Complexity Simplified

DAMS AND HYDROPOWER

Somerset Dam Improvement Works, QLD

Protecting our most precious resource for future generations

DAMS AND HYDROPOWER

Water is essential to life–it's one of the most powerful resources in the world, and it's no wonder that hydropower is the oldest form of renewable energy out there.

Our team works across all the facets of water, from keeping communities safe from earthquake and flooding, to finding storage solutions that keep our most precious resource ready when we need it. Our multidisciplinary experts ply all their energy into delivering inventive solutions to solve challenges.

Between making existing dams safer to investigating and designing new dams, conventional hydropower and pumped storage energy infrastructure, Stantec is committed to ensure that our clients' sustainability goals are achieved. No matter the project, we collaborate with you to ensure our communities have access to environmentally sound renewable energy and have a clean, safe, and reliable supply of drinking water and energy.

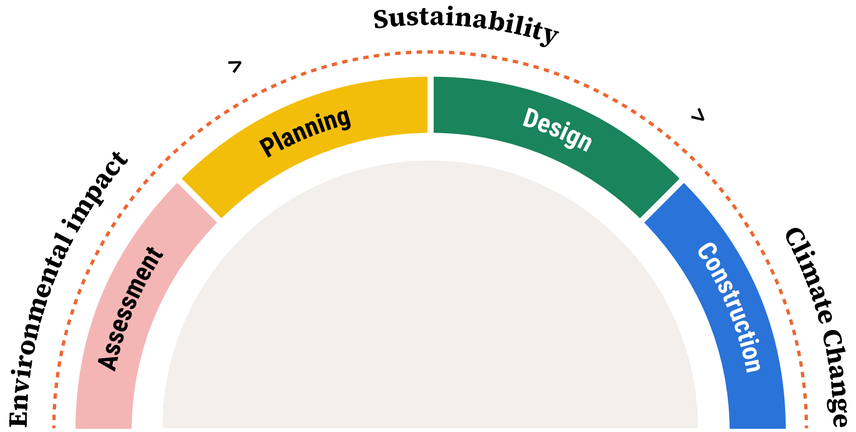
Our services

- Dam design—all types
- Dam raising and strengthening
- Dam safety management and risk assessment
- Hydropower—powerhouses, transmission, pumped storage, refurbishment, retrofit
- Cost estimating and asset valuation
- Water supply, tailings, brine
- Operation and maintenance
- Peer review/technical advisor
- Site investigations
- Spillways
- Tendering and construction management
- Water conveyance systems
- Water intakes, outlets and water diversion
- Water resource studies
- Flood studies
- Due diligence
- Project and Programme management amongst others.

Dams do more than just store water

Dams are an essential part of the communities we serve, ensuring long-term water storage and flood protection. At Stantec, we understand the crucial role they serve in our communities, from providing flood mitigation during times of heavy rains to supplying water in seasons of drought. We understand the importance of these projects and apply years of expertise to ensure our clients have safe, environmentally sound and innovative designs.

Our reputation for innovation and quality engineering is built on experience in all types of dam design and construction, and our experience extends to earthfill and rockfill (including concrete and geomembrane faced and asphaltic core), conventional concrete and roller compacted concrete, arch dams, etc. When it comes to concrete dams, we've delivered numerous new concrete dams designs of differing types, including gravity, arch, buttress, and arch-gravity dams.



Chimney Hollow Reservoir Dam, USA

Warragamba Dam Studies and Dam Raising, NSW

Dam upgrades

Our dam compliant services

Our experience includes a full suite of regulatory compliance services, including Australian National Committee on Large Dams (ANCOLD) dam safety evaluations and Potential Failure Mode Analyses (PFMAs).

Our experience with dams

A typical example of our expertise can be demonstrated through the delivery of the safety upgrade of the Warragamba Dam—one of the largest domestic water supply dams in the world, accounting for about 80% of Sydney's water supply. Stantec plays a major role in extending the life of this key element of water infrastructure and making the dam safer for the communities of Sydney. The goal of a dam raise? To create a flood mitigation zone to reduce the risk to life, property, and community assets.

Similarly, Stantec was responsible for the feasibility design of the raising of the Burdekin Falls Dam, the dam with the largest spillway capacity in Australia.

Stantec is currently working on several dam upgrades, which includes Warren Dam, constructed between 1914 and 1916, in continuing to provide reliable water to the local communities of Williamstown and the Barossa Valley.

Stantec brings in the right people for the job. This includes leveraging from our collaborative global pool of experts and ensuring that the lessons learnt across the dam and hydropower disciplines are shared and transferred across all our teams.

Dam safety

We help protect Australian communities through our inspections of their dam and lagoon systems. Our services include subsurface explorations to assess foundation conditions and identify borrow sources for new structures, seismic stability and seepage evaluations to analyse and determine the modes of failures for distressed structures.

Our commitment to dam safety stems from our long-standing relationships that have evolved and strengthened as a result of our work with various state dam safety agencies. For example, following the sudden erosion of the spillway at the Oroville Dam in California, Stantec's expertise was called upon by the State of California Department of Water Resources. We were quickly engaged to inspect the spillway and begin creating monitoring and mitigation plan to ensure the safety of the dam was not compromised hence benefiting the downstream community. We have also designed rehabilitation solutions at numerous dams worldwide including upgrades and life extension at various existing facilities.

We provide our communities with solutions for dam safety issues including seepage, stability, inspections, and risk assessments at specific project sites. We understand the mission and the purpose of dam safety programs: to protect the public and provide sound dams and flood risk management for today and into the future. Stantec has the in-house talent and skills necessary to handle your dam safety reviews.

Dam safety services

- Inspection and condition evaluation of dams and reservoirs, including tailings dams.
- Inflow design flood estimates, including Probable Maximum Flood (PMF) estimation.
- Designing auxiliary spillways and spillway expansion for existing projects to meet regulatory requirements.
- Evaluating mechanical and electrical rehabilitation needs for gates and outlet works to ensure safe operation during flood passage.
- Evaluating emergency preparedness and development of Emergency Action Plans (EAP)
- Analysis of spillway adequacy, dam stability, and gates and penstock structural integrity.
- Preparing/updating EAPs and flood inundation maps.
- Preparing public safety plans and developing recreation plans.
- Conducting dam safety training programs.
- Developing dam rehabilitation and life extension designs.
- Potential Failure Modes Analyses (PFMA) and Comprehensive Risk Assessments (CRA)/ Risk Informed Decision Making (RIDM) for dam safety improvement projects.
- Facilitating and taking part in desktop and on-site emergency exercises.

Oroville Dam Spillway Recovery, USA

Supporting your energy needs

Whether you need pumped storage or you're investigating small hydropower solutions from planning and reconnaissance studies, conceptualisation and feasibility to detailed design, construction management and commissioning, our in-house multi-disciplinary team is here to deliver your project in accordance with international best practice, providing world-class efficient, affordable, and reliable solutions to meet your energy needs.

Our reputation in hydropower precedes itself and has continued to grow in the energy space to meet the demand of our clients towards a sustainable renewable energy world.

Tekeze Hydropower Project, Ethiopia

Pumped storage

Stantec fosters the relationships with our clients and remains committed to them. As such, Stantec has remained the Engineer of Record for the Rocky Mountain Pumped Hydro since it's conceptualisation.

As one of the largest dedicated hydropower and pumped storage engineering groups in the world, Stantec provides pumped storage services from concept and screening studies and final detailed design, environmental acceptability, and economic soundness through construction support and support during operations —spanning the entire project lifecycle.

By embracing cutting-edge technology and utilising our engineers' hands-on experience in all phases of the project lifecycle, we have been at the forefront of incorporating advances in design technology, materials, fabrication methods, and controls into pumped storage projects.

Our pumped storage services

- Planning, conceptualisation, pre-feasibility and feasibility studies.
- In-house design of all associated civil works.
- Due Diligence to help our clients make the right investment decision.
- Power generation equipment design parameters and specifications—pump-turbines, generator-motors, substations
- Plant systems—auxiliary power, communication, mechanical and electrical balance of plant systems.
- Water conveyance structures—tunnels, pipelines, penstocks, and analysis using 3D fluid dynamics calculations.
- Storage facilities—dams, spillways, intakes, 3D finite element modelling analysis.
- Foundation and materials testing—geotechnical investigations and treatment, rock mechanics.
- High-voltage transmission—switchyards, gas insulated switch gear (GIS), control facilities, transients (SimSen) and energy modelling.

Stantec is the leading firm for planning, reviewing and designing pumped storage hydro around the globe.

55,000 MW

of new hydropower and pumped storage plants have been developed, designed, and constructed

145 facilities in 35 countries

Constructed and studied these projects, ranging in size from 50kW to 10,000 MW

60,000 MW

of engineered plant upgrades

Recent assignments for pumped hydro storage projects in Australia includes our role in the 2000 MW Borumba project (through our Water2Wire JV), the engineering feasibility study and continued development of the 2000 MW Mt Rawdon pumped hydro project, the FEED design of the Pioneer Burdekin pumped hydro project, and the 750 MW Capricornia pumped hydro project.

Rocky Mountain Pumped Storage Hydropower Project and Upgrade, USA

Our project experience

Warragamba Dam Raise Detailed Concept Design

New South Wales, Australia

One of the largest domestic water supply dams in the world accounting for about 80% of Sydney's water supply. The goal of a dam raise? To create a flood mitigation zone to reduce the risk to life, property, and community assets.

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Burdekin Falls Dam Improvement Project

Queensland, Australia

A critical infrastructure feature in the region, the dam was built primarily for irrigation, the dam also helps replenish local aquifers and supports recreational activities and businesses.

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Somerset Dam Improvement Project

Queensland, Australia

The Somerset Dam is a dual-purpose water supply and flood mitigation dam, owned and operated by Seqwater.

Our team's services include a detailed dam safety risk assessment, developing construction work sequences, cost estimation, and environmental approvals. When complete, this will help Seqwater better support their dam improvement program and Somerset dam upgrade plans.

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Warren Dam Safety Upgrade - Option Design

South Australia, Australia

SA Water engaged us to develop an options design study for upgrading the century-old Warren Dam to modern standards.

Our work includes risk assessment, hydraulic modelling, structural analysis, and international peer review. This safety upgrade will enhance resilience, mitigate risks, and protect both the environment and surrounding infrastructure.

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Awoonga Dam

Queensland, Australia

To support regulatory compliance and long-term safety, we conducted a 20-year dam safety review and risk assessment for Awoonga Dam on behalf of the Gladstone Area Water Board. Our work included geological studies, hydraulic assessments, stability analysis, and a comprehensive site inspection. Following its success, we were awarded the detailed design and construction support for the Awoonga Dam Spillway Upgrade, reinforcing water security for the Gladstone community.

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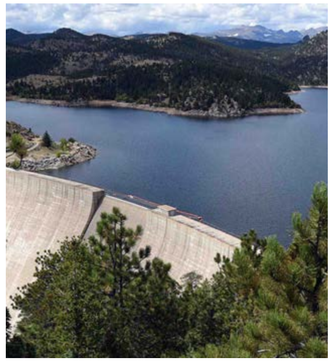
Taupō Control Gates

Waikato, New Zealand

As the primary outflow control from Lake Taupō into the Waikato River, the Taupō Control Gates are a critical asset for Mercury NZ and of national importance to New Zealand's energy storage.

With a 10–15 year timeline, our work includes structural assessments, risk mitigation, and engagement with Māori tribes to ensure the river's health is prioritised. Through collaboration, we're helping Mercury NZ develop a long-term, sustainable solution for this vital infrastructure.



Gross Dam

Colorado, United States

For over 40 years, Denver Water has trusted us to support their dam projects, including the Gross Reservoir Expansion. Our team provided safety inspections, seismic hazard assessments, and an innovative design that transformed the existing concrete gravity dam into an arch dam—the largest roller-compacted concrete dam raise in the world. With a focus on minimising risk and community impact, we helped deliver a resilient, cost-effective solution to secure water supply for generations to come.

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Chimney Hollow Reservoir

Colorado, United States

The Chimney Hollow Reservoir dam will be the tallest dam built in Colorado in 50 years and incorporates asphaltic core technology.

We are providing complete engineering and design of an approximately 110-metre-high hydraulic asphalt-core rockfill main dam, a 12.5-metre-high zoned rockfill saddle dam, inlet/outlet works in a tunnel in the right abutment of the main dam, and an ungated concrete spillway.

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Mt Rawdon Pumped Hydro Energy Storage

Queensland, Australia

What happens when mining sites reach their end-of-life cycle? Mt Rawdon, an operating open pit gold mine is expected to reach its end of mine life in 2027. Our client and the mine owner collaborated to investigate the site's potential for a pumped hydro energy storage (PHES) facility.

It presents an opportunity to restore the areas of the mine to a safe, stable, and self-sustaining condition—reducing the environmental impacts of mining.

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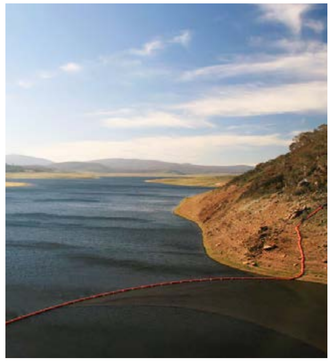

Snowy 2.0 Pumped Hydro

New South Wales, Australia

Snowy 2.0 expands the iconic Snowy Mountain Scheme, adding 2,000MW of pumped hydro storage to provide clean, flexible energy.

Our team helped design an optimised underground power station, reducing costs while minimising environmental impact. By linking existing reservoirs, Snowy 2.0 enables energy storage and generation on demand—supporting a reliable, renewable future for Australia.

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Rocky Mountain Pumped Storage Hydropower Project and Upgrade

Georgia, United States

The Rocky Mountain Pumped Storage Project delivers power to two-thirds of Georgia's land mass.

Featuring extensive dam structures, reservoirs, and advanced turbine systems, our team developed an implementation plan addressing all constraints and benefits and continues to serve as owner's engineer, supporting the project's ongoing upgrade and operational success.

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Capricornia Renewable Energy Hub

Queensland, Australia

The Capricornia Renewable Energy Hub will deliver 750MW of pumped hydro storage, strengthening Queensland's energy network.

Initially engaged for due diligence, we helped secure investment and now continue as Owner's Engineer, supporting project development towards financial close. Our role includes technical guidance on dam infrastructure, underground powerhouse design, and stakeholder collaboration—helping bring this key renewable project to life.

Dam and hydropower Leadership Team in Australia

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Where we are

With 23 offices across Australia, we're ready to work with you.

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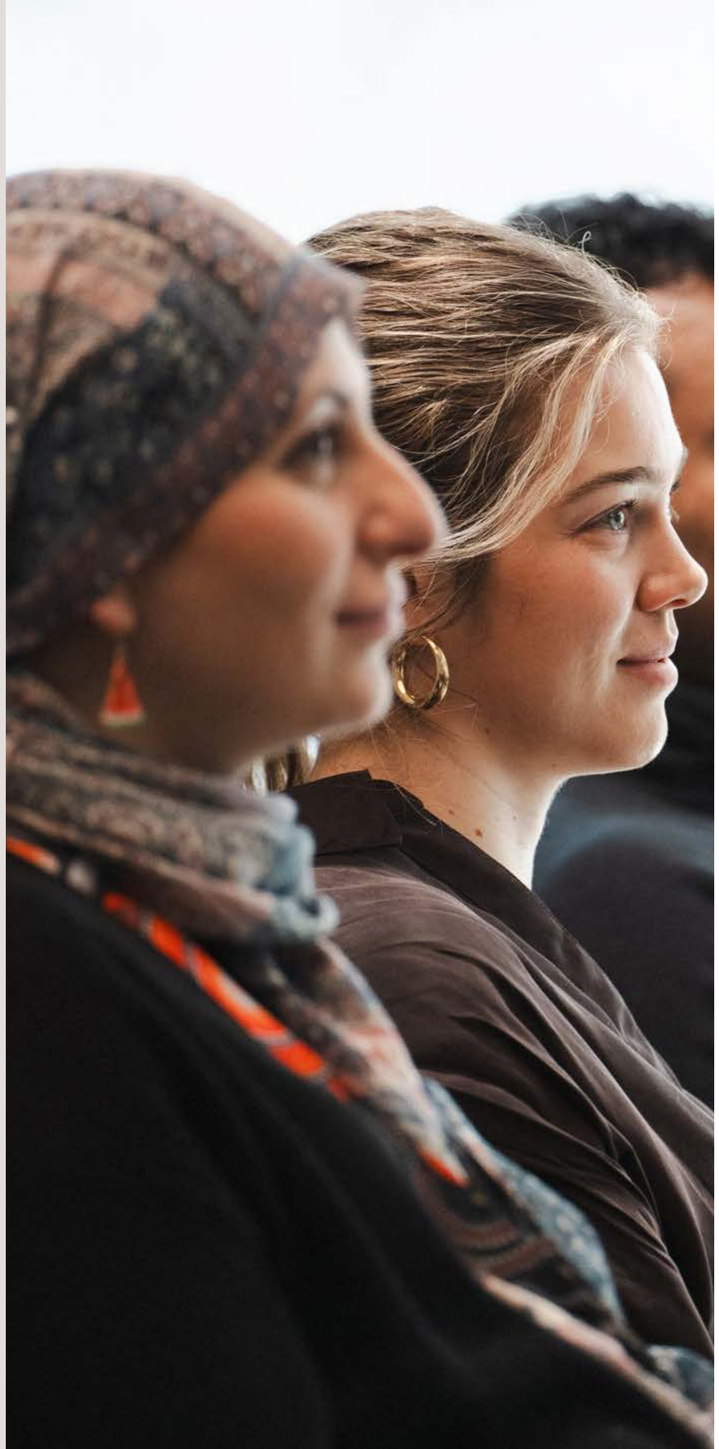

Stantec

Stantec is a global leader in sustainable architecture, engineering, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

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