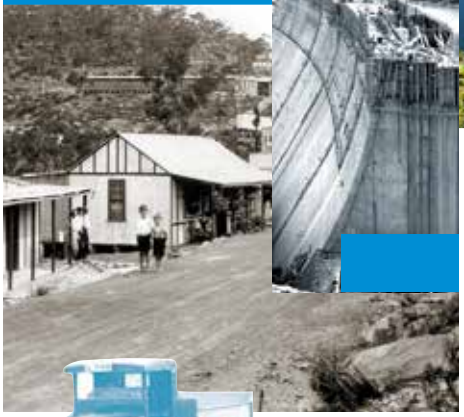
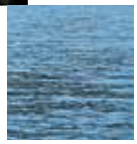
WORONORA SYSTEM





DAMS OF GREATER SYDNEY AND SURROUNDS

Woronora

WaterNSW

Sydney's drinking water is collected from five catchment areas, occupying 16,000 square kilometres. Water is stored in 21 dams, holding over 2.5 million megalitres of water.

The Woronora System consists of the catchment of the Woronora River, which drains into Woronora Dam and then to Botany Bay. This catchment supplies water to residents within the Sutherland Shire in Sydney's south, and northern suburbs of Wollongong.

< WORONORA DAM

Introducing WaterNSW

WaterNSW is Australia's largest water supplier. We provide two-thirds of the water used in NSW and develop infrastructure solutions for water supply security and reliability.

We operate and maintain 42 large dams and we deliver water for agriculture and drinking water supply customers. WaterNSW also protects the health of Sydney's drinking water catchment to ensure highest quality drinking water is consistently available.

Sydney's drinking water catchments

The catchments

A catchment is an area where water is collected by the natural landscape. In a catchment, all rain and run–off water eventually flows to a creek, river, lake or ocean, or into the groundwater system.

Natural and human systems, such as rivers, bushland, farms, industry, homes, plants, animals and people can exist alongside one another in a catchment.

WaterNSW helps protect five catchment areas, which provide water to greater Sydney and local communities.

They are:

- Warragamba Catchment
- Upper Nepean Catchment
- Woronora Catchment
- Shoalhaven Catchment
- Blue Mountains Catchment

The catchments occupy about 16,000 square kilometres in total. They extend from north of Lithgow and Blackheath in the upper Blue Mountains, south to the source of the Shoalhaven River near Cooma, and from Woronora in the east to the source of the Wollondilly River near Crookwell.

^ WORONORA CATCHMENT

Woronora Catchment

The Woronora catchment covers an area of 75 square kilometres encompassing the catchment of the Woronora River, which drains into Woronora Dam and then to Botany Bay. This catchment supplies water to residents within the Sutherland Shire in Sydney's south. Woronora Dam is the sole water supply to Helensburgh, Engadine and Lucas Heights.

Most of the Woronora catchment features native vegetation, but there are small areas of private land in the upper catchment where stock agistment, horse riding and horticulture occur.

Woronora catchment is a Special Area. Public access is restricted to the picnic areas at Woronora Dam.

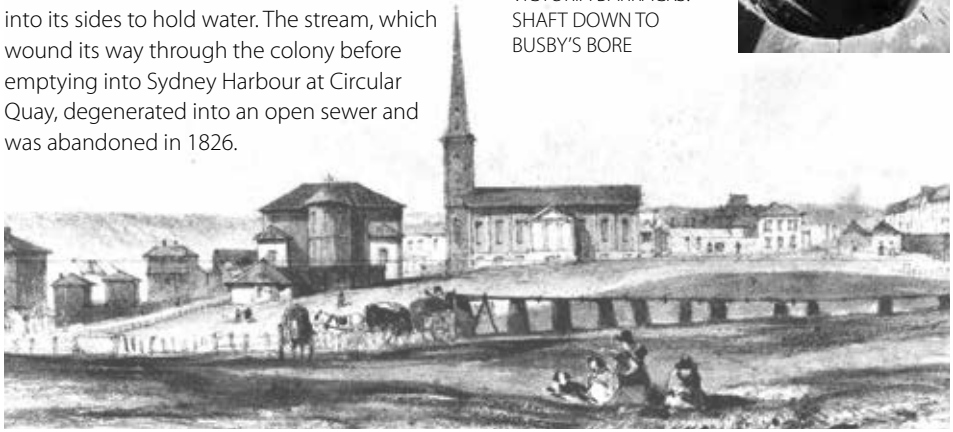
Sydney's evolving water supply system

Australia is one of the driest inhabited continents on earth. Water has been vital to the survival and prosperity of Sydney since the first days of the new colony. The need to ensure a reliable water supply through times of drought and variable seasonal rainfall has driven the development of several complex and innovative water supply schemes.

Sydney's first water supply came from the Tank Stream, named for the 'tanks' or reservoirs cut into its sides to hold water. The stream, which wound its way through the colony before emptying into Sydney Harbour at Circular Quay, degenerated into an open sewer and was abandoned in 1826.

^ TUNNEL INTERIOR UNDER OXFORD STREET

> VICTORIA BARRACKS: SHAFT DOWN TO BUSBY'S BORE

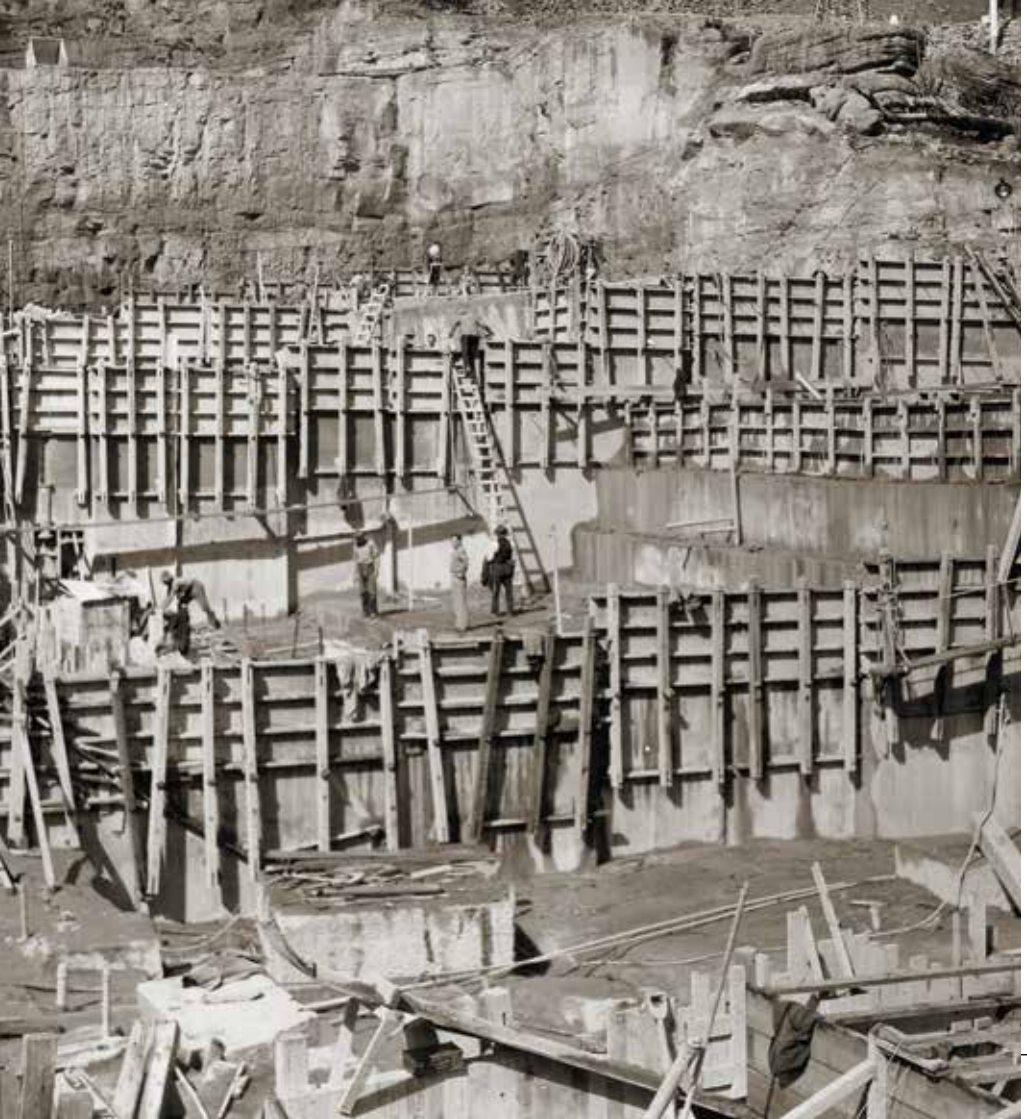


Convict labour then developed Busby's Bore, a four kilometre tunnel leading from the Lachlan Swamps, (now Centennial Park) and ending in the south–east corner of Hyde Park.

By 1852, drought and increasing population led to the call for a more permanent water supply for Sydney. A third water source, the Botany Swamps Scheme, began operations in late 1859 but within 20 years this once copious supply of fresh water was depleted.

The Upper Nepean Scheme was Sydney's fourth source of water supply. Completed in 1888, the Scheme diverted water from a series of weirs on the Cataract, Cordeaux, Avon and Nepean rivers to Prospect Reservoir via 64 kilometres of tunnels, canals and aqueducts, known collectively as the Upper Canal. The building of Cataract, Cordeaux, Avon and Nepean dams between 1907 and 1935 greatly increased the Scheme's capacity.

< BUSBY'S BORE OUTLET, HYDE PARK. PAINTING BY J.SKINNER



Supplying water to Sydney's south

Water was first supplied to Sutherland Shire in 1911 when a 150 millimetre pipe was laid from Penshurst Reservoir across Georges River at Tom Ugly's Point to Miranda. Eventually 121 houses along the route of the pipe had water supplied to their properties.

In 1920 a scheme to supply water from the Woronora River to Sutherland and Cronulla was rejected. It was resurrected five years later when the Metropolitan Water Sewerage and Drainage Board became the sole constructing authority for water supply works in the metropolitan area.

The scheme involved the construction of a dam on the Woronora River about 24 kilometres upstream of its junction with the Georges River. The dam was designed to enable it to be increased in size if necessary. At the site selected for the dam the Woronora River flowed through a rugged gorge over 100 metres deep with steep sides of Hawkesbury sandstone.

Constructing Woronora Dam

Construction of the dam began in 1927, but as forecast, its size had to be increased two years later.

Workers' accommodation was spartan but functional with small bungalows built of fibrolite and placed on brick or concrete piers on the sloping ground. In 1930 the Great Depression intervened, suspending work on the dam. The men were forced to look for work further afield, even interstate, often leaving their families behind to live on the Woronora site.

Some families had strong ties to the development of Sydney's dams, moving from the Nepean project to Woronora and then on to Warragamba. Other workers on Woronora Dam were former coal miners from nearby Helensburgh.

Late in 1931 the Unemployment Relief Account released funds to build a weir to provide water to the Sutherland–Cronulla area. Four years later, work resumed on the dam itself.

Woronora Dam was completed in 1941 at a cost of about $13 million. Six of the cottages were retained for on–site maintenance staff housing while the rest of Woronora township site was turned into picnic and recreational areas.

^ WORONORA DAM TOWNSHIP, JANUARY 1929

^ CONSTRUCTION OF DAM

^ CONSTRUCTION VISTA OF DAM WALL, FEBRUARY 1939

Transporting machinery to Woronora Dam

"In 1927, Cleary Bros, otherwise Jack and Dan, secured the contract to move all the machinery and effects of the Public Works Department from Cordeaux Dam, to the site of Woronora Dam. To cope with this mammoth task, they purchased several new International 3 tonne trucks.

...What I saw those trucks do was almost unbelievable, some of the trucks would be able to make direct trips to Woronora via Broughton's Pass, over the Cataract River, the others with some shocking overloads would go to Douglas Park Railway Station, where it be loaded onto goods trains... A team of six draughts were kept at each hill, and were hooked to each of the very overloaded trucks to help it reach the top... the shocks were all round when the weighbridge recorded 12 tons for one load, this was the base of a crane. Many times I saw a big truck load go by, with a string of Tip Drays, or Horse Jinkers tied on behind."

Interview with Sydney Percival (former Appin resident), 1981 for www.familyorigins.net

Features of Woronora Dam

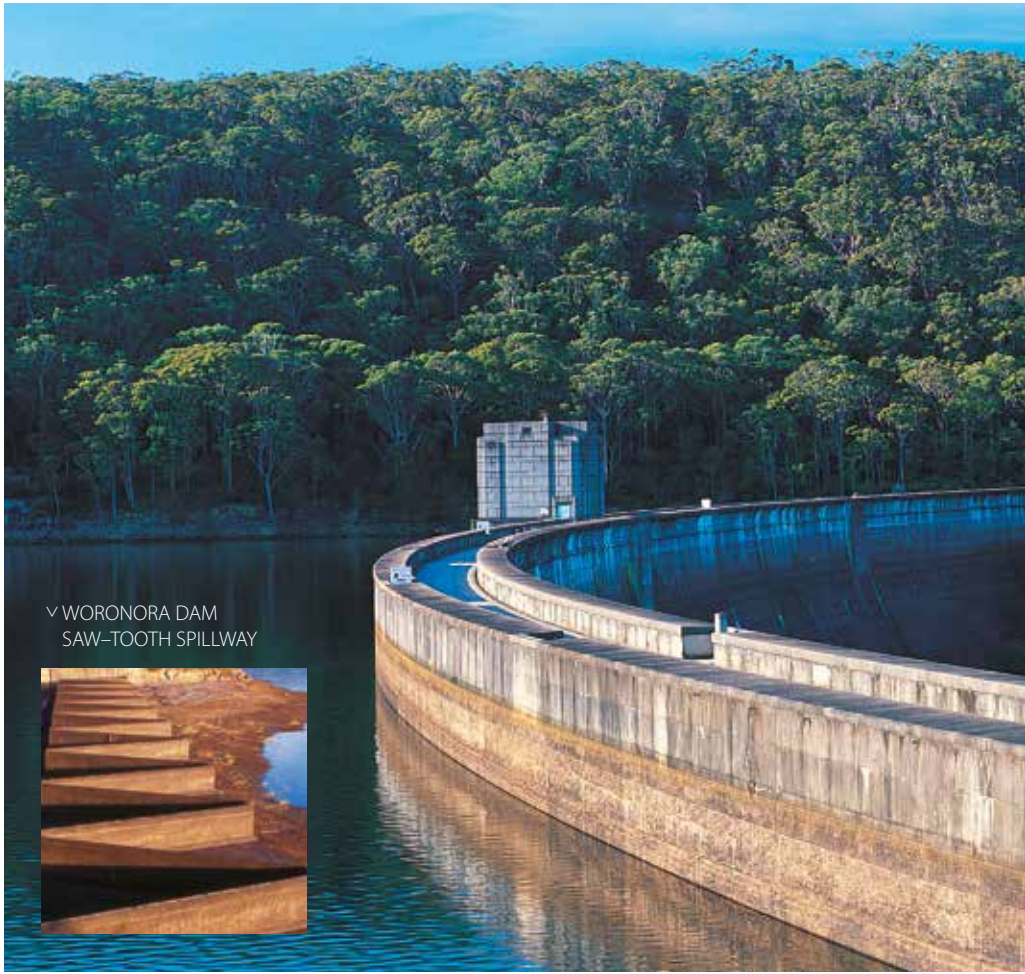
Woronora Dam is curved in appearance. It is a mass gravity dam, remaining in position under its own weight. Its lower levels are built of cyclopean masonry – massive sandstone blocks that were quarried on site. The main wall is made from blue metal and gravel concrete and there are two inspection galleries located inside.

Located south of Sydney near Waterfall, Woronora Dam has a separate, saw–tooth spillway that discharges floodwater through a concrete lined cutting into the Woronora River, downstream of the dam.

To meet international dam safety standards, Woronora Dam was upgraded in 1988 at a cost of $2.9 million by a system of wall and foundation drains.

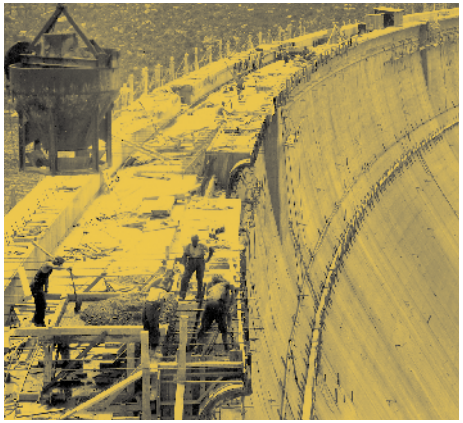
Raw water from Woronora Dam is pumped to the adjacent Woronora water filtration plant. This plant is one of eight in Sydney either operated by Sydney Water or privately owned and operated under contract to Sydney Water. The dam and water filtration plant supplies water to the areas south of the Georges River including Sutherland, Engadine, Helensburgh, Stanwell Park, Lucas Heights, and Bundeena.

Height:	66 metres
Length:	390 metres
Total capacity:	71,790 ML
Catchment:	75 square kilometres
Lake:	4 square kilometres



v WORONORA DAM
SAW–TOOTH SPILLWAY

Did you know?



The Maritime Operations Division within the Department of Defence uses Woronora Dam to test its sonar facilities. The testing station is on a pontoon in the middle of the reservoir.

The building of the Woronora Dam became part of the backdrop of the comedy drama "Dad Rudd MP" directed by Ken G. Hall for Cinesound and released in 1940.

The film featured several construction scenes and employed many workers and their families as extras.

Sir William Hudson (1896 – 1978), the former Commissioner for the Snowy Mountains Hydro Electricity Authority and a world–renowned civil engineer, was the Research Engineer for the construction of Woronora Dam.

Woronora Dam is listed on the State Heritage Register for its historic and technological value.

Ensuring dam safety

It is essential that all WaterNSW dams meet the requirements of the NSW Dams Safety Committee (DSC) under the *NSW Dams Safety Act (1978)*. The DSC, the State's regulator for dam safety, develops and implements policies and procedures for effective dam safety management in order to protect life, property and the environment from dam failures. To ensure compliance with its operating licence, WaterNSW has adopted a structured program of surveillance and monitoring that complies with the requirements of the DSC and national and international best practice.

Monitoring water quality

In Greater Sydney's drinking water catchment, WaterNSW conducts extensive routine water quality and quantity monitoring in the catchments, storages and in–flows to water filtration plants. Monitoring provides information to enable the best quality water to be drawn–off into the supply system, and to identify areas requiring special catchment management attention. WaterNSW also conducts regular testing at several locations for the presence of the protozoan parasites *Giardia* and *Cryptosporidium* in the water. Information collected from WaterNSW's monitoring programs is used for public health reporting and assessment.

Maintaining good water quality in the catchment

WaterNSW works with government, industry and the community to promote good water quality and healthy, sustainable catchments.

Extensive research is carried out by WaterNSW to help understand the catchment environment. WaterNSW also plays an important role in working with councils to ensure that proposed land use and development is compatible with preserving water quality.

Field staff undertake a range of on–ground activities in the catchments, such as pest control, fire control, erosion control and repair, regulating access, containing spills and weed control. In the Special Areas (land closest to the storages) these activities are jointly managed by the National Parks and Wildlife Service (Office of Environment and Heritage) and WaterNSW.

Many successful projects are also undertaken jointly with landholders and community groups including riverbank stabilisation, willow removal, revegetation and riverbank fencing.

Environmental flows

WaterNSW recognises that its dams and weirs affect the natural flow of water downstream. Water is provided to downstream rivers through environmental flows - water released from the storages to help restore ecological processes and biodiversity of water dependent ecosystems.

Woronora Dam had to be modified to enable environmental flows and daily variable environmental flows commenced in July 2009. At times of low flows, all inflows up to 4.1 million litres a day are released to the downstream river. At times of higher flow, an additional 20 percent of inflows to Woronora Dam are released to the downstream river.

< WATERNSW UNDERTAKES WATER QUALITY MONITORING IN THE CATCHMENTS AND STORAGES

Recreation at Woronora Dam

Woronora Dam is a popular sightseeing and picnic spot. Almost half a million visitors use the Woronora Dam picnic area each year.

Visiting hours are 10am to 5pm daily (7pm on weekends and public holidays during Daylight Saving Time). For more information on Woronora Dam see www.waternsw.com.au.

For educational excursions and project material, please contact our Education Office on (02) 4774 4435

There are no entry fees to any of our dams. Picnic areas cannot be reserved.

Woronora Dam facilities

- Electric bbqs
- Playground
- Toilets
- Drinking water
- Viewing area
- Picnic shelters

How to get there

Woronora Dam is located south of Sydney, near Waterfall.

Access is via the old Princes Highway, south from Sydney or north from Wollongong. Turn off Princes Highway onto the Woronora Dam access road just south of Waterfall.

Why Special Areas are protected

Woronora Special Area is approximately 75 square kilometres and includes all the land draining to Woronora Dam. In total, Special Areas cover about 3,700 square kilometres of land surrounding water storages.

The Special Areas protect our water supply because they act as a buffer zone, helping to stop nutrients and other substances that could affect the quality of water entering the storages.

WaterNSW and the National Parks and Wildlife Service (Office of Environment and Heritage) jointly manage the Special Areas, in accordance with the Special Areas Strategic Plan of Management.

This long–term plan aims to provide high quality water in the storages, ensure ecosystem integrity, and improve the environmental quality of the catchment areas.

Public access to parts of the Special Areas is restricted to protect water quality. This benefits the community by:

- ensuring we have safe, clean water
- protecting large areas of bushland and plant and animal habitats
- protecting threatened plants and animal species
- preserving evidence of Aboriginal occupation dating back many thousands of years, and
- preserving evidence of European exploration, early settlement, and phases of development such as forestry, mining and dam building.

Restrictions and controls are placed on land use, development and access within Special Areas. Activities such as swimming, fishing, boating and camping are prohibited, unless otherwise specified.

How you can help keep our catchments healthy

Saving water

Water is a precious resource. Each of us has a responsibility to reduce the amount of water we use – no matter where we live.

By reducing the amount of water we all use, we reduce the need to build expensive new water supply infrastructure such as dams, reservoirs and pipelines.

Reducing the amount of water we all use can also help make more water available for environmental flows, which protect the health of the rivers downstream of the dams.

WaterNSW also recognises the need to adopt exemplary practices in managing our own business. Minimising leaks in pipelines and fitting water saving appliances and devices are just some of the ways WaterNSW is reducing the amount of water we use.

Water saving tips

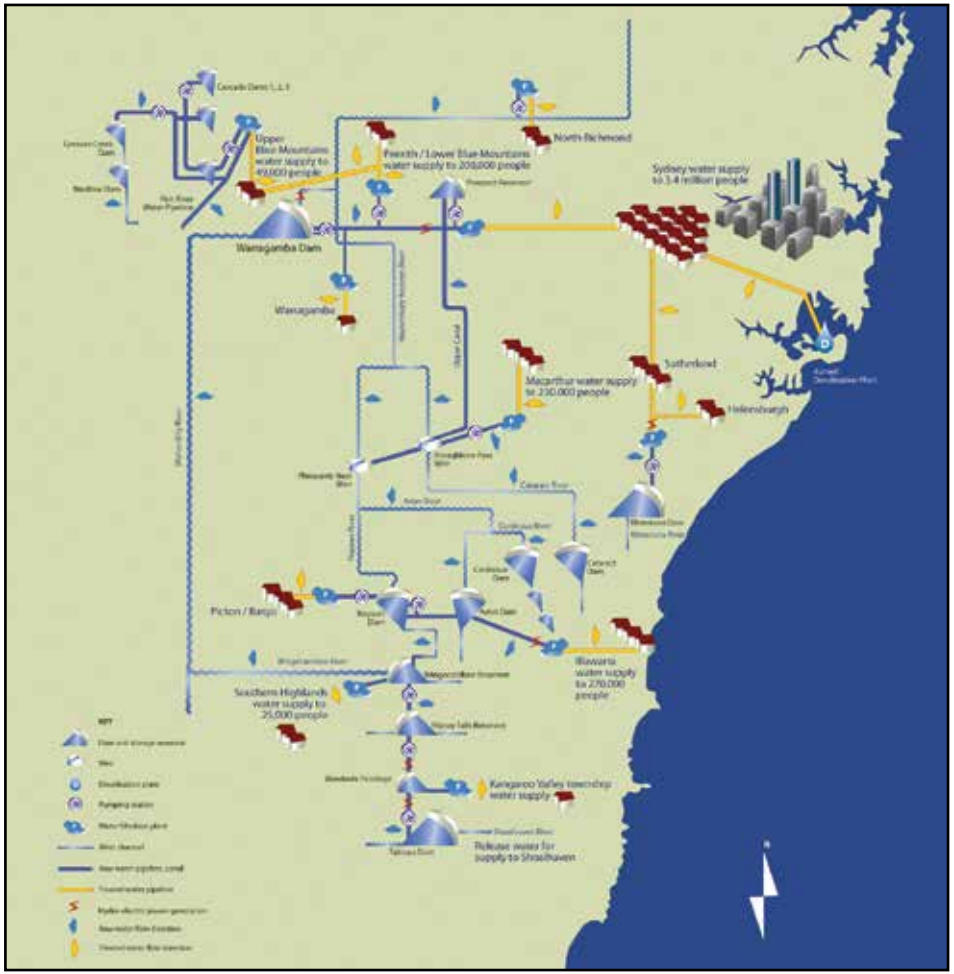
For great water savings ideas visit www.waternsw.com.au/water-quality/education/learn/using-less-water.

In the catchments

People living and working in the catchments areas play a special role in keeping our catchments healthy. Some of the ways people in the catchments help include:

- using chemicals efficiently and carefully
- controlling weeds and pests
- retaining and planting vegetation to prevent soil loss
- protecting stream bank vegetation to provide a buffer against pollution
- managing on–site sewage systems effectively
- encouraging and developing improved sewage and stormwater management systems
- preventing bushfires
- reporting spills.

Sydney's water supply system



Contacting WaterNSW

169 Macquarie Street, Parramatta 2150
PO Box 398, Parramatta NSW 2124

Phone	1300 662 077
Office hours	8.30am to 5pm Monday to Friday
Website	www.waternsw.com.au
Email	customer.helpdesk@waternsw.com.au

Visitor information

Warragamba Dam Visitor Centre

Phone	+ 61 2 4774 4433
Hours	10am to 4pm daily except Christmas Day and Good Friday

Other dams, reservoirs and camping grounds

Phone	1300 662 077
Hours	8.30am to 5pm Monday to Friday

Emergency reporting (24 hours)

Fires, chemical spills
Phone: 1800 061 069

Important

Information contained in this brochure may change after the date of printing. WaterNSW accepts no responsibility or liability for any loss or inconvenience incurred as a result of reliance upon information printed in this brochure. For the most up–to–date information on WaterNSW dams and recreational facilities, call 1300 662 077 or visit our website at www.waternsw.com.au

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