



ALKIMOS WATER PRECINCT

Environmental Management Plan

August 2022





Document Information

Title	Alkimos Water Precinct – Environmental Management Plan
Reference	140803399

Rev No	Date	Author	Reviewer	Key Changes/Comments
0		AROONA	AROONA	
1	5/11/2018	Bree Atkinson	Craig Byers Andrew Cove	Draft issued to EPA and WAPC for approval
2	30/08/2022	P Zahra		submitted to EPA within Alkimos ERD



CONTENTS

1	Purpose and Scope	4
2	Roles and Responsibilities	7
3	Background	7
3.1	Introduction	7
3.2	Site Setting	7
3.3	Tenure and land use	8
3.4	Statutory Requirements and Obligations	8
4	Objectives and Management Principles	11
5	Risks to be managed	14
5.1	Environmental and Conservation Values	14
5.2	Fire Risk Assessment	14
5.2.1	<i>Firebreaks</i>	15
5.2.2	<i>Fire-fighting Water Supply</i>	15
5.2.3	<i>Trespass and Vandalism (Security)</i>	15
6	Management Plan	16
6.1	Management of Environmental and Conservation Values	16
6.1.1	<i>Conservation Areas 9a, 10a and 10b</i>	16
6.1.2	<i>Areas outside conservation areas</i>	17
6.1.3	<i>Bush Forever Site 397 (Lot 9001)</i>	18
6.2	Fire and Fire Management	18
6.2.1	<i>Roads and firebreaks</i>	18
6.2.2	<i>Fire-fighting Water Supply</i>	19
6.2.3	<i>Trespass and Vandalism (Security)</i>	19
7	Summary of Management Actions	21

TABLES

Table 1: Commitments to Manage the Alkimos Water Precinct	4
Table 2: Summary of Management Principles for each Management Area	12
Table 3: Provenance species to be used in infill seeding	17
Table 4: Summary of Management Actions	21

FIGURES

Figure 1: Management Area Boundaries	5
Figure 2: Future potential assets within the Alkimos Water Precinct	6
Figure 3: Land use classification and future surrounding development	8
Figure 4: Conservation Areas within Lot 3000	10
Figure 5: Signage and Fencing Plan	20



1 Purpose and Scope

This document provides a plan to manage environmental and fire risks associated with the Alkimos Water Precinct including existing and future assets. The purpose of this Management Plan is to summarise the key values, threats and on-going management requirements for the conservation and management of Lot 3000 and the portion of Lot 9001 owned by the Water Corporation.

Future development is planned to be undertaken on lot 9001 therefore the boundary and scope of this management plan is restricted to the Management Area boundaries delineated in Figure 1.

The plan sets the environmental objectives and minimum requirements to prevent and minimise environmental impacts to maintain the designated conservation areas and to minimise fire risks on Water Corporation assets, the environment and the surrounding community.

Long term planning supports opportunities to locate multiple water infrastructure assets including the:

- Alkimos WWTP (Ultimate Capacity 160ML/day),
- Alkimos Seawater Desalination Plant (100GL),
- Eglinton Groundwater Treatment plant (6GL), and
- Alkimos Advanced Water Recycling Plant

Figure 2 shows the proposed layout for potential future assets.

This management plan is applicable to current and future potential assets. The obligation to protect, conserve and manage the site is limited to the following in Table 1: Commitments to Manage the Alkimos Water PrecinctTable 1.

Table 1: Commitments to Manage the Alkimos Water Precinct

Commitment	Definition	Action
Protect	Prevent unauthorised access to the bushland, conservation and rehabilitation areas.	Fencing, barriers, signage and security measures are typical tools used to “protect” land. Various standards of fencing and signage to be applied depending upon the conservation or security objectives to be achieved.
Manage	To implement appropriate strategies to mitigate risk of: <ul style="list-style-type: none"> • Fire • Loss of flora species distribution and density, where rehabilitation has been required, or damage has occurred • Unauthorised entry/clearing 	<p>Maintenance of Fire-breaks and controlled access points to them, fuel load inspections and fuel reduction programs, weeding and infill planting in areas of damage/loss of vegetation and security patrols.</p> <p>Routine maintenance of fences, barriers, gates and signage.</p>
Conserve	To ensure the conservation areas are protected from harm, loss, change, or degradation as is reasonably practicable.	Protection and management strategies are the tools for effective conservation.

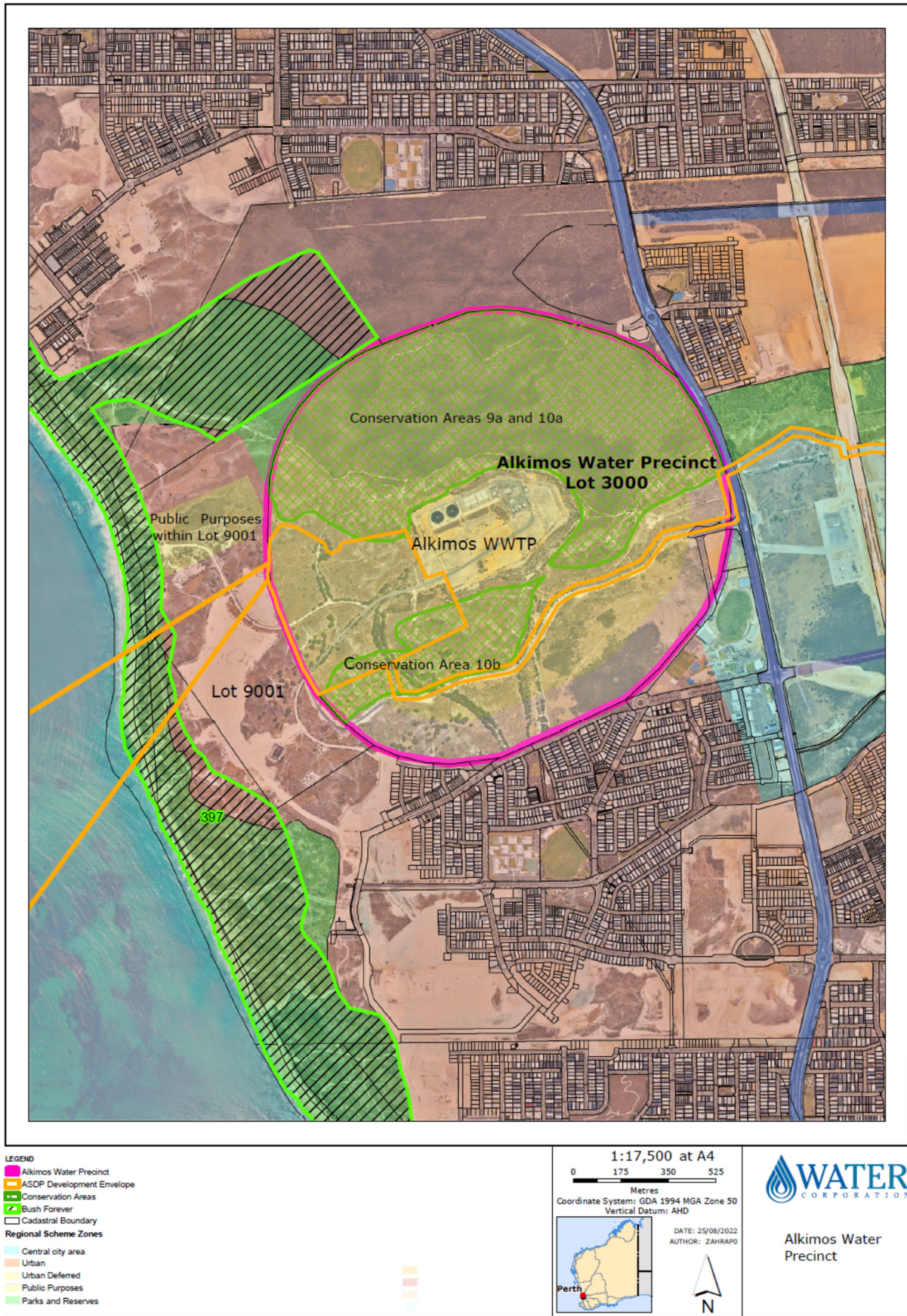


Figure 1: Management Area Boundaries



Concept design only – subject to change

Figure 2: Future potential assets within the Alkimos Water Precinct



2 Roles and Responsibilities

These requirements and obligations should be managed into the future by way of operational and maintenance provisions by the Water Corporation.

These requirements must be addressed by contractors, operators and alliances when undertaking construction, operations and routine maintenance activities.

3 Background

3.1 Introduction

In 2006 the Western Australian Planning Commission (WAPC) put forward a proposal to amend reservations and zonings in the Metropolitan Regional Scheme (MRS) consistent with the Alkimos-Eglinton Structure Plan. This proposal was assessed by the Environmental Protection Authority (EPA) under the provisions of the *Environmental Protection Act 1986*. MRS Amendment 1029/33 was endorsed by the Minister for Environment and issued Ministerial Statement 722.

As part of Ministerial Statement 722, certain areas were set out surrounding the proposed Alkimos Wastewater Treatment Plant as Conservation Areas 9a, 10a and 10b.

The Water Corporation currently operates the wastewater treatment asset on Lot 3000 at Alkimos. The Alkimos wastewater treatment plant (WWTP) was assessed by the EPA and approved by the Minister in 2007 (Statement 755).

The Alkimos WWTP and its surrounding buffer is subject to a number of statutory requirements arising from various approvals processes (by way of Ministerial Conditions) and from approved management plans required by those conditions.

This management plan has been revised to incorporate future proposed plans for additional water assets to be located within the Alkimos Water Precinct, in accordance with the provisions of Ministerial Statement 722.

The current proposal for the Alkimos Seawater Desalination Plant (SDP), would require additional clearing within Area 9a and 10b. Any disturbance in these areas would be subject to relevant conditions of Ministerial Statement 722.

3.2 Site Setting

The Alkimos Water Precinct has been the subject of multiple flora and fauna surveys, including Baseline flora surveys undertaken by Ecoscape (2018), AECOM (2017), Strategen (2017) and Stantec (2020a) were conducted in accordance with the requirements for environmental surveying and reporting for flora and vegetation in Western Australia as outlined in the technical guidance.

Stantec have prepared a Consolidated Flora and Vegetation Report that combines the findings of all other surveys to date.

The site comprises of undulating, occasionally steep sand dunes, and swales supporting coastal heathland vegetation. The majority of the site (excluding cleared areas and areas containing planted eucalypts) contain some degree of foraging habitat for Carnaby's Black Cockatoos (ranging from 'poor' to 'high'). The highest quality foraging habitat is associated with areas of Banksia woodland in the north of the Survey Area.

The site contains a combination of relatively undisturbed land as well as areas which show signs of having been degraded for a long period of time through historical clearing and weed invasion. As such, vegetation condition within the survey area ranges from Completely Degraded to Excellent (Strategen, 2017).

Beyond a strip of intended residential land and a narrow coastal reserve, Lot 9001 adjoins the Indian Ocean to the west. Land adjoining to the north, east and south is zoned for future residential/urban development or for retention of bushland. Marmion Avenue adjoins the site to the east.



The WWTP is located on a cleared and levelled site within Lot 3000, serviced by an access road, underground power, a wastewater pressure main and an ocean outlet pipeline (both underground). The WWTP is enclosed within a double security and safety fence.

Bushland surrounding the WWTP and owned by the Water Corporation is designated as a buffer zone, the aim of which is to minimise odour impacts on future surrounding residential development. The boundary of the buffer zone, which is circular in shape, has not been delineated on the ground. Sections of the buffer area were cleared or excavated during construction of the WWTP. These areas have been reshaped and rehabilitated, including direct seeding of native vegetation species.

Almost all of the bushland has been subjected to inappropriate use over many years, including fire-lighting, illegal rubbish dumping, vandalism, and trespassing.

3.3 Tenure and land use

Lot 3000 and Lot 9001 are owned in freehold by the Water Corporation of Western Australia, of which portions are subject to urban development. The lots have multiple land use zonings under the Metropolitan Region Scheme (MRS) including Urban, Urban Deferred, Public Purposes – Water Service and Public Purposes – Protected and Managed for Conservation Purposes. Figure 3 shows the land use classification and future surrounding development.

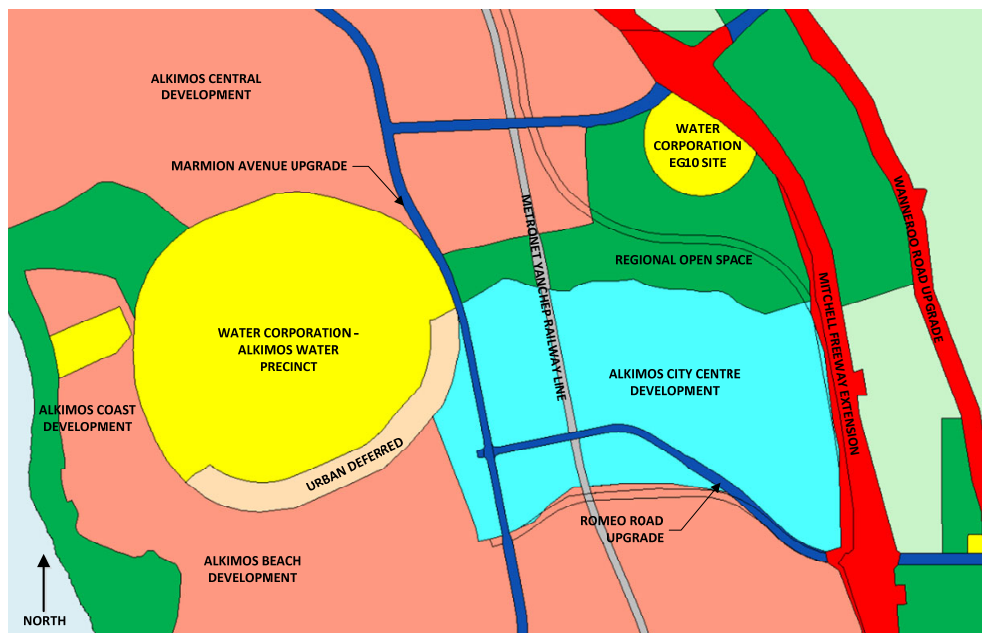


Figure 3: Land use classification and future surrounding development

3.4 Statutory Requirements and Obligations

This management plan is written to address the Metropolitan Region Scheme (MRS) Amendment 1029/33, (Ministerial Statement 722) requirements that require Areas 9a, 10a and 10b shall to the requirements of the WAPC on advice from the EPA, and shall only be used for conservation, landscape and complementary purposes (noting that minor infrastructure may be installed within these areas).

Ministerial Statement 755 (12 Nov 2007) Alkimos Wastewater Treatment Plant - Site B required a number of management plans to be approved and implemented with respect to temporary clearing, rehabilitation and maintenance of those areas. Specifically, certain areas were permitted to be cleared to facilitate construction of the WWTP, and were then to be restored and rehabilitated with only a limited area of permanent disturbance permitted post construction. Where restoration and rehabilitation has been required by Ministerial Condition or their



subordinate Management Plans, there is an obligation to manage and maintain the rehabilitation. Any need to clear those areas again in the future will require further EPA or DWER assessment and approval. Those areas include:

- The Wastewater Treatment Plant Site (areas of Temporary Clearing beyond the final approved permanent footprint;
- The Temporary Haul Road through Area 10b to construct the AWWTP, provided the dune was fully re-constructed and revegetated and maintained post construction (shaded yellow on Figure 2);
- The Quinn's Main Sewer Corridor within the Buffer as a condition of Clearing Permits issued under Part V of the Environmental Protection Act 1986 (shaded blue on Figure 2); and
- The Launch Site through the north/south coastal dune designated as Bush Forever Site 397 which similarly had to be reconstructed, revegetated and maintained (shaded dotted purple on Figure 2).

Figure 4 shows the areas requiring protection and management for conservation purposes. The Water Corporation therefore has obligations to protect, conserve, manage and maintain reasonably large tracts of land within its landholdings at Alkimos.



Figure 4: Conservation Areas within Lot 3000



4 Objectives and Management Principles

The objectives for the management of Lots 9001 and 3000 are as follows:

1. To discourage unauthorised entry onto the properties generally and in particular, into areas of medium to high conservation status;
2. To maintain the environmental and conservation values of areas of medium to high conservation status;
3. To rehabilitate areas of medium to high conservation status on the property damaged by unauthorised recreational activities;
4. To manage the WWTP and the surrounding buffer zone to mitigate the likelihood of high intensity bushfires; and
5. To provide “Fast Attack” 4WD firefighting appliances reasonable access to the bushland areas of Lot 3000.

Table 2: Summary of Management Principles for each Management AreaTable 2 below summarises the management principles according to each management area.



Table 2: Summary of Management Principles for each Management Area

Area	Requirement	Source	Conservation Status	Management Action	Ongoing Management Requirement
Area 9a Area 10 a Area 10b	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 from the EPA	<ul style="list-style-type: none"> MRS Amendment 1029/33 and appeal decisions 6 & 8; Ministerial Statement 722 	<ul style="list-style-type: none"> Medium - High Any clearing or development (with the exception of minor infrastructure works) will be subject to approval by WAPC and where relevant EPA approval. Any clearing or works shall be undertaken in accordance with this approved Management Plan. 	<ul style="list-style-type: none"> Identify and prevent access via strategic fencing and signage to delineate area. Provide security and access barrier/gates. Maintain selected existing tracks to a suitable standard for light "Fist attack" 4WD fire-fighting appliances as per Error! Reference source not found. 	<ul style="list-style-type: none"> Inspect fencing and signage. Repair and replace fencing and signage as recommended from the inspection. Conduct fuel load inspection of each vegetation type every 2 years. Where required, carry out mild-intensity mosaic fuel reduction.
Beach Dune and Haul Road Rehabilitation	Coastal dune and Haul Road restored and revegetated to be protected, managed and maintained.	WAPC and EPA requirement required in Condition 6, Ministerial Statement 755 - Terrestrial Construction Management Plan	<ul style="list-style-type: none"> High Cannot be re-developed without detailed WAPC and EPA assessment. Any clearing or works shall be undertaken in accordance with this approved Management Plan and in consultation with the WAPC and EPA. 	<ul style="list-style-type: none"> Install and maintain fencing and signage to delineate the Conservation Areas. 	<ul style="list-style-type: none"> Inspect fencing and signage. Repair and replace fencing and signage as recommended from the inspection. Conduct fuel load inspection of each vegetation type every 2 years. Where required, carry out mild-intensity mosaic fuel reduction. Annually, conduct an inspection of the Beach Dune and Haul Road rehabilitation areas for vehicular damage and resultant vegetation loss. Where required as a result of the inspection, undertake



Area	Requirement	Source	Conservation Status	Management Action	Ongoing Management Requirement
					repair, infill planting and/or seeding.
Bush Forever Site 397 (Lot 9001)	Bush Forever Site 397 in Lot 9001 to be protected and managed in accordance with this approved management plan.	State Planning Policy 2.8 (Bushland Policy for the Perth Metropolitan Region)	<ul style="list-style-type: none"> • Medium - High • Cannot be re-developed without WAPC negotiation and possible EPA assessment. • Cannot be re-developed without detailed WAPC and EPA assessment. • Any clearing or works shall be undertaken in accordance with this approved Management Plan and in consultation with the WAPC and EPA. 	<ul style="list-style-type: none"> • Install and maintain fencing and signage to prevent access to the Conservation Areas. 	<ul style="list-style-type: none"> • Inspect fencing and signage. • Repair and replace fencing and signage as recommended from the inspection.
All Areas	Overarching obligation to manage to prevent environmental harm to areas of high ecological value by Water Corporation, its personnel, agents or third parties	Section 50A and 50B of the Environmental Protection Act 1986	<ul style="list-style-type: none"> • Medium • For all areas constrained by condition, statutory requirement or rehabilitated according to environmental requirements 	<ul style="list-style-type: none"> • Maintain fencing and signage to delineate and prevent access to Conservation Areas. 	<ul style="list-style-type: none"> • Conduct security patrols. • Annually, conduct an inspection of the site for vehicular damage and resultant vegetation loss. • Where required as a result of the inspection, undertake repair, infill planting and/or seeding and maintain fencing and gate infrastructure



5 Risks to be managed

5.1 Environmental and Conservation Values

Lot 3000 contains floristic communities and flora of varying quality and diversity. Surveys undertaken have defined the areas of high ecological value. Those areas are susceptible to unacceptable degradation due to unauthorised recreational activities, fire and poor management practices.

The key threats to environmental and conservation values at the Alkimos WWTP site are the introduction and spread of weeds, erosion, vegetation clearance, and high intensity fire (fire is dealt with separately above).

Some weeds with known serious environmental consequences are declared under the Agricultural and Related Resources Protection Act 1976. Land managers have a responsibility to manage weeds listed under this Act. The Act provides for declared plants to be assigned to specific categories, P1 to P5, which determines the form of control which applies to the declared plant. The current listing of declared plant species is available at the Department of Primary Industries and Regional Development website.

Erosion and vegetation disturbance are serious issues within the site, particularly the impacts of trail bikes, quad bikes and 4WD vehicles. The vegetation is low, meaning it is easy to create new tracks, and the sandy soil is highly vulnerable to erosion by wind (blow-outs) once vegetation has been damaged.

The key environmental and conservation values found on the Alkimos WWTP site are:

- Potential foraging habitats for two species of threatened Black Cockatoos have been recorded on the site.
- Two Priority Ecological Communities that potentially occur on the Alkimos WWTP site:
 - o Coastal shrub-lands on shallow sands, southern Swan Coastal Plain ('community type 29a') and
 - o Acacia shrub-lands on taller dunes, southern Swan Coastal Plain ('community type 29b').
- The Bush Forever site 397, designated as Coastal Strip from Wilbinga to Mindarie, is located adjacent to the Alkimos WWTP site to the north.
- Banksia Woodland Threatened Ecological Community (TEC) / Priority Ecological Community (PEC) (Banksia Woodlands TEC / PEC)
- Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain TEC (Cr)

5.2 Fire Risk Assessment

No bushfire history is available for the property, but observation suggests it has been burnt often in the past. These would have been wildfires, as in the past there was no authority or landowner responsible for fire management over this land. The large tracts of bushland required to be "protected and managed for conservation purposes" pose a real and present threat of bushfires threatening both the Water Corporation assets on the site and surrounding urban and commercial development.

On June 29th 2022 Water Corporation Bushfire Mitigation Team (BMT) conducted a bushfire risk assessment of the Alkimos site. During the assessment the site vegetation was classified to be predominately coastal heath scrubland with fuel tonnages ranging from 20-25 tonnes per hectare. The overall bushfire risk of the fuel according to Department of Fire and Emergency Services Bushfire Risk Management System principles was classified as very high.

Existing firebreaks present on site are concentrated around the central and southern corridors of the site, bordering existing assets. These firebreaks are considered to be in adequate condition and offer strategic access to emergency personnel in the event of bushfire. It was the opinion of the BMT, that these internal firebreaks be cleaned prior to the construction of the desalination plant.

There are no established firebreaks in the Northern section of the site. There are the remnants of a track which roughly follows the northern perimeter of the site which the BMT are in the process of looking to re-establish. If this work proceeds, a Shire Fire Notice compliant firebreak will be installed across the breadth of the Northern section of the site, providing strategic access and an additional point of protection for development to the North of the site.



5.2.1 Firebreaks

The Water Corporation is in the process of formalising firebreaks within the Alkimos Water Precinct. All new roads and firebreaks will meet the following objectives:

- Efficient access to the WWTP from Marmion Avenue minimising conflict between heavy haulage and light local traffic in urban streets;
- Compliance with the firebreak requirements of FESA and the City of Wanneroo; and
- Internal subdivision for management purposes, especially security patrols, fuel reduction and bushfire control.

There is currently a maze of unofficial tracks on the property resulting from trail bike riders and 4WD vehicles. Closure and rehabilitation of unwanted tracks will be dealt with in this plan.

5.2.2 Fire-fighting Water Supply

As part of the WWTP infrastructure, the Water Corporation has installed a bore and a 90,000 litre tank which is kept full with fresh water at all times and is capable of delivering water under pressure. This is located within the inner security fence but could be available for bushfire management purposes. It is intended hydrants are likely to be installed on water reticulation in the adjacent urban and commercial areas as development progresses in the area.

5.2.3 Trespass and Vandalism (Security)

The Alkimos area has good topology and sandy soil to attract activities such as 4WD and dirt bike riders to visit the area occasionally for leisure. Water Corporation and City of Wanneroo are liaising with local police to stop such activities. The property is also the target of dumping of domestic waste and car bodies. This raises the need for better security measures to restrict unauthorised access.



6 Management Plan

This management plan addresses the three overarching risks that require management;

- Degradation of Environmental and Conservation Values;
- Fire and Fire Management; and
- Trespass and vandalism (Security)

This management plan identifies those actions that need to be addressed in the short-term and those that will require on-going implementation into the future. Section 7 provides a summary of key management actions required.

6.1 Management of Environmental and Conservation Values

Figure 4 shows the areas identified on Lots 9001 and 3000 as having medium to high ecological significance.

6.1.1 Conservation Areas 9a, 10a and 10b

These Conservation Areas represent pre-existing ecosystems of high conservation value requiring the following management actions. Therefore, the primary action is to prevent unauthorised access causing environmental damage and fire management to prevent fire regime change.

- Short Term Management Actions:
 - Maintain 3,509 metres of three strand agricultural fencing on the alignment(s) identified in green on Figure 4 to delineate the high value conservation areas,
 - Install “No Entry – Conservation Area” signage with wording to appropriate standard at 500m spacing along the fence line,
 - Provide/fix/secure security standard barrier gates at firebreak access points,
 - Implement disease and weed control measures,
 - Acquire and maintain a seed-bank of provenance species as specified below.
- On-going Management Actions:
 - Inspect and repair fences quarterly;
 - Inspect and replace signage quarterly;
 - Conduct an inspection of the conservation areas annually for new damage and resultant vegetation loss; and
 - Where required, engage a contractor to undertake repair/infill seeding in May/June using provenance seed (Table 3).
- Temporary Clearing Rehabilitation Actions:
 - Where temporary clearing is permitted, rehabilitate these areas using the following specifications:
 - Undertake site stabilisation to prevent erosion,
 - Direct seeding in appropriate weather conditions to maximise success, using provenance seed collected from the surrounding area and site,
 - Targeted weed control,
 - Seedling propagation for specific species (where required),
 - Targeted Rabbit control / Kangaroo exclusion,
 - Meet a completion criterion of 1.6 plants/m² and less than 10% weed cover. Species diversity should be at least 70% of species defined in Table 3.
 - Conduct an inspection of the rehabilitation sites for success, annually for two years post construction then biannually for a further 4 years for any new rehabilitation (to assess weeds, vehicular damage and resultant vegetation loss); and
 - Where required, undertake weeding, repair and infill seeding in May/June using provenance seed.



6.1.2 Areas outside conservation areas

The remainder of the Alkimos Water Precinct represent areas that may have been previously rehabilitated in accordance with Ministerial Conditions (for the Alkimos WWTP construction).

The primary action is to prevent unauthorised access causing environmental damage, and where appropriate, provide infill seeding where damage has occurred.

- Short Term Management Actions:
 - Repair and maintain the fencing and gates,
 - Install signage at regular spacing on fencing.
- On-going Management Actions:
 - Inspect and repair existing fences quarterly;
 - Inspect and replace signage quarterly;
 - Annually for two years post construction then biannually for a further 4 years for any new rehabilitation, conduct an inspection of the rehabilitation (Haul Road and Coastal Dune areas) for weeds, new vehicular damage and resultant vegetation loss; and
 - Where required, engage a contractor to undertake weeding, repair and infill seeding in May/June using provenance seed (Table 3).

Table 3: Provenance species to be used in infill seeding

Species List	
<i>Acacia cyclops</i>	<i>Ficinia nodosa</i>
<i>Acacia lasiocarpa</i>	<i>Frankenia pauciflora</i>
<i>Acacia pulchella</i>	<i>Gompholobium tomentosum</i>
<i>Acacia saligna</i>	<i>Hakea lissocarpha</i>
<i>Acacia truncata</i>	<i>Hakea prostrata</i>
<i>Acanthocarpus preissii</i>	<i>Hakea trifurcata</i>
<i>Adriana quadripartita</i>	<i>Hardenbergia comptoniana</i>
<i>Allocasuarina humilis</i>	<i>Hemiandra pungens</i>
<i>Allocasuarina lehmanniana</i>	<i>Hibbertia racemosa</i>
<i>Alyogyne huegelii</i>	<i>Jacksonia furcellata</i>
<i>Atriplex cinerea</i>	<i>Jacksonia sternbergiana</i>
<i>Atriplex isatidea</i>	<i>Kennedia prostrata</i>
<i>Banksia attenuata</i>	<i>Lepidosperma gladiatum</i>
<i>Banksia grandis</i>	<i>Macrozamia fraseri/riedlei</i>
<i>Banksia menziesii</i>	<i>Melaleuca cardiophylla</i>
<i>Banksia sessilis</i>	<i>Melaleuca huegelii</i>
<i>Calothamnus quadrifidus</i>	<i>Melaleuca lanceolata</i>
<i>Calothamnus sanguineus</i>	<i>Melaleuca systema</i>
<i>Carpobrous virescens</i>	<i>Nitraria billardierei</i>
<i>Clematis linearifolia</i>	<i>Olearia axillaris</i>
<i>Conostylis aculeata</i>	<i>Phyllanthus calycinus</i>
<i>Conostylis candicans</i>	<i>Rhagodia baccata</i>
<i>Conostylis sp.</i>	<i>Scaevola crassifolia</i>
<i>Eremaea pauciflora</i>	<i>Spinifex longifolius</i>
<i>Eremophila glabra</i>	<i>Spyridium globulosum</i>
<i>Eucalyptus utilis</i>	<i>Threlkeldia diffusa</i>
<i>Eucalyptus gomphocephala</i>	<i>Trymalium ledifolium</i>
<i>Eucalyptus todtiana</i>	<i>Xanthorrhoea preissii</i>
<i>Exocarpos sparteus</i>	



6.1.3 Bush Forever Site 397 (Lot 9001)

This area is of medium high ecological value and should be delineated to discourage access. Future development of this area will be subject to assessment and negotiation with the Western Australian Planning Commission and possibly the Environmental Protection Authority.

- Short –term Management Actions:
 - Survey and peg the cadastral boundary of the area in Bush Forever site 397 within Lot 9001.
 - Install “No Entry – Bush Forever Conservation Area” signage to appropriate standard at 500m spacing along the survey line.
- On-going Management Actions:
 - Inspect and replace pegs annually (until such time as Lot 9001 is developed);
 - Inspect and replace signage annually (until such time as Lot 9001 is developed);

6.2 Fire and Fire Management

The Alkimos Water Precinct comprises of undulating, occasionally steep sand dunes, and swales supporting coastal heathland vegetation, with the exception of the main access road, WWTP site and numerous bush tracks.

The WWTP site is entirely cleared and the facility itself is unlikely to be directly affected by a bushfire.

The vegetation on the buffer zone is coastal heathland dominated by Acacia, with small, isolated clumps of eucalypt woodland occurring in the swales and other protected areas. This vegetation type is flammable and after about a 7-year fire-free period will burn fiercely, especially under the influence of high wind.

The primary actions for the management and mitigation of bushfires are to ensure access for “First Attack Fire Appliances”¹ and manage fuel loads in the bushland areas to reduce intensity of outbreaks and provide a water source for firefighting appliances.

6.2.1 Roads and firebreaks

Roads and tracks provide access, and firebreaks on the property. There are currently many tracks on the properties as a result of trail bike riders and 4WD vehicles, that could be upgraded to a standard suitable for first attack fire appliances. A dedicated plan to divide the site into bushfire management zones will be produced as a short-term action to facilitate fuel reduction management.

- Short Term Management Actions:
 - Upgrade selected existing tracks to a standard suitable for First Attack Fire Appliances,
 - Maintain permanent sealed access road,
 - Maintain security grade lockable access gates where the fire tracks traverse the fence lines, and
 - Provide DFES with master keys for the gates.
- On-going Management Actions:
 - Inspect and repair gates quarterly;
 - Inspect and maintain tracks free of flammable material annually;
 - Inspect annually and maintain tracks in suitable trafficable condition for First Attack Fire Appliances as required;
 - Conduct a rolling fuel load inspection on a 5-year rotation through the bushfire management zones, and
 - Where required, investigate the benefit of mild-intensity fuel reduction burns on a 5-year rotation within the bushfire management zones, with consideration given to the environmental sensitivity of the site, to produce a mosaic of fuel ages across the property.

¹ **First Attack Fire Appliances** are usually ~1 tonne 4WD tray-top vehicles equipped with 400 litre water tanks and fire-fighting pumps and hoses



6.2.2 Fire-fighting Water Supply

First Attack Fire Appliances require water sources to replenish their small water tanks frequently. Provision of an accessible water hydrant/stand will be available from the potable water reticulation installed as part of the adjacent regional urban development.

6.2.3 Trespass and Vandalism (Security)

Access to the properties currently is largely unconstrained due to numerous tracks being utilised to access the dunes for 4WD and trail bike activities, and to access the beach for fishing. Preventing of unauthorised impact is impractical, however visual barriers, fencing and signage, coupled with security patrols and surveillance can provide significant deterrent to unauthorised entry onto the properties generally and into areas of medium to high conservation status in particular.

There is currently high security fencing and surveillance on the Water Corporation capital assets (the Wastewater Treatment Plant and the solar array near the coast) on the properties, and routine security patrols are undertaken. The following management actions are designed to augment those measures. Figure 5 shows the Signage and Fencing proposed to be maintained.

- Short Term Management Actions:
 - Maintain post and rail fencing on the alignment identified in blue on Figure 5 to delineate the boundary of Lot 3000 and provide a visual barrier in the areas of active public access from Marmion Avenue and the adjoining development on Lot 9001,
 - Maintain three strand agricultural fencing on the alignment(s) to delineate the high value conservation areas,
 - Maintain and install signage identifying private property, conservation areas and trespass prohibition of appropriate wording, size and standard at 500m spacing along the fence lines, and
 - Maintain security grade lockable access gates where the fire tracks and roads traverse the fence lines.
- On-going Management Actions:
 - Inspect and repair/replace all fences and signage quarterly;
 - Inspect and repair gates quarterly; and
 - Conduct ad hoc security patrols on the roads and tracks and
 - report evidence of unauthorised access;
 - report and act upon damage to fences, signage and vegetation in conservation areas from such unauthorised access.

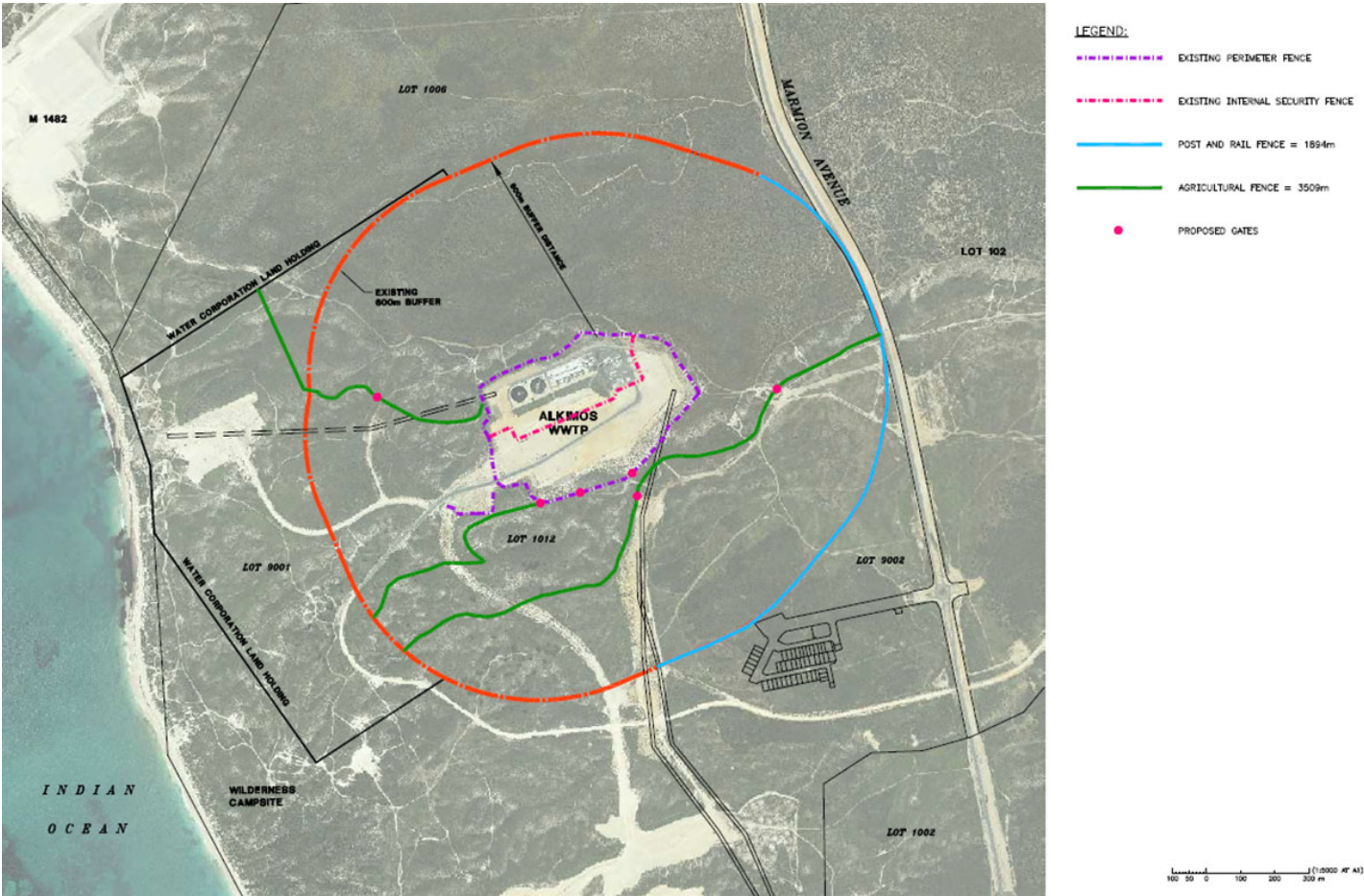


Figure 5: Signage and Fencing Plan



7 Summary of Management Actions

Table 4 summarises the short-term and on-going environmental and land management plan for the Alkimos Wastewater Treatment Plant and its surrounding buffer zone.

Table 4: Summary of Management Actions

Objective	Management Action	Outcome	Ongoing Maintenance Action
Protect and maintain Environmental and Conservation Values within the Alkimos Precinct	<ul style="list-style-type: none"> Manage unauthorised access to the site through fencing, signage and security measures. Acquire and maintain a seed-bank of provenance species. Where temporary clearing is permitted, rehabilitate these areas to the agreed specification. Inspect rehabilitation sites for success. Where required, undertake weeding, repair and infill seeding. 	<ul style="list-style-type: none"> Prevents impacts to conservation values. Provides a seed-bank resource to draw upon when required. Provides clear rehabilitation goals and monitoring requirements. 	<ul style="list-style-type: none"> Inspect and repair/replace all fences and signage quarterly. Conduct ad hoc security patrols on the roads and tracks. Undertake rehabilitation monitoring.
Ensure access for Fire management, manage fuel loads in the bushland areas to reduce intensity of outbreaks, and provide a water source for firefighting appliances.	<ul style="list-style-type: none"> Install “No Entry – Conservation Area” signage to appropriate standard at 500m spacing along the fence line(s); Acquire and maintain a seed-bank of provenance species as specified below. 	<ul style="list-style-type: none"> Maintain low fuel loads in the conservation areas. 	<ul style="list-style-type: none"> Conduct a rolling fuel load inspection on a 5-year rotation through the zones (one zone per year on a 5-year cycle). Where required, investigate the benefit of mild-intensity fuel reduction burns on a 5-year rotation within the bushfire management zones, with consideration given to the environmental sensitivity of the site, to produce a mosaic of fuel ages across the property
Trespass and vandalism	<ul style="list-style-type: none"> Maintain fencing. Install and maintain signage. 	<ul style="list-style-type: none"> Prevents unauthorised access and damage to environmental values and conservation areas. reduces risk of property damage to infrastructure. 	<ul style="list-style-type: none"> Inspect and repair fences and signage quarterly. Conduct an inspection of the conservation areas annually for new damage and resultant vegetation loss. Where impact occurs, undertake repair/infill seeding.

