METRO

WASTEWATER MANAGEMENT

DEPARTMENT

RE-USE OF TREATED EFFLUENT FROM

SEWAGE TREATMENT WORKS

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RE-USE OF TREATED EFFLUENT FROM
SEWAGE TREATMENT WORKS

Introduction

The Durban Metropolitan Council recognises that in a number of years there may be a shortage of potable water in the Metro area and therefore a continuous review of options must be carried out to ensure that adequate sources of suitable water to meet human, industrial and environmental needs is available.

However it must be appreciated that the economic cost to the end-user, assuming that the same environmental benefits are obtained, must be the criteria. Thus as the demand for potable water increases, the price of that potable water will also increase in real terms. Thus, as such increases occur, the economic benefit of using reclaimed effluent will increase and if the unit cost is below potable water more opportunities for re-cycling will occur.

The purpose of this brief document is to discuss, in broad outline, the factors which affect decisions to re-use treated sewage effluent instead of discharging it into river / watercourses or out to sea.

Treated Effluent

Wastewater, which comprises sewage and /or industrial effluents, contains many substances, some of which are in solid form whist others are dissolved in the liquid.

On arrival at the treatment works the wastewater is subjected to a number of treatment processes. Initially the wastewater is screened to remove intractable / inorganic solids such as stones, plastic bags and the like. Thereafter sand and grit is removed from the wastewater and other solids are removed by gravity settling. At land based treatment works, the liquid is then subjected to purification process such as biological filtration or biological breakdown through prolonged contact with aerobic organisms. The liquid is then passed through secondary settling tanks (to remove solids which have been produced during the biologic process) and then disinfected (usually by the addition of chlorine) prior to being discharged to the nearby river / watercourse.

The treatment processes which are described above are designed to ensure that the effluent being discharged to the river / watercourse complies with prescribed standards - usually the so-called “General Standard” set by the Department of Water Affairs and Forestry.
Whist this effluent is relatively clean and does not have significant impacts on the receiving waters or the environment it usually contains relatively small quantities of organics, inorganics and pathogens and cannot be used for anything other than for irrigation without further treatment.

Areas in which treated sewage effluent have been used throughout the world include:

X Industrial Re-use
X Potable water (Drinking Water)
X Irrigation of agricultural lands or public open space
X Aquaculture
X Recharging of ground water

**Industrial Re-use**

If consideration is to be given to the re-use of treated sewage effluent by industries it is essential to first determine the quality of the effluent which the industries will accept. For example, if treated effluent is to be used for making white paper, the colour component of the effluent is critical. On the other hand, if the effluent is to be used in a spray cooling tower, colour would not be important but other organic compounds which could cause algae growths would be of concern.

Durban Metro has identified a possible effluent re-use scheme which economic assessments have shown to be viable and is currently inviting the private sector to submit bids to design, build and operate a re-use “second class water” scheme at their Southern Wastewater Treatment Works as an extension to the second class water supply of 8 000 kilolitres per day to an industrialist which has been operating since 1974.

**Potable Water Production**

The technology to convert treated sewage effluent to drinking water is well-tried and tested and, were it not for the high costs of these processes, this would be practised on a much larger scale than is done at present.

**Agricultural Irrigation**

A major factor influencing the viability of this type of re-use is the proximity and extent of available agricultural land and the cost implications this has on reticulating water to the lands. Re-use for irrigation currently takes place at two Metropolitan works.

**Public Open Space Irrigation**

This option is at present not viable since public open space generally consists of small pockets of land widely dispersed which makes the reticulation of re-use water to these sites uneconomical.
Aquaculture

Re-use for aquaculture has been attempted twice in Durban and on both occasions the concessions have had to be terminated because they were economically unviable.

Re-Charge of Ground Water

This option is not available because ground water levels in Durban generally do not need to be re-charged and in many instances high levels actually cause problems.

Objectives of Strategic Studies

The main objective of studies is to identify the most practical, cost effective, and acceptable method of dealing with the sewage generated within a study area. A number of alternatives will be investigated and these will include, inter alia, treatment of sewage on numerous different sites including the potential for marine disposal of all or some of the sewage.

Detailed studies on the re-use of treated sewage effluent will not be carried out as part of the studies as it is envisaged that this will be done as and when market conditions dictate. However, in selecting a plan for the Metro, consideration will be given to the impact of any alternative on the possibility of future re-cycling. Because of Durban’s location, climate and topography the most likely area of re-use will be that of industrial re-use and centralisation of treatment and proximity to industrial demand would favour this.

As stated above a re-use project has already been identified by Durban Metro and is being proceeded with.

Summary

The degree of tertiary treatment which the treated sewage effluent requires before it can be sold to end-users has a significant effect on the costs of the treatment and hence on the economic viability of re-use.

Other factors which have a major financial effect on a re-use scheme are the economy of scale of the operation and the costs of distributing / reticulating the treated effluent. Studies carried out have indicated that re-use of treated sewage effluent is only viable if there is a willing consumer(s) who will purchase a substantial quantity and who is situated within 2 to 3 kilometres of a treatment works. The costs to the consumer of the treated effluent must be less than the cost of potable water otherwise artificial penalisation of users occurs.

Prepared by Messrs J. Howard / A. Davis / C. Olivier 6 August 1997