

Indirect Reuse of effluent treated to potable standards by blending into the existing Loerie Dam

1. SCHEME LAYOUT

The accepted best international practice for potable reuse of treated effluent is that the effluent should preferably be treated by an RO process and thereafter should be stored in an impoundment before abstraction and treatment by a conventional potable water treatment process. The purpose of storing the water in an impoundment is to avoid the “toilet to tap” perception of the public but also to provide a buffer so that, in the event of a malfunction of the waste water treatment process, contamination of the potable water supply would be minimised through the dilution and natural decomposition processes, followed by the conventional water treatment process.

It is also recommended that, if possible, an existing impoundment and water treatment and conveyance infrastructure should be utilised so as to minimise capital costs. In the case of the Algoa system the Groendal Dam and the Bulk and Sand River dams are closest impoundments but have very small storages and limited existing pipeline capacities.

This proposed Algoa indirect potable reuse scheme has been based on the balance of quality water to become available, following proposed treatment process upgrading at the Fishwater Flats WWTW, the main potential source of treated effluent for reuse. The sewage treatment process will, in the near future, be upgraded to an MBR system with improved quality effluent. The planned Coega IDZ industrial water supply will utilise 60 MI/day of final effluent currently discharged into the sea by 2020, after which date the additional industrial water demand of the IDZ will be supplied from the proposed Coega WWTW. The short term future discharge volume from FWF WWTW is in the order of 110 MI/day, which will leave a balance of some 45-50 MI/day for indirect re-use.

The following aspects make this intervention an attractive re-use option:

- o The Loerie water treatment works has recently been upgraded and has a treatment and distribution capacity of 105 MI/day.
- o Currently the allocation of water from the Kouga Dam, the predominant source of water for the works, is only 62 MI/day. This means that there is just over 40 MI/day of capacity available at the treatment works for immediate use.
- o The size of the Loerie Dam and the mixing ratios are favourable for good dilution and as the chloride levels of the Kouga water is very low, the reduced chloride level will result in a Class 1 potable supply.

- o The head of a tributary of the Loerie Dam is situated 5 km past the Van Stadens River gorge, thereby greatly reducing the total pumping distance from the FWF works.

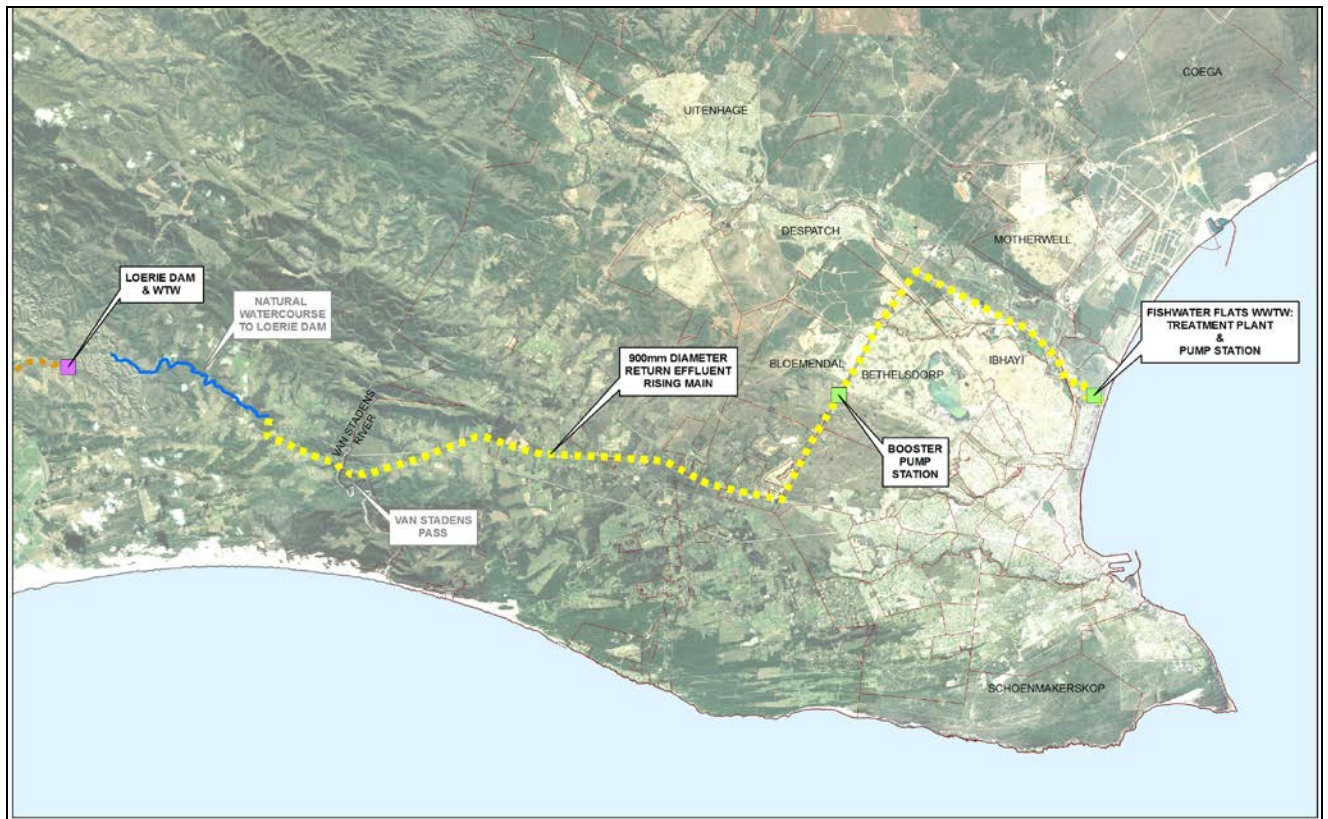


Figure 1: Possible Route of Pipeline from FWF WWTW to Loerie WTW

2. SCHEME DESCRIPTION

The scheme would comprise the following:

- o Process upgrade at FWF WWTW (45 MI/day MBR);
- o Post treatment facilities at FWF WWTW (45 MI/day phosphorus removal, ozone and GAC);
- o A 45 MI/day pump station at the Fish Water Flats WWTW;
- o A 45 MI/day booster pump station near Bethelsdorp;
- o 56 km distance 900 mm diameter rising main discharging into a water course near Thornhill, 5km before Loerie Dam;

3. SYSTEM YIELD

It has been assumed that the additional water transferred as treated effluent into the Loerie Dam, will have only enroute stream losses and short term evaporation losses from the Loerie Dam. Hence, for the transfer of 45MI/day, the scheme will be able to yield some **42 MI/d (15.3 million m³/a)**.

4. UNIT REFERENCE VALUE

The URVs for this option shown in Table 1 have been based on similar 2009 values as per URVs calculated for previous interventions under the Algoa Reconciliation Study.

Table 1: Indirect Potable Effluent Reuse after RO, Storage in Dam and Treatment

ITEM	Discount Rate 0 %	Discount Rate 3 %	Discount Rate 6 %	Discount Rate 8%
Capital cost (R million/annum)	645.5	645.5	645.5	645.5
Annual operating cost (R million/annum)	43.9	43.9	43.9	43.9
NPV Cost (R million)	1848	1447	1196	1079
Unit Reference Value (R/m ³)	5.33	5.64	6.48	7.10

5. ECOLOGICAL IMPACT

The site of the proposed post treatment works and the high lift pump station is confined to the present FWF WWTW site. The pipeline from Fishwater Flats to the discharge point some 5km from Loerie Dam, would be routed adjacent to the existing pipeline, road and rail reserves that are already disturbed.

However the last two kilometres from the existing Summit to Chelsea pipeline servitude route to the high discharge point on the Loerie watershed, would pass through indigenous mountainous vegetation.

6. SOCIO-ECONOMIC IMPACT

The indirect reuse of waste water treated by the post treatment processes followed by blending and standard water treatment after storage in Loerie Dam would eliminate the potential health risks and the public perceptions associated with the potable reuse of treated effluent.

The scheme would deliver water to the both the 20MI KwaNobuhle reservoir and the 90 MI Chelsea reservoir. This will eliminate the perception that one community only is indirectly receiving treated wastewater.

On the other hand the scheme would provide a reliable supply of good quality water close to town and would not be subject to droughts.

The scheme would involve pumping the water and would therefore be affected by increasing electricity tariffs; however anticipated electricity cost increases have been taken into account.