

15 Conclusions

The Water Corporation of WA, as the proponent for the SSDP, considers that seawater desalination is a climate independent, proven technology capable of delivering large quantities of potable water. With current uncertainty regarding future climate, desalination provides a robust source option for the IWSS.

The site selection process for the Taranto Road site was based on social, environmental and economic criteria, as discussed in chapter 1. Although met with some community anger over the lack of early consultation, the issue of concern can be addressed to eliminate some impacts, and to reduce others to minimal levels.

Alternative water transfer pipeline routes were the subject of similar social, environmental and economic assessment combined with open public consultation before the ultimate route was chosen. The selection of the summit tanks site, to be located 3.5kms north of Harvey, was guided by engineering considerations and a combination of environmental and social inputs, including the wishes of the Shire of Harvey that the tanks did not impact on the visual amenity of the area.

The proposal as described in this PER has been developed to avoid, minimise, manage and mitigate environmental impacts. Some decisions made early in the project planning stage which significantly reduce both environmental and social impacts are as follows:

- The purchase of Part Lot 8, a partly quarried site adjacent to the originally proposed Water Corporation owned land, allowing a reduction in plant footprint;
- The decision to construct all marine inlet/outlet works and underground terrestrial works (including the buried water transfer pipeline) to the full 100 GL/year capacity, resulting in less environmental and social disturbance;
- The preliminary design of the brine diffuser to achieve dilution rates to ensure that the brine will not significantly impact on the marine environment. The Water Corporation has committed to the brine not causing an increase in salinity at the boundary of the Low Ecological Protection Area (LEPA) greater than 1 part per thousand (ppt) 95% of the time and greater than 1.3 ppt at any time; and
- The commitment to the purchase of electricity to power the plant from renewable sources, including all environmental credits (for example, renewable energy certificates). Additionally, 20% of this renewable power is being sought from unproven sources, thereby providing stimulus to a new market.

This PER describes the impacts of the proposal, and for each factor discusses:

- The EPA objective for that factor;
- The potential impact;
- The management of impacts; and
- The predicted outcome.

The following factors were considered:

- Terrestrial – construction impacts (chapter 5);
- Terrestrial – operational impacts (chapter 6);

- Marine – construction impacts (chapter 7);
- Marine – operational impacts (chapter 8);
- Atmospheric – construction impacts (chapter 9);
- Atmospheric – operational impacts (chapter 10);
- Social – construction impacts (chapter 11);
- Social – operational impacts (chapter 12).

As described in the Environmental Scoping Document (Water Corporation 200b) which was endorsed by the EPA in January 2008, the following factors were considered 'key' (requiring a fuller assessment than 'applicable' factors):

- **Biodiversity** (which was considered to overarch many factors and therefore was assessed within those factors);
- **Terrestrial flora and vegetation.** The impacts on this factor have been reduced as a result of the purchase of Part Lot 8, the selection of a pipeline route that results in minimal clearing (and will be rehabilitated following construction) and the demarcation of plant construction areas on Lots 32, 33 and Part Lot 8 which conserves the high value vegetation. An offset package to enhance degraded areas on the site has also been proposed.
- **Terrestrial fauna.** As for terrestrial flora and vegetation. The minimising of habitat loss results in a much reduced impact on fauna.
- **Marine flora (benthic habitat).** The mapping undertaken for the project showed that seagrass was sparse in the study area, and was not present until some 1300m offshore, beyond the construction area of the offshore inlet/outlet works. The impacts of construction (for example from a dredge plume) are not considered significant and the impacts of brine discharge have been reduced by adopting a diffuser design which will ensure no adverse impacts.
- **Wetlands.** The impacts on wetlands of conservation significance has been reduced with the adoption of construction management strategies (contained in the Construction Environmental Management Framework).
- **Coastal processes;**As the marine pipelines will be buried and the inlet/outlet structures appropriately located and designed, the seascape and landform integrity will be maintained.
- **Hydrodynamics;** The brine from the SSDP will disperse and will result in increases in salinity up to 1 ppt close to the diffuser. This increase reduces with distance from the diffuser and will not impact on marine life.
- **Marine water quality and sediment water quality.** The overall marine water and sediment water quality (including dissolved oxygen levels) will be maintained during the operation of the SSDP.
- **Noise (operational).** Noise modelling under adverse/worse case climatic conditions using predicted noise levels from PSDP (which is expected to be noisier than SSDP) showed that levels are less than 30La10 and would comply with regulation requirements. Plant layout will take into consideration the location of the noisiest components furthest from noise sensitive premises, and a constructed berm (bund) will further reduce impacts.
- **Sustainability.** The Water Corporation's overall commitment to implementing sustainability principles at all levels of decision making in the business is described in chapter 13. A review of the proposal against the Water Corporation's own business principles (based on the EPA's) was conducted and found that at this early stage (ie planning and preliminary design) many decisions are yet to be made, making an

assessment difficult for some aspects. However, this offers opportunities to take on board recommendations on the appropriate use of the principles to guide future decision making. It was also found that overall sustainability of the project had been significantly enhanced through the early decisions (described above) and commitments made during the planning and approvals stage.

For all factors assessed, it is considered that with appropriate management and mitigation (see Appendix C for the Construction Environmental Management Framework and Appendix D for the Operational Environmental Management Framework) the EPA's objectives can be met. The Water Corporation's full list of Environmental Commitments to achieve this, which will may become legally binding as Ministerial Conditions under the EP Act, are contained in chapter 14.

16 References

- 360 Environmental 2006. Binningup baseline water quality
- 360 Environmental 2007. Binningup water treatment facility and pipeline corridor: due diligence flora and fauna investigation.
- 360 Environmental 2008a. Southern Seawater Desalination Project 2007 Terrestrial Flora and Fauna Survey.
- 360 Environmental 2008b. Southern Seawater Desalination Plant Contamination Assessment.
- ANZECC/ARMCANZ 2000a. *Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting*, Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand. National Water Quality Management Strategy No. 4.
- ANZECC/ARMCANZ 2000b. *Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting*. Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, National Water Quality Management Strategy No. 7
- Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000. National Water Quality Management Strategy - Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
- Australian and New Zealand Environment and Conservation Council 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Chapter 3.
- Australian and New Zealand Environment and Conservation Council 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Chapter 3.
- Australian Wildlife Conservancy 2008. *Wildlife Profiles: Quenda (Southern Brown Bandicoot) (Isodon obesulus fusciventer)*. Available at: <http://www.australianwildlife.org/wildlifeprofiles.asp?WID=598>. Accessed 23 January 2008.
- Australian Wildlife Conservancy 2008. *Wildlife Profiles: Quenda (Southern Brown Bandicoot) (Isodon obesulus fusciventer)*. Available at: <http://www.australianwildlife.org/wildlifeprofiles.asp?WID=598>. Accessed 23 January 2008.
- Ayvazian, S.G. & Hyndes, G.A. 1995. Surf-zone fish assemblages in south-western Australia: do adjacent nearshore habitats and the warm Leeuwin Current influence the characteristics of the fish fauna? *Marine Biology* 122: 527-536.
- Barber P.A., Archibald R., Drake P., Edwards T., Eslick H., Legault A., Moore N., Scott P., Taylor K., Bowen B., Calver M., Colquhoun I., Dell B., Harvdy G., Haswell D., McCaw L., McGrath J. & Froend R. (c.2004) *Investigating the Cause(s) of the Eucalyptus gomphocephala (Tuart) Decline Epidemic in Western Australian Native Forest*.
- Bowden, K.F. 1983. Physical Oceanography of Coastal Waters. Ellis Harwood, pp. 302.
- Bureau of Meteorology (BoM) 2008b. [online] viewed 31 January 2008, <http://www.bom.gov.au/climate/averages/tables/cw_009965.shtm>
- Centre for Water Research (CWR) 2006a. Hydrodynamic Modelling of the Impact of the Perth Seawater Desalination Plant Discharge on Cockburn Sound. University of Western Australia. Prepared for the Water Corporation of Western Australia. June. Okely, P., Antenucci, J.P., Imberger, J., and Marti, C.L. November.
- Centre for Water Research (CWR) 2006b. Modelling of the Impact of the Perth Seawater Desalination Plant Discharge on Dissolved Oxygen in Cockburn Sound. University of Western Australia. Prepared for the Water Corporation of Western Australia. June. Okely, P., Antenucci, J.P., Imberger, J., and Marti, C.L. November.
- Centre for Water Research (CWR) 2007a. The Near-Field Characteristics of the Perth Seawater desalination Plant Discharge, December, Report WP2175PO.
- Centre for Water Research (CWR) 2007b. Field Investigations into the Impact of the Perth Seawater Desalination Plant Discharge on Cockburn Sound. University of Western Australia. Prepared for the Water Corporation of Western Australia. Okely, P., Antenucci, J.P., Imberger, J., and Marti, C.L.

June.

- Centre for Water Research (CWR) 2007c. Summary of Investigations into the Impact of the Perth Seawater Desalination Plant Discharge on Cockburn Sound. University of Western Australia. Prepared for the Water Corporation of Western Australia. June. Okely, P., Antenucci, J.P., Imberger, J., and Marti, C.L. August.
- Centre for Water Research (CWR) 2007d. Horizontal Mixing and dispersion at the Proposed Outfall Site for the Southern Seawater Desalination Plant, Binningup. Report WP2174CM. Centre for Water Research. University of Western Australia.
- Collier, C.J., 2006. *Characterising responses of the seagrass Posidonia sinuosa to changes in light availability*. Ph.D. thesis, Faculty of Computing, Health and Science. Perth, Edith Cowan University
- Commonwealth of Australia 2005. Natural Hazard Risk in Perth Western Australia. Compiled by T. Jones, M. Middelmann and N. Corby for Geoscience Australia
- Crawley, K.R., Hyndes, G.A., Ayvazian, S.G. 2006. Influence of different volumes and types of detached macrophytes on fish community structure in surf zones of sandy beaches. *Marine Ecology Progress Series* 307: 233-246.
- D.A. Lord and Associates (DAL) 2005. Ecological assessment of the effects of discharge of seawater concentrate from the Perth Seawater Desalination Plant on Cockburn Sound. A report prepared for the Water Corporation.
- DALSE 2002, Independent Turbidity Monitoring Consultant Quarterly Report #3. Jervoise Bay Southern Harbour Turbidity Monitoring Programme and Southern and Northern Harbour Water and Sediment Quality Monitoring, Prepared for Department of Industry and Technology by DAL Science & Engineering Pty Ltd, Report no. 02/207/3, Perth, Western Australia, May 2002.
- Deeney, A.C. 1989 Geology and groundwater resources of the superficial formations between Pinjarra and Bunbury, Perth Basin. Geological Survey of Western Australia. Report 26 p31-57
- Department of Environment and Conservation 2005 *Landfill Waste Classification and Waste Definitions 1996* (as amended).
- Department of Environment and Conservation 2006 *Geomorphic Wetlands of the Swan Coastal Plain Dataset*. Available from the Department of Environment and Conservation, Perth, Western Australia.
- Department of Environment c.2005 Stormwater Management Manual for Western Australia.
- Department of Environmental Protection Western Australia, Water and Rivers Commission Western Australia and Department of Health Western Australia 2002. *Western Australian Guidelines for Direct Land Application of Biosolids and Biosolids Products*. Available from Department of Environment and Conservation, Perth Western Australia.
- Department of Health Western Australia 2004. *Sewage Pollution in Recreational Waters*. Available at www.health.wa.gov.au/envirohealth/
- Department of Health Western Australia 2004. *Sewage Pollution in Recreational Waters*. Available at www.health.wa.gov.au/envirohealth/
- Department of Premier and Cabinet 2006. Options for bringing water to Perth from the Kimberley. An independent review commissioned by the Department of Premier and Cabinet, Government of Western Australia.
- Department of the Environment and Water Resources 2007 *Forest Black Cockatoos - Baudin's Cockatoo (*Calyptrorhynchus baudinii*) and Forest Red-tailed Black Cockatoo (*Calyptrorhynchus banksii naso*)*. Draft recovery plan. DEWR, Canberra.
- Department of Water Western Australia 2006. Water Quality Protection Note #13 – *Dewatering of soils at Construction Sites*.
- Diaz, R.J., Rosenberg, R. 1995, 'Marine benthic hypoxia: A review of its ecological effects and the behavioural responses of benthic macrofauna'. *Oceanography and Marine Biology: An Annual Review*, vol. 33, pp. 245-303.
- Economic Regulation Authority 2005. Final report: Inquiry on the cost of supplying bulk potable water to Kalgoorlie-Boulder.
- Environmental Protection Authority 1993 *A Guide to Wetland Management in the Perth and Near Perth Swan Coastal Plain Area*. Available at www.epa.wa.gov.au.

- Environmental Protection Authority 2000. Perth's Coastal Waters: Environmental values and objectives – the position of the EPA, a working document. February 2000. Report 17. Department of Environmental Protection, Perth WA.
- Environmental Protection Authority 2003. Guidance Statement number 54: Consideration of Subterranean Fauna in Groundwater and Caves during Environmental Impact Assessment in Western Australia. Environmental Protection Authority, Perth, Western Australia.
- Environmental Protection Authority 2004a. *EIA Principles, Factors and Objectives: Guide to EIA* Environmental Principles, Factors and Objectives Environmental Protection Authority, Perth.
- Environmental Protection Authority 2004b. *Guidance for the Assessment of Environmental Factors: Benthic primary Producer Habitat Protection for Western Australia's Marine Environment*, No. 29 Environmental Protection Authority, Perth.
- Environmental Protection Authority 2005a. Environmental Guidance for Planning and Development (Draft).
- Environmental Protection Authority 2005b. Manual of Standard Operating Procedures - For Environmental Monitoring against the Cockburn Sound Environmental Quality Criteria (2003-2004): a supporting document to the State Environmental (Cockburn Sound) Policy 2005. Report No. 21. Environmental Protection Authority, January 2005.
- Environmental Protection Authority 2005c. Environmental Quality Criteria Reference Document for Cockburn Sound. A Supporting Document to the State Environmental (Cockburn Sound) Policy 2005. Environmental Protection Authority. Report 20. January 2005.
- Ertemeijer P. L. A, & Robin Lewis III R.R., 2006. Environmental impacts of dredging on seagrasses: A review. *Marine Pollution Bulletin*, Vol. 52, pp. 1553-1572.
- Froend R. & Zencich c.2002. *Groundwater Dependent Ecosystems*. In: *Environmental Issues in Western Australia*. School of Natural Sciences, Edith Cowan University.
- Gallop G. 2005. Collie River recover project to help secure our water future. Media release from the Premier of Western Australia, Perth, 3 August 2005.
- GCD Alliance 2006. Material change of use application: ERA 16, 19 and 7.
- German Standard DIN 4150-3 1999. Structural vibration – effects of vibration on structures.
- GHD 2007a. Report for Southern Seawater Desalination Plant Summit Tank – Preliminary Site Assessment.
- GHD 2007b. Report for Southern Seawater Desalination Plant Trunk Main – Preliminary Route Assessment (Draft).
- GHD 2007c. Report on the Southern Seawater Desalination Plant – Preliminary Geotechnical Investigation (Draft Revision A.)
- GHD 2007d Southern Seawater Desalination Plant – Marine Investigations. Report for Oceanography of Southern Seawater Desalination Plant: Seaglider Transects (July-August 2007).
- GHD 2008 Southern Seawater Desalination Project. Social impact assessment.
- GHD 2008b Southern Seawater Desalination Project. Sustainability assessment.
- GHD 2008c Southern Seawater Desalination Plant – Marine Investigations. Report for Oceanography of Southern Seawater Desalination Plant: Seaglider Transects (December 2007-January 2008).
- Golder and Associates 2008 Geotechnical surveys interpretation report.
- Government of Western Australia 2005, State Environmental (Cockburn Sound) Policy 2005, Western Australia State Environmental Policy Series 01.
- Government of Western Australia. 2004. State Water Quality Management Strategy No. 6: Implementation Framework for Western Australia for the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting (Guidelines Nos. 4 & 7: National Water Quality Management Strategy). Report No. SWQ 6, Perth.
- Herring Storer Acoustics 2007a. Baseline noise monitoring July 2007.
- Herring Storer Acoustics 2007b. Baseline noise monitoring October 2007.
- Herring Storer Acoustics 2008a. Noise modelling and recommendations.
- Herring Storer Acoustics 2008b. Noise modelling and recommendations.
- KBR 2007a. Southern Seawater Desalination Plant – Marine Investigations – Water Quality Monitoring Stage 1.

- KBR 2008b. Southern Seawater Desalination Plant – Marine Investigations. Oceanographic Modelling.
- Lattemann, S. and Höpner, T. 2003. Seawater Desalination: Impacts of Brines and Chemical Discharge on the Marine Environment. Desalination Publications, L'Aquila.
- Mattiske & Associates 1991. *Gnangara Mound – Root Studies*. Report for the Water Authority of Western Australia.
- National Environment Protection Council 1999. National Environment Protection Assessment of Site Contamination) Measure 1999: Schedule B (7a) Guideline on Health-Based Investigation Levels.
- National Native Title Tribunal 2007. *Claimant Application Summary: Gnaala Karla Booja*. Available at: www.nntt.gov.au/applications/claimant/WC98_58.html.
- Oceanica 2005. Perth Metropolitan Desalination Plant: Effect of low dissolved oxygen concentrations on marine organisms, a review. A report prepared for: the Water Corporation of Western Australia.
- Oceanica 2008a. Southern Seawater Desalination Plant – marine investigations. Historical water quality review.
- Oceanica 2008b. Memorandum on the Impact of Dredging on Seagrass Health. Prepared for the Water Corporation.
- Perth Reverse Osmosis Alliance 2008. Material Safety Data Sheet: Filter Backwash Cake.
- Roberts P. J. W. and G. Toms 1987. Inclined Dense Jets in Flowing Current, J. Hydraulics Div, ASCE, Vol 113, March, 323-341.
- Roberts P. J. W., Ferrier, A. and G. Daviero 1997. Mixing in Inclined Dense Jets, J. Hydraulics Div, ASCE, Vol 123, August, 693-699.
- Santa Barbara City College Biological Sciences Department 2006. [online] viewed 06 November 2006, <<http://www.biobcc.net/ocean/marinesci/02ocean/swcomposition.htm>>
- Shire of Harvey (undated) Shire of Harvey Municipal Heritage Inventory.
- Shire of Harvey 2006. Website: Shire of Harvey Population Statistics. <http://www.harvey.wa.gov.au/About%20Harvey/General%20Information/Population>. Accessed on 21 January 2007.
- Standards Australia 2002. Australian Standard 1742.3-2002: Manual of Uniform Traffic Control Devices – Part 3: Traffic control devices for works on roads.
- Travers, M. 2006. Review of the Nursery Role of the Deep Central Basin of Cockburn Sound and the Potential for Low Dissolved Oxygen Values to Effect Seasonally Abundant Fish and Crustaceans. Prepared for Oceanica Consulting on behalf of Water Corporation.
- United States Environmental Protection Agency (US EPA). 2000. Ambient Aquatic Life Water Quality Criteria for Dissolved Oxygen (Saltwater): Cape Cod to Cape Hatteras, EPA-822-R-00-012.
- United States Environmental Protection Authority (USEPA) 2001. National Pollutant Discharge Elimination System: Regulations addressing cooling water intake structures for new facilities. Federal Register / Vol. 66, No. 243 / Tu.
- UWA 2005. Sediment Oxygen Demand in the Deeper Basin of Cockburn Sound. Centre for Water Research.
- UWA 2008a. Characterising the marine benthic habitats of the proposed Southern Seawater Desalination Plant (SSDP) Site: Interpretation From Underwater Towed Video and Map Interpolation. University of Western Australia, Nedlands. Report MRG 2008-1 to Kellogg Brown and Root.
- UWA 2008b. Southern Seawater Desalination Plant: Oceanographic Forcing. University of Western Australia, Nedlands.
- UWA 2008c. Proposed Southern Seawater desalination Plant – Sediment Oxygen Demand. University of Western Australia, Nedlands.
- UWA 2008d. Southern Seawater Desalination Plant: CTD Measurements. University of Western Australia, Nedlands.
- UWA 2008e. Southern Seawater Desalination Plant: Current Measurements. University of Western Australia, Nedlands.
- UWA 2008f. Beach Profile Monitoring at Binningup Beach. Stage II Report. University of Western Australia, Nedlands.

- Walker, D.I. 1989. Regional Studies – Seagrass in Shark Bay, the Foundations of an Ecosystem. *Biology of Seagrasses – A Treatise on the Biology of Seagrasses with Special Reference to the Australian Region*. S.A. Shepherd. Amsterdam, Elsevier: 182-210.
- Water and Rivers Commission 2001. *Position Statement on Wetlands*. Available from the Department of Water website at www.water.wa.gov.au.
- Water Consultants International 2006. An environmental literature review and position paper for reverse osmosis desalination plant discharges. Report prepared for the Water Corporation and Sydney Water.
- Water Corporation (undated) *Guidelines for the Disposal of Disinfection Water*. Document No. BWW 024-2.
- Water Corporation 2004. Metropolitan Desalination Proposal, Section 46 Review, Prepared for Water Corporation by Strategen, February 2004.
- Water Corporation 2007a. Site alternatives and considerations.
- Water Corporation 2007b. Southern Seawater Desalination Project Environmental Scoping Document.
- Water Corporation 2007c. Southern Seawater Desalination Project. Response to public submissions on the Environmental Scoping Document.
- Water Corporation 2007d. Water Corporation Acid Sulphate Soil and Dewatering Management Strategy. AQUA Document No. 441876.
- Water Corporation 2008. Overview of Water Quality – Physical Parameters, February 2004.
- Western Australian Planning Commission (WAPC) 1999. Coastal and Lakelands Planning Strategy. Dawesville – Binningup. Western Australian Planning Commission, Perth, Western Australia.
- Western Australian Planning Commission (WAPC) 2007. Greater Bunbury Region Scheme. Perth, Western Australia.
- Western Whale Research 2008, Preliminary Advice and Recommendations for the Minimisation of Potential Impacts of the SSDP Upon Marine Mammals Near Binningup, WA, February 2008.
- Westphalen, G., Collings, G., Wear, R., Fernandes, M., Bryars, S. and Cheshire, A. 2004 *A review of seagrass loss on the Adelaide metropolitan coastline*. ACWS Technical Report No. 2 prepared for the Adelaide Coastal Waters Study Steering Committee. South Australian Research and Development Institute (Aquatic Sciences) Publication No. RD04/0073, Adelaide.