Information Sheet - Kemerton to Ocean Brine Pipeline

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Brine to Ocean Outfall

The brine pipeline will transport brine from a Brackish Water Reverse Osmosis (RO) treatment plant in Kemerton operated by Harvey Water to ocean outfall 2.5 kilometers north of Buffalo Road, Leschenault. This plant functions as a desalination plant to make sterile water from a blend of Harvey Dam fresh water and previously supplied dam water that has already passed through a cooling tower system onsite in Kemerton.

• HW regularly monitors water in its distribution network and dam sources and reports this information to Department of Water and Environmental Regulation (DWER) annually. The quality and quantity of brine water discharged will be subject to the same level of compliance reporting, as will the acceptance of water inputs to the brine pipeline, which will be screened prior to acceptance. Water quality parameters of particular interest include:

o total dissolved solids (TDS- the measure of mineral salts present in water);
o pH (representative of the level of acidity or alkalinity of water);
o major cations and anions (positively and negatively charged ions in water);
o turbidity (clarity of water due to presence/absence of suspended particles);
o total suspended solids (TSS- the dry weight of suspended particles);
o heavy metals (to monitor background levels for environmental protection);
o flow rates and volumes of discharge expelled to the system.

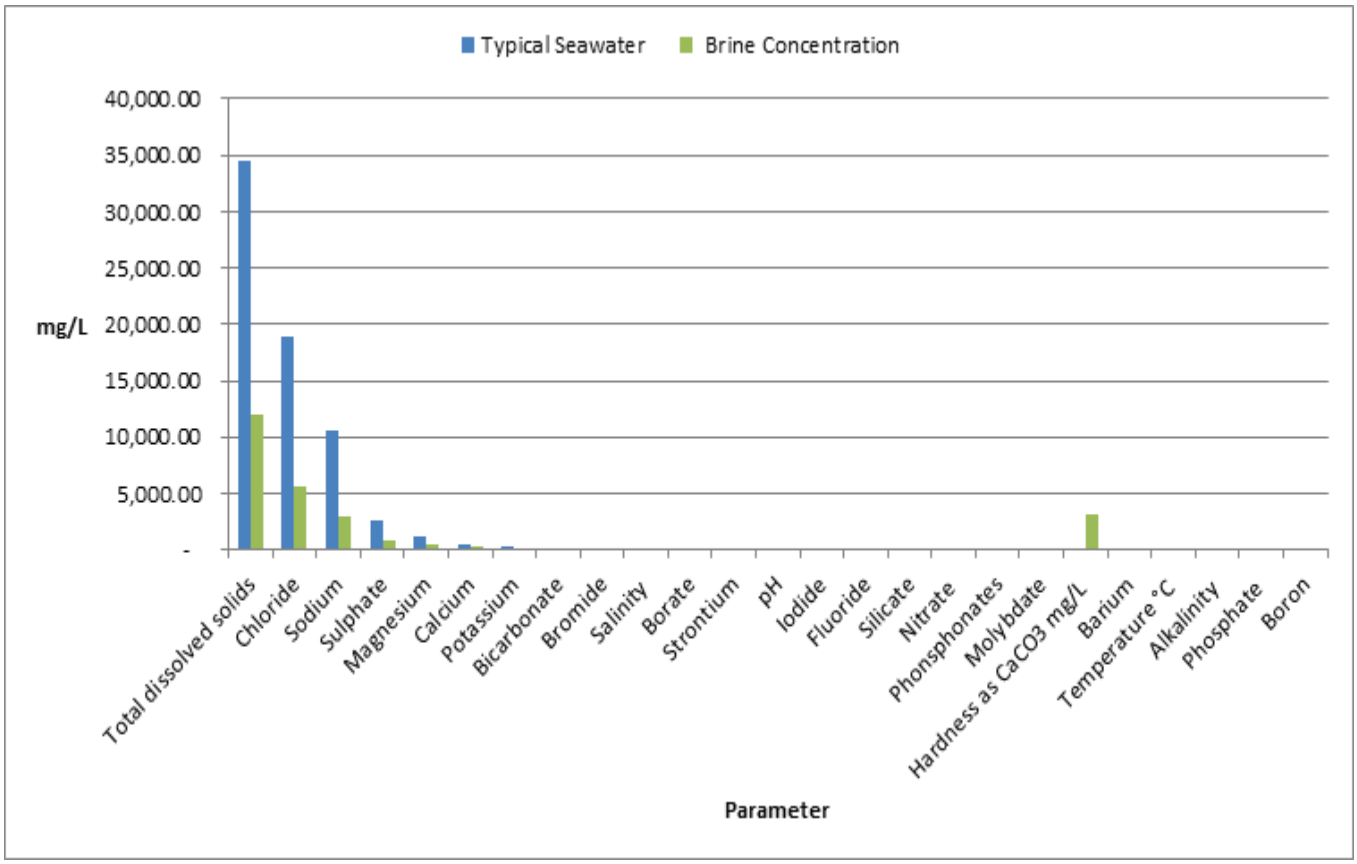
The brine is composed of water & salts both naturally occurring from the Harvey Dam feed water and from the return water collected for recycling from the cooling towers situated in Kemerton. The cooling tower water contains biocides (to control bacterial growth in the cooling circuit) and corrosion inhibitors and antiscalents (to protect the steel tower construction).

These chemicals are broken down upstream of the RO filter membranes for two reasons:
1. to ensure that chlorine and similar treatment products are not discharged in the brine stream;
2. to protect the sensitive filtration membranes from being damaged.

The resulting brine contains components of these chemicals but not in a form that is harmful to the environment or classed as marine toxicants.

Recent modelling suggests that the total dissolved solids (sum of all salts) in the brine stream is much lower than originally forecast as the RO membrane efficiency calculations have been updated to more relaxed “squeezing” of filtered water which equates to lower concentrations of salts in the brine opposed to higher recovery rates which would produce greater TDS in brine. This requires a slightly higher dilution factor than previously predicted but means that less mass of particles is being discharged to the environment.

- Physical and chemical modelling has been undertaken for the brine proposed to be discharged to the ocean, with the aim of determining suitable dilution targets for the discharge, which is the key to managing potential marine impacts. The parameter which is likely to be found in the highest level is TDS and this is the parameter of greatest influence on salinity (see graph below). TDS sets the dilution approach and targets to be achieved at the diffuser end of the pipeline in ocean
- Modelling conducted has factored in a conservative dilution target of one part brine to 12 parts seawater, which when combined with our flow rates, more than achieves the required dilution. The predicted composition of brine to be discharged contains less than the background levels of respective salts naturally occurring in the ocean, with the exception of some parameters (Calcium and Magnesium) that are naturally present in freshwater.



Monitoring stations will be placed at locations along the route, these will have communication equipment above ground level, and will be constructed in areas away from public recreational use.

The pipeline has an air release chamber in the dunes before the shore. Its location has been chosen to minimize any visual and recreational impacts at the beach. Its purpose is to ensure no air locking occurs in the pipeline.

A pump station will be installed to keep the pipe under pressure, located adjacent to the treatment plant in Kemerton. Access and air valves will be designed along the pipeline at low and high points respectively. These will allow access to important points of the pipeline for maintenance and upkeep. These fittings will remain below ground level, with no impact on visual amenity.

For the dune and marine sections, the pipe will be installed using the Horizontal Direct Drilling method. The pipe will extend under the dunes, under the beach and continue below the seabed out to a distance approximately 400meters from the shoreline where the water is approximately 8 meter deep. The pipe will terminate with a diffuser that rises on a 30-degree angle to be approximately 0.5 meters above the seabed (see diagram below).

The diffuser on the end of the pipe will reduces from the 200 millimeters down to 50 millimeters so that the brine is released under pressure, helping to discharge over a greater distance, which increases the rate at which it mixes with seawater. Water Quality Objectives have been defined around diluting salinity (ANZECC & ARMCANZ 2000 guidelines), adopting a conservative target for salinity.

Diagram: Outfall diffuser design.