

WOODMAN POINT WASTEWATER TREATMENT PLANT ODOUR IMPROVEMENT PLAN OVERVIEW

This document sets out the Odour Improvement Plan for the Woodman Point Wastewater Treatment Plant. The first section provides relevant background information on the development of the plant, odour control requirements and the buffer zone around the plant. A Strategic Environmental Review (SER) of future odour management at the plant was prepared and issued for public review in September 2005, as summarised in Section 2.

Conditions of the Department of Conservation and Environment (DEC) Operating Licence relating to odour control are set out in Section 3. The proposals for odour control are being refined as detailed design progresses, and in the light of the EPA recommendations on the SER and further community input. Section 4 summarises the EPA recommendations and the Corporation's response to implement them.

The current proposals to reduce odour emissions from the existing plant by at least 50% by the end of October 2008 are described in Section 5. The monitoring and modelling program required to verify the performance of these works in reducing odour emissions is described in Section 6. The program, community viewpoints and future plans for consultation with the community are described in Section 7.

Once the odour containment and scrubbing systems are installed, new procedures are required to inspect and maintain all related equipment. Part or all of the covers must be removed for these operations and this must be done without excessive release of odour. The development of new procedures to operate covered plants is set out in Section 8.

The plant must be upgraded to handle increased flows of wastewater and organic solids from new development in the sewerage catchment during the period of the odour upgrade. The new works proposed in the coming years are summarised in Section 9. All new works will incorporate stringent odour controls.

Section 10 describes possible future works to achieve further reductions in odour emissions as required by the DEC Licence and the EPA. It should be noted that Woodman Point WWTP will be a large wastewater treatment plant serving over a million persons in metropolitan Perth. Even with a high level of odour control, there still will be continued fugitive releases of odour and residual emissions during operations and maintenance. Thus the Corporation considers that a buffer zone will be required after the odour upgrades, as foreshadowed in the SER. The proposal to address residual land use conflicts within the remaining buffer are described in Section 11.

In summary, the Odour Improvement Plan described how the Water Corporation will:

- *Collect and treat strong or objectionable odours being released at the plant;*
- *Release the scrubbed gas through a tall stack;*
- *Reduce odour emissions by at least 50% by the end of October 2008 and by more in later years;*
- *Improve operations and maintenance at the plant;*
- *Verify the reduction in odour impacts in the community; and*
- *Review and, if appropriate, refine the buffer zone following monitoring of the outcomes of the odour upgrade, and assess what further odour controls are required to ensure that no odour nuisance occurs in existing urban residential areas or adjacent odour-sensitive premises.*

1. BACKGROUND INFORMATION

The Woodman Point Wastewater Treatment Plant (WWTP) was first licensed in 1991 by the then Department of Environmental Protection (DEP) as a primary treatment facility. At that time, residential areas were distant from the plant and the surrounding land uses were compatible with the odour produced by a large wastewater treatment plant (rural, public reserves and industrial uses). The original buffer zone was a nominal 1000 metres distance from the plant boundary.

In 1996, a study of odour emissions and odour dispersion was carried out to refine the buffer zone around the plant. The boundary of the buffer zone followed the predicted 7 OU (Odour Unit) contour at the 99.8 percentile frequency. The 1996 buffer extended from the outer boundary of the treatment plant for 800 metres to the north (over undeveloped urban land - now South Coogee); 700 to 800 metres to the west; 700 metres to the south; and 650 to 800 metres to the east across Lake Coogee and into a strip of the market gardening area on the eastern shore of the lake.

In 1997, the market gardening area east of Lake Coogee was rezoned to Urban Deferred via MRS Amendment 939/33A, while the area beyond the buffer was rezoned to Urban. The then Minister for Planning, in correspondence dated 21 January 1997, made the following statement about the zoning of the land to Urban Deferred:

“It should be noted that the land within the Urban Deferred Zone should not be considered as being suitable for future residential development. Rather, future use is to be compatible with the location of land within the Waste Water Treatment Plant Buffer Zone or the Minister for the Environment’s conditions of development as appropriate.”

The Woodman Point WWTP treats wastewater from more than 500,000 people living south of the Swan River. The plant has been expanded and upgraded a number of times to cater for growth and development in the catchment and to improve the quality of the effluent.

The sludge drying beds were replaced by large egg-shaped digesters to achieve better stabilisation of biosolids and reduce odour emissions.

The most significant of these upgrades was undertaken in 2000/02, when the \$150-million Woodman Point Environmental Enhancement Project was completed. This involved adding secondary treatment to the existing primary treatment plant to enable nitrogen to be removed biologically and significantly reduce the nitrogen loading to the ocean. The upgrade also included covering the screens, grit tanks and primary treatment tanks, with the odorous air extracted from beneath the covers treated in two odour scrubbers. The Works Approval for the upgrade stated:

“The Works Approval holder shall construct the new facilities such that the overall odour impact of the wastewater treatment plant is reduced in comparison with the existing impacts.” (Works Approval No 2710 dated 1 April 1999).

A comprehensive odour sampling and odour modelling program was undertaken after the 2000/02 upgrade to review the odour buffer zone. The program was undertaken in the first half of 2003 by a specialist odour sampling and analysis company, The Odour Unit, and it was estimated that odour emissions from the plant totalled 273,000 OU/s (odour units per second). As this was approximately 50 % lower than odour emissions prior to the upgrade, the Works Approval condition was met.

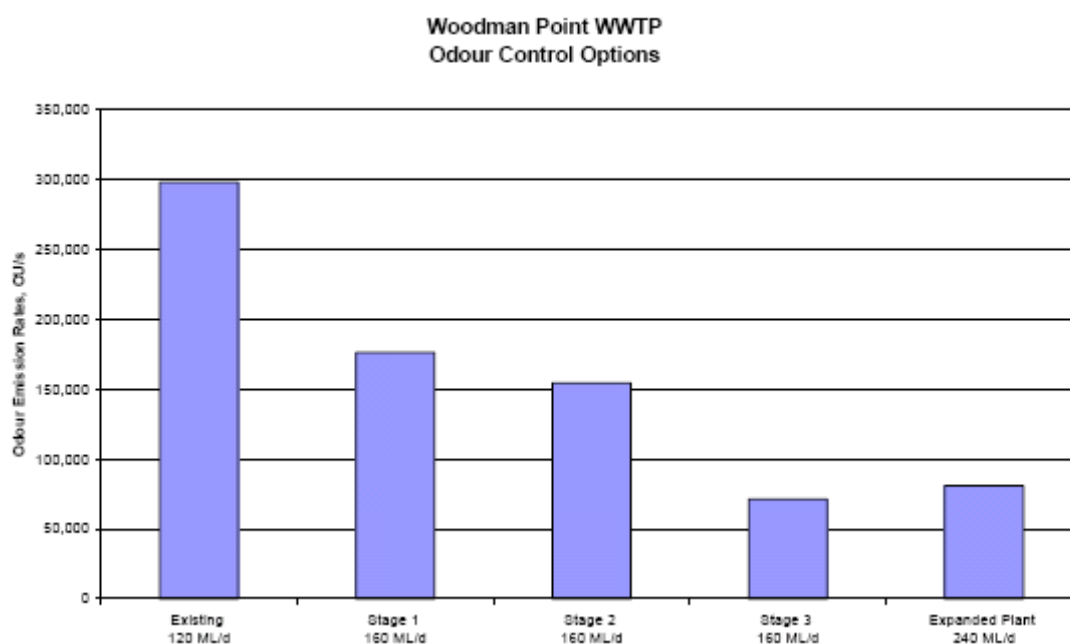
Despite the reduction in odour emissions, modelling of the extent of noticeable odour that was undertaken at the time indicated that elevated odour levels were occurring beyond the existing buffer, although few odour complaints had ever been received from residents.

To clarify the situation, a detailed telephone survey was undertaken of residents living in the areas closest to the plant, namely Coogee, South Coogee and East of Lake Coogee, to assess their experiences of odour from the plant and other local sources. This survey indicated that the majority of residents detected odour and were annoyed by the odours they experienced. The survey found that residents east of Lake Coogee were particularly affected by odours.

Recognising that additional odour control works were required at the plant, the Water Corporation sought the Minister for the Environment's views, via Section 16 advice from the Environmental Protection Authority under the *Environmental Protection Act*, on the level of odour control works necessary, and on the size of the long term buffer.

2. STRATEGIC ENVIRONMENTAL REVIEW

To provide the Section 16 advice to the Minister for the Environment, the EPA requested that the Water Corporation submit a Strategic Environmental Review (SER) for Odour Management at Woodman Point WWTP. The SER was submitted to the Environmental Protection Authority on 27 September 2005. It proposed a three-stage program of works to reduce odours at the plant, with retention of the existing buffer zone, and adopting a more stringent odour target of 5 OU at 99.9 percentile using 1-hour averaging.



The SER proposed to reduce odours from 297,100 OU/s to 176,000 OU/s at the end of the Stage 1 upgrade, 154,500 OU/s after Stage 2 and 71,200 OU/s after Stage 3 in 2014/15. These reductions are illustrated in the figure above, which is taken from the SER report. Growth in the plant by the time Stage 3 was to have been completed would add more treatment units and fugitive emissions. Therefore the target for the actual plant after the end of Stage 3 was 81,000 OU/s, which represented a reduction in odour emissions of 73 % compared to prior to the upgrade.

The EPA advertised the SER for public comment for three months and the public submission period closed on 22 December 2005. 20 submissions were received from the community and agencies. The EPA also commissioned Air Assessments Pty Ltd, to undertake a peer review of the SER.

On 6 June 2006, the Water Corporation provided detailed responses to both the public submissions on the SER and to the main findings and recommendations of Air Assessments' report. The recommendations of the EPA to the Minister are summarised below in Section 4 of this Odour Improvement Plan.

3. WOODMAN POINT WWTP DEPARTMENT OF ENVIRONMENT LICENCE

The Minister for the Environment amended the Woodman Point Wastewater Treatment Plant Department of Environment Licence 4201/10 on 4 November 2005, to include the following requirements related to odour control:

- G3 (a) *The Licensee shall develop in consultation with the community and submit to the Director by 1 October 2006, an Odour Improvement Plan.*
- G3 (b) *The Odour Improvement Plan referred to in condition G3 (a) should aim to:*
 - i. *Initially reduce Odour Emissions, which are currently modelled to be 297,100 OU/s, by at least 50 % within three years;*
 - ii. *Provide further reductions beyond three years, to ultimately achieve an ambient odour level of 5 odour units (or as otherwise approved by the Director) at the nearest odour sensitive premises; and*
 - iii. *Develop strategies to resolve any residual land-use conflicts surrounding the Premises in the event that (ii) cannot be achieved.*
- G3 (c) *The Licensee shall provide to the Director by 31 December 2005, a Management Strategy Plan that shall include the proposed timelines and actions to be taken by the Licensee to demonstrate that the development of the Odour Improvement Plan required by Condition G3(a) has commenced."*

The Management Strategy Plan required in condition G3 (c) was provided to the Department of the Environment on 29 December 2005 and outlined the actions that had been taken to commence development of the Odour Improvement Plan (OIP).

The Minister set a more ambitious target than the SER of requiring a 50 % reduction in odour emissions by the end of October 2008. This means that the odour upgrade must include all of the proposed Stage 1 and Stage 2 works (which were estimated to reduce odour emissions by 48 %) plus an additional component to achieve a further reduction of 2 % or more. The revised Stages 1 and 2 are now estimated to reduce odour emissions by 52 % and 56 %, respectively.

In response, the Water Corporation engaged specialist consultants to develop plans to achieve the additional odour capture. The modified odour upgrade plan is described in Section 5 of this Plan.

The draft Odour Improvement Plan was advertised for public comment and one submission was received. The draft Plan also has been extensively reviewed by the Community Reference Group. All comments received have been taken into account in finalising the Plan.

To meet its statutory requirements, the Water Corporation submitted a draft Odour Improvement Plan to the DEC on 1 October 2006. The Corporation will resubmit the finalised Plan to the DEC in December 2006 incorporating additional community input.

4. RECOMMENDATIONS OF THE EPA

On 20 November 2006, the EPA issued a report and recommendations to the Minister of the Environment under Section 16 of the *Environment Protection Act 1986*.

The four key recommendations by the EPA to the Minister are as follows:

- 1 The EPA recommends the urgent implementation of Stage 1 controls to achieve a reduction of 50 % of the current odour levels as soon as possible but no later than the end of October 2008;
- 2 The Minister notes that the EPA is of the view that the establishment of a long-term buffer for the plant needs to be reconsidered once a 50 % reduction in odour is achieved;
- 3 The current buffer should be retained until after the implementation of the Stage 1 measures, after which further emissions estimates, modelling and ground-truthing should be undertaken to determine the extent of odour impact and a long term buffer reconsidered; and
- 4 Further odour reduction measures beyond the 50 % reduction are likely to be necessary to meet the goal of no impact on odour-sensitive premises in residential areas.

This Odour Improvement Plan is consistent with the EPA recommendations. A 50 % reduction in odour emissions by the end of October 2008 is proposed in Stages 1 and 2 of the planned upgrade.

An odour monitoring and modelling program is proposed, to verify the performance of these works in reducing odour emissions after each stage of the works, as described in Section 6.

It is accepted that future works to achieve further reductions in odour emissions will be needed - these are already foreshadowed in the DEC Licence and are outlined in concept in Section 10 of the Plan. Nonetheless, even after all the future odour upgrades, the Corporation considers that a buffer zone will be required as Woodman Point will be a very large wastewater treatment facility and there will always be release of fugitive odours.

In their advice which accompanied the recommendations to the Minister, the EPA reiterated the recommendations and made the following additional points:

- Current odour management is not adequate and fails to meet the goal of no impact on odour-sensitive premises in residential areas.
- The Woodman Point Holiday Park may still experience occasional odour impact even after the implementation of all three stages of the proposed odour control works; and
- There are significant issues with the previous odour sampling and modelling, and the best estimate of odour impact causing annoyance will be obtained by modelling odour on a 1-hour average and the 99.5 percentile frequency.

This Odour Improvement Plan is designed to address the issues raised in the first two points and will considerably decrease odour levels at odour sensitive premises, including the Woodman Point Holiday Park. In response to the third point, the Corporation commissioned odour modelling using a 1-hour average and the 99.5 percentile frequency as recommended by the EPA. The results, attached in Appendix A, show that the reduction in area in which noticeable odours will occur is predicted to be very similar using the EPA 99.5 % criterion as using the 99.9 % criterion adopted for the SER.

5. REDUCE ODOUR EMISSIONS BY 50% BY THE END OF OCTOBER 2008

The Water Corporation has initiated design for the works needed to meet Licence Condition G3 (b) i. (see Section 3 above) to reduce odour emissions by 50% by the end of October 2008. Faced with a very tight timetable, the Corporation has concluded that the only feasible means of meeting the requirement is to accelerate the works detailed in the SER. As the Corporation is also subject to financial constraints, the works will still need to be undertaken in two stages.

5.1 Stage 1: Reduce Odour Emissions by 50%

The works now proposed for Stage 1 include:

- Sealing the existing waste receival pit, and improving the sealing (with a combination of new covers or renovating existing covers) in the preliminary and primary treatment areas;
- Covering the bioselectors of the SBR;
- Covering the sludge storage tanks;
- Covering the egg-shaped digester sludge boxes;
- Increasing the odorous air extraction rates from specified parts of the sludge treatment processes;
- Constructing a new chemical scrubbing system for the foul air from the preliminary and primary treatment works, together with installing a 50 m stack to discharge the scrubbed gases well above any local inversion levels; and
- Decommissioning the existing inlet chemical scrubbers.

The Stage 1 odour controls will cost \$53.5 million (current cost estimate) and be in operation by the end of October 2008, with commissioning extending to January 2009 (see Appendix B).

5.2 Stage 2: Optimise Stage 1 Works and Provide System Redundancy

The works now proposed for Stage 2 include:

- Providing improved inspection hatches in the preliminary treatment area to reduce odour emissions during operations and maintenance activities;
- Installing bioscrubbers on the 'front end' of the chemical scrubbing system;
- Constructing a building over the new waste receival pit;
- Replacing selected parts of existing covers on the primary tanks with FRP covers to improve access;
- Installing larger ducts in the preliminary and primary treatment processes to accommodate higher air flow rates; and
- Providing odour control for the new grit washing system.

The Stage 2 works will cost \$17.9 million (current cost estimate) and will be completed by 2010 (see Appendix B). Table 1 indicates the reductions to odour emissions achieved with the Stages 1 and 2 odour control works, based on flows of 240ML/d.

5.3 Consideration of Alternatives

In developing the proposed Stage 1 and Stage 2 works, various alternative odour control options were developed and assessed. A team of experienced consultants was engaged to develop, cost and compare alternatives. The basis for selection of the proposed plan is as follows:

- The strongest and most offensive sources of odour are to be controlled in Stage 1 (this means that odours from the preliminary treatment, primary treatment, anoxic tanks and sludge processing should be tackled early in the program);
- The least offensive odours (generally from the aerated section of the SBR) should be tackled later in the program;
- The work must progress towards the achieving the long term 73 % reduction in odour emissions as envisaged in the SER, which is necessary to control odours to the extent that there are not noticeable odours beyond the existing buffer zone;
- Proven and reliable means of odour control should be used, avoiding techniques with a significant risk of poor performance or failure;
- The odour controls including fans and scrubbers should be designed to achieve 99.9 % reliability and 99.9 % availability;
- Effectiveness of odour containment and collection in the long term are critical design considerations;
- Preference is given to works that will be used in the long term and short term 'fixes' are to be avoided;
- Operability and maintainability are important considerations in achieving reliable odour control;
- Cost is an important factor, but not as important as achieving a successful outcome. Thus the work should proceed in stages, as capital funds become available.

Table 1: Proposed Odour Control Works for Woodman Point WWTP

Odour Sources	Before Upgrade	After Stage 1 Works	After Stage 2 Works	Comments (*St 1 and St 2 denotes Odour Control stages 1 and 2)
Preliminary treatment	8,400	4,600	2,840	<ul style="list-style-type: none"> • Close inlet pit (St 1*) • Seal cover joints (St 1) • Replace covers (St 2) • Increase suction (St 2) • Ducts to scrubbers (St 2)
Primary treatment	20,000	16,000	4,850	<ul style="list-style-type: none"> • Seal cover joints (St 1) • Increase suction (St 2) • Ducts to scrubbers (St 2)
Bioselectors	88,000	9,610	9,710	<ul style="list-style-type: none"> • Install covers (St 1) • Ducts to new scrubber (St 2) • New 2-stage scrubber (St 1)
Aerobic tanks	76,000	83,990	86,210	<ul style="list-style-type: none"> • No works in St 1 and St 2
Effluent storage	3,550	3,550	3,550	<ul style="list-style-type: none"> • No works proposed.
Tanker Receiving Facility (under normal operating conditions)	4,400	2,000	2,000	<ul style="list-style-type: none"> • Improved sealing (St 1) • Upgrade scrubber (St 2)
Sludge thickeners	3,100	1,560	1,960	<ul style="list-style-type: none"> • New ventilation system (St 1) • Additional equipment DAFs & storage tanks (St 1&2)
Sludge digesters	25,700	5,830	5,830	<ul style="list-style-type: none"> • New ventilation system (St 1&2)
Biofilter outlet	22,300	0	0	<ul style="list-style-type: none"> • Decommission (St 1) • New scrubber (St 1)
Sludge storage	2,000	1,140	1,140	<ul style="list-style-type: none"> • Improved sealing (St 1)
Sludge dewatering	7,000	3,180	3,260	<ul style="list-style-type: none"> • New ventilation (St 1)
Biosolids bin and loading	3,050	1,610	1,660	<ul style="list-style-type: none"> • New enclosed bins (St 1) • New ventilation (St 1&2) • Closed bins (St 1)
Odour bed	140	0	0	<ul style="list-style-type: none"> • Decommission (St 1)
Energy recovery and gas engines	6,000	5,400	5,540	<ul style="list-style-type: none"> • Improved digester gas treatment (St 1)
Waste gas burner	7,460	3,320	3,410	<ul style="list-style-type: none"> • New burner (St 1 & 2)
Subtotal ground level and low stack emission	277,100	141,790	131,960	52% reduction in odour emissions at ground level
Inlet scrubber	20,000	0	0	Replaced by new scrubbers and tall stack
Total, all emissions	297,100	141,790	131,960	52%(Stage 1) and 56% (Stage 2) reduction in ground level emissions

5.4 Project Delivery Risks

Several key risks associated with the delivery of the OIP have been identified as follows:

Safety – the safety of personnel is paramount and works above operating tanks or where personnel can be exposed to a hazardous working environment are major constraints.

Continual Operations – the plant must continue to treat wastewater and meet all DEC licence requirements throughout the odour upgrade project. This limits the number of tanks that can be taken out of service and the time schedule for construction of the new works.

Finance – At present, the Department of Treasury & Finance (DT&F) has approved \$30.7 million in capital borrowings, which is not sufficient to undertake all of the Stage 1 odour control works. The Water Corporation is requesting the Department of Treasury and Finance to increase borrowings to \$71.4 million to undertake the Stage 1 and Stage 2 odour control works, but this has not yet been approved. Lack of finance is a risk that may hamper the delivery time.

Implications of Options - The design team contains technical specialists and odour modelling to examine the implications of various odour control alternatives.

Regulatory Approvals - The time schedule for the project assumes that the Department of the Environment and Conservation will grant a Works Approval by 21 March 2007 so that construction can then commence. If Works Approval is delayed, the project will be completed later than scheduled.

Time Schedule - The Corporation has appointed national and international partners to work in an Alliance the Woodman Point and upgrades of other major wastewater treatment plants. This team is currently reviewing design alternatives and assessing the cost implications, to recommend the best method to achieve the 50 % or more reduction in odour emissions within the available time. The team includes Corporation personnel with previous experience in the odour upgrade projects at Subiaco and Beenyup WWTPs.

It should be noted that the odour upgrade involves the design and fabrication overseas of specialist equipment specifically sized for the project, and the fabrication process takes months to complete, even working on the shortest possible delivery schedule.

Rate of Improvement – Based on experience from the odour upgrades at Subiaco and Beenyup WWTPs, the major sustained reduction in odour comes near the end of the project. This outcome needs to be communicated to the community so there are not unrealistic expectations of a reduction in odour at an earlier time in the program.

6. ODOUR MONITORING AND MODELLING PROGRAM

The performance of the odour control works will be determined via a detailed monitoring and modelling program following completion and successful commissioning of the works in Stage 1. It is expected that monitoring and modelling program will be implemented from January 2009 to June 2010, and has been timed to:

- Monitor and understand odour emissions and odour levels in surrounding areas during summer and autumn, the period when odour conditions are worst, and the time when the greatest number of odour complaints are received;
- Monitor the performance of the Stage 1 odour control works to ensure that the required 50% reduction in emissions is achieved;
- Measure odour emissions from the various treatment processes during the summer and autumn seasons – ideally this work could occur in 2009 if commissioning is completed by January 2009, but it may have to occur in 2010 if commissioning takes longer.
- Monitor the odour controls in the Stage 1 sludge treatment upgrade program (see Section 9) to ensure they contribute as planned to meeting the required 50 % overall reduction in odour emissions from the plant; and
- Gain a good understanding of fugitive odour releases, as well as odour releases during normal operations and maintenance from all process areas. This work will check that the new covers on the primary tanks; and increased air extraction rates from the inlet works, preliminary and primary treatment processes meet design requirements in normal operating conditions.
- Collect feedback from the community over a full year of operating conditions.

As noted above, there are several constraints which influence the timing of odour monitoring and modelling. The emissions testing must occur after commissioning has been completed, which may take 6 months or more, and also must occur in the summer months when highest levels of odour are present. Scheduling of the community surveys must allow time for the community to adjust to the new conditions of lower odour, as this is seen as a critical input to the odour modelling.

The emissions measurement, odour modelling and ground-truthing program will be similar to that undertaken in 2005-06 to verify the performance of the works at Subiaco WWTP, and will include sampling of all odour sources, assessment of fugitive odour releases, assessment of odour releases during normal operations and maintenance works, community odour surveys, ambient odour surveys, and modelling.

The monitoring and modelling program will be designed in consultation with the Community Reference Group and the program will be designed in accordance with relevant policies and guidelines of the EPA and the DEC. The results of the monitoring and modelling will be made available to the CRG and the wider community at 3 to 6 monthly intervals or as agreed with the CRG.

7. COMMUNITY CONSULTATION

The Management Strategy Plan indicated that consultation with the community in developing the Odour Improvement Plan would be met by:

- Incorporating the views and comments from the 20 public submissions received by the EPA on the SER.
- Seeking input from the reconstituted Community Reference Group (CRG) established in May 2006 to facilitate effective communications between the Water Corporation and the local community in relation to the upgrade of Woodman Point WWTP; and
- Direct communication with neighbours via mail out, media coverage and provision of information via the Water Corporation website.

7.1 Community Views

The key community concerns and issues which are relevant to the Odour Improvement Plan, are summarised below:

Poor operations and maintenance causes odours

Odour control works

- All three stages of odour controls must be implemented as soon as possible
- The works must constitute best practice, including odour monitoring systems
- The works must be implemented before any extensions to the plant

Performance criteria for the proposed odour control works

- Odour control should meet and preferably exceed the standard at Subiaco WWTP
- The upgrade should achieve background odour levels at the east shore of the Lake

Issues associated with the buffer

- The Water Corporation should undertake works so that a buffer is not needed
- The majority view is that the buffer should extend at most to the eastern margin of Lake Coogee (i.e. not over the Urban Deferred area or over any residence)

Land uses in the buffer

- No residence should be subject to odour
- A land use planning process should be undertaken to examine alternative, odour-compatible land uses if the buffer remains unchanged
- Residential use is appropriate for the area adjacent to Lake Coogee

Ongoing community consultation

- A transparent and accountable community liaison process is needed between the Water Corporation and residents, and the process needs to be more independent of the Corporation
- Need ongoing stakeholder consultation

The Corporation recognizes these community aspirations, which reflect a desire for no odour impact at any site beyond the boundary of the plant. However, as pointed out elsewhere in his document, the Corporation notes that the 50 % reduction in odour emissions will go towards meeting these aspirations but will not fully satisfy them.

7.2 Community Reference Group

A new Community Reference Group (CRG) has been established to provide an informed community perspective on the proposed odour control works. The Terms of Reference for the CRG are to:

- Provide advice to the Water Corporation in its decision making processes on wastewater issues impacting on neighbouring communities.
- Provide input into the development of odour reduction management strategies within a timeframe established by the Minister and the EPA.
- Provide input into the odour assessment and modelling activities to be undertaken on completion of the upgrade to confirm the actual degree of improvement.
- Facilitate feedback to, and seek input from, the community on the operations of the wastewater treatment plant.

The CRG comprises up to 18 members excluding the independent Chairperson. Members are drawn from the community surrounding the plant, with a preference for those residing near the plant (minimum of five and a maximum of 10 representatives) plus the Water Corporation (2), the City of Cockburn (2), affected local industry (2), the State Parliamentary Member for Cockburn (or representative) and the Department of Environment and Conservation (1). General membership will be nominally for two years.

The CRG will meet monthly or as agreed by the CRG, and will provide six-monthly public reports on its activities, achievements and issues either through a community newsletter or advertorial article in a local newspaper.

The reconstituted CRG held its first meeting in June 2006 and has held a number of meetings to date. The draft Terms of Reference for the CRG are given in Appendix C.

7.3 Community Reference Group Viewpoint

The CRG reviewed and contributed to the development of the Odour Improvement Plan. The CRG's comments on the Odour Improvement Plan have been taken into account (see Appendix D. Specifically, the CGR generally expressed the view that they considered:

- Odour control should have a very high priority;
- Cost should not be the major constraint for the Water Corporation in deciding on the level of odour control;
- The buffer zone should be progressively reduced over time, as odour controls are implemented;
- The ultimate goal should be that the buffer zone does not extend beyond the eastern shore of Lake Coogee; and
- In view of the long period to reach the ultimate goal of no buffer zone, the Corporation should try to resolve the concerns of residents inside the buffer zone before then.

The Water Corporation, through the CGR, will provide the opportunity for the community to have ongoing input to the Odour Improvement Plan as the project progresses from the planning phase through to implementation and commissioning. The CRG will have access to detailed technical advice on the relative merits and costs of various approaches, and the constraints on the project.

It is expected that through a process of deliberation and comparison of alternatives, the CRG will develop an understanding of the optimum path and, in consultation with the Water Corporation and the project's Alliance team, refine the scope of work for the odour upgrade within the constraints set by plant operations, safety, finance, outcomes and time schedule.

At about 3 to 6 month intervals throughout the project, the CRG will receive briefings from the Alliance project manager on the progress of the project in relation to the time schedule, and from the project odour auditor on the outcomes in relation to the agreed 50 % reduction in odour emissions.

7.4 Processes for Broader Community Input

Ongoing communications with the local and broader community will be important to promote awareness of the plant and the essential community services it provides.

The new CRG will be involved in determining appropriate forms of communications with residents and other stakeholders on all issues associated with operating and upgrading the plant over the next few years, including implementing the Odour Improvement Plan, and reviewing action on complaints received on the 1800 number which has been put in place specifically to receive odour complaints on the Woodman Point plant.

It is anticipated that the CRG will assist in recruiting 20 to 25 members of the community who will assist in monitoring the degree of improvement in odour conditions throughout the construction and commissioning period.

The Water Corporation will promote broader community awareness and canvas wider views on the Odour Improvement Plan by providing information and inviting input through local community newspapers, addressing community groups (such as the Coogee Beach Progress Association) and provision of information via the Water Corporation's website.

8. OPERATING THE PLANT

The community has expressed concerns that the management and operation of the plant is causing higher emissions of odour than necessary. The Corporation recognizes these concerns and agrees that effective operation and maintenance of all plant treatment processes, and of the odour collection and scrubbing system, are important to consistently achieve a high level of odour control at the plant.

The Water Corporation recently commissioned a third party audit of the current odour control equipment. This audit found that the operations and maintenance had been fully compliant with the Licence conditions and internal management procedures.

The new covers, air collection ducts and new scrubbers will add operating complexity to the plant. Thus the operating procedures for the plant will be further development during the detailed design stages so they are ready for implementation when the new odour control works and new plant assets are commissioned. The operating procedures will set out detailed instructions to ensure that odour controls continue to operate effectively during normal operations, and during planned and unplanned maintenance.

9. EXPAND THE CAPACITY OF THE PLANT FOR GROWTH

All new facilities constructed at the plant will incorporate a high degree of odour containment and control. The Water Corporation must increase the operating capacity of the treatment plant so that it can cater for the increased flows from the catchment in the future. Decisions about development in the catchment are made by local and regional planning agencies, and the Corporation has the responsibility to provide sewerage services to handle future growth.

Unprecedented urban growth and development has resulted in the sludge treatment processes being at design capacity, which at times results in excessive odours being generated and reduced biosolids quality.

The sludge treatment processes will be augmented in three stages constructed over 5 years to provide improved sludge treatment capacity (two additional egg-shaped digesters and other associated works), to provide high levels of odour control for all works, and to improve process control (works to reliably maintain and enhance the quality of the resultant biosolids). Augmentation of the sludge treatment works has an estimated capital expenditure of \$93 million and will be progressively completed and commissioned through to 2012/13.

There are critical links between the continued operation of existing plant processes, operational constraints of the existing plant, the planned plant upgrades, and the production of odours. Some expansion of treatment processes have to be undertaken in tandem with the staged odour control works, to ensure the plant can continue to treat the community's wastes.

The sludge treatment and other proposed process upgrades over the next 20 years involve substantial expenditure and must be carried out in parallel with the odour control works. The new works proposed are summarised in Table 2. As noted above, all new works will incorporate stringent odour controls.

**Table 2: Proposed Future Works at the Woodman Point WWTP
(excluding odour controls)**

Works	Planned completion	Cost estimate
Replace inlet screens	2007	\$1 million
Provision of new waste receival facility	2007	\$1 million
Refurbish sludge storage tanks	2007	\$2 million
SBR improvement works	2008	\$5 million
Upgrades to TRF	2008	\$1.8 million
Sludge Treatment Upgrade Stage 1 (capacity increase and odour control)	2009	\$47.4 million
Sludge Treatment Upgrade Stage 2 (upgrade for biosolids quality improvement)	2010/11	\$5.6 million
Sludge Treatment Upgrade Stage 3 (increase capacity)	2012/13	\$39.9 million
Additional primary tanks	2014	\$39 million
Additional SBR tanks (80 ML/d)	2015	\$84 million

10. WORKS TO PROVIDE FURTHER REDUCTIONS IN ODOUR EMISSIONS

Following the Odour Monitoring and Modelling Program (see Section 6) to verify the performance of the Stage 1 odour control works in reducing the odour ‘footprint’ of the plant, additional odour control works to provide further reductions in odour emissions will be assessed. At present, it is envisaged that there will be the Stage 3 odour control works. The Corporation is committed to reducing odours to the extent that there is no odour impact on odour-sensitive premises beyond an agreed buffer zone.

It is anticipated that the Stage 3 odour control works will provide for the covering, extraction and treatment of the odour emissions from the whole or part of the aerated areas of the sequencing batch reactor (SBR). Covering the SBR aerated tanks will be technically challenging and must be undertaken safely while maintaining the wastewater treatment standards required by the plant Licence. This can only be achieved by emptying and covering one quadrant of the SBR at a time, which will reduce secondary treatment capacity to 120 ML/d.

The current inflow at the plant is 120 ML/d with peak flows well above this. As a result, prior to undertaking the Stage 3 odour upgrade, an additional 80 ML/d of secondary treatment tanks will need to be constructed. This work will also service growth in the wastewater system. The project is scheduled to be completed in 2014/15. A funding submission for Stage 3 works, currently estimated at \$72.2 million, will be submitted to the Department of Treasury and Finance at a future date.

11. STRATEGY TO RESOLVE RESIDUAL LAND-USE CONFLICTS

Condition G3 (b) iii of the plant's DEC Licence requires the Corporation to develop strategies to resolve any residual land use conflicts surrounding the plant in the event that further reductions in odour emissions to achieve an ambient odour level of 5 OU at the nearest odour sensitive premises cannot be achieved.

As set out in the SER, the Water Corporation expects that an odour buffer of similar size to the existing buffer will still be required in the future, even after the installation of the new odour control works. However the extent of the buffer zone will only become clear following the completion of works and further monitoring and odour modelling.

Even with a high level of odour control, experience from operating the Corporation's other highly odour controlled plants at Subiaco and Beenyup demonstrate that there will still be fugitive releases of odour and residual emissions during operations and maintenance events. Based on experience at these plants, where detailed monitoring and modelling has been completed, it is anticipated that a buffer zone will be required.

Extensive programs of odour measurement and modelling, including surveys to establish the community responses, have been undertaken following the major upgrades at the Subiaco and Beenyup treatment plants. The recommended buffer zones, following the odour upgrades, extend 600 m from the Subiaco plant (62 ML/d capacity) and 750 m from the Beenyup plant (120 ML/d capacity). As the Woodman Point Plant has a future capacity of 240 ML/d, it is apparent that reducing odour impact to within a buffer zone distance of 750 m to the east will be challenging.

On the information available at present, the Corporation does not consider it economically feasible (and it may not be technically feasible, because of the local topography and wind patterns) to further reduce the buffer zone beyond that set out in the SER within the next decade. Thus the Corporation, in cooperation with local planning agencies and the land owners remaining in the long term buffer zone, is willing to try to develop innovative and acceptable land use solutions.

Any residual land use conflicts will be addressed by the Water Corporation and other planning authorities as part of scoping additional Stage 3 odour control works at the plant, following the odour monitoring and modelling outlined in Section 6.

The Corporation recognizes that it is many years before the Stage 3 odour control works can be completed and the final buffer zone defined. In the interim, the Corporation is willing to consider innovative land use solutions, in cooperation with planning agencies and the land owners within the expected long term buffer zone.

12. SUMMARY

In the SER published in September 2005, the Water Corporation set out a plan to reduce odour emissions from the Woodman Point WWTP by at least 73 % by upgrading odour control at the plant in three stages. The current estimated capital cost of the works in the three stages is \$143.6 million, including the additional secondary treatment capacity. There are about 220,000 residences in the catchment served by the Woodman Point WWTP, so the capital cost corresponds to \$650 per household.

The operating licence for the plant issued by the DEC requires the Corporation to reduce odour emissions by 50 % by the end of October 2008. The EPA has supported that decision, and advised that no change can be made to the existing buffer zone until the results of that upgrade are assessed, which will be in 2009/10.

It is recognized by the Corporation, DEC, EPA and the broader community that further odour control will be required after Stages 1 and 2 have reduced odour by 50 %.

To prepare the SER, the Corporation carried out an extensive odour measurement and modelling program, together with a phone survey of nearby residents and analysis of odour complaints. From the information, the Corporation has estimated the area potentially affected by odour (the area encompassed by the 5 OU contour at 99.9 % frequency). This area contains developed residential zones and industrial zones.

There are about 3000 houses within this area. The Water Corporation estimates that the works proposed will reduce the number of houses potentially affected by odour to about 30 - the number of houses within the existing buffer zone to the east of Lake Coogee (urban deferred zone). It also is recognized that there are odour impacts at the Woodman Point Holiday Park. There will be a substantial reduction in the level of odour at the Holiday Park as a result of the odour controls. The Corporation also proposed in the SER that the buffer zone be refined by adopting cadastral boundaries, which would mean that 10 land holdings would no longer be constrained by the urban deferred zoning.

In summary, it is expected that the Odour Improvement Plan Woodman Point WWTP will to reduce the number of houses potentially affected by odour from 3000 at present to about 30 in the future. The resolution of the required buffer zone required for the long term depends on the overall performance of the odour controls put in place and further decisions from the EPA and planning agencies.

Appendix A
Predicted Odour Contours for 99.5 % Frequency
Woodman Point WWTP

Appendix B
Timeline for Woodman Point WWTP
Odour Control Improvement Plan

Appendix C
Terms of Reference for Community Reference Group
for Woodman Point WWTP Odour Control Improvement Plan

Appendix D
Community Reference Group Comments on
Woodman Point WWTP Draft Odour Improvement Plan