the ambient salinity regime and DO consumption rates.

The EPA has recommended a condition to prepare a Commissioning and Operations Marine Environmental Management Plan (COMEMP) that sets out a monitoring, management and investigative framework designed to address potential toxicity and stratification issues and to ensure the objectives for marine environmental quality will be met.

Toxicity management

The COMEMP will incorporate a program to undertake comparative whole-of-effluent toxicity testing of wastewater from the ASDP that contains 'clean in place' chemicals, and that does not contain 'clean in place' chemicals during the commissioning phase. The results will be used to determine the dilutions required to achieve the 99% species protection level and to determine which sample type has the greatest toxicity. The number of dilutions required for the most toxic sample type will provide the minimum dilutions to be achieved 100 m from the discharge point and will guide toxicity testing during operations.

Stratification management

The EPA notes the proponent's intention in its response to submissions document (Water Corporation 2023a) to undertake studies during commissioning to provide data that will be used to reduce uncertainty and validate predictions of the effects of the discharge on stratification and DO levels. These studies will be described in the COMEMP and include characterising the salinity field in the vicinity of the discharge point and campaign monitoring of DO concentrations and relevant physical properties (for example, salinity and temperature) using fixed instruments and profiles through the water column at locations in the far-field. These data will allow for a direct comparison between measured and modelled data and to calibrate and fine tune the model accordingly. This model tuning will increase confidence to be placed on re-modelling the consequences of brine discharges at discharge flow rates representative of initial and future stages. The early investigations and staged implementation approaches will allow adaptive/pre-emptive management measures to be put in place if and when required to address any stratification and associated DO drawdown issues through the full range of production rates including at the final design capacity of 100 GL/y which is not expected until after 2040.

The EPA notes that plume dispersion at the proposed location of the outlet is constrained by the reef lines to the east and west and, based on modelling and comments by the independent peer review panel, considers that the likelihood and extent of persistent stratification would be lower if the brine was discharged further offshore beyond the second reef line. The EPA expects that in the event that modelling and/or monitoring indicates that the environmental values are not adequately protected, and further management is required, the proponent will consider all available management options, including engineering solutions such as modifying diffuser design or location to enhance dispersion, to ensure the required environmental protection outcome is met.

The EPA considered that the key environmental value for marine environmental quality likely to be impacted by the proposal is Ecosystem Health.

Ecosystem health

The EPA has assessed the likely residual impacts of the proposal on Ecosystem Health to be:

- An area of 4.26 ha within 100 m of the discharge points where the level of ecological protection is reduced from high (that is, the baseline state) to low. This low ecological protection area (LEPA) encompasses the zone of initial dilution and will exist for the life of the proposed activity. The changes will occur in the water column and water quality is expected to return to the original baseline state soon after discharges cease.
- An area of near-permanent stratification in the far-field induced by the brine discharge.
- A risk to ecosystem health beyond the LEPA if oxygen replenishment rates of bottom waters are reduced due to stratification to the extent that DO concentrations are reduced to levels that cause stress or impacts to marine biota.

Cumulative impacts on Ecosystem Health

A regional cumulative impact assessment by the proponent (Water Corporation 2023a) was undertaken and presented consistent with EPA advice (EPA 2000) (see Figure 2-2 of the RTS document). The additional area of LEPA associated with this proposal (4.26 ha) will increase the total area of low ecological protection to 33.14 ha when considering all approved impacts at a regional scale (that is, within an area of 24,452 ha including Hillarys marina in the south and the Alkimos wastewater treatment plant (WWTP) outlet in the north).

The cumulative area of LEPA includes LEPA's associated with the Alkimos and Beenypup WWTP discharges and amounts to <0.14% of the region. The combined percentage of low and moderate levels of ecological protection amount to <0.62% of the region, the remainder (99.38%) is designated as a high level of ecological protection.

The EPA advises that the additional impact on the environmental value ecosystem health associated with implementation of the ASDP proposal is relatively small in area, is readily manageable and reversible and will not cause unacceptable impacts to ecosystem health at local and/or regional scales.

2.5.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts and risks of the proposal on marine environmental quality environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed to ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 7.

Table 7: Summary of assessment for marine environmental quality

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1	Potential impacts to marine biota due to toxicity and/or osmotic stress resulting from the discharge of brine.	<p>A high level of ecological protection will be maintained 100 m from the point of discharge.</p> <p>There is a level of uncertainty regarding the number of dilutions required to achieve a high level of ecological protection for brine containing 'clean in place' chemicals compared to brine without these chemicals. This uncertainty can be addressed through the recommended conditions.</p> <p>The discharge and diffuser performance will need to be</p>	<p>Condition A1 (Limitations and extent of proposal)</p> <p>Condition B4 (Marine Environmental Quality)</p> <p>Establishes the environmental outcomes that must be met including that:</p> <ul style="list-style-type: none"> A 'high' level of ecological protection will be maintained 100 m from the point

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	<p>managed to ensure sufficient dilutions to achieve the 99% species protection levels determined through whole of effluent testing and under the full range of operating conditions.</p> <p>The proposal can be implemented without compromising the EPA objective for benthic communities and habitats.</p>	<p>of discharge and beyond.</p> <p>Requires the development and implementation of a Commissioning and Operations Marine Environmental Management Plan (COMEMP) that sets out how the environmental outcome will be met, including monitoring, management and reporting protocols.</p> <p>Requires further whole of effluent toxicity testing of comparative samples of brine containing 'clean in place' (CIP) chemicals during commissioning.</p>
2. Potential impacts on marine biological communities through increased density stratification and reduced dissolved oxygen exchange resulting from the discharge of brine.	<p>A 'high' level of ecological protection will be maintained 100 m from the point of discharge and beyond.</p> <p>The residual uncertainty about effects of the predicted near-permanent stratification on dissolved oxygen levels of the water column near the seabed in the far-field can be improved during the commissioning phase.</p> <p>The discharge and diffuser performance will need to be managed to ensure dissolved oxygen levels meet relevant criteria in the far-field (in the HEPA) under the full range of operating conditions.</p>	<p>Condition B4 (Marine Environmental Quality)</p> <p>Establishes the environmental outcomes that must be met.</p> <p>Requires the development and implementation of a COMEMP that sets out how the environmental outcome will be met, including monitoring and evaluation, and remodelling of density stratification and dissolved oxygen concentrations in bottom waters to inform adaptive/pre-emptive management.</p>

2.6 Benthic Communities and Habitats

2.6.1 Environmental objective

The EPA environmental objective for benthic communities and habitats is *to protect benthic communities and habitats so that biological diversity and ecological integrity are maintained* (EPA 2016a).

2.6.2 Investigations and surveys

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to benthic communities and habitats:

- *ASDP impact assessment habitat mapping* (BMT 2018).

The investigations and surveys were generally consistent with the *Technical Guidance: Benthic Communities and Habitats*. (EPA 2016a).

2.6.3 Assessment context – existing environment

The existing environment, including benthic communities and habitats, is described in section 2.5.3.

The EPA has developed a framework for presenting and assessing the impact of a proposal on benthic communities and habitats (EPA 2016a). The EPA has also developed a framework to present and assess impacts on BCH associated with dredging and other turbidity generating activities (EPA 2021e). These frameworks allow impacts to be presented in a consistent manner and within a defined area which facilitates cumulative impact assessments.

The proponent has mapped the benthic communities and habitats within a 54 km² local assessment unit (LAU) and undertaken assessments of the area of predicted permanent loss and the area where some level of non-permanent disturbance to benthic communities and habitats would occur if the proposal was implemented.

The proponent proposed the following:

- there would be no permanent loss of benthic communities and habitats further than 10 m from each of four drilling sites for installing the seawater inlet and brine discharge infrastructure
- there would be no disturbance to benthic communities and habitats outside of defined marine development envelopes associated with installing the seawater inlet and brine discharge structures.

The proponent has also evaluated the predicted permanent loss of benthic communities and habitats associated with this proposal in the context of previously approved losses in the LAU established for this purpose.

2.6.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the response to submissions document (Water Corporation 2023a).

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.6.5, 2.6.6 and 2.6.9.

2.6.5 Potential impacts from the proposal

The construction of seawater intake and brine discharge structures, and the discharge of brine, have the potential to significantly impact benthic communities and habitats.

Impacts of operations (brine discharge) on marine biota, including benthic communities and habitats, could occur through direct toxicity and stress associated with the components of the brine discharge, and indirectly due to oxygen stress that may be associated with water column stratification in the far-field. These pathways of potential impact are considered and assessed under the factor marine environmental quality.

The main pathways of impact associated with construction include direct physical disturbance due to installation of pipelines and intake and outlet structures, and indirectly through the effects of turbidity and sediment deposition associated with construction and installation activities.

2.6.6 Avoidance measures

The proponent has proposed measures to avoid direct and indirect impacts on benthic communities and habitats associated with pipeline installation:

- utilising a tunnel boring machine to install the inlet and outlet pipelines below the seabed, avoiding direct disturbance to, and indirect effects of turbidity and sediment deposition on, benthic communities along the pipeline routes.

2.6.7 Minimisation measures

The proponent has proposed measures to minimise impacts to benthic communities and habitats:

- positioning outlet structures as far as possible from nearest seagrass and macroalgal habitats
- if seagrass and macroalgal habitats are not able to be avoided, permanent losses of benthic communities and habitats will be restricted to within 10 m of the four drilling points
- implementing management measures in accordance with a Construction Marine Environmental Management Plan (Water Corporation 2023d) to ensure the proposal achieves the objective of maintaining biological diversity and ecosystem integrity.

2.6.8 Rehabilitation measures

No rehabilitation measures in relation to this factor were proposed by the proponent.

2.6.9 Assessment of impacts to environmental values

For the purposes of this assessment, the proponent has presented a worst-case scenario that assumes:

- the irreversible loss of all benthic communities within 10 m of the proposed drilling sites required to connect inlet and outlet structures to the relevant pipelines
- disturbance to 8.39 ha of benthic communities and habitats within a defined marine development envelope but considered as reversible or temporary losses.

The EPA notes the avoidance and minimisation measures proposed by the proponent and considers that the construction of the marine infrastructure required to extract seawater and to discharge wastewater can be managed to cause minimal disturbance to benthic communities and habitats. Impacts associated with drilling and associated infrastructure installation activities are likely to be low intensity, localised and of short duration when appropriate management measures, such as those identified in the draft Construction Marine Environmental Management Plan (Water Corporation 2023d), are implemented.

Specific details of the management measures will be developed in consultation with key contractors and set out in Project Execution Plans (PEPs) which will become part of the CMEMP.

The EPA has recommended a condition to prepare a CMEMP that sets out how the irreversible loss of BCH will be restricted to within 10 m of the proposed drilling sites and shall not exceed 0.13 ha in total. It will also require the total area of disturbance to not exceed 8.38 ha and be restricted to the 11.45 ha marine development envelope defined in Figure 2. The draft CMEMP will require approval by the CEO before construction can commence, and the approved CMEMP will have to be implemented.

Residual impacts on benthic communities and habitats

The EPA has assessed the likely residual impacts of the proposal on benthic communities and habitats to be:

- The permanent loss of up to 0.13 ha of benthic communities and habitats due to sediment deposition from drill cuttings and the direct impacts of construction of the intake and out take structures.
- The disturbance of up to 8.39 ha of benthic communities and habitats due to the indirect impacts of construction activities.

The EPA advises that the residual impact to benthic communities and habitats should be subject to implementation conditions to ensure protection of biological diversity and ecological integrity consistent with the EPA objective for benthic communities and habitats.

Cumulative impacts to benthic communities and habitats

An assessment of cumulative impacts of the proposal on benthic communities and habitats was undertaken by the proponent (Water Corporation 2023a) and presented consistent with EPA advice (EPA 2016a). This assessment considered cumulative losses within a defined local assessment unit (LAU) of 5,398 ha. The assessment assumes the LAU originally contained 3752 ha of vegetated benthic communities (comprised primarily of seagrass and macroalgae) with the remaining 2,742 ha categorised as bare sand.

Historical permanent losses within the LAU are confined to 3.3 ha of losses associated with construction of marine infrastructure associated with the Alkimos wastewater treatment plant. When potential impacts associated with the ASDP are added, the combined cumulative loss of benthic communities and habitats within the LAU would amount to 11.45 ha which includes 7.4 ha of bare sand. The total cumulative loss of each of the individual habitat and community types within the LAU is $\leq 0.6\%$. When irreversible losses are taken into account (0.13 ha), consistent with the EPA's Technical Guidelines, the cumulative losses are much smaller.

The EPA advises that the additional impact on benthic communities and habitats associated with implementation of the ASDP proposal is relatively small in area, is readily manageable and will not cause unacceptable impacts to biological diversity and ecological integrity at local and regional scales.

2.6.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts and risks of the proposal on benthic communities and habitats. In doing so, the EPA has considered whether reasonable conditions could be imposed to ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 8.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts and risks will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 8: Summary of assessment for BCH

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1	Impacts to benthic communities and habitats due to construction activities.	The impacts of construction activities can be managed to limit the permanent (irreversible) loss of benthic communities and	Condition A1 (Limitations and extent of proposal)

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
	<p>habitats to within 10 m of each of the 4 drilling points.</p> <p>Non-permanent (recoverable) impacts on benthic communities and habitats can be managed to ensure they are confined to the marine development envelope.</p> <p>The proposal can be implemented without compromising the EPA objective for benthic communities and habitats.</p>	<p>Limit on extent of seabed disturbance</p> <p>Condition B5 (Benthic Communities and Habitats)</p> <p>Limit the extent of:</p> <ul style="list-style-type: none"> irreversible loss of benthic communities and habitats to 0.13 ha any temporary impacts to benthic communities and habitats to be confined to within the marine development envelope.

2.7 Marine Fauna

2.7.1 Environmental objective

The EPA environmental objective for marine fauna is *to protect marine fauna so that biological diversity and ecological integrity are maintained* (EPA 2016a).

2.7.2 Investigations and surveys

The proponent did not undertake any specific surveys for marine fauna, however conducted an online search for species using the EPBC Act Protected Matters Reporting tool. In addition, the following investigations were used to inform the assessment of the potential impacts to marine fauna:

- Alkimos Seawater Desalination Plant Marine Noise Study (Appendix C of the ERD document) (GHD 2022)
- Construction Marine Environmental Management Plan (Appendix A of the response to submissions supporting document) (Water Corporation 2023d)

2.7.3 Assessment context – existing environment

As mentioned in section 2.6, the benthic communities are productive and diverse, supporting a number of recreationally and commercially important finfish, and invertebrate species such as western rock lobster (*Panulirus cygnus*) and Roe's abalone (*Haliotis roei*). The marine waters in the vicinity of the proposed inlet and outlet are used for a range of recreational activities that include primary and secondary contact and harvesting seafood.

The marine waters surrounding the proposal support a variety of fauna, several of which are protected under State and Commonwealth legislation. Conservation significant marine fauna include the (Australian Sea-lion (*Neophoca cinerea*) – 'Vulnerable', Southern Right Whale (*Eubalaena australis*) – 'Endangered' and Humpback Whale (*Megaptera novaeangliae*) – 'Vulnerable'.

2.7.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the proponent's response to submissions document (Water Corporation 2023a). Public submissions raised concerns about impacts to marine fauna from underwater construction noise, impingement and entrainment of commercially valuable species, and concerns about the impact of brine discharge to commercial fisheries of western rock lobster and Roe's abalone.

2.7.5 Potential impacts from the proposal

The proposal has the potential to significantly impact on marine fauna from:

- impact from underwater noise during construction
- direct impacts from vessel strike during construction
- brine disposal affecting marine fauna and marine fauna habitat in the vicinity of the discharge

- introduction of marine species via construction equipment.

2.7.6 Avoidance measures

The proponent has selected the use of a tunnel boring machine to install the inlet and outlet pipelines below the seabed, avoiding higher intensity underwater noise emissions associated with dredging, trenching, and blasting.

2.7.7 Minimisation measures (including regulation by other DMAs)

The proponent has committed to timing marine construction activities to avoid impacts to marine fauna by not undertaking underwater drilling works during the whale migration period (between May and November), where practicable. Recognising that it may not be able to totally avoid the migration period, the proponent has also set out the marine fauna protocols for marine fauna observers and monitoring of exclusions zones to minimise impacts to significant marine fauna.

Matters raised regarding underwater noise during stakeholder consultation have been largely addressed by the proponent's minimisation measures and addressed further by recommended conditions as discussed in sections 2.7.9 and 2.7.10.

Matters raised during stakeholder consultation about the potential impact of brine discharge to commercial fisheries of western rock lobster and Roe's abalone have been discussed further in section 2.7.9 and addressed through the minimisation measures, the environmental outcomes, and recommended conditions in marine environmental quality (section 2.5).

Matters raised during consultation regarding impingement and entrainment are addressed through the proponent's final design which would include velocity caps fitted at the intake structures (such caps convert the water flow from vertical to horizontal) and a screen sizing that would achieve a maximum velocity intake of 0.15 m/s, reducing fish impingement intake of up to 96% of fish species (Water Corporation 2023a).

2.7.8 Rehabilitation measures

Rehabilitation measures are not a relevant mitigation in relation to this environmental factor.

2.7.9 Assessment of impacts to environmental values

The EPA considered that the key environmental values for marine fauna likely to be impacted by the proposal are conservation significant species from underwater noise during construction, and from the brine discharge.

Underwater Noise

Underwater drilling and operation of large construction vessels with large propulsion systems will generate underwater noise during construction, which may either have a physiological impact to an animal's hearing (which is either permanent or temporary) or a behavioural response (such as fleeing or moving away).

The proponent conducted underwater noise modelling to predict the extent of noise propagation during construction. Noise modelling was undertaken for the use of construction vessels such as heavy lift vessels and anchor handler vessels some of which have large positioning propellers.

The noise modelling identified that low frequency cetaceans (for example, humpback whales) would experience permanent injury at 50 m from the noise source, while temporary injury may occur at less than 500 m from noise source.

The predicted zones of impact for behavioural responses varied depending on construction scenarios. Based on the most probable construction scenario low frequency cetaceans may exhibit a behavioural response from 4.5 km and 3.3 km from the noise source during the installation of the intake/outfall structures and vessel transit period, respectively.

The marine construction activities are temporary and short-term and are likely to be manageable. Furthermore, the transit of construction vessels between drilling sites will be of a very short duration (number of days) and hence the risk of vessel strike is low.

As part of the proponent's response to submissions, a literature review was undertaken of potential impacts to western rock lobster and abalone larvae from underwater noise and vibration. This included a review of existing knowledge and understanding of crustacean larvae and abalone sensitivities to underwater noise. Based on its evaluation in the environmental review and the additional review in the proponent's response to submissions, the proponent has concluded any adverse impacts on marine invertebrates from low underwater noise emissions from construction activities are to be highly localised near the proposal, and short lived.

Brine discharge

As identified in the assessment of Marine Environmental Quality (section 2.5), there are potential impacts to marine fauna due to toxicity and/or osmotic stress from the discharge of brine. The proponent has undertaken a review of existing knowledge about tolerances of marine fauna (including commercially important species such as western rock lobster and Roe's abalone) to predicted changes in salinity, dissolved oxygen, and temperature. The proponent concluded that the predicted changes outside the LEPA are within the tolerances of temperate marine fauna.

In relation to toxicity effects, the proponent predicted that any 'clean in place' chemicals used at the plant will be used intermittently and at low concentrations and therefore CIP is unlikely to be detectable within the LEPA.

The proponent's overall prediction that discharge of brine will have no impacts on marine fauna assumes that the toxicity of the brine would be managed to achieve the 99% species protection at the LEPA boundary and that any stratification-induced depressions in DO levels would be spatially and temporally localised and not severe enough to adversely affect marine fauna.

The level of confidence in the assumptions and management of the discharge against the environmental outcomes is discussed in detail in section 2.5 under MEQ. In summary, the EPA has noted the level of uncertainty with respect to the number of dilutions required to achieve a high level of ecological protection for brine containing CIP chemicals and has recommended conditions to improve the level confidence during the commissioning phase and inform management during the operations phase. As indicated, to protect marine fauna communities, it is important that the discharge and diffuser performance is managed to ensure sufficient dilutions to achieve the 99% species protection levels determined through whole of effluent testing and under the full range of operating conditions.

2.7.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on marine fauna environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 9.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 9: Summary of assessment for marine fauna

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1	Potential impacts to marine fauna during construction from underwater noise and vessel strike.	<p>Marine construction activities that have the potential to impact marine fauna (e.g. underwater drilling and operation of large anchor handling vessels) will be short-term, temporary and any impacts are likely to be localised.</p> <p>The proponent has incorporated fauna observation protocols into a preliminary Marine Mammal Management Plan to minimise impacts during construction.</p> <p>Implementation of the marine fauna protocols will mean that the environmental outcome consistent with the EPA factor objective for marine fauna if subject to recommended conditions.</p>	<p>Condition B6 (Marine fauna)</p> <p>Implementation of measures to achieve the objective including establishing marine fauna exclusion zones, noise management measures, and fauna observations and reporting.</p>

Residual impact or risk to environmental value	Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
<p>2. Potential impacts to marine fauna due to toxicity and/or osmotic stress resulting from the discharge of brine.</p>	<p>As identified in the assessment of Marine Environmental Quality (MEQ), a high level of ecological protection will be maintained 100 m from the point of discharge.</p> <p>There is a level of uncertainty regarding the number of dilutions required to achieve a high level of ecological protection for brine containing 'clean in place' chemicals.</p> <p>The discharge and diffuser performance will need to be managed to ensure sufficient dilutions to achieve the 99% species protection levels determined through whole of effluent testing and under the full range of operating conditions.</p>	<p>Condition A1 (Limitations and extent of proposal)</p> <p>Condition B6</p> <p>As discussed in section 2.5, the requirements in condition B6-1 for Marine Environmental Quality will ensure the environmental outcome is consistent with EPA factor objective for marine fauna.</p>

2.8 Greenhouse Gas Emissions

2.8.1 Environmental objective

The EPA environmental objective for greenhouse gas (GHG) emissions is *to reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.*

2.8.2 Potential emissions from the proposal

The proposal will produce GHG emissions from:

- vegetation clearing
- plant and equipment used in construction activities for the development of the desalination plant, the marine tunnels and pipelines and the terrestrial pipeline
- use of electricity from the South West Integrated System (SWIS) during the commissioning phase and ongoing operations for activities such as water treatment and clear-water pumping.

The *Environmental Factor Guideline – Greenhouse Gas Emissions* (EPA 2020a) provides that, generally, GHG emissions from a proposal will be assessed where they exceed 100,000 tonnes of scope 1 emissions each year measured in tonnes of CO₂-e. This is currently the same as the threshold criteria for designation of a large facility under the Australian Government's *Safeguard Mechanism*.

For this proposal scope 2 emissions during the construction and operation phases account for the greatest GHG emissions. The proponent has acknowledged this and committed to having zero net GHG emissions during all phases of the proposal. In light of the proponent's commitment regarding scope 1 and 2 emissions and noting the EPA's approach to assessing GHG from the Southern Seawater Desalination Project, the EPA decided Greenhouse Gas Emissions would be assessed as a key environmental factor.

Estimates of scope 2 emissions are based on the electricity needs of the proposal and the projected GHG emissions intensity of the SWIS.

The proponent has provided the following estimates of GHG emissions:

- scope 1 and 2 during construction: up to 36,214 tCO₂-e
- scope 1 and 2 during commissioning: up to 40,674 tCO₂-e
- scope 1 and 2 during operation: up to 169,318 tCO₂-e per annum (commencing in 2028, annual emissions are projected to decrease overtime with Government's priority to reduce emission intensity in the South West Interconnected System (SWIS) GHG to net-zero by 2050)
- scope 3 involving purchased goods and capital, indirect fuel and electricity emissions and waste: 14,615 tCO₂-e per annum
- total scope 1 and 2 GHG emissions of 2,047,573 tonnes CO₂-e over the life of the project. This estimate includes the projected reduction in the emissions

intensity in the SWIS, over the year life of the proposal (100 years operation, plus 5 years construction and commissioning).

For the purposes of benchmarking the proposal against comparable projects, the proponent has benchmarked the GHG emissions intensity (emissions per unit of production) of the ASDP with other local and national Australian facilities (Table 12 of the GHGMP) and international facilities (Table 13 of the GHGMP), excluding clearwater pumping (distribution of water product to the distribution network)³. The proponent estimates an energy intensity of 3.3 kWh/kL when operating at its full capacity of 100GL/yr. This is comparable with energy intensities of other facilities.

2.8.3 Consultation

Consultation on the proposal raised issues about greenhouse gas emissions remaining unmitigated due to ineffective monitoring and compliance to demonstrate net-zero emissions.

2.8.4 Minimisation measures (including regulation by other DMAs)

The proponent has identified the following measures to minimise GHG emissions:

- locating the plant in close proximity to targeted consumers in Perth's northern suburbs
- reducing GHG emissions through selection of efficient design and equipment technologies such as:
 - optimising gravity flow in the design of the intake and outfall and treatment processes to minimise energy use
 - selecting pipeline diameters and lengths to optimise flow velocities and energy use
 - lowering the land elevation of the plant site to reduce energy used in pumping
 - using energy recovery devices (ERI PX® Pressure Exchanger) which recover energy from the concentrate stream and apply this recovered energy to the feed stream of the reverse osmosis process (as used by the proponent at the Southern Seawater Desalination Plant)
 - by co-locating the groundwater treatment plant so that blending of groundwater in the permeate process providing excess alkalinity and therefore reducing embodied energy in alternative chemical consumption
 - general energy efficient lighting, equipment and installing rooftop solar
- implementing the Alkimos Seawater Desalination Plant Greenhouse Gas Management Plan (GHGMP). The proponent submitted version September 2022) of the GHGMP with its ERD. During the assessment process, the EPA encouraged the proponent to revise and improve the GHGMP. The proponent submitted a revised GHGMP (Revision 3 February 2023), which the EPA has

³ Clearwater pumping has only been excluded for benchmarking purposes to resolve issues with variables across different facilities such as in distance and elevation that changes the energy consumption. Clearwater pumping remains included within annual and total GHG emissions estimates.

used as the basis for its assessment. Both versions of the GHGMP are available on the EPA website.

The proponent advises that at this stage there is minimal scope for further improvements in increasing energy efficiencies because its energy recovery device technology is already highly efficient. Going forward, the proponent expects continual improvement and efficiencies are more likely to be achieved by future membrane technology improvements and application of artificial intelligence to plant operation and optimisation, once its available, in the future.

The GHGMP includes: a commitment to achieve net-zero emissions for construction and operations by undertaking the following:

- For Scope 2 emissions – providing renewable energy to the SWIS over and above the independent SWIS emission reductions achieved. By providing renewable energy to the SWIS the proponent aims to achieved net zero scope 2 GHG emissions for operations. To demonstrate this, the proponent proposes to acquire and surrender Large-scale Generation Certificates (LGCs).
- For Scope 1 emissions – providing offsets (Australian Carbon Credit Units (ACCUs)) for 100% of Scope 1 emissions that have not been otherwise mitigated. The proponent has advised that ACCUs are currently being generated through vegetated offset projects (for example, pines plantations). At this stage, the proponent expects the projects to generate up to 24,000 ACCUs per annum from 2022 to 2047. Only a small proportion of the annual GHG emissions (estimated 421 t CO₂-e) are proposed to be offset using ACCUs, the remainder will be using LGCs.

The EPA advises that any offsets which may be required to be surrendered at the first reporting period (2030) and then every five years until the proposal is fully implemented, should demonstrate they meet offset integrity principles and be based on clear, enforceable, and accountable methods. This applies to the use of both LGCs and ACCUs. The EPA's guidance on GHG emissions (EPA 2020a) currently recognises that Australian Carbon Credit Units (ACCUs) issued under the Commonwealth *Carbon Credits (Carbon Farming Initiative) Act 2011* (the Act) as meeting these standards.

ACCUs are administered by the Clean Energy Regulator and assured by the Emissions Reduction Assurance Committee (ERAC), an independent statutory committee which assesses ACCUs compliance against the Offsets Integrity Standards set out in section 113 of the Act. The EPA notes that in response to recent concerns raised about the methodology used to verify some of the ACCUs, the ERAC has conducted a review, and the Commonwealth Government has conducted a further review. The EPA considers that by the time any offsets are required to be surrendered under the recommended conditions (2030 at the earliest), there is likely to be sufficient assurance that ACCUs meet the Offsets Integrity Standards set out in section 113 of the Act.

2.8.5 Assessment of impacts to environmental values

There is an established link between GHG emissions and the risk of climate change. The EPA recognises that climate change will impact on Western Australia's environment and environmental values. For example, climate change has already caused a significant drying of the State's south-west, which in turn places significant additional pressures on water resources, flora and fauna, marine environmental quality, and social surroundings. The EPA therefore considers GHG emissions to be a key environmental factor in the assessment of the proposal.

The annual estimated scope 1 and 2 GHG emissions (with mitigation) from the proposal would, at commencement, constitute approximately 0.21% of Western Australia's total emissions (based on 2020 emissions data) (DCCEE 2022). As mentioned above, it is estimated that annual operational emissions would continue to decrease based on the projected trends for the emissions intensity of the SWIS.

The GHG Guideline recognises that Western Australia's GHG emissions are expected to continue to increase in the short- to medium-term. However, in the meantime, the objective of the GHG Guideline is *to reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change*.

The EPA notes that the GHG Guideline does not mandate net zero emissions over the life of a proposal. Rather, its objective is reduction of emissions having regard to the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement and the Intergovernmental Panel on Climate Change's (IPCC) 1.5 report which recommend achievement of net zero emissions by 2050. When assessing proposals where greenhouse gas emissions are a key environmental factor, the EPA therefore usually considers a proposal's annual and total contributions to GHG emissions, but also assesses the proponent's contribution and trajectory towards this net zero by 2050 goal.

The intent of the EPA's GHG Guideline is to inform the development and assessment of proposals, not determine the outcome of the EPA's assessment. Consistent with this, the EPA assesses proposals where GHG emissions are a key environmental factor on a case-by-case basis and recognises that a flexible approach is important to drive innovation and improvement in best practice technologies.

In relation to the proposal, the EPA had particular regard to annual and total contributions to GHG emissions (see above); the projected emissions intensity of the proposal and the SWIC (including by considering industry benchmarking); whether the proponent has committed to achieving reduction targets over time in accordance with a linear trajectory (based on 5 yearly targets) to achieve net zero by 2050 (in this case by also accounting for the energy reduction achieved by the decarbonisation of the SWIS); the proponent's commitment to achieving net zero scope 1 and 2 emissions from commencement of the proposal; whether it has incorporated continual improvement; transparency and reporting; and whether it has considered offsetting emissions.

In considering these, the EPA has noted:

- the proponent's benchmarking assessment, which found that its projected GHG emissions are comparable against similar operating facilities in the world.
- the proponent's consideration of best practice design to reduce emissions
- the proponent's commitment to net zero Scope 1 and 2 greenhouse gas emissions from commencement of the proposal through avoidance, minimisation, and offsetting.

The GHG Guideline acknowledges GHGs from a cumulative range of sources may have an impact on WA's environment, even if the specific impact of a particular proposal's emissions may not be known with certainty. In response to this, and to minimise cumulative impacts to WA's environment, the GHG guideline therefore generally applies to proposals emitting greater than 100,000 tonnes CO₂-e per annum of scope 1 emissions, so the GHG Guideline's objective to reduce emissions can be applied to those particular proposals. The EPA's consideration of the GHG Guideline in its assessment of this proposal therefore means the impact of cumulative emissions on WA's environment have been taken into account for this proposal.

2.8.6 Consideration of conditions

The EPA believes it is reasonable to recommend condition B-7 which requires the proposal to achieve net zero GHG emissions during operations, which is when estimated combined scope 1 and 2 emissions exceed 100,000 tonnes CO₂-e per annum. Based on the commitments made by the proponent to provide additional renewable energy to the SWIS by 2028 (over and above the independent SWIS emissions reduction being achieved), the EPA is confident that this outcome can be met.

The EPA also believes it is reasonable to recommend the proponent update the GHGMP (Revision 3 2023), before commissioning to incorporate more specific avoidance and minimisation measures following detailed design and contractor procurement. The proponent would then be required to implement the revised plan and also, subject to continuous improvement by going through ongoing 5-yearly reviews. The reporting will include annual and 5-yearly calculations (based on actual emissions intensity of the SWIC) and detail the method and timing for the surrendering of LGCs and offsets to meet the proponent's commitments. Conditions relating to reporting, audits, peer reviews, timing for surrendering of LGCs and offsets and summary plans and reports are also recommended to increase transparency and continuous improvement of the proposal's GHG emissions and emissions intensity.

The EPA notes that the science and policy of GHG emissions and climate change are rapidly evolving. The EPA advises the GHG conditions are expected to be able to be responsive to this, particularly by enabling reviews of the GHGMP to reflect any significant changes (for example, if there are material changes to relevant State, Commonwealth or international GHG science or policy). The EPA also notes the Minister can direct the EPA to inquire into Ministerial Statement conditions (including GHG conditions) at any time.

The EPA believes the GHG conditions it is recommending will be responsive enough to take account of changes in this evolving area as well as provide the need for innovation and improvement in best practice technologies. The conditions are also consistent with the current GHG Guideline which is based on a continuous improvement approach to emissions reduction.

2.8.7 Summary of key factor assessment and recommended regulation

The EPA has considered whether the residual emissions from the proposal are consistent with the principles of the EP Act (see Appendix C) and with the EPA factor objective for GHG emissions.

In doing so, the EPA has also considered whether reasonable conditions could be imposed to reduce potential inconsistency with the EP Act principles and EPA's factor objective.

The EPA summary findings are in Table 10.

The EPA advises that, with the application of the recommended conditions, and the proponent's adoption of efficient technology, continuous improvement, and commitment to delivering net zero greenhouse gas emissions for scopes 1 and 2 emissions, the proposal is generally consistent with the EPA's GHG Guideline.

Table 10: Summary of assessment for greenhouse gas emissions

Residual emissions		Assessment finding	Recommended conditions and DMA regulation
1.	<p>Construction scopes 1 and 2: up to 36,214 tCO₂-e.</p> <p>Commissioning scopes 1 and 2: up to 40,674 tCO₂-e.</p> <p>Operations scopes 1 and 2 up to 169,318 tCO₂-e per annum (expected to commence in 2028). Annual emissions are then projected to decrease overtime in line with a gradual reduction in the emission intensity in the South West Interconnected System (SWIS), i.e. GHG to net-zero by 2050.</p> <p>GHG emissions contribute to climate change, which impacts on WA's environment.</p>	<p>2,047,573 tonnes scope 1 and 2 GHG emissions CO₂-e over 100 years.</p> <p>The following aspects of the proposal are generally consistent with the GHG Guideline (where relevant):</p> <ul style="list-style-type: none"> commitment to achieving net zero emissions for Scopes 1 and 2 emissions continuous improvement approach use of efficient technology benchmarking that projected GHG emissions are 	<p>Condition B7 (Greenhouse Gas emissions)</p> <ul style="list-style-type: none"> require achievement of and reporting on net zero emissions throughout the operations phase require revision and implementation and review of the GHGMP. <p>Complementary reporting requirements to the Clean Energy Regulator to comply with the <i>National Greenhouse and Energy Reporting Act 2007</i> (NGER Act).</p>

Residual emissions		Assessment finding	Recommended conditions and DMA regulation
		expected to be comparable in emissions intensity of similar seawater desalination plants.	

3 Holistic assessment

While the EPA assessed the impacts of the proposal against the key environmental factors and environmental values individually in the key factor assessments above, given the link between Flora and Vegetation, Terrestrial Fauna, Landforms, and Social Surroundings and between Marine Environmental Quality, Benthic Communities and Habitat and Marine Fauna, the EPA also considered connections and interactions between them to inform a holistic view of impacts to the whole environment.

Figure 5 illustrates the connections and interactions between the key environmental factors and the relevant other environmental factors described in Appendix D, to inform the EPA's holistic assessment.

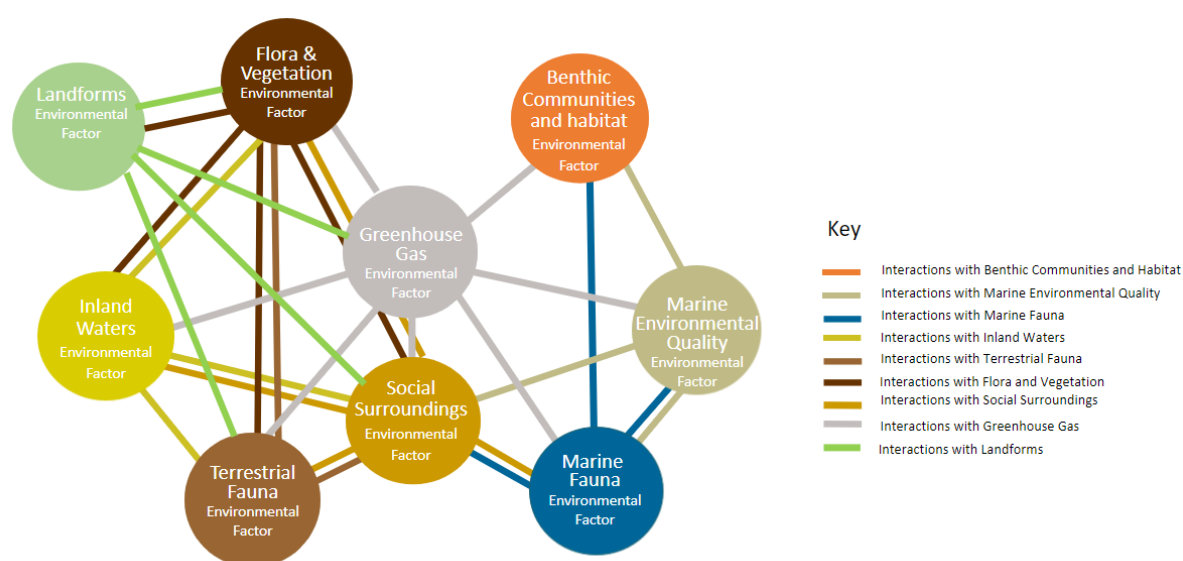


Figure 5: Intrinsic interactions between environmental factors

Benthic Communities and Habitat – Marine Environmental Quality – Marine Fauna

There is a recognised and established scientific link between impacts to marine environmental quality and the condition of the environment for benthic communities and habitat and marine fauna. Avoiding and minimising significant turbidity, stratification, and sedimentation effects during pipeline construction, and therefore maintaining the quality of marine waters is important in protecting the ecosystem health of environmental factors such as Benthic Communities and Habitat. This in turn supports other environmental values and beneficial uses for marine fauna such as whales, fish species, and invertebrates which rely on good marine water quality and healthy benthic communities and habitat.

The EPA also considers that by limiting the extent and timing of construction activities (installation of inlet and outlet pipelines), and the type of tunnelling

proposed, the proponent has avoided significant environmental impacts to Marine Fauna and Benthic Communities and Habitats.

The EPA considers that the proposed mitigation and management measures and recommended conditions for impacts to marine environmental quality will also mean the inter-related impacts to the health of other factors of the environment including the values associated with marine fauna and benthic communities and habitat are likely to be consistent with the EPA environmental factor objectives.

Landforms - Flora and Vegetation – Terrestrial Fauna

There is a high level of connectivity between the environmental factors of Flora and Vegetation, Landforms, and Terrestrial Fauna. The flora and vegetation, which includes regionally significant native vegetation, provides stabilisation of the dune formations and habitat for threatened fauna, including Carnaby's cockatoo and forest red-tailed black cockatoo.

The EPA considers that the proposed mitigation and management measures, and recommended conditions to achieve the environmental outcomes, and offsetting of significant residual impacts to flora and vegetation will also mean the inter-related impacts to other environmental factors, including the values associated with Terrestrial Fauna and Landforms, will be consistent with the EPA environmental factor objectives.

Social Surroundings

There is a direct link between Aboriginal culture and the physical or biological aspects of the environment. Access to land, ability to carry out traditional Aboriginal customs and areas of cultural importance may be impacted through impacts to environmental factors of Flora and Vegetation, Terrestrial Fauna, and Landforms.

The EPA considers that the proposed mitigation and management measures and recommended conditions related to flora and vegetation, terrestrial fauna and landforms values will also mean the inter-related impacts to the values of social surroundings will likely be consistent with the EPA environmental factor objectives.

Greenhouse Gas Emissions

There is an established link between GHG emissions and the risk of climate change. The EPA recognises that climate change will impact on Western Australia's environment and environmental values.

GHG emissions have the potential to impact on all other environmental factors through the effects of climate change.

The EPA considers that the proposed mitigation conditions to regulate GHG emissions will also mean that the impacts to other factors and values of the environment including the values associated with Flora and Vegetation, Marine Environmental Quality and Social Surroundings are likely to be consistent with the EPA environmental factor objectives.

Cumulative impact

This proposal will result in further fragmentation of fauna habitats and conservation significant ecological communities, and these cumulative impacts should be avoided, and assessed when avoidance is not possible.

The EPA has assessed the cumulative effects by considering the impacts of the proposal, and other projects in the local area, including the nearby Yanchep Rail Extension Part 1 and Part 2 projects.

The EPA notes that on a bioregional scale, implementation of this proposal would contribute to cumulative impacts through fauna habitat loss, and conservation significant community loss. However, the impacts are not to a level that would alter the likely environmental outcomes for the species or communities.

Summary of holistic assessment

When the separate environmental factors and values affected by the proposal were considered together in a holistic assessment, the EPA formed the view that the impacts from the proposal would not alter the EPA's views about consistency with the EPA's factor objectives as assessed in section 2.

4 Offsets

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual impacts of a proposal.

Consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014), the EPA may consider the application of environmental offsets to a proposal where it determines that the residual impacts of a proposal are significant, after avoidance, minimisation and rehabilitation have been pursued.

In the case of this proposal, likely significant impacts are:

- clearing of vegetation associated with the following conservation significant ecological communities:
 - 1.03 ha of the *Melaleuca huegelii* - *Melaleuca systema* shrublands on limestone ridge FCT26a (endangered BC Act)
 - 1.7 ha of the Banksia woodlands of the Swan Coastal Plain ecological community (endangered EPBC Act, P3 BC Act)
 - 1.16 ha of the Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain (critically endangered EPBC Act, P3 BC Act)
- clearing of 5.7 ha of regionally significant native vegetation within Bush Forever sites
- clearing of 52.1 ha high quality foraging habitat for Carnaby's cockatoo and 49.8 ha of high-quality foraging habitat for forest red-tailed black cockatoo
- loss of 104 black cockatoo trees including 96 trees with the potential to develop hollows and eight with suitable hollows.

Environmental offsets are not appropriate in all cases. In this case the EPA considers offsets are appropriate given:

- the proponent has sought to avoid, minimise, and rehabilitate impacts to environmental values wherever possible (principle 1 of the WA Environmental Offsets Policy)
- magnitude of the likely significant residual impacts on environmental biodiversity values (principle 2 of the WA Environmental Offsets Policy).

Proposed offsets

The proponent has proposed five specific offsets, as detailed in its Offset Strategy Revision 4 (Water Corporation 2023g):

1. Provision of 5.98 ha of Banksia Woodlands community within a site owned by the proponent near Eglington (Eglington stie).
2. Provision of 3.1 ha of vegetation likely to be representative of Melaleuca Shrubland TEC within a site owned by the proponent in Carabooda (Carabooda Tank site).

3. Provision of 4.91 ha of Tuart Woodlands community within a site owned by the proponent within the Alkimos Water Precinct (Alkimos site).
4. Provision of up to 449 ha of existing black cockatoo foraging and potential breeding habitat, 70 ha of habitat revegetation and provision of 25 artificial nesting hollows (Neergabby sites).
5. Contribution of funding (of up to 10% of required offsets) to Edith Cowan University for a black cockatoo research program.

The proponent's draft Offset Strategy Revision 2, August 2022 (Water Corporation 2023f) was advertised during the public review period. Advice from DBCA was sought on the adequacy of the draft Offset Strategy Revision 2, August 2022 (Water Corporation 2022a) and draft Offset Strategy Revision 3, December 2022 (Water Corporation 2022b). The respective DBCA advice was received on 25 October 2022 and 6 February 2023.

Revisions 2 and 3 of the Offset Strategy did not include the Neergabby sites or contribution to research listed above. The EPA advised the proponent that land acquisition of intact habitat without revegetation of degraded lands was unlikely to be able to counterbalance the proposed loss of habitat for black cockatoos on the northern Swan Coastal Plain. A further revision of the Offset Strategy was submitted (Revision 4 April 2023) (Water Corporation 2023g).

The EPA considers that Revision 4 contained sufficient information to finalise its assessment. Revision 4 of the Offsets Strategy was published with the response to submissions documentation. The main changes between Revisions 3 and 4 of the Offset Strategy were:

- the provision of an alternative land acquisition site and revegetation of habitat at a site nearby the proposal (Neergabby) to counterbalance impacts to black cockatoos
- the inclusion of a research offset for black cockatoos.

The EPA has considered whether the proposed offsets are likely to counterbalance the significant residual impacts. The EPA's view is that offsets could not be finalised and secured as part of the assessment mainly because the proponent is still in the process of finalising purchase and undertaking biological surveys of the two privately-owned lots at Neergabby. This is consistent with principle 4 of the WA Offsets Policy that environmental offsets will be based on sound environmental information and knowledge. The challenges of counterbalancing impacts to black cockatoo habitat on the northern Swan Coastal Plain are further discussed in section 7 (Other Advice).

Notwithstanding the above, the EPA considers it received sufficient information both within the draft Offset Strategy Revision 4 (Water Corporation 2023g) and obtained through its own investigations and inquiries to be confident that suitable offsets are available to counterbalance impacts. The EPA has recommended condition B8 which would require further revision to the Offset Strategy prior to the commencement of ground disturbance for the proposal. Condition B8 would also require the proposal is implemented to meet several environmental outcomes and

objectives designed to ensure significant impacts are counterbalanced. Further to this, an Offset Environmental Management Plan is required to detail proposed on-ground management (such as weed control, fencing, rubbish removal and revegetation of degraded areas) and completion criteria that would result in tangible environmental benefits to the values being offset.

The key issues raised during the EPA's assessment of offsets and how they have been considered are described further below.

Assessment of proposed offsets

Land acquisition and on-ground management offsets for TECs/PECs and Bush Forever sites

The proponent proposed land acquisition sites and on-ground management at three sites to counterbalance the significant residual impacts to the threatened and priority ecological communities Banksia Woodlands community, Tuart Woodlands community and Melaleuca Shrubland TEC, and Bush Forever sites.

Banksia Woodlands community and Bush Forever offset

The proponent is proposing a land acquisition site in Eglinton, about 2.5 km from the impact site. The Eglinton site is owned by the proponent and zoned Public Purpose under the MRS. The site is proposed to fully counterbalance significant residual impacts to 1.7 ha of Banksia Woodlands community and 5.7 ha of regionally significant bushland associated with Bush forever sites.

In assessing the suitability of this offset and consistent with principle 5 (based on sound environmental information), the EPA notes that the vegetation at the site has been surveyed by Ecoscape (2018) to confirm it contains vegetation representative of the Banksia Woodlands community in mostly 'Good' or better condition. The proponent is proposing general on-ground management including weed control, rubbish removal, and access management.

A direct offset of a 7 ha portion of the 20 ha site is proposed to fully offset impacts to Bush Forever sites. Within the 7 ha site, 5.98 ha on the western side is representative of the Banksia Woodlands community and proposed to fully counterbalance the impacts to this value. The EPA therefore notes the proponent's consideration of principle 3 (offsets are relevant) and considers that the values of the Eglinton site are relevant to the environmental values being impacted.

In considering the suitability of this site and offset principle 6 (longer-term strategic outcomes) the EPA notes the offset is strategically located given its south-west boundary adjoins a sizable 'Parks and Recreation' reserve, providing protection from future edge effects and increasing the likely long-term resilience of the vegetation. The EPA notes the proponent proposes to secure the site through a conservation covenant, increasing the size of protected vegetation within the constrained and rapidly developing suburb of Eglinton.

While the proponent proposed to counterbalance 9.42 ha of impact to Bush Forever sites, the EPA has assessed the significant residual impacts to be 5.7 ha of regionally significant bushland within Bush Forever sites. This is consistent with WA offset principle 2 in that offsets are not applied to minor environmental impacts. Consistent with WA offset principle 2 (offsets are relevant and proportionate) and previous EPA assessments, the EPA advises that offsets should provide at least 2:1 of equivalent vegetation communities and/or complexes to achieve the same vegetation condition as those being impacted. Therefore, the EPA has recommended condition B8-2 to ensure this environmental outcome is met.

The EPA therefore considers it is likely that the Eglinton site would provide a suitable offset for Banksia Woodlands community and Bush Forever.

Tuart Woodlands TEC/PEC offset

The proponent is proposing a site at Alkimos which it owns freehold and zoned partly Public Purpose and partly Urban-deferred. This site is within the Alkimos Water Precinct, directly south of the plant DE and area 10b and is proposed to counterbalance impacts to Tuart Woodlands community. In considering the suitability of this site, the EPA notes the 9 ha site contains native vegetation mostly in 'Good' condition with small pockets of degraded areas and 4.91 ha of vegetation associated with the Tuart Woodlands community (Stantec 2021).

The proponent proposes to secure the site through a conservation covenant and undertake on-ground management including rehabilitation of degraded areas, controlling threats such as weeds, and general environmental management to improve the Tuart Woodlands community values of the site. The EPA considers these offset measures would result in a conservation benefit to the environmental values being offset, particularly the potential gains in vegetation condition.

Melaleuca Shrubland TEC offset

The proponent has proposed a site in Carabooda zoned Public Purpose under the MRS which it owns freehold. The Carabooda site directly adjoins the pipeline DE so is close to the proposed impacts. The 32 ha site comprises an existing operational area (tank infrastructure), and remnant vegetation ranging in condition from 'Good' to 'Excellent', including species-rich thickets, heaths and scrubs dominated by *Melaleuca huegelii*, *Melaleuca systema* and *Banksia sessilis* commonly over *Grevillea preissii* and *Acacia lasiocarpa*.

The proponent proposes a direct offset of 3.1 ha to counterbalance impacts to Melaleuca Shrubland TEC. The Stantec survey (2021) indicated that Melaleuca Shrubland TEC is likely to be present at the site given its affiliation with the vegetation type along with the presence of limestone outcropping. The survey also indicated that the vegetation at the site is in excellent condition. A spring survey is planned to be undertaken in 2023 to confirm the presence and extent of the TEC values by way of floristic community type analysis.

In considering the likely suitability of this proposed offset site, principle 4 (based on sound environmental information), and based on advice received the EPA considers

it is likely that values commensurate with the Melaleuca Shrubland TEC are present at the site; however, recommends condition B8-3 to require more detailed survey information to be submitted with the revised Offset Strategy to confirm the presence of the Melaleuca Shrubland TEC.

In summary and consistent with offset principle 3 (offsets are relevant), the EPA considers that the values of the land acquisition sites at Alkimos, Eglinton and Carabooda are relevant given they contain, or are likely to contain, the relevant environmental values being impacted and are in close proximity to the impact site.

Consistent with principle 6 (longer-term strategic outcomes) the EPA advises the sites would likely provide a conservation benefit to the environmental values being impacted through the implementation of on-ground management and transfer to protected tenure. In considering principles 3 (offsets are proportionate) and 4 (based on sound environmental information) the EPA advises that further information to demonstrate offsets are proportionate and contain sufficient values is required prior to allowing ground disturbance and to the requirements of condition B8-3. In particular, further technical surveys at the Carabooda tank site would be required. The EPA has also recommended condition B8-3 (offset environmental management plan) to ensure offsets and associated on-ground management are implemented within an adaptive management framework (principle 5) to achieve the intended long-term environmental outcomes.

Through its assessment of proposed offsets and based on the information received during the assessment, the EPA considers that the proposed land acquisition sites are likely to contain environmental values of a quality and extent that would ensure the significant residual impacts of the proposal to TEC/PECs and Bush Forever can be counterbalanced. The EPA has therefore recommended conditions to meet specific environmental objectives and outcomes through recommended conditions B8-1 and B8-2; and submission of a revised Offset Strategy in accordance with recommended condition B8-3.

Offsets for black cockatoos

Land acquisition and on-ground management

The proponent has proposed a combination of land acquisition, installation of artificial nesting hollows and revegetation of degraded lands to counterbalance the significant residual impacts to black cockatoos. Two privately-owned lots in Neergabby, about 37 km north of the proposal, have been proposed for acquisition. The EPA understands that negotiations for acquisition are well advanced.

The proponent's biological survey of the sites confirmed they are likely to contain potential breeding habitat for black cockatoos, with 420 trees with DBH of greater than 500 mm, and 58 hollows, 10 that are potentially suitable for breeding, recorded (360 environmental/SLR 2023a). Proportionate to the impact to 96 potential nesting trees and eight suitable nesting trees (principle 3), the EPA notes that the proposed offset at Neergabby would result in the protection of more than three times the number of potential nesting trees.

While the survey did not formally assess and score the quality of foraging habitat values at the sites in accordance with Commonwealth guidelines (DAWE 2022), the EPA considers that it provided a broad qualitative assessment of the existing intact vegetation indicating that it likely contains black cockatoo foraging habitat in good condition. Further to this, the proponent advised that preliminary biodiversity surveys undertaken by the DBCA indicate the two Neergabby sites contain up to 449 ha of Banksia Woodlands community vegetation in excellent condition, which is likely to provide high-quality foraging habitat for black cockatoo species.

The EPA advises that consistent with WA Offset Policy principle 3 (relevant and proportionate), the sites are likely to contain the relevant environmental values and sufficient extent for the purposes of counterbalancing the significant residual impact. However, in considering principle 4 (based on sound environmental information) the EPA has recommended condition B8-3 to ensure the values are confirmed in a revised Offset Strategy prior to ground disturbance.

The proponent has also proposed to revegetate 70 ha of degraded areas at the Neergabby sites to provide replacement habitat for black cockatoos. Other proposed on-ground management includes fencing, weed control, installation of artificial hollows and feral bee control to enhance and improve the environmental values relevant to black cockatoos at the Neergabby sites. In considering principle 3 (relevant and proportionate) of the WA Offset Policy, the EPA considers that the provision of 70 ha of revegetation of habitat would partially counterbalance the significant residual impacts to black cockatoos. Importantly, revegetation would provide additional habitat on the northern Swan Coastal Plain where cumulative effects of habitat loss are impacting black cockatoos, particularly Carnaby's cockatoo.

In considering the suitability of this offset and the principles of the WA Offset Policy, the EPA advises that the acquisition and enhancement of the Neergabby sites through revegetation and on-ground management would likely counterbalance the significant residual impacts to the two species of black cockatoo from this proposal. This combined approach of offset measures addresses the EPA section 16j advice (2019) as it provides both a short-term benefit through land acquisition and installation of artificial hollows, and a longer-term benefit through the replacement of habitat (typically within 7 to 10 years for non-breeding foraging habitat).

The EPA advises, consistent with the EPA's section 16j advice, that this is a more sustainable long-term approach to offsets than simply acquiring high-quality habitat as "a net loss of biodiversity will occur if offsets seek only to protect existing, high-quality assets, rather than restoring degraded ecosystems and functions" (EPA 2019 p. 17). This is also consistent with WA Offset Policy principle 6, that environmental offsets should be focused on longer-term strategic outcomes.

In considering the EPA's section 16j advice (EPA 2019) and the regional significance of the proposal's significant residual impacts to black cockatoos on the northern Swan Coastal Plain, the EPA advises revegetation of replacement habitat should occur close to the impacts and has therefore recommended condition B8-2(3) to require the proponent revegetate at least 70 ha to provide foraging habitat for the two black cockatoo species.

The EPA considers that the proposed combination of land acquisition, on-ground management, and revegetation of 70 ha of foraging habitat relatively close to the impact site to be an appropriate strategy to counterbalance the proposal's significant residual impacts to black cockatoos.

The EPA therefore recommends the environmental outcomes in conditions B8-1 and B8-2 to ensure the significant residual impacts to black cockatoos are counterbalanced. The revised Offset Strategy required by condition B8-3 would need to demonstrate that the environmental outcomes and objectives will be met.

Research offsets

The proponent has proposed to contribute funds to Edith Cowan University (ECU) for black cockatoo research. To align with the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*, the proposed funding would equate to no more than 10% of the required offsets for black cockatoos.

Consistent with the WA Offset Policy, the EPA advises that research should be considered to add value to the outcomes of on-ground management and scientific understanding of the environmental value being offset. In this case, the EPA considers that black cockatoo research would contribute to counterbalancing the significant residual impacts of the proposal by addressing knowledge gaps and providing long-term environmental outcomes for the two black cockatoo species. The EPA advises that combining the long-term environmental outcomes of research with the short- to longer-term outcomes of land acquisition, revegetation and on-ground management is the preferred approach as this would likely provide a more holistic counterbalance of impacts.

The EPA has recommended condition B8-3(8) and condition B8-6 to ensure any proposed research program would meet the requirements for research offsets applied under the EP Act (that is, to improve environmental protection and on-ground management) and ensure positive conservation outcomes are delivered for the values being offset.

5 Matters of national environmental significance

The Commonwealth Minister for the Environment has determined that the proposal is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as it is likely to have a significant impact on one or more MNES. It was determined that the proposed action is likely to have a significant impact on the following matters protected by the EPBC Act:

- listed threatened species and communities (s. 18 and s. 18A)
- listed migratory species (s. 20 and s. 20A).

The EPA has assessed the controlled action on behalf of the Commonwealth as an accredited assessment under the EPBC Act.

This assessment report is provided to the Commonwealth Minister for Environment who will decide whether or not to approve the proposal under the EPBC Act. This is separate from any Western Australian approval that may be required.

Commonwealth policy and guidance

The EPA had regard to the following relevant Commonwealth guidelines, policies and plans during its assessment:

- Commonwealth EPBC Act Environmental Offsets Policy (Commonwealth of Australia 2012)
- Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015)
- Australian National Guidelines for Whale and Dolphin Watching 2017 (Commonwealth of Australia, 2017)
- Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (Department of the Environment and Energy, 2018)
- Schedule 2 of the Marine bioregional plan for the North-west Marine Region – Regional advice on matters of national environmental significance (DSEWPaC, 2012)
- Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015)
- Referral guideline for three WA threatened black cockatoo species: Carnaby's Cockatoo (*Zanda latirostris*), Baudin's Cockatoo (*Zanda baudinii*) and the Forest Red-tailed Black cockatoo (*Calyptorhynchus banksia naso*) (Commonwealth of Australia, 2022)
- Banksia Woodlands of the SCP: a nationally protected ecological community (Commonwealth of Australia 2016)
- Tuart Woodlands and Forests of the SCP: A Nationally Significant Ecological Community (Commonwealth of Australia, 2019)

EPA assessment

Listed threatened species and communities and listed migratory species

Listed threatened species and communities and listed migratory species that occur or may occur in the proposal area include:

- southern right whale
- blue whale
- humpback whale
- bottlenose dolphins
- Australian sea lion
- osprey
- fork-tailed swift
- Carnaby's cockatoo
- forest red-tailed black cockatoo
- Yanchep mallee
- *Melaleuca* sp. Wanneroo
- Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain
- *Banksia* woodlands of the Swan Coastal Plain.

Appendix I to the proponent's ERD (Water Corporation 2022) identifies all species listed under the EPBC Act that may occur in the proposal area.

Potential impacts to whales and dolphins are primarily a result of construction noise associated with vessel movements and underwater drilling. There is the potential for entanglement, interaction, or collision with marine fauna from construction vessels and machinery. Potential impacts from vessel strike/entanglement would be minimised by applying measures such as marine fauna observers and monitoring of exclusions zones during marine construction, and through recommended condition B6. Potential impacts from underwater noise would be minimised by avoiding underwater drilling works during whale migration period (between May and November), where practicable; and implementing noise management procedures to avoid hearing damage or changes, and through recommended condition B6.

Whales and dolphins may also be potentially impacted from toxicity and/or osmotic stress resulting from the discharge of brine. This would be minimised through measures to avoid potential adverse impacts to marine environmental quality, through the requirements for a Commissioning and Operations Marine Environmental Management Plan as recommended by condition B4.

Potential impacts to flora species, ecological communities and terrestrial fauna species are primarily a result of clearing and habitat loss. Clearing and disturbance has been minimised through aligning the pipeline to the greatest extent possible with existing roads, tracks and other cleared areas. This has largely avoided further

fragmentation and has restricted clearing primarily to already fragmented edges of bushland from existing infrastructure or other disturbances. Potential indirect impacts to MNES would be minimised through recommended conditions B1 and B2.

The assessment of the potential impacts to listed and migratory species is discussed in sections 2.1 Flora and Vegetation, section 2.2 Terrestrial Fauna, 2.7 Marine Fauna, and in section 4 of this report.

Summary

The EPA recommends the following environmental conditions to minimise impacts on MNES:

- limit the location and authorised extent of the clearing of vegetation to 51.2 ha in recommended condition A1
- condition B1 – limits on clearing of flora and vegetation MNES values and requirements to avoid indirect impacts from disease, weeds, and changes to hydrological regimes
- condition B2 – limits on clearing of black cockatoo habitat and potential nesting trees, and requirements to avoid or minimise potential indirect impacts to black cockatoos during clearing and disease introduction/spread to adjoining habitat
- condition B6 – implementation of measures to achieve the objective of minimising potential impacts to marine fauna MNES, including establishing marine fauna exclusion zones, noise management measures, and fauna observations
- condition B4 – requirement for an environmental management plan, including measure to avoid potential adverse impacts to marine environmental quality to minimise potential indirect impacts to marine fauna MNES.

The EPA considers that there will be a significant residual impact from the clearing and disturbance of foraging and potential breeding habitat for Carnaby's and forest red-tailed black cockatoo, loss of Banksia Woodlands community, and loss of Tuart Woodlands community. The EPA has recommended offsets in condition 8 (see section 4) to counterbalance the significant residual impact to 1.6 ha of the Banksia Woodlands community, 1.16 ha of the Tuart Woodlands community, 52.1 ha of high-quality foraging habitat for Carnaby's cockatoo, 49.8 ha of high-quality foraging habitat for forest red-tailed black cockatoo, and 104 black cockatoo potential nesting trees, 8 which contain hollows.

The EPA's view is that the impacts from the proposal on the above-listed MNES are therefore not expected to result in an unacceptable or unsustainable impact on any matters of NES.

6 Recommendations

The EPA has taken the following into account in its assessment of the proposal:

- environmental values likely to be significantly affected by the proposal
- assessment of key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- EPA's confidence in the proponent's proposed mitigation measures
- likely environmental outcomes which can be achieved with the imposition of conditions
- consistency of environmental outcomes with the EPA's objectives for the key environmental factors
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment
- principles of the EP Act.

The EPA recommends that the proposal may be implemented subject to the conditions recommended in Appendix A.

7 Other Advice

This assessment, like other assessments in the Perth metropolitan area, highlights the challenges of continuing development on the Swan Coastal Plain, and in particular the challenge to ensure EPA factor objectives can be met for individual proposals when cumulative effects on certain key environmental values are already significant.

Large infrastructure proposals in the Perth metropolitan area are often located in sensitive environments where the cumulative loss of native vegetation and threatened fauna habitat is a key issue. In the absence of a landscape and regional approach to environment protection, the EPA will continue to consider these proposals through case-by-case assessment processes with individual offset requirements.

One example highlighted through this assessment is the incremental effect of proposals on black cockatoo habitat. The declining availability of suitable land that provides high quality habitat for offsets, together with the increasingly fragmented ecosystems of the Swan Coastal Plain, means that the piecemeal acquisition of land as offsets for individual proposals is unlikely to be a sustainable regional strategy for black cockatoos. The EPA has previously advised that there should be greater emphasis on rehabilitation and restoration of degraded areas within close proximity of the impacted area to increase or improve the habitat available for Carnaby's cockatoo.

In light of the above, the EPA reiterates the need for a regional environmental protection framework that considers cumulative effects and includes strategic restoration and enhancement.

Similarly, it is also noted that the State Government is prioritising regional planning for Perth and Peel through the Western Australian Native Vegetation Policy, which will address cumulative environmental impacts in Perth and Peel. Detailed conservation and restoration plans will be developed to reverse declining environmental values in Perth and Peel, and to help facilitate State and Commonwealth environmental assessments.

Appendix A: Recommended conditions

Section 44(2)(b) of *Environmental Protection Act 1986* specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This appendix contains the EPA's recommended conditions and procedures.

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED **(*Environmental Protection Act 1986*)**

ALKIMOS SEAWATER DESALINATION PLANT

Proposal:	<p>The construction and operation of a 100 GL per annum seawater desalination plant and a 6 GL per annum groundwater treatment plant at the Alkimos water precinct. The source water for the desalination process will be delivered through the construction of a pipeline directly west of the proposed seawater desalination plant.</p> <p>By-products of the desalination process will be returned further offshore to the marine environment through a separate pipeline.</p> <p>In order to distribute the drinking water into Perth's Integrated Water Supply Scheme, the project includes a 32.93 kilometre pipeline from the Alkimos site to the Wanneroo Reservoir, and other significant distribution points along the pipe route.</p>
Proponent:	<p>Water Corporation</p> <p>Australian Business Number 28 003 434 917</p>
Proponent address:	<p>629 Newcastle Street Leederville WA 6007</p>
Assessment number:	2210
Report of the Environmental Protection Authority:	1739

Introduction: Pursuant to section 45 of the *Environmental Protection Act 1986*, it has been agreed that the proposal entitled Alkimos Seawater Desalination Plant described in the 'Proposal Content Document', as amended by the change to proposal approved under s. 43A on 7 March 2023, may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

Conditions and procedures:

Part A: Proposal extent

Part B: Environmental outcomes, prescriptions, and objectives

Part C: Environmental management plans and monitoring

Part D: Compliance and other conditions

PART A: PROPOSAL EXTENT

A1 Limitations and Extent of Proposal

A1-1 The proponent must ensure that the proposal is implemented in such a manner that the following limitations or maximum extents/capacities/ranges are not exceeded:

Proposal element	Location	Maximum extent
Physical elements		
Terrestrial development envelope	Within the development envelope shown in Figure 1	Clearing of no more than 51.2 ha of native vegetation within a development envelope of 130.15 ha
Marine development envelope	Within the development envelope shown in Figure 2	Disturbance to no more than 8.39 ha within a 11.45 ha development envelope
Operational elements		
Marine brine discharge		Maximum salinity of 75,200 mg/L
Intake velocity		Maximum velocity 0.15 metres/second
Timing elements		
Project life – operation of desalination plant		100 years from commissioning of desalination plant

PART B – ENVIRONMENTAL OUTCOMES, PRESCRIPTIONS AND OBJECTIVES

B1 Flora and Vegetation

B1-1 The proponent must ensure the implementation of the proposal achieves the following environmental outcomes:

- (1) no **adverse impacts** to the three *Melaleuca* sp. Wanneroo (G. J. Keighery 16705) individuals recorded in the **targeted flora survey**;
- (2) **disturb** no more than the following environmental values:
 - (a) 1.7 **ha** of the Banksia woodlands of the Swan Coastal Plain ecological community;
 - (b) 1.16 **ha** of the Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain ecological community;
 - (c) 1.03 **ha** of the *Melaleuca huegelii* - *Melaleuca systema* shrublands on limestone ridge (Gibson et al. 1994 type 26a);
 - (d) 1.55 **ha** of the Northern Spearwood shrublands and woodlands ('floristic community type (FCT) 24');
 - (e) 28.08 **ha** of the Acacia shrublands on taller dunes, Southern SCP ('floristic community type (FCT) 29b'); and
 - (f) 9.42 **ha** of native vegetation within Bush Forever sites, of which 5.7 ha is regionally significant bushland;
- (3) no **adverse impacts** to native vegetation within twenty (20) metres outside the **terrestrial development envelope**; and
- (4) no **adverse impacts** to vegetation within Neerabup National Park occurring within or directly adjacent to the **terrestrial development envelope**.

B1-2 Prior to **ground disturbing activities** within the area shown in Figure 3 of Schedule 1, the proponent shall:

- (1) undertake a survey in accordance with *EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016)* of the area shown in Figure 3 of Schedule 1, to determine the occurrence of the *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a) threatened ecological community;
- (2) submit the findings of the survey required under condition B1-2(1), in the form of a report to the **CEO** for confirmation that it was conducted in

accordance with *EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016)*;

- (3) submit to the **CEO** the measures to be implemented to ensure no **adverse impacts** to *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a) threatened ecological community, within the area shown in Figure 3 of Schedule 1, should it be identified under condition B1-2(1);
- (4) not undertake **ground disturbing activities** within the area shown in Figure 3 of Schedule 1, until the **CEO** has **confirmed** in writing that the measures referred to in condition B1-2(3) meet the requirements of that condition; and
- (5) implement measures confirmed by the **CEO** in accordance with condition B1-2(3) to ensure no **adverse impacts** to *Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a) threatened ecological community if identified under condition B1-2(1).

B1-3 The proponent shall implement hygiene protocols consistent with the *Management of Phytophthora cinnamomi for Biodiversity Conservation in Australia, Part 2 National Best Practice Guidelines* as amended or replaced from time to time.

B1-4 The proponent must:

- (1) **revegetate** all areas of native vegetation **disturbed**, but not reasonably expected to be required for ongoing **operations**, along the **integration pipeline** route within twenty-four (24) months of completion of **construction activities**;
- (2) demonstrate the **revegetation** required by condition B1-4(1) is consistent with pre-construction **vegetation densities**; and
- (3) undertake annual monitoring and any remedial measures to ensure revegetation required by condition B1-4(1) will successfully establish within five (5) years post construction.

B2 Terrestrial Fauna

B2-1 The proponent must ensure the implementation of the proposal achieves the following environmental outcomes:

- (1) **disturb** no more than the following environmental values:
 - (a) 52.1 **ha** of foraging habitat for Carnaby's cockatoo (*Zanda latirostris*);

- (b) 49.8 **ha** of foraging habitat for forest red-tailed black cockatoo (*Calyptrorhynchus banksii naso*); and
- (c) 96 **potential nesting trees** and 8 **suitable nesting trees**.

B2-2 During construction, the proponent must undertake the following actions:

- (1) within seven (7) days prior to clearing, using a **fauna handler** with experience in surveying for **black cockatoos**, inspect all **suitable nesting hollows** within the **terrestrial development envelope** to determine if any hollows are being used for nesting by **black cockatoos**;
- (2) if any hollows are in use by **black cockatoos**, the proponent shall not **disturb** the nesting tree, or vegetation within a ten (10) metre radius of the nesting tree, until after the **black cockatoos** have naturally completed nesting (young have fledged and dispersed) and a **fauna handler** has verified that the hollow(s) are no longer being used by **black cockatoos**;
- (3) clear trapped vertebrate fauna from within open **trenches** using a **fauna handler**:
 - (a) at least twice daily, with the first daily clearing to be completed no later than three hours after sunrise and the second clearing to be completed between the hours of 3:00 pm and 6:00 pm of that same day, unless otherwise agreed to by the **CEO**; and
 - (b) within one (1) hour prior to backfilling of **trenches**;
- (4) ensure that open **trench** lengths do not exceed a length capable of being inspected and cleared by the requirements set out in condition B2-2(3);
- (5) provide egress points, ramps and/or fauna refuges that provide suitable shelter from the sun and predators for trapped fauna in open **trenches** at intervals not exceeding fifty (50) metres; and
- (6) in the event of substantial rainfall, and following the clearing of vertebrate fauna from the **trench**, pump out any pooled water in the open **trench** and discharge it to adjacent vegetated areas in a manner that does not cause erosion.

B3 Landforms

B3-1 The proponent must ensure the implementation of the proposal achieves the following environmental outcome:

- (1) **disturb** no more than 35.1 **ha** of the **Alkimos Dune Complex**, including no more than 5.17 **ha** of **area 10b**.

B3-2 The proponent must ensure the implementation of the proposal achieves the following environmental objectives:

- (1) no **adverse impacts**, beyond the extents identified in condition B3-1(1); and
- (2) **rehabilitated** dunes and the **westerly-facing berm** are stable and not prone to erosion, are not a source of ongoing dust emissions, and contain cover and composition of native dune vegetation consistent with undisturbed **Alkimos Dune Complex** within a two (2) kilometre radius.

B3-3 The proponent must:

- (1) **rehabilitate** the **westerly-facing berm** and any areas **disturbed** during construction within **area 10b** that are not reasonably required for ongoing **operations**;
- (2) commence **rehabilitation** of areas listed in condition B3-3(1) within twelve (12) months of the completion of **construction activities** to achieve the environmental objective in condition B3-2(2).

B3-4 The proponent must, in consultation with the Department of Mines, Industry Regulation and Safety, prepare an environmental management plan that satisfies the requirements of condition C5 and demonstrates how achievement of the Landforms environmental objectives in condition B3-2 will be achieved, and submit it to the **CEO**.

B4 Marine Environmental Quality

B4-1 The proponent must ensure the implementation of the proposal achieves the following environmental outcomes:

- (1) no **adverse impacts** on the **marine environmental values** of Ecosystem Health, Fishing and Aquaculture, Recreation and Aesthetics, Industrial Water Supply, Cultural and Spiritual outside the **Low Ecological Protection Area**; and
- (2) the levels of ecological protection to be achieved inside of the:
 - (a) **Low Ecological Protection Area**; and
 - (b) **High Ecological Protection Areas**,

are consistent with the corresponding level of ecological protection described in Appendix 1, Table 1 of the **Marine Water Quality Technical Guidance**, including the method used to derive **Environmental Quality Guidelines** and **Environmental Quality Standards**, or an alternative method that has been confirmed by the CEO.

B4-2 The proponent must review and revise the Commissioning and Operations Marine Environmental Management Plan (Rev 3, February 2023), that satisfies the requirements of condition C4 and demonstrates how the achievement of the marine environmental quality environmental outcomes in condition B4-1 will be monitored and substantiated, and submit to the **CEO**.

B5 Benthic Communities and Habitat

B5-1 The proponent must ensure the implementation of the proposal achieves the following environmental outcomes:

- (1) **irreversible loss of benthic communities and habitats** shall not exceed 0.13 ha;
- (2) **disturbance to benthic communities and habitats** shall not exceed 8.39 ha within the **marine development envelope**; and
- (3) no **irreversible loss of benthic communities and habitats** outside of the **zones of high impact**.

B6 Marine Fauna

B6-1 The proponent shall implement the proposal to achieve the following environmental objectives:

- (1) minimise the risk of physical injury or mortality from vessel strike on **significant marine fauna**;
- (2) minimise the risk of behavioural changes, health impacts, physical injury, or mortality from underwater noise emissions from construction to **significant marine fauna** (including temporary or permanent hearing loss).

B6-2 During **marine construction activities**, the proponent shall:

- (1) implement measures to avoid vessel strikes with **significant marine fauna**;
- (2) implement a **significant marine fauna** observation zone consisting of a at least one (1) kilometre radius from each underwater drilling location whereby an observer must undertake **significant marine fauna** observation for a minimum of 30 minutes prior to the commencement of **marine construction activities**;
- (3) implement an exclusion zone consisting of at least 500 metre radius from the underwater drilling location whereby:
 - (a) **marine construction activities** cannot commence should a **significant marine fauna** be within the exclusion zone; and

- (b) **marine construction activities** to cease should a **significant marine fauna** enter the exclusion zone during construction and are not to recommence until the **significant marine fauna** have moved outside the exclusion zone.
- (4) must engage a suitably trained and experienced marine fauna observer who has a demonstrated knowledge of **significant marine fauna** in the marine temperate region to undertake observations in the observation zone and exclusion zone;
- (5) implement noise management procedures to avoid temporary and permanent changes to hearing sensitivity in **significant marine fauna** and minimise behavioural responses;
- (6) maintain a log of recorded sightings, locations and behaviours indicative of stress or disturbance of **significant marine fauna** and submit these to the **National Cetacean Sighting Database**; and
- (7) document and report to relevant regulators any incidents relating to **significant marine fauna** injury / mortality.

B7 Greenhouse Gas Emissions

- B7-1 The proponent shall take measures to ensure there are zero **net scope 1 and 2 GHG emissions** from the **commencement of operations** throughout the life of the proposal.
- B7-2 At least six (6) months prior to commissioning, the proponent shall revise the Greenhouse Gas Management Plan (Revision 3, 2023) and submit to the **CEO** to:
- (1) be consistent with the achievement of **net zero scope 1 and 2 GHG emissions** for the operation of the proposal;
 - (2) update the estimated **proposal GHG emissions** and **emissions intensity** for the life of the proposal;
 - (3) include a comparison of the estimated **proposal GHG emissions** and **emissions intensity** for the life of the proposal against other comparable facilities;
 - (4) update and revise any measures that the proponent will implement to avoid, reduce and/or offset **proposal GHG emissions** and/or reduce the **emissions intensity** of the proposal; and
 - (5) provide a program for the future review of the plan to:
 - (a) assess the effectiveness of measures referred to in condition B7-2(4); and

- (b) identify and describe options for future measures that the proponent may or could implement to avoid, reduce, and/or offset **proposal GHG emission** and/or reduce the **emissions intensity** of the proposal.

B7-3 Within one (1) month of receiving confirmation in writing from the **CEO** that:

- (1) the Greenhouse Gas Environmental Management Plan referred to in condition B7-2 has been revised and satisfies condition B7-2; or
- (2) any subsequent version of the **confirmed** Greenhouse Gas Environmental Management Plan submitted under condition C2 satisfies condition B7-2,
- (3) the proponent must submit a separate summary of the relevant plan to the **CEO**, which must include a summary of the matters specified in conditions B7-2(1) to condition B7-2(4).

B7-4 The proponent shall submit an annual report to the **CEO** each year by 31 March, commencing on the first 31 March after the **commencement of operations**, or such other date within that financial year as is agreed by the **CEO** to align with other reporting requirements for **GHG**, specifying for the previous financial year:

- (1) the quantity of **proposal GHG emissions**; and
- (2) the **emissions intensity** for the proposal.

B7-5 The proponent shall submit to the **CEO** by 31 March 2030 or such other date within that financial year as is agreed by the **CEO** to align with other reporting requirements for GHG, and every five (5) years thereafter:

- (1) a consolidated report specifying:
 - (a) for each of the preceding five financial years, the matters referred to in conditions B7-4(1) and B7-4(2);
 - (b) for the 5 year period from the **commencement of operations** that ended on 30 June of the year before the report is due:
 - (i) the quantity of **proposal GHG emissions**;
 - (ii) the **net GHG emissions**;
 - (iii) any measures that have been implemented to avoid or reduce **proposal GHG emissions**; and
 - (iv) the type, quantity, identification or serial number, and date of retirement or cancellation of any **large-scale generation certificates** and **authorised offsets** which have been

retired or cancelled and which have been used to calculate the **net GHG emissions** referred to in condition B7-5 (1)(b)(ii), including written evidence of such retirement or cancellation.

- (2) an audit and peer review report of the consolidated report required by condition B7-5(1), carried out by an independent person or independent persons with suitable technical experience dealing with the suitability of the methodology used to determine the matters set out in the consolidated report, whether the consolidated report is accurate and whether the consolidated report is supported by credible evidence.

B7-6 A consolidated report referred to in condition B7-5(1) must be accompanied by:

- (1) a revision of the **confirmed** Greenhouse Gas Environmental Management Plan under condition B7-2; and
- (2) a separate summary report, from the **commencement of operations** that ended on 30 June of the year before the report is due, and which includes:
 - (a) a graphical comparison of **net GHG emissions** with the zero **net GHG emissions** limit detailed in condition B7-1;
 - (b) **emissions intensity** compared to comparable plant facilities and **emissions intensity** of the **South West Interconnected System** used to estimate the scope 2 emissions;
 - (c) a summary of measures to reduce the **proposal GHG emissions** undertaken by the proponent; and
 - (d) a clear statement as to whether zero **net GHG emissions** set out in condition B7-1 have been met, and continue to be met in future **net GHG emissions**, including a description of any reasons why it has not been, and/or are unlikely to be met.

B7-7 In addition to the requirements of condition C2-6 about publication of the **confirmed** Greenhouse Gas Environmental Management Plan, the proponent shall make the summary of the **confirmed** Greenhouse Gas Environmental Management Plan, and all reports required by this condition B7 publicly available on the proponent's website within the timeframes specified below, or in any other manner or time specified by the **CEO**:

- (1) the summary of the **confirmed** Greenhouse Gas Environmental Management Plan within twenty (20) business days of submitting the document to the **CEO** in accordance with condition B7-3; and

- (2) the reports referred to in condition B7-4, condition B7-5, and condition B7-6 within twenty (20) business days of submitting the document to the **CEO**, and they shall remain published for the life of the proposal.

B8 Offsets

B8-1 The proponent must implement offsets to counterbalance the significant residual impacts of the proposal on the following environmental values:

- (a) Banksia woodlands of the Swan Coastal Plain ecological community;
- (b) Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain ecological community;
- (c) *Melaleuca huegelii* - *Melaleuca systema* shrublands on limestone ridge (Gibson et al. 1994 type 26a);
- (d) **regionally significant bushland**;
- (e) foraging habitat for Carnaby's black cockatoo (*Zanda latirostris*)
- (f) foraging habitat for forest red-tailed black cockatoo (*Calyptrorhynchus banksii naso*); and
- (g) **potential nesting trees** and **suitable nesting trees**;

B8-2 In order to meet the requirements of condition B8-1 the proponent must ensure the implementation of the offsets achieves the following environmental outcomes and objectives:

- (1) ensure implementation of offsets provides an environmental benefit for the environmental values listed in condition B8-1;
- (2) ensure **land acquisition** offsets for the value identified in condition B8-1(d):
 - (a) contain at least two (2) times the extent impacted;
 - (b) contain the same vegetation communities and/or vegetation complexes to the environmental value being impacted; and
 - (c) contain, or can be enhanced to achieve, a vegetation condition that is commensurate to the environmental value being impacted;
- (3) revegetate at least seventy (70) ha within 37 km of the **terrestrial development envelope** to provide **self-sustaining** foraging habitat for **black cockatoos**;

- (4) install at least three (3) artificial nesting hollows for every **suitable nesting tree** authorised to be cleared in accordance with condition B2-1;
- (5) ensure **land acquisition** offsets contain at least three (3) times the number of **potential and suitable nesting trees** cleared by the proposal;

Alkimos Seawater Desalination Plant Offset Strategy (Environmental Management Plan)

B8-3 The proponent shall revise the Draft Alkimos Seawater Desalination Plant Offset Strategy (April 2023) (Environmental Management Plan) and submit it to the **CEO**. The revised Alkimos Seawater Desalination Offset Strategy (Environmental Management Plan) must:

- (1) demonstrate that the objectives and outcomes in condition B8-1 and condition B8-2 will be met;
- (2) be prepared in consultation with **DBCA**;
- (3) spatially identify the **Proposed Offset Conservation Areas** proposed as:
 - (a) **land acquisition** offset area(s) and/or other lands to receive **on-ground management**; and
 - (b) **revegetation** offset area(s) to receive **on-ground management**;
- (4) for the **land acquisition** offset area(s):
 - (a) demonstrate that the **Proposed Offset Conservation Areas** contain the minimum extents of the environmental values needed to meet the objectives and outcomes of condition B8-1 and condition B8-2;
 - (b) identify how the **Proposed Offset Conservation Areas** will be protected, being either the sites are ceded to the Crown for the purpose of management for conservation, or the sites are managed under other suitable mechanism for the purpose of conservation as agreed by the **CEO** by notice in writing;
 - (c) specify the quantum of works associated with establishing the **Proposed Offset Conservation Areas**, including a contribution for maintaining the offset for at least twenty (20) years after completion of purchase; and
 - (d) identify the **relevant management body** for the on-going management of the **Proposed Offset Conservation Areas**,

including its role, and the role of the proponent, and confirmation in writing that the **relevant management body** accepts responsibility for its role;

- (5) identify the proportion of resources allocated for each specific offset addressed by the Alkimos Seawater Desalination Offset Strategy (Environmental Management Plan);
- (6) demonstrate how the environmental values within the **Proposed Offset Conservation Areas** will be maintained and/or improved in order to meet the objectives and outcomes in condition B8-1 and condition B8-2 through application of the principles of the *WA Environmental Offsets Policy* and completion of the WA Offsets Template as described in the *WA Environmental Offsets Guidelines*, and the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*, or any subsequent revisions or replacements of these documents;
- (7) demonstrate the artificial nesting hollows required by condition B8-2(4) will:
 - (a) be installed at suitable locations determined in consultation with **DBCA**, and in accordance with *Fauna Notes – Artificial hollows for black cockatoos* (DBCA 2023) or any subsequent **DBCA** revision of this guideline;
 - (b) be designed and placed in accordance with the specifications detailed within the *Fauna Notes – Artificial hollows for black cockatoos* (DBCA 2023) or any subsequent **DBCA** revision of this guideline; and
 - (c) be monitored and maintained in accordance with the specifications detailed in *Fauna Notes – Artificial hollows for black cockatoos* (DBCA 2023) or any subsequent **DBCA** revision of this guideline, for a period of at least twenty (20) years;
- (8) where a research offset is proposed, prepare a draft research program that:
 - (a) identifies the objectives and intended outcomes;
 - (b) identifies how the research will result in a positive conservation outcome, and will either improve management and protection or address priority knowledge gaps that have been identified as a research priority needed to improve management and protection, for the environmental values identified in condition B8-1;

- (c) demonstrates the consistency of the objectives and outcomes in condition B8-2(8)(a) with any relevant guidance, including but not limited to, recovery plans or area management plans, the principles of the *WA Environmental Offsets Policy*, the *WA Environmental Offsets Guidelines*, or any subsequent revisions of these documents;
- (d) identifies and justifies how the research will support **land acquisition** and/or **on-ground management** in achieving a positive conservation outcome;
- (9) identify how the ongoing performance of the offset measures, and whether they are achieving the objectives and intended outcomes in condition B8-1 and condition B8-2 will periodically be made publicly available.

Alkimos Seawater Desalination Plant Offset Environmental Management Plan

- B8-4 The proponent must prepare and submit to the **CEO** an offset environmental management plan that is consistent with the **confirmed** Alkimos Seawater Desalination Plant Offset Strategy (Environmental Management Plan) and satisfies the requirements of condition 8-1 and condition B8-2 and demonstrates how the environmental objectives and outcomes in condition B8-1 and condition B8-2 will be achieved.
- B8-5 The Alkimos Seawater Desalination Plant Offset Environmental Management Plan must:
- (1) be prepared in consultation with **DBCA**;
 - (2) demonstrate how the Alkimos Seawater Desalination Plant Offset Environmental Management Plan is consistent with the **confirmed** Alkimos Seawater Desalination Offset Strategy, including how the Plan meets the requirements of condition B8-3;
 - (3) for the **on-ground management** offsets identified in condition B8-3(3):
 - (a) state the targets for each environmental value to be achieved by **on-ground management**, including completion criteria which will result in a **tangible improvement** to the environmental values listed in condition B8-1. For **revegetation** offsets relating to **black cockatoo** environmental values, this must include, but not be limited to:
 - (i) quantity of **black cockatoo** foraging habitat to be achieved;
 - (ii) completion criteria to measure the foraging habitat value, vegetation structure, species diversity and abundance,

- plant density and vegetation condition that is to be achieved to provide high-quality **black cockatoo** foraging habitat;
- (iii) densities of *Phytophthora* Dieback resistant species where appropriate;
 - (iv) criteria to measure and demonstrate the **revegetation** is **self-sustaining**;
 - (v) contingency actions to be undertaken if criteria are not met;
- (b) demonstrate the consistency of the targets with the environmental objectives and outcomes in condition B8-1 and condition B8-2 and the objectives of any relevant guidance, including but not limited to, recovery plans, conservation advices, or area management plans where relevant;
 - (c) detail the **on-ground management actions** with associated timeframes for implementation and completion, to achieve the targets identified in condition B8-5(3);
- (4) detail the monitoring, reporting and evaluation mechanisms for the targets identified under condition B8-5(3).
 - (5) include a procedure for incorporating the findings and learnings from the research in condition B8-6 into the future revisions of the Offset Environmental Management Plan;

B8-6 where a **research offset** is proposed, prepare a research program that:

- (1) demonstrates how the program meets the requirements of condition B8-2(8);
- (2) identifies the objectives and intended outcomes, and specifies the associated deliverables and completion criteria;
- (3) provides an implementation and reporting schedule, including an outline of key activities, all deliverables, stages of implementation, reporting of research results (including interim results), reporting on implementation status, and milestones towards completion criteria;
- (4) identifies the governance arrangements including responsibilities for implementing, and oversight of, the research program, agreements with government agencies, agreements with any third parties, and contingency measures;
- (5) identify how a research program summary, and the results (including interim results) of the research program will be communicated and/or published in an open access format; and

- (6) identifies the third party to carry out the work required to meet the objectives and intended outcomes of condition B8-6(2), who is satisfactory for the role to the **CEO**. In applying to the **CEO** for endorsement of the selected third parties, the proponent shall provide:
 - (a) demonstration of the track record, experience, qualifications, and competencies of the proposed third party to carry out the work and achieve the outcomes.

PART C – ENVIRONMENTAL MANAGEMENT PLANS AND MONITORING

C1 Environmental Management Plans: Conditions Related to Commencement of Implementation of the Proposal

C1-1 The proponent must:

- (1) not undertake **ground disturbing activities** until the **CEO** has **confirmed** in writing that the environmental management plan required by condition B3-4 meets the requirements of that condition and condition C5;
- (2) not undertake commissioning of the desalination plant in the **terrestrial development envelope** until the **CEO** has **confirmed** in writing that the revised environmental management plan required by condition B4-2 meets the requirements of that condition and condition C4;
- (3) not undertake the **commencement of operations** until the **CEO** has **confirmed** in writing that the environmental management plan referred to in condition B7-2 has been revised and satisfies the requirements of that condition;
- (4) not undertake **ground disturbing activities** until the **CEO** has **confirmed** in writing that the Alkimos Desalination Plant Offset Strategy required by condition B8-3 meets the requirements of that condition;
- (5) submit the Alkimos Desal Plant Offset Environmental Management Plan required by condition B8-4 within six (6) months of the Alkimos Desalination Plant Offset Strategy being **confirmed** by the **CEO**.

C2 Environmental Management Plans: Conditions Relating to Approval, Implementation, Review and Publication

C2-1 Upon being required to implement an environmental management plan under Part B, or after receiving notice in writing from the **CEO** under condition C1-1 that the environmental management plan(s) required in Part B satisfies the relevant requirements, the proponent must:

- (1) implement the most recent version of the **confirmed** environmental management plan; and
- (2) continue to implement the **confirmed** environmental management plan referred to in condition C2-1(1), other than for any period which the **CEO** confirms by notice in writing that it has been demonstrated that the relevant requirements for the environmental management plan have been met, or are able to be met under another statutory decision-making process, in which case the implementation of the environmental management plan is no longer required for that period.

C2-2 The proponent:

- (1) may review and revise a **confirmed** environmental management plan provided it meets the relevant requirements of that environmental management plan, including any consultation that may be required when preparing the environmental management plan;
- (2) must review and revise a **confirmed** environmental management plan and ensure it meets the relevant requirements of that environmental management plan, including any consultation that may be required when preparing the environmental management plan, as and when directed by the **CEO**;
- (3) must revise and submit to the **CEO** the **confirmed** environmental management plan if there is a material risk that the outcomes or objectives it is required to achieve will not be complied with, including but not limited to as a result of a change to the proposal;
- (4) must revise and submit to the **CEO** the **confirmed** Greenhouse Gas Environmental Management Plan by the date that the first five (5) yearly consolidated report is required to be submitted under condition B7-6(1) and every five (5) years after that date.

C2-3 Despite condition C2-1, but subject to conditions C2-4 and C2-5, the proponent may implement minor revisions to an environmental management plan if the revisions will not result in new or increased **adverse impacts** to the environment or result in a risk to the achievement of the limits, outcomes, or objectives which the environmental management plan is required to achieve.

C2-4 If the proponent is to implement minor revisions to an environmental management plan under condition C2-3, the proponent must provide the **CEO** with the following at least twenty (20) business days before it implements the revisions:

- (1) the revised environmental management plan clearly showing the minor revisions;
- (2) an explanation of and justification for the minor revisions; and
- (3) an explanation of why the minor revisions will not result in new or increased **adverse impacts** to the environment or result in a risk to the achievement of the limits, outcomes, or objectives which the environmental management plan is required to achieve.

C2-5 The proponent must cease to implement any revisions which the **CEO** notifies the proponent (at any time) in writing may not be implemented.

C2-6 **Confirmed** environmental management plans, and any revised environmental management plans under condition C2-4(1), must be published on the proponent's website and provided to the **CEO** in electronic form suitable for on-line publication by the Department of Water and Environmental Regulation within twenty (20) business days of being implemented, or being required to be implemented (whichever is earlier).

C3 Conditions Related to Monitoring

C3-1 The proponent must undertake monitoring capable of:

- (1) substantiating whether the proposal limitations and extents in Part A are exceeded; and
- (2) **detecting** and substantiating whether the environmental outcomes identified in Part B are achieved (excluding any environmental outcomes in Part B where an environmental management plan is expressly required to monitor achievement of that outcome).

C3-2 The proponent must submit as part of the Compliance Assessment Report required by condition D2, a compliance monitoring report that:

- (1) outlines the monitoring that was undertaken during the implementation of the proposal;
- (2) identifies why the monitoring was capable of substantiating whether the proposal limitation and extents in Part A are exceeded;
- (3) for any environmental outcomes to which condition C3-1(2) applies, identifies why the monitoring was scientifically robust and capable of **detecting** whether the environmental outcomes in Part B are met;
- (4) outlines the results of the monitoring;
- (5) reports whether the proposal limitations and extents in Part A were exceeded and (for any environmental outcomes to which condition C3-1(2) applies) whether the environmental outcomes in Part B were achieved, based on analysis of the results of the monitoring; and
- (6) reports any actions taken by the proponent to remediate any potential non-compliance.

C4 Environmental Management Plans: Conditions Relating to Monitoring and Adaptive Management for Outcomes Based Conditions

C4-1 The environmental management plan required under condition B4-2 must contain provisions which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include:

- (1) **Environmental Quality Standards** and **Environmental Quality Guidelines** to protect the **marine environmental values** and levels of ecological protection, including the methodology used to derive site-specific **Environmental Quality Standards** and **Environmental Quality Guidelines**;
- (2) monitoring parameters, sites, control/reference sites, methodology, timing, and frequencies which will be used to measure **Environmental Quality Standards** and **Environmental Quality Guidelines**. Include methodology for determining alternate monitoring sites as a contingency if proposed sites are not suitable in the future;
- (3) baseline data;
- (4) data collection and analysis methodologies;
- (5) adaptive management methodology;
- (6) **contingency measures** which will be implemented if **Environmental Quality Guidelines** or **Environmental Quality Standards**, are not met; and
- (7) reporting requirements.

C4-2 The environmental management plan required under condition B4-2 are also required to include, but not be limited to:

- (1) the spatial data and coordinates for the **Low Ecological Protection Area** referred to in condition B4-1;
- (2) at least two years of baseline data for salinity in the local receiving environment;
- (3) measures to ensure that the 99% species protection guideline 'trigger' levels for toxicants, as defined in the **ANZG**, are achieved in the **High Ecological Protection Areas**;
- (4) the monitoring and evaluation, including remodelling, of the environmental effects of discharging wastewater into the marine environment off Alkimos, during commissioning phase including on density stratification and dissolved oxygen concentrations in bottom waters, to assess performance against the environmental outcome;
- (5) a program to undertake whole-of-effluent toxicity testing during the commissioning phase, of two wastewater types, including one sample that contains **clean in place chemicals**, and one sample that does not contain **clean in place chemicals**, with sufficient rigour to determine the dilutions required to achieve the 99% species protection level of each

wastewater sample type using protocols that are consistent with the **ANZG**, and to determine which sample type has the greatest toxicity;

- (6) a program to undertake whole-of-effluent toxicity testing during the operations phase, of the type of wastewater that has the greatest toxicity as determined during the commissioning phase, with sufficient rigour to determine the dilutions required to achieve the EC10(%) of at least three (3) taxa, using protocols that are consistent with the **ANZG**;
- (7) a program for the future review and revision of the plan prior to **commencement of operations** following the completion of requirements specified in condition C4-3(4) and condition C4-3 (5).

C4-3 Without limiting condition C3-1, failure to achieve an environmental outcome, regardless of whether threshold **contingency measures** have been or are being implemented, represents a non-compliance with these conditions.

C5 Environmental Management Plans: Conditions Related to Management Actions and Targets for Objective Based Conditions

C5-1 The environmental management plan required under condition B8-5 and condition B3-4 must contain provisions which enable the achievement of the relevant objectives of those conditions and substantiation of whether the objectives are reasonably likely to be met, and must include:

- (1) **management actions**;
- (2) **management targets**; and
- (3) **contingency measures** if **management targets** are not met; and
- (4) reporting requirements.

C5-2 The environmental management plan required under condition B3-4 is also required to include, but not be limited to:

- (1) completion criteria for **rehabilitated** dunes and the **westerly-facing berm**.

C5-3 Without limiting condition C2-1, the failure to achieve an environmental objective, or implement a **management action**, regardless of whether **contingency measures** have been or are being implemented, represents a non-compliance with these conditions.

PART D – COMPLIANCE, TIME LIMITS, AUDITS AND OTHER CONDITIONS

D1 Non-compliance Reporting

D1-1 If the proponent becomes aware of a potential non-compliance, the proponent must:

- (1) report this to the **CEO** within seven (7) days;
- (2) implement **contingency measures**;
- (3) investigate the cause;
- (4) investigate environmental impacts;
- (5) advise rectification measures to be implemented;
- (6) advise any other measures to be implemented to ensure no further impact; and
- (7) provide a report to the **CEO** within twenty-one (21) days of being aware of the potential non-compliance, detailing the measures required in conditions D1-1(1) to D1-1(6) above.

D1-2 Failure to comply with the requirements of a condition, or with the content of an environmental management required under a condition, constitutes a non-compliance with these conditions, regardless of whether the **contingency measures**, rectification or other measures in condition D1-1 above have been or are being implemented.

D2 Compliance Reporting

D2-1 The proponent must provide an annual Compliance Assessment Report to the **CEO** for the purpose of determining whether the implementation conditions are being complied with.

D2-2 Unless a different date or frequency is approved by the **CEO**, the first annual Compliance Assessment Report must be submitted within fifteen (15) months of the date of this Statement, and subsequent plans must be submitted annually from that date.

D2-3 Each annual Compliance Assessment Report must be endorsed by the proponent's Chief Executive Officer, or a person approved by proponent's Chief Executive Officer to be delegated to sign on the Chief Executive Officer's behalf.

D2-4 Each annual Compliance Assessment Report must:

- (1) state whether each condition of this Statement has been complied with, including:

- (a) exceedance of any proposal limits and extents;
 - (b) achievement of environmental outcomes;
 - (c) achievement of environmental objectives;
 - (d) requirements to implement the content of environmental management plans;
 - (e) monitoring requirements;
 - (f) implement **contingency measures**;
 - (g) requirements to implement adaptive management; and
 - (h) reporting requirements;
- (2) include the results of any monitoring (inclusive of any raw data) that has been required under Part C in order to demonstrate that the limits in Part A, and any outcomes or any objectives are being met;
 - (3) provide evidence to substantiate statements of compliance, or details of where there has been a non-compliance;
 - (4) include the corrective, remedial and preventative actions taken in response to any potential non-compliance;
 - (5) be provided in a form suitable for publication on the proponent's website and online by the Department of Water and Environmental Regulation;
 - (6) be prepared and published consistent with the latest version of the Compliance Assessment Plan required by condition D2-5 which the **CEO** has confirmed by notice in writing satisfies the relevant requirements of Part C and Part D.

D2-5 The proponent must prepare a Compliance Assessment Plan which is submitted to the **CEO** at least six (6) months prior to the first Compliance Assessment Report required by condition D2-2, or prior to implementation of the proposal, whichever is sooner.

D2-6 The Compliance Assessment Plan must include:

- (1) what, when and how information will be collected and recorded to assess compliance;
- (2) the methods which will be used to assess compliance;
- (3) the methods which will be used to validate the adequacy of the compliance assessment to determine whether the implementation conditions are being complied with;

- (4) the retention of compliance assessments;
- (5) the table of contents of Compliance Assessment Reports, including audit tables; and
- (6) how and when Compliance Assessment Reports will be made publicly available, including usually being published on the proponent's website within sixty (60) days of being provided to the **CEO**.

D3 Contact Details

D3-1 The proponent must notify the **CEO** of any change of its name, physical address, or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

D4 Time Limit for Proposal Implementation

- D4-1 The proposal must be substantially commenced within five (5) years from the date of this Statement.
- D4-2 The proponent must provide to the **CEO** documentary evidence demonstrating that they have complied with condition D4-1 no later than fourteen (14) days after the expiration of period specified in condition D4-1.
- D4-3 If the proposal has not been substantially commenced within the period specified in condition D4-1, implementation of the proposal must not be commenced or continued after the expiration of that period.

D5 Public Availability of Data

D5-1 Subject to condition D5-2, within a reasonable time period approved by the **CEO** upon the issue of this Statement and for the remainder of the life of the proposal, the proponent must make publicly available, in a manner approved by the **CEO**, all validated environmental data collected before and after the date of this Statement relevant to the proposal (including sampling design, sampling methodologies, monitoring and other empirical data and derived information products (e.g. maps)), environmental management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

D5-2 If:

- (1) any data referred to in condition D5-1 contains trade secrets; or
- (2) any data referred to in condition D5-1 contains particulars of confidential information (other than trade secrets) that has commercial value to a

person that would be, or could reasonably be expected to be, destroyed, or diminished if the confidential information were published,

the proponent may submit a request for approval from the **CEO** to not make this data publicly available and the **CEO** may agree to such a request if the **CEO** is satisfied that the data meets the above criteria.

- D5-3 In making such a request the proponent must provide the **CEO** with an explanation and reasons why the data should not be made publicly available.

D6 Independent Audit

- D6-1 The proponent must arrange for an independent audit of compliance with the conditions of this statement, including achievement of the environmental outcomes and/or the environmental objectives and/or environmental performance with the conditions of this statement, as and when directed by the **CEO**.
- D6-2 The independent audit must be carried out by a person with appropriate qualifications who is nominated or approved by the **CEO** to undertake the audit under condition D6-1.
- D6-3 The proponent must submit the independent audit report with the Compliance Assessment Report required by condition D2, or at any time as and when directed in writing by the **CEO**. The audit report is to be supported by credible evidence to substantiate its findings.
- D6-4 The independent audit report required by condition D6-1 is to be made publicly available in the same timeframe, manner, and form as a Compliance Assessment Report, or as otherwise directed by the **CEO**.

Table 1: Abbreviations and definitions

Acronym or abbreviation	Definition or term
Adverse impact /adversely impacted	<p>Negative change when compared to pre-construction conditions that is neither trivial nor negligible that could result in a reduction in health, diversity or abundance of the receptor/s being impacted, or a reduction in environmental value. Adverse impacts can arise from direct or indirect disturbance, or other impacts from the proposal.</p> <p>With specific reference to flora and vegetation this includes, but is not limited to, hydrological change, spread or introduction of environmental weeds, introduction or spread of disease, changes in erosion and edge effects.</p> <p>With specific reference to landforms this includes, but is not limited to, changes in erosion/deposition/accretion.</p>
Alkimos Dune Complex	As mapped by the Geoheritage Sites and Reserve Register, Western Australia; unique ID: ANZWA1220000661; housed by Department of Mines, Industry Regulation, and Safety; accessed on 21 March 2023 http://www.dmp.wa.gov.au/datacentre
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ (2000))
Area 10b	An area referred to in Attachment 1, Specification 2-1 and spatially defined in the attached Figure of Ministerial Statement 722 as one of the areas to be protected and managed for conservation purposes to protect the integrity, function, and environmental value of the bushland to the requirements of the WAPC on advice of the EPA, and shall only be used for conservation, landscape, and complementary purposes. Minor infrastructure may be installed within these areas, providing the work is undertaken in accordance with a Management Plan approved by the EPA.
Authorised offsets	<p>Units representing GHG emissions issued under one of the following schemes and cancelled or retired in accordance with any rules applicable at the relevant time governing the cancellation or retiring of units of that kind:</p> <ul style="list-style-type: none"> (a) Australian Carbon Credit Units issued under the <i>Carbon Credits (Carbon Farming Initiative) Act 2011</i> (Cth); (b) Verified Emission Reductions issued under the Gold Standard program; (c) Verified Carbon Units issued under the Verified Carbon Standard program; or

	(d) other offset units that the Minister has notified the proponent in writing meet integrity principles and are based on clear, enforceable, and accountable methods.
Benthic communities and habitats	Functional ecological communities that inhabit the seabed and the areas of seabed that support these communities (e.g. high relief reef, platform reef, sand). The communities may include biota such as algae, seagrass and corals that obtain their energy primarily from photosynthesis, or animals such as ascidians, soft corals and some sponges that obtain their energy primarily by consuming live or dead organisms
Black cockatoos	Carnaby's black cockatoo (<i>Calyptorhynchus latirostris</i>) and forest red-tailed black cockatoo (<i>Calyptorhynchus banksii naso</i>)
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <i>Environmental Protection Act 1986</i> , or the CEO's delegate.
Clean in place chemicals	Clean in place chemicals are additional chemicals injected into treated wastewater streams from time to time during operations to ensure pipelines remain functional.
Commencement of operations	Means commencing operation of the proposal.
Commissioning	The testing phase of the equipment and seawater desalination plant, prior to the operations phase.
Confirm/ confirmed/ confirmation	<p>In relation to a plan required to be made and submitted to the CEO, means, at the relevant time, the plan that the CEO confirmed, by notice in writing, meets the requirements of the relevant condition.</p> <p>In relation to a plan required to be implemented without the need to be first submitted to the CEO, means that plan until it is revised, and then means, at the relevant time, the plan that the CEO confirmed, by notice in writing, meets the requirements of the relevant condition</p>
Construction activities	Activities that are associated with the substantial implementation of the proposal, including but not limited to, earthmoving, vegetation clearing, grading or construction of right of way. Construction activities do not include Geotechnical investigations (including potholing for services and the installation of piezometers) and other preconstruction activities where no clearing of vegetation is required.

Contingency measures	Planned actions for implementation if it is identified that an environmental outcome, environmental objective, threshold criteria , Environmental Quality Standards or management target are likely to be, or are being, exceeded. Contingency measures include changes to operations or reductions in disturbance or adverse impacts to reduce impacts and must be decisive actions that will quickly bring the impact to below any relevant threshold, management target and to ensure that the environmental outcome and/or objective can be met.
DBCA	The Department of Biodiversity, Conservation and Attractions.
Detecting/ Detectable	The smallest statistically discernible effect size that can be achieved with a monitoring strategy designed to achieve a statistical power value of at least 0.8 or an alternative value as determined by the CEO .
Disturb/ Disturbed/ Disturbance	<p>Flora – result in death, destruction, removal, severing or doing substantial damage to</p> <p>Fauna – has the effect of altering the natural behaviour of fauna to its detriment</p> <p>Benthic communities and habitats – measurable adverse impact on benthic communities or habitats that does not result in irreversible loss</p> <p>Direct – causes or immediately has the disturbance effect</p> <p>Indirect – materially contributes to the disturbance effect</p>
Emissions intensity	Proposal GHG emissions per tonnes per annum of product produced.
Environmental value	A beneficial use, or ecosystem health condition.
Environmental Quality Guidelines	Threshold numerical values or narrative statements which if met indicate there is a high degree of certainty that the associated environmental quality objective has been achieved.
Environmental Quality Standards	Threshold numerical values or narrative statements that indicate a level which if not met indicates there is a significant risk that the associated environmental quality objective has not been achieved and a management response is required.
Environmental weeds	Any plant declared under section 22(2) of the <i>Biosecurity and Agriculture Management Act 2007</i> , any plant listed on the Weeds of National Significance List and any weeds listed on the Department of Biodiversity, Conservation and Attractions' Swan

	Region Impact and Invasiveness Ratings list, as amended, or replaced from time to time.
Fauna handler	A person who is qualified and licenced under section 40 of the <i>Biodiversity Conservation Act 2016</i> .
GHG emissions	Greenhouse gas emissions expressed in tonnes of carbon dioxide equivalent (CO ₂ -e) as calculated in accordance with the definition of 'carbon dioxide equivalence' in Section 7 of the National Greenhouse and Energy Reporting Act 2007 (Cth), or, if that definition is amended or repealed, the meaning set out in an Act, regulation or instrument concerning greenhouse gases as specified by the Minister.
Greenhouse gas or GHG	Has the meaning given by Section 7A of the <i>National Greenhouse and Energy Reporting Act 2007</i> (Cth) or, if that definition is amended or repealed, the meaning set out in an Act, regulation or instrument concerning greenhouse gases as specified by the Minister.
Ground disturbing activities	Any activity or activities undertaken in the implementation of the proposal, including any clearing, civil works, or construction.
Ha	Hectare.
High Ecological Protection Areas	The area outside the Low Ecological Protection Area and as defined in the <i>Technical Guidance Protecting the Quality of Western Australia's Marine Environment</i> , as amended from time to time, and available at www.epa.wa.gov.au .
Integration pipeline	As defined in the proponent's Proposal Content Document, as amended by section 43A of the <i>Environmental Protection Act 1986</i> , or any future amendments approved under the <i>Environmental Protection Act 1986</i> .
Irreversible loss	Adverse impact which is unlikely to, or does not return to the pre-impact state within five (5) years following the completion of proposal related activities that are likely to have an impact on benthic communities and habitats .
Land acquisition	The protection of environmental values on an area of initially unprotected land for the purpose of conservation through improved security of tenure or restricting the use of land (e.g. ceding land to the Crown or perpetual conservation covenants). This includes upfront costs of establishing the offset site and the on-going management costs of maintaining the offset for the long term (20 years).

Large-scale generation certificates	Means a certificate created under the Renewable Energy (Electricity) Act 2000
Low Ecological Protection Area	The Low Ecological Protection Area is defined as the 100 m radius from the centre point of each outfall diffuser.
Management actions	The identified actions implemented with the intent of achieving the environmental objective.
Management targets	A type of indicator to evaluate whether an environmental objective is being achieved.
Marine construction activities	Activities that are associated with the substantial implementation of the marine related aspects of the proposal, including but not limited to, earthmoving, underwater drilling, disturbance of the seabed and any other activity that may disturb significant marine fauna .
Marine development envelope	The area shown within Figure 2 and defined by coordinates in Schedule 1.
Marine environmental value	Particular values or uses of the marine environment that are important for a healthy ecosystem or for public benefit, welfare, safety or health and which require protection from the effects of pollution, waste discharges and deposits as defined in the Technical Guidance Protecting the Quality of Western Australia's Marine Environment, as amended from time to time, and available at www.epa.wa.gov.au .
Marine Water Quality Technical Guidance	<i>Technical Guidance for protecting the quality of Western Australia's marine environment</i> , as amended from time to time, and available at www.epa.wa.gov.au .
National Cetacean Sighting Database	The database maintained by the Commonwealth Department of Climate Change, Energy, the Environment and Water.
Net scope 1 and 2 GHG emissions	<p>Proposal GHG emissions for a period less any reduction in GHG Emissions represented by the cancellation or retirement of large-scale generation certificates and authorised offsets which:</p> <p>(a) were cancelled or retired between the first day of the period until 1 March in the year after the period has ended;</p>

	<p>(b) have been identified in the report for that period as required by condition B7-5(1)(b)(iv);</p> <p>(c) have not been identified as cancelled or retired in the report for that period as required by condition B7-5(1)(b)(iv);</p> <p>(d) have not been used to offset any GHG emissions other than proposal GHG emissions; and</p> <p>(e) were not generated by avoiding proposal GHG emissions.</p>
On-ground management	This includes revegetation (re-establishment of native vegetation in degraded areas) and rehabilitation (in the context of repair of ecosystem processes including actions such as, but not limited to, management of weeds, disease, or feral animals) with the objective to achieve a tangible improvement to the environmental values in the offset area.
Operations	Operation of the plant and pipeline infrastructure for the proposal.
Potential nesting trees	Any existing tree of a species known to support black cockatoo breeding which has a diameter at breast height of 500 millimetres or greater that therefore may develop a nest hollow.
Proposal GHG emissions	GHG emissions released to the atmosphere as a direct result of an activity or series of activities that comprise/s or form/s part of the proposal, including scope 2 emissions from electricity consumption from the South West Interconnected System.
Proposed Offset Conservation Areas	Areas required to be spatially defined by condition B8-3(3) and proposed to receive offset measures.
Research offset	A program or study that must be reasonably related to the impact and is designed to result in a positive conservation outcome. It may include improving the management and protection of existing conservation estate, adding to existing State Government initiatives, policies, or strategies, or addressing priority knowledge gaps.
Regionally significant bushland	All bushland (which may include wetland areas) within a Bush Forever area that meets the Bush Forever criteria for regional significance (Government of Western Australia 2000a and 2000b) ⁴ .

⁴ Government of Western Australia 2000a, Bush Forever Volume 1, Western Australian Planning Commission, Perth, Western Australia.

Government of Western Australia 2000b, Bush Forever Volume 2, Department of Environmental Protection, Perth, Western Australia.

Rehabilitate/ Rehabilitated/ Rehabilitation	Rehabilitation in the context of re-establishing dune values / temporary cleared areas and recontouring / reconnecting disturbed dunes within the Alkimos Dune Complex to the maximum environmental value that is considered reasonable and to achieve the environmental objectives in condition B3-2 and requirements of condition B3-3.
Relevant management body	A party or parties that has a role in the establishment and/or ongoing management of the Proposed Offset Conservation Area . Note: This includes the role of the proponent.
Revegetate/Rev vegetation	Re-establishment of native vegetation/habitat in degraded areas.
Self-sustaining	Refers to vegetation that can survive (continue indefinitely) without on-going management actions such as watering, weed control or infill planting.
Significant marine fauna	Includes cetaceans, penguin, and pinnipeds.
South West Interconnected System	The South West Interconnected System is a medium-sized power system serving the southwest region of Western Australia.
Suitable nesting hollows	Any hollow with dimensions suitable for use for nesting by black cockatoos . Characteristics of hollows used by each species is available in the SPRAT database http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
Suitable nesting trees	Trees with suitable nesting hollows present, although no evidence of use.
Tangible improvement	A perceptible, measurable, and definable improvement that provides additional ecological benefit and/or value.
Targeted flora survey	The targeted flora survey results, and supporting spatial data described in the report <i>Alkimos Seawater Desalination Plant Project Pipeline Survey – Species Specific Targeted Flora Survey</i> (SLR Consulting 2023)
Terrestrial development envelope	The shown within Figure 1 and defined by coordinates in Schedule 1.
Threshold criteria	The indicators that have been selected to represent limits of impact beyond which the environmental outcome is not being met.

Trench/ Trenches/ Trenching	Any excavation that is of sufficient depth that would cause vertebrate fauna to be become trapped and unable to escape and would include, but not be limited to, trenches, tunnels or pits for utilities, pipelines, dewatering or bell holes.
Trigger criteria	Indicators that have been selected for monitoring to provide a warning that if exceeded the environmental outcome may not be achieved.
Vegetation Condition	The condition of native vegetation rated in accordance with the <i>Technical guidance – Flora and vegetation surveys for environmental impact assessment (EPA 2016)</i> including any revision to this technical guidance.
Westerly-facing berm	As described in the proponents ERD p.192 "The western boundary [of the] seawater desalination plant development envelope incorporates a sand berm with a finished top surface level of approximately 30 mAHD. This berm effectively connects the existing southern and northern sand dunes and forms a visual barrier to the plant from the future western residential development."
Zones of High Impact	Areas within ten (10) m of the drilling sites for the marine seawater intake and wastewater discharge infrastructure.

Figures (attached)

- Figure 1 Alkimos Seawater Desalination Plant terrestrial and marine development envelopes (This figure/map is a representation of the coordinates referenced in Schedule 1)
- Figure 2 Alkimos Seawater Desalination Plant marine development envelope (This figure/map is a representation of the coordinates referenced in Schedule 1)
- Figure 3 Potential occurrence of floristic community type 20a, required to be surveyed (This figure/map is a representation of the co-ordinates referenced in Schedule 1)

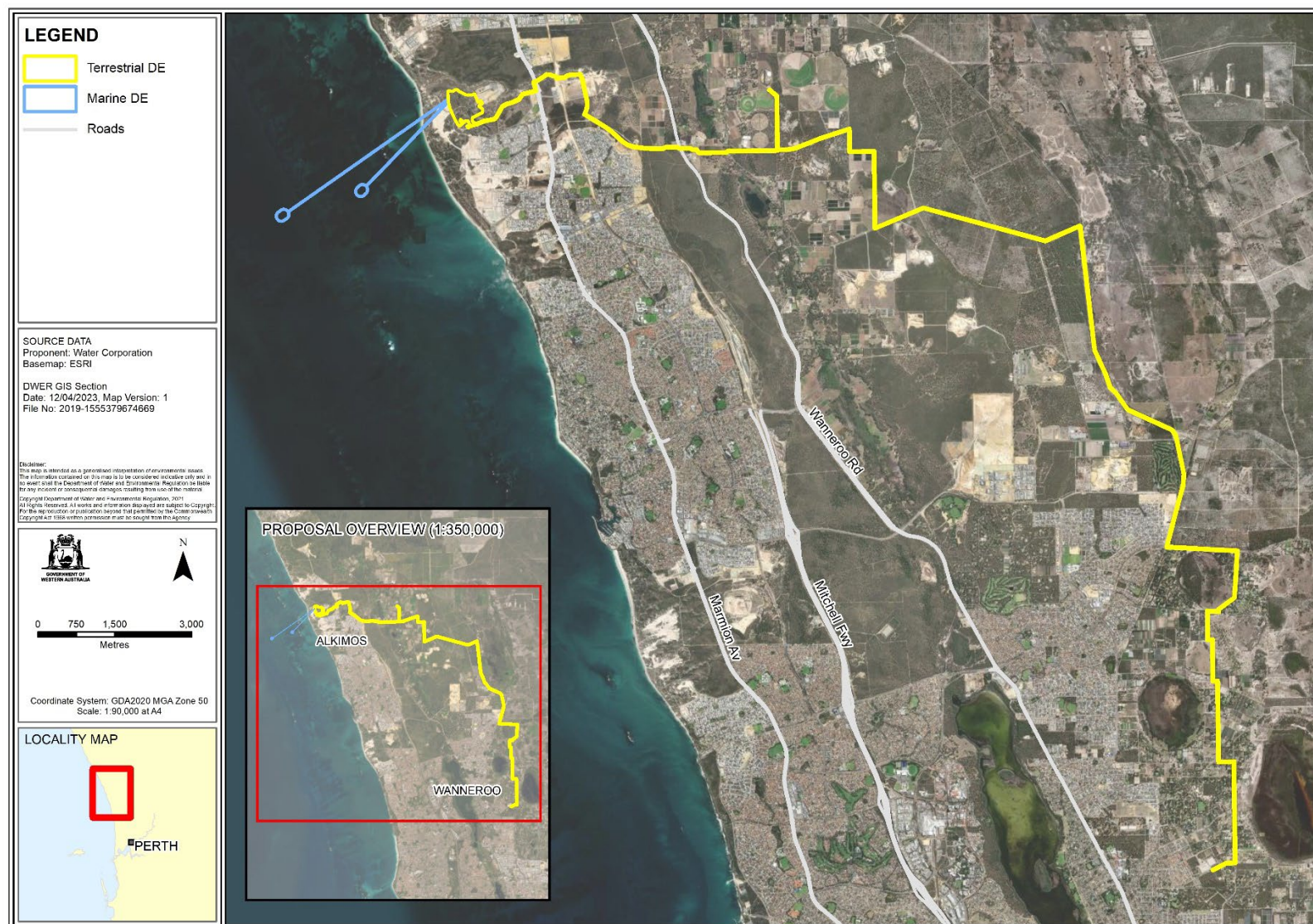
Figure 1 Alkimos Seawater Desalination Plant terrestrial and marine development envelopes

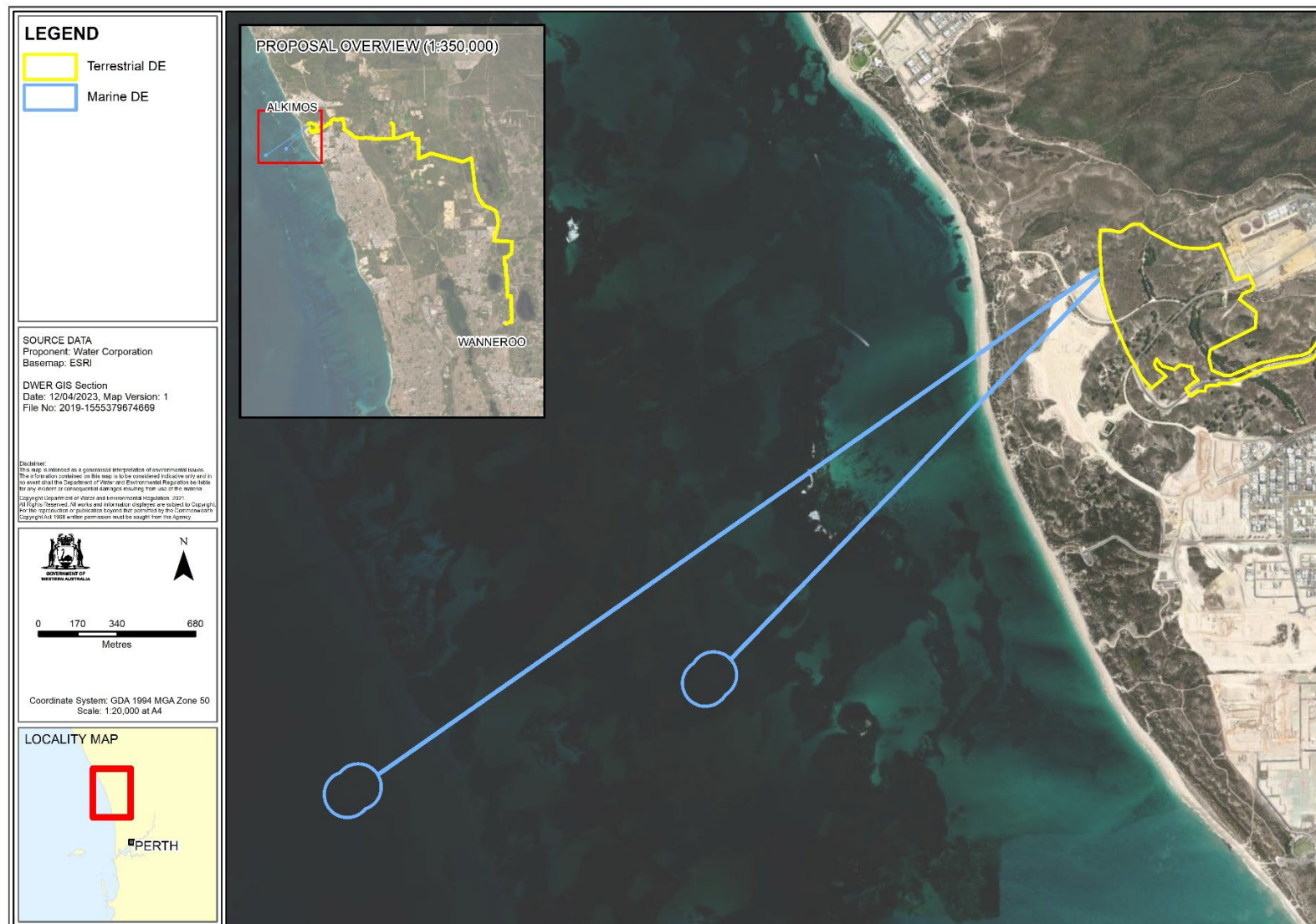
Figure 2 Alkimos Seawater Desalination Plant marine development envelope

Figure 3 Potential occurrence of floristic community type 20a, required to be surveyed



Schedule 1

All coordinates are in metres, listed in Map Grid of Australia Zone 50 (MGA Zone 50, datum of Geocentric Datum of Australia 1994 (GDA94)).

Spatial data depicting the figures are held by the Department of Water and Environmental regulation. Record no. DWERDT773469.

Appendix B: Decision-making authorities

Section 45 of the *Environmental Protection Act 1986* requires the Minister for Environment to determine which or whom of the decision-making authorities (DMA) in relation to the assessed proposal the Minister considers to be a key DMA. The Minister must consult, and if possible, agree with the key DMA(s) on the implementation issues.

The EPA has identified the relevant DMAs for the proposal in Table B1.

Table B1: Relevant DMAs

Decision-Making Authority	Legislation (and approval)
1. Minister for Environment	<i>Biodiversity Conservation Act 2016</i> - section 45 authority to modify occurrence of a threatened ecological community
2. Minister for Lands	<i>Land Administration Act 1997</i> - section 91 licence to access crown land
3. Minister for Planning	<i>Planning and Development Act 2005</i> - Scheme amendment
4. Minister for Water	<i>Rights in Water and Irrigation Act 1914</i> - groundwater abstraction licence (dewatering)
5. Chief Executive Officer, Department of Biodiversity, Conservation and Attractions	<i>Conservation and Land Management Act 1984</i> - permit/lease/licence in respect of State forests, timber reserves, national parks, conservation parks, nature reserves, marine nature reserves, marine parks, marine management areas and land vested in Conservation and Parks Commission
6. Chief Executive Officer, Department of Water and Environmental Regulation	<i>Environmental Protection Act 1986</i> - part V works approval and licence - approval for noise management plans for construction outside of prescribed hours
7. Chief Dangerous Goods Officer Department of Mines, Industry Regulation and Safety	<i>Dangerous Goods Safety Act 2004</i> - storage and handling of dangerous goods
8. Chairman, Western Australian Planning Commission	<i>Planning and Development Act 2005</i> - development application

Appendix C: Environmental Protection Act principles

Table C1: Consideration of principles of the *Environmental Protection Act 1986*

EP Act principle	Consideration
<p>1. The precautionary principle</p> <p><i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</i></p> <p><i>In application of this precautionary principle, decisions should be guided by –</i></p> <p>(a) careful evaluation to avoid, where practicable, serious, or irreversible damage to the environment; and</p> <p>(b) <i>an assessment of the risk-weighted consequences of various options.</i></p>	<p>The EPA has considered the precautionary principle in its assessment, and has had particular regard to this principle in its assessment of Flora and Vegetation, Terrestrial Fauna and GHG:</p> <p><u>Flora and Vegetation, and Terrestrial Fauna</u></p> <p>The proponent has investigated the biological and physical environment to identify environmental values of the proposal area. The EPA notes that the proponent has undertaken avoidance and mitigation measures to avoid potential serious or irreversible damage to the environment by:</p> <ul style="list-style-type: none"> • avoiding clearing 3 individuals (and root systems) of threatened flora species <i>Melaleuca</i> sp. Wanneroo (G. J. Keighery 16705) recorded during the surveys • avoiding clearing of any areas identified as Floristic Community Type (FCT) 20a '<i>Banksia attenuata</i> woodland over species rich dense shrublands' DBCA listed TEC (endangered) after requiring further detailed survey work • aligning the pipeline in existing cleared roads and tracks where possible • pre-clearance inspection of fauna habitat and fauna relocation as required. <p><u>Greenhouse Gas Emissions</u></p> <p>The EPA notes that climate change as a result of cumulative GHG emissions has the potential to cause serious damage to WA's environment. The specific impacts of any single proposal's GHG emissions are not able to be known with certainty at this time. However, the EPA has not used this as a reason for postponing assessment of the proposal's contribution to the State's GHG emissions or recommending practicable conditions to reduce emissions in order to minimise the risk of environmental harm associated with climate change.</p> <p>For this proposal, the proponent has committed to net zero Scope 1 and 2 GHG emissions for the construction and operation of the proposal. Consistent with this the EPA has recommended conditions to ensure the achievement and reporting of net zero GHG emissions limits in condition B7.</p>

EP Act principle	Consideration
	<p>The EPA has recommended conditions to ensure that environmental outcomes are achieved, and that monitoring is conducted during implementation of the proposal. From its assessment of this proposal the EPA has concluded that there is no threat of serious or irreversible harm.</p>
<p>2. The principle of intergenerational equity</p> <p><i>The present generation should ensure that the health, diversity, and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	<p>The EPA has considered the principle of intergenerational equity in its assessment and has had particular regard to this principle in its assessment of Flora and Vegetation, Terrestrial Fauna, Social Surroundings, Marine Environmental Quality, Benthic Habitat and Communities, Marine Fauna, Landforms and GHG emissions.</p> <p>The EPA notes that the proponent has identified measures to avoid and minimise impacts to the key environmental factors. The EPA has considered these measures during its assessment and has recommended conditions to ensure that appropriate measures are implemented.</p> <p>The EPA considers consistency with this principle could be achieved with the implementation of its recommended conditions, which requires the proponent to:</p> <ul style="list-style-type: none"> • Limit the extent of disturbance to flora, vegetation, and fauna habitat types • Limit the extent of disturbance to dune complex • manage potential adverse impacts • Maintain levels of ecological protection within the marine environment • Limit the extent of direct and indirect disturbance to benthic communities • Minimise the risk of behavioural changes, health impacts, physical injury, or mortality from underwater noise emissions from marine construction to significant marine fauna (including temporary or permanent hearing loss) • Offset significant residual impacts <p><u>Greenhouse Gas Emissions</u></p> <p>The EPA has noted that GHG emissions pose a risk to future generations, however, also notes that the proponent has committed to net zero Scope 1 and 2 GHG emissions for the construction and operation of the proposal. The EPA has recommended condition B7 to ensure this.</p>

EP Act principle	Consideration
	<p>The EPA has concluded that the environmental values will be protected, and the health, diversity and productivity of the environment will be maintained for the benefit of future generations.</p>
<p>3. The principles of the conservation of biological diversity and ecological integrity</p> <p><i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>	<p>The EPA has considered the principle of conservation of biological diversity and ecological integrity in its assessment, and has had particular regard to this principle in its assessment of flora and vegetation, terrestrial fauna, benthic habitats and communities and marine fauna.</p> <p><u>Flora and Vegetation and Terrestrial Fauna</u></p> <p>The EPA has considered to what extent the potential impacts from the proposal to flora and vegetation and terrestrial fauna can be ameliorated to ensure consistency with the principle of conservation of biological diversity and ecological integrity, including by provision of offsets. The EPA has concluded that given the impacts are significant (areas of vegetation and habitat for conservation significant fauna species and communities that will be cleared) that the proposed offsets are likely to counterbalance the impacts of the loss of biological diversity and ecological integrity.</p> <p><u>Benthic Communities and Habitat and Marine Fauna</u></p> <p>The EPA has concluded that the actions to avoid and minimise impact to marine fauna (including, locating outfalls and intakes to avoid key benthic habitats and communities and 100 m buffer zone from key habitats), which are recommended as conditions, will likely conserve marine biological diversity and ecological integrity, so that environmental outcomes are achieved.</p>
<p>4. Principles relating to improved valuation, pricing, and incentive mechanisms</p> <p>(8) Environmental factors should be included in the valuation of assets and services.</p> <p>(9) The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance, or abatement.</p> <p>(10) The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.</p>	<p>The EPA has had regard to this principle during the assessment. In considering this principle, the EPA notes that the proponent will bear the costs relating to implementing the proposal to achieve environmental outcomes and management and monitoring of environmental impacts during construction, operation and decommissioning of the proposal.</p> <p>The EPA has had particular regard to this principle in considering Flora and Vegetation, Terrestrial Fauna, Marine Fauna and GHG emissions, including the costs of adopting advances in process management and other measures in the future to be consistent with the proponent's commitment to achieve net zero GHG emissions for Scope 1 and 2.</p>

EP Act principle	Consideration
(11) Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.	
<p>5. The principle of waste minimisation</p> <p><i>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</i></p>	<p>The EPA has considered the principle of waste minimisation in its assessment and has had particular regard to this principle in its assessment of GHG emissions and Marine Environmental Quality.</p> <p>The EPA has recommended a condition requiring the proponent to develop and implement a GHGMP that outlines emissions reduction measures to achieve the proponent's commitment for net zero GHG emissions for Scope 1 and 2.</p> <p>The EPA notes the proponent is proposing to minimise the discharge of waste into the environment by application of the mitigation hierarchy with regard to brine discharge to the marine environment.</p> <p>The EPA notes the proponent proposes to reuse natural materials, such as excavated dune sediment where possible and to adopt the hierarchy of waste controls avoid, minimise, reuse, recycle and safe disposal.</p>

Appendix D: Other environmental factors

Table D1: Evaluation of other environmental factors

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
Land			
Subterranean Fauna	Potential impacts during construction due to small scale de-watering. Potential removal of subterranean fauna habitat.	<u>Public comments</u> <ul style="list-style-type: none"> No public comments were received. <u>Agency comments</u> <ul style="list-style-type: none"> No agency comments were received. 	<p>Subterranean Fauna was not identified as a preliminary key environmental factor when the EPA set the level of assessment. The assessment of subterranean fauna within the proposal area concluded that:</p> <ul style="list-style-type: none"> Soil conditions within the DE are unlikely to support subterranean fauna The proposal is mostly located in previously disturbed areas which are unlikely to still support any cave systems. <p>Accordingly, the EPA did not consider subterranean fauna to be a key environmental factor at the conclusion of its assessment.</p>
Terrestrial Environmental Quality	Pipeline DE bisects a known contaminated site – Restricted use, other than for analytical testing or remediation.	<u>Public comments</u> <ul style="list-style-type: none"> No public comments were received. <u>Agency comments</u> <ul style="list-style-type: none"> No agency comments were received. 	<p>Terrestrial Environmental Quality was not identified as a preliminary key environmental factor when the EPA set the level of assessment. The assessment of Terrestrial Environmental Quality within the proposal area concluded that:</p> <ul style="list-style-type: none"> Potential impacts are localised, short-term and able to be remediated. Further investigations for current contaminated sites will be undertaken and additional management actions incorporated into the construction environmental management plan. No dewatering will occur without an approved ASS or dewatering management plan to be developed in accordance with DWER Guidelines.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			Accordingly, the EPA did not consider terrestrial environmental quality to be a key environmental factor at the conclusion of its assessment.
Water			
Inland Waters	<p>Areas of varying degrees of risk of ASS from low to high along the pipeline DE.</p> <p>A range of geomorphic wetlands are intersected by or occur in close proximity to the proposal, including Lake Joondalup, Nowergup Lake, Lake Pinjar, Jandabup Lake, and Mariginiup Lake. The pipeline bisects Camel Swamp, a REW, adjacent to an existing road and skirts MUW and CCW portions of Lake Pinjar and several smaller, unnamed wetlands.</p> <p>Construction water</p>	<p><u>Public comments</u></p> <ul style="list-style-type: none"> No public comments were received. <p><u>Agency comments</u></p> <ul style="list-style-type: none"> No agency comments were received. 	<p>Impacts to SCP wetlands have been minimised to the greatest extent possible. Locating the pipeline on the edge of wetlands is not likely to result in a significant impact to hydrological regimes or water quality if potential ASS are managed in accordance with standard guidelines.</p> <p>The location of the pipeline at Camel Swamp is unlikely to significantly impact hydrological regimes or water quality of the wetland given it will be located adjacent to the existing road and will be buried at shallow depth.</p> <p>By aligning the pipeline with existing roads and tracks to the extent possible, and given its shallow depth, the proponent has minimised to the greatest extent practicable the potential impacts to Inland Waters. The depth and diameter of the pipeline once constructed is unlikely to impede groundwater flow to an extent greater than the existing roads or tracks.</p> <p>Impacts to wetland vegetation are considered under the Flora & Vegetation factor. ASS can be managed in accordance with standard guidelines and recommended conditions in B1.</p> <p>Accordingly, the EPA did not consider Inland Waters to be a key environmental factor at the conclusion of its assessment.</p>
Air			
Air Quality (Odour)	<p>The operation of the proposal has the potential to increase odour impacts from marine intake.</p> <p>Increased dust during construction activities.</p>	<p>Public comments</p> <ul style="list-style-type: none"> No public comments were received. <p>Agency comments</p> <ul style="list-style-type: none"> No agency comments were received. 	<p>Air Quality was identified as a preliminary key environmental factor when the EPA set the level of assessment.</p> <p>The assessment of Air Quality within the proposal area concluded that:</p> <p>The proponent has indicated that odour from the existing wastewater treatment plant has been reported by nearby</p>

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			<p>residents, and the operation of the desalination plant has the potential to increase odour impacts from biological material in the marine intake. However, the use of a macerator to process the waste and discharge back into the marine environment via the outfall – rather than onsite waste management, would minimise the potential for significant increases in odour.</p> <p>Dust control measures will be implemented during construction, including ceasing dust producing activities immediately should dust suppression measures prove ineffective.</p> <p>Dust emissions potentially produced during construction and operations at the plant site from aeolian erosion within the dune system have been assessed under landforms and can be managed in accordance with condition B3.</p> <p>It is not likely that the proposal will have a significant impact on air quality, and the proposal is likely to be consistent with the EPA objective for air quality. Accordingly, the EPA did not consider Air Quality to be a key environmental factor at the conclusion of its assessment.</p>
Sea			
Coastal Processes	<p><i>Sediment transport</i> The potential to alter morphology of coastal zone.</p> <p><i>Public amenity</i> Public access to beaches may be limited during pipeline installation.</p>	<p><u>Public comments</u></p> <ul style="list-style-type: none"> No public comments were received. <p><u>Agency comments</u></p> <ul style="list-style-type: none"> No agency comments were received. 	<p>Coastal Processes was not identified as a preliminary key environmental factor when the EPA set the level of assessment. The assessment of coastal processes within the proposal area concluded that:</p> <ul style="list-style-type: none"> The proposed construction methods, particularly tunnelling under the dune system and seabed, will have negligible effects on the morphology of the coastal zone and the geophysical processes on the Alkimos coastal zone. The presence of the marine intake and outfall tunnels will not result in long-term changes in sediment transportation.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			<ul style="list-style-type: none"> • Presence of the intake and outfall tunnels will not cause any long-term change in existing beach access or amenity. <p>Sediment transport patterns and long-term continuity of public access are aligned with the WA Coastal Zone Strategy (DPLH 2017).</p> <p>It is likely that the proposal will be consistent with the EPA objective for coastal processes. Accordingly, the EPA did not consider Coastal Processes to be a key environmental factor at the conclusion of its assessment.</p>
People			
Human Health	No potential impacts identified.	<p><u>Public comments</u></p> <ul style="list-style-type: none"> • Concerns over potential hazards and the processes used to identify them. • Concerns over nuclear waste being present in the seawater used for desalination. <p><u>Agency comments</u></p> <ul style="list-style-type: none"> • No agency comments were received. 	<p>Human Health was not identified as a preliminary key environmental factor when the EPA set the level of assessment. The assessment of Human Health within the proposal area concluded that:</p> <ul style="list-style-type: none"> • There are no potential radiation impacts identified from the proposal. • Desalinated water is generally considered to have very low mineral content with the desalination processes effective in the removal of radionuclides • Water Corporation distribution networks are routinely monitored for radiological values downstream in accordance with the Australian Drinking Water Guidelines 2011 Version 3.7 (NHMRC 2022) at one yearly or five yearly intervals. <p>It is likely that the proposal will be consistent with the EPA objective for Human Health. Accordingly, the EPA did not consider human health to be a key environmental factor at the conclusion of its assessment.</p>

Appendix E: Relevant policy, guidance, and procedures

The EPA had particular regard to the policies, guidelines and procedures listed below in the assessment of the proposal.

- *Environmental factor guideline – Benthic communities and habitats* (EPA 2016a)
- *Environmental factor guideline – Flora and vegetation* (EPA 2016b)
- *Environmental factor guideline – Greenhouse gas emissions* (EPA 2020a)
- *Environmental factor guideline – Landforms* (EPA 2018)
- *Environmental Factor Guideline – Marine environmental quality* (EPA 2016c)
- *Environmental factor guideline – Marine fauna* (EPA 2016e)
- *Environmental factor guideline – Social surroundings* (EPA 2016f)
- *Environmental factor guideline – Terrestrial fauna* (EPA 2016g)
- *Environmental impact assessment (Part IV Divisions 1 and 2) procedures manual* (EPA 2021)
- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014)
- *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021d)
- *Environmental impact assessment (Part IV Divisions 1 and 2) administrative procedures 2021* (State of Western Australia 2021)
- *Technical guidance – Environmental impact assessment of marine dredging proposals* (EPA 2021e)
- *Technical guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016h)
- *Technical guidance – Protection of benthic communities and habitats* (EPA 2016j)
- *Technical guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020b).

Appendix F: List of submitters

7-day comment on referral

Organisations and public

- Anonymous
- Blair Homan
- Damien McKenna
- Deirdre Gilluley
- Hayley Byok
- Jackson Botfield
- Nick Byok
- Regge Yyonne
- Hon. Diane Evers MLC, Greens WA

Public review of proponent information

Organisations and public

- Murdoch University - Black cockatoo Conservation Management Project
- Western Australian Fishing Industry Council
- Quinn's Rock Environmental Group Inc.
- Brian Smith
- Dave Kabay
- David Wake
- Tess Robinson
- Jessica Swindlehurst
- Paul McIntosh
- Paul Reed
- Ruth Morgan, Andrea Gaynor & Margaret Cook
- Stephanus
- Stewart Dallas

Government agencies

- Department of Mines, Industry Regulation and Safety
- Department of Primary Industries and Regional Development
- Department of Planning, Lands and Heritage

Appendix G: Assessment timeline

Date	Progress stages	Time (weeks)
12 June 2019	EPA decided to assess – level of assessment set	
8 May 2020	EPA approved Environmental Scoping Document	47
21 September 2022	EPA accepted Environmental Review Document	119
28 September 2022	Environmental Review Document released for public review	1
25 October 2022	Public review period for Environmental Review Document closed	8
15 February 2023	EPA received draft response to submissions	16
16 March 2023	EPA completed its assessment, subject to receiving a final response to submissions	4
13 April 2023	EPA received final response to submissions	4
19 May 2023	EPA provided report to the Minister for Environment (s. 44(2b))	6 weeks
24 May 2023	EPA report published	3 days
14 June 2023	Appeals period closed	3

Timelines for an assessment may vary according to the complexity of the proposal and are usually agreed with the proponent soon after the EPA decides to assess the proposal and records the level of assessment.

In this case, the EPA met its timeline objective to complete its assessment and provide a report to the Minister.

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