THE DESALINATION PROCESS

What is Desalination?

Desalination is the process of removing salinity (dissolved salts) from a salt water source.

It has been commonly used for more than 100 years in dry climates such as the Middle East, Spain, Malta, Cyprus and parts of the United States where access to traditional water supplies is limited.

In response to climate change and drought in Australia, desalination plants are becoming more common. They now exist or are currently being built in Sydney, Perth, the Gold Coast and Adelaide.

Various methods can be used to desalinate seawater; reverse osmosis technology will be used at Victoria’s new desalination plant. It is more energy efficient and less visually intrusive than other methods.

The major benefit of desalination is that it can continue to deliver high quality drinking water even if there is no rain.

SEAWATER INTAKE
1. Seawater is drawn in from the ocean through specially designed intake structures. Seawater is drawn at very low speeds – even small fish will be able to swim against the intake current – and a protective grill will ensure that larger marine life can’t swim into the structure. Long tunnels will protect the marine environment, including the beach and dunes.

FILTRATION
2. Pre-treatment filters remove solids such as sand and sediment.

REVERSE OSMOSIS
3. Filtered seawater passes through two stages of reverse osmosis, where it is pushed through ultra-fine membranes under high pressure. Fresh water will pass through, leaving seawater concentrate behind.

REMINERALISATION
4. Desalinated water is remineralised to meet Australian Drinking Water Guidelines and Victorian Health requirements.

STORAGE
5. Drinking water is stored before it is distributed into the Melbourne and regional water networks, where it may be blended with water from existing catchments.

WATER OUTLET
6. Seawater concentrate is safely returned to the ocean through diffuser structures. Ocean currents dilute the concentrate within seconds.
Why is it called Reverse Osmosis?

Osmosis is the process where water molecules move across a semi-permeable membrane from an area of lower salt concentration to an area of higher concentration. The process does not use any energy. An example of this in nature is the movement of water from the soil into plant roots. It is also how flowers take in water when they are in a vase.

Reverse osmosis is the opposite process. Energy is used to apply pressure to water to force it to move from an area of higher salt concentration (in seawater) to an area of lower salt concentration.

Reverse Osmosis membranes

Each reverse osmosis membrane has a surface area of 40.9 square metres. The membrane material is wrapped rather like a closed umbrella inside each cylinder.

Simple outline of Reverse Osmosis Process
Reverse Osmosis Processing Plant

This is a plan view of the layout of the reverse osmosis processing plant. Water moves through the process from left to right. It takes about one hour for a water drop to move through from the seawater lift pump station (1) through the plant to the treated water storage (11).

1 SEAWATER LIFT PUMP STATION
Transfers seawater to the pump station via intake structures located on the seabed.

2 SCREEN & FEED PUMP STATION
Houses screen filters that remove large particles from seawater.

3 PRETREATMENT DMPF
Houses Dual Media Pressure Filters (DMPF) to remove fine particles from seawater.

4 DMPF BACKWASH
Collects backwash from the DMPFs and pumps it through to the Backwash Treatment Building.

5 BACKWASH TREATMENT BUILDING
Treats and stores backwash from the DMPF process before it is pumped to the Solids Treatment Building.

6 REVERSE OSMOSIS BUILDING
Water passes through two stages of reverse osmosis where minerals and salts are removed.

7, 8 AND 9 CHEMICAL BUILDINGS
House chemicals like fluoride and carbon dioxide used to potabilise the desalinated water.

10 LIME STORAGE AND SATURATION
Houses lime used to remineralise the desalinated water.

11 TREATED WATER STORAGE
Stores potable water prior to distribution.

12 SOLIDS TREATMENT BUILDING
Settlement and centrifuge process used to dewater the backwash waste prior to transfer offsite.

13 STABILISATION PONDS
Treatment ponds used for the stabilisation and treatment of outfall waters.

14 UTILITIES BUILDING

15 AND 16 ELECTRICAL ENCLOSURES

17 POTABILISATION SYSTEM
Point for mixing of chemicals to produce safe drinking water.

18 ADMINISTRATION COMPLEX
Contains reception, offices, meeting rooms and plant control room.

19 FIRE SERVICES BUILDING

20 SUBSTATIONS
Contain electrical equipment and transformers.

21 TRANSFER PUMP STATION AND SURGE VESSELS
Pumps potable water into the transfer pipeline.

22 PROCESS BUILDING
Houses chemicals used to assist the reverse osmosis process.

FUTURE PLANT EXPANSION ZONES TO 200GL
CONTACT US

Visit the Victorian Desalination Project Community Information Centre
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Opening hours
Tuesday–Friday 9.30am–4.30pm, Saturday 9am–12pm.

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