Delivering safe drinking water to homes in remote areas is a significant challenge. The residents of Adelaide River, located over 100km from Darwin in the Northern Territory, rely on the Adelaide River Water Treatment Plant (WTP) for their drinking water. The natural groundwater, drawn from a series of bores, contains elevated and variable concentrations of iron and manganese causing discolouration, laundry stains, and an unpleasant taste.

In August 2014, SUEZ and Goodline, a local construction company, were awarded the contract by Power and Water Corporation to upgrade the Adelaide River Water Treatment Plant. These upgrades included the ability to remove iron and manganese in order to deliver better quality drinking water. The upgraded plant commenced operations in July 2015, delivering the residents of Adelaide River with clean, pleasant-tasting drinking water, directly from their taps.

“It’s a huge step forward for Adelaide River to really bring their drinking water in line with everywhere else in Australia, to make water out of the tap look like it should,” said the Primary Industries and Deputy Chief Minister of Northern Territory at the Plant’s opening in December 2015.

The upgraded plant commenced operations in July 2015, delivering the residents of Adelaide River with clean, pleasant-tasting drinking water.
introducing Australia’s first biological water treatment facility to remove iron and manganese

SUEZ’s biological technologies, Ferazur™ and Mangazur™ were installed at the Adelaide River Water Treatment Plant to remove iron and manganese from the natural ground water.

Iron and manganese are removed by utilising two different bacteria types, both naturally present in groundwater. Each, however, requires a different environment to achieve optimal performance. A sequential process consisting of successive biological iron and manganese removal filters was found to be most effective.

The filtration process occurs in a reactor containing a layer of sand media which supports bacterial growth. Upon introduction, the bacteria oxidises dissolved iron and manganese into particles easily removed using rapid sand filtration. Accumulated iron and manganese particles are subsequently removed from the filters using a regular backwashing process. These sustainable solutions accelerate the filtration process for superior water quality and enable the filters to operate without the requirement for additional chemicals.

In September 2016, SUEZ along with our partners were presented both the Northern District and Innovation Research and Development Award for the Adelaide River Water Treatment Plant Upgrade Project at the Australian Engineering Excellence Awards.
TECHNICAL INFORMATION

TREATMENT PROCESS DIAGRAM

- Tanker truck
- Backwash wastewater settling tank
- Supernatant to planted area (irrigation)
- Mixing chamber
- Biological iron removal filter
- Biological manganese removal filter
- NaOH
- NaOCl
- Backwash pump
- Air scour blower
- Disinfection storage tank
- Mixing chamber
- Termination point
- Blended bore raw water header
- Adelaide River bores
- Sludge hopper
- A view from the top of the filters
delivering cost efficiency and operational reliability

To serve the Adelaide River community over the long-term, the water treatment plant needs to be cost efficient and to have high reliability. SUEZ brought together a team of in-house experts with years of operational experience to design and build the plant.

The biological removal system is simple to operate, requiring less supervision. The filtration process rapidly reacts to changes in raw water quality, ensuring consistently high-quality of treated water for residents.

The chemical free treatment practice ensures sludge from the filtration process contains only iron, manganese and associated biomass without the additional metals found in coagulant chemicals. As a result, sludge production is more environmentally friendly and operational expenditures due to sludge management are reduced.

### WATER CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Inlet</th>
<th>Outlet</th>
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<tbody>
<tr>
<td>Iron (mg/L)</td>
<td>3.5</td>
<td>&lt; 0.3</td>
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<tr>
<td>Manganese (mg/L)</td>
<td>0.28</td>
<td>&lt; 0.05</td>
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<tr>
<td>Arsenic (mg/L)</td>
<td>0.01</td>
<td>&lt; 0.0075</td>
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<tr>
<td>Turbidity (NTU)</td>
<td>5.0</td>
<td>&lt; 0.3</td>
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<tr>
<td>Carbon dioxide (mg/L)</td>
<td>150</td>
<td>&lt; 10</td>
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<tr>
<td>pH</td>
<td>6.2 - 7.2</td>
<td>6.5 - 8.5</td>
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</table>
the first water treatment plant in Australia equipped with **biological iron** and **manganese filters**

<table>
<thead>
<tr>
<th>TYPE OF CONTRACT</th>
<th>Design &amp; Build</th>
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<tr>
<td>PROJECT CAPACITY</td>
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<td>CONTRACT DURATION</td>
<td>2014 - 2015</td>
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<tr>
<td>ESTIMATED POPULATION SERVED</td>
<td>300</td>
</tr>
</tbody>
</table>

**Adelaide River**

Northern Territory

MLD: Megalitres Per Day
“Throughout the project execution the collaboration with SUEZ was very good. SUEZ’s project team maintained a cooperative and positive relationship with Power and Water Corporation and demonstrated significant technical competence in terms of water treatment, risk management, constructability and commissioning. SUEZ’s project team successfully managed the planning, execution, and closing of the project ensuring that the key issues of safety, cost, time, quality, and client satisfaction have been realised.

The biological water treatment solution is very reliable, robust and simple to operate. It has created significant net value for Power and Water Corporation and has opened up a new perspective in terms of water treatment capabilities for the Northern Territory and for the Australian water industry more broadly.

Adelaide Rive Water Treatment Plant fulfils its intended objectives. It achieves all expectations in terms of water quality performance, reliability, operability, disinfection efficacy and operating costs and represents very good value to Power and Water Corporation.”

Eric Vanweydeveld
(MIEAust, CPEng, MAIPM, CPPM)
Senior Project Manager, Water Services
Power and Water Corporation
SUEZ Australia & New Zealand
Level 3, 3 Rider Boulevard
RHODES NSW 2138 Australia

State Offices:
QUEENSLAND
28 Weyba Street
Banyo QLD 4014

SOUTH AUSTRALIA
133 Cormack Road
Wingfield SA 5013

WESTERN AUSTRALIA
116 Kurnell Road
Welshpool WA 6106

02 8759 7900
suez.com.au