

Water

DRIVING PROGRESS

Innovation and creative construction in Water.

We provide outstanding water infrastructure solutions for our customers across diverse environments, no matter how challenging or sensitive. That is the McConnell Dowell difference.

Creative capability

network for remote communities in Fiji to expanding dam capacity in central Tasmania. We have delivered some of the world's largest and most efficient desalination plants and built large diameter water pipeline networks. These help to alleviate drought and bring water security to urban and rural communities.

tunnelling and building to deliver integrated design and construct solutions, combined with more than 50 years of experience and a

Vision and innovation

At McConnell Dowell we work hard to create a world where our infrastructure does more than maximise returns. Our water

Partnership and consultation

Our technical expertise is complemented by our significant approach to contractual arrangements. We work collaboratively with our customers and our technology and engineering partners to deliver creative solutions.

local communities. We engage closely with them before each economies. We are committed to leaving every community with better facilities while causing minimal disruption to lives

Safety and sustainability

McConnell Dowell is deeply committed to the safety of its workers, customers and the community. Sustainable outcomes are integral to each project and we follow through with 'green' work sites.

Industry influence

water infrastructure projects across water and wastewater treatment, transmission, storage and hydropower plants. With every successful project we create, we help to ensure an abundant future for people living in cities, towns, and rural and remote areas for generations to come.

Our progressive thinking and creative approach is what makes us different.

From ambitious resource projects in remote locations to large-scale, city-changing infrastructure, for over 50 years customers have been coming to McConnell Dowell with complex projects that require innovative solutions.

So we've built a culture of progressive thinking. It's an approach that looks for opportunities, embraces change and finds different, creative solutions to difficult problems.

ng better communities and providing a better life

ell Dowell is founded on a proud heritage of innovation ering spirit. In collaboration with our customers and en track record in building better ough safe, smart and efficient infrastructure. arly 1960's our reputation has been forged by finding tions and delivering creative construction ribute positively to those communities

ressive thinking, on-going culture of expertise, innovation ative approach is what sets us apart. It's why our projects nsistently win industry awards and why so many of our stomers keep coming back to us.

nnovation that improves lives

We care deeply about the people we work with: our customers, our employees, our partners, investors and the communities we serve

We foster a safe, high quality, systematic and structured approach llows people to challenge ideas, find hidden insights, look for ative solutions and deliver infrastructure that improves the y of life and benefits all stakeholders.

BUSINESS MODEL

A value offering encompassing part or full optimal integration of the complete life cycle of project execution; Project Management, Engineering, Procurement, Construction, Commissioning and Operations.





the Middle East. Bringing local knowledge and international expertise.



 \mathcal{R}

Residential

TREATMENT

Water management is essential to the health, wealth and growth of every community. This is why governments prioritise the secure, uninterrupted delivery of potable water, and the safe and efficient treatment of wastewater.

McConnell Dowell meets these requirements by constructing water systems that provide new and extended infrastructure capability with minimal public impact. Our depth of experience has won us a range of landmark water treatment projects and considerable industry recognition for their successful outcomes.

We partner with leading water technology companies to complement our own capabilities and ensure we provide our customers with the most comprehensive solutions for their water and wastewater treatment needs.

Our water and wastewater treatment focus is:

- Designing sustainable solutions that support economic growth
- Minimising energy use, operational costs and environmental impact
- Enabling a cleaner environment while improving or resolving water quality
- Increasing capacity and alleviating pressure on existing networks
- Reducing or relieving wastewater and stormwater flooding issues
- Coordinating construction activity with concurrent civic and building works while minimising disruption to businesses, residents and traffic
- Supporting high levels of community engagement



OUR PROJECTS

650,000 m³ of earthworks

2.5 km of subsea tunnels

35,000 Reverse Osmosis membranes

Winner 2013 Project Management Institute International Project of the Year

Australia Adelaide Desalination Plant



As part of the Adelaide Aqua Consortium, McConnell Dowell designed, constructed and commissioned the Adelaide reverse osmosis seawater desalination plant.

The largest water infrastructure project in South Australia, the plant now delivers 100 GL of desalinated water per annum – about half of Adelaide's water needs.

Our role encompassed extensive work in all construction disciplines including bulk earthworks, civil structures, marine, tunnelling, mechanical, electrical and building works.

Completed in 2012, the international award-winning project incorporated a range of initiatives associated with the pretreatment process, efficient reverse osmosis and diffuser design to minimise operating costs, environmental impact and energy use.

Ъ	Building
5	Civil
Ā	Electrical
H	Marine
00	Mechanical
0	Pipelines
	Tunnel &

Australia

Western Sydney Recycled Water Scheme





50 mL/day highly treated recycled water

Over 30 km of urban pipeline construction

Pump station and buffer storage

15 year operations and maintenance contract

As part of the Deerubbin WaterFutures Consortium, McConnell Dowell designed and constructed the Western Sydney Recycled Water Scheme to provide environmental flows to the Hawkesbury-Nepean River System, and highly-treated recycled water for industry.

Key civil, building, mechanical, electrical and instrumentation components included designing and constructing an advanced water treatment plant at the St Marys Sewage Treatment Plant. The project also required construction of large pipelines to transfer tertiary treated effluent, recycled water and concentrate between Penrith, St Marys and Quakers Hill plant and Vineyard Creek.

Today, the plant produces 50 mL/day of highly treated recycled water, replacing existing freshwater releases from the Warragamba Dam. McConnell Dowell also provides ongoing plant operations and maintenance.



45 GL/year desalination plant

Installation of all mechanical equipment

23,000 m of piping up to 1,200 mm in diameter

Completed with zero environmental issues

Australia **Perth Desalination Plant Mechanical Installation**



McConnell Dowell was a sub-alliance partner for the first municipal desalination plant in Australia. Completed for the Water Corporation of Western Australia, the 45GL/year Perth seawater desalination plant now provides 17% of Perth's water supply.

McConnell Dowell's responsibility as a sub-alliance partner involved all the mechanical, structural and piping works. This included the installation of mechanical equipment including the reverse osmosis filters and pumps, and the installation of over 23,000 m of GRP and SAF piping. The piping work ranged in size up to 1,200 ${\rm mm}$ in diameter.

The McConnell Dowell team worked closely with the project's environmental team to ensure all onsite works complied with the requirements of the comprehensive environmental management plan. Our contract was completed with zero environmental issues and an excellent safety record.

Electrical • Mechanical

New Zealand

Mangere Wastewater Treatment Plant Biological Nutrient Removal



Watercare expanded the processing facilities at the Mangere Wastewater Treatment Plant by building an additional Biological Nutrient Removal (BNR) facility. McConnell Dowell & HEB Joint Venture was awarded the project due to our ability to deliver an optimal solution for the customer at the right price.

The scope of work involved the construction of two new reactors, two clarifiers, a blower building, ethanol dosing facility, several pump stations, splitter boxes, secondary effluent pipeline, sludge storage tanks and interconnecting pipework. This provided additional secondary wastewater treatment capacity for approximately 250,000 people.

The project also included the construction of a new road linking Ascot Road and Puketutu Island, and an embankment to the south of the new facility. The embankment and associated landscaping enhanced the appearance of the plant and minimised the impact of the expansion on residents.

Multidicipline construction contract

Additional secondary treatment for 250,000 people

Two new reactors and clarifiers

Multiple pump stations





Electrical

on Mechanical



TRANSMISSION

Pipelines are the backbone of every water network, moving water safely and efficiently between storage, treatment and end-users.

McConnell Dowell is expert in pipeline and pump station construction, delivering cost-effective solutions with minimal social and environmental impact for the most complex and diverse projects.

With the largest fleet of pipeline plant and equipment in Australasia, we have delivered water pipelines of up to 1,450mm in diameter through every type of environment – from inner urban to remote desert.

In addition to traditional pipelining techniques, our in-house expertise includes trenchless construction, marine pipe-pulls and pipe bridges. Our teams bring expertise and experience in pipeline materials spanning carbon steel, MSCL, GRP, DICL and HDPE.

Our water transmission focus is:

- Providing game-changing technology to resource owners and developers
- Minimising impact on the environment through trenchless solutions
- Supporting high levels of engagement with local communities
- Significantly reducing disruption and inconvenience to businesses, residents and traffic
- Coordinating construction activity with concurrent civil and building works, while maintaining safe and efficient access

OUR PROJECTS

Australia South East Queensland Water Grid





Contract value exceeded \$1.5 billion

20,330 stakeholders and landowners consulted

250,000 trees planted

Winner of over 20 industry awards

The Queensland Government drew on McConnell Dowell's skills and partnerships as part of its \$9 billion investment in new water infrastructure to help resolve severe drought issues affecting the state in the late 2000s.

Completed in 2012, this network of essential projects now provides millions of Queenslanders with water security in the rapidly growing region of southeast Queensland.

Projects included:

Southern Regional Water Pipeline – a 94 km long, 1,086 to 1,290 mm diameter reverse-flow pipeline between Brisbane and the Gold Coast.

Northern Pipeline Interconnector Stages 1 and 2 - a 95 km long, 1,290 mm diameter pipeline connecting Landers Shute Water Treatment Plant, Noosa Water Treatment Plant and Morayfield Reservoir.

Eastern Pipeline Interconnector – a 9 km long, 600 mm diameter pipeline linking reservoirs at Mount Cotton and Shailer Park, and incorporating a pump station and water quality facility.

Western Corridor Recycled Water Pipeline – over 120 km of pipelines, up to 1,451 mm in diameter, connecting reservoirs, treatment plants and power stations.



New Zealand Hobson Bay Sewer Tunnel



This multidisciplinary project was for the replacement of a 90 year old sewer pipe crossing Hobson Bay on Auckland's waterfront.

The tunnel offers greater sewerage capacity to cater for projected population growth and prevents wastewater overflows into the bay and Waitemata Harbour basin, a popular swimming spot. The replacement of the existing wastewater pipe also opens up the bay for recreational boating.

The project scope included a 3 km long, 3.8 m internal diameter tunnel driven approximately 30 m below the bay floor and construction of three shafts of approximately 35 m to 40 m in depth (23 m, 8 m and 10 m internal diameters). The scope also included considerable mechanical and electrical works, surface reticulation and connection works and the demolition of the existing sewer pipeline.

Key challenges included dealing with the unique geology of the area and operating 24 hours a day on a site located in a residential area with imposed restrictions on traffic, operating noise and visual impact. The team developed an innovative noise reduction mechanism with a completely enclosed head house to minimise disruption to local residents in the construction area. Tunnelling 30 m under the bay's mud and rock floor also ensured minimal environmental disturbance during construction. 17 days ahead of schedule

75 m long tbm weighing over 200 tonnes

157 m per week progress rates

13,000 m³ capacity of sewage & water every hour



Electrical

0 Mechanical

Pipelines

Tunnel & Underground 7.5 km of twin 1,400 mm diameter subsea pipeline

6.4 km of 1,800 mm dia, onshore pipeline

250 mL/day pump station

Winner NSW Civil Contractors Federation Excellence Award

Australia Sydney Desalination Plant Water Distribution Network



As part of the Water Delivery Alliance, McConnell Dowell collaborated to design, procure and construct the pipeline and pump station infrastructure that links Sydney's new desalination plant to the existing water grid.

The 14 km long pipeline and 250 mL/d pump station infrastructure carries water from the plant at Kurnell to the City Tunnel at Erskineville. To transport the substantial volume of water required, McConnell Dowell specified twin pipelines that were laid across Botany Bay concurrently using specialised marine plant to minimise seabed disturbance.

We also delivered an effective community and stakeholder management plan to establish ongoing relationships with residents and authorities that included councils, mayors and state government ministers.



Australia

Adelaide Desalination Transfer Pipeline

Our role in developing this transfer pipeline helped secure Adelaide's water supply in the face of severe drought.

The McConnell Dowell and Built Environs Joint Venture, in association with principal designer, Arup, designed and constructed a transfer pipeline linking Adelaide's new desalination plant to its existing water supply pipeline network.

The project comprised 10 km of 1,575 mm diameter MSCL rising main, 2 km of 1,575 mm diameter gravity main, a transfer pump station with up to 375 mL/day capacity and a 9 mL capacity break pressure tank, 44 metres in diameter and 6 metres high.

The pipeline development was an essential part of the Adelaide Desalination Project, designed to provide half the city's annual water needs for generations to come.



12 km of 1,575 mm diameter pipeline	
140 m single lift pump station	
10 - 375 mL/day flexible flow rate	
600,000 man-hours LTI free	



1 state-of-the-art EPB TBM		
350 concrete ballast blocks		
2.1 km of 1,600 mm diameter hdpe pipeline		

18,000 precast tunnel segments

100 year life span

5 NZCF Awards & 1 Ingenium Excellence Award

New Zealand **Rosedale Ocean Outfall**



This challenging design and construct project involved delivery of a new outfall to discharge high-quality treated effluent to sea.

Encroaching on sensitive ecological and stakeholder environments, the 2.6 km outfall route stretches from the treatment plant to a tunnel 25 m below the streets, parks and reserves, and commercial and residential properties of Mairangi Bay. It then runs 2.8 km under the seabed into the Rangitoto Channel.

McConnell Dowell's deep tunnel option simplified the route so that the Council benefited from a saving of NZ\$7 million. This method eliminated the need for street works, minimising reinstatement risks and disruption to the lives and businesses of Mairangi Bay residents.

A state-of-the-art Earth Pressure Balance Tunnel Boring Machine was manufactured specifically for the project and was the first of its type to be used in New Zealand. The tunnel connects to a 1,600 mm diameter, 2 km long HDPE submarine pipeline laid in a dredged trench. The marine pipeline also includes a 30 m long diffuser section. In addition, our scope included inlet works and a shaft at the treatment plant.

🔣 Marine Pipelines Tunnel & Underground



New Zealand

Christchurch Major Sewer Upgrade

McConnell Dowell's commitment to our customers is particularly evident in our ongoing support of Christchurch City Council's NZ\$42.5 million Christchurch Major Sewer Upgrade since its completion in 2012. We have been there to ensure the infrastructure's effectiveness despite two earthquakes in two years.

The upgrade involved constructing two separate but connecting sewer lines, the Western Interceptor (4 km, 1,350 mm diameter) and Fendalton Duplication (2 km, 1,050 mm diameter), that incorporated 12 jacking reception shafts, 38 manholes and an 800 m long, 450 mm diameter rising main with a bridge crossing the River Avon.

4 km of 1,350 mm gravity sewer

2 km of 1.050 mm pumped sewer

10 separate tunnelled drives

12 shafts up to 7 m deep



Tunnel & Underground

STORAGE

Dams are vital to the ongoing resilience of our communities. They store precious drinking water, retain and manage water for industry and irrigation, and help minimise flooding.

Dams are logistically challenging to construct. They require a multidisciplinary skill set, sensitivity to environmental settings and river health, and an ability to work effectively in remote locations.

McConnell Dowell has delivered many award-winning new and refurbished dams, bringing water security to numerous communities in need. Our diverse construction techniques include roller compacted concrete, post-tensioned ground anchoring, concrete spillway refurbishment and intake/outlet pipework systems.

Our water storage focus is:

- Enhancing water security and safety through dam refurbishment and augmentation
- Using creative construction techniques to guarantee safety and environmental compliance
- Overcoming (often extreme) logistical challenges to deliver on time and budget
- Minimising impact on river health through our marine construction experience



12 m deep foundation excavations

20,000 m³ of mass concrete buttress

Refurbished dam holds 3 million mL of water

Australia Hume Dam Southern Training Wall Buttress





One of the mightiest Australian structures of the inter-war years, the Hume Dam near Albury-Wodonga can hold three million megalitres of water. This is about six times the volume of Sydney Harbour.

In 2014, McConnell Dowell undertook a project to strengthen the dam's existing concrete gravity Southern Training Wall by constructing a 20,000 m³ mass concrete buttress on the spillway side. This will greatly improve overall safety in the event of extreme flooding.

Constructing the temporary cofferdam was a key challenge that McConnell Dowell overcame using its specialist marine construction capability. This enabled dewatering to be carried out smoothly and continuously for the duration of the project.







Australia

Lake Manchester Dam Upgrade

McConnell Dowell delivered the design and construction upgrade of the Lake Manchester Dam near Brisbane. The project strengthened the existing dam wall to meet current Australian National Committee on Large Dams guidelines and industry state of practice standards.

In a world first, McConnell Dowell employed an anchoring solution incorporating 69 vertical and inclined post-tensioned anchors to increase the sliding friction resistance of forces on the dam wall. In an Australian first, McConnell Dowell undertook the sensitive task of rock blasting within 50 m of a live concrete gravity dam.

A highlight of the project's excellent environmental record was capturing five Queensland lungfish from the spillway 'plunge pool' during the course of the earthworks and their subsequent successful release into the nearby Brisbane River. 90,000 m³ of earthworks

69 post-tensioned ground anchors installed

Dam wall raised by 5.8 m

Winner Queensland Civil Contractors Federation Excellence Award



Civil



Marine

Mechanical

180 m long, 47 m high new dam wall

225,000 m³ of rock quarried

85,000 m³ of roller compacted concrete laid

Winner Tasmanian Civil Contractor's Federation Excellence Award

Australia Meander Dam



In collaboration with the Tasmanian Water Solutions Consortium, McConnell Dowell built a 47 m high roller-compacted concrete dam in the heart of the state's north.

Located in the Meander Valley, the 43,000 mL capacity dam is 180 m long across its top and employs precast concrete – a safe, environmentally friendly and effective construction method – for the spillway training walls and crest.

Generating 85,000 m³ of roller-compacted concrete and 225,000 tonnes of rock from an onsite quarry ensured tight construction timelines were achieved. McConnell Dowell's stakeholder engagement experience was also essential at every stage of the project and helped deliver a successful outcome for Meander's people, wildlife and environment.



New Zealand

North Otago Irrigation Scheme



McConnell Dowell expanded the irrigation scheme for North Otago Irrigation Company in New Zealand. This is a pumped scheme taking approximately 730 mL/day of water from the lower Waitaki River and lifting it 200 metres up into the hill country south of the river.

This project extended the irrigated land down into the Kakanui Valley and to farms on the coast, south of Oamaru. The expanded scheme irrigates an additional 25,000 Ha of land.

McConnell Dowell's scope of works was multidisciplinary with a major element of the project being the additional storage added to the scheme. McConnell Dowell enlarged and raised the crest of the existing head pond to triple the volume of water being stored.

Other works included civil and structural work associated with new pump buildings, mechanical, electrical, control and instrumentation installation. Cross country pipe laying included 45 stream crossing, 30 road crossings and one rail crossing.



Earthworks and dam construction

110 km of cross country pipe laying ranging in size from 1,200 mm to 300 mm diameter

Extensive stream, road and rail crossings 5 pump stations

Mechanical, electrical and instrumentation installations





HYDROPOWER PLANTS

Generating and supplying sustainable green power through hydropower plants enhances the wellbeing of regional communities, economies and the environment.

Diverse skills and experience are required to construct hydropower plants. Effective coordination is pivotal. Managing stakeholder needs and expectations is critical.

McConnell Dowell's proven record and string of industry and environmental awards are testament to our ability to successfully deliver new hydropower plants, as well as rehabilitate and enhance existing ones.

Our hydropower infrastructure project focus:

- Adds value through innovative solutions that cut costs significantly
- Accelerates civil programs to reduce construction time
- Ensures finished projects blend in and have positive environmental effects
- Engages communities to achieve 'no complaint' solutions
- Uses community management and awareness programs tailored to stakeholders and local authorities
- Safeguards local residents and mitigates noise and vibration impacts caused by construction
- Boosts local economies by locally sourcing and up-skilling onsite staff

7.8 km of 5 m diameter tunnelling

Underground power station construction

Installation of two 70 MW turbines

Winner Victorian Civil Contractors Federation Excellence Award





Australia

Bogong Hydro Power Plant

The largest hydropower project built in Australia in 25 years was designed and constructed by McConnell Dowell.

The project incorporated a new underground hydroelectric power station with two 70 MW turbines near Falls Creek in Victoria's pristine Alpine National Park. Working in a national park meant the project was highly scrutinised by AGL Southern Hydro and the EPA. The results were exceptional.

McConnell Dowell's engineering team worked with consultants to reduce the project price by A\$30 million. The team realigned tunnels and developed innovative materials-handling techniques that included providing rock spoil to the shire council for upgrading local roads.

The power station now generates 140 MW of renewable power from the East Kiewa River and existing water resources released from the Mackay Creek Power Station.







Philippines

Ambuklao and Binga Hydro Power Plants

McConnell Dowell showcased its hydropower construction capacity by resurrecting two important facilities in the northern Philippines - the former 75 MW Ambuklao Power Plant and the ailing 100 MW Binga Plant.

A key component was furnishing the Binga plant with new generators and equipment so it can now generate 120MW of power and achieve an average annual production of 419 GWh.

The Ambuklao and Binga Hydropower Plants project won a Silver Award for Best Renewable Energy Power Plant at the 2011 Asian Power Awards.

19,000 m³ of concrete poured

700 tonne of rebar, 230 tonne of steel lining

2 million man hours LTI free

Silver Award Winner for Renewable Energy Power Plant of the Year



Civil



Electrical

0 Mechanical



Tunnel & Underground





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