



# Australia and New Zealand Creating Water Solutions



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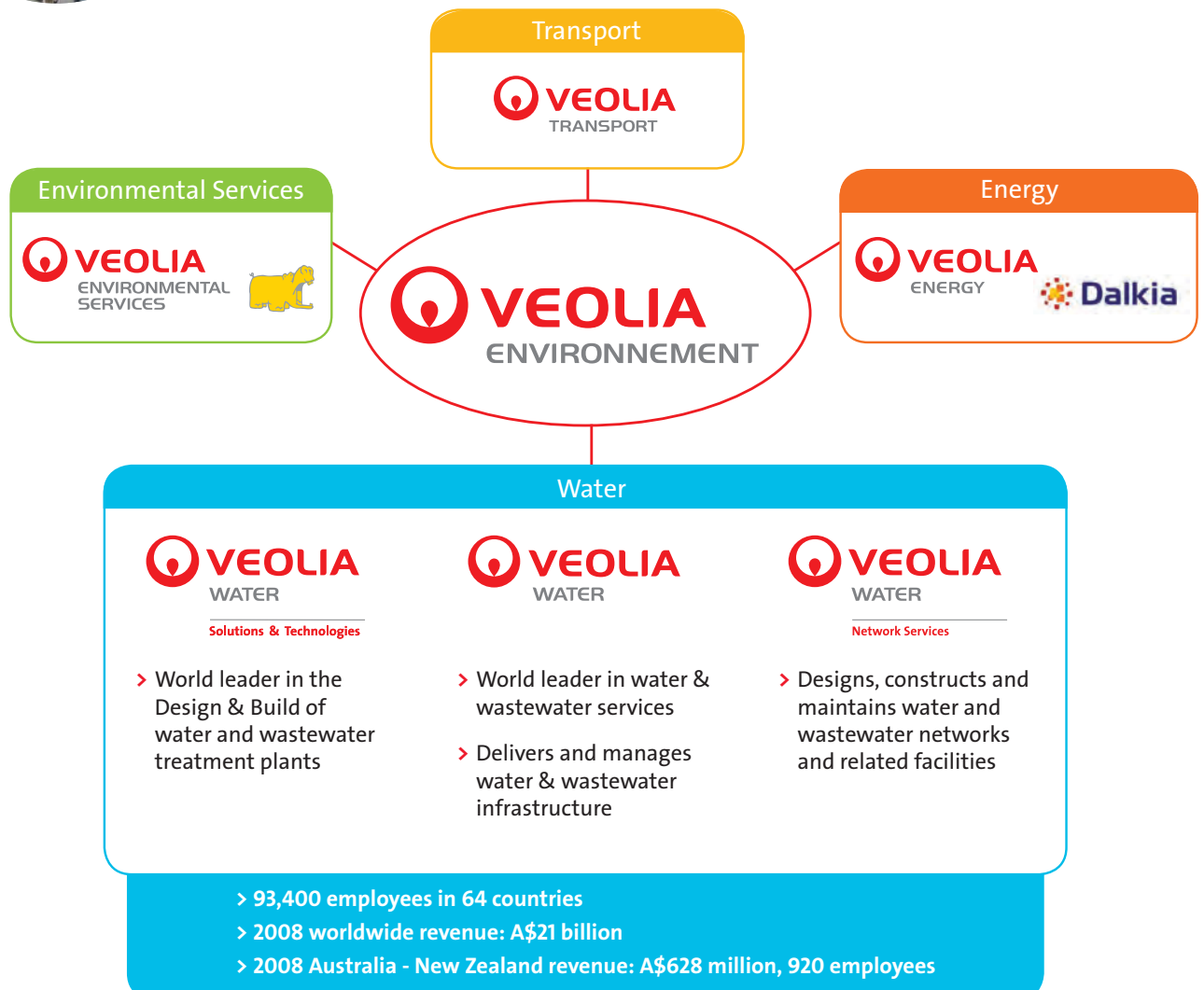
Solutions & Technologies



## World Leader in Environmental Solutions

As the world leader in environmental solutions, **Veolia Environnement** is meeting the biggest environmental challenges of this century, conserving natural resources and fighting climate change, whilst fostering sustainable and equitable means of growth on a global scale.

In 72 countries, generating **revenue of A\$62 billion**, Veolia Environnement has **336,000 employees** offering the entire range of environmental services in water management, waste management, energy and transport for commercial, industrial and public authorities.





# Veolia Water Solutions & Technologies

## Creating Water Solutions



**Veolia Water Solutions & Technologies** is a world leader in Design & Build of water and wastewater treatment plants, focusing on **reuse & desalination**.

We provide Design & Build capabilities, turnkey packaged plants and skid systems incorporating Maintenance & Service and Hydrex® Specialty Chemical agreements.

We have developed a unique range of **differentiating technologies** through our worldwide research and development teams to deliver the most **innovative** and effective **technological solutions** for our customers.

We create water solutions for **drinking water**, **industrial process water** and **wastewater** to meet the needs of municipal, commercial & industrial customers.

## Providing innovative technological solutions & services for our customers

### Design & Build

- **Design, construction and commissioning** of projects on every scale with tailored processes and technological solutions
- Focusing on **reducing operating costs**, and improving flexibility, reliability, environmental protection and safety



### Packaged Plants & Skid Systems

- We offer a range of turnkey packaged plants and skid systems to provide **efficient & cost effective** solutions with short turnaround times
- Easily integrated on **sites** with **space restrictions**
- Leasing of mobile units and pilot plants



### Maintenance & Service

- Our customers benefit from the **highest possible levels of service** and support throughout the long life of our water treatment systems and equipment. We can provide:
  - Hydrex® Specialty Water Treatment Chemicals, PICA Activated Carbon, Spares & Consumables
  - Maintenance & Service Agreements, Chemical Service Agreements
  - Technical consultation including audits and plant refurbishments for power stations



# Municipal Customers



We work with **water authorities, councils and municipal customers** to deliver high quality drinking water and advanced wastewater solutions.

We help our customers to secure a drought proof water supply, ensure the security and safety of drinking and recycled water processes, and provide effluent treatment to protect the **environment**.

We can provide **innovative water solutions** for:

- > **Highest quality potable water** from rivers, dams, groundwater and desalination of seawater or borewater
- > Advanced **tertiary treatment** for recycling of municipal wastewater for new housing developments, high rise buildings, tourist developments and golf courses
- > **Sewer mining, blackwater treatment** and **recycling** for local recycled water schemes
- > **Treatment of wastewater, storm flow and phosphorous removal** before discharge into sensitive environment

## > World Leader in Water Reuse

**Recycling water for industrial and agricultural use is of key importance in Australia.**

Veolia Water is a world leader in water reuse, with over **50 water reuse projects** in Australia, **recycling up to 600 Megalitres a day**, producing high quality treated water.

Treated water is suitable for irrigation of fields, recreational areas, for industrial reuse (process water, boiler feed water, cooling towers, etc), or for discharge into sensitive environments.



## > World Leader in Desalination

**Desalination plays a key role in overcoming Australia's scarce water resources and creates an alternative drought-proof water supply.**

Veolia Water is a world leader in desalination, with over **2,000 desalination installations worldwide**, using Reverse Osmosis or thermal processes.



# Industrial Customers



## > Power

**We work with power companies throughout Australia and New Zealand.**

**We can provide:**

- > Boiler feed water production for steam generators
- > Cooling water production and management
- > Water chemical conditioning, including Legionella control
- > Effluent treatment and reuse, including Zero Liquid Discharge (ZLD), sludge treatment and disposal

***Some of our customers: Macquarie Generation, Eraring Energy, Stanwell Corporation, Redbank Power, Griffin Energy, Delta Electricity, Alstom, Genesis Energy, ERM Power, Austrian Energy.***



## > Oil & Gas

**We have developed specific processes suitable for water and wastewater treatment for Liquefied Natural Gas, Coal Seam Gas, oil and petrochemical production and exploration. We can provide:**

- > Treatment of produced water to remove pollutants for reuse or environmental discharge
- > Treatment of sea water or groundwater for producing high quality demineralised water, process water or drinking water
- > Integrated and packaged plants on skids

***Some of our customers: Woodside, Esso, Caltex, Technip, Shell, BP, Chevron, Queensland Gas Company/ BG Group, Arrow Energy.***



## > Mining & Metal Processing

**Our robust and reliable process technologies are ideally suited to the mining industry. We can provide:**

- > Microfiltration and desalination systems for water reuse and drinking water supply
- > Water solutions for complex mineral processing, recovery applications and treatment of contaminated pond or underground mine water
- > Pre-engineered packaged plants for fast and effective remote construction

***Some of our customers: BHP Billiton, Rio Tinto, Vale Inco, Lihir Gold, Dampier Salt, Queensland Nickel, Perseverance, BlueScope Steel, Bendigo Mining.***



## > Food & Beverage

**Water is widely used in the Food & Beverage industry as process water, as an ingredient, for industrial use, treatment of effluents, and water recycling. We offer:**

- > Consistent production of high quality water, compliant with Health and Food safety legislation
- > Effluent treatment and reuse, including treatment of oil, fat & grease
- > Prevention of Legionella and management of health risks through our preventative solutions

***Some of our customers: Coca Cola Amatil, Warrnambool Cheese & Butter Factory, Arnotts, d'Vineripe, Tatura Milk, Cadbury, Cargill, Fonterra, Freshpak, CUB, Masterfoods.***



## > Pharmaceuticals

**We can provide pharmaceutical companies with water treatment solutions such as:**

- > Production of Purified Water, highly purified water, pyrogen free water and water for injection (WFI)
- > Specific treatment technologies for manufacturing facilities, from process water to waste water and sludge treatment

***Some of our customers: Astra Zeneca, CSL, Probiotec, Pharmaxis, Hospira, Baxter Healthcare***



# Innovative Technologies

## Actiflo® Clarification

- > Actiflo® is a **compact, high performance water clarification system** combining the advantages of microsand enhanced flocculation with fast lamella clarification – particularly suited for high turbidity water
- > Key features: **flexibility** (reacts quickly to changing raw water quality), **efficiency** (removal rate of turbidity exceeding 99%), start up to steady state within minutes
- > Strong 18-year operating experience with over **530 Actiflo® plants worldwide**
- > Available: **Actiflo®** and **Actifloc®** (with filtration) clarification packaged plants (1,000 to approx. 3,000 kL/day), **Actiflo® HCS** (High Concentration Sludge), **Actiflo® Turbo** and engineered solutions for larger plants



## Hydrotech® Discfilters

- > **Tertiary treatment** capable of producing effluent with both low turbidity and low total suspended solids. Discfilters are utilised in treatment plants primarily for effluent polishing
- > Key features: robust construction, low headloss, **small footprint**, automatic backwash, **low maintenance**, easy access, **minimal equipment and operational flexibility**
- > Strong 10-year operating experience with more than **6,000 Hydrotech® installations worldwide**
- > Capacity: 10 to 4,000 kL/hour

*To achieve higher clarification and filtration of suspended solids water, or phosphorous removal, the compact and efficient Actidisk® process is recommended (Actiflo® + Discfilters).*



## Neosep® Membrane Bioreactor

- > A new generation membrane biological process for **producing high quality recycled water** from industrial or municipal wastewater
- > Key features: **high quality reuse water** (class A++), high BOD/COD removal rate, small footprint
- > 12-year operating experience with **75 Neosep® plants worldwide**
- > Available: Neosep® packaged plants (50 kL/day to 1 Megalitre/day) or engineered system



## Moving Bed Biofilm Reactor (AnoxKaldnes™ MBBR)

- > Leading-edge biological solution for wastewater treatment combining the advantages of activated sludge & fixed biofilm systems
- > The biofilm attached to a carrier achieves **high BOD, organic & nitrogen pollutant removal**
- > The MBBR process can be used as a standalone solution or combined with activated sludge
- > Key features: **very flexible, easy to operate**, can easily be installed in existing tanks or basins
- > More than **500 installations worldwide** across 50 countries



## Ultrafiltration

- > **Membrane filtration** range including ultrafiltration, microfiltration and nanofiltration
- > Can be used as a **pre-treatment for RO**, or as a standalone process for producing high quality water
- > Key features: robust proven technology, barrier filtration (ideal for reuse applications), low cost, small footprint
- > Available: packaged plants up to 96 kL/hour or engineered solution



## Reverse Osmosis

- > A membrane process used extensively for **removing salt from seawater or brackish water** and even dissolved contaminants from sewage
- > Key features: robust proven process technology, **small footprint, easy to operate**
- > Available: skid-mounted packaged plant (12 to 2,520 kL/day) or engineered solution
- > **Aquamove® Mobile Units:** containerised reverse osmosis units for water demineralisation or desalination which provide a quick, cost effective response for short or mid-term water treatment needs



## Ion Exchange

- > A packaged or individually tailored solution ideally suited for ultra pure water for boiler feed
- > Key features: **low operating costs**, small footprint, **efficient chemical usage**
- > Available: countercurrent or packed bed designs



## Packaged Plants & Skid Systems

- > Standard products & equipment including **Actiflo® Clarification** packaged plants, Desalator Reverse Osmosis systems, Multipure Plus & Midi **Reverse Osmosis** units, Continuous and Rapide Strata **Deionisation** systems, **softeners** and filters
- > Packaged plants specific for purified water treatment for the pharmaceutical industry include Orion II™, Polaris™, IonPro-LX™ and Quattro™



## Hydrex® Specialty Water Treatment Chemicals

- > A complete range of specialty water treatment chemicals for boiler & cooling water systems including Legionella control, Reverse Osmosis **antiscalants**, **biocides**, **cleaners**, **inhibitors**, **dispersants** and **polymers**
- > Can significantly improve the management of **scaling**, **biofouling**, **corrosion**, **suspended solids**



# Creating Water Solutions for municipal customers

## > RECYCLING TREATED WASTEWATER FOR INDUSTRIAL REUSE

### Rosehill Recycled Water Scheme for Sydney Water Corporation - NSW

- > Design, build, own and operate (20 years) of a **water recycling plant** to treat municipal wastewater for **reuse by local industry**
- > Capacity: 20 Megalitres/day
- > Process: **ultrafiltration** and **reverse osmosis** will treat secondary effluent from the Liverpool Sewerage Treatment Plant
- > Application: the plant will **produce 4.3 billion litres a year** (upgradable to 7.3 billion litres) for reuse by major industrial and commercial customers, reducing demands on drinking water supplies



### Illawarra Recycled Water Plant for Sydney Water Corporation – NSW

- > Advanced wastewater treatment plant in Wollongong treating the wastewater from 300,000 residents
- > Capacity: 320 Megalitres/day (ADWF: 59 ML/day)
- > Process: using **membrane filtration**, and **reverse osmosis** to recycle 20 Megalitres/day
- > Application: produce high quality water suitable for industrial reuse by BlueScope Steel at Port Kembla



## > REDUCING WASTEWATER & STORMWATER ENVIRONMENTAL IMPACT

### Actiflo® Clarification Packaged Plants for Rodney District Council & Gore District Council – New Zealand

- > Design & supply **Actiflo® Clarification** packaged plants
- > Rodney DC: **treat peak storm flows to reduce Total Suspended Solids (TSS) & phosphorous** before discharge into environment. Capacity: 9 Megalitres/day
- > Gore DC: **reduce phosphorous from municipal wastewater** before discharge into nearby river. Capacity: 7.5 Megalitres/day



### Maroochydore Sewage Treatment Plant for Maroochy Waters Alliance – QLD

- > Upgrade of Sewage Treatment plant to advanced tertiary filtration
- > Capacity: 36 Megalitres/day (ADWF: 12 ML/day)
- > Process: 2 **Hydrotech® Discfilters** used for tertiary effluent filtration
- > Application: provide class A water for agricultural reuse and irrigation, as well as improve the quality of water discharge into the Maroochy river



## > RECYCLING WASTEWATER USING BIOLOGICAL TREATMENT FOR IRRIGATION

### Brampton Island Sewage Treatment Plant - Whitsundays, QLD

- > Design & Build contract for the upgrade of Brampton Island Sewage Treatment Plant
- > Capacity: 100 Kilolitres/day
- > Process: **Neosep® Pack Membrane Bioreactor**, Ultrafiltration
- > Application: class A quality treated water suitable for irrigation of the resort grounds and golf course





# Case studies

## > TREATING BORE WATER & WASTEWATER TO MEET TIGHTER CONSENT REQUIREMENTS

### Water treatment plants for Barwon Heads & Portsea Golf Clubs – VIC

- > Reduce salinity of bore water or wastewater using microfiltration and/or reverse osmosis
- > Barwon Heads Golf Club: Design & Supply of a **Microfiltration/ Reverse Osmosis** plant to treat Class C water from a nearby sewage treatment plant. Capacity: 120 kL/day
- > Portsea Golf Club: Design & Supply of a Multipure Plus **Reverse Osmosis** packaged plant to reduce the salinity of bore water. Capacity: 300 kL/day
- > Application: produce **high quality treated water** to irrigate the golf course fairways & tees



## > PROVIDING SAFE DRINKING WATER THROUGH MICROFILTRATION OF RAW WATER

### Three Villages Water Microfiltration Plants, Wauchope WTP and Port Macquarie Reclaimed Water Plant for Port Macquarie Hastings Council – NSW

- > Design and installation of 4 water filtration plants, using continuous **submerged microfiltration** and a water reclamation plant at Port Macquarie using **reverse osmosis**
- > Total capacity: 9.3 Megalitres/day upgradable to 22.3 Megalitres/day
- > Application: the 4 water filtration plants **produce high quality drinking water** (8.3 Megalitres/day) and the Reclaimed Water Plant treats tertiary effluent using **ultrafiltration, Reverse Osmosis, UV disinfection and chlorine** to provide an alternative source of water for **agricultural and playing fields irrigation** (1 Megalitre/day)



*2009 Engineering Excellence NSW Awards: Award for Excellence & Innovation in Sustainable Engineering Excellence (Wauchope WTP)*

## > PROVIDING SAFE DRINKING WATER THROUGH DESALINATION OF SEAWATER

### Sydney Desalination Plant for Sydney Water – NSW

- > 20-year Design, Build & Operate contract for a **Sea Water Reverse Osmosis desalination** plant
- > Capacity: 250 Megalitres/day upgradable to 500 Megalitres/day
- > Process: using **pre-treatment**, 2-pass **Reverse Osmosis** and **post-treatment**
- > Minimise environmental impacts through protection of coastal waters and **reducing the impact on sensitive marine ecosystems**. The plant will be powered by green energy and energy recovery devices are used to **reduce energy consumption**
- > Application: **drinking water** will be provided to **1.5 million people in Sydney**



### Gold Coast Desalination Plant for WaterSecure – QLD

- > 10-year Design, Build & Operate contract for a **Sea Water Reverse Osmosis desalination** plant
- > Capacity: 125 Megalitres/day
- > Process: using **pre-treatment**, 2-pass **Reverse Osmosis** and **post-treatment**
- > Application: provide **drinking water for 450,000 people** of South East Queensland



*2009 Global Water Awards: Membrane desalination plant of the year*

# Creating Water Solutions for industrial customers

## > TREATING UNDERGROUND MINE WATER FOR REUSE

### Bendigo Mining Water Treatment Plant for Bendigo Mining - VIC

- > **Treatment of underground mine water** at the New Moon gold mine site, to remove heavy metals, arsenic and other contaminants
- > Capacity: 7 Megalitres/day
- > Process: **Actiflo® Clarification** unit used for pre-treatment of feedwater, manganese greensand filters and **Reverse Osmosis**
- > Application: treated mine water suitable for irrigation, supply of environmental flows and other community uses



## > TREATING SURFACE WATER FOR INDUSTRIAL PROCESS WATER

### Bayswater Power Station Water Treatment Plants for Macquarie Generation – NSW

- > Design, Build & Operate 4 Water Treatment Plants at Bayswater Power Station, one of Australia's largest power stations
- > Capacity: 2,640 MW (power station) and 120 Megalitres/day (WTPs)
- > Process: **lime softening, reverse osmosis, 8 Actiflo® clarification units, ion exchange, filtration, HPD brine concentrator and crystalliser**
- > Application: industrial process water
- > Protect the environment by reducing the salinity of nearby Lake Liddell, through an increased salt removal capacity, as well as maintain Bayswater as a **Zero Liquid Discharge (ZLD)** Power Station



## > TREATING WASTEWATER FOR REUSE

### Water Treatment Plant for d'Vineripe at Two Wells Hydroponic Tomato Glasshouse - SA

- > Design, supply & build of a Microfiltration/Reverse Osmosis Plant treating water sourced from the Bolivar Water Reuse Project
- > Capacity: 1 Megalitre/day
- > Process: **Microfiltration & Reverse Osmosis**
- > Application: provide high quality water for **irrigation of hydroponic tomato crops** and provide **cooling water** for the evaporation system



## > REMOVING IMPURITIES TO PRODUCE PROCESS WATER

### Condensate Polishing Plant for Huntly Power Station - New Zealand

- > Design, supply, install & construct a new **Condensate Polishing Plant**
- > Capacity: 360 m<sup>3</sup>/hour
- > Process: **Tripol® condensate polishing** system with 3 regenerator vessels
- > Application: **remove impurities** from **condensed steam** from the power plant steam turbine for the high pressure boiler



# Case studies

## > PROVIDING HIGH QUALITY DRINKING & DEMIN WATER FOR REMOTE SITES

### Desalination Plants for Woodside's North Rankin A and North Rankin 2 Redevelopment Project offshore platforms

- > North Rankin A: Design and build of a sea water **reverse osmosis** (SWRO) plant providing high quality **drinking water** for employees. Ongoing **service** and maintenance for the offshore platform. Capacity: 70 m<sup>3</sup>/day
- > North Rankin 2: design and supply of a **brackish water reverse osmosis** plant, treating potable water from the North Rankin A SWRO unit to produce **demin water** with low chloride levels for the tempered water system. Capacity: 120 m<sup>3</sup>/day



## > PROVIDING WATER SERVICES TO PRODUCE HIGH QUALITY WATER FOR FOOD & BEVERAGE

### Warrnambool Cheese & Butter Factory – VIC

- > **Multi-year service contract** & supply of Hydrex® Specialty Water Treatment Chemicals
- > New state-of-the-art automated dosing equipment for cooling, boiler and closed loop systems
- > Service of the demineralisation plant and softening plants onsite



## > TREATING CONTAMINATED WATER FOR INDUSTRIAL REUSE

### Orica Groundwater Treatment Plant for Orica Australia Pty – NSW

- > Design & supply of the final purification components for a Groundwater Treatment Plant treating contaminated groundwater to remove dissolved solids, organic acids and organic contaminants
- > Capacity: treating up to 15 Megalitres/day
- > Process: 2 **Actiflo®** units, **reverse osmosis** and **sludge thickening**
- > Application: high quality treated water used by local industry for cooling tower make-up and other industrial uses



### Effluent Polishing Plant for Woodside Pluto Project, WA

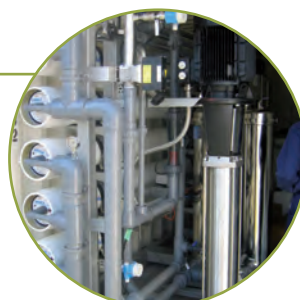
- > Design and supply of an Effluent Polishing Plant for the Pluto Onshore Liquefied Natural Gas (LNG) Plant
- > Capacity: 43 m<sup>3</sup>/hour
- > Process: **Tilted Plate Interceptor (TPI)**, **Macro Porous Polymer Extraction (MPPE®)**, Chillers & Coolers, **Membrane Bioreactor (MBR®)**, **Filtration & Advanced Oxidation Systems**, **PICA Activated Carbon**
- > Application: Effluent water streams are treated for **removal of contaminants** for reuse in the demineralised plant or for discharge into environment



## > PROVIDING A MID OR SHORT-TERM LEASING SOLUTION FOR TEMPORARY PURIFIED WATER NEEDS

### Aquamove® Reverse Osmosis Mobile Units for BlueScope Steel – NSW

- > Multi-year lease agreement of 3 **Aquamove® 1000** & 1 **Aquamove® 500** reverse osmosis mobile units and skid-mounted submerged **microfiltration** units for pre-treatment
- > Capacity: 3.5 Megalitres/day
- > Mobile units manufactured in Australia, guarantee given on treated water conductivity





# Committed to Sustainable Development

As the world leader in environmental solutions, Veolia Environnement is meeting the biggest environmental challenges of this century; conserving natural resources and fighting climate change. Sustainable development is central to our culture, business activity and strategy.

Veolia Environnement's high standards in ethical conduct and behaviour are recognised by key corporate social responsibility global organisations, including the

Dow Jones Sustainability Indexes and the FTSE4Good index (London-based Socially Responsible Investment Index).

At Veolia Water Solutions & Technologies Australia & New Zealand, we are committed to fostering sustainable development and operating our business to the highest environmental standards. We aim to create sustainable water solutions for industrial and municipal customer.

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