Mangrove Creek Dam
The Central Coast has the third largest urban water supply system in New South Wales.

The water supply system serves the region’s population of almost 300,000 people, delivering water to about 125,000 homes and businesses.

The system currently incorporates three dams, three weirs, three water treatment plants, over 50 reservoirs, and more than 2,000 kilometres of pipelines.
Mangrove Creek Dam is the Central Coast’s largest dam, located 50km north-west of Gosford in a narrow valley.

Constructed between 1978 and 1982, the dam provides 93 percent of the region’s water storage with a maximum capacity of 190,000 million litres of water.

Mangrove Creek Dam is a concrete faced rockfill dam that provides on-stream storage of water. The dam has a catchment area of 101 square kilometres and provides water to both Gosford City and Wyong Shire.
Facts and figures

General facts:
- Maximum capacity: 190,000ML
- Highest recorded level: 74.11% on 2 August 1990
- Lowest recorded level: 10.27% on 24 February 2007
- Water surface area: 7km² at full supply level
- Maximum depth: 65m
- Average annual rainfall: 960mm
- Catchment area: 101 km²

Dam facts:
- Type: Concrete faced rockfill
- Height: 80m
- Length: 380m
- Width at base: 250m
- Width at crest: 6m
- Volume of rock fill: 1,340,000m³
- Volume of concrete: 13,500m³
- Intake tower height: 47m

Spillway facts:
- Type: Concrete lined chute
- Length of spillway: 240m
- Width: 20m tapering to 10m
- Discharge capacity: 570m³/s
Why the dam was built

Mangrove Creek Dam was built due to a rising demand for water from an expanding population. The dam was built to boost water supply storage for the Central Coast and to help provide a more reliable water supply.

Mangrove Creek Dam offered a number of advantages as a site for the region’s major dam. The dam site was determined by the NSW Department of Public Works in the 1970’s after extensive investigation. The decision was based on a number of environmental, physical and financial considerations including:

- **Dam size** - For a dam this size the site is the closest possible location to the coastal areas where most people live.

- **Catchment** - The land comprises extensive undeveloped, uninhabited land which helps to maintain a pristine catchment area.

- **Geology** - The site has a rock foundation. Areas with a sandy base are not suitable for dam construction. The naturally V-shaped valley is the ideal storage with a small surface area compared to volume – which means less surface evaporation.

- **Future water supply works** - The dam site is located relatively close to all other water catchments – which minimises the costs associated with transfer pipelines and pumping stations.

Mangrove Creek Dam was proposed as a large storage dam, not primarily a collection dam. Its catchment area was relatively small but the shape of the valley and its geology enabled the construction of an 80 metre high wall that would store 190,000 million litres of water.
How the dam was built

Mangrove Creek Dam was built using rolled, soft rockfill of sandstones and siltstones. This material was obtained from a quarry located within the storage area. These sandstones and siltstones were crushed and compacted to form the dam embankment.

The embankment also contains approximately 100,000 cubic metres of processed basalt. This material was incorporated into various filters and drains within the embankment to cope with seepage within the embankment and foundations.

The concrete face which tapers from 600 millimetres at the base to 300 millimetres at the crest acts as a seal between the water and the dam embankment.

Provision was made to increase the height of the dam wall by 25 metres to a total capacity of 420,000 million litres if the need arose in the future.
Photos of history
How the dam works

Mangrove Creek Dam is the largest of the region’s three dams and acts as a main back up to the water supply. Water is released from the dam when stream flows are low in Mooney Mooney Creek, Ourimbah Creek and Wyong River.

Water is drawn from the dam via the intake tower and then released via valves at the outlet works, this water then flows 20 kilometres downstream to Mangrove Creek Weir and pumped to Mooney Mooney. From here the water is further pumped to Somersby balance tanks and then transferred from the balance tanks to Somersby Water Treatment Plant. After treatment, the water is then distributed around the Central Coast.

Although Mangrove Creek Dam is an on-stream dam, the Mardi-Mangrove Link pipeline can also capture excess flows in Wyong River and Ourimbah Creek and transfer these to Mangrove Creek Dam for storage, via Mardi Dam. The two-way pipeline also allows water to be released from the dam, through Boomerang Creek Tunnel back to Mardi Dam. From Mardi Dam water will then be pumped to Mardi Water Treatment Plant for distribution to the Wyong Shire.
Mardi-Mangrove Link

Construction of the Mardi-Mangrove Link started in March 2010 and the project was officially completed in July 2012. The Mardi-Mangrove Link was the largest water infrastructure project completed on the Central Coast since the mid-1980s when Mangrove Creek Dam was built.

The Mardi-Mangrove Link is made up of two pipelines totalling 21 kilometres in length. The Link means that during high flows water can be transferred from Wyong River and Ourimbah Creek, via Mardi Dam to the large Mangrove Creek Dam for storage, instead of allowing it to flow to the ocean.

The Mardi-Mangrove Link will help protect the region against future extended periods of below average rainfall. The project was a key element of WaterPlan 2050, the long term strategy to secure the Central Coast water supply.
Spillway

A spillway is a structure used to provide the controlled release of flows from a dam into a downstream area. Spillways release floods so that the water does not overtop and damage or even destroy the dam. Except during flood periods, water does not normally flow over a spillway.

The Mangrove Creek Dam spillway was built in 1982. The spillway is 240 metres long and has a crest with a maximum width of 20 metres. The spillway channel can be divided into four segments: the upper, gently sloping portion, the steeply sloping portion, the flip-bucket area, and the stilling basin.

In times of flood the spillway would transfer excess water from behind the dam down a smooth decline into Lower Mangrove Creek. The spillway is lined on the bottom and sides with concrete to protect the dam and topography. The flip-bucket area of the spillway slows the water down by causing the water to rise and fall back down on itself, protecting the base of the dam from erosion. The stilling basin then continues to slow the water protecting the environment downstream of the dam.

Boomerang Creek Tunnel

In 1989 Boomerang Creek Tunnel, an 11 kilometre tunnel linking Mangrove Creek Dam and Wyong River, was completed. This 3 metre diameter tunnel enabled water to be transferred from the dam to Wyong River. This water was then extracted downstream at Lower Wyong River Weir and pumped for storage in Mardi Dam. However the Mardi-Mangrove Link now allows water to be directly transferred between the two dams.
Monitoring the dam

Mangrove Creek Dam is staffed 365 days of the year to enable daily monitoring and safety inspections of the embankment and surrounding structures.

Instrumentation located within the dam embankment allows staff to monitor and record any movement activities, seepage or any other physical changes to the dam and surrounding structures. There are also regular surveys carried out on the structure.

Monitoring and maintaining water quality

Mangrove Creek Dam staff carry out sampling and water quality monitoring on a weekly basis. The samples collected are sent to various laboratories for analysis.

The stored water is maintained at its highest quality by the process of destratification.

Destratification involves compressed air being pumped into the lower levels of the dam adjacent to the intake tower to continually turn the water over. This process is used to reduce temperature variations over depth, help control algal growth and reduce levels of dissolved metals.
Water Catchment

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, bush land, farms, dams, homes, plants, animals and people can co-exist in a catchment.

Healthy catchments provide:

▶ a source of clean drinking water
▶ habitat for plants and animals, and
▶ healthy vegetation and waterways.

Mangrove Creek Dam has a catchment area of 101 square kilometres and is a pristine environment with minimal habitation.

Restricted access

To maintain the health of the Mangrove Creek Dam catchment, access to the surrounding area is restricted. The restricted area covers about 101 square kilometres of land around the dam and protects our water supply by acting as a buffer zone to help stop nutrients and other substances that could affect the quality of water entering the dam.

By restricting access to the area we benefit by:

▶ protecting water quality
▶ protecting large areas of bush land and plant and animal habitats
▶ protecting threatened plants and animal species, and
▶ preserving evidence of Aboriginal occupation dating back many thousands of years.