Seawater Desalination

In detail – July 2025

Why is seawater desalination the preferred new water source for Exmouth?

We are planning for a secure and sustainable water supply for the future, with a focus on protecting the environmental value of the region.

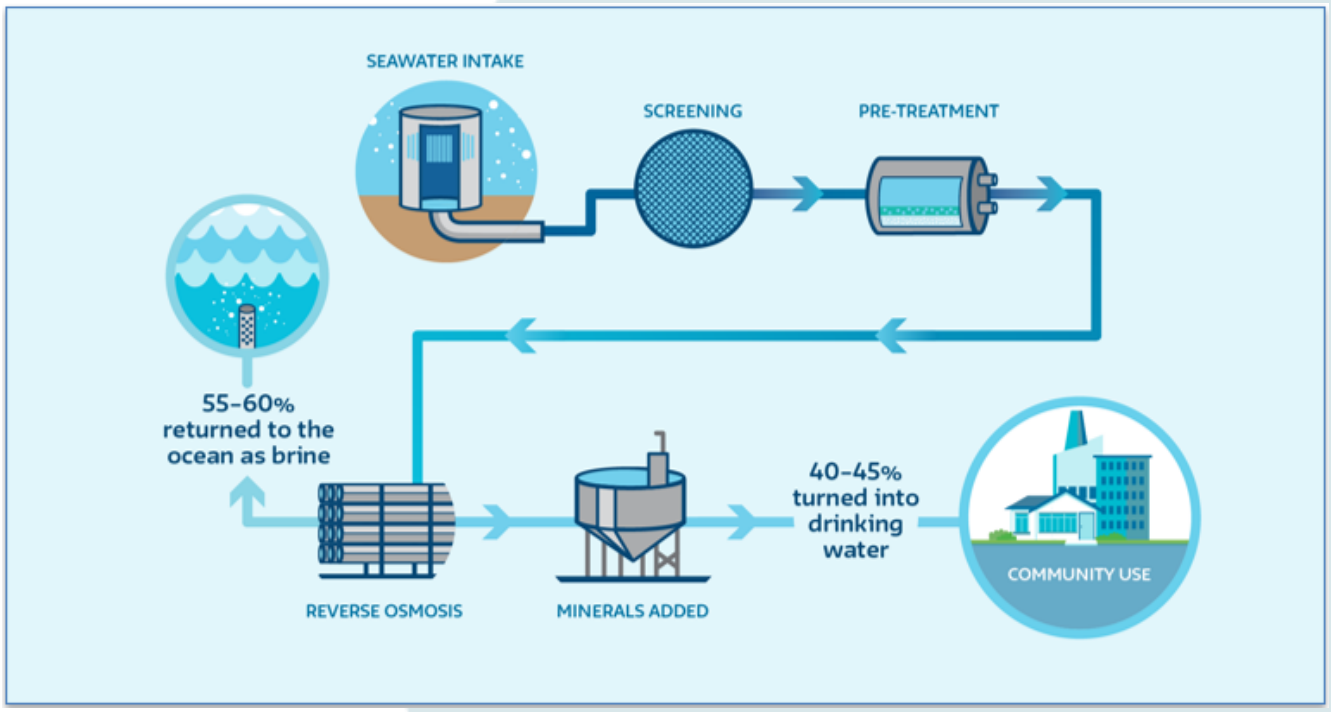
Population growth and climate change are affecting the Exmouth area.

A key benefit of seawater desalination, when compared to new groundwater bores, is that desalination is a rainfall-independent source. Seawater desalination does not depend on rainfall to produce the amount of water needed to supply a growing town.

What is seawater desalination?

Seawater desalination is the process of removing salt and impurities from seawater to produce fresh water for drinking.

Seawater is screened and pre-treated to remove large particles, like sand and seaweed. The seawater is then fed through reverse osmosis membranes, where water molecules pass through, rejecting other components such as salt. About 40-45% of the seawater becomes fresh water for drinking and the remaining 55-60% is brine. This means brine is nearly twice as salty as the original seawater.



Seawater desalination process diagram

WATER CORPORATION

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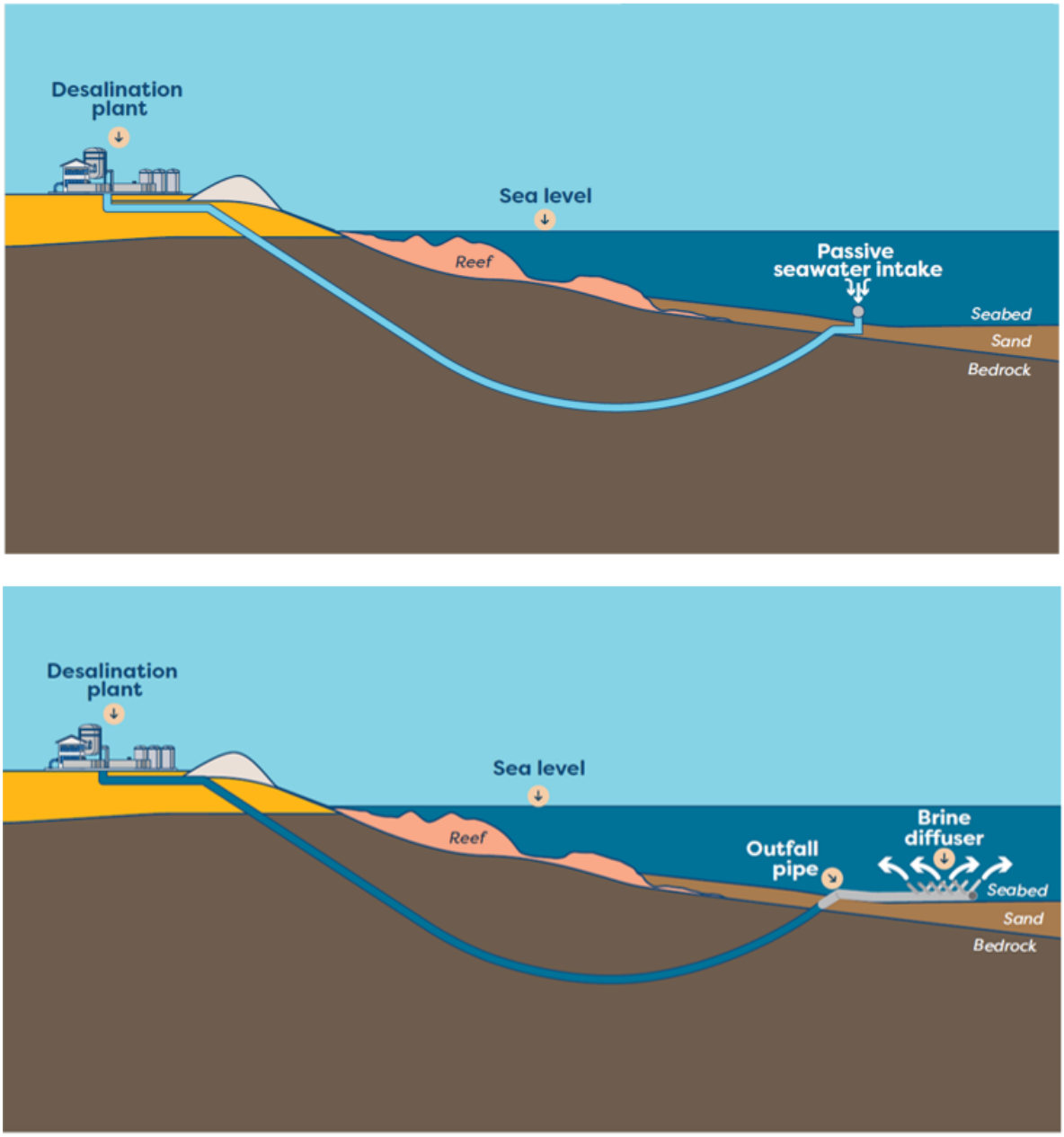
What marine infrastructure is required for seawater desalination?

Marine pipelines are installed by tunnelling under the land and seabed, to minimise disturbance to the environment. A method that is commonly used is called horizontal directional drilling.

Seawater desalination requires an intake pipeline to bring in seawater from the ocean and a brine pipeline to return brine to the ocean. The images below show an example of a typical seawater intake and brine pipeline.



Seawater desalination plant pipelines

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A **seawater intake** structure sits above the seabed.

Example of an intake head

Fish move freely in and out of the head

The seawater intake in the ocean is fitted with a screen to prevent large sea animals from entering. The design incorporates a passive (low velocity) intake, so that marine life can swim in and out of the intake structure.

What is brine?

Brine is primarily saltier seawater. It is nearly twice as salty as seawater, with a slight change in temperature.

Brine contains trace amounts of anti-scalants and may occasionally contain cleaning additives, to protect the desalination plant infrastructure. Only food-grade chemicals approved by the Department of Health for use in drinking water are used.

Managing brine

To manage brine from a seawater desalination plant, we:

- choose a deep-water location that helps effective mixing of the brine with the surrounding seawater.
- carefully select the location of the brine pipeline to reduce environmental impacts, taking into consideration:
    - seabed (benthic) habitat surveys, to avoid sensitive habitats
    - waves and currents of the location, to choose a site that has the best characteristics for mixing of brine into the surrounding seawater
- install a diffuser on the end of the brine pipeline to ensure rapid mixing (dilution)
    - mixing typically returns the brine back to natural seawater salinity levels within a small area; generally within **10s of metres** from the diffuser.
    - the diffuser design is site-specific. The design is informed by **dispersion modelling** to predict and maximise how the brine will dilute in the ocean. Dispersion modelling uses wave, current, wind and tide data collected from the area.

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Brine continues to mix with seawater after it leaves the diffuser.

The diffuser design ensures that it will not form pools of hypersaline water or collect in depressions or basins.

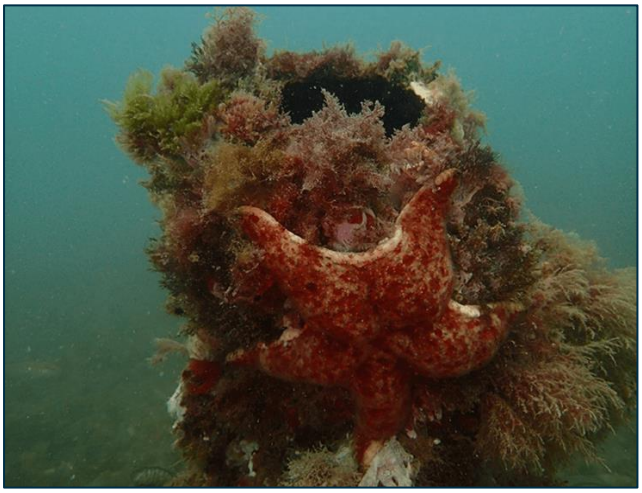
Does brine impact the marine environment?

Whenever we can, we try to avoid sensitive marine habitats, such as seagrass and coral., altogether. We prefer to install brine diffusers in areas with bare sand.

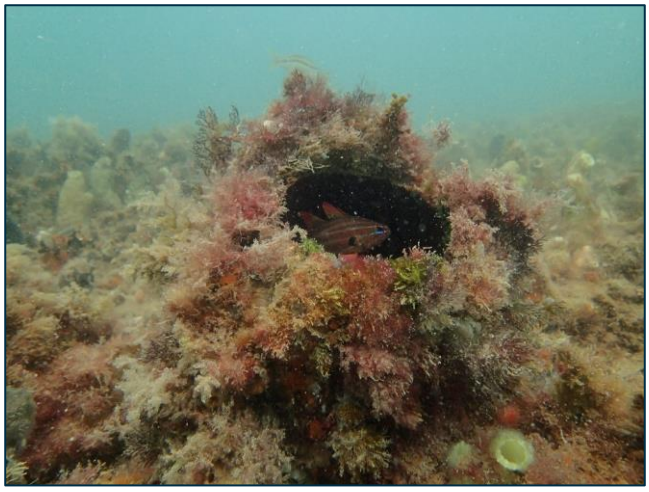
We regularly monitor the marine environment around the brine diffuser to detect any changes.

The effect on stationary marine life, like seagrass, will be limited to the area where the highly diluted brine plume touches the seabed. We use brine dispersion modelling and habitat mapping to predict where this will happen. Modelling helps us find areas that reduce impacts and avoid sensitive habitats, like seagrass or reef. Modelling also helps us design the brine diffuser specifically for the location where it will be installed, so that we ensure the brine is being effectively dispersed into the surrounding ocean.

Mobile marine life that prefers lower salinity will move away from the brine. However, many species that tolerate higher salinity will thrive near the brine diffuser. Mussels, starfish, seahorses and fish often gather around these structures.



Sea star on a diffuser (Perth Seawater Desalination Plant)



Fish inside a diffuser (Perth Seawater Desalination Plant)

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Environmental approvals and supporting investigations

For a seawater desalination plant, we submit a full Environmental Impact Assessment (EIA), covering all marine and land environmental values and aspects. This is submitted to the Environmental Protection Authority (EPA), together with environmental management plans for construction and operations.

The EIA is a step-by-step way to assess how a proposal might impact the environment. The EIA must show that Water Corporation has genuinely evaluated the location and design options for the proposal, and incorporated controls and environmental management measures. Stakeholders and the public are encouraged to join the process via the EPA's consultation hub.

Water Corporation is required to demonstrate proposed brine dilution and dispersion meet the levels of ecological protection set by the EPA and ANZECC (Australian and New Zealand Environment and Conservation Council) guidelines.

To support **marine** approvals and monitoring, we undertake investigations covering the following:

Social factors:

- tourism, fishing and recreation
- cultural heritage – Aboriginal and European
- community and stakeholder key uses, values and concerns

Biological factors:

- benthic (seabed) habitat mapping – including seagrass meadows and reefs
- fauna (e.g. whales, fish, coral)
- sediment invertebrates

Physical factors:

- waves, currents, tides and winds
- water chemistry and quality
- seabed topography
- natural salinity levels of the ocean.

Note: The EIA process is thorough. Land, water and air impacts are considered in addition to the above marine factors.

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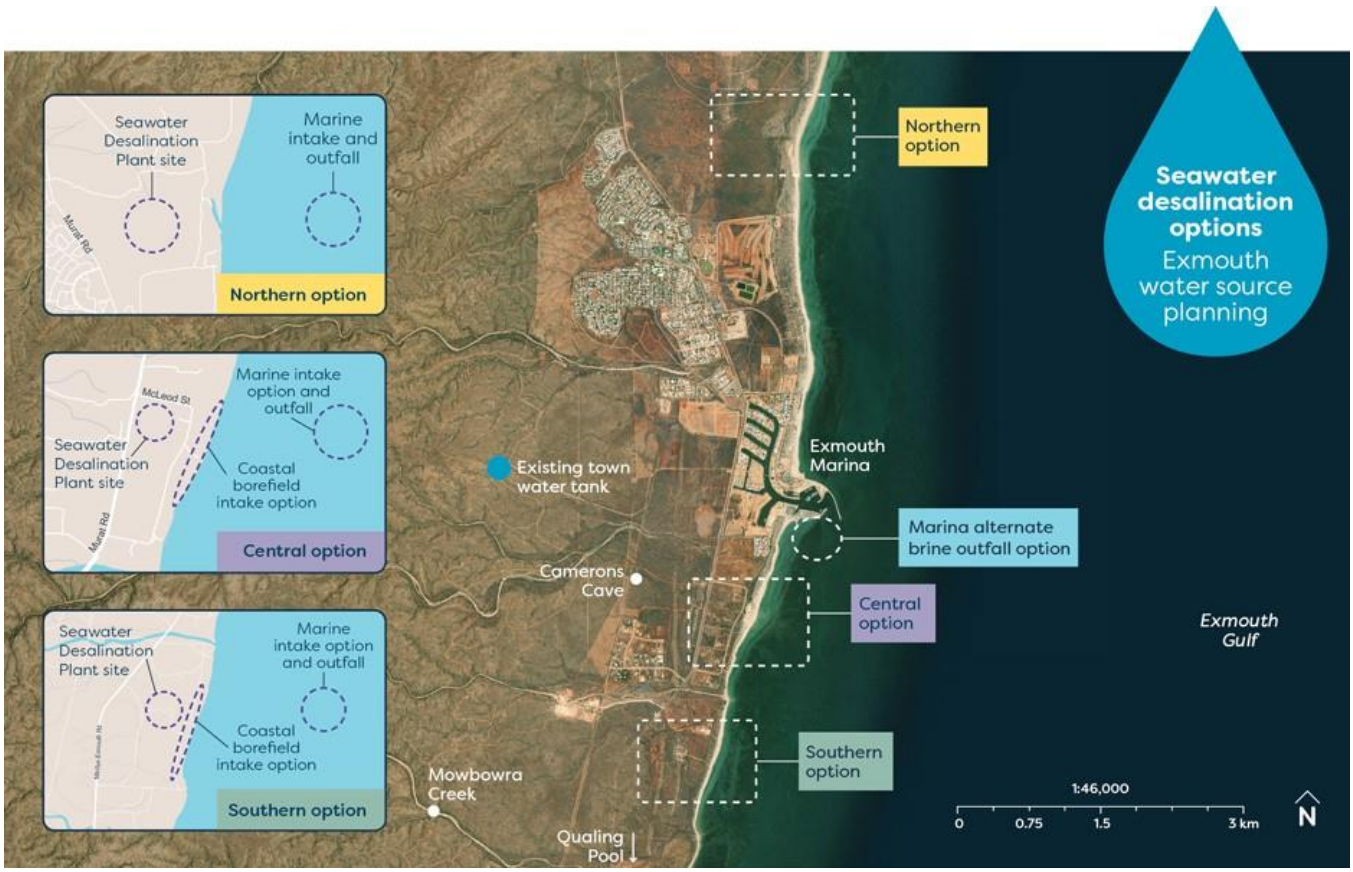
What locations are being considered for potential seawater desalination sites?

Three sites were identified in planning, for a potential future seawater desalination plant at Exmouth.



How can I be involved?

We are committed to keeping the community updated and providing opportunities for feedback.

Sign up for project updates by searching “Exmouth water source planning” in your preferred browser or scan the QR code.

Feedback and questions can be sent through to our team at **Community.Engagement@watercorporation.com.au**

July 2025