

4.5 WASTEWATER REUSE

4.5.1 BACKGROUND AND EXISTING INFRASTRUCTURE

The reuse or reclamation of wastewater not only improves the sustainability of water resources, but is strategically important as it improves the security of supply through the diversification of water resources. Wastewater is available throughout the year and the supply is consistent.

Umgeni Water currently owns an 18% share in the Durban Wastewater Recycling (DWR) Plant. The DWR treats domestic sewage to near potable standards for industrial use. The plant has the capacity to treat approximately 40 MI/day of wastewater.

4.5.2 PROPOSED OPTIONS

Umgeni Water is currently investigating the option of treating domestic sewage from Darvill Wastewater Works (WWW) (**Section 6.2**) to potable standards. The proposal is to return the treated water back into the distribution system at Umlaas Road (**Section 5.2**). The water can then be used to augment the supply to the Western Aqueduct which will serve the high growth areas along the western corridor of the eThekweni Municipality (**Section 5.2**). The advantage of this is that water is made available higher up in the system and can therefore be supplied using gravity. The alternative is reliant on pumping from Durban Heights WTP to serve these demand centres (**Section 5.2**).

4.5.3 PROJECT PROGRESS

A number of studies have been undertaken as part investigations into wastewater reclamation at Darvill WWW. These include infrastructure and environmental pre-feasibility studies as well as treatment technology investigations.

The infrastructure study involves the evaluation of two methods of utilising Darvill wastewater to augment the potable supply. The first, a Direct Reuse option, is designed to treat the Darvill effluent at a proposed wastewater reclamation plant adjacent to the existing works. The second, an Indirect Reuse option, is designed to abstract the Darvill effluent from a location downstream of the WWW on the Msunduzi River. Both options require the water to be pumped to the Umlaas Road Node (**Section 5.2**) for distribution. The Indirect Reuse (river abstraction) option will require treatment and therefore the WTP at the Umlaas Road Node will need to be re-commissioned for this purpose.

Due to the poor water quality of the Msunduzi River (**Section 4.4.4**) the WTP would have to be upgraded to cater for the inclusion of more advanced water treatment technology. Treatment technology studies are presently being undertaken which will provide design information for the WTP upgrade.

Storage reservoirs, distribution pipelines and the associated infrastructure to pump the treated water to Umlaas Road WTP are required for both alternatives and preliminary designs and pipeline routes have been completed.

Both the Direct and Indirect Reuse options will reduce the flow in the Msunduzi River by approximately 60 MI/day which potentially may have an environmental impact on the river and its users. A specialist environmental study has recently been completed to assess the

possible impacts of this reduction in flow on the river. The study revealed that reduction in flow would have no to limited impact on the ecology of the river, because the flow would be returning to its natural or “virgin” state. The river habitat and ecosystem would therefore adapt to what it was formally used to. The discharge from Darvill WWW is a return flow and therefore not part of the natural flow regime of the river. Social impacts were more difficult to quantify without the undertaking of a full Environmental Impact Assessment, but were also limited and could be mitigated against.

A vital component in the Direct Reuse option is the design of the advanced water treatment technology process train for the reclamation plant. The treating of wastewater for potable reuse requires that appropriate technologies are used to ensure the public’s safety at all times. This is achieved by designing treatment systems that ensure no harmful substances or viruses will pass through the system. The most effective way of doing this is to design “multiple treatment barriers”. International experience at NEWater in Singapore and at Goreangab in Windhoek makes use of this philosophy. These plants also undertook extensive treatment trials using pilot plants to obtain the best treatment train design.

Umgeni Water is following a similar strategy, and with the approval and sponsorship of the Water Research Commission (WRC), is undertaking a wastewater reclamation pilot plant investigation. The first stage in these investigations involves the installation of the Membrane Bioreactor (MBR) pilot plants (**Figure 4.53**). The MBR’s will provide excellent pre-treatment for further advanced treatment technologies such as Reverse Osmosis and Ultra Violet Irradiation. Combinations of advanced treatment technologies will be tested to ascertain the most effective “multiple barrier” system. These tests will take place over the next two years and will culminate in a WRC report.

Coupled with the pilot plant investigations is a rigorous water quality monitoring programme. Of major concern when reclaiming wastewater to potable standards are the health and safety aspects, especially those relating to the presence of Contaminants of Emerging Concern (CEC) in the final water. CEC represent a range of contaminants that include pesticides, pharmaceuticals and personal care products. Much attention has been given to particular contaminants that fall under the banner of Endocrine Disrupting Chemicals (EDCs) such as Estrogen. Umgeni Water is sampling and analysing for Estrogen in the product water from the MBR’s and will be gradually increasing the sampling programme for other contaminants as the project progresses.



Figure 4.53 Three different Membrane Bio-Reactor Pilot Plants undergoing testing at Darvill WWWW.

4.6 SEAWATER DESALINATION

Umgeni Water has recently completed a desalination pre-feasibility study. The objective of this study was to investigate the viability of constructing a large scale desalination plant in the eThekweni area as a possible alternative to the proposed Mkomazi Water Project (**Sections 4.4.4** and **5.2**). The ultimate capacity of the plant was set at 450 MI/day (164 million m³/annum), making it potentially one of the largest SWRO to ever be built.

The study identified the northern end of the Durban Airport as the optimal site to construct a seawater reverse osmosis (SWRO) desalination plant. The cost of constructing and operating the plant was estimated as well as the possible environmental implications.

Few points exist within the water supply infrastructure of eThekweni Municipality that have the capacity to receive the water from a single point desalination plant producing 450 MI/day of potable water. Early investigations have also shown that due to the limited space for the pipeline installation, it is highly likely that a phased implementation of the pipelines will not be feasible because of these space constraints. At this point it is proposed that about 150 of the 450 MI/day would be injected into the Wiggins System (**Section 5.2**) at its WTP whilst the balance is injected into the Central Aqueducts.

An economic comparison, at a pre-feasibility level of detail, between this desalination plant and the alternative Mkomazi Water Project, indicated no discernable difference. It is therefore necessary to undertake more detailed investigations of both options so as to obtain a higher level of accuracy in their comparison.

In order to understand the required components to be focused on during the detailed investigation of the desalination option, a workshop was arranged with desalination experts from Australia. Lessons learnt from this workshop have assisted in planning the feasibility study for the desalination plant. In particular the recommendations regarding the proposed site and linkages to existing supply infrastructure will need to be reviewed.

A revised strategy has now been adopted. The detailed feasibility investigation is considering the option of a 150MI/day plant on both the North Coast and South Coast. The capacity of these plants is based on the capacity of existing and proposed bulk water supply infrastructure in these areas, which will be utilised to convey the potable water from the desalination plants to the various distribution points. Datasets on the various criteria that affect the positioning of a desalination plant have been sourced for the appropriate coastal areas. Discussions are currently underway with various stakeholders in order to determine the most suitable locations for the desalination plants. Once the sites have been identified, the intention is to complete the detailed investigations of the inlet, outfall and connection pipelines, energy requirements and to obtain costs on the desalination plant.

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PLANNING SERVICES MANAGER