Alkimos Seawater Desalination Plant

Landforms Environmental Management Plan

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WATER CORPORATION

Document Control

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Executive Summary

Proposal Name	**Alkimos Seawater Desalination Plant (ASDP)**
Proponent Name	Water Corporation
Ministerial Statement	1207
Purpose of EMP	This Landforms Environmental Management Plan (EMP) has been prepared to meet the legal requirements of Conditions B3, C1 and C5 of the Ministerial Statement 1207 for the ASDP Project. The Landforms EMP has been developed according to the EPA guidelines (EPA, 2021) and describes the management measures that will be implemented during the ASDP construction phase and ongoing operations to ensure the environmental outcome and objectives are met.
EPA Key Environmental Factor, Outcome(s), Objectives	**Landforms** To maintain the variety and integrity of significant physical landforms so that the environmental values are protected (EPA, 2018)
Condition Clauses	**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 km) 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.**

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;

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.
Proposed Construction Date	**November 2023**
EMP Required Pre-Construction	Yes ☒ No ☐

Contents

Acronyms

Abbreviation	Definition
ASDP	Alkimos Seawater Desalination Plant
DBCA	Department of Biodiversity, Conservation and Attractions
DE	Development Envelope
DMIRS	Department of Mines, Industry Regulation and Safety
DPIRD	Department of Primary Industries and Regional Development
EPA	Environmental Protection Authority
GSWA	Geological Survey of Western Australia
PDE	Pipeline Development Envelope

Definitions

Term	Definition
Adverse impact/adversely impacted	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 disturbances, or other impacts from the proposal. With specific reference to landforms this includes, but is not limited to, changes in erosion/deposition/accretion.
Alkimos Dune Complex	The ASDP ERD (Water Corporation 2022a) identifies the Quindalup Parabolic Dune System on the Swan Coastal Plain consists of four phases of dune formation (Q1, Q2, Q3 and Q4). Within the Quindalup Parabolic Dune System, the Alkimos Dune Complex represents a largely intact example of all four dune phases.
Area 10b	Ministerial Statement 722 was issued following the EPA Assessment of Metropolitan Region Scheme Amendment 1029/33. This Ministerial Statement identified a circular portion of land in the Alkimos locality for the planned Alkimos Wastewater Treatment Plant (WWTP), zoned 'Public Purposes Reserve'. The Public Purposes Reserve contained for a 600m odour buffer surrounding the then proposed WWTP. The approval also highlighted a number of areas that were to be protected for conservation, with an area to the south of the WWTP labelled as Area 10b. See Figure 1 and Attachment 3.
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.
Disturb/ Disturbed/ Disturbance	Direct – causes or immediately has the disturbance effect. Indirect - materially contributes to the disturbed effect.
Environmental value	A beneficial use or ecosystem health condition.
Ground disturbing activities	Any activity or activities undertaken in the implementation of the proposal, including any clearing, civil works or construction
Ha	Hectare

Rehabilitate / Rehabilitated / Rehabilitation	Rehabilitation in the context of re-establishing dune values / temporary cleared areas and re-contouring / 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.
Westerly-facing Berm	As described as “the Western boundary [of the] seawater desalination plant development envelope incorporates a sand berm with a finalised 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.”

1. Context, Scope and Rationale

1.1. Proposal

Water Corporation is proposing to construct and operate a new seawater desalination plant (SDP) and Groundwater Treatment Plant (GWTP) plant at the Alkimos Water Precinct and an associated new 32.93 km integration pipeline connecting the SDP to the Wanneroo Reservoir ('the Proposal'). Collectively, these elements form the Alkimos Seawater Desalination Plant project ('Alkimos SDP') (Figure 1).

The Proposal will require the clearing of native vegetation and excavation/construction of works within a portion of the Alkimos Dune Complex. The Alkimos Dune Complex is recognised in the EPA Environmental Factor Guideline – Landforms (EPA, 2018) as having national and world significance of parabolic dunes and recognised as an important geo-heritage site that demonstrates all phases of the Quindalup Dune formation in a contiguous landform.

The Proposal was referred to and assessed by the EPA under the *Environmental Protection Act 1986* (EP Act) and has received a Ministerial Statement that the proposal may be implemented subject to conditions (Statement 1207).

The purpose of this document is to address the conditions of the Ministerial Statement that relate to Landforms key environmental factor.

1.2. Key Environmental Factors

This management plan has been prepared to address the EPA's key environmental factor of Landforms. The environmental values relevant to landforms and the indirect impacts to these values from the construction and operation of the project are described in Table 1.

Table 1 - Relevant Key Environmental Factor for the Proposal

Environmental Factor	Objective	Activities	Values	Impacts
Landforms	To maintain the variety and integrity of significant physical landforms so that the environmental values are protected.	• Clearing of native vegetation • Excavations and earthworks	Alkimos Dune Complex Area 10b of the Alkimos Dune Complex	**Direct Impacts**: • Disturbance of up to 35.1 ha of the Alkimos Dune Complex • Disturbance of up to 5.17 ha of the Area 10b within the Alkimos Dune Complex **Indirect Impacts:** • Dust and erosion • Increased spread or introduction of weeds/disease • Habitat fragmentation

1.3. Condition Requirements

The Proposal has been assessed by the EPA, which led to the Minister for Environment issuing Ministerial Statement 1207 in August 2023. This Landforms EMP has been prepared to meet the conditions of the Ministerial Statement related to Landforms outlined in Table 2.

Table 2 - Ministerial Statement 1207 Conditions

No.	Condition
B3 Landforms	
B3-1	The proponent must ensure the implementation of the proposal achieves the following environmental outcome: 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: • No adverse impacts, beyond the extents identified in condition B3-1(1); and • 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) km radius.
B3-3	The proponent must: • Rehabilitate the western-facing berm and any areas disturbed during construction within area 10b that are not reasonably required for ongoing operations. • 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.
C1 Environmental Management Plans: Conditions Related to Commencement of Implementation of the Proposal	
C1-1	The proponent must: • 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
C5 Environmental Management Plans: Conditions Related to Management Actions and Targets for Objectives Based Conditions	
C5-1	The environmental management plan required under 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: • Management actions; • Management targets; and • Contingency measures if management targets are not met; and • Reporting requirements.
C5-2	The environmental management plan required under condition B3-4 is also required to include, but not be limited to: • Completion criteria for rehabilitated dunes and the westerly-facing berm.

1.4. Rationale and Approach

This section provides a concise description of the rationale and approach for this Landforms EMP and discusses the environmental outcomes and objectives to which implementation conditions apply.

1.4.1. Environmental Outcomes and Objectives

The environmental outcome for the proposal is to:

- Disturb no more than 35.1 ha of the Alkimos Dune Complex, including no more than 5.17 ha of Area 10b.

The environmental objectives for the Proposal include:

- No adverse impacts, beyond the extents identified in condition B3-1(1)
- 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) km radius.

The outcome and objectives will be met through the management measures proposed in Section 2.

1.5. Survey and Study Findings

The following studies have been previously completed for the Landforms environmental factor within and surrounding the proposal area:

- *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.
- *Alkimos Seawater Desalination Plant, Environmental Review Document, Assessment No. 2210, Water Corporation (2022a).*

Landforms

The ASDP DE is bound by steep-sided high-relief sand dunes to both the north and south. The eastern boundary of the ASDP DE is characterised by moderate relief sand dunes with steep to undulating topography, while the western boundary is characterised by a low-relief and gently undulating ridge of shallow limestone rock. The site comprises undulating coastal dunes primarily of the Quindalup Complex soil type, characterised by white calcareous sand (Safety Bay Sand), with some Cottesloe Complex consisting of shallow brown / yellow sand (Tamala Sand) over Tamala Limestone.

The Alkimos Dune Complex registered as a geoheritage site under the GSWA for research and education purposes (DMIRS, 2018). The Alkimos Dune Complex provides an exceptional example of the development of a parabolic dune complex of the Quindalup Parabolic Dune System that has not been encroached on by urbanisation and is still accessible for scientific study (Gozzard, 2007).

Area 10b was an area within the Alkimos Water Precinct, identified in Ministerial Statement 722 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.

Figure 1 details the location of Area 10b within the Alkimos Water Precinct. It was established that the land shall only be used for conservation, landscape and complementary purposes, however allowed for minor infrastructure to be installed, subject to works being undertaken in accordance with an EMP. Another figure detailing the Alkimos Dune Complex in relation to the project is provided in Attachment 3.

1.6. Key Assumptions and Uncertainties

The studies and investigations summarised in the previous section have formed the basis of the rationale and management approach adopted for this Landforms EMP. It is assumed that the surveys/studies undertaken have accurately identified and mapped the locations and characteristics of the landforms within and surrounding the Proposal area.

To establish measurable environmental criteria (targets, triggers, thresholds) and appropriate adaptive management measures, baseline surveys and ground-truthing of monitoring locations is required. The measures developed for this Landforms EMP identify proposed environmental criteria and corresponding adaptive management actions based on the limitations of current knowledge.

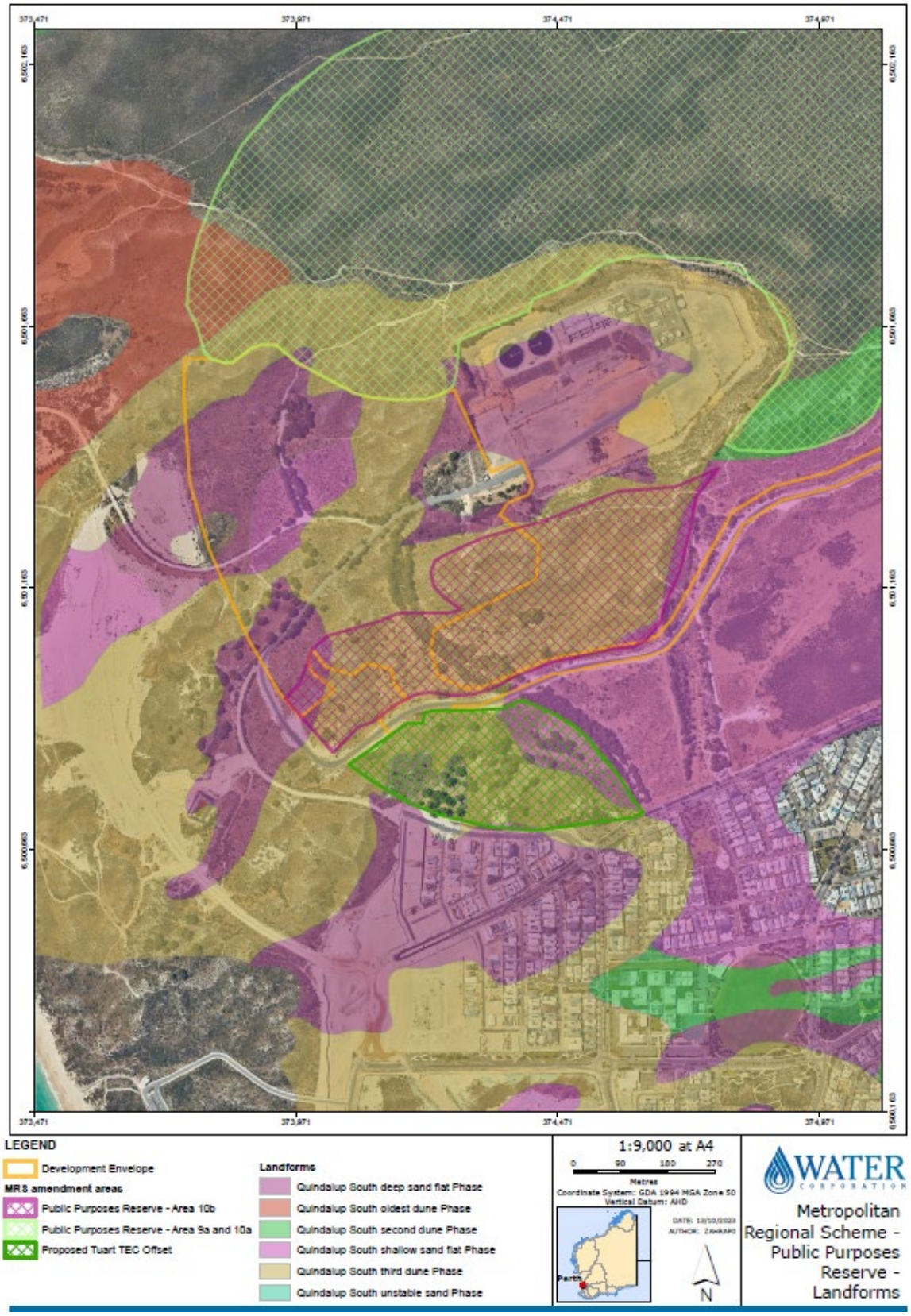

Figure 1 - Alkimos Dune Complex within the Alkimos Water Precinct and Area 10b

2. Management Plan Components

Table 3 details the management measures proposed to ensure that the project is managed in a way that ensures no detrimental impact occurs to the landforms as a result of the proposal, outside the approved disturbance.

Table 3 **– Landforms Environmental Management Measures**

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Clearing and Construction	• No alteration to the dune's morphology, beyond that currently proposed, at completion of construction. • No disturbance to the Alkimos Dune Complex outside of 35.1 ha, and no disturbance to Area 10b of outside of 5.17 ha. • Minimise impacts to native flora and vegetation within the approved disturbance areas where possible. • No adverse impacts, beyond the extents approved. • The rehabilitated landforms contain cover and composition of native vegetation consistent with the surrounding undisturbed landforms. • Final landform to have ≤ 20% weed cover with no Declared weed species present. • No visible dust plumes extending greater than 10 m from the boundary of the Development Envelope. • Final landform is stable at the completion of construction.	A1	Construction contractors, subcontractors and all personnel will be inducted on the requirements of all environmental approvals and associated management plans.	• Induction to all site personnel prior to commencing work on the site for the first time.	Prior to any personnel start works on the site	Sign on to track induction of site personnel.
		A2	Prior to clearing and works within the Alkimos Dune Complex and Area 10b, all relevant permits and approvals shall be reviewed, and any requirements identified and communicated to Contractors.	• Toolbox meeting prior to commencing clearing and disturbance works within the Alkimos Dune Complex and Area 10b.	Prior to clearing/disturbance commencing in the Alkimos Dune Complex and/or Area 10b	• Contractors to sign on to Clearing Permits • Inspection reports • Toolbox meeting minutes
		A3	Clearing/Disturbance areas will be surveyed by a qualified surveyor and limits will be delineated by the use of physical continuous demarcation for each stage of disturbance/clearing activities.	• A qualified surveyor is to survey and demarcate the clearing/disturbance areas and retention areas with continuous physical demarcation. • Contractor and Water Corporation personnel to review the demarcation prior to clearing commencing. Water Corporation is to provide written approval of the clearing/disturbance area prior to clearing commencing.	10 days prior to clearing/disturbance for each stage of works	• Survey GPS data • Photograph records of the land and vegetation conditions will be taken prior to clearing/disturbance and post demarcation. • clearing / disturbance release forms

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Clearing and Construction (continued)		A4	Within areas adjacent to TEC/PEC or conservation areas, hazard tape/flagging tape at least 1 m inside the clearing area is to be used in addition to existing demarcation. This will serve as a buffer and be surveyed by a qualified surveyor to reduce risk of unauthorised clearing or material spoil outside of the approved areas.	• A qualified surveyor is to survey and demarcate the clearing/disturbance areas and retention areas with continuous physical demarcation.	Prior to clearing/disturbance commencing	• Survey GPS data • Photograph records of the land and vegetation conditions will be taken prior to clearing/disturbance and post demarcation. • Clearing / disturbance release forms.
		A5	Identify areas that can be retained, avoided or protected to thereby reduce the overall clearing and disturbance where required. These areas identified will be demarcated clearly prior to clearing commencing.	• Qualified surveyor to mark out areas of retention	Prior to clearing/disturbance commencing	• Survey GPS data • Photographs
		A6	Inspect and maintain the integrity of barriers and continuous demarcation of approved clearing/disturbance areas, tree protection zones and retention areas.	• Inspection of barriers/demarcated areas for damage or signs of encroachment.	Daily	• Daily inspection report

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Clearing and Construction (continued)		A7	Vegetation earmarked for removal within the approved clearing areas should be felled so that it falls within the DE to avoid damage to surrounding retained vegetation.	• Inspection of approved clearing areas	Daily	• Daily inspection report. • Toolboxes
		A8	Topsoil within areas of significant vegetation (National Park, State Forest, TEC/PEC, ESA, Bush Forever Sites and Area 10b) to be stripped to a depth of 100-150 mm and stockpiled separately.	• Areas identified in initial site demarcation. • Contractor and Water Corporation personnel to review the demarcation prior to clearing commencing. • Site inspection	Prior to clearing commencing.	• Topsoil management records
		A9	Topsoil must not be stockpiled at heights greater than 1.5 m.	• Visual inspections of dust suppression activities and soil stockpile stability.	Daily	• Daily inspection report. • Register of non-conformances and/or public complaints.
		A10	Vehicle movement to be minimised where possible and to remain on designated tracks at appropriate designated speeds.	• Daily monitoring of weather conditions prior to the commence of works to determine the potential for dust generation. • Visual inspections of dust suppression activities	Daily	• Daily inspection report. • Register of non-conformances and/or public complaints

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Clearing and Construction (continued)		A11	Stabilise stockpiles to prevent erosion and dust emissions.	• Monitoring of weather conditions prior to the commence of works to determine the potential for dust generation. • Visual inspections of dust suppression activities and soil stockpile stability	Daily	• Daily inspection report. • Register of non-conformances and/or public complaints
		A12	The total cleared area must be determined by an engineering surveyor, mapped and reported to Water Corporation including start and end dates of clearing activities.	• Survey the extent of actual clearing progress	Monthly and within two (2) weeks of completing clearing activities.	• Contractor to complete clearing record logs to be provided to Water Corporation
Hygiene Management	• The rehabilitated landforms contain cover and composition of native vegetation consistent with the surrounding undisturbed landforms. • Final landform to have ≤ 20% weed cover with no Declared weed species present. • No adverse impacts beyond the extents approved.	B1	Undertake separate pre-construction dieback and weed surveys at the proposed clearing areas and 25 m into adjacent Conservation areas.	• Survey confirmation	Prior to clearing/disturbance activities commencing	• Report and mapping of weed and dieback areas and management. • Photos
		B2	Hygiene management. • Establish clean on entry and exit points, as a minimum, brush down facility and a log of vehicles entering and exiting the area.	• Photo evidence of established hygiene points. • Vehicle logbook check.	Prior to and during clearing/disturbance activities commencing.	• Contractors to sign on to Clearing Permits. • Toolbox meeting minutes. • Vehicle certifications and logbooks.

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Hygiene Management (continued)			• Ensure earthmoving equipment is clean before being mobilised to site.			
		B3	Pre-disturbance weed control. • Implement an initial weed control event in areas adjacent to rehabilitation areas.	• Conduct on-going inspections and weed control program for Declared pests and significant weeds within the Development Envelope.	Prior to clearing/disturbance activities commencing. And Following rehabilitation monitoring events in Spring and Autumn every year for three (3) years post initial rehabilitation activities.	• Confirmation of weed control in records, photographs and other documentation, including herbicide usage. • Rehabilitation monitoring reports.
		B4	Implement hygiene management controls. Inspection of all plant entering and exiting the site	• Regular monitoring of adherence to Hygiene management controls as part of routine environmental inspections	Daily	• Logbook kept on site for all vehicles, plant & equipment entering the site. • Dieback-free and weed-free certifications.
		B5	All topsoil from areas identified as weed infested and/or dieback infested shall be stripped separately and deposited in the nominated spoil sites for disposal	• Areas identified in initial site demarcation. • Contractor and Water Corporation personnel to review the demarcation prior to clearing commencing. • Site inspection	Prior to clearing commencing.	• Topsoil management records

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Landform Preparation	• The rehabilitated landforms are stable and not prone to erosion and are not a source of ongoing dust emissions. • Final landform is stable at the completion of construction. • No visible dust plumes extending greater than 10 m from the Development Envelope boundary	C1	Construct landform in accordance with following criteria: • Landform rehabilitation of the berm is to be at a ratio of 1:3 batter. • Coir netting is to be installed at 400 gsm lapped 100 mm at joints and secured with 300 mm long steel U pins at 3 m^2 or 150 mm where the ground is too compact. • The edges of the coir netting is to be folded and pinned to prevent unravelling • Mulch is to be placed on the relevant locations on the Western-Facing Berm after fitting coir netting to a minimum thickness of 75 mm. • In areas with no coir netting, mulch is to be added on top of the re-respread topsoil to a minimum thickness of 50 mm, as approved by the Revegetation Contractor prior to re-spreading. • Rip-rap or stone pitching protection is to be	• QAQC inspection of landform stability by suitably qualified engineer. • Baseline quadrat establishment event. • Monitoring for dust plumes	• Post dune reconstruction and prior to revegetation planting and seedling activities commencing. Then • Spring and Autumn monitoring for three (3) years post initial rehabilitation. • Dust monitoring daily	• QAQC reporting against design specifications. • Rehabilitation monitoring reports and photographs. • Site inspection report reporting of plumes

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Landform Preparation (continued)			installed in the required locations of the berms • Implement structural controls to stabilise the landform, including battering excavations or using retaining walls, informed by geotechnical investigations and detailed engineering design. • Source re-used topsoil from the same area where consistent with dieback and weed control objectives. • Apply soil stabilisers where appropriate to revegetation areas, where required. • Install temporary stabilisers and erosion protection to the reconstructed berms, where required.			
Seed Collection and Seedling Propagation	• Final landform is stable at the completion of construction. • The rehabilitated landforms contain cover and composition of native	D1	The revegetation contractor is to arrange propagation of seedlings from the seed bank in late 2023. The seed bank is detailed in – Attachment 1.	Review evidence of seed collection and seed bank volumes.	Late 2023	• Evidence of seed collection and seed bank volumes.

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Seed Collection and Seedling Propagation (continued)	vegetation consistent with the surrounding undisturbed Alkimos Dune Complex within a two (2) km radius. • Provide sufficient endemic plant cover to protect dunes against wind erosion. • No adverse impacts beyond the extents approved. • The rehabilitated landforms are stable and not prone to erosion and are not a source of ongoing dust emissions.	D2	Conduct revegetation activities: • Utilising species that are hardy, quick to establish and will positively compete with weeds, prioritising native species endemic to the dune system. • Prioritising older seeds in direct seeding. • Allocate seed bank species to appropriate locations of the revegetation areas. • Planting and direct seeding is to be conducted as close to the completion of dune reconstruction where possible to reduce erosion potential. • Direct seeding will be applied at a rate of 3 kg/ha and seeding planting at 1 stem/m^2 • Groundcover revegetation is to mainly be used on drainage basin batter • Small revegetation from 0 m to 1 m high is to be used in areas adjacent to	Baseline quadrat establishment event.	Initial rehabilitation activity in the Autumn following the completion of landform reconstruction activities	• Rehabilitation implementation report • Photographs

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Seed Collection and Seedling Propagation (continued)			fence lines, fire breaks and roadways etc. • Medium revegetation consisting of shrub vegetation between 1 m and 2 m high in areas away from infrastructure. • Fire-resistant medium shrubs are to be planted along the top of the Western-Facing Berm as additional screening in a single row at 5 m centres and alternating species. Specific mapping from the proposed rehabilitation is detailed in Attachment 2. Revegetation completion criteria and success targets: • ≥ 1 stem/m^2 of native species (or less where native cover exceeds 50%) • ≥ 70% species richness used in and around each monitoring quadrat. • ≥ 50% native species cover (or projected to be once plants mature) • ≤ 20% weed cover with no Declared weed species present.			

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Seed Collection and Seedling Propagation (continued)		D3	Conduct infill planting up to 30% planting density (if required).	Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Year 1.	Autumn Monitoring Year 1.	• Rehabilitation monitoring reports. • Photographs.
		D4	Conduct infill planting up to 15% planting density (if required).	Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Year 2	Autumn Maintenance Year 2.	• Rehabilitation monitoring reports. • Photographs.
		D5	Conduct infill planting up to 5% planting density (if required).	Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Year 3	Autumn Maintenance Year 3.	• Rehabilitation monitoring reports. • Photographs.
	• ≤ 20% weed cover with no Declared weed species present.	D6	Undertake weed control during revegetation activity.	• Baseline monitoring quadrat establishment. Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Years 1-3.	Spring, Summer and Autumn for three (3) years post initial revegetation activity, as required.	• Rehabilitation monitoring reports. • Photographs.
	• The rehabilitated landforms are stable and not prone to erosion and are not a source of ongoing dust emissions.	D7	Conduct remediation activities / reinstalment of any disturbed or damaged areas and/or conduct infill planting and/or weed control	• Inspection of landforms to assess erosion/damage impacts. • Monitor and record site response to fire. • Monitoring for vandalism, vehicular traffic etc.	Post high wind, storms, large rainfall events, fire and/or other relevant events during construction and for three (3) years post initial revegetation activities.	• Rehabilitation monitoring reports • Site photographs • Site inspection reports

Activity	Management Objective	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence
Site Protection	• The rehabilitated landforms contain cover and composition of native vegetation consistent with the surrounding undisturbed landforms. • Provide sufficient plant cover to protect dunes against wind erosion.	E1	Install pest management to protect the rehabilitated areas, including: • Rabbit exclusion skirting to be added to fencing where necessary to prevent fauna entering revegetation areas. • Rabbit exclusion skirting is to be 0.9 m mesh with a 90 bend, with the upper 600 mm clipped to the fencing at 300 mm centres and the bottom 300 mm pinned flat on the ground on the outside of the revegetation areas.	Inspection of landforms to identify pest presence.	3 monthly	• Rehabilitation monitoring reports. • Site photographs. • Site inspection reports.
		E2	Install fencing to prevent pedestrian movement into revegetated areas. • Fencing to have multiple strands of plain wire to allow passage of wildlife and discourage pedestrian movement.	Inspection of fencing.	3 monthly	• Rehabilitation monitoring reports. • Site photographs. • Site inspection reports.
		E3	Remove rabbit proof skirting at the end of the revegetation activity to allow the passive of native fauna (after native plants have been successfully established).	Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Year 3	End of plant establishment as per the recommendation of the Revegetation Consultant	• Rehabilitation monitoring report. • Photographs

3. Adaptive Management and Review

Water Corporation will implement adaptive management to learn from monitoring and evaluation against trigger and threshold criteria and monitoring of the effectiveness of response actions to more effectively meet the environmental outcomes and objectives outlined in this Landforms EMP.

The following approach will apply:

- Monitoring data will be evaluated and compared to baseline and reference site data (where available) on a weekly basis in a process of adaptive management to verify whether responses to the impact are the same or similar to predictions.
- Implement management and mitigation measures.
- Monitor and evaluate performance against amended environmental provisions.
- Adjust management and mitigation measures and, monitoring where required to meet the outcome and/or objectives.
- The effectiveness and relevance of trigger level and contingency actions will be evaluated based on data reviews to determine if any changes are required.

3.1. Review and Update of the Landforms EMP

This Landforms EMP will be reviewed and updated to ensure it addresses the relevant conditions and is being implemented effectively. Changes may arise from, but not limited to, a change of scope, requests by proponent or regulator for a change to Ministerial Conditions or this Landforms EMP, stakeholder consultation comments or from opportunities for improvement.

Any revisions to this Landforms EMP will be provided for review and endorsement by the CEO as per the requirements of the respective Ministerial Statement conditions.

4. Implementation

4.1. Roles and Responsibilities

The Proponent, Water Corporation, is responsible for implementing and fulfilling the requirements of this Landforms EMP and maintaining compliance with its provisions.

4.2. Reporting and Auditing

The minimum inspection requirements for the Proposal are summarised in Table 4 below:

Table 4 – Minimum Auditing requirements

Party	Type	Frequency
Contractor	Site Environmental Inspection	Fortnightly
Water Corporation	Environmental Inspections	Ad hoc, but no more than monthly unless objectives or outcomes are not being met

	Environmental Audit	Ad hoc, but no more than quarterly unless objectives or outcomes are not being met
Regulator	Audit/Inspection	As requested by the Regulator

At the end of the ASDP earthworks construction phase, the Contractor will prepare a Summary Report documenting the outcomes of the implementation and adherence to this Landforms EMP, including the extent to which the management objectives and outcomes were implemented and met.

5. Stakeholder Consultation

Water Corporation has undertaken comprehensive stakeholder consultation as part of the environmental approvals process for the Alkimos SDP project as outlined in Section 4 of the *Alkimos Seawater Desalination Plant - Environmental Review Document* (Water Corporation 2022).

Water Corporation has consulted with DMIRS in preparation of this Landforms EMP. A summary of consultation is provided in Table 5 below.

Table 5: Stakeholder Consultation

Date	Proponent	Stakeholder	Discussion/ Outcomes
21/09/2023	Water Corporation	Department of Mines, Industry Regulation and Safety (DMIRS) – Geological Survey and Resource Strategy Division	DMIRS were provided the draft management plan to review on 18/09/2023 (via email). Comments were provided back to Water Corporation on 21/09/2023. The comments provided requested that: *1. Define GSWA in the list of acronyms (Geological Survey of Western Australia)* *2. Correct the definition of DMIRS (Department of Mines, Industry Regulation and Safety) in this list* *3. Add the references to DMIRS (2018) and Gozzard (2007) to the reference list* These changes have been updated in the document.

6. References

Department of Mines, Industry Regulation and Safety (DMIRS), 2018. GeoVIEW.WA, accessed via https://geoview.dmp.wa.gov.au/. Government of Western Australia.

Environmental Protection Authority (EPA), 2016. *Environmental Factor Guideline: Flora and Vegetation.* Government of Western Australia.

Environmental Protection Authority (EPA), 2018. *Environmental Factor Guideline: Landforms.* Government of Western Australia.

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EPA, 2023. *Ministerial Statement 1207 – Alkimos Seawater Desalination Plant*. Government of Western Australia.

Gozzard, J. R., 2007, *Geology and landforms of the Perth Region: Western Australia Geological Survey*, 126p

Stantec (2021), ASDP Project, Flora and Vegetation Consolidation Report

Tranen, 2023. *Alkimos Seawater Desalination Plant – Enabling Earthworks Revegetation Plan*. Prepared for Jacobs Group. Bayswater, Western Australia.

Water Corporation, 2022. *Alkimos Seawater Desalination Plant – Environmental Review Document*. Prepared for EPA Services. Available at: https://www.epa.wa.gov.au/proposals/alkimos-seawater-desalination-plant. Perth, Western Australia.

7. Audit Table

Table 5 Audit table

Activity	Item	Management Action	Monitoring	Timing / Frequency of Actions	Reporting/ Evidence	Status	Comment
Clearing and Construction	A1	Construction contractors, subcontractors and all personnel will be inducted on the requirements of all environmental approvals and associated management plans.	• Induction to all site personnel prior to commencing work on the site for the first time.	Prior to any personnel start works on the site	Sign on to track induction of site personnel.		
	A2	Prior to clearing and works within the Alkimos Dune Complex and Area 10b, all relevant permits and approvals shall be reviewed and any requirements identified and communicated to Contractors.	• Toolbox meeting prior to commencing clearing and disturbance works within the Alkimos Dune Complex and Area 10b.	Prior to clearing/disturbance commencing in the Alkimos Dune Complex and/or Area 10b	• Contractors to sign on to Clearing Permits • Inspection reports • Toolbox meeting minutes		
	A3	Clearing/Disturbance areas will be surveyed by a qualified surveyor and limits will be delineated by the use of physical continuous demarcation for each stage of disturbance/clearing activities.	• A qualified surveyor is to survey and demarcate the clearing/disturbance areas and retention areas with continuous physical demarcation. • Contractor and Water Corporation personnel to review the demarcation prior to clearing commencing. Water Corporation is to provide written approval of the clearing/disturbance area prior to clearing commencing.	10 days prior to clearing/disturbance for each stage of works	• Survey GPS data • Photograph records of the land and vegetation conditions will be taken prior to clearing/disturbance and post demarcation. • clearing / disturbance release forms		

Clearing and Construction (continued)	A4	Within areas adjacent to TEC/PEC or conservation areas, hazard tape/flagging tape at least 1 m inside the clearing area is to be used in addition to existing demarcation. This will serve as a buffer and be surveyed by a qualified surveyor to reduce risk of unauthorised clearing or material spoil outside of the approved areas.	• A qualified surveyor is to survey and demarcate the clearing/disturbance areas and retention areas with continuous physical demarcation.	Prior to clearing/disturbance commencing	• Survey GPS data • Photograph records of the land and vegetation conditions will be taken prior to clearing/disturbance and post demarcation. • Clearing / disturbance release forms.		
	A5	Identify areas that can be retained, avoided or protected to thereby reduce the overall clearing and disturbance where required. These areas identified will be demarcated clearly prior to clearing commencing.	• Qualified surveyor to mark out areas of retention	Prior to clearing/disturbance commencing	• Survey GPS data • Photographs		
	A6	Inspect and maintain the integrity of barriers and continuous demarcation of approved clearing/disturbance areas, tree protection zones and retention areas.	• Inspection of barriers/demarcated areas for damage or signs of encroachment.	Daily	• Daily inspection report		
Clearing and Construction (continued)	A7	Vegetation earmarked for removal within the approved clearing areas should be felled so that it falls within the DE to avoid damage to surrounding retained vegetation.	• Inspection of approved clearing areas	Daily	• Daily inspection report. • Toolboxes		

Clearing and Construction (continued)	A8	Topsoil within areas of significant vegetation (National Park, State Forest, TEC/PEC, ESA, Bush Forever Sites and Area 10b) to be stripped to a depth of 100-150 mm and stockpiled separately.	• Areas identified in initial site demarcation. • Contractor and Water Corporation personnel to review the demarcation prior to clearing commencing. • Site inspection	Prior to clearing commencing.	• Topsoil management records		
	A9	Topsoil must not be stockpiled at heights greater than 1.5 m.	• Visual inspections of dust suppression activities and soil stockpile stability.	Daily	• Daily inspection report. • Register of non-conformances and/or public complaints.		
	A10	Vehicle movement to be minimised where possible and to remain on designated tracks at appropriate designated speeds.	• Daily monitoring of weather conditions prior to the commence of works to determine the potential for dust generation. • Visual inspections of dust suppression activities	Daily	• Daily inspection report. • Register of non-conformances and/or public complaints		
	A11	Stabilise stockpiles to prevent erosion and dust emissions.	• Monitoring of weather conditions prior to the commence of works to determine the potential for dust generation. • Visual inspections of dust suppression activities and soil stockpile stability	Daily	• Daily inspection report. • Register of non-conformances and/or public complaints		
	A12	The total cleared area must be determined by an engineering surveyor, mapped and reported to Water Corporation including start and end dates of clearing activities.	• Survey the extent of actual clearing progress	Monthly and within two (2) weeks of completing clearing activities.	• Contractor to complete clearing record logs to be provided to Water Corporation.		

Hygiene Management	B1	Undertake separate pre-construction dieback and weed surveys at the proposed clearing areas and 25 m into adjacent Conservation areas.	• Survey confirmation	Prior to clearing/disturbance activities commencing	• Report and mapping of weed and dieback areas and management. • Photos		
	B2	Hygiene management. • Establish clean on entry and exit points, as a minimum, brush down facility and a log of vehicles entering and exiting the area. • Ensure earthmoving equipment is clean before being mobilised to site.	• Photo evidence of established hygiene points. • Vehicle logbook check.	Prior to and during clearing/disturbance activities commencing.	• Contractors to sign on to Clearing Permits. • Toolbox meeting minutes. • Vehicle certifications and logbooks.		
	B3	Pre-disturbance weed control. • Implement an initial weed control event in areas adjacent to rehabilitation areas.	• Conduct on-going inspections and weed control program for Declared pests and significant weeds within the Development Envelope.	Prior to clearing/disturbance activities commencing. And Following rehabilitation monitoring events in Spring and Autumn every year for three (3) years post initial rehabilitation activities.	• Confirmation of weed control in records, photographs and other documentation, including herbicide usage. • Rehabilitation monitoring reports.		
Hygiene Management (continued)	B4	Implement hygiene management controls. Inspection of all plant entering and exiting the site	• Regular monitoring of adherence to Hygiene management controls as part of routine environmental inspections	Daily	• Logbook kept on site for all vehicles, plant & equipment entering the site. • Dieback-free and weed-free certifications. •		

	B5	All topsoil from areas identified as weed infested and/or dieback infested shall be stripped separately and deposited in the nominated spoil sites for disposal	• Areas identified in initial site demarcation. • Contractor and Water Corporation personnel to review the demarcation prior to clearing commencing. • Site inspection	Prior to clearing commencing.	• Topsoil management records		
Landform Preparation	C1	Construct landform in accordance with following criteria: • Landform rehabilitation of the berm is to be at a ratio of 1:3 batter • Coir netting is to be installed at 400 gsm lapped 100 mm at joints and secured with 300 mm long steel U pins at 3 m^2 or 150 mm where the ground is too compact. • The edges of the coir netting is to be folded and pinned to prevent unravelling • Mulch is to be placed on the relevant locations on the Western-Facing Berm after fitting coir netting to a minimum thickness of 75 mm. • In areas with no coir netting, mulch is to be added on top of the re-respread topsoil to a minimum thickness of 50 mm, as approved by the Revegetation Contractor prior to re-spreading	• QAQC inspection of landform stability by suitably qualified engineer. • Baseline quadrat establishment event. • Monitoring for dust plumes	• Post dune reconstruction and prior to revegetation planting and seedling activities commencing. Then • Spring and Autumn monitoring for three (3) years post initial rehabilitation. • Dust monitoring daily	• QAQC reporting against design specifications. • Rehabilitation monitoring reports and photographs. • Site inspection report reporting of plumes		

Landform Preparation (continued)		• Rip-rap or stone pitching protection is to be installed in the required locations of the berms • Implement structural controls to stabilise the landform, including battering excavations or using retaining walls, informed by geotechnical investigations and detailed engineering design • Source re-used topsoil from the same area where consistent with dieback and weed control objectives • Apply soil stabilisers where appropriate to revegetation areas, where required. • Install temporary stabilisers and erosion protection to the reconstructed berms, where required					
Seed Collection and Seedling Propagation	D1	The revegetation contractor is to arrange propagation of seedlings from the seed bank in late 2023. The seed bank is detailed in – Attachment 1.	Review evidence of seed collection and seed bank volumes.	Late 2023	• Evidence of seed collection and seed bank volumes.		
	D2	Conduct revegetation activities: • Utilising species that are hardy, quick to establish and will positively compete with weeds,	Baseline quadrat establishment event.	Initial rehabilitation activity in the Autumn following the completion of landform reconstruction activities	• Rehabilitation implementation report • Photographs		

Seed Collection and Seedling Propagation (continued)		prioritising native species endemic to the dune system. • Prioritising older seeds in direct seeding. • Allocate seed bank species to appropriate locations of the revegetation areas. • Planting and direct seeding is to be conducted as close to the completion of dune reconstruction where possible to reduce erosion potential. • Direct seeding will be applied at a rate of 3 kg/ha and seeding planting at 1 stem/m^2 • Groundcover revegetation is to mainly be used on drainage basin batter • Small revegetation from 0 m to 1 m high is to be used in areas adjacent to fence lines, fire breaks and roadways etc. • Medium revegetation consisting of shrub vegetation between 1 m and 2 m high in areas away from infrastructure. • Fire-resistant medium shrubs are to be planted along the top of the Western-Facing Berm as additional screening in a single row at 5 m centres and alternating species.					

		Specific mapping from the proposed rehabilitation is detailed in Attachment 2. Revegetation completion criteria and success targets: • ≥ 1 stem/m^2 of native species (or less where native cover exceeds 50%) • ≥ 70% species richness used in and around each monitoring quadrat. • ≥ 50% native species cover (or projected to be once plants mature) • ≤ 20% weed cover with no Declared weed species present.					
	D3	Conduct infill planting up to 30% planting density (if required).	Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Year 1.	Autumn Monitoring Year 1.	• Rehabilitation monitoring reports. • Photographs.		
Seed Collection and Seedling Propagation (continued)	D4	Conduct infill planting up to 15% planting density (if required).	Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Year 2	Autumn Maintenance Year 2.	• Rehabilitation monitoring reports. • Photographs.		
	D5	Conduct infill planting up to 5% planting density (if required).	Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Year 3	Autumn Maintenance Year 3.	• Rehabilitation monitoring reports. • Photographs.		

	D6	Undertake weed control during revegetation activity.	• Baseline monitoring quadrat establishment. Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Years 1-3.	Spring, Summer and Autumn for three (3) years post initial revegetation activity, as required.	• Rehabilitation monitoring reports. • Photographs.		
	D7	Conduct remediation activities / reinstalment of any disturbed or damaged areas and/or conduct infill planting and/or weed control	• Inspection of landforms to assess erosion/damage impacts. • Monitor and record site response to fire. • Monitoring for vandalism, vehicular traffic etc.	Post high wind, storms, large rainfall events, fire and/or other relevant events during construction and for three (3) years post initial revegetation activities.	• Rehabilitation monitoring reports • Site photographs • Site inspection reports		
Site Protection	E1	Install pest management to protect the rehabilitated areas, including: • Rabbit exclusion skirting to be added to fencing where necessary to prevent fauna entering revegetation areas. • Rabbit exclusion skirting is to be 0.9 m mesh with a 90 bend, with the upper 600 mm clipped to the fencing at 300 mm centres and the bottom 300 mm pinned flat on the ground on the outside of the revegetation areas.	Inspection of landforms to identify pest presence.	3 monthly	• Rehabilitation monitoring reports. • Site photographs. • Site inspection reports.		

	E2	Install fencing to prevent pedestrian movement into revegetated areas. • Fencing to have multiple strands of plain wire to allow passage of wildlife and discourage pedestrian movement.	Inspection of fencing.	3 monthly	• Rehabilitation monitoring reports. • Site photographs. • Site inspection reports.		
	E3	Remove rabbit proof skirting at the end of the revegetation activity to allow the passive of native fauna (after native plants have been successfully established).	Monitoring of rehabilitation quadrats Spring and Autumn Maintenance Year 3	End of plant establishment as per the recommendation of the Revegetation Consultant	• Rehabilitation monitoring report. • Photographs		

Attachment 1 – Revegetation Species List

Species list is taken from the Tranen, 2023 (Enabling Earthworks Revegetation Plan). The list aligns with the species identified in specific surveys of the Alkimos Plant site documented in the Stantec Flora and Vegetation Consolidation Survey (2021) (see page 850 of 1249 of Appendix J of Environmental Review Document.

https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/Appendix%20J%20-%20Alkimos%20SDP%20Flora%20and%20Vegetation%20Consolidation%20Report%20REDUCED.pdf)

Allocation of Native Seed from WC ASDP & WWTP Banks for Alkimos Seawater Desalination Plant Enabling Earthworks					Numbers of seedlings to be propagated from provenance seed (where available)									^Est. Seed Reqd for Propagation g	Est. Balance for Broadcast g	Remaining provenance seed to be used for direct seeding, g						
					West Batters		Plant Batters				Offset Areas		Total			Plant Batters			Offset Areas			Total g
Species	Seed Avail ASDP g	Seed Avail WWTP g	Total Seed Available g	Approx. Seeds/g	Emerge Batters	Medium Fire-resistant	Medium 1/m²	Small 1/m²	Ground-cover 1.6/m²	PSP	Large 1/m²	Small 1/m²	Seedlings			Medium	Small	Ground-cover	Large	Small	Low	
				Area →	2,919		82,400	33,700	2,600		101,100	12,100				82,400	33,700	2,600	101,100	12,100	3,300	
Acacia cyclops	940.0	3,024.0	3,964.0	26			2,000				1,000		**3,000**	**461.5**	**3,502**	800			1341			**2,141.0**
Acacia lasiocarpa	3,744.0		3,744.0	273			3,000	1,500			400	400	**5,300**	**77.7**	**3,666**	1000	1550	50	100	300	100	**3,100.0**
Acacia pulchella	3,135.0		3,135.0	100			3,000	1,500			400	400	**5,300**	**212.0**	**2,923**	600	1550	50	100	300	100	**2,700.0**
Acacia saligna		3,035.0	3,035.0	51											**3,035**				1000			**1,000.0**
Acacia truncata	1,264.0		1,264.0	215			2,000	1,500			1,000	400	**4,900**	**91.2**	**1,173**	300	550	50	89	50	50	**1,089.0**
Acanthocarpus preissii	7,465.0		7,465.0	20			3,000	1,500	400		1,000	400	**6,300**	**1,260.0**	**6,205**	2500	1500	50	500	265	50	**4,865.0**
Adriana quadripartita	768.7		768.7	39			2,000	1,000			1,000	400	**4,400**	**451.3**	**317**							**0.0**
Allocasuarina humilis	908.0		908.0	450			1,000				1,000		**2,000**	**17.8**	**890**	379			10			**389.0**
Allocasuarina lehmanniana	500.0		500.0	770							200		**200**	**1.0**	**499**				200			**200.0**
Alyogyne huegelii	35.0		35.0	200			1,000				200		**1,200**	**24.0**								**0.0**
Atriplex cinerea	1,000.0		1,000.0	960			2,000	1,500	400		200	400	**4,500**	**18.8**	**981**	260	480	50	23	100	50	**963.0**
Atriplex isatidea	439.0		439.0	120			2,000				200		**2,200**	**73.3**	**366**	150			10			**160.0**
Banksia attenuata	516.0	5,768.0	6,284.0	10							1,000		**1,000**	**200.0**	**6,084**				3000			**3,000.0**
Banksia grandis	500.0	140.0	640.0	11							1,000		**1,000**	**181.8**	**458**				458			**458.0**
Banksia menziesii	843.0	157.0	1,000.0	12							1,000		**1,000**	**166.7**	**833**				833			**833.0**
Banksia sessilis	807.0		807.0	155			2,000				3,000		**5,000**	**129.0**	**678**	500			126			**626.0**
Calothamnus quadrifidus	3,179.0		3,179.0	200	314	22	4,000				5,000		**9,336**	**186.7**	**2,992**	2000			972			**2,972.0**
Calothamnus sanguineus	2.9		2.9	300							100		**100**	**1.3**	**2**				2			**2.0**
Carpobrous virescens	400.0		400.0	2550			1,000	1,000	400		3,000	400	**5,800**	**9.1**	**391**	50	200	40	59	40		**389.0**
Clematis linearifolia	38.0		38.0	240			1,000	1,000				180	**2,180**	**36.3**								**0.0**
Conostylis aculeata	203.1		203.1	3000			2,000	1,000	200		400	400	**4,000**	**5.3**	**198**	16	20	40	5	15	100	**196.0**
Conostylis candicans	202.3		202.3	2100	186		2,000	1,000	200		400	400	**4,186**	**8.0**	**194**	15	20	40	7	10	100	**192.0**
Conostylis sp.	8.0		8.0	2500			1,000	1,000	200		100	400	**2,700**	**4.3**	**4**							**0.0**
Eremaea pauciflora	116.0		116.0	1000			2,000				1,000		**3,000**	**12.0**	**104**	60			5			**65.0**
Eremophila glabra	1,100.0		1,100.0	17	186		440	1,000	200		400	400	**2,626**	**617.9**	**482**						100	**100.0**
Eucalyptus utilis					19								**19**									
Eucalyptus gomphocephala	2,595.0	269.0	2,864.0	81						42	1,000		**1,042**	**51.5**	**2,813**				600			**600.0**
Eucalyptus todtiana	3,000.0	3,343.0	6,343.0	2							1,000		**1,000**	**2,000.0**	**4,343**				600			**600.0**
Exocarpos sparteus		231.0	231.0	87									**0**	**0.0**	**231**	150			81			**231.0**
Ficinia nodosa	1,049.0		1,049.0	2900	519		4,000	2,280	400		4,000	400	**11,599**	**16.0**	**1,033**	150	300	60	69	400	50	**1,029.0**
Frankenia pauciflora	0.0	616.0	616.0	680	236		2,000	2,000			1,000	200	**5,436**	**32.0**	**584**	90	300	40	30	100		**560.0**
Gomphrolobium tomentosum	201.6		201.6	650	313		2,000	2,000			1,000	400	**5,713**	**35.2**	**166**	35	50	40	13	10		**148.0**
Hakea lissocarpha	4.2		4.2	41			20				20		**40**	**3.9**	**0**							**0.0**
Hakea prostrata	731.7		731.7	25			2,500				472		**2,972**	**475.5**	**256**				16			**16.0**
Hakea trifurcata	545.2		545.2	66			2,500				1,000		**3,500**	**212.1**	**333**				182			**182.0**
Hardenbergia comptoniana	3,816.0		3,816.0	30	186		1,000	1,000	200		2,000	200	**4,586**	**611.5**	**3,205**	600	1000	60	1145	300	100	**3,205.0**
Hemiandra pungens	301.3		301.3	450	365		2,000	3,000	400		1,000	400	**7,165**	**63.7**	**238**	40	100	40	11	20		**211.0**
Hibbertia racemosa	240.1		240.1	404	186		2,000	2,000			2,000	400	**6,586**	**65.2**	**175**	50	60	40	5	20		**175.0**
Jacksonia furcellata	198.0		198.0	200			1,000				2,000		**3,000**	**60.0**	**138**	50			36			**86.0**
Jacksonia sternbergiana	18.0		18.0	110			400				100		**500**	**18.2**	**0**							**0.0**
Kennedia prostrata	4,607.0		4,607.0	40			1,000	1,000	400		1,000	400	**3,800**	**380.0**	**4,227**	1000	1500	40	997	600	90	**4,227.0**
Lepidosperma gladiatum	3.1		3.1	450	598			10				10	**618**	**5.5**	**-2**							**0.0**
Lysiandra calycina	2,004.4		2,004.4	500	236		2,000	1,870	200		5,000	200	**9,506**	**76.0**	**1,928**	400	600	40	280	600		**1,920.0**
Macrozamia fraseri/riedlei	30,000.0		30,000.0	0.063							300		**300**	**19,047.6**	**10,952**				10000			**10,000.0**
Melaleuca cardiophylla	2,179.0		2,179.0	720							12,000		**12,000**	**66.7**	**2,112**				2112			**2,112.0**
Melaleuca huegelii	1,402.0	1,417.0	2,819.0	500	19						12,808		**12,827**	**102.6**	**2,716**				2716			**2,716.0**
Melaleuca lanceolata					22								**22**									
Melaleuca systena	897.0	1,649.0	2,546.0	2500			4,800				18,000		**22,800**	**36.5**	**2,510**	1500			150			**1,650.0**
Nitraria billardierei	0.0	2,077.0	2,077.0	10	314		2,000				1,500		**3,814**	**1,525.6**	**551**	140			10			**150.0**
Olearia axillaris	6,000.0		6,000.0	1080	314	22	4,000				2,000		**6,336**	**23.5**	**5,977**	5000			100			**5,100.0**
Rhagodia baccata	7,336.0		7,336.0	560			4,000				2,000		**6,000**	**42.9**	**7,293**	5000			100			**5,100.0**
Scaevola crassifolia	1,319.0		1,319.0	180	186		3,000	3,000	400		2,000	400	**8,986**	**199.7**	**1,119**	150	300	50	30	500		**1,030.0**
Spinifex longifolius	0.0	12,260.0	12,260.0	70	519		2,000	40			3,500		**6,059**	**346.2**	**11,914**						100	**100.0**
Spyridium globulosum	2,100.0		2,100.0	556			3,000				1,000		**4,000**	**28.8**	**2,071**	1585			20			**1,605.0**
Threlkeldia diffusa	99.0		99.0	148			500	1,000	160		200	200	**2,060**	**55.7**	**43**		30					**30.0**
Trymalium ledifolium	0.0	347.0	347.0	475			240				200		**440**	**3.7**	**343**	150			187			**337.0**
Xanthorrhoea preissii	1,000.0	4,277.0	5,277.0	50									**0**	**0.0**	**5,277**				2000			**2,000.0**
Total	**99,760.6**	**38,610.0**	**138,370.6**		**4,718**	**44**	**82,400**	**33,700**	**4,160**	**42**	**101,100**	**7,790**	**233,954**	**29,833**	**108,525**	**24,720**	**10,110**	**780**	**30,330**	**3,630**	**990**	**70,560**
			Plants required		4,718	44	82,400	33,700	4,160	42	101,100	12,100	**Seed reqd at 3,000 g/ha**		70,560	24,720	10,110	780	30,330	3,630	990	
					238,264											**70,560**						

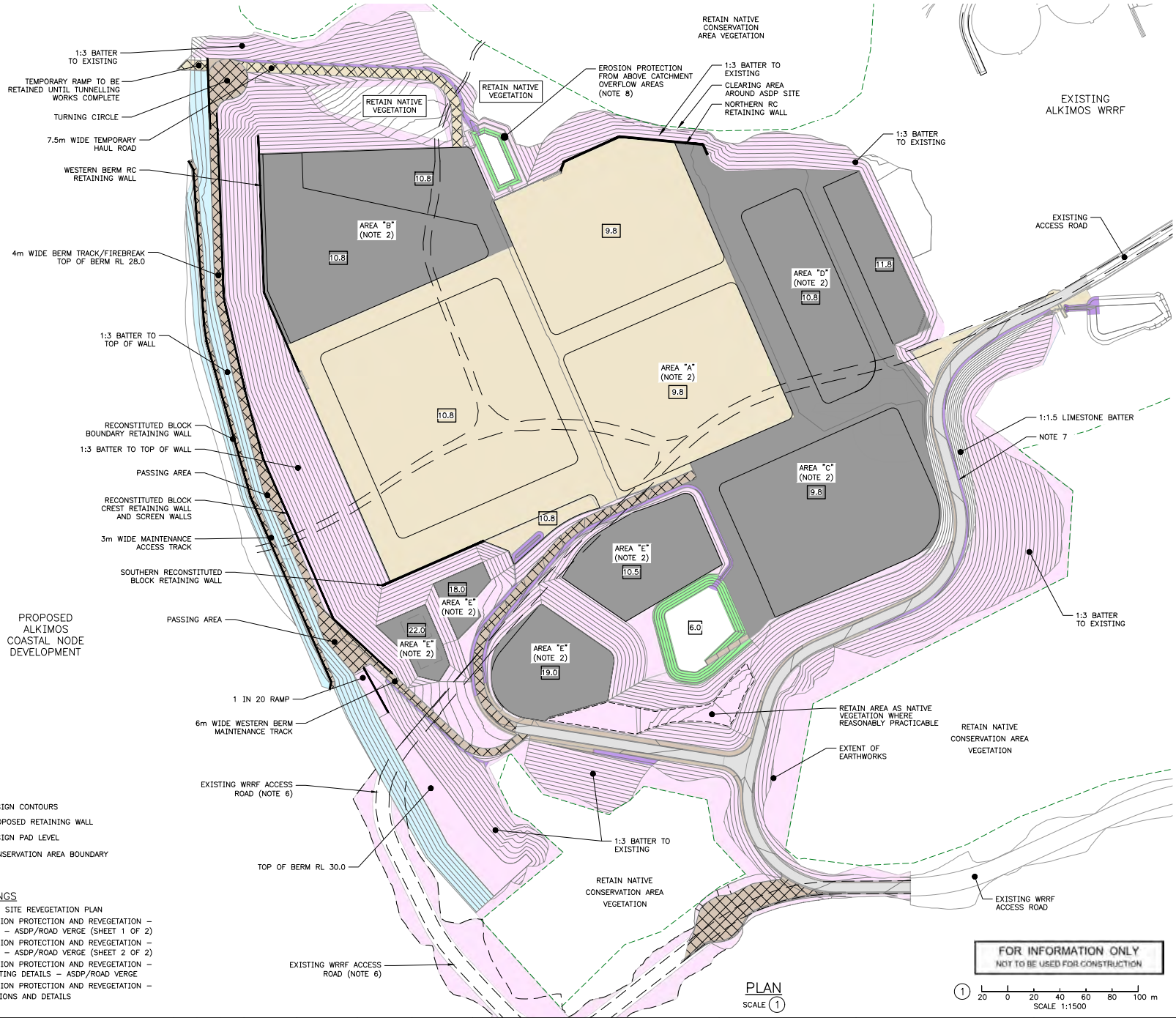
Notes: seeds/g typical from Tranen experience.

^ potential total numbers assuming 25% seed viability for all except Banksia attenuata and menziesii 50%. If viability is lower, procure seedlings to make up the numbers from nursery provenance stock

Emerge = as shown on drawings MV08-17-24.3 and 4. **Bolded species name** indicates fire resistant (R1SK Consulting). Seed from ASDP bank to be used as first priority for propagating seedlings.

Shading key to plant sizes:	Large, L	Medium, M	Small, S

Attachment 2 - Site Revegetation Plans



NOTES

1. EROSION PROTECTION ON BATTER SURFACES SHALL BE UNDERTAKEN AS SOON AS THE FINISHED SURFACE LEVEL (FSL) IS ACHIEVED AND IN ACCORDANCE WITH THE PARTICULAR SPECIFICATION "BEWM".
2. THE ASDP PAD AREAS ARE DEMARCATED FROM 'A' TO 'E'. AREA 'A' IS CRITICAL FOR LIMESTONE CAPPING TO PROVIDE A HARDSTAND AND ISOLATION BARRIER FOR FUTURE TUNNEL EARTHWORKS NEUTRALISATION. THE LIMESTONE CAPPING SHALL BE DONE WITH EXCAVATED LIMESTONE ON SITE. AREAS DEMARCATED 'B' TO 'E' MAY BE CAPPED WITH PAPER PULP HYDROMULCH, ONLY IF SUFFICIENT SUITABLE LIMESTONE IS NOT AVAILABLE FROM THE EXCAVATION ON SITE. THE ORDER OF PREFERENCE FOR FURTHER LIMESTONE CAPPING IS FROM 'B' TO 'E'.
3. COIR NETTING SHALL BE 400 g/m^2 "GEOFABRICS" OR SIMILAR APPROVED. COIR NETS SHALL BE INSTALLED TO THE MANUFACTURER'S SPECIFICATION AND SHALL BE PINNED IN A STAGGERED PATTERN WITH A MINIMUM OF THREE 300mm LONG STEEL PINS PER SQUARE METRE (150mm LONG PINS MAY BE USED WHERE THE GROUND IS TOO HARD FOR 300mm PINS). NETTING EDGES TO BE OVERLAPPED BY MINIMUM 100mm.
4. MULCHING SHALL BE 50 TO 75mm THICK (MIN) TAKEN FROM MULCHED MATERIAL STOCKPILED ON SITE FOR REUSE. AREAS FOR MULCHING SHALL BE APPROVED BY THE REVEGETATION SPECIALIST PRIOR TO PLACING OF THE MULCH.
5. FOR DETAILED EROSION PROTECTION MEASURES SUCH AS ALONG ROAD DRAINS AND WITHIN THE INFILTRATION BASIN REFER TO THE DETAILED DRAWINGS.
6. THE EXTENT OF THE REDUNDANT PORTION OF THE EXISTING WRRF ACCESS ROAD SURFACE TO BE STRIPPED IS TO BE APPROVED BY THE SUPERINTENDENT PRIOR TO COMMENCEMENT. THE STRIPPED ROAD BASE MATERIAL SHALL BE REUSED AS SURFACING ON ACCESS TRACKS AND PATHWAYS. ANY EXCESS STRIPPED ROAD BASE SHALL BE STOCKPILED ON THE SITE FOR REUSE IN THE FUTURE WORKS BY OTHERS.
7. THE EXTENT OF DRAINAGE EROSION PROTECTION WHERE LIMESTONE IS IDENTIFIED MAY BE REDUCED WHERE HARD LIMESTONE HAS BEEN IDENTIFIED AND REVIEWED IN CONJUNCTION WITH A GEOTECHNICAL ENGINEER TO BE SUITABLE TO PREVENT EROSION AT A INTERMITTENT FLOW VELOCITIES UP TO 2.7m/s AND A SUSTAINED FLOW VELOCITIES UP TO 2.1m/s.
8. A PROVISIONAL SUM HAS BEEN ALLOWED FOR ADDITIONAL EROSION PROTECTION MEASURES TO THE CUT BATTER AND INFILTRATION BASIN FROM OVERLAND FLOWS ENTERING THE BASIN FROM THE CATCHMENT AREA EXTERNAL (TO THE NORTH) OF THE ASDP SITE. THE SUPERINTENDENT SHALL DIRECT THE CONTRACTOR TO TYPE AND EXTENT OF EROSION PROTECTION REQUIRED ONCE THE EXCAVATION OF THE BASIN AND ADJACENT CUT BATTERS HAVE BEEN CONCLUDED.
9. ASDP EROSION PROTECTION AREAS:
   a. COIR NETTING 0.32 ha (NOTE 3)
   b. COIR NETTING WITH 75mm MULCH 1.12 ha (NOTE 3&4)
   c. 50mm MULCHING 10.78 ha (NOTE 4)
   d. LIMESTONE CAPPING (AREA 'A') 7.59 ha (NOTE 2)
   e. LIMESTONE AND/OR PAPER PULP HYDRO MULCH CAPPING (AREAS 'B' TO 'E') 7.47 ha (NOTE 2)

LEGEND

- LIMESTONE CAPPING (NOTE 2)
- RECYCLED CRUSHED CONCRETE, OR IF AVAILABLE AT THE TIME, USE SITE WON EXCAVATED LIMESTONE
- GRAVEL CAPPING (ROAD SHOULDERS)
- REUSED ROAD BASE FROM STRIPPED WRRF ACCESS ROAD OR RECYCLED CRUSHED CONCRETE ROAD BASE (IPWA TYPE 1)(NOTE 6)
- ASPHALT ROAD SURFACING
- 75mm (MIN.) MULCH WITH COIR NETTING (NOTES 3&4)
- COIR NETTING (NOTE 3)
- 50mm (MIN.) MULCHING INCORPORATED INTO SURFACE (NOTE 4)
- RIP-RAP OR STONE PITCHING PROTECTION
- EXISTING SURFACE AND/OR NO TREATMENT
- PAPER PULP HYDROMULCH (NOTE 2)

ISSUE	DATE	GRID	REVISION	DRN	REC	APPD

DESIGN SURVEY IW200099 | VERTICAL DATUM AHD | COORDINATE SYS MGA94-50 | ASCON SURVEY | DES REF IW200099 | DES CALC A. RIX | DES CHD G. WILSENACH | DRN M. FOSTER | Q.C. CHD C. LEGERSTEE | NORTH POINT

Jacobs

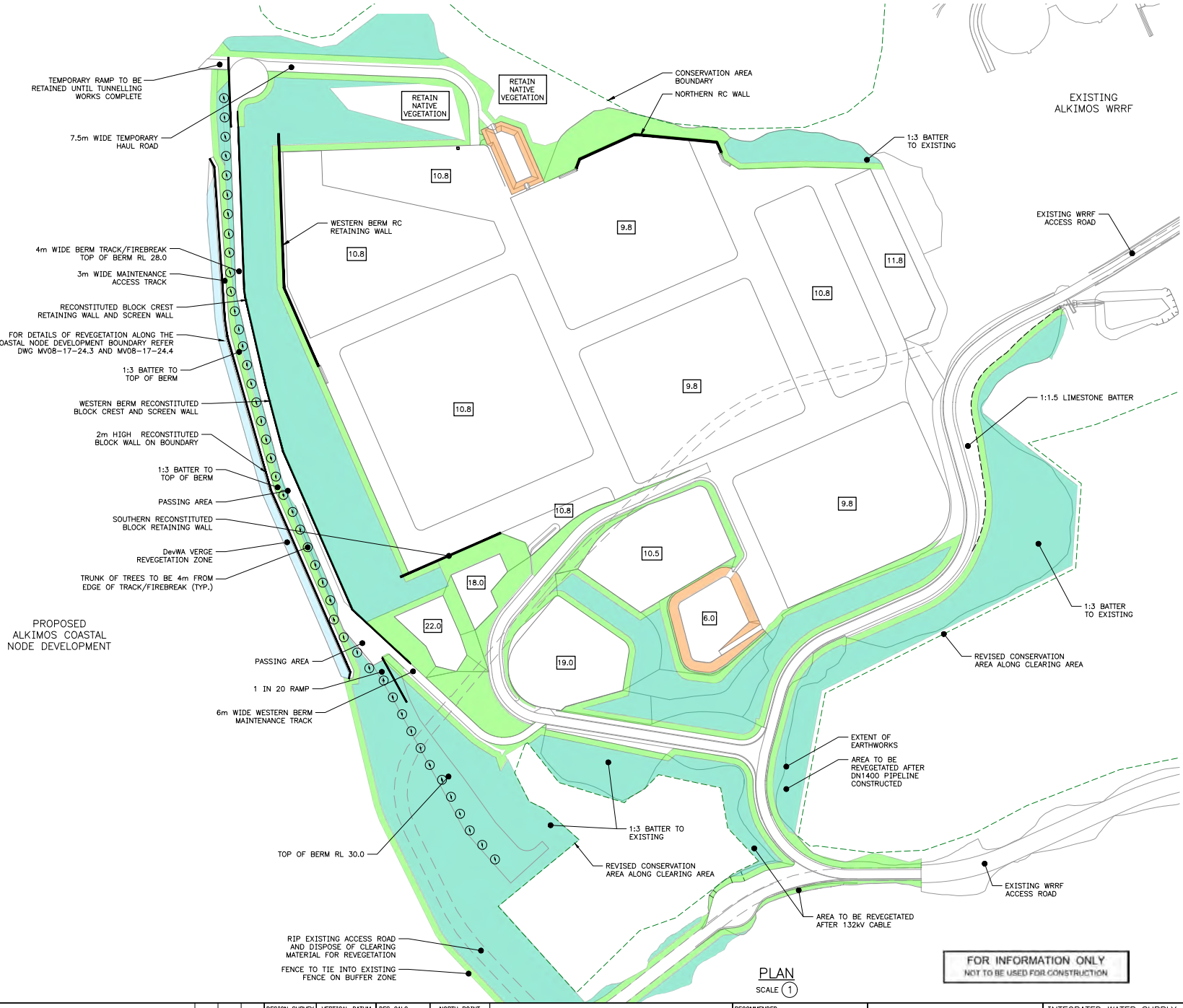
RECOMMENDED
CONSULTANT PROJECT MANAGER
APPROVED
CONSULTANT PROJECT DIRECTOR

WATER CORPORATION

INTEGRATED WATER SUPPLY
ALKIMOS SEAWATER DESALINATION PLANT
ASDP SITE EROSION PROTECTION PLAN

FILE PROJECT C-W03713 | PLAN MV08-17-24.1 | CAD | ISSUE A8 | ORIGINAL SHEET SIZE A1 | MF

566
810



PLAN
SCALE 1

NOTES

1. FOR INTERIM EROSION PROTECTION UNDERTAKEN AS PART OF THE ENABLING EARTHWORKS, REFER TO DWG MV08-17-24.1 AND MV08-17-25.2 FOR TYPICAL DETAILS.
2. REVEGETATION INDICATED ON THIS PLAN SHALL BE UNDERTAKEN AS A SEPARATE CONTRACT REQUIREMENT TO THE REQUIREMENTS AND SPECIFICATIONS INDICATED IN THAT CONTRACT DOCUMENT.
3. FOR THE REVEGETATION WORKS ON THE ROAD VERGE REFER TO DRAWINGS MV08-17-24.3 & MV08-17-24.4.
4. SEEDLINGS SHOULD BE PLANTED USING POTTIPUTKI PLANTING TUBES, WITH A 10g NATIVE PLANT FERTILISER TABLET PLANTED ADJACENT TO EACH.
5. REVEGETATION INDICATED INTO FOUR CATEGORIES:
   - TYPE 1: GROUND COVER REVEGETAION, MAINLY TO BE USED ON DRAINAGE BASIN BATTER.
   - TYPE 2: SMALL VEGETATION FROM 0 TO 1m HIGH AND TO BE USED ADJACENT TO FENCELINES, FIRE BREAKS, ROAD WAYS ETC.
   - TYPE 3: MEDIUM VEGETATION CONSISTING OF SHRUB VEGETATION BETWEEN 1 AND 2m HIGH FOR AREAS AWAY FROM INFRASTRUCTURE.
   - TYPE 4: IS FOR FIRE-RESISTANT MEDIUM SHRUBS ALONG THE TOP OF THE WESTERN BERM AS ADDITIONAL SCREENING IN A SINGLE ROW AT 5m CENTRES, ALTERNATING OLEARIA AXILLARIS (COASTAL DAISYBUSH) AND CALOTHAMNUS QUADRIFIDUS (ONE-SIDED BOTTLEBRUSH).
6. AREAS OF REVEGETATION:

a. TYPE 1: GROUND COVER	0.25 ha
b. TYPE 2: SMALL VEGETATION	3.19 ha
c. TYPE 3: MEDIUM VEGETATION	8.20 ha
d. TYPE 4: MEDIUM SHRUBS	44 No.

LEGEND

- DESIGN CONTOURS
- PROPOSED RETAINING WALL
- 9.8 DESIGN PAD LEVEL
- CONSERVATION AREA BOUNDARY
- ① MEDIUM SHRUBS (TYPE 4)
- MEDIUM REVEGETATION (TYPE 3)
- SMALL REVEGETATION (TYPE 2)
- GROUND COVER (TYPE 1)
- ASDP/ROAD VERGE REVEGETATION (REFER TO DRAWINGS MV08-17-24.3 & MV08-17-24.4)
- FINAL SURFACING (BY OTHERS) AND/OR NO REVEGETATION WORKS

REFERENCE DRAWINGS

MV08-17-24.1	ASDP SITE EROSION PROTECTION PLAN
MV08-17-24.3	EROSION PROTECTION AND REVEGETATION – PLAN – ASDP/ROAD VERGE (SHEET 1 OF 2)
MV08-17-24.4	EROSION PROTECTION AND REVEGETATION – PLAN – ASDP/ROAD VERGE (SHEET 2 OF 2)
MV08-17-25.1	EROSION PROTECTION AND REVEGETATION – PLANTING DETAILS – ASDP/ROAD VERGE
MV08-17-25.2	EROSION PROTECTION AND REVEGETATION – SECTIONS AND DETAILS

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① 20 0 20 40 60 80 100 m
SCALE 1:1500

ISSUE	DATE	GRID	REVISION	DRN	REC	APPD

DESIGN SURVEY IW200099	VERTICAL DATUM AHD	DES CALC A. RIX	NORTH POINT
	COORDINATE SYS MGA94-50	DES CHD G. WILSENACH	
ASCON SURVEY	DES REF IW200099	DRN M. FOSTER	
		Q.C. CHD C. LEGERSTEE	

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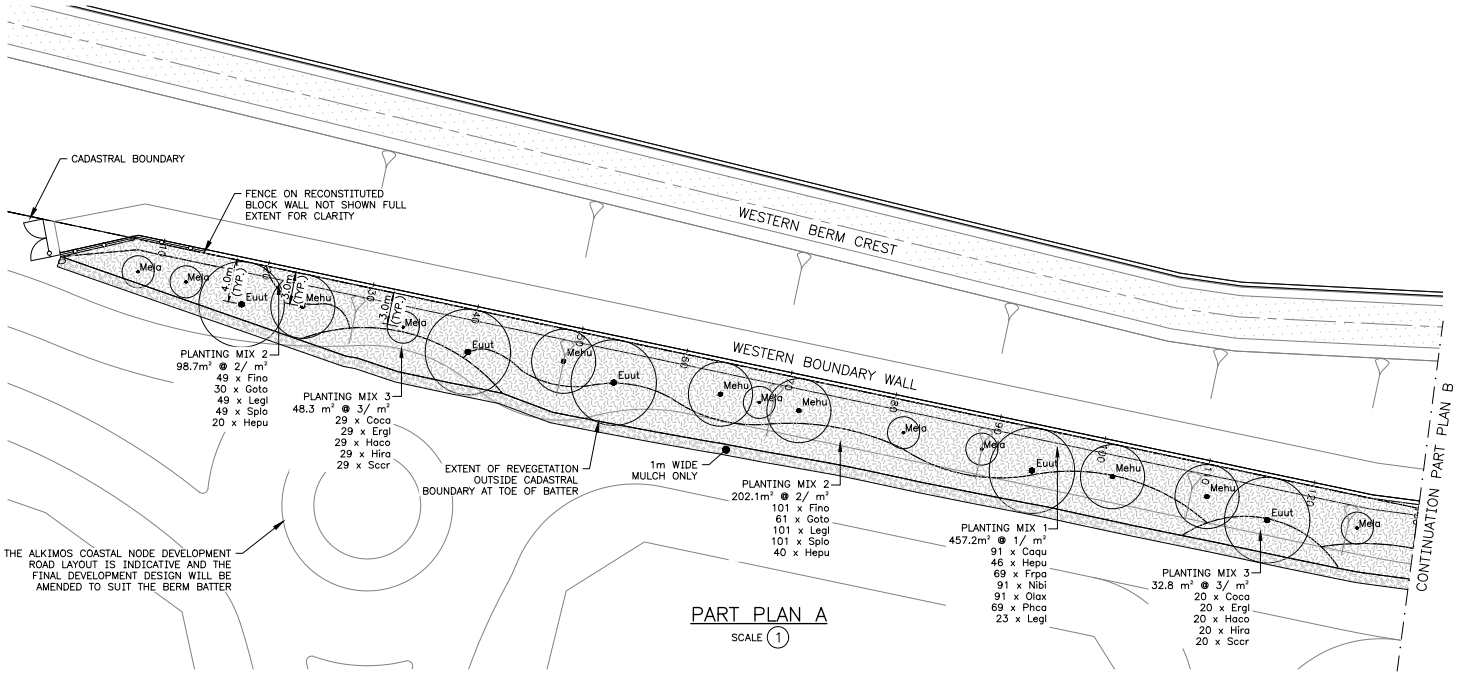
WATER CORPORATION

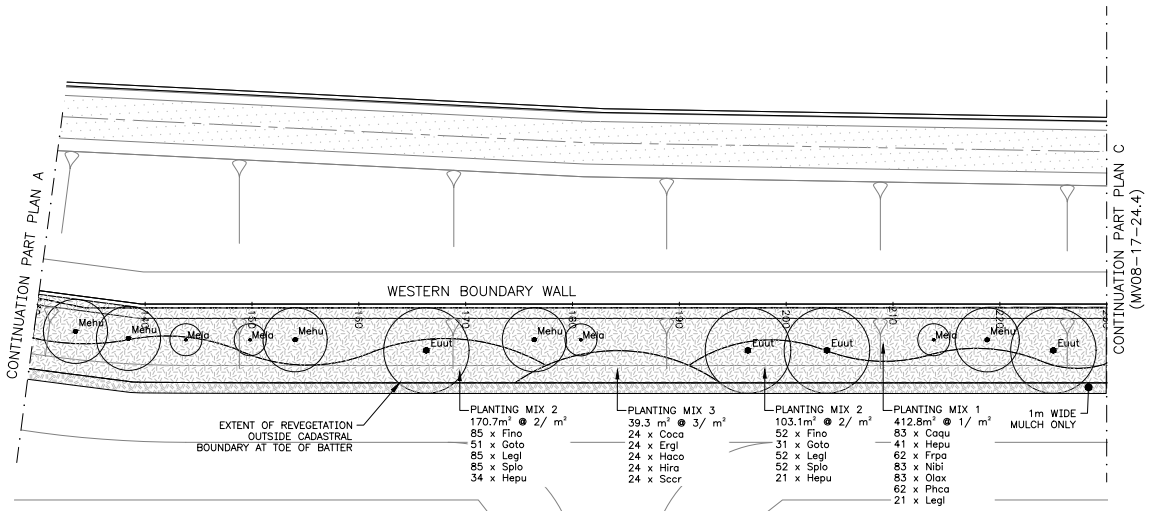
INTEGRATED WATER SUPPLY
ALKIMOS SEAWATER DESALINATION PLANT
ASDP SITE REVEGETATION PLAN

FILE	PLAN	CAD	ISSUE	ORIGINAL SHEET SIZE
PROJECT C-W03713	MV08-17-24.2	A8	MF	A1

566
810



PART PLAN A
SCALE 1



PART PLAN B
SCALE 1

NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS MV08-1-4.1 AND MV08-1-4.2.
2. FOR INTERIM EROSION PROTECTION UNDERTAKEN AS PART OF THE ENABLING EARTHWORKS, REFER TO DWG MV08-17-24.1 AND MV08-17-25.2 FOR TYPICAL DETAILS.
3. COIR NETTING SHALL BE INSTALLED BY OTHERS AND BE 400 g/m² "GEOFABRICS" OR SIMILAR APPROVED. COIR NETS SHALL BE INSTALLED TO THE MANUFACTURER'S SPECIFICATION AND SHALL BE PINNED IN A STAGGERED PATTERN WITH THREE 300mm LONG STEEL PINS PER SQUARE METRE (150mm LONG PINS MAY BE USED WHERE GROUND IS TOO HARD FOR 300mm PINS). NETTING EDGES TO BE OVERLAPPED BY A MINIMUM 100mm AT LAPS.
4. MULCHING SHALL BE INSTALLED BY OTHERS AND BE 75mm THICK. TAKEN FROM MULCHED MATERIAL STOCKPILED ON SITE FOR REUSE. AREAS FOR MULCHING SHALL BE APPROVED BY THE REVEGETATION SPECIALIST PRIOR TO PLACING OF THE MULCH.
5. FOR DETAILED EROSION PROTECTION MEASURES SUCH AS ALONG ROAD DRAINS AND WITHIN THE INFILTRATION BASIN REFER TO THE DETAILED DRAWINGS.
6. ASDP ROAD VERGE EROSION PROTECTION AREAS:
   a. COIR NETTING 0.29 ha
   b. MULCHING 0.04 ha
7. SEEDLINGS SHOULD BE PLANTED USING POTTIPUTKI PLANTING TUBES, WITH 10g NATIVE PLANT FERTISER TABLET PLANTED ADJACENT TO EACH TRIANGULAR SECTION CORFLUTE TREE GUARDS, EACH SECURED WITH ONE TIMBER STAKE, SHALL BE USED.
8. ROTTNEST ISLAND TEATREE AND CHENILLE HONEY MYRTLE TREES TO BE PLANTED AT AN OFFSET OF 3m FROM THE FACE OF THE RECONSTITUTED BLOCK RETAINING WALL AND THE COASTAL MOORT TREES AT AN OFFSET OF 4m.
9. THE ALKIMOS COASTAL NODE DEVELOPMENT ROAD LAYOUT IS INDICATIVE AND THE FINAL DEVELOPMENT DESIGN WILL BE AMENDED TO SUIT BERM BATTER.

LEGEND

- RECONSTITUTED BLOCK RETAINING WALL
- CADASTRAL BOUNDARY
- FENCE – 1.2m COMMERCIAL GRADE CITY OF SWAN (TYP.)
- MULCHING, NETTING AND PLANTING
- MULCH ONLY (75mm THICK)

REFERENCE DRAWINGS

MV08-17-5	ENABLING EARTHWORKS- SITE LAYOUT
MV08-17-3	SITE CLEARING – PLAN AND SETOUT (SHEET 2 OF 2)
MV08-17-24.4	PLAN – ASDP/ROAD VERGE (SHEET 2 OF 2)
MV08-17-25.1	PLANTING DETAILS – ASDP/ROAD VERGE

PLANTING SCHEDULE

PLANTING MIX 1

KEY	BOTANIC NAME	COMMON NAME	SPACING	POT	QTY.
Caqu	CALOTHAMNUS QUADRIFIDUS	ONE-SIDED BOTTLEBRUSH	1/m²	TUBE	174
Frpa	FRANKENIA PAUCIFLORA	COMMON SEA-HEATH	1/m²	TUBE	131
Hepu	HEMIANDRA PUNGENS	SNAKEBUSH	2/m²	TUBE	87
Legl	LEPIDOSPERMA GLADIATUM	COAST SORD-SEDGE	1/m²	TUBE	44
Nibi	NITRARIA BILLARDIERE1	NITRE BUSH	1/m²	TUBE	174
Olax	OLEARIA AXILLARIS	COASTAL DAISY-BUSH	1/m²	TUBE	174
Phca	PHYLLANTHUS CALYCINUS	FALSE BORONIA	1/m²	TUBE	131

PLANTING MIX 2

KEY	BOTANIC NAME	COMMON NAME	SPACING	POT	QTY.
Fino	FICINIA NODOSA	KNOTTY CLUB-RUSH	2/m²	TUBE	287
Goto	GOMPHOLOBIUM TOMENTOSUM	HAIRY YELLOW PEA	2/m²	TUBE	173
Hepu	HEMIANDRA PUNGENS	SNAKEBUSH	2/m²	TUBE	115
Legl	LEPIDOSPERMA GLADIATUM	COAST SWORD-SEDGE	2/m²	TUBE	287
Splo	SPINIFEX LONGIFOLIUS	BEACH SPINIFEX	2/m²	TUBE	287

PLANTING MIX 3

KEY	BOTANIC NAME	COMMON NAME	SPACING	POT	QTY.
Coca	CONOSTYLIS CANDICANS	GREY COTTONHEAD	3/m²	TUBE	73
Ergl	EREMOPHILA GLABRA 'KALBARRI CARPET'	KALBARRI CARPET	3/m²	TUBE	73
Haco	HARDENBERGIA COMPTONIANA	NATIVE WISTERIA	3/m²	TUBE	73
Hira	HIBBERTIA RACEMOSA	STALKED GUINEA FLOWER	3/m²	TUBE	73
Sccr	SCAEVOLA CRASSIFOLIA	CUSHION FANFLOWER	3/m²	TUBE	73

PLANT AND TREE NUMBERS IN SCHEDULE ARE TO BE USED AS GUIDE ONLY. TENDERERS TO REFER LABELS ON PLANS FOR NUMBERS. PLANT NUMBERS AND SPECIES ARE SUBJECT TO AVAILABILITY.

TREE SCHEDULE

SYM.	KEY	BOTANIC NAME	COMMON NAME	POT	QTY.
Euut	Euut	EUCALYPTUS UTILIS	COASTAL MOORT	TUBE	9
Mehu	Mehu	MELALEUCA HUEGELI	CHINILLE HONEY MYRTLE	TUBE	11
Mela	Mela	MELALEUCA LANCEOLATA	ROTTNEST ISLAND TEATREE	TUBE	12

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1 5 4 3 2 1 0 5 10 15 m
SCALE 1:250

ISSUE	DATE	GRID	REVISION	DRN	REC	APPD

DESIGN SURVEY IW200099	VERTICAL DATUM AHD	DES CALC A. NEWBURY	NORTH POINT
	COORDINATE SYS MGA94-50	DES CHD E. CARR	
ASCON SURVEY	DES REF IW200099	DRN J. NAYLOR	
		Q.C. CHD M. FOSTER	

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APPROVED
CONSULTANT PROJECT DIRECTOR

INTEGRATED WATER SUPPLY
ALKIMOS SEAWATER DESALINATION PLANT
EROSION PROTECTION AND REVEGETATION
PLAN – ASDP / ROAD VERGE (SHEET 1 OF 2)

FILE PROJECT C-W03713
PLAN MV08-17-24.3
CAD
ISSUE A8
ORIGINAL SHEET SIZE A1
MF

566
810

TREE SCHEDULE

SYM.	KEY	BOTANIC NAME	COMMON NAME	POT	QTY.
Euto	Euut	EUCALYPTUS UTILIS	COASTAL MOORT	TUBE	10
Mehu	Mehu	MELALEUCA HUEGELI	CHINILLE HONEY MYRTLE	TUBE	8
Mela	Mela	MELALEUCA LANCEOLATA	ROTTNEST ISLAND TEATREE	TUBE	10

PLANTING SCHEDULE

PLANTING MIX 1

KEY	BOTANIC NAME	COMMON NAME	SPACING	POT	QTY.
Caqu	CALOTHAMNUS QUADRIFIDUS	ONE-SIDED BOTTLEBRUSH	1/m²	TUBE	140
Frpa	FRANKENIA PAUCIFLORA	COMMON SEA-HEATH	1/m²	TUBE	105
Hepu	HEMIANDRA PUNGENS	SNAKEBUSH	2/m²	TUBE	70
Legl	LEPIDOSPERMA GLADIATUM	COAST SORD-SEDGE	1/m²	TUBE	35
Nibi	NITRARIA BILLARDIERE1	NITRE BUSH	1/m²	TUBE	140
Olax	OLEARIA AXILLARIS	COASTAL DAISY-BUSH	1/m²	TUBE	140
Phca	PHYLLANTHUS CALYCINUS	FALSE BORONIA	1/m²	TUBE	105

PLANTING MIX 2

KEY	BOTANIC NAME	COMMON NAME	SPACING	POT	QTY.
Fino	FICINIA NODOSA	KNOTTY CLUB-RUSH	2/m²	TUBE	232
Goto	GOMPHOLOBIUM TOMENTOSUM	HAIRY YELLOW PEA	2/m²	TUBE	140
Hepu	HEMIANDRA PUNGENS	SNAKEBUSH	2/m²	TUBE	93
Legl	LEPIDOSPERMA GLADIATUM	COAST SWORD-SEDGE	2/m²	TUBE	232
Splo	SPINIFEX LONGIFOLIUS	BEACH SPINIFEX	2/m²	TUBE	232

PLANTING MIX 3

KEY	BOTANIC NAME	COMMON NAME	SPACING	POT	QTY.
Coca	CONOSTYLIS CANDICANS	GREY COTTONHEAD	3/m²	TUBE	113
Ergl	EREMOPHILA GLABRA 'KALBARRI CARPET'	KALBARRI CARPET	3/m²	TUBE	113
Haco	HARDENBERGIA COMPTONIANA	NATIVE WISTERIA	3/m²	TUBE	113
Hira	HIBBERTIA RACEMOSA	STALKED GUINEA FLOWER	3/m²	TUBE	113
Sccr	SCAEVOLA CRASSIFOLIA	CUSHION FANFLOWER	3/m²	TUBE	113

PLANT AND TREE NUMBERS IN SCHEDULE ARE TO BE USED AS GUIDE ONLY. TENDERERS TO REFER LABELS ON PLANS FOR NUMBERS. PLANT NUMBERS AND SPECIES ARE SUBJECT TO AVAILABILITY.

NOTES

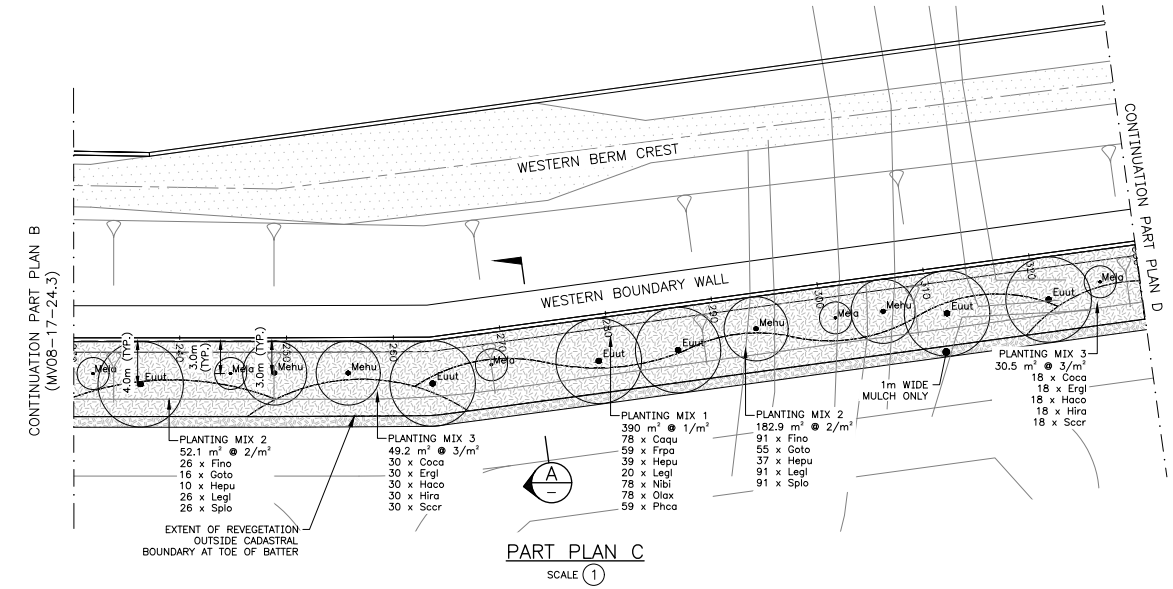
1. FOR GENERAL NOTES REFER TO DRAWING MV08-1-4.1 AND MV08-1-4.2
2. FOR SPECIFIC NOTES REFER TO DRAWING MV08-17-24.3.

LEGEND

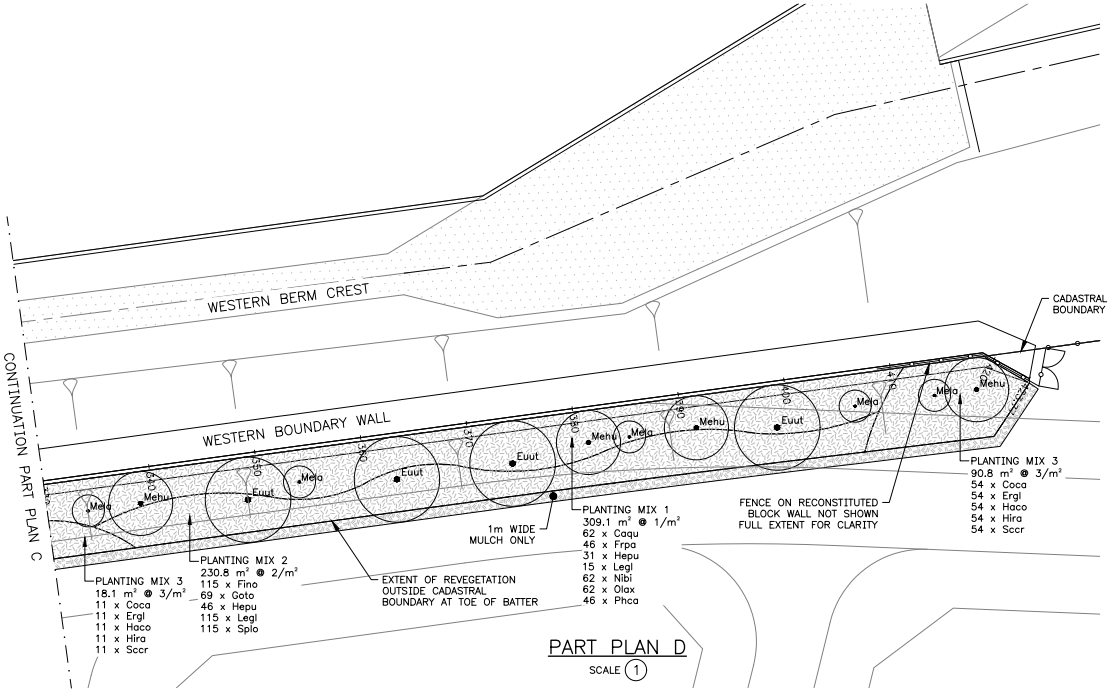
- RECONSTITUTED BLOCK RETAINING WALL
- CADASTRAL BOUNDARY
- FENCE - 1.2m COMMERCIAL GRADE CITY OF SWAN (TYP.)
- MULCHING, NETTING AND PLANTING
- MULCH ONLY (75mm THICK)

REFERENCE DRAWINGS

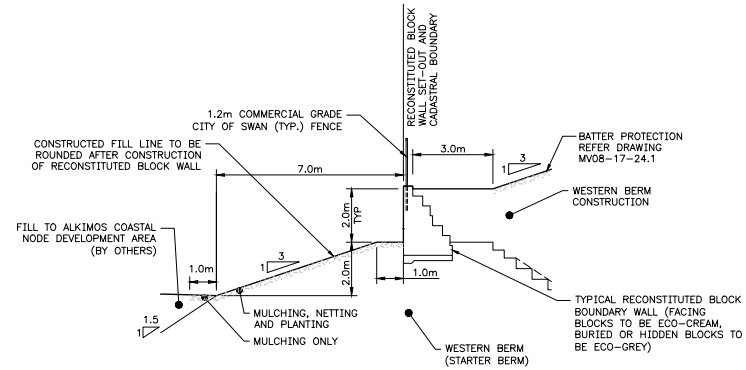
MV08-17-5	ENABLING EARTHWORKS- SITE LAYOUT
MV08-17-3	SITE CLEARING - PLAN AND SETOUT (SHEET 2 OF 2)
MV08-17-24.3	PLAN - ASDP / ROAD VERGE (SHEET 1 OF 2)
MV08-17-25.1	PLANTING DETAILS - ASDP / ROAD VERGE



PART PLAN C
SCALE (1)



PART PLAN D
SCALE (1)



SECTION (A)
SCALE (2)

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SCALE 1:250

(2) 1 0.5 0 1 2 3 4 5 6 7 m
SCALE 1:100

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ISSUE	DATE	GRID	REVISION	DRN	REC	APPD

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	COORDINATE SYS MGA94-50	DES CHD E. CARR	
ASCON SURVEY	DES REF IW200099	DRN J. NAYLOR	
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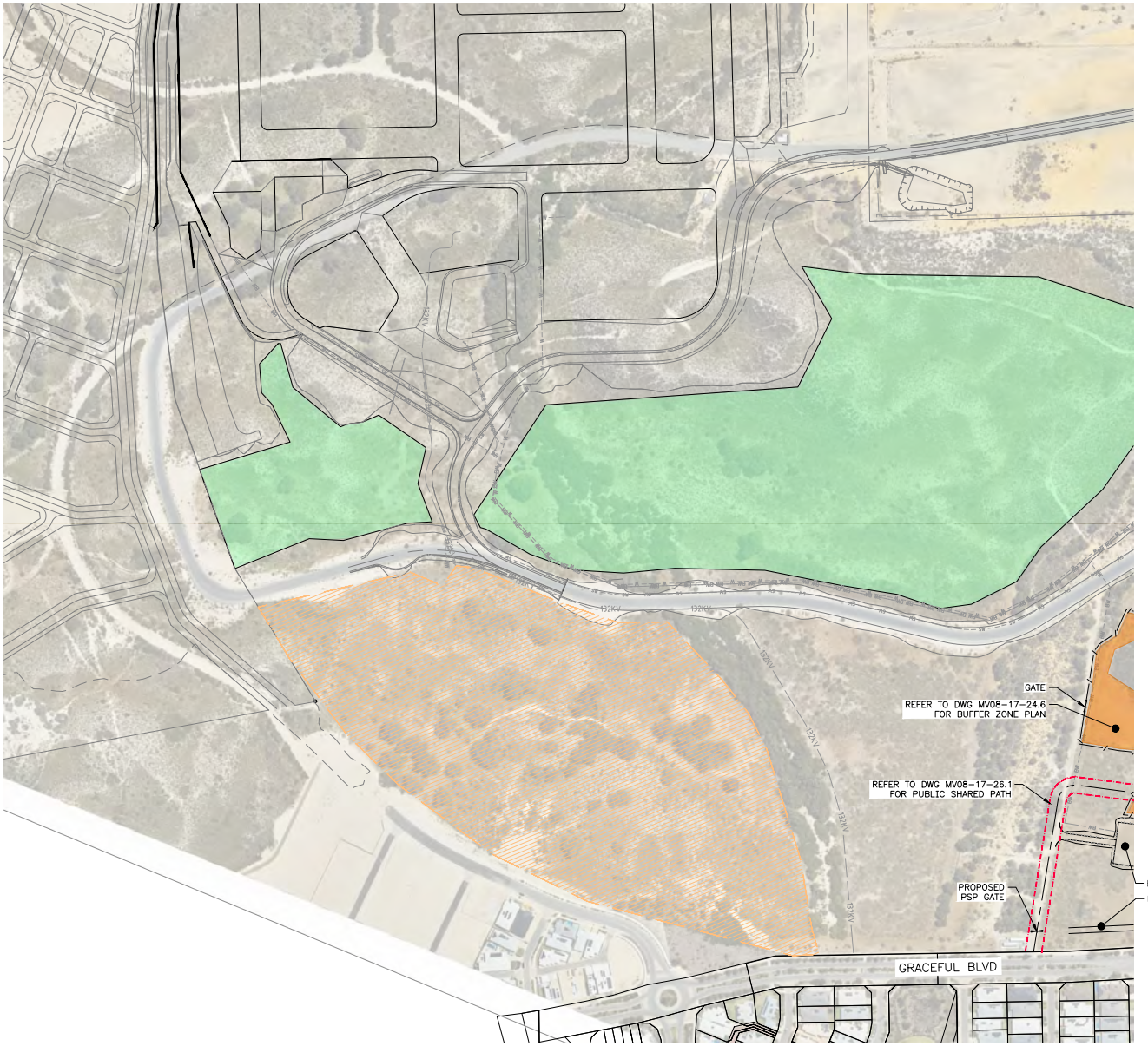
WATER CORPORATION

INTEGRATED WATER SUPPLY
ALKIMOS SEAWATER DESALINATION PLANT
EROSION PROTECTION AND REVEGETATION
PLAN - ASDP / ROAD VERGE (SHEET 2 OF 2)

FILE	PLAN	CAD	ISSUE	ORIGINAL SHEET SIZE
PROJECT C-W03713	MV08-17-24.4	A8	MF	A1

566
810



PLAN

SCALE (1)

NOTES:

1. TUART TREE SEEDLINGS ARE TO BE PLANTED ALONG ONE (NORTH) SIDE OF THE PROPOSED FUTURE PUBLIC SHARED PATH (PSP). THESE SHALL BE SET BACK SEVEN TO NINE METRES FROM THE FUTURE PSP CENTRELINE. THE TUART TREES SHALL BE PLANTED AT AN APPROXIMATE SPACING OF FIVE METRE CENTRES AND AS DETERMINED APPROPRIATE BY THE SPECIALIST REVEGETATION CONTRACTOR BASED ON EXISTING NATIVE VEGETATION.
2. TREE SEEDLINGS PLANTED OUTSIDE OF REVEGETATION FENCE LINE SHOULD BE PLANTED USING POTTIPUTKI PLANTING TUBES, WITH A 10g NATIVE FERTILISER TABLET PLANTED ADJACENT EACH, AND EACH PROTECTED WITH A TRIANGULAR SECTION CORFLUTE TREE GUARD SECURED WITH ONE TIMBER STAKE.
3. GRASS TREES "XANTHORRHOEA PREISSII" UPLIFTED FROM ASDP SITE ARE TO BE RELOCATED BY AN APPROVED CONTRACTOR TO AN AREA SOUTH OF THE NEW REALIGNED ACCESS ROAD AND NORTH OF THE PROPOSED FUTURE PSP FOOTPATH.
4. NO TREES TO BE PLANTED WITHIN 20m OF EG40 BORE PAD AND WITHIN 5m OF BUFFER AREA BOUNDARY/ROAD RESERVE TO MINIMISE BUSHFIRE RISK.

LEGEND

- OD 355 HDPE SITE WATER
- DN1400 CLEAR WATER MAIN
- BORE FEEDER MAIN
- RAW WATER
- 132KV ELECTRICAL CABLE ALIGNMENT
- REVEGETATION FENCE LINE
- PROPOSED FUTURE PSP GATE (2 OFF)
- TUART TREE / REVEGETATION OFFSET CORRIDOR
- PROPOSED TUART TEC OFFSET AREA
- OFFSET REVEGETATION AREA – REFER DRAWING MV08-17-24.6
- CONSERVATION AREA
- NEW TUART TREE SEEDLINGS CORRIDOR – TOTAL LENGTH OF CENTRELINES APPROXIMATELY 2500m

REFERENCE DRAWINGS

MV08-17-24.6	EROSION PROTECTION AND REVEGETATION – PSP / SOUTHERN BUFFER ZONE – PLAN (SHEET 2 of 2)
MV08-17-26.1	PUBLIC SHARED PATH – GENERAL ARRANGEMENT

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(1) 50 40 30 20 10 0 50 100 m
SCALE 1:2000

ISSUE	DATE	GRID	REVISION	DRN	REC	APPD

DESIGN SURVEY | VERTICAL DATUM AHD | COORDINATE SYS MGA94-50 | DES CALC A. RIX | DES CHD G. WILSENACH
ASCON SURVEY NONE | DES REF IW200099 | DRN M. FOSTER | Q.C. CHD C. LEGERSTEE

NORTH POINT

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WATER CORPORATION

INTEGRATED WATER SUPPLY
ALKIMOS SEAWATER DESALINATION PLANT
EROSION PROTECTION AND REVEGETATION
PSP / SOUTHERN BUFFER ZONE PLAN (SHEET 1 OF 2)

FILE | PLAN MV08-17-24.5 | CAD | ISSUE A8 | ORIGINAL SHEET SIZE A1
PROJECT C-W03713 | MF

566
810

Attachment 3 – Alkimos Dune Complex

LEGEND

- Development Envelope

MRS amendment areas

- Public Purposes Reserve - Area 10b
- Public Purposes Reserve - Area 9a and 10a
- Proposed Tuart TEC Offset

Landforms

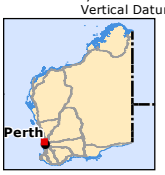
- Quindalup South deep sand flat Phase
- Quindalup South oldest dune Phase
- Quindalup South second dune Phase
- Quindalup South shallow sand flat Phase
- Quindalup South third dune Phase
- Quindalup South unstable sand Phase

1:13,000 at A4

0 130 260 390

Metres

Coordinate System: GDA 1994 MGA Zone 50
Vertical Datum: AHD



DATE: 13/10/2023
AUTHOR: ZAHRAP0

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Metropolitan Regional Scheme - Public Purposes Reserve - Landforms

Attachment 3

File: S:\AA_EIA_GIS\1_Projects\Capital\CW03474 - Alkimos Desalination Plant\ArcMap\Alkimos RTS Conservation Areas landforms.mxd