

**Great Southern Region  
Customer Services Division**

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**Albany Effluent Irrigation Treefarm  
Annual Report 2006**

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**March 2006**





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Customer Services Division  
Water Corporation**

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A 10-year old blue gum that has completely embraced the drip-irrigation system. March 2004

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Date	Description	Author	Reviewer	Approved for Issue	
				Name	Signature
25 Feb 2006	Draft report	K. Eade	D. Burkett R. Collins	D. Burkett	
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## **Executive Summary**

The Water Corporation's Effluent Irrigation Treefarm has been operating successfully for more than 10 years. All of Albany's treated wastewater is used to irrigate a blue gum plantation at the treefarm site 10km north west of the town, opposite Albany airport. Wastewater is treated at the Timewell Road Wastewater Treatment Plant (WWTP) to a secondary level before being pumped to the treefarm. The treefarm not only manages the disposal of the treated wastewater by means of the trees, but also further treats the wastewater by flood irrigating grass bays to remove primarily nitrogen and suspended solids.

This report covers operation of the Treefarm during the 2005 calendar year. It reports on environmental monitoring at the treefarm and provides a summary Progress and Compliance Report against the Ministerial Conditions.

In mid 2005, harvest of 27 hectares of irrigated plantation and 27.2 hectares of rainfed plantation occurred. The harvest program was altered to remove trees that were encroaching on the optimal approach/departure angles to the east-west runway at the Albany airport.

The Albany Treefarm for the 2005 calendar year is in full compliance with the Ministerial and Licence Conditions for the site. This is the second year of operation with the revised allowable nitrogen application rate of 150kg/ha/year. The nitrogen application rate for 2005 was 134kg/ha applied to the average irrigated area of 232 hectares. Discharges in surface water (Seven Mile Creek) have carried export nutrient loads of 1920kg nitrogen and 310kg phosphorus.

Upgrade of the Timewell Road wastewater treatment plant has progressed with preliminary works done in late 2005. It is anticipated that the construction will be completed in 2006/07.

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# 1 Introduction

All of Albany's treated wastewater is used to irrigate a blue gum plantation at the tree farm site 10km north-west of the town, opposite Albany airport. Wastewater is treated at the Timewell Road Wastewater Treatment Plant (WWTP) to a secondary level before being pumped to the tree farm. The tree farm not only manages the disposal of the treated wastewater by means of the trees, but also further treats the wastewater by flood irrigating grass bays to remove additional nutrients. A further reduction of nitrogen and phosphorus occurs in the plantation.

The Water Corporation's Effluent Irrigation Treefarm at Gunn Road was developed between 1992 and 1994 following extensive public consultation with the people of Albany. As a result of the Public Environmental Review process a number of Ministerial Conditions were issued under which the Treefarm must be operated.

This report is produced in accordance with Ministerial Conditions described in Statement 000675 to "Prepare brief annual and comprehensive triennial reports...". This is the Annual report for the Albany Effluent Irrigated Tree Farm for the operating year 2005.

## **2 Overview of Operations**

### **2.1 Wastewater Treatment Plant (WWTP) and Land Disposal Site Infrastructure**

The Timewell Road WWTP treats all the sewerage from Albany to secondary effluent standard. The design capacity of the Timewell Road WWTP is 6 ML/day. The plant comprises influent screening followed by 2 aerated ponds and 3 facultative ponds.

Treated wastewater is pumped from Timewell Road directly into two holding ponds at the Gunn Road land disposal site (treefarm). These ponds supply a pump station that distributes the wastewater to flood-irrigated overland flow grass bays for the primary purpose of nitrogen stripping.

The 365 ML main irrigation dam collects all surface runoff from the grass bays and supplies the irrigation pump station through a floating off-take for pumping over the 280ha effluent irrigated blue gum plantation. An additional 120ha of rainfed plantation serves as visual and storm run-off buffer.

The treefarm is constructed at the head of the Seven-Mile Creek catchment and discharge from the site into Seven-mile Ck is monitored at the Gunn Road Gauging Station. This station incorporates a flow logging device and a refrigerated automatic water sampler.

### **2.2 Overview of Wastewater Treatment Operations in 2005**

#### **2.2.1 Timewell Road Wastewater Treatment Plant**

##### **2.2.1.1 INFLOW VOLUMES**

Inflows to the treatment plant have increased in the past few years due to infill sewerage and natural growth. The annual average flow into the treatment plant during the 2005 calendar year was 5.3ML/day. This flow is higher than previous years in part due to two very high rainfall events in April and June. These events contributed significantly to the higher than average annual rainfall of 986mm and increased annual inflow was experienced as a result. Since the tree farm operations began, 2005 was both the wettest rainfall year and had the highest total irrigation volume.

##### **2.2.1.2 SLUDGE MANAGEMENT**

Desludging of the facultative ponds was completed in 2002 and the sludge has been stored in the geotextile bags used in dewatering since this time. There have been no odour or insect problems associated with the bags, and the sludge has dried very effectively. Approximately 200 cubic meters of dried sludge was sent for beneficial reuse during 2005. Other reuse opportunities are being sought for the remaining 400m<sup>3</sup> of sludge. In the interim, the sludge will continue to be stored in the bags on site.

Future desludge work will occur in 2006 as part of the upgrade of the wastewater treatment plant; however this will involve transfer of sludge between ponds rather than removal and drying.

##### **2.2.1.3 ODOUR CONTROL**

Odour issues associated with the heavy loading on the aerated ponds and the inlet works at the Timewell Road treatment plant is one of the primary drivers for the upgrade to this site. The upgrade will improve the aerobic condition in the ponds and so reduce the odour. The inlet screening plant will also be enclosed with foul air drawn off and treated in the upgraded aerated ponds.

There were no formal odour complaints during 2005 concerning either the Timewell Rd WWTP or the Gunn Road tree farm, though odours have been recorded at the inlet area of the WWTP.

### **2.3 Overview of Land Treatment Site Operations in 2005**

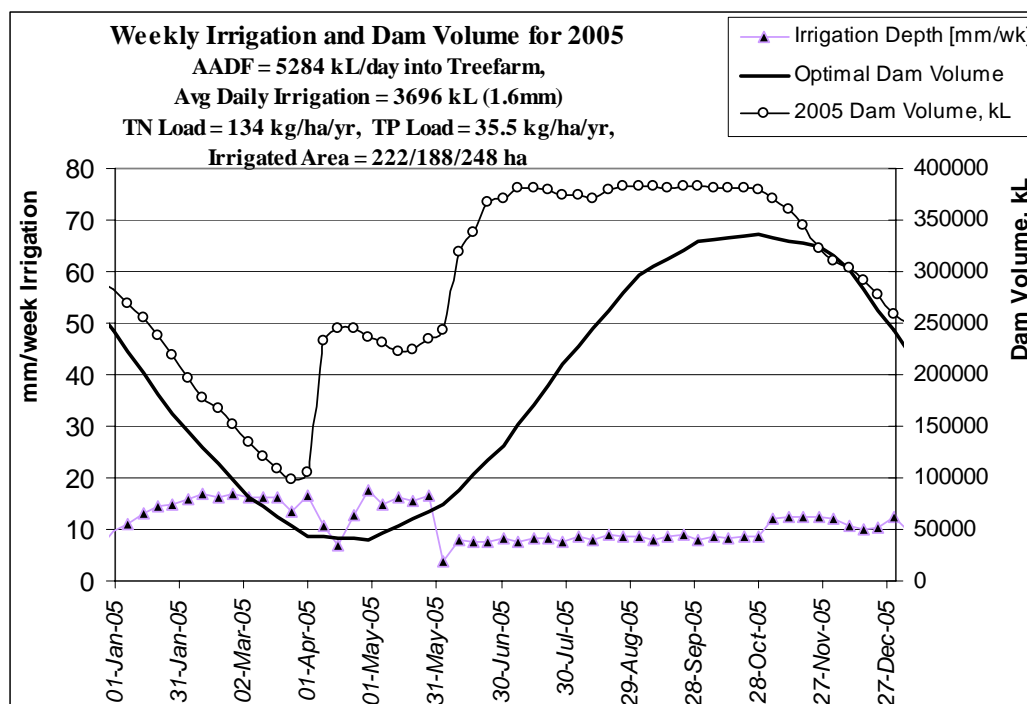
#### **2.3.1 Overland Flow System**

Nitrogen removal from the overland flow treatment system continues to be excellent. Vegetation in the

grass bays has become very dense and this has in the past prevented successful harvest of the excess growth. During October 2005 one half of the grass bays were taken off-line and burnt under CALM management. Irrigation was resumed in late November once regrowth had commenced. The remaining grass bays will be similarly burnt in the 2006 season with CALM management.

### 2.3.2 Irrigated Blue-gum Plantation

Figure 1 below shows the weekly irrigation depth and the level in the main storage dam for 2005. Summary statistics for the flows and plantation nutrient loading are also provided. The fairly constant weekly irrigation depth and large deviation of storage level shown in Figure 1 highlight the extreme inflow conditions experienced during the year. Two large storm events in April and June led to the capacity storage being reached well before the end of winter. The resultant wet conditions across the site also limited irrigation during spring so as not exceed the licensed nutrient export from site.



**Figure 1 Dam Volume and Weekly Irrigation Summary for 2004.**

The “Optimal Dam Volume” curve shown in Figure 1 has been revised to reflect the increased annual inflows relative to the design capacity. From 2005, the target is to have the dam at bottom water level at the end of April, a month earlier than previous years. This is to ensure high irrigation rates are not required for the early winter period.

Numerical water balance modelling of the irrigated plantation shows a leaching factor of 0.21 was achieved in 2005 without surface runoff. This leaching fraction is higher than the design average leaching factor of 0.13 although this is expected to vary on an annual basis and to be higher in wet years. For sustainable management of salinity across the site the design requires the average leaching fraction be maintained above 0.10. The average leaching fraction since 2000 is 0.12.

### 2.3.3 Irrigation control system

Irrigation control is managed centrally via radio telemetry to 8 field units. Each field unit manages a group of irrigation valves and also transmits soil moisture data to the PLC and operator interface. Irrigation is scheduled by the operator according to the season, soil moisture condition, dam level and dam nutrient concentrations.

The control centre software was upgraded in 2005 to the latest industry standards to improve serviceability and equipment consistency. This upgrade also involved software enhancements to allow more thorough irrigation assessment and reporting. During 2006/07 the soil moisture telemetry system

will be upgraded to replace superseded and unserviceable components.

#### 2.3.4 Plantation Harvest Operations

The effective irrigation area during 2005 was 232 hectares. The harvest removed approximately 27 hectares of irrigated plantation and 27.2 hectares of rainfed plantation. The harvest schedule has been modified to suit airport runway approach requirements and to minimise impacts the trees may have on the weather radar situated adjacent to the airport. This has not altered the irrigation loading or forestry requirements of the site.

#### 2.3.5 Septage Treatment Plant

During 2002/2003 a septage treatment plant was constructed at the centre of the treefarm site. This facility receives domestic septage and commercial grease trap wastes. The septage plant does not receive industrial or petroleum based liquid wastes.

The plant is comprised of two anaerobic ponds followed by a facultative lagoon. The process also allows for seasonal evaporation losses in the ponds with excess volumes pumped to the holding ponds at the inlet of the treefarm grass bay irrigation system.

The septage plant was constructed under Works Approval No.3549 and is now licensed under the wastewater treatment plant licence that also covers operations at the treefarm disposal site.

Flows and nutrient data reported through the tree farm incorporate the nutrient and volume loadings attributable to the septage plant. Weekly flow monitoring and analysis of discharge from the septage plant shows a nominal 160kg TN and 30kg TP contributed to the treated wastewater from Timewell Road WWTP. These annual loads equate to about 0.1% and 0.2% respectively of the total annual load received at the tree farm.

There was no requirement during 2005 to desludge any of the treatment ponds and the plant is operating within design expectations. Desludging is scheduled for early-mid 2006/07 and will utilise on-site drying facilities.

### 3 Performance Monitoring

#### 3.1 Flow Volumes

The average inflow to the tree farm during 2005 was 5.3 ML/day. This compares to the design hydraulic capacity of 6ML/day for the Treefarm.

The annual volumes of flow through the treefarm treatment process are summarised below in Table 1. The volume irrigated to the blue gum plantation is consistently about 65% of the volume delivered to the site. The difference is accounted for in losses to evaporation and evapotranspiration in the grass bays and seepage beneath the grass bays and main storage dam.

The annual wastewater volume received at the site in 2005 was 1,924ML compared with 4,900ML received from rainfall. Higher rainfall than in recent years, in addition to 3 extreme rainfall events in April and June, resulted in discharge from the site being more than double the average discharge of the previous 4 years.

**Table 1 Summary of flows at the Albany treefarm site**

	<b>Inflow to Treefarm ML/year</b>	<b>Pumped to overland flow bays ML/yr (% inflow)</b>	<b>Irrigated to blue-gum plantation ML/yr (% inflow)</b>	<b>Discharge of Seven- Mile Ck at Gunn Rd ML/yr</b>
<b>1997</b>	1354	1118 (83%)	896 (66%)	525
<b>1998</b>	1426	876 (61%)	958 (67%)	486
<b>1999</b>	1595	947 (59%)	950 (60%)	419
<b>2000</b>	1732	1254 (72%)	1249 (72%)	450
<b>2001</b>	1660	1443 (87%)	1033 (62%)	368
<b>2002</b>	1689	Meter faulty	1155 (68%)	347 <sup>1</sup>
<b>2003</b>	1765	1607 (91%)	1145 (65%)	648
<b>2004</b>	1739	1558 (90%)	1101 (63%)	386
<b>2005</b>	1924	1392 (72%)	1345 (70%)	1020

(1). Some data missing Nov-Dec 2002 due to upgrade of flow logging equipment. Gaps 'filled' using adjusted 2001 data.

#### 3.2 Raw and Treated Wastewater Quality.

Raw and treated wastewater is analysed at a number of points through the treatment process. The results presented in Table 2 below are the combined averages from both NATA certified analysis and on-site analysis at the Albany Treefarm. Note that where the on-site analysis varies significantly to the NATA certified results, the more accurate NATA results are also given.

**Table 2 Average wastewater quality through the treatment process in 2005.**

<b>2005</b>	<b>Total Kjeldahl Nitrogen (mg/L)</b>	<b>Total Nitrogen (mg/L)</b>	<b>Total Phosphorus (mg/L)</b>	<b>pH</b>	<b>BOD<sub>5</sub> (mg/L)</b>	<b>Hardness, mg /L as CaCO<sub>3</sub></b>
Raw wastewater (Inlet to works)	60.2 (11)	-	10.5 (11)	7.4 (11)	233 (11)	-
Inflow to treefarm (Holding ponds)	48.8 (13)	51.7 (41)	7.5 (43)	7.6 (42)	39 (12)	-
Grass Bay Outflow (Inlet to dam)	22.9 (11)	29.8 (40)	5.9 (41)	7.5 (36)	4 (11)	224 (8)
Irrigated to blue-gums (Main irrigation dam)	18.3 (20)	22.6 (49)	5.7 (43)	7.7 (29)	4 (29)	203 (8)
Seven-Mile Creek (Gunn Rd Gauge stn)	1.3 (13)	2.23 (43) 1.49 (13) <sup>NATA ONLY</sup>	0.29 (43)	6.2 (39)	-	-

(n) is number of samples used to calculate the average value and, unless stated, is the combined data from on-site analysis and NATA certified laboratory analysis.

These nutrient concentrations in the raw and treated wastewater (inflow to treefarm) are typical for a domestic sewerage system with secondary treatment processes. The annual average nitrogen concentration received at the tree farm has increased steadily as loading on the WWTP has increased

and has been an important driver for upgrade of the WWTP. The upgrade of the Timewell Road WWTP commenced in February 2006 will significantly improve the water quality at the tree farm. The basis of the design upgrade is to reduce the total nitrogen to well below half the current concentration.

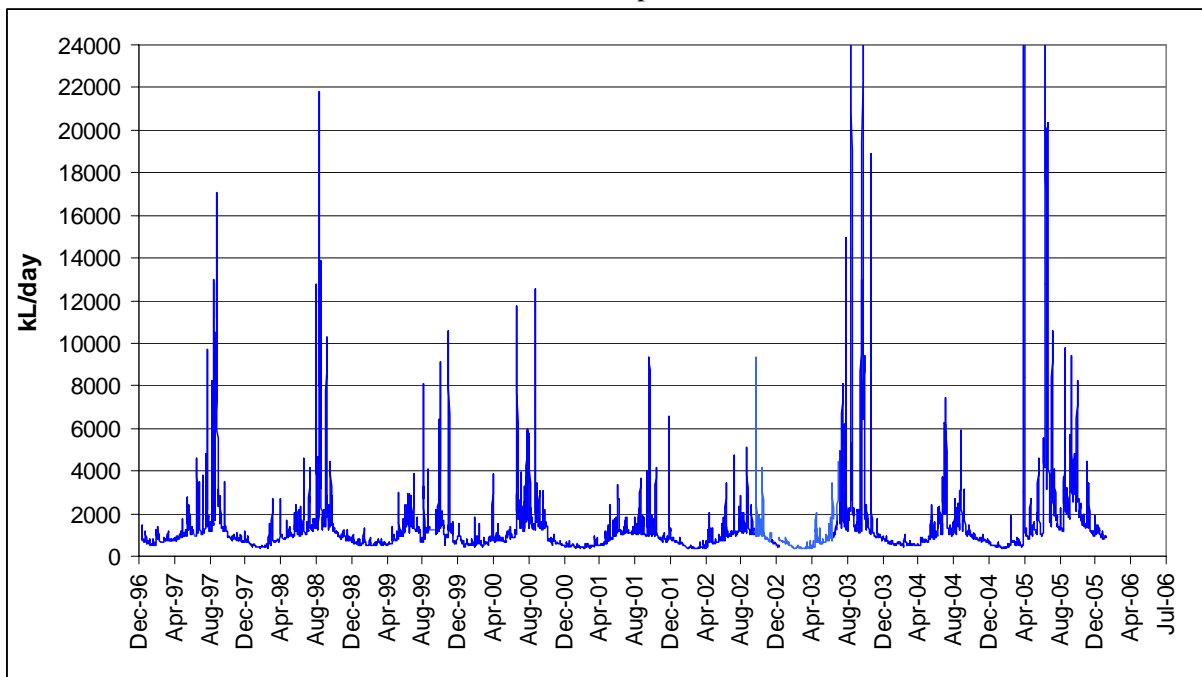
Table 2 includes two results for total nitrogen in Seven-Mile Creek. The first includes on-site analysis, which tends to over-estimate the nitrogen by about 50%. The second result is NATA certified laboratory analysis results collected on a monthly frequency. Only certified analysis results have been used to estimate the annual nutrient loads discharged in Seven Mile Creek.

This analysis conservatively estimated about 1920 kilograms of nitrogen and about 310 kilograms of phosphorus were discharged in Seven Mile Creek during 2005. These loads are significantly higher than in previous years due to the very large annual streamflow in Seven-Mile Creek. The higher flow rates additionally cause increased turbidity that can contribute to the nutrient concentrations in the stream water. It is not expected that these increased export levels will be sustained as they are the result of extreme rainfall events in a wetter than average year, and are not due to any deterioration in the tree farm performance.

Because of the extreme nature of discharges through the year it is difficult to estimate the total loads exported in surface and groundwater. These calculations will be performed in 2007 for the triennial reporting and will require detailed groundwater modelling to be performed. It is however anticipated that the total discharge loads will remain within the Ministerial limits of 3000kg nitrogen and 1000kg phosphorus.

### 3.3 Site discharge and historical performance

Figure 2 below shows the daily discharge from the site in Seven Mile Creek. The total discharge volume from the site was 1020ML which is much higher than average owing to an increased annual rainfall total of 986mm and severe rainfall events in April and June.



**Figure 2 Daily streamflow in Seven Mile Creek at the Gunn Road Gauging Station**

Table 3 and Figure 3 below has been included following recent requests for historical data describing the nutrient quality of water in Seven-Mile Creek, and to demonstrate the reduction in nutrient export from the site since establishment of the irrigated plantation.

This data summarises the relative sources of water on the site and the discharges in Seven Mile Creek. Note that in 2005 the irrigated area averaged 232 hectares compared to the total site area of 550 hectares. Consequently, the irrigated volume equates to about 22% of the total of rainfall and irrigated

volumes received on the site. In 2005 the historical trend in nutrient reduction is not evident due to the increased flow and hence nutrient export from the site owing to large rainfall events and a generally wetter year.

**Table 3 Historical annual rainfall, irrigation and Seven Mile Creek nutrient loads**

Year	Rain [mm/year]	Irrigation [mm/yr] <sup>1</sup>	7-Mile Ck discharge [ML/yr]	TN <sup>*5</sup> [kg/yr]	TP <sup>*5</sup> [kg/yr]
1992 <sup>*4</sup>	930	0	950	1399	262
1993 <sup>*4</sup>	821	0	734	916	207
1994 <sup>*4</sup>	675	0	576	1054	169
1995 <sup>*4</sup>	720	146	466	541	67
1996 <sup>*4</sup>	831	264	593	733	95
1997	724	389	525	466	40
1998	783	417	486	456	36
1999	719	398	419	162 <sup>*2</sup>	21 <sup>*2</sup>
2000	768	455	450	459	37
2001	879	365	368	225	11
2002	684	408	347 <sup>*3</sup>	146 <sup>*2</sup>	8 <sup>*2</sup>
2003	847	449	648 <sup>*3</sup>	386 <sup>*3</sup>	36 <sup>*3</sup>
2004	624	491	386	420	52
2005	986	591	1020	1923	312

\*1. Irrigation depth calculated weekly for actual irrigation area

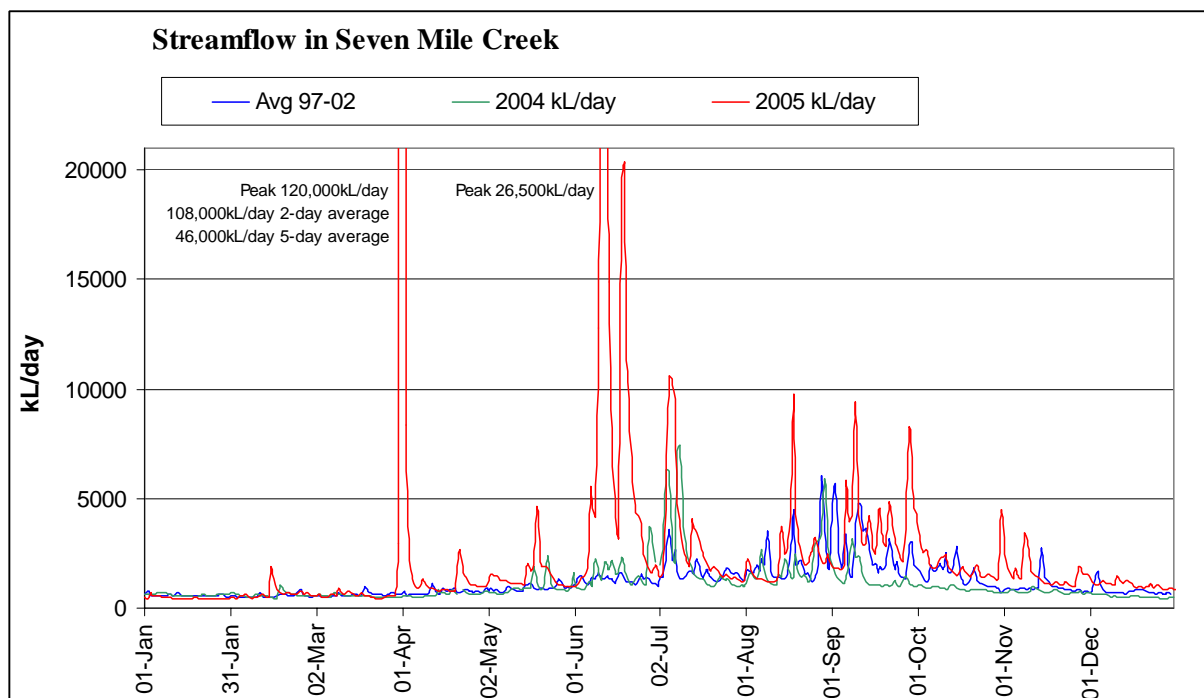
\*2. Load underestimated due to insufficient nutrient data for calculation using HYDSYS

\*3. Includes estimated data

\*4. Sourced from Albany Land Treatment System review (Kinhill Pty Ltd, 1997)

\*5. Nutrient loads prior to 2004 calculated using all site and NATA analysis, despite site results being approximately 150% of certified results. This gives an over-estimation of nutrient discharge loads.

Figure 3 below shows the three large flow events in April and June in response to large rainfall events. Also evident is the higher base-flow, particularly from September and though to the end of the year. 2003 was also a wet year but has been omitted for clarity. The 2003 total flow was still low at 648ML/year when compared to the 1020ML recorded in 2005.



**Figure 3 Comparison of Gunn Road stream flow for 2005 and previous years**

## 4 Progress and Compliance Report

Table 4 below provides a complete progress and compliance update against ministerial conditions Statement 000675 for the Albany Tree farm.

**Table 4 Statement of progress and compliance against Ministerial Conditions Statement 000675**

Element	Requirement	Compliance Status
<b>Implementation</b>		
Condition 1-1	The proponent shall implement the proposal as documented in the Public Environmental review “Albany Sewage – treatment and disposal of wastewater” and Environmental Protection Authority Bulletin 628 subject to the conditions of this statement.	COMPLIANCE ACHIEVED The Water Corporation has implemented the proposal as documented.
<b>Proponent Commitments</b>		
Condition 2-1	The proponent shall implement the environmental management commitments documented in schedule 1 of statement 675, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	COMPLIANCE ACHIEVED The Water Corporation has implemented the commitments documented in Schedule 1 (refer below).
<b>Proponent Nomination and Contact Details</b>		
Condition 3-1	The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the <i>Environmental Protection Act 1986</i> is responsible for the implementation of the proposal until such time as the Minister for the environment has exercised the Minister’s powers under section 38(7) of the Act to revoke the nomination of that proposal and nominate another person as the proponent for the proposal.	NO ACTION REQUIRED The Water Corporation has not sought to change the proponent.
Condition 3-2	If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.	NO ACTION REQUIRED The Water Corporation remains the proponent for the proposal
Condition 3-3	The nominated proponent shall notify the Department of Environment of any change of contact name and address within 60 days of such change.	NO ACTION REQUIRED The Water Corporation contact details have not changed
<b>Commencement and Time Limit of Approval</b>		
Condition 4-1	The proponent shall substantially commence the modified proposal within 5 years of the date of this statement or the approval granted in the statement published on 7 October 1002 shall lapse and be void. Note: the Minister for the Environment will determine any dispute as to whether the modified proposal has been substantially commenced.	COMPLIANCE ACHIEVED The modified statement has been substantially commenced. Adjustments to monitoring requirements are being developed and additional reporting requirements addressed.
Condition 4-2	The proponent shall make application for any extension of approval for the substantial commencement of the modified proposal beyond 5 years from the date of this statement to the Minister for the Environment, prior to the expiration of the five-year period referred to in condition 4-1. The application shall demonstrate that: <ol style="list-style-type: none"> <li>1. the environmental factors of the modified proposal have not changed significantly;</li> <li>2. new, significant, environmental issues have not arisen; and</li> <li>3. all relevant government authorities have been consulted.</li> </ol> Note: The Minister for the Environment may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the modified proposal.	NO LONGER RELEVANT The proposal has substantially commenced.

<b>Element</b>	<b>Requirement</b>	<b>Compliance Status</b>
<b>Land-based Wastewater Disposal</b>		
Condition 5-1	Within two years following commissioning of the land disposal site, the proponent shall commence trial plantings on the land disposal site to ascertain the merits and disadvantages of alternative tree species and provenances, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	COMPLIANCE ACHIEVED Two arboretums have been established and are managed under contract. Annual and triennial reviews of tree performance are conducted.
Condition 5-2	The proponent shall maintain an un-harvested 50-metre wide visual buffer along the southern periphery (Gunn Road border) of the land disposal site, consisting of a combination of plantation and ornamental native species, to the requirements of the Minister for the Environment on the advice of the Environmental Protection Authority.	COMPLIANCE ACHIEVED A 50-metre wide vegetated buffer is maintained on the southern boundary. Where this buffer includes plantation trees, the harvest of the trees is staggered to maintain a visual buffer into the plantation.
Condition 5-3	The proponent shall not irrigate remnant vegetation on the land disposal site with wastewater.	COMPLIANCE ACHIEVED No irrigation of the remnant vegetation has occurred.
Condition 5-4	The proponent shall design and manage the rising main leading into the holding pond such that the outlet is submerged at all times.	COMPLIANCE ACHIEVED The Department of Environment approved the design of the rising main and outlet on 19 December 1996 under Statement 287. The rising main outlet is submerged at all times.
Condition 5-5	Commencing at the time of commissioning the woodlot, the proponent shall measure soil infiltration rates on a triennial basis and shall ensure that the infiltration rate is not reduced to a level which results in water-logging or surface run-off, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	COMPLIANCE ACHIEVED. Not required as soil moisture is continuously monitored by soil moisture probes across the site.
Condition 5-6	The proponent shall monitor soil moisture content to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority,	COMPLIANCE ACHIEVED Soil moisture is monitored continuously. The irrigation regime is scheduled according to the seasonal soil moisture deficit.
Condition 5-7	Utilising the data arising from the monitoring required by condition 5-6, the proponent shall operate the woodlot to minimise the off-site export of contaminants, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	COMPLIANCE ACHIEVED Soil moisture is monitored continuously. The irrigation regime is scheduled according to the seasonal soil moisture deficit.
Condition 5-8	If the requirements of conditions 5-5 and 5-7 are not likely to be met, the proponent shall implement contingency measures (see conditions 8 and 9-4), to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	NO ACTION REQUIRED Compliance with Conditions 5-5 and 5-7 have been achieved. The tree farm continues to operate in accordance with design expectations.
<b>Timewell Road (No. 2) Treatment Plant</b>		
Condition 6-1	The proponent shall retain remnant native vegetation at the Timewell Road (No. 2) treatment plant site, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.	COMPLIANCE ACHIEVED The remnant vegetation at the Timewell Road (No.2) treatment plant site remains intact.
<b>Operation of Wastewater Disposal Site</b>		
Condition 7-1	For three years following the date of this statement, the proponent shall operate the overland flow area or utilise other means to remove the nitrogen content of the incoming wastewater to a level which results in not more than 150 kilograms per hectare per year of total nitrogen being applied to the area of trees being irrigated.	COMPLIANCE ACHIEVED The overland flow area is operated to maximise nitrogen volatilisation. 134 kg TN/ha/yr was applied to woodlot in 2005. The projected loading for 2006 is between 95 to 140 kg/ha, subject to timing of the WWTP upgrade works.
Condition 7-2	Beyond the three year period referred to in condition 7-1, the proponent shall irrigate the area of trees with wastewater such that the total nitrogen application rate does not exceed 106 kilograms per hectare per year, unless Minister for the Environment on advice of the Environmental Protection Authority permits a higher total nitrogen application rate.	NO ACTION REQUIRED Condition takes effect 5 April 2008. The WWTP upgrade works will be conducted to meet the 106 kg/ha/yr limit.

<b>Element</b>	<b>Requirement</b>	<b>Compliance Status</b>
Condition 7-3	The proponent shall support any request for an increase in the total nitrogen application rate with further adequate information and/or trials, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	NO ACTION REQUIRED The Water Corporation has an approved total nitrogen application rate of 150 kg/ha/yr until April 2008. The Water Corporation has not requested an increase in total nitrogen application above this limit. A revised sampling program is being implemented to support this application rate beyond 2008 should the need arise.
<b>Contingency Measures</b>		
Condition 8-1	The proponent shall not irrigate with wastewater Reserve 20948, which is vested in the National Parks and Nature Conservation Authority.	COMPLIANCE ACHIEVED Reserve 20948 has not been irrigated. The Water Corporation does not propose to irrigate Reserve 20948 in the future.
Condition 8-2	Within six months following the issuing of the notice to the decision-making authorities under section 45(7) of the <i>Environmental Protection Act 1986</i> , the proponent shall review the alternative plan for the temporary irrigation of treated wastewater in the event that insect attack, fire or a decline in soil infiltration are likely to cause either: <ol style="list-style-type: none"> <li>1. nutrient losses from the site to exceed either three tonnes of nitrogen or one tonne of phosphorus per year; or</li> <li>2. surface runoff, other than stormwater, from the site to occur more frequently than 1 year in 10 (based on long-term rainfall probabilities),</li> </ol> to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and Department of Conservation and Land Management.	COMPLIANCE ACHIEVED The review of the alternative plans for temporary irrigation is contained in <i>Albany Effluent Irrigated Tree Farm Contingency Plan</i> (Water Corporation, August 2005). Contingency plan has been cleared by the DoE in a letter dated 23 March 2006.
Condition 8-3	Within six months following the issuing of the notice to the decision making authorities under section 45(7) of the <i>Environmental Protection Act 1986</i> , the proponent shall prepare a contingency plan in the event that monitoring indicates that total nutrient losses from the site to groundwater and surface water are likely to exceed either three tonnes of nitrogen or one tonne of phosphorus per year, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Conservation and Land Management.	COMPLIANCE ACHIEVED The contingency plan is contained in <i>Albany Effluent Irrigated Tree Farm Contingency Plan</i> (Water Corporation, August 2005). Contingency plan has been cleared by the DoE in a letter dated 23 March 2006.
Condition 8-4	The proponent shall implement the plans referred to in conditions 8-2 and 8-3, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	NO ACTION REQUIRED There has been no need to implement the contingency or alternative plans.
<b>Monitoring</b>		
Condition 9-1	The proponent shall submit to the Department of Environment brief annual and more detailed triennial reports addressing the following: <ol style="list-style-type: none"> <li>1. a water balance for the land disposal site, including a comparison between measured and estimated (modeled) evapotranspiration for both rainfed and irrigated woodlots;</li> <li>2. a nitrogen balance for the land disposal site;</li> <li>3. results of environmental monitoring;</li> <li>4. results of infiltration rate measurements, groundwater monitoring, trends and implications for the onsite retention of water and contaminants (see condition 5-6);</li> <li>5. results of trial plantings of alternative species (see condition 5-1); and</li> <li>6. any proposed changes to management or monitoring of aspects of the system,</li> </ol> to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	COMPLIANCE ACHIEVED This report is submitted to meet the requirements for annual reporting. The next triennial report is due after 5 April 2008, being three years after the issue of Statement 675. However the next Triennial report will be submitted after April 2007 being three years since the last Triennial report. Annual reports are also submitted separately to the DoE under the License for the premises.

Element	Requirement	Compliance Status
Condition 9-2	Within three years following commissioning of the land disposal site, the proponent shall commence submitting the reports required by condition 9-1 to the Department of the Environment and shall make them publicly available.	COMPLIANCE ACHIEVED This report is submitted to meet the requirements for submitting the reports to the DoE. All annual and triennial reports are made publicly available on the Water Corporation website and are available on request from the Albany and Leederville offices.
Condition 9-3	The proponent shall report and breach or anticipated breach of the environmental conditions and commitments to the Department of the Environment within five working days.	COMPLIANCE ACHIEVED No breach or anticipated breach of the conditions or commitments has occurred.
Condition 9-4	If impacts are detected which are deemed to be unacceptable by the Department of the Environment, the proponent shall modify and remedy the operations of the treatment plants and/or the land disposal site, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	NO ACTION REQUIRED No unacceptable impacts have been detected or deemed to be unacceptable.
<b>Compliance Audit and Performance Review</b>		
Condition 10-1	The proponent shall prepare an audit program and submit compliance reports to the Department of Environment which addresses: <ul style="list-style-type: none"> <li>1. evidence of compliance with the conditions and commitments; and</li> <li>2. the performance of the environmental management plans and programs.</li> </ul> Note: Under sections 48(1) and 47(2) of the <i>Environment Protection Act 1986</i> , the Chief Executive Office of the Department of the Environment is empowered to audit the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.	COMPLIANCE ACHIEVED This compliance report meets the requirements of this condition.
Condition 10-2	The proponent shall submit a performance review report every six years after the start of operation, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, which addresses: <ul style="list-style-type: none"> <li>1. the major environmental issues associated with the project; the targets for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those targets;</li> <li>2. the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable;</li> <li>3. significant improvements gained in environmental management, including the use of external peer reviews;</li> <li>4. stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and</li> <li>5. the proposed environmental targets over the next five years, including improvements in technology and management processes.</li> </ul>	NO ACTION REQUIRED The Performance Review Report is not required until after 5 April 2011.

<b>Decommissioning Plans</b>		
Condition 11-1	<p>Within six months following the issuing of the notice to the decision-making authorities under section 45(7) of the <i>Environmental Protection Act 1986</i>, the proponent shall prepare a Preliminary Decommissioning Plan, which provides the framework to ensure that the wastewater treatment and disposal sites are left in an environmentally acceptable condition to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.</p> <p>The preliminary decommissioning plan shall address:</p> <ol style="list-style-type: none"> <li>1. conceptual plans for the removal or, if appropriate, retention of plant and infrastructure;</li> <li>2. long-term management of ground and surface water systems or soil affected by the storage and disposal of wastewater (where applicable);</li> <li>3. a conceptual rehabilitation plan for all disturbed areas and a description of a process to agree on the end land use(s) with all stakeholders;</li> <li>4. a conceptual plan for a care and maintenance phase; and</li> <li>5. management of noxious materials to avoid the creation of contaminated areas.</li> </ol>	<p>COMPLIANCE ACHIEVED</p> <p>The Preliminary Decommissioning Plan is contained in <i>Albany Effluent Irrigated Tree Farm Preliminary Decommissioning Plan</i> (Water Corporation, August 2005). The Preliminary Decommissioning Plan was cleared by the DoE in a letter dated 10 February 2006.</p>
Condition 11-2	<p>At least 12 months prior to the anticipated date of decommissioning, or at a time agreed with the Environmental Protection Authority, the proponent shall prepare a Final Decommissioning Plan designed to ensure that the site is left in an environmentally acceptable condition to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.</p> <p>The Final Decommissioning Plan shall address:</p> <ol style="list-style-type: none"> <li>1. removal or, if appropriate, retention of plant and infrastructure in consultation with relevant stakeholders;</li> <li>2. long-term management of ground and surface water systems or soil affected by the storage and disposal of wastewater (where applicable);</li> <li>3. rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s); and</li> <li>4. identification of contaminated areas, including provision of evidence of notification and proposed management measures to relevant statutory authorities.</li> </ol>	<p>NO ACTION REQUIRED</p> <p>There is no intention to decommission the site at this time.</p>
Condition 11-3	<p>The proponent shall implement the Final Decommissioning Plan required by condition 11-2 until such time as the Minister for the Environment determines, on advice of the Environmental Protection Authority, that the proponent's decommissioning responsibilities have been fulfilled.</p>	<p>NO ACTION REQUIRED</p> <p>There is no intention to decommission the site at this time.</p>
Condition 11-4	<p>The proponent shall make the Final Decommissioning Plan required by condition 11-2 publicly available, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.</p>	<p>NO ACTION REQUIRED</p> <p>There is no intention to decommission the site at this time.</p>
<b>Proponent Commitments – Wastewater Discharges</b>		
Commitment 1	<p>Discharge from the No. 1 treatment plant to cease in December 1994.</p>	<p>COMPLIANCE ACHIEVED</p> <p>Commitment 1 was cleared by the DoE on 30 August 1996 under Statement 287.</p>
Commitment 2	<p>Discharge from the No. 2 treatment plant into Five Mile Creek to cease in December 1996.</p>	<p>COMPLIANCE ACHIEVED</p> <p>Commitment 2 was cleared by the DoE on 30 August 1996 under Statement 287.</p>

Commitment 3	The nutrient discharge from the land treatment site in groundwater and surface water not to exceed either 1 tonne of phosphorus or 3 tonnes nitrogen per annum.	<p>COMPLIANCE ACHIEVED</p> <p>In 2005, 1920 kg TN and 310 kg TP was discharged via surface water.</p> <p>Groundwater modeling is conducted triennially. Previous modeling has indicated the discharge of TN and TP via groundwater has typically been 50% of the surface water discharges of TN and TP. 2005 had increased rainfall compared to previous years. Based on the 2005 rainfall, it is considered that the TN and TP discharges via groundwater would equate to between 30% to 50% of the surface water discharge of TN and TP, equating to approximately 576-960kg TN and 93-155kg TP.</p>
<b>Proponent Commitments – No. 2 Treatment Plant</b>		
Commitment 4	The existing No. 2 aerated pond treatment plant to be upgraded to a capacity of 3,500 kilolitres/day by December 1994.	<p>COMPLIANCE ACHIEVED</p> <p>Commitment 4 was cleared by the DoE on 30 August 1996 under Statement 287.</p>
Commitment 5	The treatment facilities to be further upgraded, enlarged or replaced as necessary to meet further demand, depending on their performance and that of the land treatment system.	<p>COMPLIANCE ACHIEVED</p> <p>The WWTP was upgraded in 1995. Further upgrade of the WWTP commenced early in 2006. The aerated ponds will be converted to activated sludge plants for increased treatment on the same footprint. Sludge dewatering and odour control at the inlet works is also included. Expansion of the tree irrigation area is also being progressed.</p>
Commitment 6.1	From December 1994, the volume of wastewater pumped daily to the land treatment site to be not less than the volume of water diverted from the no. 1 treatment plant.	<p>COMPLIANCE ACHIEVED</p> <p>All treated wastewater has been pumped to the land treatment site since 1995.</p>
Commitment 6.2	The volume pumped to be gradually increased as the trees grow on the land treatment site, until discharge into Five Mile Creek ceases in December 1996.	<p>COMPLIANCE ACHIEVED</p> <p>All treated wastewater has been pumped to the land treatment site since 1995.</p>
Commitment 7.2	The aerated pond plant and any subsequent upgraded or new plant to be managed and operated in such a manner that offensive odours to be only detectable at the nearest odour-sensitive premises on rare occasions.	<p>COMPLIANCE ACHIEVED</p> <p>Commitment 7.3 is managed under the DoE Licence for the premises.</p> <p>There were no odour complaints recorded in 2005. The WWTP and land disposal site are managed and operated to minimize odours. The upgrade that commenced in 2006 will assist to reduce odour at the treatment inlet works.</p>
Commitment 7.3	The aerated pond plant and any subsequent upgraded or new plant to be managed and operated in such a manner that the wastewater from the plant not to create odour problems on the land treatment site	<p>COMPLIANCE ACHIEVED</p> <p>Commitment 7.3 is managed under the DoE Licence for the premises.</p> <p>The WWTP and land disposal site are managed and operated to minimize odours. The upgrade that commenced in 2006 will assist to reduce odour at the treatment inlet works.</p>
Commitment 7.4	Appropriate remedial action to be taken if noise or odour reaches unacceptable levels.	<p>COMPLIANCE ACHIEVED</p> <p>Commitment 7.4 is managed under the DoE Licence for the premises.</p> <p>Noise and odour have been controlled to acceptable levels. Action has been taken to minimize odours through odour control measures and WWTP upgrade.</p>
Commitment 8	Sludge from the plant to be disposed of in accordance with the document <i>Western Australian Guidelines for Direct Land Application of Biosolids and Biosolids Products</i> , Department of Environmental Protection, Water and Rivers Commission and Department of Health (February, 2002) or other method approved by the Department of Environment and the Department of Health.	<p>COMPLIANCE ACHIEVED</p> <p>Commitment 8 is managed under the DoE Licence for the premises.</p> <p>200t of biosolids was beneficially reused at Redmond Vineyard under Department of Health Approval Ref 7061/04 and in accordance with the <i>WA Guidelines for Direct Land Application of Biosolids and Biosolids Products</i>.</p>

Commitment 9	Earthworks for the new aerated pond and storage pond to be carried out in a manner which minimizes increased sediment flow into Five Mile Creek.	COMPLAINCE ACHIEVED Commitment 9 was cleared by the DoE on 30 August 1996 under Statement 287.
<b>Proponent Commitments – Land Treatment System: Construction</b>		
Commitment 10	Establishment of the woodlot to be carried out in an environmentally responsible manner.	COMPLAINCE ACHIEVED Commitment 10 was cleared by the DoE on 30 August 1996 under Statement 287.
Commitment 11.1	In particular, shatter ploughing and mounding to avoid developed watercourses and to be managed to minimize increased sediment flow into Five Mile Creek.	COMPLAINCE ACHIEVED Commitment 11.1 was cleared by the DoE on 30 August 1996 under Statement 287.
Commitment 11.2	Fifteen metre wide buffer zones to be maintained on each side of the creek.	COMPLAINCE ACHIEVED Commitment 11.2 was cleared by the DoE on 30 August 1996 under Statement 287.
Commitment 12	The spraying of herbicide for pre-emergent and post-emergent weed control to be closely managed to avoid pollution of Seven Mile Creek or overspray onto adjoining properties.	COMPLAINCE ACHIEVED Spraying is managed by a certified contractor extensively involved in plantation management in the area.
Commitment 13.1	Earthworks for the construction of the storage dam and tracks and roads on the property to take place during summer.	COMPLAINCE ACHIEVED Commitment 10 was cleared by the DoE on 30 August 1996 under Statement 287.
Commitment 13.2	Drainage discharge from disturbed areas to be diverted onto areas of established pasture to minimise increased sediment flow into Seven Mile Creek.	COMPLAINCE ACHIEVED Commitment 10 was cleared by the DoE on 30 August 1996 under Statement 287.
Commitment 13.3	The generation of dust to be suppressed by the use of water tankers.	COMPLAINCE ACHIEVED Commitment 10 was cleared by the DoE on 30 August 1996 under Statement 287.
<b>Proponent Commitments – Land Treatment System: Operation</b>		
Commitment 14	The land treatment system to be managed and operated in accordance with the Agricultural and Resource Management Council of Australia and New Zealand, Australian and New Zealand Environment and Conservation Council, National Health and Medical Research Council Guidelines for Sewerage Systems, Use of Reclaimed Water (November 2002), or otherwise approved by the Department of Health.	COMPLAINCE ACHIEVED The land treatment system is designed and operated around principles of sustainable use of reclaimed water and complies with the Guideline.
Commitment 16	The storage of wastewater in the dam to be managed so that overflow of the dam occurs not more than 1 year in 10 (based on long-term rainfall probabilities).	COMPLAINCE ACHIEVED Overflow of the dam occurred in 2005 due to two storm events significantly greater than 1 in 10 year intensity. The overflow in 2005 was the only one since operations commenced. Impacts of the overflow were monitored at the Seven Mile Creek gauging station and have been reported.
Commitment 17.1	The operation of the irrigation system to be managed in a manner that run-off occurs in not more that 1 year in 10 (based on long-term rainfall probabilities).	COMPLAINCE ACHIEVED Run-off occurred in response to greater than 1 in 10 year events and the subsequent dam overflow.
Commitment 17.2	The operation of the irrigation system to be managed in a manner that downward percolation is limited to the amount required to ensure that root zone salinity is maintained as a sustainable level.	COMPLAINCE ACHIEVED The average leaching fraction since operation began is 0.12 which meets the design requirements to limit downward percolation to ensure root zone salinity is maintained.
Commitment 17.3	The operation of the irrigation system to be managed in a manner that evapotranspiration by the trees is optimized	COMPLAINCE ACHIEVED The operation of the irrigation system is managed to ensure the evapotranspiration by the trees is optimised.
Commitment 17.4	The operation of the irrigation system to be managed in a manner that a proposal for the future management of the land disposal site to be referred to the Environmental Protection Authority at least one year before the design effluent volume of 6 ML/day (average) is produced for disposal to the site.	NO ACTION REQUIRED The 6ML/day average is not anticipated to be met within the next year.
Commitment 18	The performance of the wastewater disposal site to be monitored in accordance with a monitoring program agreed with the Department of the Environment and amended from time to time.	COMPLAINCE ACHIEVED The agreed monitoring program is demonstrated in annual and triennial reports.

Commitment 19	The proponent would join with an approved Forestry Manager and other landholders with tree plantations in the Albany area to monitor insect activity in order to provide early warning of insect build-up.	COMPLIANCE ACHIEVED Forestry issues are managed under contract by the Forest Products Commission/South Coast Share Farms. The Forest Products Commission/South Coast Share Farms are in a position to monitor insect activity.
Commitment 20	If serious insect attack appears likely, the proponent, in conjunction with the Department of Conservation and Land Management and Forest Products Commission, to develop and implement a plan to control attack.	NO ACTION REQUIRED No serious insect attack problems have occurred.
Commitment 21.2	Keep any dam reserved for combating fires at an adequate water level during summer.	COMPLIANCE ACHIEVED Water levels are kept at an adequate level during summer for combating fires. Operationally, these dams may not be used for fire fighting due to the high risk of sediment and/or weed fouling the fire unit pumps. Two standpipes are available on-site in addition to the dams to provide clean water for combating fires.
Commitment 21.3	Provide a bush fire control vehicle to the site (by donating monies to the local Bush Fire Brigade to fund a vehicle).	COMPLIANCE ACHIEVED The vehicle has been funded.
Commitment 21.4	Prohibit smoking in the areas planted with trees.	COMPLIANCE ACHIEVED Smoking remains prohibited in areas planted with trees.
<b>Proponent Commitments – Land Treatment System: Contingency Planning</b>		
Commitment 22.1	If the land treatment system fails to perform to design, the proponent will as necessary expand the overland flow and/or irrigated tree areas.	NO ACTION REQUIRED The land treatment system continues to meet all design expectation and performs to design.
Commitment 22.2	If the land treatment system fails to perform to design, the proponent will as necessary construct an additional storage dam.	NO ACTION REQUIRED The land treatment system continues to meet all design expectation and performs to design.
Commitment 22.3	If the land treatment system fails to perform to design, the proponent will as necessary improve nitrogen and/or phosphorus removal at the Timewell Road treatment plant.	NO ACTION REQUIRED The land treatment system continues to meet all design expectation and performs to design.

## 5 Conclusions

This report has reviewed operational and environmental data for the Water Corporation's Albany treefarm for the 2005 reporting year.

The treefarm has been operated in compliance with the Ministerial Conditions despite increases in the volume of treated wastewater received at the site and extreme rainfall events results in overflow of the storage dam.

There are a number of measures that are being investigated, have been planned or are being implemented to ensure the continued performance of the treefarm. These include:

- Upgrade of the capacity at Timewell Road WWTP through conversion to activated sludge (Commenced February 2006).
- Expansion of the control system to provide increased automation of irrigation and improved flexibility in irrigation scheduling (in progress, ongoing).
- Development of numerical model for integration into the treefarm management to assist in meeting environmental and regulatory requirements (implemented).
- Detailed modelling of groundwater flows and nutrient fluxes beneath the treefarm site (complete and ongoing for future Triennial reporting).
- Strategic planning of harvest operations (complete).
- Integration of recommendations developed by The University of Western Australia following five years research into the nutrient dynamics and treatment capacity of the site (in progress, ongoing).

The operation of the Albany wastewater scheme including the Albany treefarm continues to be in full accordance with all regulatory requirements and principles of sustainable environmental management. While the volume of wastewater continues to increase, the monitoring in Seven Mile Creek continues to demonstrate the success of the site with nutrient loads continuing to be within acceptable limits.

The high nutrient export loads in 2005 have been attributed to the combination of high loading and the exacerbating affect of extreme rainfall during the year. The loading in future years will be reduced following completion of the wastewater treatment upgrade.

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