2.4 City COMMENT ON MANAGED AQUIFER RECHARGE
(ALL WARDS) (SD)

KEY ISSUES AND RECOMMENDATION

- In response to growing concerns over the sustainability of potable water supplies for the Perth region, the Environmental Protection Authority (EPA) has released a discussion paper on Managed Aquifer Recharge (MAR). The EPA is requesting comment on:
  - the concept of Water Recycling;
  - the use of MAR as a means of recycling wastewater;
  - the acceptability of using MAR with treated wastewater for
    (a) improvement of groundwater quality,
    (b) horticultural irrigation and environmental benefits,
    (c) integrated water management in new residential areas, and
    (d) to increase public drinking water supplies; and
  - any concerns or issues in addition to those raised in the discussion paper.
- Wastewater reuse systems such as Managed Aquifer Recharge and neighbourhood scale grey-water reuse systems have the potential to contribute up to 100 gigalitres to the State’s water supplies.
- The introduction of wastewater reuse schemes offers a number of potential benefits to the City of Swan including some potential to prevent future decreases in and even lead to increases in groundwater allocations; benefits to wetland health if groundwater levels are improved; and assist in sustainability of water supplies to horticultural and viticulture industries located within the City of Swan.
- Risks that may be associated with MAR using treated groundwater include potential risk to aquifer health and to the health of groundwater dependent systems; and potential human health risks through increased exposure to chemicals, pathogens, and other pollutants contained in wastewater.

It is recommended that Council supports a cautious, staged approach to Managed Aquifer Recharge, subject to a full Public Environmental Review as proposals progress to a more advanced stage.

BACKGROUND

Perth’s potable water supplies are under pressure due to increasing demand and a decline in average yearly rainfall since the 1970’s. In response the State Government facilitated a number of Water Forums throughout the state in 2002 to find solutions to our dwindling water supplies, and in 2003 released “Securing our Future: A State Water Strategy for Western Australia”.
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The State Water Strategy provides an overview of the State’s water supplies, proposes the development of new water supplies, increased opportunities for water reuse, and decreasing household and industry water usage through better conservation and efficiency. The proposed desalination plant is a response to the need to develop new water supplies.

Wastewater was recognised as a significant resource that is currently wasted. Almost 100 gigalitres of wastewater is discharged into the ocean annually that may be available for reuse - Perth’s annual water consumption is just under 600 gigalitres (State Water Strategy 2003). The discussion paper “Managed Aquifer Recharge using Treated Wastewater on the Swan Coastal Plain” provides further information on the benefits – and outlines some of the concerns associated with the introduction of wastewater reuse schemes.

“Securing our Future; A State Water Strategy for Western Australia” may be found online at www.ourwaterfuture.com.au/community/statewaterstrategy.asp

REPORT

The Environmental Protection Authority (EPA) is currently conducting a preliminary investigation into the acceptability of introducing Managed Aquifer Recharge (MAR) schemes using treated wastewater for replenishment of groundwater prior to any specific proposal being considered. The City of Swan has been invited to make a submission to the EPA regarding its position on using treated wastewater for MAR on the Swan Coastal Plain.

Specifically, the EPA is requesting comment on:

- the concept of Water Recycling;
- the use of MAR as a means of recycling wastewater;
- the acceptability of using MAR with treated wastewater for (a) improvement of groundwater quality, (b) horticultural irrigation and environmental benefits, (c) integrated water management in new residential areas, and (d) to increase public drinking water supplies; and
- any concerns or issues in addition to those raised in a discussion paper released by the EPA on the issue.

Discussion Paper

Issues relating to using treated wastewater for MAR are outlined in a discussion paper entitled Managed Aquifer Recharge using Treated Wastewater on the Swan Coastal Plain that was received from the EPA in late April 2005. The document discusses the possibility of using treated wastewater for groundwater recharge and possible reuse in selected areas on the Swan Coastal Plain. The report begins by outlining the non-sustainability of current water allocation levels and describes the recent decline in water levels in the Gnangara Groundwater Mound and other aquifers. Information is provided on the potential detrimental effects of allowing current water usage patterns to continue.

The paper then discusses the potential benefits and risks associated with the MAR using treated wastewater. Areas of discussion include:
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- Potential benefits that may result from MAR for managing Perth’s water supplies
- Possible adverse impacts on the environment and human health of using treated wastewater for groundwater recharge
- Amounts of treated wastewater that may be available for recharge
- Potential uses for the additional groundwater that is extracted,
- Potential environmental benefits of re-establishing groundwater levels closer to pre-extraction levels
- Advice on the level of further investigation that may be required prior to the introduction of MAR schemes
- Conditions that may be set by the Health Department for varying uses and
- Existing or proposed infrastructure that may be used to establish recharge systems.

Five potential applications for MAR are discussed:

- Improvement of groundwater resource - Mosman Peninsula. Injecting treated wastewater from the Subiaco wastewater treatment plant via subsurface infiltration to prevent further saltwater intrusion and reduce groundwater salinity levels.
- Irrigated Horticulture – Carabooda. Halt declining groundwater levels and provide water for sustainable irrigation using treated wastewater from the Beenyup or proposed Alkimos wastewater treatment plants. This area also contains a number of significant ecosystems (Yanchep caves and a number of lakes) that are currently under threat from declining water levels.
- Multiple benefits – Gnangara Mound. Recharge of groundwater on the western edge of the Gnangara Mound for horticultural and public water supplies. Environmental benefits to wetlands, caves and lakes are also expected
- Irrigated water management in new residential areas – Alkimos or East Rockingham. Potential for introduction of reuse schemes to provide water for backyard garden use, irrigation of public open spaces and golf courses. Third pipe grey water systems may also be suitable
- Drinking water supplies – Pinjar Borefield. Treated wastewater from the Beenyup treatment plant could be used to infiltrate the superficial aquifer or injected into the Leederville confined aquifer.

Although none of the applications are within the boundaries of the City of Swan, several of the schemes offer a potential benefit to the City through increased groundwater levels due to the interconnectedness of the groundwater systems. This interconnectedness may result in adverse effects affecting areas within the City.

The introduction of third pipe greywater systems that are discussed for Alkimos and East Rockingham may also be suitable for new urban areas within the City of Swan and be used to provide water for irrigation of recreational grounds and areas of Public Open Space.
Public Meeting

A series of public meetings to inform the public have been held throughout the Perth metropolitan area, one of which was held in the Midland Town Hall on 26th May. This meeting was attended by an Environmental Health Officer and the Environmental Planner on behalf of the City of Swan to gather further information and to gauge public opinion.

Speakers from the EPA, State Water Council, Water Corporation, Department of Environment and Department of Health addressed the meeting to outline the issues and to provide information. The meeting then was reformed into discussion groups to provide feedback to the EPA.

Information provided by the speakers included information on:

- Long term rainfall trends in Western Australia, including the reduction in rainfall by 10 to 20% experienced over the past 28 years and associated 40 to 50% decrease in runoff. The meeting was informed that groundwater recharge had declined to a similar extent.
- The possibility of rainfall remaining at its current levels, or declining further
- That the current rate of usage from aquifers on the Swan Coastal Plain is unsustainable
- Possible benefits associated with each of the five schemes outlined in the discussion paper, and raised the possibility of further schemes being developed (including some suitable for Guildford Clay soils within the City of Swan)
- Risks associated with wastewater reuse

Risks associated with wastewater reuse were broken down into several areas by the speakers:

- Environmental risks; nitrification of groundwater supplies or wetlands, increased algal blooms, loss of biodiversity and ecosystems
- Risks to human health including long term and chronic health risks through exposure to chemicals and / or pathogens contained in wastewater.

Health risks were treated at length during the discussions, with potential contaminants categorised into four groups:

- Pathogens; including bacteria, viruses, protozoa and helminths
- Chemicals; including endocrine disruptors such as those found in the oral contraceptives, industrial chemicals and household chemicals
- Heavy metals such as mercury, lead and zinc, and
- Radiation from treatment therapies.

Representatives from the Department of Environment and the Health Department provided an in depth discussion on the effectiveness of current testing techniques and the measures that would necessarily be installed to protect both the natural environment and human health. The Health Department representative reassured the meeting that water would be “fit for purpose” prior to any recharge occurring, using the phrase “belts and braces approach” to explain the Department’s philosophy. Examples were also provided of similar schemes that are currently operating in Australia, the United States, Israel and in other countries with no identified health issues.
While the level of acceptance from those attending the meeting was high, with very little adverse comment at the meeting attended by officers from the City of Swan, some comments on the meeting are in order:

- Attendance at the meeting was less than 30 people
- The majority of attendees to the meeting (estimated more than 75%) were industry related professionals (Government, academic or industry).
- Community members who attended appeared generally well informed on the issues discussed.
- The structure, timing and registration process may have discouraged greater community input.

Although the potential benefits of MAR to agriculture were not discussed, the results of other meetings indicate a high level of support for MAR for use in horticultural and viticulture applications. Areas within the City of Swan were not identified for MAR schemes in either the discussion paper or the meeting, however comment was made that recharge in one area will benefit the aquifer as a whole, with the analogy of blowing up a balloon being used to describe the effect on the aquifer. Indications were also given that investigation may in the future be carried out on systems that may be suitable for areas of Guildford clay soils found in the City of Swan. Increased provision of groundwater allocations may therefore lead to positive benefits for the horticultural and viticulture sectors within the City.

The full discussion paper is too large to be appended to this report, however it may be found online along with the results of the discussion forums held by the EPA at www.epa.wa.gov.au/template.asp?ID=45&area=Reviews&Cat=S16%28e%29+Managed+Aquifer+Recharge.

### Opportunities for the City of Swan

The City of Swan is currently heavily dependent on groundwater for watering of its parks and reserves. Future developments in and around Ellenbrook and to the south in the Urban Growth Area are likely to increase water demand in these areas. MAR using treated wastewater has the potential to increase sustainable groundwater allocation; and the amount of groundwater available to the City of Swan for these uses.

Water reuse schemes such as greywater (laundry and bathroom – not toilet) schemes can be established on a neighbourhood scale using a “third pipe” system. Greywater requires a lower level of treatment to wastewater, and water from small neighbourhood treatment plants may be utilized for watering recreational parks and other areas of public open space. Opportunities exist for the introduction of greywater reuse schemes into the new Albion, West Swan, Caversham and Whiteman Park urban areas.

### Conclusion

The introduction of wastewater reuse schemes offers a number of potential benefits to the City of Swan:

- May prevent future decreases and lead to increases in groundwater allocations
- Positive benefits to wetland health if groundwater levels are improved
- Assist in sustainability of water supplies to horticultural and viticulture industries located within the City of Swan
Risks that may be associated with MAR using treated groundwater include:

- Potential risk to aquifer health and to the health of groundwater dependent systems
- Potential human health risks through increased exposure to chemicals, pathogens, and other pollutants contained in wastewater.

It is suggested therefore that the City of Swan supports a cautious, staged approach to Managed Aquifer Recharge, subject to a full Public Environmental Review as proposals progress to a more advanced stage.

ATTACHMENTS

Nil

APPENDICES

Nil

STRATEGIC IMPLICATIONS

Wastewater reuse systems such as Managed Aquifer Recharge and neighbourhood scale greywater reuse systems have the potential to contribute up to 100 gigalitres to the State’s water supplies.

Supporting the introduction of Managed Aquifer Recharge including the incorporation of greywater reuse systems into new developments is seen to align to the City’s Corporate Plan, in particular:

KRA 4: Valuing the Natural Environment - Objectives 4.1 Plan and Manage development to minimise pollution and the depletion of finite resources; and Objective 4.3 Provide a positive influence to reduce the impact of resource consumption on the environment and the community.

STATUTORY ENVIRONMENT

Nil

FINANCIAL IMPLICATIONS

Possible future financial benefits to the City of Swan may arise from the MAR implementation. However at this stage such potential benefits are unable to be quantified.
RECOMMENDATION

That the Council resolve to:

(1) Support in principle the use of treated wastewater for Managed Aquifer Recharge using treated wastewater on the Swan Coastal Plain subject to continued and extensive evaluation of any proposals considered for adoption.

(2) Support the investigation of other water reuse initiatives that may be suitable for areas within the City of Swan, such as community scale grey water reuse systems or systems suitable for use in areas containing Guildford clay soils.

(3) Request the EPA to support further investigation of initiatives which will assist in providing sustainable water supplies to horticulture and viticulture industries in the Swan Valley.

(4) Request the EPA to support further investigation of neighbourhood scale third pipe grey water systems in the City’s urban growth corridor.

CARRIED