

**Perth Seawater Desalination Plant
Desalination Plant Site**

Draft Flora and Fauna Management Plan

February 2005



**PERTH SEAWATER DESALINATION PLANT
DRAFT FLORA AND FAUNA MANAGEMENT PLAN**

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PERTH SEAWATER DESALINATION PLANT DRAFT FLORA AND FAUNA MANAGEMENT PLAN

1. INTRODUCTION

The Water Corporation is undertaking design and construction planning associated with the Perth Seawater Desalination Project. The Premier announced the project on 29/7/2004 and studies and design works are underway in order to meet the requirement of commissioning the works in late 2006. Perth's Seawater Desalination Plant (PSDP) is proposed to be built adjacent to Cockburn Sound in Kwinana. It is planned that the plant will provide 45 gegalitres (GL) per annum to the Integrated Water Supply System (IWSS).

The Perth Seawater Desalination Plant (PSDP) and the pipeline to Thomsons Reservoir (DN 1200) received environmental approval on 9/7/2004 (EPA Bulletin 1137, 2004). The approval for the project, gave the following commitments from the proponent with regard to flora and fauna (Statement 655):

Prepare and implement a Flora and Fauna Management Plan, that will include the following :

- Locating the plant and pipelines to minimise clearing and effects on conservation values.
- Mitigating impacts on Priority Flora.
- Dieback management measures.
- Weed control measures.

Implement the Flora and Fauna Management Plan described above.

The Water Corporation intends to develop a desalination plant and associated infrastructure at the Western Power site, Barter Road, Kwinana. The vegetation of the area was described by Bennett Environmental Consulting Pty Ltd (2004) and the fauna by Greg Harewood (2004).

Feedback on the Preliminary Draft Fauna and Flora Management Plan was provided by the Department of Environment, Audit Branch and the Department of Conservation and Land Management. These comments are summarised in Attachment One.

Attachment Two contains the Flora Assessment of Proposed Perth Seawater Desalination Plant, Kwinana (Bennett, 2004) and Attachment Three contains the Proposed Perth Seawater Desalination Project Fauna Report (Harewood, 2004).

The flora and vegetation of the site is degraded (Department of Environmental Protection, 2000). 39 species were planted or gazetted as weeds from a total of 64 species recorded during the survey. The understorey throughout the site had been predominantly replaced by weeds. Although many plants were weeds they do assist in binding the dune and ensuring the soil is stabilized. The dune face at the ocean had been and continues to be undercut by wave action during storms. Here, plants including weeds help minimise wave erosion.

Dieback management measures have not been included as part of this report due to lack of evident dieback/dieback susceptible species.

Fauna are best protected by minimising the impact on their habitat and hence the focus of the plan is to minimise clearing and undertake rehabilitation.

2. MANAGEMENT DURING CONSTRUCTION

The site consists of a vegetated dune face on the seaside and that of the fore dunes. In the swales near to Barter Road there is a small area of Low Open Forest of *Agonis flexuosa* subsp. *flexuosa* over a Tall Open Shrubland of *Acacia rostellifera*. A larger area of the site consisted of a Heath of *Acacia rostellifera* over varying species including an area of weeds. In some of the swales tree species had been planted several years previously. These included *Eucalyptus utilis* (previously *Eucalyptus platypus* subsp. *heterophylla*) and *Melaleuca lanceolata*, which are not endemic to the site.

Although the understorey has been completely replaced by weeds these species assist with the stabilization of the soil. The fine beach sands of the sea front and fore dunes is very prone to wind erosion. Soil erosion will be an environmental issue that requires management during construction.

Subject to receiving all approvals, clearing will be undertaken towards the middle of 2005. The clearing will involve a swathe of approximately 40 meters between the Perth Seawater Desalination Plant site and the Indian Ocean (20 meters per pipe) to allow for the inlet and outlet pipes, which will be buried. Winter clearing will minimize erosion as damp, heavier soils tend to remain relatively stable. If the area remains exposed into drier periods or summer months as a result of construction requirements, exposed surfaces will be kept damp or will be protected from the wind until the work is completed to avoid wind erosion of the opened surface. On completion of construction of the inlet and outlet either brush, liquid soil binders, geofabric, coarse mulch or a material that provides a similar protective cover, will be laid over the surface, reducing the exposure of the surface soils and the chance of erosion. Where possible, brush from endemic shrubs or trees removed during the construction phase will be used as brush or coarse mulched on site and used to protect open soil areas.

Where possible, the outlet and inlet pipes will be positioned where there will be minimal damage to the natural vegetation and if possible the *Agonis flexuosa* subsp. *flexuosa* area will be avoided, as this area will provide a buffer for the infrastructures.

Seed will be collected from native plants along the foredune to ensure the species used in the rehabilitation are provenance correct. Clumps of *Lepidosperma gladiatum* destroyed through construction will be separated and cultivated on for use in the final rehabilitation. Seed collection will commence in late spring and continue through early summer, several collection sessions being undertaken to ensure that a representative collection of the different species be included in the seed mix. Some seed can be germinated for planting as seedlings at the completion of the development; other seeds will be stored for direct sowing.

2.1 Selection of Disturbance Areas

Where possible, construction will be phased so that a limited amount of ground is exposed at one time. The dense stand of *Agonis flexuosa* subsp. *flexuosa* will be retained and the understorey rehabilitated at the end of construction. The fenced triangle visible from the road and beach could be used in the development especially as when the area is rehabilitated afterwards the visual effect of the area would be enhanced.

Care will be taken with any pipe laying or similar construction that is to occur on the seaside of the foredune. This area is open to erosion from several sources including wind (particularly the south westerly) and wave action of the ocean. The Water Corporation has had experience with similar ocean pipe construction and is aware of problems associated with such construction (examples include the Bunbury Ocean Outfall).

Many of the *Acacia rostellifera* shrubs at the northern end of the site are dead. This could be an age factor as all plants appeared to be of the same age, or could be caused by the roots reaching the saline groundwater in this area or there could be storage or an outlet in the Western Power site that is causing the deaths. Contamination surveys were undertaken as part of the desalination plant site works and it appears that saline groundwater is the possible cause of death.

2.2 After Disturbance

After construction it will be essential to ensure that erosion does not occur. This will be achieved by protecting the exposed surface, preferably with branches, biodegradable geofabric or mulch of species that occur naturally in the environment. As native vegetation is removed during construction vegetative material will be stock piled. Non-native vegetation will be taken to an approved green waste site. At the end of each construction the branches themselves or the coarsely chipped branches will be laid on the exposed surface to reduce the erosion. By placing the branches or mulch on the surface, seeds included on the removed vegetation will be shed on the soil and the seeds can germinate, assisting with the rehabilitation.

Just before the break of season the disturbed areas will be prepared for planting of seedlings and sowing of seeds. The area will be contoured back to the original form, and the surface sand will be broken and small furrows or seedling planting wells made. This will allow the water to be contained in rills rather than spreading across the surface and being lost. Scattering of seeds and planting of seedlings will be undertaken once the ground has been prepared and once the winter season of 2006 breaks. Should it be determined that the rehabilitation is to occur earlier than the winter of 2006, the area will be reticulated. Branches or mulch will be placed over the surface to provide protection for the young plants.

2.3 Collection of seed

Seed will be sourced with the permission of the Department of Planning and Infrastructure (the land is vested therein) and the Department of Conservation and Land Management (seed collecting licence). With permission, the area south of

Barter Road, or other areas with natural vegetation within the vicinity may also be utilised. This will ensure that the genotype of the vegetation is maintained. Care will be taken not to introduce other nonendemic species into the rehabilitation areas.

Seed will be collected and stored in paper bags or cardboard boxes, not plastic. An insecticide will be added to the seed as many fruits include seed predators, which will completely deplete the seed store. Consideration will be given to have an experienced seed collector collect and store the seed for use after the break of season.

Seed will be sown as soon as possible after the rain season commences. Some of the hard seeded species will need to be pretreated e.g. wattles and peas where their surface will be scarified to enhance water uptake and therefore germination. Kings Park and Botanic Garden has trialed the use of smoke and smoke water with success and this method will be considered.

Some of the seed collected will be germinated enabling seedlings to be planted. Some species may need to be propagated from cuttings.

Care will need to be taken with the choice of species for each of the different locations. Only some species are able to tolerate the harsh conditions of the sea front, others will only survive in the swales where they are protected from the prevailing, salt laden winds. The vegetation report will assist with the location of some species but as most of the species recorded from the site were weeds the endemic species list was limited. Notes will be made when the seed is collected of the preferred habitat for that species.

3. MANAGEMENT AFTER CONSTRUCTION

3.1 Rehabilitation

The area opened for construction of the infrastructure will be rehabilitated as discussed above. As the area is already degraded and will require the removal of weeds, which in many sections can be undertaken with a non-selective herbicide e.g. round up, but where there are endemic shrubs and trees growing a selective grass herbicide e.g. fusillade or similar will be used. The area opened at any one time will be dependent upon the amount of seed and seedlings available for use.

Spraying of weed seedlings will be undertaken as soon as they are visible and then re-sprayed as the next lot of seedlings germinate. After the weeds have been killed the ground surface may need to be prepared by shallow ripping whilst retaining the original contour. Alteration to the contour may need to be undertaken where the area adjoins land altered during the construction of the infrastructures.

Seeds will be sown and seedlings planted at the same time as the construction site is rehabilitated. Naturally occurring species in the dune swales and crests will be used. The seed mix will include several seeds of the native *Acacia* species as these are nitrogen fixing plants, germinate and grow quickly and will provide initial soil stabilisation and subsequent protection for smaller seedlings.

Senecio lautus was a common native annual throughout the area. Collection of seeds of this species will commence immediately as the greater the number of these seeds the better the cover that will be attained.

3.2 Monitoring

Monitoring of the rehabilitated areas will be undertaken annually for the first three years and then after a further three years to determine the success or otherwise of seedling establishment. Permanent quadrats will be established and monitored for germination, seedling establishment and weed growth. The size of the rehabilitation area and the number of quadrats will be determined once the area of disturbance has been completed. Monitoring of the dune face may be best done from a distance as care will need to be taken to ensure that the soil surface is not damaged and opened.

Weeds will be removed, especially grass weeds, which can be readily treated with a specific herbicide. Where several deaths of shrub and tree species are recorded, additional seed will be sown or seedlings of shrubs and trees planted.

Monitoring will include the following information:

- Species
- Number of each species
- Average height
- Cover as the plants develop
- Weed species and their cover

By comparing the information for each year of monitoring a gradual increase in the cover of native species will be recorded.

The Department of Environment has requested that the Completion Criteria for the site is 'an increase in species diversity and stems per hectare in comparison to the surrounding vegetation'. However, it could be suggested that the area is weed infested and hence the 'target' is not reflective of a naturally vegetated site. An increase in the stems per hectare is a change from the existing environment and therefore the final rehabilitation will be to a condition better than that currently existing at the foredune site. This may not necessarily translate to a direct increase in the stems per hectare or species diversity (particularly considering the weed infested nature of the site), but will mean that native species will be planted and weed species controlled. Native stems per hectare will at minimum match that present at the site.

Water Corporation has committed to a condition better than that currently existing at the site, in consultation with the Department of Conservation and Land Management.

Should monitoring discover that the rehabilitation criteria is sub standard, or a possible autumn or winter drought is experienced, an adaptive management protocol will be adopted. This will include such things as infill planting and/or watering of rehabilitated species. By including this as part of the long-term management a successful rehabilitation program will be secured.

4. SUMMARY OF OUTCOMES

- Minimal disturbance to the areas not required for the infrastructure development.
- Providing all site construction personnel with induction and training with regard to flora and fauna management.
- A clearly stated work plan will be developed by the Contractor (to the satisfaction of Water Corporation) to ensure clearing widths are understood and demarcated, that soils are kept damp where appropriate, or other forms of soil stabilizers are maintained on extremely mobile cuts or batters.
- The Supervisor will be immediately notified if an injured animal is found. The Supervisor will immediately notify the Superintendent's Representative. In the case of native animals being found injured, the Superintendent's Representative will contact the local Veterinary Clinic or an appropriate local carer.
- No native fauna (including venomous snakes) will be impaired or killed by construction personnel.
- Stabilisation of opened areas to ensure there is minimal wind/rain or other elements erosion exacerbated by the infrastructure development.
- Seed collection from the site and nearby areas.
- Rehabilitation of the area disturbed during construction.
- Final rehabilitation will be to a condition better than that currently present at the foredune site.
- Monitoring of the rehabilitation to ensure that the required completion criteria are met.
- Implementing and adaptive management responses to ensure the rehabilitation criteria are met.

5. REFERENCES

Bennett Environmental Consulting Pty Ltd (2004). Flora Assessment of Proposed Perth Seawater Desalination Plant Kwinana. Unpublished report for Water Corporation

Harewood, G. (2004) Proposed Perth Seawater Desalination Project Kwinana Fauna Assessment. Unpublished report for Water Corporation

Department of Environmental Protection. (2000). Bush Forever. Government of Western Australia.

Attachment One: Feedback from CALM and Department of Environment

Summary of Feedback Received from the Department of Conservation and Land Management and the Department of Environment – Audit Branch

Comments Received From	Comment	Outcome
Department of Conservation and Land Management	<p>Because of previous disturbance at the desalination plant site, the nature of the calcareous soils and the lack of any highly valued environmental assets, such as Declared Rare Flora or Threatened Ecological Communities, that management of environmental issues is quite straight forward.</p> <p>The methods for management of weeds during the rehabilitation stage is appropriate, so to is the post-rehabilitation monitoring. However, there is a precedent for timing of rehabilitation to maximise rehabilitation success. This is through assessments of rehabilitation success as a function of season in Bold Park by Research Scientists at Kings Park and Botanic Gardens. If the rehabilitation is to be conducted outside of the most appropriate season, (a possibility given that start dates are yet to be confirmed) then the plan should really indicate how this will be managed, especially for planted tube stock. It is encouraged you to think about adopting an adaptive management protocol that accounts for possible autumn or winter drought. Drought will limit the chance of a successful rehabilitation outcome.</p>	<p>Noted – the site is very disturbed and weed infested.</p> <p>Noted and plan updated.</p>
	<p>The reports are written in an aspirational manner, suggesting the Water Corporation may adopt a more environmentally prudent approach – not that it will and the plan should be more definite and specific about management procedures for environmental values. Re-phrase the text.</p> <p>There are several examples where statements of management procedures are unclear or not explicit. These could be re-written or re-phrased to make them much clearer to the reader and would therefore provide a greater level of confidence in the management proposed.</p>	<p>Noted - when the draft plan was completed (September 2005) the construction timing was not known. Since writing the draft, planning has progressed further and the clearing will occur in mid-2005 and the report has been updated accordingly.</p>
	<p>Page 2, third paragraph of the report, the consultant has identified dead <i>Acacia rostellifera</i> shrubs at the northern end of the desalination plant construction site. It was hypothesised in the report that these deaths may have been caused by senescence, a quite plausible explanation. The report then goes on to suggest, “there could be storage or an outlet in the Western Power site that is causing the deaths.” It is unclear what this exactly means, and indicates there is a risk that some form of effluent has been discharged in the vicinity of these plants causing these deaths. There is precedent for effluent release from failed pipes causing tree deaths near the Leda Nature Reserve. Given that there may be some risk that the <i>A. rostellifera</i> deaths may indeed be anthropogenic in origin, then Western Power or the Water Corporation should outline how this will be addressed in the vegetation management plan.</p>	<p>A site contamination survey has been undertaken and it is most likely that the death of the trees is a result of natural causes. This is likely to be a result of age and/or the roots reaching the groundwater likely to be subject to salt water intrusion.</p>
	<p><i>Fauna Management Report.</i></p> <p>There are likely to be few issues relating to fauna at the desalination plant site. It is disappointing that some</p>	<p>Noted. The works will not preclude this from happening by and biologist at some</p>

Comments Received From	Comment	Outcome
	assessment of reptiles could not be undertaken, with appropriate weather conditions, in September or October, as this would maximise the chance of observing this fauna.	point in the future.
	On page 8 of the fauna report it states that a viable population of Quenda (<i>Isoodon obesulus</i>) could not persist. I agree that the 'risk' of them occurring at the site is quite low. However, they do occur in the district and may, in-fact, be encountered during construction. I recommend you adopt some contingency plan for this event.	Noted – report updated to include management measures.
Department of Environment – Audit Branch (letter ref:A/311/04)	Approval from CALM is pending and will be forwarded to the DoE when the approval has been formally received from the Water Corporation.	Noted – Water Corporation is seeking approval from CALM.
	It is understood that the completion criteria proposed by Water Corporation for the rehabilitation is that a significant increase in stems per hectare and species diversity will be observed throughout the rehabilitation area, by comparison to a reference area near to the rehabilitation area. The reference area will be agreed with the DoE.	Final rehabilitation will be to a condition better than that currently existing at the foredune site. This may not necessarily translate to a direct increase in the stems per hectare or species diversity (particularly considering the weed infested nature of the site), but will mean that native species will be planted and weed species controlled. Native stems per hectare will at minimum match that present at the site.

Attachment Two: Flora Survey

Attachment Three: Fauna Survey