Albany sewage - treatment and disposal of wastewater

Water Authority of Western Australia

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
of Perth, Western Australia
Bulletin 638
July 1992

THE PURPOSE OF THIS REPORT

This report contains the Environmental Protection Authority's environmental assessment and recommendations to the Minister for the Environment on the environmental acceptability of the proposal.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's recommendations.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding environmental conditions which might apply to any approval.

APPEALS

If you disagree with any of the assessment report recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of $10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS

Hon Minister for the Environment
18th Floor, Allendale Square
77 St George's Terrace
PERTH WA 6000

CLOSING DATE

Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 pm on the 1 August, 1992

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Appendices

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Summary and recommendations

The Water Authority of Western Australia has proposed that all municipal wastewater from Albany undergo secondary treatment at the Timewell Road (No. 2) plant prior to being piped and irrigated onto trees and pasture at a land disposal site on the outskirts of Albany. This proposal constitutes part of a long-term plan to rehabilitate the eutrophic Princess Royal Harbour and would result in the removal of the Point King sewage outfall (a significant source of nutrients to the harbour), as recommended by the Environmental Protection Authority (EPA Bulletin 412).

The Environmental Protection Authority (EPA) required a Public Environmental Review for the project because of a high level of community interest and the potential resultant environmental impacts.

The Water Authority's plan to manage the environmental impacts of the project was released for public comment for eight weeks on the 7th March 1992.

The strategy proposed by the Water Authority has outstanding community and environmental benefits, including: a 10% reduction in phosphorus and nitrogen inputs to Princess Royal Harbour; removal of a major source of faecal contamination known to pose a health risk at nearby Middleton Beach; enhanced visual amenity at the Point King and Fortress scenic lookouts; and the removal of a large proportion of the nutrient inputs to Lake Powell and Torbay Inlet. In addition, the discharge is to be put to a productive use irrigating a woodlot.

The Water Authority's proposal for the broadscale land-based disposal of secondary treated municipal wastewater is the first of its kind in Western Australia, though the design is based on similar installations in the United States of America, Victoria and South Australia. Although local information is scant, the Environmental Protection Authority is satisfied that the project incorporates a large degree of conservatism and that the environmental issues are manageable, provided the Water Authority adheres to the EPA's recommendations contained in this report.

Key issues

Several major issues were raised by the public and the EPA in response to this plan and these have been addressed either by the proponent or the EPA as follows:

"Will the groundwater resource in the vicinity be adequately protected?"

- The EPA is satisfied that the quality of water in groundwater resources in the vicinity of the project will be adequately protected in the long term.

"Will the development result in contamination of nearby surface waters?"

- The EPA is satisfied that nearby watercourses are adequately protected. Removal of the Timewell Road sewage discharge would greatly improve the water quality of downstream environments (particularly Lake Powell and Torbay Inlet).

"Will the proposed upgrade and expansion of the Timewell Road treatment plant create odour problems in the area?"

- The Water Authority has provided a commitment to establish a formal buffer to ensure there are no future housing developments close to the plant to be affected by odours.

Recommendation 1

The Environmental Protection Authority concludes that the Water Authority of Western Australia's proposal for the secondary treatment and land-based disposal of wastewater in Albany, as described in the PER and subsequently modified in the proponent's response to submissions, is environmentally acceptable.

In reaching this conclusion, the Authority identified the following environmental issues:

- odours;
- visual impacts;
- surface water protection;
- groundwater protection;
- impacts on Lake Powell and Torbay Inlet; and
- nutrient pollution of Princess Royal Harbour.

The Environmental Protection Authority notes that these environmental factors have been addressed adequately by environmental management commitments given by the proponent, or by the Environmental Protection Authority's recommendations made in this report.

The Environmental Protection Authority therefore recommends the proposal could proceed subject to the undertakings and commitments provided by the proponent (Appendix 1), and subject to the recommendations of this report.

Recommendation 2

The Environmental Protection Authority recommends that the outlet of the rising main into the holding pond at the land-based disposal site be submerged at all times to reduce odours.

Recommendation 3

The Environmental Protection Authority recommends that remnant vegetation on the land disposal site not be irrigated with wastewater.

Recommendation 4

The Environmental Protection Authority recommends that remnant vegetation at the Timewell Road (No. 2) treatment plant site be retained where practical, to meet the requirements of the Environmental Protection Authority.

Recommendation 5

The Environmental Protection Authority recommends that the Water Authority should measure soil infiltration rates at the land disposal site on a triennial basis to ensure that appropriate soil water storage capacities are maintained. If measurements show these values to be sufficiently low as to threaten the retention of contaminants on the site then contingency measures (see section 4.7) should be implemented, to meet the requirements of the Environmental Protection Authority.

Recommendation 6

The Environmental Protection Authority recommends that the Water Authority maintain an unharvested 50m vegetative screen along the southern periphery (Gunn Road border) of the land disposal site.

Recommendation 7

The Environmental Protection Authority recommends the Water Authority conduct trial plantings to ascertain the suitability of alternate tree species for the land-based disposal site, to meet the requirements of the Environmental Protection Authority.

Recommendation 8

The Environmental Protection Authority recommends that Reserve 20948 (vested in the Department of Conservation and Land Management) not be irrigated with wastewater and that the Water Authority prepare an alternate plan to meet the requirements of the Environmental Protection Authority for the temporary irrigation of treated wastewater in the event that insect attack, fire or a decline in soil infiltration should threaten to cause:

- nutrient losses from the site to exceed three tonnes of nitrogen and one tonne of phosphorus per annum; and
- surface runoff from the site more frequently than one year out of 10.

1. Background

The Environmental Protection Authority conducted investigations between 1987 and 1989 to ascertain the causes of seagrass decline in Princess Royal Harbour and Oyster Harbour (EPA Bulletin 412). This study showed that nutrient discharges from industrial, agricultural and urban sources exceeded the harbours natural capacity to assimilate these nutrients, resulting in detrimental changes to the aquatic ecosystem.

The Environmental Protection Authority made a number of recommendations as a consequence of these investigations, which were subsequently endorsed by State Government (EPA Bulletin 426). One recommendation placed an onus on the Water Authority to remove the No. 1 (Point King) treatment plant outfall in 1994.

Subsequently, the Water Authority carried out a number of studies to review future wastewater treatment and disposal options for Albany (WAWA, 1989a and 1989b). These reviews led to a preferred strategy, that all municipal wastewater from Albany undergo pre-treatment at the Timewell Road (No. 2) treatment plant prior to discharge to a land disposal site. It is this document which is the subject of this assessment.

2. The proposal

The Water Authority proposes that municipal wastewater from the town of Albany undergo pre-treatment at the Water Authority's Timewell Road (No. 2) treatment plant prior to being discharged to a land-based disposal system. This system utilizes overland flow through pasture, followed by irrigation of a plantation of trees, to further treat and dispose of wastewater.

The Water Authority proposes to extend the Timewell Road treatment plant to cater for the secondary treatment of all municipal wastewater from Albany (including the existing No. 1, No. 2, No.3 and No. 4 treatment plant inflows). Wastewater from the Timewell Road treatment plant would then be transported via rising main to a land treatment site adjacent to the airport.

3. Public review

During the public review of the PER, 12 submissions were received from members of the public, community groups, local government and government agencies: six submissions were in favour and two were against the proposal (the remaining two raised technical issues). A detailed summary of these submissions is presented in Appendix 2. The proponent's responses to the issues and comments raised in the summary of submissions is included in Appendix 3.

The main environmental issues raised were:

- groundwater protection;
- protection of remnant vegetation;
- protection of surface water and downstream environments (particularly Albany Harbours, Lake Powell and Torbay Inlet);
- odours; and
- visual impact.

4. Environmental impacts

Based on the Environmental Protection Authority's assessment of the proposal, additional information provided in the public submissions, the proponent's responses to the public submissions and further clarification of issues by the proponent and government agencies, the Authority identified the following major environmental issues:

4.1 Odours

The Water Authority has provided commitments that the Timewell Road treatment plant would be managed in such a manner that:

- wastewater from the plant would not create odour problems at the land disposal site; and
- offensive odours would only be detectable at the nearest odour-sensitive premises on rare occasions.

The Water Authority has also provided a commitment to undertake appropriate remedial action if odours did reach unacceptable levels away from the treatment plant. Such action could entail construction of separate aerobic digesters, installation of mechanical dewatering devices, venting or covering the anoxic zones of the plant.

In addition, the Water Authority is committed to establishing a formal buffer zone around the Timewell Road treatment plant to ensure future housing is not affected by odours (Appendix 3 - response to submissions 2.2). The Water Authority aims to prevent any development within this buffer zone which is not compatible with the nearby treatment plant. The Environmental Protection Authority endorses this aim and suggests that the Water Authority should liaise with the Town and Shire of Albany and the Department of Planning and Urban Development in this regard.

The treated wastewater pumped to the land disposal site would have an organic content below the threshold for odour generation. It is proposed to discharge this wastewater to a holding pond on the site, which would be 1.5 km from the Albany Highway; however, potential does exist for odour build-up within the confines of the pipeline. Accordingly the Environmental Protection Authority makes the following recommendation:

Recommendation 2

The Environmental Protection Authority recommends that the outlet of the rising main into the holding pond at the land-based disposal site be submerged at all times to reduce odours.

4.2 Dust

Potential exists for dust generation as a consequence of earth moving activities associated with construction of the rising main, extension of the Timewell Road treatment plant and preparation of the land disposal site (particularly due to shatter ploughing, mounding and dam construction).

The Water Authority proposes to follow standard dust suppression procedures by applying water from tankers and sprinklers to the land surface.

Dust control measures would also be incorporated in works approval and licence conditions under the Environmental Protection Act.

4.3 Protection of native vegetation

4.3.1 Rising main

The route of the rising main, connecting the Timewell Road treatment plant with the land disposal site, has been selected to follow road reserves, other services, fencelines and to minimize clearing of remnant vegetation. The route would pass through previously cleared areas at every opportunity.

4.3.2 Land disposal site

Two significant areas of remnant vegetation on the land disposal site will be fenced and retained (about 5 ha each).

Due to the low tolerance of some native vegetation to elevated nitrogen and phosphorus concentrations, the Environmental Protection Authority considers that these areas should not be irrigated with wastewater:

Recommendation 3

The Environmental Protection Authority recommends that remnant vegetation on the land disposal site not be irrigated with wastewater.

4.3.3 Timewell Road (No. 2) treatment plant

The No. 2 treatment plant site has an area of 14.4 ha, of which ponds and facilities currently occupy about 7 ha. The remainder of the site comprises regrowth, 1 ha of remnant jarrah and some riparian vegetation along Five Mile Creek (downstream of the existing wastewater discharge).

The amount of vegetation retained would largely depend on future research findings to determine what type of plant would be best suited to the site. However, where practical remnant and riparian vegetation should be retained on the site.

Recommendation 4

The Environmental Protection Authority recommends that remnant vegetation at the Timewell Road (No. 2) treatment plant site be retained where practical, to meet the requirements of the Environmental Protection Authority.

4.4 Nutrients

Since 1962, about 90% of the seagrass meadows in Princess Royal Harbour and 80% in Oyster Harbour have been lost. In recent years, the rate of seagrass loss in the harbours has accelerated due to a proliferation of macroalgae which shade and smother the seagrass meadows. Studies have identified the algal-growth limiting nutrient as phosphorus (EPA Bulletin 412) and draft catchment management plans have now been formulated to reduce phosphorus inputs to the harbours. Although nitrogen is not currently an algal-growth limiting nutrient, the Environmental Protection Authority is mindful that nitrogen inputs to the harbours must also be reduced, otherwise 'new' and opportunistic species of algae may thrive in the ecological niche which is left vacant by the departure of the existing species of algae.

The Water Authority has selected a site near the Albany airport for the disposal of wastewater for a number of reasons:

- the soils at this location have a very high capacity to retain phosphorus. It is proposed to realise this capacity by using trees to reduce the incidence of surface runoff and promote infiltration (movement of water through the soil). Studies by the CSIRO and the University of Western Australia show that the top 13m of soil could adsorb the phosphorus in the wastewater for between 300 and 1,000 years. In addition, no measurable increase in the phosphorus content of the groundwater is expected within 300 years;
- the area to be irrigated with waste water is located outside the Princess Royal Harbour and Oyster Harbour catchments;
- the depth to groundwater is considerable (10-13 m below ground level); and

- the soils have a moderate permeability which facilitates the root zone storage of water on the site over winter.

The Environmental Protection Authority believes that the land disposal site exhibits inherent characteristics which would, in all likelihood, make offsite losses of nutrients so small as to be undetectable for the duration of the anticipated operational life of the site. The Authority is also mindful that the satisfactory operation of the site is highly dependant on maintenance of soil infiltration rates and the success of shatter ploughing.

Recommendation 5

The Environmental Protection Authority recommends that the Water Authority should measure soil infiltration rates at the land disposal site on a triennial basis to ensure that appropriate soil water storage capacities are maintained. If measurements show these values to be sufficiently low as to threaten the retention of contaminants on the site then contingency measures (see section 4.7) should be implemented, to meet the requirements of the Environmental Protection Authority.

The Water Authority anticipates that residences served by the No. 3 treatment plant would not be connected to mains sewer until late 1996 and residences served by the No. 4 plant would not be connected until the year 2000. These plants currently serve about 570 and 390 persons with a capacity of about 1,000 persons each. This represents a maximum discharge of about 1,000 kg of phosphorus and 4,000 kg of nitrogen per annum from each plant, with offsite losses being considerably less than this. The Environmental Protection Authority believes the environmental impacts of these plants, prior to their connection to mains sewer, could be readily addressed by licence conditions (Part V of the Environmental Protection Act).

4.5 Surface water resources

The proposed method of disposal of Albany's wastewater offers substantial environmental benefits to the community of Albany, as well as the surrounding districts. Existing discharges from the Timewell Road treatment plant have a deleterious effect on the water quality of downstream waterways, including Lake Powell (a Nature Reserve) and Torbay Inlet, both of which exhibit (seasonally) toxic blue-green algal blooms. The Water Authority's proposal would result in a large reduction in the nutrient loading to these waterways and would provide an impetus for local community groups currently endeavouring to rehabilitate these systems (such as the Torbay Inlet Management Advisory Group).

The Water Authority has provided a commitment that nutrient losses from the land disposal site would not exceed three tonnes of nitrogen and one tonne of phosphorus per annum (Appendix 1). These represent never-to-be-exceeded nitrogen and phosphorus loss rates of 5.2 kg/ha/yr and 1.7 kg/ha/yr, respectively. These figures compare favourably with the nearby King River catchment which had loss rates of 6.7 and 1.1 kg/ha/yr respectively in 1988 (a wet year).

The never-to-be-exceeded site losses proposed by the Water Authority would also include losses from pre-existing landuses on the site, such as previous fertilizer applications and past piggery operations. In addition, the Water Authority has provided a commitment that no runoff from the site would occur in nine years out of 10 (Appendix 1).

The Environmental Protection Authority recommends that the proposed monitoring programme be modified to incorporate sampling of pathogens in Seven Mile Creek under peak flow conditions.

The Environmental Protection Authority believes that the commitments given by the Water Authority and the subsequent recommendations contained in this report will serve to adequately protect downstream water resources, and in all likelihood, will contribute to an improvement in the environmental values of the downstream watercourses.

4.6 Groundwater resources

The proposal entails achieving the phosphorus binding capacity of the soils at the land disposal site by increasing infiltration. It is anticipated that by permitting the irrigation waters to pass through the soil, rather than run off, the area and time of contact between the adsorptive soil and these phosphorus-rich waters would be increased thereby capitalising on the natural binding capacity of the soil. It is proposed to increase infiltration on the site by shatter ploughing (fracturing the soil and hardpan) and planting trees (reducing the incidence of waterlogging and providing root channels through the soil).

Due to the promotion of infiltration and infrequency of surface runoff (no surface runoff in 90% of years), groundwater management is a key issue in assessing the environmental acceptability of this project. The Environmental Protection Authority considers that because of the likelihood of increased contaminant levels in Seven Mile Creek not being discernible for many years, if at all, monitoring should initially be designed to quantify groundwater rather than surface water contaminant losses from the site.

The Water Authority has placed an emphasis on monitoring the quality of groundwater at the site (25 borehole sampling sites are proposed). In particular, the measurement of contaminants that are common in wastewater (for example, nitrate) and/or that are not readily adsorbed by soil or taken up by plants (for example, salt) should provide a very useful early warning system in the unlikely event the site should fail to retain contaminants.

4.7 Visual impact

The proposed land disposal site is visible from Albany Highway, consequently it is proposed to maintain an unharvested vegetative screen along this margin of the property. Tree plantings in the vicinity of the Albany airport (east-west) runway will be modified to comply with Civil Aviation Authority safety requirements.

Due to a number of public submissions regarding the visual impact of the site, particularly on nearby residents, the Authority makes the following recommendation:

Recommendation 6

The Environmental Protection Authority recommends that the Water Authority maintain a unharvested 50m vegetative screen along the southern periphery (Gunn Road border) of the land disposal site.

Advice from the Valuer General and two other local valuers indicates that there is unlikely to be any long term impact on adjacent land values, if the land disposal site is operated as outlined in the PER.

The Water Authority has proposed to purchase and maintain a controlled buffer zone around the Timewell Road (No. 2) treatment plant. Although this buffer is primarily for odour control it should also provide a visual buffer to surrounding rural landuses.

4.8 Contingency measures

Water balance modelling has been conducted using conservative estimates of the evapotranspirational capabilities of the preferred tree species Tasmanian bluegum (*Eucalyptus globulus*). The Environmental Protection Authority recognises the importance of this modelling to the onsite retention of contaminants, and is aware of a shortage of locally derived evapotranspirational data; however, the Environmental Protection Authority is satisfied that the Water Authority has been sufficiently conservative in its modelling approach.

The Environmental Protection Authority acknowledges the importance of maintaining a cover of high water-using plants so that contaminants can be retained onsite, and recommends that judicious plantings of alternate tree species be conducted in order that future impacts on the

hydrological functioning of the woodlot (due to insect attack or tree mortality) be reduced. The Department of Conservation and Land Management should be consulted in this matter.

Recommendation 7

The Environmental Protection Authority recommends the Water Authority conduct trial plantings to ascertain the suitability of alternate tree species for the land-based disposal site, to meet the requirements of the Environmental Protection Authority.

The proposed land disposal system is in compliance with design criteria specified by both the United States Environmental Protection Agency and the Environmental Protection Authority of Victoria. In the unlikely event that the land disposal system failed to perform to design, the Water Authority has provided commitments to:

- expand the overland flow and irrigated tree areas; and
- construct an additional storage dam.

The Water Authority has suggested that a nearby reserve (Reserve 20948, vested in the Department of Conservation and Land Management) could be temporarily irrigated with treated wastewater in the case of severe insect attack. The Environmental Protection Authority recommends against this because of the low tolerance of some native vegetation to elevated nitrogen and phosphorus concentrations. As a contingency, and in the unlikely event that temporary irrigation of treated wastewater is required, local landholders should be approached to ascertain their willingness to accept treated wastewater for temporary irrigation onto their lands.

Recommendation 8

The Environmental Protection Authority recommends that Reserve 20948 (vested in the Department of Conservation and Environment) not be irrigated with wastewater and that the Water Authority prepare an alternate plan for the temporary irrigation of treated wastewater in the event that insect attack, fire or a decline in soil infiltration should threaten to cause:

- **nutrient losses from the site to exceed three tonnes of nitrogen and one tonne of phosphorus per annum; and**
- **surface runoff from the site more frequently than one year out of 10.**

The Water Authority anticipates that effluents from the existing Albany foreshore industries could be accommodated under the proposed treatment/disposal strategy, provided these effluents were to meet Water Authority of Western Australia sewer entrance criteria. This would mean that some effluents would require pre-treatment before they could be entered into the mains sewer. Plans to pre-treat effluent from the foreshore industries and enter this material into the mains sewer would be subject to environmental assessment by the Environmental Protection Authority.

5. References

Albany Harbours Technical Advisory Group (1990). Albany harbours environmental study 1988-1989, a report to the Environmental Protection Authority. EPA, Bulletin No. 412.

Albany Harbours Technical Advisory Group (1990). Albany harbours environmental study 1988-1989, a report to the Environmental Protection Authority - summary and recommendations. EPA, Bulletin No. 426.

Water Authority of Western Australia (1989a). Albany sewerage development review.

Water Authority of Western Australia (1989b). Albany wastewater treatment and disposal: a plan for the future.

Appendix 1

Proponent's commitments on the proposal

5.4 The Water Authority recognises CALM's expertise in the management of woodlots and we have already had some discussions with them on their possible participation in this project. Further discussions will be held with CALM during the preparation of the management plan for the woodlot area. The degree of their ultimate involvement will depend upon the outcome of these discussions and, of course, financial considerations.

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Chapter Nine

SUMMARY OF COMMITMENTS

9.1 WASTEWATER DISCHARGES

9.1.1 NO. 1 (KING POINT) TREATMENT PLANT

Discharge from the No. 1 treatment plant would cease in December 1994.

9.1.2 NO. 2 (TIMEWELL ROAD) TREATMENT PLANT

Discharge from the No. 2 treatment plant into Five Mile Creek would cease in December 1996.

9.1.3 LAND TREATMENT SITE

The nutrient discharge from the land treatment site in groundwater or surface water would not exceed 1 t of phosphorus and 3 t of total nitrogen per annum.

9.2 NO. 2 TREATMENT PLANT

The existing No. 2 aerated pond treatment plant would be upgraded to a capacity of 3,500 kL/d by December 1994.

The treatment facilities would be further upgraded, enlarged or replaced as necessary to meet further demand, depending on their performance and that of the land treatment system.

From December 1994, the volume of wastewater pumped daily to the land treatment site would not be less than the volume of water diverted from the No. 1 treatment plant. The volume pumped would be gradually increased as the trees grew on the land treatment site, until discharge into Five Mile Creek ceased in December 1996.

The aerated pond plant and any subsequent upgraded or new plant would be managed and operated in such a manner that:

- noise levels from the plant complied with the noise limits likely to be set by the EPA;

- offensive odours would only be detectable at the nearest odour-sensitive premises on rare occasions;

- the wastewater from the plant did not create odour problems on the land treatment site.

Appropriate remedial action would be taken if noise or odour reached unacceptable levels.

Sludge from the plant would be disposed of in accordance with the proposed Australian Water Resources Council *Draft guidelines for sewerage systems—Sludge management* or by a method approved by the Health Department of Western Australia.

Earthworks for the new aerated pond and storage pond would be carried out in a manner that minimized increased sediment flow into Five Mile Creek.

9.3 LAND TREATMENT SYSTEM

9.3.1 CONSTRUCTION

Establishment of woodlot

Establishment of the woodlot would be carried out in an environmentally responsible manner.

In particular, shatter ploughing and mounding would avoid developed watercourses and would be managed to minimize increased sediment flow into Seven Mile Creek. Fifteen metre wide buffer zones would be maintained on each side of the creek.

The spraying of herbicide for pre-emergent and post-emergent weed control would be closely managed to avoid pollution of Seven Mile Creek or overspray on to adjoining properties.

Earthworks

Earthworks for the construction of the storage dam and tracks and roads on the property would take place during the summer. The drainage discharge from disturbed areas would be diverted on to areas of established pasture to minimize increased sediment flow into Seven Mile Creek to the satisfaction of the EPA.

The generation of dust would be suppressed by the use of water tankers.

9.3.2 OPERATION

The land treatment system would be managed and operated in accordance with the National Health and Medical Research Council and Australian Water Resources Council guidelines (1987) for land treatment of wastewater, or as otherwise approved by the Health Department of Western Australia.

Overland flow area

The overland flow area would be operated to remove the nitrogen content in the incoming wastewater to a level that resulted in not more than 106 kg/ha of total nitrogen per annum being applied to the area of trees irrigated.

Storage dam

The storage of wastewater in the dam would be managed so that no overflow of the dam occurred in 90% of years.

Irrigation system

The operation of the irrigation system would be managed in a manner that:

- achieved no runoff in 90% of years;
- achieved moisture levels in the effective root zone of the trees sufficient to limit downward percolation to the amount required to ensure root zone salinity was maintained at a sustainable level;
- optimized evapotranspiration by the trees.

Monitoring

The performance of the system would be monitored in accordance with the programme set out in Appendix D.

Insect attack

The Water Authority would join with CALM and other landholders with tree plantations in the Albany area to monitor insect activity in order to provide early warning of insect build-up.

If serious insect attack appeared likely, the Water Authority, in conjunction with CALM, would develop and implement a plan to control the attack.

Fire

The Water Authority would:

- maintain firebreaks on the site to the satisfaction of the Bush Fires Board;
- keep all fire dams on the site full of water during summer;
- provide and maintain fire control vehicles on the site to the satisfaction of the Bush Fires Board;

- ensure that Water Authority employees were trained to handle fire incidents;
- ensure that staff complied with the provisions of the *Bush Fires Act 1954*;
- prohibit smoking in the areas planted with trees.

9.3.3 CONTINGENCY PLANNING

If the land treatment system failed to perform to design, the Water Authority would, as necessary:

- expand the overland flow and irrigated tree areas
- construct an additional storage dam.

Appendix 2

Issues raised during the public review period

SUMMARY OF SUBMISSIONS MADE DURING THE PUBLIC SUBMISSION PERIOD

PROPONENT: Water Authority of Western Australia

PROPOSAL: Albany sewage - treatment and disposal of wastewater

CLOSING DATE: 2nd May 1992

NO. OF SUBMISSIONS: 12

The following comments, issues and questions have been raised with the Environmental Protection Authority during the public review period.

1. Summary

Of the submissions 8 were in favour and 2 were against the proposal, the remainder queried the project on technical grounds.

2. General

2.1 The site is far too small, has a limited operational life (until 2020) and has limited scope for future expansion. The site should be located further inland.

2.2 A buffer zone must apply to the site. The summary on page ii suggests this; however, figure 4.8 doesn't.

2.3 It is unfair for local land owners to bear the cost of this development. Independent evaluations indicate that real estate values in the vicinity of the site will fall by about 20%.

2.4 No specific time frame is given for the connection of the No 4 Sewage Treatment Plant (Bayonet Head) to the centralised facility at Timewell Rd (this services about 100 dwellings).

2.5 The proposed construction of an activated sludge treatment plant at Timewell Rd should not occur later than 1996. A delay would overtax the existing plant which would already be under pressure to cope with the proposed effluent volumes. Delays would also defer the consideration of establishing a septage treatment plant for Albany.

2.6 Trees may be an added danger to the airport in case of a forced landing. In addition, the trees and dams may hinder air traffic by enticing birds into the area.

2.7 The aquifer is likely to be a regional one with preferential zones. The rain-fed trees should cover a strip along the southern boundary of the project area in order to intercept groundwater flows.

2.8 The intent of the document to consider as a contingency the irrigation of the Down Road Nature Reserve is undesirable. The document fails to appreciate the recent change to purpose and vesting of this reserve.

3. Alternative Proposals

3.1 There is no consideration given to alternative treatment processes prior to irrigation. It may actually be feasible to discharge tertiary treated effluent to Five Mile Creek.

3.2 Tertiary treatment should be conducted prior to land disposal on this site.

4. Technical Issues

4.1 A budget for nitrate, nitrite, orthophosphate, salinity, pathogens and heavy metal losses from the site should be included.

4.2 The effluent quality of BOD/SS quoted as 50/180 is very poor for a treatment process of this kind (pg 4-14).

4.3 For at least 5 months of the year evaporation rates at Albany would not be adequate for any nett loss of effluent by evapotranspiration, necessitating storage until summer (Marshall, 1991). From the figures in the PER, the storage would have to be at least 900,000 kL (ie 150 days at 6000 kL per day); this does not agree with the graph on page 4-17 which gives only 1/3 this figure.

4.4 On page 7-9, it is proposed to limit discharge of nitrogen to 3t per annum, which is very different from the preliminary study which proposed zero discharge. Why?

4.5 Discussion of pathogen loads in the storage dam is inadequate. It is not correct to assume that these pathogens would die in the storage dam (page 7-11). Viruses may be relatively long-lived and may persist in the sediments over winter, or may survive in the groundwater. Any surface discharge during high rainfall may result in the discharge of potential pathogens, particularly entero-viruses and enteric bacteria such as *Salmonella spp* into Seven Mile Creek.

5. Suggestions

5.1. Pilot plant studies using biological methods be carried out in order to achieve maximum levels of BOD, nitrate and phosphate reduction in Albany sewage.

5.2 In order to minimise the fire hazard it is suggested that the plantation be grazed from time to time.

5.3 Long term dynamic changes in the demand for water and nutrients from effluents have only been studied in pilot trials. CALM would be pleased to be involved in on-going forest research with the proponent.

5.4 CALM would be pleased to be closely involved with the proponents in preparation of an Environmental Management Programme should the EPA recommend that the project be approved.

Appendix 3

Proponents response to the issues raised during the public review period

V.G.1

VALUER GENERAL'S OFFICE

18 Mount Street,
Perth, Western Australia 6000.
Telephone: 322 2400
Fax No: (09) 322 3016

Correspondence:
P.O. Box 7201
Cloisters Square
Perth W.A. 6000.

Your Ref.
Our Ref. GF:JC
Enquiries. MR G FENNER

T R & C K Ackley
R M B 9678
Albany Highway
ALBANY WA 6330

ALBANY SEWERAGE: LAND DISPOSAL OPTION

Reference is made to your letter of 24 March, 1992 regards possible affect on land values to land adjoining, or in near vicinity of the above project.

As this type of sewerage treatment is relatively new to this state, and especially the citizens of the Albany area, it is perceived that any possible purchasers of land in the vicinity would treat the project with some caution, until it was shown after some time of operation that any possible problems with:-

1 Odour
2 Aesthetics
3 or Pollution of waterways and underground supply were unfounded.

Due to the closeness to Albany Town and size of surveyed lots, aesthetics have a greater influence on value than agricultural production and therefore the reluctance of purchasers to consider buying in the area in the short term would have a considerable impact on saleability, from the time of the projects announcement until the full impact is evident.

It may also happen that if the project is successful in establishing a tree plantation with no visible problems to neighbours, it may actually enhance the area and therefore the value to purchasers. It is difficult to project at this early stage, the longer term outcome especially as we currently do not have access to all the relevant expert reports on the project.

Conclusions:

In regard to rating values this Office will only make adjustments when the outcome is evidenced by property sales.

The general affect on adjoining values is difficult to predict in the longer term as it is dependant on the success or failure of the project.

Yours faithfully

G FENNER
REGIONAL VALUER - RURAL

1 May 1992

CC MR A MUIR
DISTRICT VALUER, ALBANY

WAWA

WATER AUTHORITY of Western Australia

263 FITZGERALD STREET
NORTHAM W.A.
Postal Address: P.O. Box 265 Northam
Western Australia 6401
Telephone: (096) 22 4888 Fax: (096) 22 2696

Your Ref A25172
Our Ref MR P MOORE
Enquiries (096 224818
Tele Direct

THE CHAIRMAN
ENVIRONMENTAL PROTECTION AUTHORITY
WESTRALIA SQ, 38 MOUNTS BAY TCE
PERTH 6000
Attention: Mr G Bott

Dear Geoff

PER - ALBANY SEWERAGE: TREATMENT AND DISPOSAL OF WASTEWATER - RESPONSES TO PUBLIC COMMENTS

On 25 May you faxed us a summary of the submissions made during the public review period for this PER.

Attached is a copy of that fax together with our response to each of the issues raised in your summary.

Should you wish to discuss any of these responses please contact me on the above number.

Yours faithfully

P MOORE

9 June 1992

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WATER AUTHORITY OF WA
GREAT SOUTHERN REGION

WATER AUTHORITY RESPONSE TO ISSUES AND QUESTIONS RAISED WITH THE ENVIRONMENTAL PROTECTION AUTHORITY ON THE PUBLIC ENVIRONMENT REVIEW FOR ALBANY SEWERAGE - TREATMENT AND DISPOSAL OF WASTEWATER

GENERAL

2.1 The site has been selected to satisfy the anticipated demands from Albany until the year 2020 (25 years from commissioning) which is consistent with established long term planning horizons.

It should be noted however, that the Stage 1 Report highlighted that large areas of land of similar soil characteristics were available immediately north of the selected site and the development of this land would effectively double the life of the disposal system.

All land in the area is zoned rural with little, if any, demand to rezone in the short to medium term.

The Water Authority therefore believes it would be unwarranted to take action to require control of this land at such an early stage.

2.2 The PER (page 4-5) indicates that a formal WAWA controlled buffer zone will be established around the No. 2 WWTP to ensure future housing development adjacent to the plant is not affected by any odours that may occur from time to time.

The Water Authority believes that the development proposed for the land disposal site does not require a formal buffer zone. Section 7.3.5 of the PER addresses the issue of possible odour generation and determines that odours from the site should not be detected.

The most probable point for any odour generation is located some 1.5km from the Albany Highway and the nearest house is well in excess of any normal buffer zone requirements.

2.3 The effect of the land disposal site on the price of adjacent land is difficult to determine with any certainty.

The land disposal system proposed is new to Western Australia, and as such some form of initial apprehension from the community could result in some degree of negative movement on adjacent land prices in the initial establishment phase.

Advice received from the Valuer General and two other local valuers indicates that, if the land disposal site operates as outlined in the PER, there is unlikely to be any long term impact on the adjacent land values. In fact, there is some possibility that the proposal may in fact lead to elevated land prices in the area.

(Refer letter from Valuer General)

2.4 The existing No. 4 treatment plant has the capacity to treat sewage from 1,000 persons and currently is only serving around 370 persons. As a consequence the plant is producing a high quality effluent which is currently being discharged satisfactorily on site. There is no evidence to suggest that adjacent waterways are in anyway being polluted by this plant.

The No. 4 treatment plant was installed some years ago to cater for nonfrontal development that took place in the Oyster Harbour and Lower King areas. The plant is still relatively isolated with the closest acceptable discharge main being some 7.5 kms from the current site. The cost of connection to the scheme would therefore be extremely large and should be avoided until this area is linked to the frontal development or an observed environmental impact occurs.

Although a time frame for the removal of the plant is not mentioned in the PER, current planning indicates that development within the area could dictate that it will reach its useful capacity around the year 2000.

2.5 The long term proposal for Albany's sewerage scheme is based on the No. 2 Treatment Plant at Timewell Road handling all wastewater from Albany. An integral part of this proposal relies on the existing aerated pond plant being converted to an activated sludge plant.

Original planning indicated that this conversion would have occurred around 1996 however as the proposal has been refined it has been possible to delay this conversion for an additional 4 years (around 2000) and thus achieve significant cost savings which can in turn be passed on to customers.

With regard to the siting of a septage plant, although some preliminary contact has been made with the Authority there has been no formal proposal submitted. Furthermore the Authority has some concerns in relation to the overall viability of accepting septage wastes into the sewerage system particularly at the Timewell Road plant where the aerobic treatment system is somewhat incompatible with the anaerobic septage wastes. A septage plant is not now nor has it ever been part of this proposal and it is recognised that separate environmental approval will be required for such an installation should it be proposed in the future.

2.6 The impact of the proposed land disposal site on the operations of the Albany Airport were summarised in Section 7.3.6 of the PER and discussed in Section 12.6 of the Stage 2 Report.

The Albany airport is controlled by the Shire of Albany who set conditions on the development. These conditions which are detailed in Section 12.6 of the Stage 2 report have been incorporated into the proposal.

In general terms:-

(i) plantings in the western flight path approach of the east-west runway have been modified to safeguard planes in the case of emergency landings, and

(ii) information received from CALM, the Civil Aviation Authority, and local ornithologists (verbal communications) is that no appreciable increase in bird hazard should occur as a result of the development.

2.7 The investigations carried out by the hydrogeological consultants A.J. Peck and Associates (Stage 2 Report) indicate that no aquifer as such exists in the vicinity of the land treatment site although groundwater was encountered at a depth of around 10 metres below the surface.

Due to the clayey soils in the site, sub-surface lateral flows will be extremely low. Vertical infiltration will be further facilitated by the contour ripping of the site prior to tree planting.

Due to the measures taken to prevent shallow sub-surface lateral flows, a strip of rain fed trees will be unlikely to have any real impact from a water management point of view.

Consideration will however be given to maintaining a zone of unharvested trees along Gunn Road to act as a visual buffer and to ensure that evapotranspiration from trees along the southern boundary of the site is maximised.

2.8 The Water Authority acknowledges the recent change of purpose and vesting of Reserve 20948.

The use of this reserve for the temporary irrigation of effluent was suggested as one of several alternatives that could be considered as part of contingency planning in case of severe damage from insect attack.

With the change in purpose of the reserve, other contingency options,(the irrigation of adjacent pasture would seem to be the most likely as a short term measure) will be developed to enable continued operation of the proposal should it be necessary.

It should be stressed that the probability of requiring this option is considered to be extremely low particularly in view of the protection proposals outlined in the PER.

ALTERNATIVE PROPOSALS

3.1 & 3.2 The current proposal has been developed after an extensive review of the options available for the disposal of Albany's wastewater.

In May 1991, Kinhill Engineers, consultants employed by the Water Authority, released a report titled "Preliminary Study of Options for Disposal of Treated Wastewater" (Stage 1 Report) which considered a range of disposal options and ultimately recommended the adoption of the current proposal.

Under Section 4.3 of that report a detailed comparison of the various land disposal options were discussed, including the effects of changing levels of treatment prior to the land disposal system.

The conclusion from this section of the report was that a land disposal system incorporating the slow rate land treatment was the most cost effective option.

Section 4.4 and 4.5 of the same report then carried out an analysis of possible slow rate treatment systems and concluded that there was no benefit gained from treating to tertiary quality prior to the land treatment system and in fact tertiary treatment is detrimental for land disposal systems. The nutrients in tertiary treated effluent are in a form where they are not readily utilised by the vegetation or trapped in the soil.

A treatment system which produced secondary quality effluent was therefore recommended.

Section 4.2 and 4.3 of the Stage 1 Report discusses the potential of discharging to the environment via a wetland system and concludes that these systems could not achieve the original zero nutrient discharge criteria.

An additional literature review recently carried out has confirmed that:-

(i) a tertiary treatment plant followed by a wetland system could not reduce the long term nutrient discharge levels to a figure below the levels currently being discharged into 5 Mile Creek, and

(ii) a tertiary treatment plant followed by a constructed wetland system would not be as cost effective as the current proposal.

TECHNICAL ISSUES

4.1 The theoretical design of the land treatment and disposal site as described in the Stage 2 Report and the PER is for zero nutrient loss from the site for 90% of years. In years of higher rainfall some discharge of nutrients may occur but this will be highly diluted by the flood flows in the waterways at the time. Any nutrient discharge will be insignificant compared with the nutrients in the existing runoff from the developed land.

Although no commitments are given for specific losses in relation to nitrate, nitrite, and orthophosphate, the Water Authority has given specific commitments in relation to total nitrogen and total phosphorus.

The possibility of increases in groundwater salinity is discussed at page 7-9 of the PER. Due to the extremely slow movement of the groundwater (10 metres per annum) it is estimated that it will take around 20 years before increased salinity will be detected in the groundwater adjacent to Seven Mile Creek. Setting a salinity budget to assist short to medium term management would therefore be meaningless.

Section 12.4 of the Stage 2 Report discusses the impact of heavy metals from the wastewater on the land treatment site. Due to the extremely low concentrations of heavy metals in Albany's wastewater, heavy metals are not considered to be a management problem.

Pathogens are expected to be completely retained on site except in extreme rainfall events. During these periods flows in Seven Mile Creek will ensure high levels of dilution and hence extremely low risk.

4.2 The effluent quality criteria quoted in Section 4.5.2 of the PER for the aerated ponds plant are not uncommon for this type of plant. The relatively high suspended solids levels can be attributed to the high algae concentrations that are present in this type of effluent. It should be noted that if the algae were filtered out of the effluent, the quality would be better than that of an activated sludge plant (ie. BOD/SS of 20/30).

An essential part of the land treatment option is the overland flow area which will effectively filter out most algae prior to discharge into the storage dam and hence irrigation to the trees. The proposal also provides for the complete filtration of effluent prior to irrigation. The filtration plants proposed are known to have successfully removed algae from pond effluents in both Victoria and South Australia.

4.3 Section 7.3 of the Kinhill Stage 2 Report discusses in detail the water balance methodologies for the land treatment site.

The proposal as detailed in the PER and justified in the Stage 2 Report is based on:-

(i) storage in the root zone area of the irrigated trees, and

(ii) storage in the dam.

The storage requirements have been mathematically modelled for a range of rainfall and evaporation scenarios and the volume of the constructed storage adjusted for the worst case.

On-site infiltration tests have been carried out to verify the root zone storage capabilities of the soil.

The comment that 900,000kL of storage is required fails to take into account the root zone storage.

4.4 The design of the system has not changed from the original proposal outlined in the Stage 1 Report.

Section 7.3.2 of the PER and Section 7.4 of the Stage 2 Report discuss in detail the nutrient balances within the site.

From the modelling that has been carried out all nitrogen can be used on site. However although theoretically possible, the Water Authority accepts that in a practical sense it would be impossible to guarantee a zero discharge, and as such the Water Authority has set a practical limit as a commitment in the PER.

The figure of 3T of total nitrogen represents approximately 1/3 of the total nitrogen load currently being discharged into 5 Mile Creek from the No. 2 WWTP and as such is a significant improvement.

4.5 As outlined in the PER it is anticipated that under normal operations, pathogenic organisms (bacterial and viral) will be retained on site (within the soil profile) and progressively die off over time. Section 12.3 of the Stage 2 report details experiences in the U.S.A. which support this premise.

The Water Authority accepts that some viruses have long lives and there is some possibility that they may survive until they are transported off site during extreme rainfall events.

With the site preparation (contour deep ripping) the water holding capacity of the site will be greatly improved thus making runoff events rare.

Furthermore, the dilution that will occur during such rare events will be extremely high thus significantly reducing off site risk.

It should be noted that secondary effluent from the existing Timewell Road treatment plant has been discharging into Five Mile Creek for approximately 10 years and there is no record of illness resulting from this discharge.

In light of the operational experiences from the Timewell Road plant and the particular design safeguards incorporated into the proposal, the risks from pathogens are considered to be minimal.

SUGGESTIONS

5.1 The time frame available to the Water Authority before the King Point treatment plant is to be closed precludes the possibility of carrying out pilot studies on the land treatment site.

The design of the land treatment site has therefore had a large degree of conservatism built into the initial development.

As the site has a 25 - 30 year life, a considerable degree of research can be carried out before the site becomes heavily loaded.

The initial aerated pond plant is based on well known and established technology.

The design of the activated sludge plant, to be constructed in the year 2000, will be the subject of numerous studies to ensure that the plant delivers the most cost effective effluent standards.

5.2 Section 9.6 of the Kinhill Stage 2 Report outlines the proposed approach to minimising the fire hazard.

As soon as environmental approval is obtained, the Water Authority will commence the development of a management plan for the woodlot area. Fire control will be an important part of that management plan.

Section 9.5 of the Kinhill Stage 2 Report indicates that grazing offers a means of practical fire hazard minimisation. This option will be further explored during the development of the woodlot management plan.

5.3 In addition to the commitments given in relation to the land treatment site in Section 9.3 of the PER the Water Authority will also be conducting research into the long term impacts of this proposal (i.e. growth rates, nutrient uptakes, evapotranspiration rates, nutrient and salinity build up in the soil).

The research proposals as suggested, will be discussed with CALM during the preparation of the woodlot management plan, at which time their input can be considered.

5.4 The Water Authority recognises CALM's expertise in the management of woodlots and we have already had some discussions with them on their possible participation in this project. Further discussions will be held with CALM during the preparation of the management plan for the woodlot area. The degree of their ultimate involvement will depend upon the outcome of these discussions and, of course, financial considerations.

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