

**Review of infauna monitoring licence conditions for the Adelaide
Desalination Plant:
June 2014**

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AdelaideAqua Pty Ltd
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Table of contents

EXECUTIVE SUMMARY	1
PURPOSE.....	1
BACKGROUND	1
APPROACH	2
<i>Specific requirements</i>	2
<i>General requirements</i>	2
CONCLUSION	2
LICENCE CONDITION: INFAUNA MONITORING	3
SPECIFIC REQUIREMENT (SEE ATTACHMENT A – MARINE MONITORING SCHEDULE):.....	3
OVERALL SUMMARY IN RELATION TO INFAUNA MONITORING	4
APPENDIX A KEY DATES IN PLANT CONSTRUCTION AND OPERATION	7

EXECUTIVE SUMMARY

Purpose

This document represents a report on the extent to which monitoring of sediment infaunal ecosystems from selected sites in the vicinity of Port Stanvac meets with the EPA Licence Conditions for the construction and operation of the Adelaide Desalination Plant (ADP) over the period February 2009 to 12-Dec-2013. The monitoring reports were associated with the construction (including commissioning) of the desalination plant (by AdelaideAqua D&C Consortium – AAD&C) from February 2009 to 12-Dec-2012 and to the operation of the desalination plant (AdelaideAqua Pty Ltd) from 12-Dec-2012 to 12-Dec-2013.

Background

AdelaideAqua Pty Ltd is the operator of the Adelaide Desalination Plant at Port Stanvac South Australia. Operation of the ADP requires the discharge of reject water to the marine environment; this activity was originally conducted under a licence issued to AAD&C by the Environment Protection Authority of South Australia (EPA Licence Number 26902) and subsequently under another licence issued to AAPL (EPA Licence Number 39143). These licences authorised AAD&C and AAPL to undertake a series of activities of environmental significance under Schedule 1 Part A of the Environment Protection Act 1993 (the Act). The licences had specific requirements in relation to “Discharges to Marine Waters” that are the subject of this report.

Section 14 (305-626) of the licence requires that the licensee must ensure that:

1. An independent review of all marine monitoring is conducted by independent specialist(s) as approved in writing by the EPA prior to the review commencing;
2. All marine monitoring from the period commencing with the issue of the licence and ending 12 months after project handover of the 100 GL desalination plant is included in the review; and
3. The full results of the review are provided to the EPA not more than 18 months after project handover of the 100 GL desalination plant.

The EPA has also advised that prior to appointment, the independent reviewer must be able to demonstrate to the EPA that:

1. They will use their own professional judgment;
2. They will take appropriate specialised advice when the issue is outside their expertise;
3. Their opinions will be reached independently;
4. In forming opinions, they will not be unduly influenced by the views or actions of others who may have an interest in the outcome of the review; and
5. They must declare any real or apparent conflict of interest.

With the approval of the EPA, Anthony Cheshire (the author of this report) was selected by AdelaideAqua Pty Ltd (AAPL) to undertake this review.

Approach

This review of infauna monitoring encompassed a study of all documentation provided by AdelaideAqua Pty Ltd which comprised a series of 8 monitoring reports each of which was produced by staff at AAD&C, AAPL or by experts contracted by the parties for that purpose.

Each report has been critically reviewed and key issues that pertain to compliance with the licence conditions have been aggregated into a summary that has been presented in this report.

Specific requirements

To consider the work done against the Scheduled Marine Monitoring Requirements detailed in Attachment A to Licences 26902 and 39143. These being:

EPA Licence 26902 & EPA Licence 39143: Two surveys per year of the meiofauna and microfauna [macrofauna] (see below) in the soft sediments at 20 sites, including 5 reference sites, with multiple samples at each site to characterise variability.

General requirements

In addition the EPA require that the Independent Reviewer is to undertake a technical review of all marine monitoring results from the commencement date of the Licence 26902 (D&C) until 12 December 2013 (12 months after plant handover) in order to assess the environmental impact of the desalination plant. This matter will be addressed in a subsequent report.

Conclusion

The monitoring program is largely consistent with Licence Conditions as detailed in Attachment A of the licence conditions. Data have been collected through a series of 8 surveys over a four year period from May 2009 to February 2013. For each survey meiofaunal and macrofaunal samples were collected from 20 sites including 10 sites in the vicinity of the ADP discharge and an additional 10 sites distributed evenly over North and South Control zones. There was only one sampling event in 2012 because the second survey was delayed to February 2013 due to equipment failures. This is not considered to have had a material impact on the overall program relative to what would have been achieved had this survey been undertaken in late 2012 as originally planned.

LICENCE CONDITION: INFAUNA MONITORING

In the following the specific requirements pertaining to the licence condition (infauna survey) are summarised along with information about the documents that have been reviewed.

Documents reviewed for this licence condition:

Document Name	Reference
fauna_oct09.pdf	Glavinic, A., Beattie, K., Benkendorff, K. and Dittmann, S. (2009). Infaunal Monitoring for the Adelaide Desalination Plant Winter Report October 2009. Flinders University of South Australia.
fauna_final09-10.pdf	Beattie, K.J., Glavinic, A., Ramsdale, T.M., Dittmann, S. and Benkendorff, K (2010). Adelaide Desalination Plant Final Benthic Fauna Monitoring Report 2009/2010. Flinders University of South Australia.
fauna_jun12.pdf	Loo, M.G.K., Mantilla, L. and Moody, I. (2012). Adelaide Desalination Project June 2012 Infauna Survey Interim Report. South Australian Research and Development Institute (Aquatic Sciences).
Infauna Interim Report 2010 Winter Reported Jan11.pdf	Glavinic, A., Ramsdale, T.M. and Dittmann, S. (2011). Adelaide Desalination Infauna Monitoring Second Quarter Report Winter 2010. Flinders University.
Infauna Interim Report 2011 Summer11 April11.pdf	Glavinic, A., Ramsdale, T.M. and Dittmann, S. (2011). Adelaide Desalination Infauna Monitoring Fourth Quarter Report April 2011. Flinders University.
fauna_dec11.pdf	Ramsdale, T.M., Keuning, J., Stewart, T. and Dittmann, S. (2011). Adelaide Desalination Infauna Monitoring Final Report Winter Sampling December 2011. Flinders University of South Australia.
ADP Infauna Survey February 2013-interim report.pdf	Loo, M.G.K., Mantilla, L. and Moody, I. (2013). Adelaide Desalination Project February 2013 Infauna Survey Interim Report. South Australian Research and Development Institute (Aquatic Sciences).
Adelaide Desalination Infauna Final Report.pdf	Loo, M.G.K., Mantilla, L. and Moody, I. (2014). Adelaide Desalination Project Infauna Survey June 2012 and February 2013 Final Report.. South Australian Research and Development Institute (Aquatic Sciences), Adelaide.. Note: SARDI Publication No. F2014/000214-1. SARDI Research Report Series No. 764. 95pp.

Specific requirement (see Attachment A – Marine Monitoring Schedule):

EPA Licence 26902 & EPA Licence 39143: Two surveys per year of the meiofauna and microfauna [macrofauna] (see below) in the soft sediments at 20 sites, including 5 reference sites, with multiple samples at each site to characterise variability.

It needs to be noted that the licence condition makes explicit reference to “meiofauna and microfauna”. It is understood that this is in fact an error and the licence condition meant to

read “meiofauna and *macrofauna*” [my italics]. This matter was clarified by the EPA and I have been advised that this error was corrected through email correspondence with various parties. The subsequent sampling program therefore focussed on meiofauna and macrofauna (not microfauna).

There is a fundamental difference between microfauna and macrofauna in that macrofauna is generally taken to mean that component of the biota that is retained on a 500 µm sieve, meiofauna is that component retained on a 50 µm sieve while microfauna is the component that passes through the 50 µm sieve. On this basis alone the difference in terminology is not trivial but equally important is the fact that macrofauna are much better understood and therefore have been much more widely used as indicators of ecological disturbance in marine benthic systems (see for example the discussion in Kennedy and Jacoby, 1999).

Overall summary in relation to infauna monitoring

The aim of this monitoring program was to establish a baseline dataset for infaunal communities around Port Stanvac in Gulf St Vincent.

Over the four year period four different types of sampling was undertaken (Table 1) including the use of a suction sampler (for macrofauna), a dredge sampler (that allowed an assessment of larger sedentary epibenthic fauna), a box corer (designed for the collection of meiofauna) and a HAPS corer (allowing for the collection of both meiofauna and macrofauna). For each survey samples were collected from 20 sites including 10 sites in the vicinity of the ADP discharge and an additional 10 sites distributed evenly over North and South Control zones. There was only one sampling event in 2012 because the second survey was delayed to February 2013 due to equipment failures. This is not considered to have had a material impact on the overall program relative to what would have been achieved had this survey been undertaken in late 2012 as originally planned. Collectively these samples provided the basis for characterising a wide array of the benthic fauna that make up the communities both at Port Stanvac and more generally along this section of coastline (i.e. through the survey of communities at the North and South Control zones).

Individually each of the surveys was conducted competently and the data were comprehensively analysed and interpreted. The results provide detailed, quantitative summaries of benthic communities and report on how these communities have changed through time and space. Collectively the spatial analyses have quantified differences in community structure over small scales (tens of meters), medium scales (hundreds of meters) and larger scales (kilometres).

Table 1 – Summary of infaunal survey dates including information on sampling methodology and the organization that undertook the studies.

Document	Year	Sampling procedure	Start Date	End Date	Sampled by	Notes
fauna_oct09.pdf	2009	Suction & Dredge	31-May-09	10-Jun-09	Flinders	
fauna_final09-10.pdf	2009	Suction & Dredge	20-Nov-09	18-Dec-09	Flinders	
fauna_final09-10.pdf	2010	Box Core	10-Mar-10	15-Mar-10	Flinders	
Infauna Interim Report 2010 Winter Reported Jan11.pdf	2010	Suction, Dredge, Box Core	21-Jul-10	7-Sep-10	Flinders	
Infauna Interim Report 2011 Summer11 April11.pdf	2011	Suction, Dredge, Box Core	19-Jan-11	16-Feb-11	Flinders	
Infauna Final Report Winter reported December 2011.pdf	2011	Suction & Box Core	18-Jul-11	31-Aug-11	Flinders	
fauna_jun12.pdf	2012	HAPS Corer	18-Jun-12	26-Jun-12	SARDI	1
ADP Infauna Survey February 2013-interim report.pdf	2012	HAPS Corer	26-Feb-13	27-Feb-13	SARDI	2

Notes to table 1

1. North Control sites were moved 3.2 km NW of original which were deemed unusable due to seagrass and rhodolith dominance of the benthos.
2. Delayed due to equipment failure.

While providing a good basis for characterising the structure of communities and documenting how they vary with respect to substratum type (particularly the structure of sediments in terms of grain size) the program struggles to provide useful information on temporal variability that can be used to determine changes in community structure that may have resulted from the construction or operation of the ADP. There are 3 reasons why this is the case:

- 1 The four different survey methods that have been used have not been applied consistently over time (Table 1) and therefore generally do not allow a full assessment of whether or not there are differences in the trajectory through time of the putatively impacted site (Port Stanvac) when compared to the control sites (North and South).
- 2 The suitability of the North Control Zone (used in the first six surveys) has subsequently been brought into question in later surveys which deemed it unsuitable because the epibenthos at this location was dominated by seagrasses and rhodolith communities that were qualitatively dissimilar to those found at either Port Stanvac or the South Control Zone.
- 3 The decision to move the location of the North Control Zone for surveys 7 and 8 means that no analysis can be conducted that utilises the data from the original North Control Zone and, when coupled with the differences in the methodology adopted in the earlier surveys, makes any comprehensive assessment of change through time problematical.

In summary therefore, the capacity to undertake a fully quantitative assessment of the impact of the ADP on infaunal communities is compromised in the short term but the data that have been collected provide a comprehensive baseline against which future studies can be assessed.

References

Kennedy, A. D., & Jacoby, C. A. (1999). Biological indicators of marine environmental health: meiofauna—a neglected benthic component? *Environmental Monitoring and Assessment*, 54(1), 47-68.

Appendix A KEY DATES IN PLANT CONSTRUCTION AND OPERATION

The following provides a list of key dates in the construction and operation of the plant. This material provides background to the review and in particular places the analysis and interpretation of each of the monitoring reports into context with the activities that were occurring on-site in the period leading up to the monitoring event.

Date	Activity
01-Feb-2009	Construction activities commenced
16-Nov-2009	Maritime platform arrived on site
08-Jul-2010	Maritime platform completed operations
01-Jun-2011	First discharge and first intake of seawater
14-Oct-2011	First Water – plant production was (30 MLD)
21-Mar-2012	SP1 – Full production from first half the plant (150 MLD)
31-May-2012	SP2 – Full production from second half of the plant (150 MLD)
24-Oct-2012	Performance test – plant running at full production for 7 days (150 MLD)
07-Nov-2012	Performance test – plant running at full production for 7 days (150 MLD)
21-Nov-2012	Reliability test – continuous running at various production rates
12-Dec-2012	Plant handover from commissioning