

# WESTERN AUSTRALIA

UNIQUE | DIVERSE | EXTRAORDINARY



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"We are proud and excited to introduce you to Veolia WA and our incredible state of Western Australia"



## Welcome. Bienvenue.

You may be surprised by what you discover – both Perth and the Pilbara are home to many iconic and inspiring destinations.

At Veolia WA, we are unique because of the environment we live and work in and the challenges we face every day, including high temperatures and vast geographical distances. Another key factor that defines us is the clients we have – global mining and resources companies that insist on the highest safety and environmental standards in the world. Safety always comes first. Everyone has a responsibility to keep themselves safe and it is expected that requirements are followed at all times.

Mining and the oil & gas industries are integral to Australia's economy and Veolia is proud to be part of the success stories. One of the key drivers for our clients in the Pilbara region is achieving continuity of operations with minimal downtime.

The importance on Indigenous engagement is also essential. We recognise the importance of the contribution Aboriginal people have made to the social and economic

development of Australia and to Western Australia in particular. Veolia operates North West Alliance, an Aboriginal joint venture with Our Country, which seeks to build the local Indigenous economy through a framework of best practice.

We hope your visit broadens your horizons and gives you the opportunity to see relevant work in a new context. We also hope you gain an insight into the business operations of Veolia WA, and the broader issues associated with doing business in Australia's north-west.

With so much natural beauty and diversity on offer in Western Australia, and a rich history of Aboriginal culture dating back thousands of years, you won't have time to explore it all. However, we hope you will be inspired to return to WA one day, perhaps with your families, so you can relax and take it all in at your leisure.

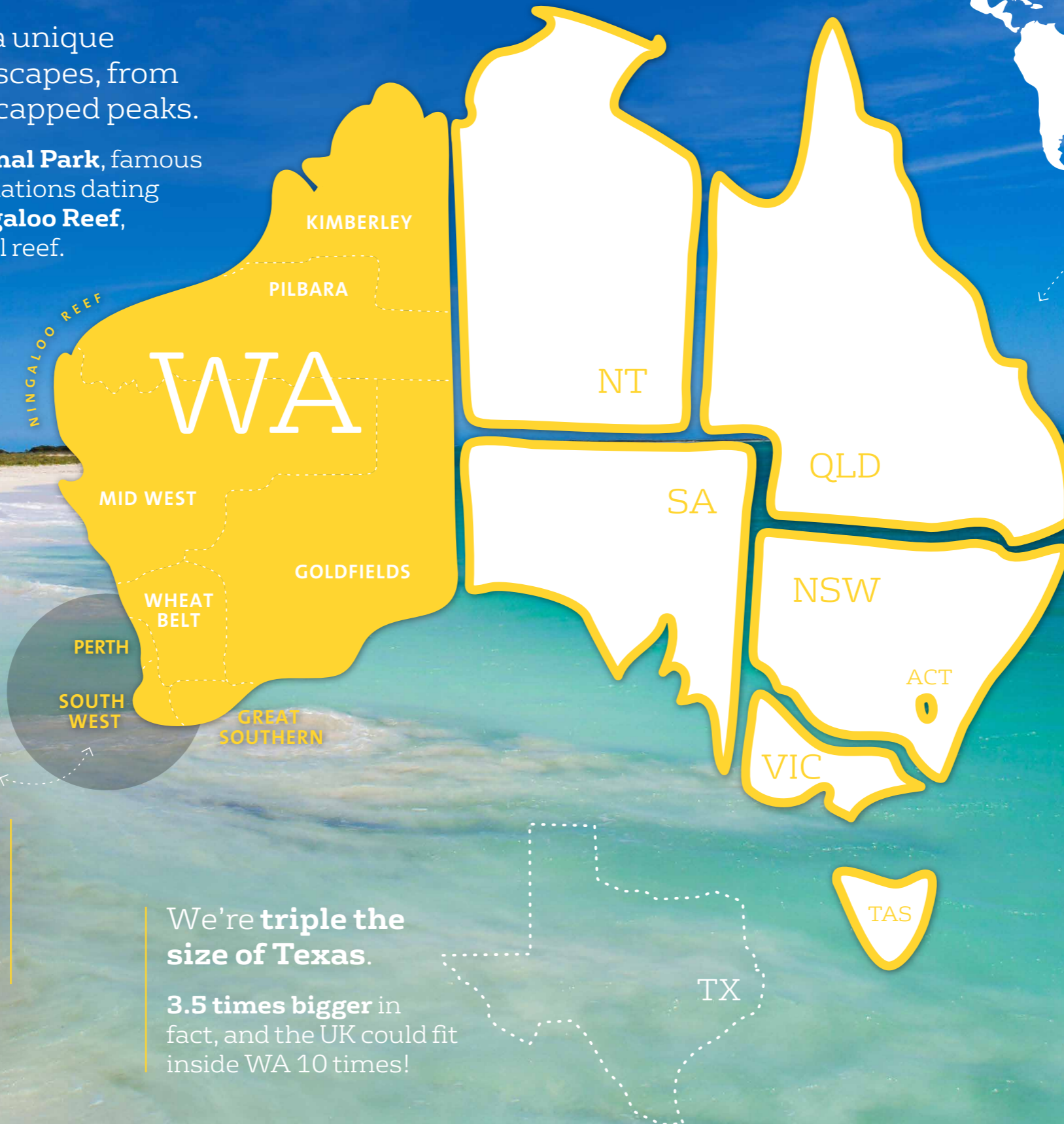
**Marc Churchin**  
GROUP GENERAL MANAGER  
Veolia Western Australia



# About WA

Western Australia offers a unique diversity of inspiring landscapes, from red desert plains to snow-capped peaks.

Landscapes like **Karijini National Park**, famous for some of the oldest rock formations dating back two billion years, and **Ningaloo Reef**, the world's largest fringing coral reef.



More than **1,400 vessels** have been **wrecked** off the WA coast.

The high number is due to WA's vast and hazardous coastline that has very few natural harbours. The long cyclone season and the prevalence of storms and powerful onshore winds also make our coastline particularly dangerous -and largely unexplored.

WA's first recorded shipwreck was The Triall in 1622. The most famous (and the subject of books and screen) is the Dutch East India Ship Batavia, which was lost in 1629. The WA Maritime Museum at Fremantle is an international centre of excellence in maritime archaeology.



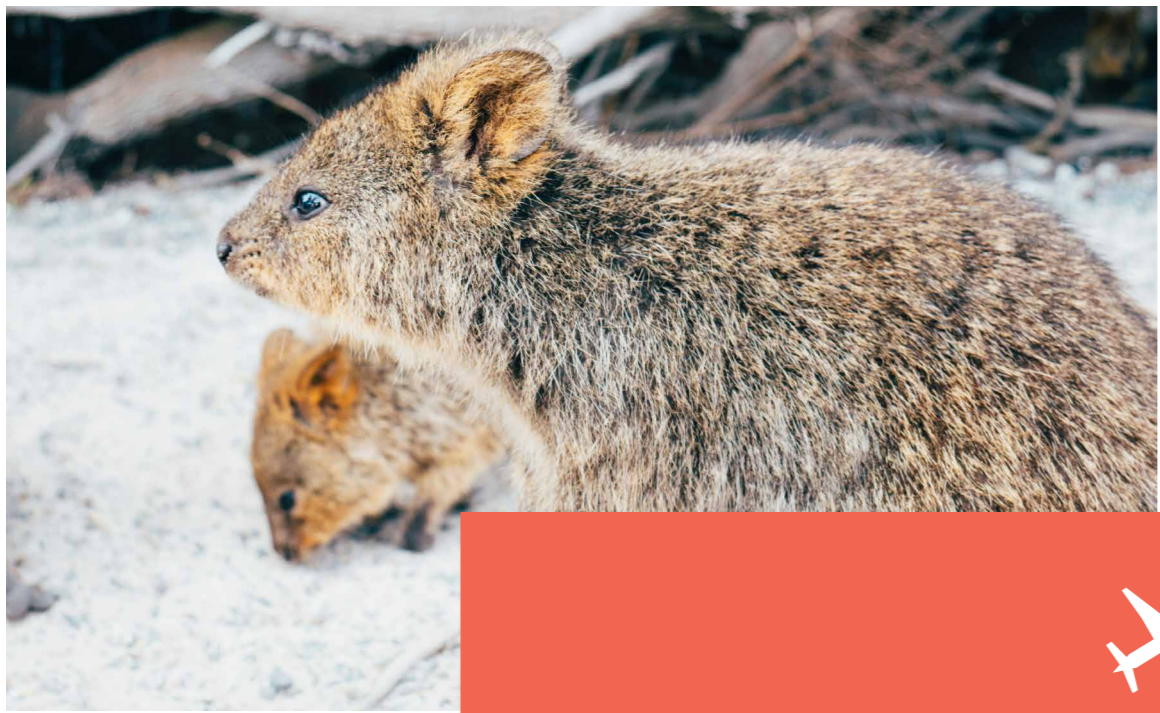
Home to 2.6 million people, **92%** of WA's population lives in the state's **south-west corner**, including **72% in Perth**. The remainder of the state is sparsely populated.

We're **triple the size of Texas**.

**3.5 times bigger** in fact, and the UK could fit inside WA 10 times!

With more than **20,000 kilometres of coastline**, WA has more breathtakingly beautiful beaches than any other state or territory in Australia - many with white sand so pristine, it squeaks.





WA's capital, Perth is one of the **most isolated major cities** in the world.

Perth's closest Australian capital city is Adelaide – a 24-hour drive across the Nullabor Plain. Not surprisingly, most people choose to fly. Perth is closer to Singapore and Jakarta than Australia's own capital, Canberra.



Perth's iconic **Kings Park** offers spectacular views of the city and attracts more than 6 million visitors each year.

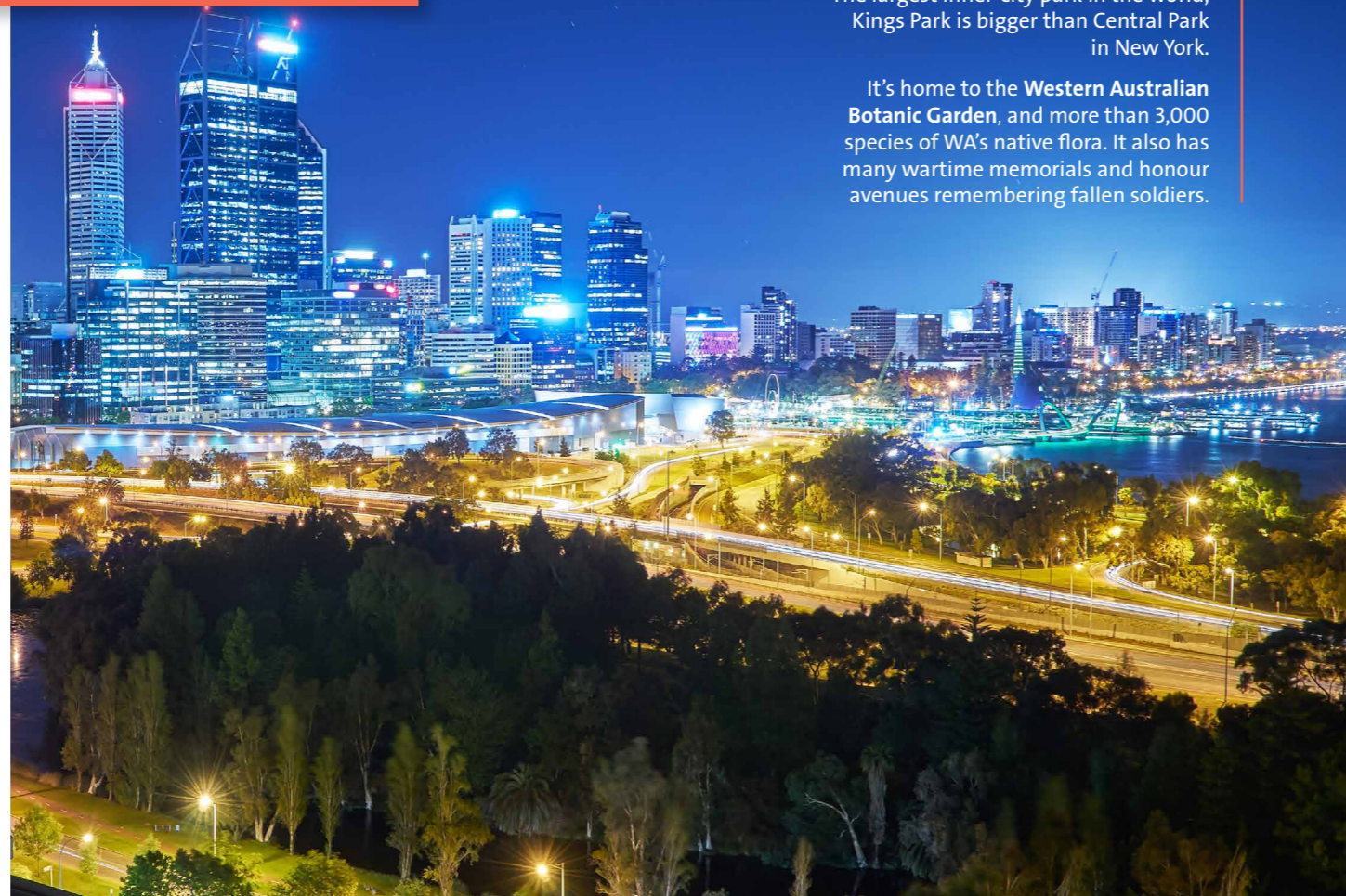
The largest inner-city park in the world, Kings Park is bigger than Central Park in New York.

It's home to the **Western Australian Botanic Garden**, and more than 3,000 species of WA's native flora. It also has many wartime memorials and honour avenues remembering fallen soldiers.

Perth is located on the beautiful **Swan River**, which gracefully meanders its way through the city until it reaches the Indian Ocean at Fremantle.

The river has been a source of life and sustenance for the Indigenous Noongar people for more than 40,000 years. It is also a place of deep spiritual and cultural significance.

WA's official emblem, which features on the state's flag and the coat-of-arms, is the black swan – the only swan that is native to Australia. You'll see plenty of business and sporting names in Perth paying homage to the large waterbird.



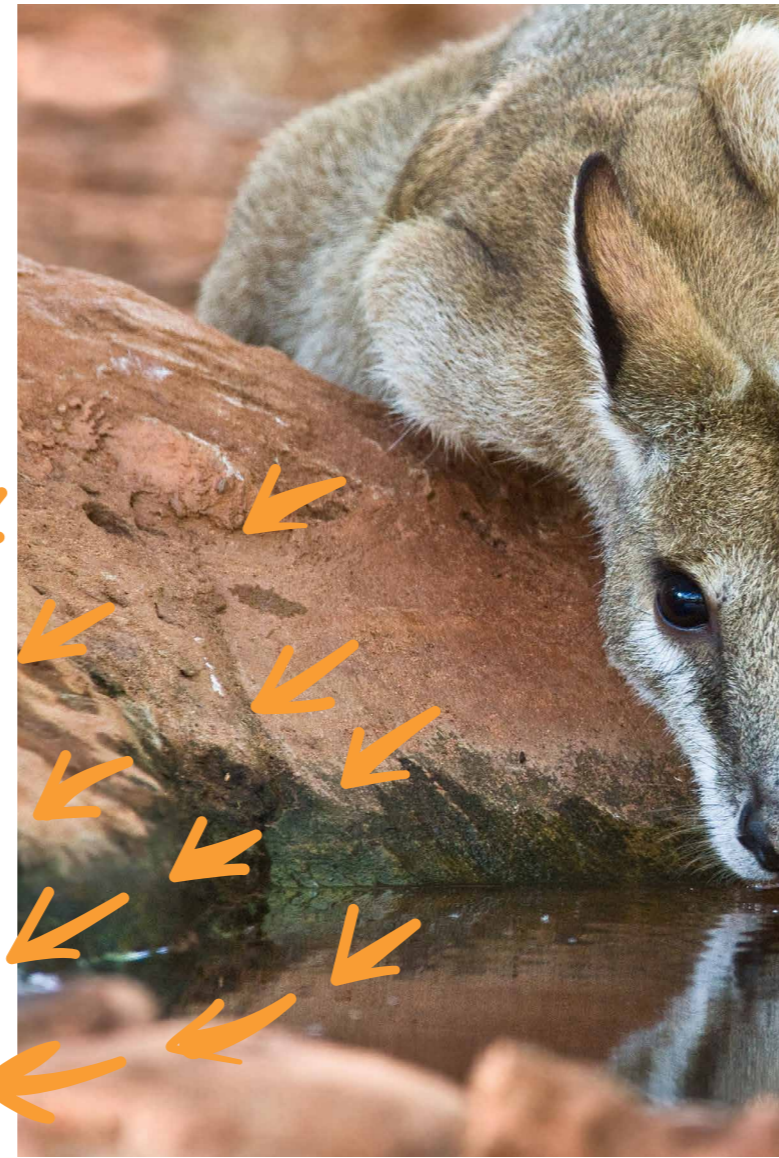


## Discover Ancient Rock Art

Archaeologists believe that Aboriginal occupancy of the Pilbara is over five times more ancient than the Egyptian pyramids.

Evidence dating back at least 40,000 years tells of a people who had art and a sophisticated culture. There are estimated to be more than one million rock carvings, known as petroglyphs, on the Burrup Peninsula just 15 minutes' drive from the Pilbara mining town of Karratha.

The rock art changed as the last ice age ended and melting icecaps caused sea levels to rise, turning inland plains into coastal headlands. Earlier art features kangaroos and emus and later, fish and turtles. The Burrup petroglyphs also contain deep cultural meanings. The area was recognised as meeting the criteria for World Heritage protection in 1980.



We acknowledge the Ngarluma-Yindjibarndi, the Yaburara-Mardudhunera and the Woon-goo-tt-oo people as the Traditional Custodians of **Murujuga National Park.**

Aboriginal people have a deep connection to land and sea, which is intertwined with traditional knowledge, cultural expression and identity. Murujuga National Park is solely owned by Aboriginal people and jointly managed by Murujuga Aboriginal Corporation and the Parks and Wildlife Service.

# WA's Indigenous Heritage

WA is one of the **most ancient** lands on the planet.

There's plenty to explore, from 3.5 billion-year-old living fossils, to more than 40,000 years of Aboriginal history.

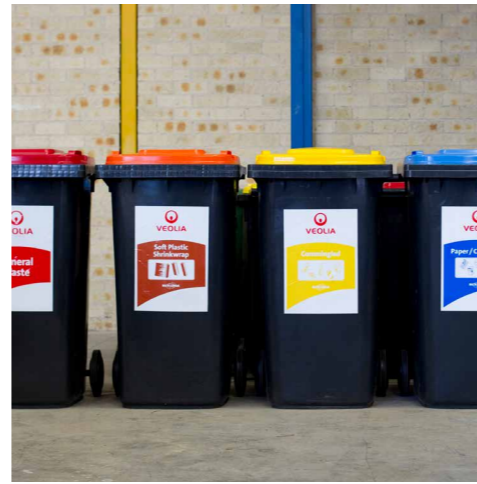
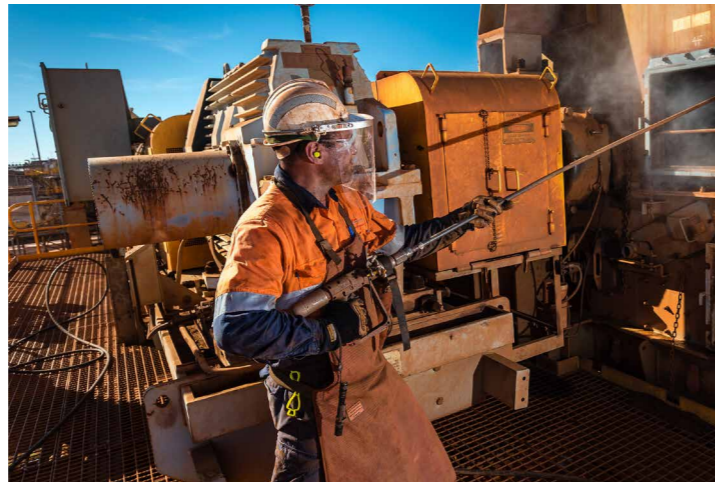
## Cultural Awareness

Positive Indigenous engagement is founded on **trust, respect, understanding** and **consultation.**

Veolia acknowledges Aboriginal people as the Traditional Owners and custodians of the land and their ongoing connection to it.



# Veolia in WA



Kujungka la  
palyamarnku;  
Working together  
to make it better.

North West Alliance (NWA), operated by Veolia, is a fully incorporated, 50/50 joint venture between two capability partners: Veolia and Our Country – a 100% Aboriginal owned sustainable development advisory.

NWA uses a best practice framework to build the local Indigenous economy. Veolia brings global best practice and Our Country brings a local Aboriginal focus to NWA. All waste management opportunities in the Pilbara are pursued by Veolia and Our Country through this operational vehicle.



Water



Waste Management



Energy



Industrial Services

**North West Alliance**  
operated by **VEOLIA**

**OUR COUNTRY**





TRIFR: Total recordable injury frequency rate (per 1 million hours worked) LTIFR: Lost Time Injury Frequency Rate (per 1 million hours worked) \*Market Capital as at 18 May, 2018.

### Woodside

Dampier | Karratha | Offshore

TRIFR	Market Capital
1.29 (2017)	\$32 Billion*



Established one year after Australia's first oil discovery in 1953 near Exmouth in WA, Woodside is Australia's largest independent oil and gas company. With its headquarters in Perth, Woodside has a global portfolio. Its Australian operations are in Karratha and Broome.

Woodside's focus is on upstream oil and gas (exploration and production). Australia's leading Liquefied Natural Gas (LNG) operator, Woodside produces around 7% of global LNG supply and operates a fleet of floating production storage and offloading (FPSO) facilities.

### Rio Tinto

Throughout the Pilbara

LTIFR	Market Capital
1.25 (2017)	\$104 Billion*



Rio Tinto is a global mining group and Australia's largest exporter of iron ore, operating an integrated network of 16 mines, 4 port facilities and 1700 km of rail network and related infrastructure in the Pilbara.

Rio Tinto's Pilbara operations are designed to respond rapidly to changes in demand for iron ore globally, supported by their Operations Centre in Perth. Backed by 12,000 employees, Rio continues to be the world's largest autonomous truck operator and a proud leader in automated mining technologies.

### Chevron (Bechtel)

Wheatstone LNG Project (Construction Phase) Onshore | Offshore

TRIFR	Market Capital
0.65 (2017)	\$248 Billion*



Chevron is an American multi-national energy corporation with a strong presence in the Pilbara.

Barrow Island is home to Chevron's Gorgon and WA Oil operations. One of Australia's finest Class A Nature Reserves, Barrow Island has the world's largest non-government quarantine management system, which has been recognised locally and globally as "best practice".

Today, the Island's 235 square kilometres of sparsely vegetated and arid landscape is a secure habitat for a variety of plants and animals – many of them endangered or rare on the mainland.

Gorgon is one of the world's largest LNG projects and the largest single resource project in Australia's history.

### BHP

BHP Billiton Iron Ore  
BHP Billiton Petroleum

Throughout the Pilbara | Offshore

TRIFR	Market Capital
4.2 (2017)	\$137 Billion*



BHP is a leading global resources company with three operating assets in WA – Western Australia Iron Ore, Nickel West and Petroleum.

Western Australia Iron Ore (WAIIO) is an integrated system of four processing hubs and five mines, connected by more than 1,000 kilometres of rail infrastructure and port facilities in the Pilbara.

BHP's marketing slogan is, fittingly, 'Think Big.' In 2014, BHP celebrated 100 billion tonnes of iron ore exports to both China and Japan. In 2015, BHP signed an agreement enduring more than 100 years to provide real and lasting benefits for generations of the Banjima People.

### Quadrant Energy

Karratha | Dampier

TRIFR	Market Capital
3.71 (2017)	(Private Company)



Quadrant Energy is one of Australia's largest oil and gas companies and an active offshore explorer. In 2016, Quadrant accounted for 22.3% of WA's domestic gas production. They also produce significant amounts of Australia's oil.

Quadrant's energy assets are located across WA's North-West. Their main focus is in the Exmouth and Carnarvon Basins offshore north Western Australia.

They deliver natural gas from their three production hubs, including Varanus Island. Two floating production vessels located off Exmouth process and store oil from multiple sub-sea fields.

### Roy Hill

Throughout the Pilbara

Market Capital
(Private Company)



Roy Hill is a relatively new iron ore mining, rail and port operation in the Pilbara. Its Remote Operations Centre and corporate headquarters are based in Perth.

Independently owned and operated, with WA-majority ownership, Roy Hill's operations include a conventional open pit, bulk mining operation and a 55 million tonne per annum (Mtpa) wet processing plant. It also owns 344km of single line, heavy haul railway, which is used to transport iron ore from the mine to its world class, two-berth iron ore port facility in Port Hedland. The port facility can receive, stockpile, screen and export iron ore as lump and fines.

First ore was mined from Roy Hill Mine in April 2014 and the first export shipment was loaded in December 2015. Key markets are Japan, Korea, China and Taiwan.

## Our Clients

The Pilbara was built on the **iron ore** industry.

You only have to look at Perth city's skyline to see the influence of the major mining and oil & gas companies... Rio Tinto's logo sits atop Perth's tallest building – a 249m office tower in Central Park, with BHP and Woodside nearby.



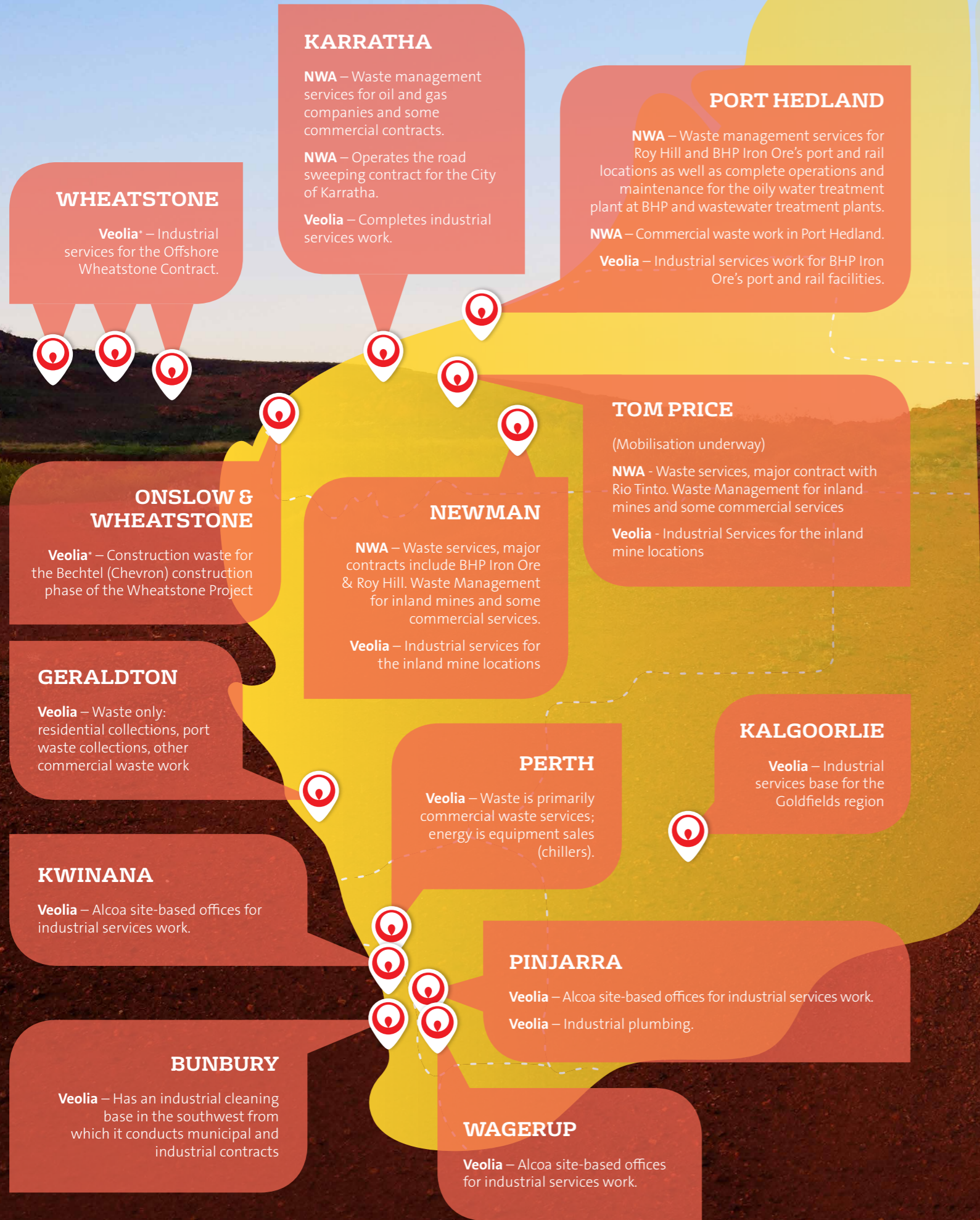
Clients outside of the Pilbara



# Veolia goes the distance.

Western Australia's unique environment and working conditions present interesting challenges for the local waste industry.

Due to environmental, safety and logistical requirements, Veolia travels huge distances as part of its waste management and disposal efforts.



North West Alliance's Newman Depot transports solid hydrocarbon waste approximately **600 km** to Karratha in order to access appropriate disposal options. That's about the same distance as Berlin to Amsterdam, or Brussels to Munich.



North West Alliance's Port Hedland Depot disposes of its contaminated soil by carting it to Geraldton around **1,400 km** away, the closest facility that has the environmental approvals to take such waste. That's about the same distance as London to Rome, or Paris to Belgrade.



North West Alliance and Veolia work on **Varanus Island** and **Barrow Island**. These are Conservation Reserves, as well as containing oil and gas deposits, which mean there are strict quarantine regulations in place. This can mean shrink wrapping all equipment to ensure that no species are brought onto the island which could endanger native wildlife.



\*Project location only.



# The cycles of boom or bust

The health of the mining industry is heavily dependent on **commodity prices**.

Unlike many other industrial plants, mines can shut down and restart with relative ease based on commodity prices and the industry forecast.



## How you know you're in a mining boom...

- Very high rental costs in mining towns and Perth's CBD offices
- High wages for jobs on site and in supporting industries
- Jobs are easy to find and employers have to work hard to keep good staff
- Incentives offered to recruit more people to live/work on site
- People swapping careers and moving to WA to 'cash-in' on the boom
- Business lounges at the airport full of people wearing high-vis clothing
- General feeling of optimism and business confidence



## Why the price of iron ore in China matters to WA

Iron ore is the key ingredient in the production of steel, one of the most fundamental and durable products for modern-day living, with uses from railways to refrigerators and pipes to paperclips.

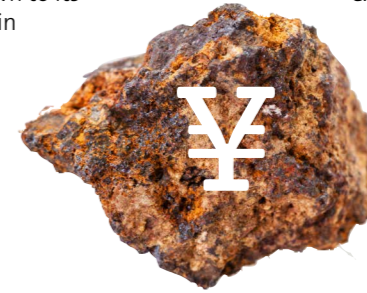
At its peak, the price of iron ore reached \$191 per tonne in February 2011 and hovered around \$160 in 2013. Prompted by lower demand in China however, the price steadily fell by 75% over the next two years, down to its record low of \$37 per tonne in December, 2015.

Western Australia felt the price drop hard and it contracted the industry.

The major players (BHP, Rio Tinto etc) stopped taking on new projects, other projects were delayed, house prices fell sharply in regional WA and in Perth, and some smaller mining companies ceased production.

The price has been hovering around \$80 per tonne for the past year and there are signs of some recovery in the industry. If higher commodity prices persist, a turnaround in exploration and investment activity is likely.

Minerals exploration has already begun to increase, particularly for gold.



## Living on Site

Most mines are housed in camps. Workers live on site and are provided with their own portable, square room called a 'Donga.' The dining room is called the Mess and the bar is called the Wet Mess, if you're lucky to have one. Most camps have a gym and some have a pool. Otherwise, leisure activities are limited.

## FIFO

Most mines operate a fly-in-fly-out (FIFO) operation where workers stay for an extended shift before flying home. Typical rosters are 2 weeks on/1 week off, or even as long as 4 weeks on/1 week off. The resources companies make an effort to look after FIFO workers' mental health and ensure their families can cope with the disruptive lifestyle.

## It's a long way to the big smoke.

Being so geographically remote creates plenty of logistical issues and the cost of transporting people and supplies can be hugely expensive. Consequently, sites aim to source locally, and are largely self-sufficient, for example housing their own medical staff.

## Lithium – the next boom resource for Western Australia?

The rapid growth in the use of electric vehicles has put the spotlight on lithium – a key ingredient in the manufacture of lithium ion batteries used in electric vehicles and electronic devices like mobile phones and laptops. WA has an abundance of it.

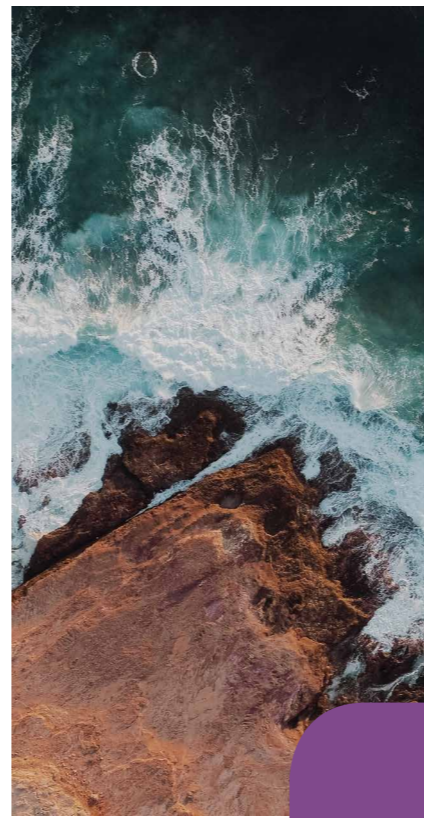
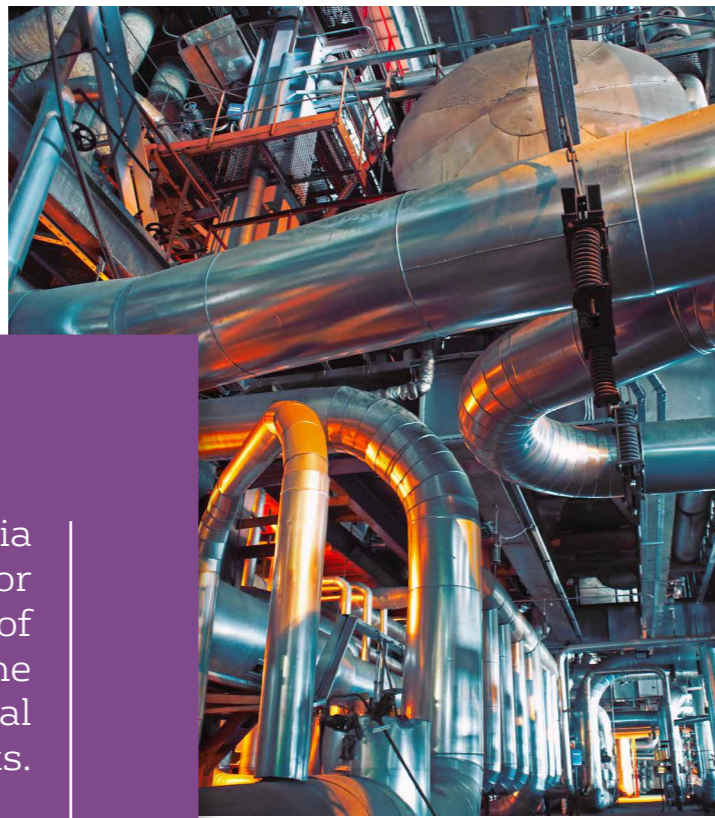
Western Australia is tipped to produce more than half of the world's lithium supply by the end of 2018.

There are already a handful of hard rock mines operating in WA, and others soon to start, including one of the world's biggest lithium refineries set to be established south of Perth.

WA is in the box seat of the booming global lithium industry and is well placed to satisfy the major electric vehicle markets in Europe and China.







Western Australia accounts for approximately 69% of Australia's and 8% of the world's liquefied natural gas (LNG) exports.

The Karratha LNG plant in WA is one of the largest in the country, covering 200 hectares and employing 430 staff and contractors. The Karratha plant supplies around 12 million tons of LNG a year to customers in the Asia Pacific region and other parts of the world. It also produces domestic gas, condensate and LPG (liquefied petroleum gas).

65% of the gas required by the Western Australian domestic market is supplied by the Karratha LNG plant.

Petroleum (oil) is a fossil fuel which was formed when large quantities of dead organisms, usually planktons and algae, were buried underneath sedimentary rock and subjected to intense

heat and pressure starting from the Jurassic age (180 million to 140 million years ago).

Western Australia has around 50 operating oil and gas fields. WA delivers value-added products to local and international markets, including liquefied natural gas and oil products, nickel, alumina, titanium dioxide pigment, gold, copper cathode, and tin, among others.

### Oil & Gas - The Three Energy Markets

The oil and gas industry is divided into three major components: upstream, midstream and downstream.

Upstream companies are the exploration and production companies. They search for potential crude oil and natural gas fields – identifying deposits, drilling wells and extracting raw materials from underground.

Downstream operations include refineries and marketing. They turn crude oil into usable products such as gasoline, fuel oils and petroleum-based products.

The midstream sector links upstream and downstream operations and incorporates transportation and storage of resources.

The bulk of the oil and LNG produced by WA is exported around Australia and the rest of the world. In Western Australia, the Dampier to Bunbury Natural Gas Pipeline and the Goldfields Gas Pipeline transport the gas to large urban and industrial centres to generate electricity.

In order to transport natural gas, it is cooled to about -162 degrees Celsius (which turns it to a liquid state and condenses its volume).

Liquefied Natural Gas (LNG) is safely stored and transported in double-walled tanks designed to handle the cold temperature. Once it reaches its destination, LNG is heated and changes back into natural gas for underground piping to households and industry.

Australia's gas production (LNG and domestic use) increased by almost 21% in 2017 compared with 2016. It has more than doubled over the last decade.

# Oil & Gas

### The Price of Oil

After falling from over US\$100 per barrel in 2014 to around US\$26 per barrel in January 2016, oil prices somewhat recovered to average US\$51 in

2017, mainly due to OPEC production cuts and steady demand growth. The oil price is forecast to average US\$58/barrel in 2018.



On 7th April 1924, the Pilbara town of Marble Bar achieved a **world record** – 160 consecutive days of temperatures of at least 37.8 °C.

# Going to the Pilbara

## What you need to know

There is an expectation that no-one walks past anything unsafe without doing something about it or failing to challenge anyone who is not meeting site safety requirements.

Don't be surprised if a stranger reminds you to wear your safety glasses or offers you hearing protection – the correct response is to thank them for their concern and comply.

### Mining is all about safety.

A lot of effort goes into keeping people safe on mine sites.

In fact, it's the law. The mining industry has a dedicated state government department and there are statutory frameworks that apply exclusively to mine sites.

On top of this, the major resources companies impose even more stringent safety requirements on their sites. Take them seriously.

	Dec-Feb		Mar-May		Jun-Aug		Sep-Nov		Annual (total)	
Average weather	Perth	Pilbara	Perth	Pilbara	Perth	Pilbara	Perth	Pilbara	Perth	Pilbara
Maximum temperature	30.6	34.7	25.9	33.1	19	27.0	23.5	32.2	24.8	31.8
Minimum temperature	17.5	26	13.6	21.6	8.2	14.1	11.8	20	12.8	20.4
Hours of sun per day	10.4	10.3	7.3	9.3	5.4	9.3	8.4	11.3	7.9	10.2
Number of days' rain (greater than or equal to 1mm)	1.6	1.8	5.6	1.7	13.1	0.8	6.8	0.2	91	14
Monthly rainfall	14.8mm	44.8mm	48.3mm	45.8mm	131.2mm	16.4mm	49.3mm	1.9mm	732.8mm	323.8 mm

### Drug and Alcohol

Most sites are subject to alcohol and drug testing and demand that all workers have a blood alcohol level of 0.00. Construction workers submit to a compulsory breath test before starting every shift. Even visitors must make sure they don't drink too much the night before. If you fail the test, you will not be allowed on site.

You may also be selected for a random drug test. This is done by urine analysis and you must be free of illicit drugs as per Australian Standards. If you are taking prescription medication, please have a copy of the prescription or the original packaging (with prescription label) issued by the pharmacist with you.

### Drink water

In summer, temperatures in the Pilbara can reach 50° so it's important to stay hydrated and protected from the sun. Even in winter, heat stress can still occur. A good hydration test is to check the colour of your urine.

### Snakes... be aware not alarmed

The Pilbara is home to 46 species of snakes, which live both on land and sea, but most snake bites in Australia are not lethal if managed quickly, calmly and effectively. Snakes are actually shy and prefer to retreat rather than attack.

### Cultural awareness

Stick to established paths so you don't disturb places of cultural significance for Aboriginal people. It's also important not to wander off alone for safety reasons.

### Safety. It's non-negotiable.

Please remember that all information, inductions and instructions issued on site are requirements – not recommendations or suggestions. From crossing roads at the correct place to wearing your hardhat, adherence to signage is 100% enforced.



# We're serious about safety

## Very serious.

Despite its remoteness, North Western Australia is the **epicentre of operations for some of the worlds' largest industrial players**, and like Veolia, they all put safety first.

When it comes to correctly wearing **PPE** (Personal Protective Equipment) there is no room for negotiation regardless of comfort or fashion.

It is essential that safety expectations are adhered to at all times when on client or Veolia sites.

### HELMET

Wear your hardhat wherever signposted.

### SAFETY GLASSES

Wear at all times (except in offices), clear glasses indoors with the option of the tinted outdoors.

### SHIRT

Buttoned down & tucked in – Not just for appearance, but to reduce the chance of being caught in machinery. Sleeves must be rolled down and buttoned.

### GLOVES

Gloves on a clip, on hip – Always have your gloves with you and wear them when picking up anything or navigating through walkways etc.

### BOOTS

Steel cap boots. Make sure your boots are in good condition and laced all the way up.



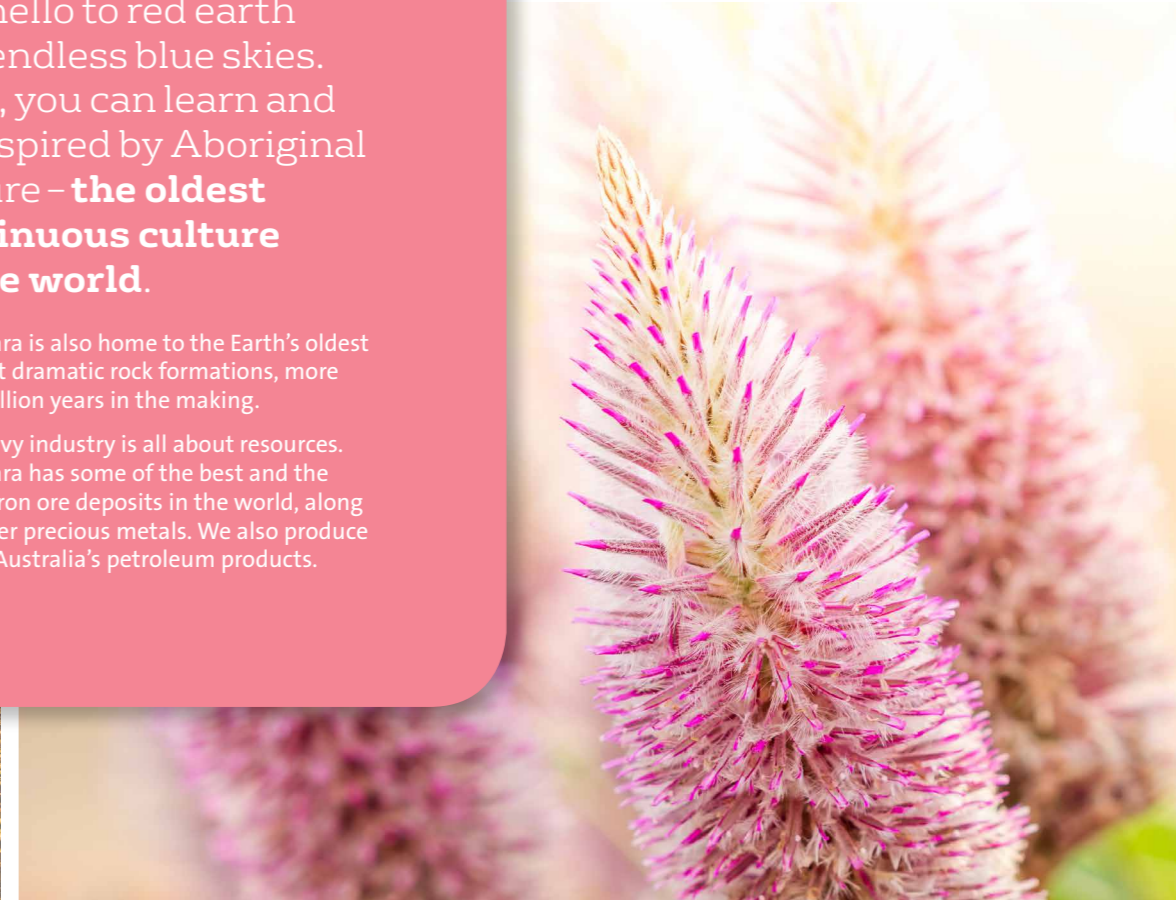


# Visiting the Pilbara

Say hello to red earth and endless blue skies. Here, you can learn and be inspired by Aboriginal culture – **the oldest continuous culture in the world.**

The Pilbara is also home to the Earth's oldest and most dramatic rock formations, more than 2 billion years in the making.

WA's heavy industry is all about resources. The Pilbara has some of the best and the biggest iron ore deposits in the world, along with other precious metals. We also produce most of Australia's petroleum products.



It's hard to imagine just how much salt the Pilbara produces – almost **ten million tonnes** each year!

Dampier Salt, a Rio Tinto company, produces salt by natural solar evaporation of sea water. It takes about 60 million tonnes of sea water to produce one million tonne of salt, and about 18 months to move the sea water through the series of ponds and to grow the salt ready for harvesting.

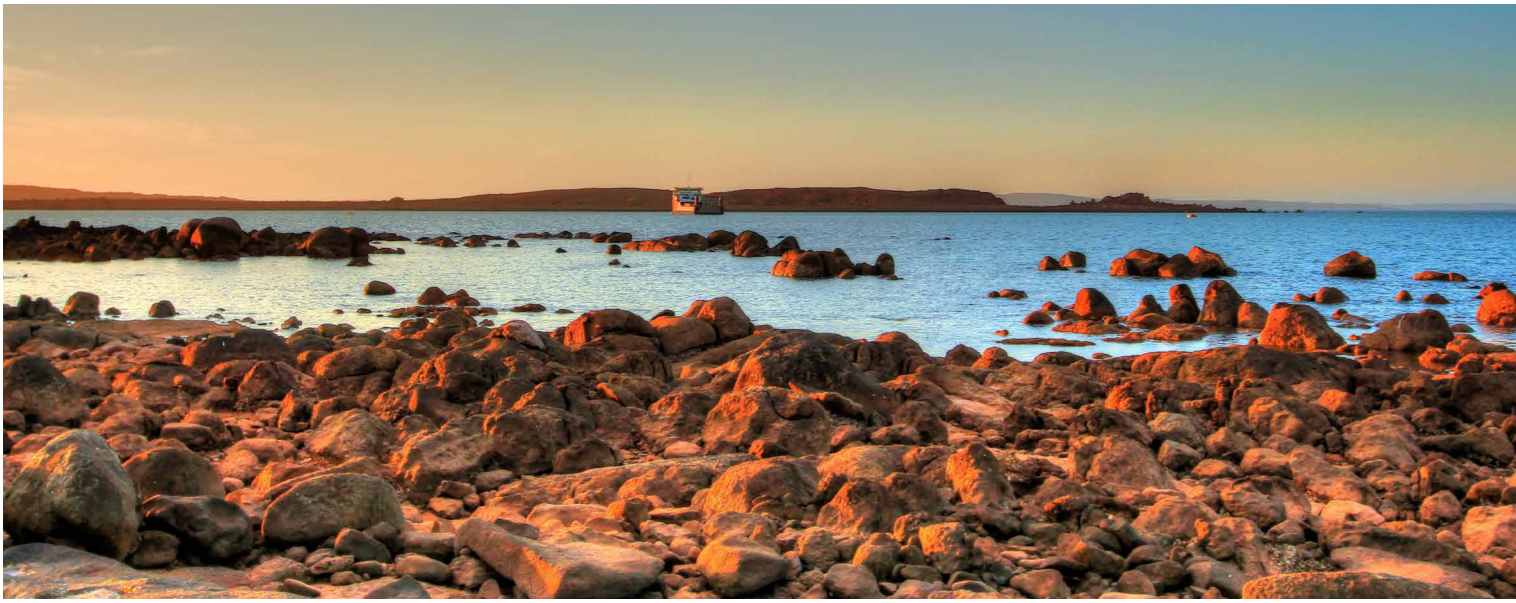
Salt is exported mainly to China, Korea and the Philippines for use in the chemical industry.



## Movie Review: **Red Dog** (2011)

Based on the legendary true story of Koko, an Australian Kelpie who united a local community while roaming the Australian outback in search of his long-lost master. The iconic film has become Pilbara folklore and has a sequel: **Red Dog: True Blue** (2016).





# Notes

A series of horizontal dotted lines for taking notes.



Ngurra palya, marpla palya, wangyu palya.  
Good country, good people, good prosperity.

[www.veolia.com/anz](http://www.veolia.com/anz)

