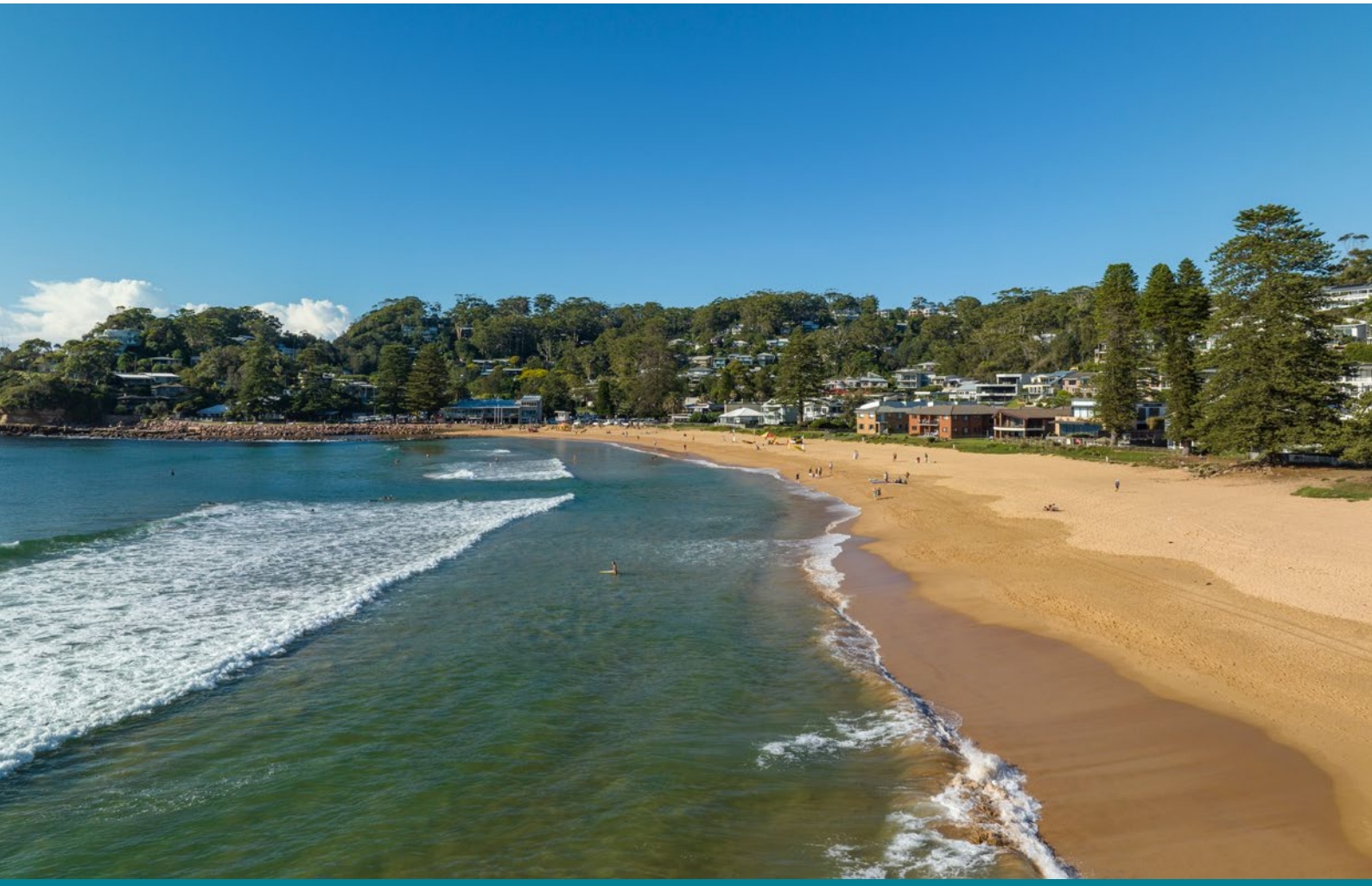

Beachwatch

State of the beaches 2023–24

Central Coast region

Department of Climate Change,
Energy, the Environment and Water

NSW GOVERNMENT

Acknowledgement of Country

Department of Climate Change, Energy, the Environment and Water acknowledges the Traditional Custodians of the lands where we work and live.

We pay our respects to Elders past, present and emerging.

This resource may contain images or names of deceased persons in photographs or historical content.

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Artist and designer Nikita Ridgeway from Aboriginal design agency Boss Lady Creative Designs created the People and Community symbol.

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Recreational water quality has been monitored in the Central Coast region since 2002 by Central Coast Council under the Department of Climate Change, Energy, the Environment and Water's Beachwatch Partnership Program. This report summarises the performance of 32 swimming sites on the Central Coast of New South Wales, providing a long-term assessment of how suitable a site is for swimming. Monitored sites included ocean beaches, ocean baths, estuarine areas in Brisbane Water, designated swimming areas in Lake Macquarie, Lake Munmorah and Tuggerah Lake, and 4 coastal lagoons.

In 2023–2024, 59% of swimming sites in the Central Coast region were graded as Very Good or Good, including 15 ocean beaches, an estuarine beach and 3 ocean baths. These sites were suitable for swimming for most or almost all of the time. This is an improvement in performance on the previous year and reflects the mostly average to below average rainfall conditions over the year. Despite some Poor grades, the majority of monitored sites were still suitable for swimming during dry weather. The Central Coast region has a large proportion of lake/lagoon and estuarine swimming locations, which have been most susceptible to impacts from wet weather conditions.

Central Coast region summary 2023–2024

Killcare Beach

Photo: Beachwatch/DCCEEW

Monitoring water quality for swimming in New South Wales

The water quality of beaches and other swimming locations is monitored under the NSW Government's Beachwatch programs to provide the community with accurate information on the cleanliness of the water and to enable individuals to make informed decisions about where and when to swim. Routine assessment also measures the impact of pollution sources, enables the effectiveness of stormwater and wastewater management practices to be assessed and highlights areas where further work is needed.

Swimming sites in New South Wales are graded as Very Good, Good, Fair, Poor or Very Poor in accordance with the National Health and Medical Research Council's 2008 *Guidelines for Managing Risks in Recreational Waters*. These Beach Suitability Grades provide a long-term assessment of how suitable a beach is for swimming. The grades are determined from the most recent 100 water quality results (2–4 years' worth of data depending on the sampling frequency) and a risk assessment of potential pollution sources.

See the section on **Quality assurance** in the Statewide Summary for results of the quality assurance program.

Recreational water quality has been monitored in the Central Coast region by Central Coast Council since its amalgamation in 2016. Prior to 2016, swimming sites were monitored by Wyong Shire Council from 2002 and by Gosford City Council from 2004.

A **quality assurance** program ensures the information collected and reported by Beachwatch and its partners is accurate and reliable.

Rainfall impacts

During 2023–2024, 32 swimming sites were monitored including ocean beaches, ocean baths, estuarine areas in Brisbane Water, designated swimming areas in Lake Macquarie, Lake Munmorah and Tuggerah Lake and 4 coastal lagoons.

Rainfall is the major driver of pollution to recreational waters, generating stormwater runoff and triggering untreated discharges from the wastewater treatment and transport systems. Changes in rainfall patterns are reflected in beach water quality over time due to variation in the frequency and extent of stormwater and wastewater inputs.

The Beach Suitability Grades for 2023–2024 are based on water quality data collected over the last 2–4 years. Rainfall over this period has been diverse:

- 2020–2021: variable rainfall with some very wet months over summer and early autumn
- 2021–2022: varied rainfall, with extreme wet weather conditions over summer and early autumn, and flooding impacts
- 2022–2023: varied rainfall, with some very wet months over winter and spring, including the wettest July on record
- 2023–2024: mostly average to below average rainfall, except for some isolated wet months.

See the section on **How to read this report** on page 49 for an explanation of the graphs, tables and Beach Suitability Grades.

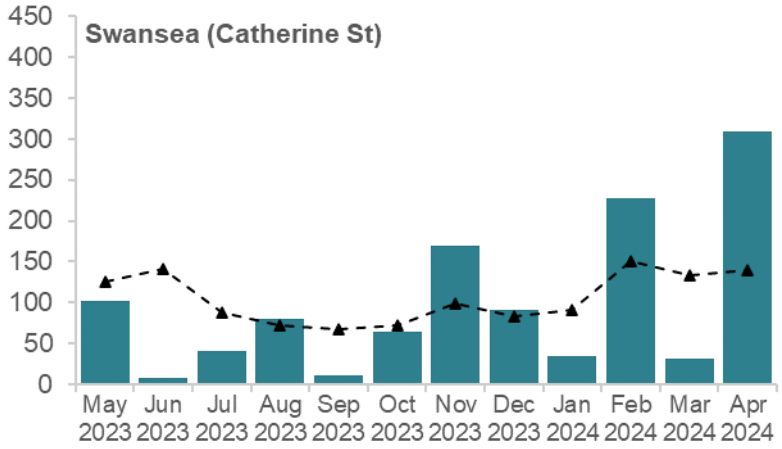
Rainfall on the Central Coast was average to below average for the 2023–2024 reporting year, except for some isolated wet months. Well above average rainfall was recorded across the region in November 2023 and February and April 2024.

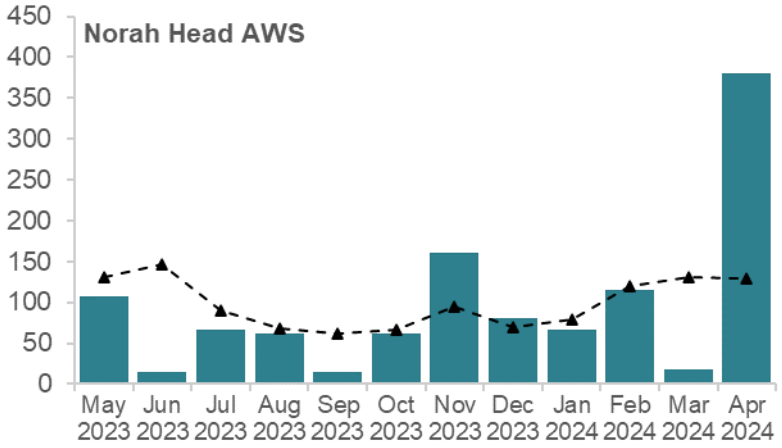
April 2024 was notably wet, with Norah Head recording its highest April daily rainfall of 120.8 mm on 20 April, and its highest April total rainfall in 25 years at 381 mm, almost 3 times the long-term monthly average. Similarly, Swansea recorded its highest April daily rainfall of 114 mm on 6 April.

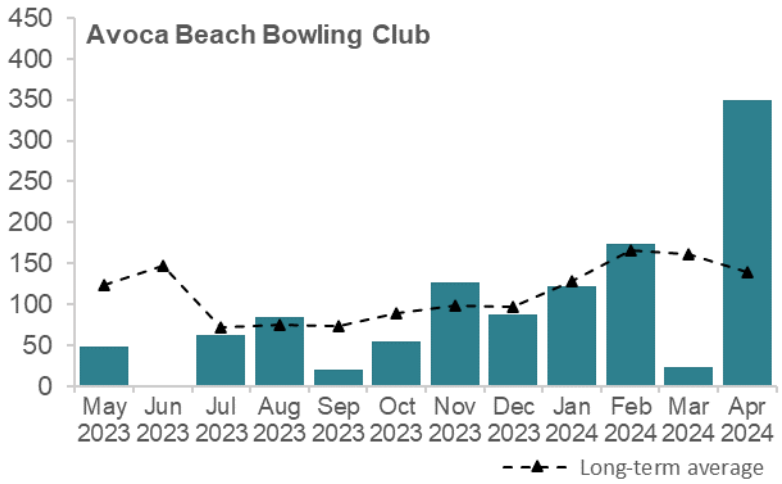
Monitoring by Central Coast Council showed the significant wet weather and associated flooding in early April 2024 had made microbial water quality unsuitable for swimming. The most affected areas were in estuaries, lakes and lagoons, which have a lower level of flushing and took longer to recover from the stormwater inputs than the ocean beaches. The water quality at some ocean beaches located near the open lagoons, river or lakes

were also impacted by stormwater and floodwaters discharging from these sources.

Central Coast region rainfall







Marine algal blooms

Marine algal bloom present in the water

Photo: Chad Weston/ NPWS, DCCEEW

Water NSW issued a caution alert for Lake Macquarie for *Noctiluca* sp., in October 2023 near Summerland Point Gwandalan and Chain Valley Bay boat ramps in Lake Macquarie. Water NSW also reported a marine red algae bloom from *Gonyaulax polygramma* in May 2023, and marine blooms in December 2023 that may have impacted beaches in the Central Coast region.

Algae advisories were issued on the Beachwatch and Water NSW websites, as well as onsite signage during blooms.

The appearance of **marine algae** is sometimes mistaken for **sewage contamination** or **oil slicks**, due to a strong odour and red or brown discolouration in the water caused by the blooms.

As a precaution, direct contact with algae should be avoided as it can cause skin and eye irritations. The marine algal blooms dissipated with changes in tide and wind conditions.

Beachwatch issues daily **beach pollution forecasts** to enable beach goers to make informed decisions about where and when to swim.

Pollution forecasts for the Central Coast beaches can be accessed via the Beachwatch website, email subscription, X (formerly Twitter) and Facebook.

Health risks

Contamination of recreational waters with faecal material from animal and human sources can pose significant health problems to beach users owing to the presence of pathogens (disease-causing micro-organisms) in the faecal material. The most common groups of pathogens found in recreational waters are bacteria, protozoans and viruses.

Exposure to contaminated water can cause gastroenteritis, with symptoms including vomiting, diarrhoea, stomach-ache, nausea, headache and fever. Eye, ear, skin and upper respiratory tract infections can also be contracted when pathogens come into contact with small breaks and tears in the skin or ruptures of the delicate membranes in the ear or nose.

Certain groups of users may be more vulnerable to microbial infection than others. Children, the elderly, people with compromised immune systems, tourists,

and people from culturally and linguistically diverse backgrounds are generally most at risk.

Beach Suitability Grades for Central Coast region

Swimming site	Site type	Beach Suitability Grade	Change
Central Coast Council			
Lakes Beach	Ocean beach	VG	↑
Cabbage Tree Bay Rockpool	Ocean baths	G	○
Soldiers Beach	Ocean beach	VG	↑
North Entrance Beach	Ocean beach	VG	○
The Entrance Beach	Ocean beach	G	○
The Entrance Ocean Baths	Ocean baths	G	○
Toowoon Bay	Ocean beach	G	○
Shelly Beach	Ocean beach	G	○
Gwandalan	Lake/Lagoon	P	○
Summerland Point Baths	Lake/Lagoon	P	○
Chain Valley Bay	Lake/Lagoon	P	○
Mannering Park Baths	Lake/Lagoon	P	○
Lake Munmorah Baths	Lake/Lagoon	P	○
Canton Beach	Lake/Lagoon	P	○
Wamberal Beach	Ocean beach	G	○
Wamberal Lagoon	Lagoon	P	○
Terrigal Beach	Ocean beach	G	↑
Terrigal Lagoon	Lagoon	P	○
North Avoca Beach	Ocean beach	G	○
Avoca Beach	Ocean beach	G	○
Avoca Lagoon	Lagoon	P	○
Copacabana Beach	Ocean beach	G	○
Cockrone Lagoon	Lagoon	P	○

Swimming site	Site type	Beach Suitability Grade	Change
Central Coast Council (continued)			
MacMasters Beach	Ocean beach	G	○
Killcare Beach	Ocean beach	G	○
Ocean Beach	Ocean beach	G	○
Umina Beach	Ocean beach	G	○
Pearl Beach Rockpool	Ocean baths	G	○
Davistown Baths	Estuarine	P	○
Pretty Beach Baths	Estuarine	P	○
Woy Woy Baths	Estuarine	G	↑
Yattalunga Baths	Estuarine	P	○

Beach Suitability Grade					Change		
VG	G	F	P	VP	↑	○	↓
Very Good	Good	Fair	Poor	Very Poor	Improved	Stable	Declined

Central Coast Council

Overall results

100%
ocean beaches graded Good or Very Good

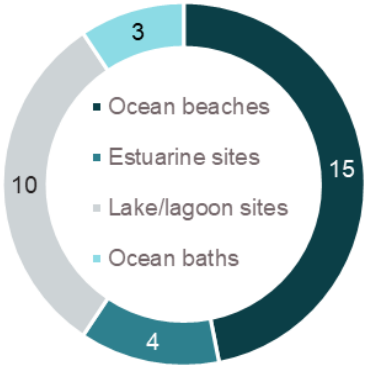
Nineteen of the 32 swimming sites were graded as Very Good or Good in 2023–2024, which is an improvement on the previous year. The overall performance is influenced by a large proportion of monitored swimming sites being in lagoons and estuaries, where the impacts of rainfall are more apparent, with reduced dilution and flushing of pollution inputs.

Percentage of sites graded as Very Good or Good

	2021–2022	2022–2023	2023–2024	Trend
Ocean beaches (15 sites)	87%	93%	**100%**	
Estuarine sites (4 sites)	0%	0%	**25%**	
Lake/ lagoon sites (10 sites)	10%	0%	**0%**	
Ocean baths (3 sites)	100%	100%	**100%**	

See the section on **How to read this report** on page 49 for an explanation of the graphs, tables and Beach Suitability Grades.

Thirty-two swimming sites were monitored by Central Coast Council. All sampling and laboratory analysis was conducted and fully funded by the council. All sites are sampled weekly between October and April and monthly from May to September.



Site types in Central Coast region

Beach Suitability Grades for Central Coast ocean beaches

Best beaches

Lakes Beach, Soldiers Beach and North Entrance Beach

This site had excellent water quality and was suitable for swimming almost all of the time.

Swimming sites monitored in the Central Coast region include ocean beaches, estuarine areas in Brisbane Water, lake swimming sites in Lake Macquarie, Lake Munmorah and Tuggerah Lakes, coastal lagoons at Wamberal, Terrigal, Avoca and Cockrone, and ocean baths at The Entrance, Cabbage Tree Bay and Pearl Beach, with each site type having a different response to rainfall-related impacts.

In general, estuarine, lake and lagoon swimming sites did not perform as well as ocean beaches and ocean baths, due to lower levels of flushing increasing the time needed to disperse and dilute pollution inputs, taking longer to recover from stormwater events.

As a general precaution swimming should be avoided during and for at least one day after heavy rain at ocean beaches, and for up to 3 days in estuarine areas, or if there are signs of stormwater pollution such as discoloured water or floating debris.

Ocean beaches

Lakes Beach, Soldiers Beach and North Entrance Beach were graded as Very Good in 2023–2024. While the grade for North Entrance Beach was consistent with the previous year, Lakes Beach and Soldiers Beach grades improved from Good in the previous year due to improved microbial water quality. Water quality at these sites was suitable for swimming almost all of the time.

Twelve of the 15 ocean beaches were graded as Good: The Entrance Beach, Toowoon Bay, Shelly Beach, Wamberal Beach, Terrigal Beach, North Avoca Beach, Avoca Beach, Copacabana Beach, MacMasters Beach, Killcare Beach, Ocean Beach and Umina Beach. Water quality at these

sites is suitable for swimming most of the time but can be susceptible to pollution following rainfall.

Terrigal Beach was upgraded to Good from Poor in the previous year. Despite a higher proportion of samples collected during wet weather conditions in this year's assessment period compared to the 2022–2023 assessment period, overall microbial water quality has shown improvement.

More information about Central Coast Council's audit of sewer and stormwater networks and remediation works is available on council's website.

During 2019–2020 Central Coast Council, the then Department of Planning, Industry and Environment and the University of Technology Sydney (UTS) investigated the scale and extent of elevated bacterial levels at Terrigal Beach. Council is using the findings from the investigation to detect and resolve water quality issues in the catchment. In 2019, Central Coast Council instigated a widespread audit of the sewer and stormwater network. This involved extensive in field and laboratory analysis to determine the pollution source, CCTV inspection of over 50 km of sewer pipes in the Terrigal Beach and Lagoon catchments, the relining and upgrading of over 32 km of pipes, and smoke and dye testing to identify illegal connections.

It is recommended that swimming be avoided during and for up to one day after rainfall at ocean beaches or if there are signs of stormwater pollution such as discoloured water, flowing drains or outflow from lagoons, due to the possibility of pollution.

Estuarine beaches

Beach Suitability Grades for Central Coast estuarine beaches

Woy Woy Baths was graded as Good in 2023–2024, an improvement from Poor in the previous year. Water quality at this site was suitable for swimming most of the time, with 84% of dry weather samples within the safe swimming limit. Microbial water quality at this site has shown gradual improvement over the last 3 years, however remains close to the threshold between Good and Poor grades.

Three estuarine swimming sites in Brisbane Water continued to be graded as Poor in 2023–2024: Davistown Baths, Pretty Beach Baths and Yattalunga Baths. This

result is consistent with previous years. Despite the Poor grades, microbial water quality at these sites has shown trends of improved microbial assessments in the last 3–4 years.

Microbial water quality at Yattalunga Baths was mostly suitable for swimming during dry weather conditions, with 78% of samples within the safe swimming limit when no rain had fallen in the previous 24 hours. Elevated enterococci levels were often recorded following light rainfall, and increased in response to increasing rain.

Microbial water quality at Davistown Baths and Pretty Beach Baths was often elevated during dry weather conditions. At these sites, the bacterial levels continued to increase significantly in response to increasing rainfall, with bacterial levels regularly exceeding the safe swimming limit after light to moderate rain.

The estuarine beaches may be impacted by several significant potential sources of faecal contamination including stormwater and other sources within Brisbane Water, and have low levels of flushing.

Swimming at the estuarine beaches is not recommended during and for up to 3 days following rainfall or if there are any signs of stormwater such as discoloured water or floating debris.

Lake/lagoon swimming sites

Beach Suitability Grades for Central Coast lake/lagoon swimming sites

Summerland Point Baths, Gwandalan, Chain Valley Bay, Mannering Park Baths, Lake Munmorah Baths and Canton Beach were graded as Poor in 2023–2024, consistent with the previous year.

Microbial water quality at Summerland Point Baths was mostly suitable for swimming during dry weather conditions, with 85% of samples within the safe swimming limit when no rain had fallen in the previous 24 hours. Elevated enterococci levels increased in response to rainfall, and were often recorded following light to moderate rainfall. Despite the Poor grade, the microbial water quality is close to the threshold between Good and Poor grades.

Gwandalan, Chain Valley Bay, Mannering Park Baths, Lake Munmorah Baths and Canton Beach continued to be graded as Poor in 2023–2024, a similar result to the previous years. Elevated enterococci levels were often recorded after light rainfall and continued to increase with increasing rainfall at these sites.

Microbial water quality was often suitable for swimming during dry weather conditions at Mannering Park Baths, Lake Munmorah Baths and Canton Beach, with between 59% and 73% of samples within the safe swimming limit when no rain had fallen in the previous 24 hours, and occasionally suitable for swimming during dry weather conditions at Gwandalan and Chain Valley Bay with 48% and 46% of samples within the safe swimming limit when no rain had fallen in the previous 24 hours.

Despite the Poor grades, Canton Beach has shown trends of improved microbial assessments in last 4 years with management actions improving water quality at this site. Central Coast Council has been undertaking studies in microbial source tracking and enterococci loads in sediment at Canton Beach to better understand the sources of elevated enterococci levels periodically recorded at the swim site.

The impact of rainfall-related pollution is more apparent at these sites with low levels of flushing and slower dilution to disperse pollution inputs. Swimming should be avoided during and for at least 3 days after rainfall.

The 4 lagoons were graded as Poor in 2023–2024: Wamberal Lagoon, Terrigal Lagoon, Avoca Lagoon and Cockrone Lagoon, consistent with previous years. However, the microbial assessment for the 4 lagoon sites has improved from the previous years' assessments. Microbial water quality at these sites was often elevated in dry weather conditions, and regularly exceeded the safe swimming limit following light to moderate rainfall. While microbial water quality increased significantly with increasing rainfall at all 4 lagoon swimming sites, bacteria levels at Terrigal and Avoca lagoons were generally more elevated than levels measured at Wamberal and Cockrone lagoons.

Sampling is undertaken near the lagoon mouths, and showed bacterial levels increased significantly with increasing rainfall. Swimming should be avoided during and for at least 3 days after rainfall, or if there are any signs of pollution such as discoloured water, odours or floating debris.

During 2019–2020, Central Coast Council, the then Department of Planning, Industry and Environment and UTS investigated the scale and extent of elevated bacterial levels at the 4 lagoons, and the source of microbial contamination. Council is using the findings from these investigations to detect and resolve water quality issues in these catchments. As part of Central Coast Council's sewerage infrastructure program, and the Terrigal Lagoon Pollution Reduction Program, council has recently relined sewer mains in the Terrigal Lagoon and Avoca Lagoon catchments to reduce sewage overflows reaching the environment.

Pollution inputs can accumulate in coastal lagoons due to very low levels of flushing. While pollution is usually diluted when the lagoon entrance is open to the ocean, the outflow can impact the microbial water quality at nearby beaches.

Beach Suitability Grades for Central Coast ocean baths

Ocean baths

Cabbage Tree Bay Rockpool, The Entrance Ocean Baths and Pearl Beach Rockpool continued to be graded as Good in 2023–2024, consistent with previous years. Water quality at these sites was suitable for swimming most of the time but can be impacted by pollution following rain.

The Entrance Ocean Baths was frequently suitable for swimming during dry weather conditions with 100% of dry weather samples within the safe swimming limit. Elevated enterococci were occasionally recorded following heavy rain.

Cabbage Tree Bay Rockpool and Pearl Beach Rockpool were mostly suitable for swimming after little or no rain, with elevated levels of enterococci often recorded following moderate to heavy rainfall.

The Entrance Ocean Baths are cleaned regularly year round by council, while Cabbage Tree Bay Rockpool and Pearl Beach Rockpool are flushed irregularly and are dependent on the natural exchange of ocean water over the rocks and pool walls. It is recommended that swimming be avoided during and for up to one day after rainfall, or if there are signs of pollution such as discoloured water or floating debris.

Sampling sites and Beach Suitability Grades in Central Coast Council (northern)

Sampling sites and Beach Suitability Grades in Central Coast Council (southern)

Lakes Beach

Beach grade: VG

See 'How to read this report' for key to map.

Lakes Beach is at the southern end of an 8 km stretch of beach. The beach is patrolled during summer.

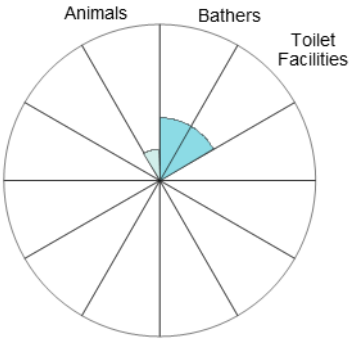
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

Enterococci levels increased slightly with increasing rainfall, often exceeding the safe swimming limit after 10 mm or more of rain.

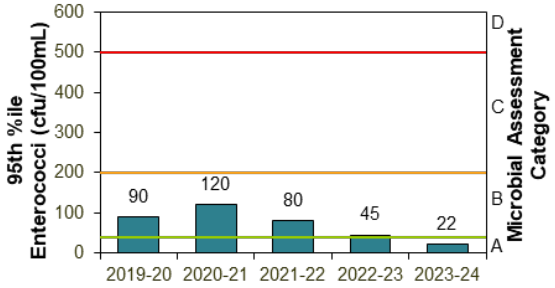
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	98%	100	Improved ↑

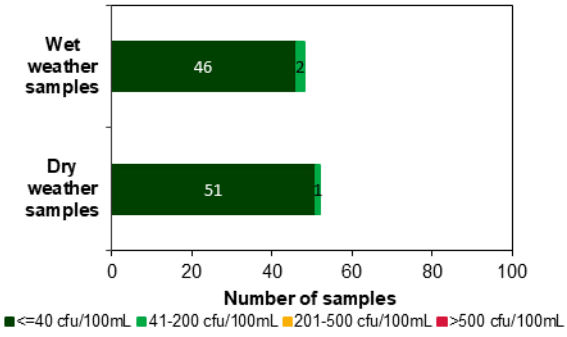
Sanitary inspection: Low



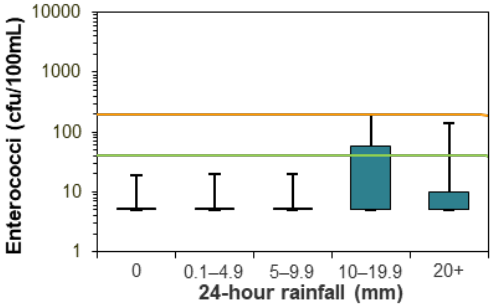
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Cabbage Tree Bay Rockpool

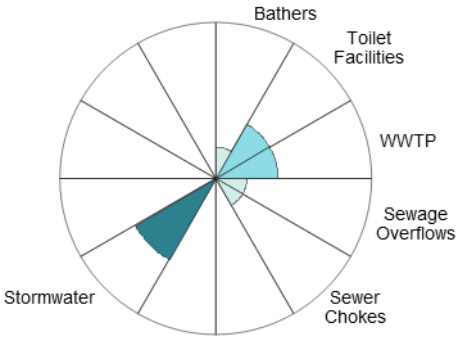
Beach grade: G

See 'How to read this report' for key to map.

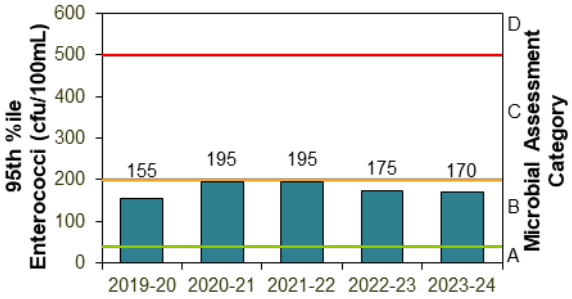
Cabbage Tree Bay Rockpool is located within a sheltered bay of Cabbage Tree Harbour, Norah Head and is naturally flushed by the ocean.
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination.
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and often after 10 mm or more.
The site was monitored from 2002 until 2005, and since 2017.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean baths	Mar 2021 to Apr 2024	81%	100	Stable

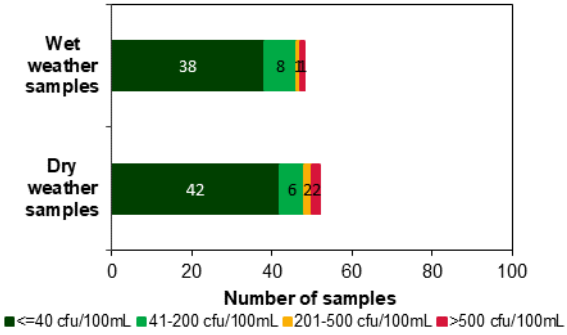
Sanitary inspection: Moderate



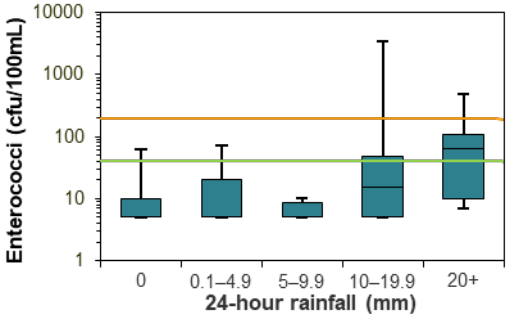
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Soldiers Beach

Beach grade: VG

See ‘How to read this report’ for key to map.

Soldiers Beach is a popular beach surrounded by reserve and is patrolled over summer.

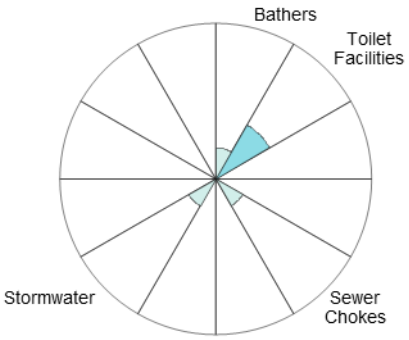
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 10 mm or more of rain.

The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	96%	100	Improved ↑

Sanitary inspection: Low



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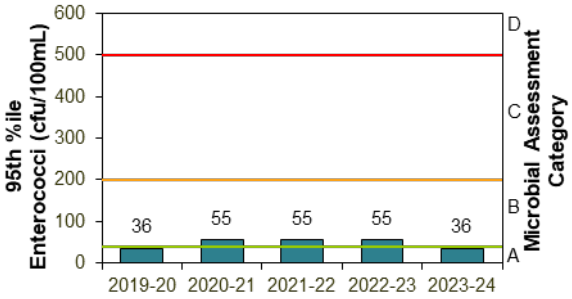
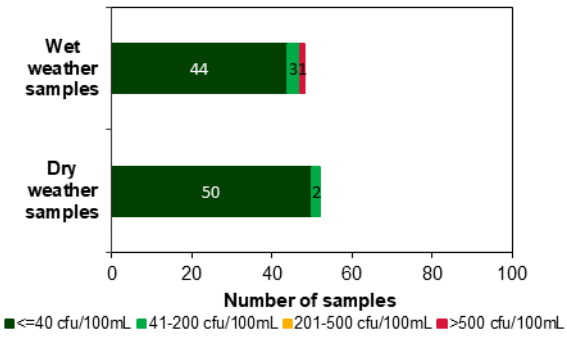
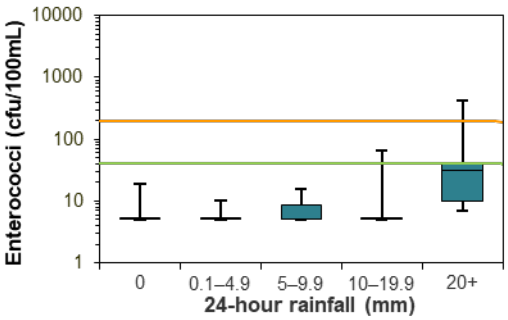


Dry and wet weather water quality



Water quality in response to rainfall



North Entrance Beach

Beach grade: VG

See 'How to read this report' for key to map.

North Entrance Beach is located to the north of the entrance to Tuggerah Lake, and is patrolled over summer.

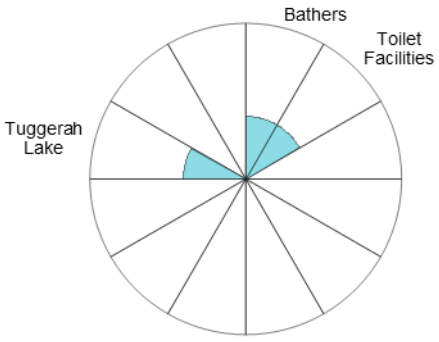
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

Enterococci levels had little response to rainfall and generally remained below the safe swimming limit.

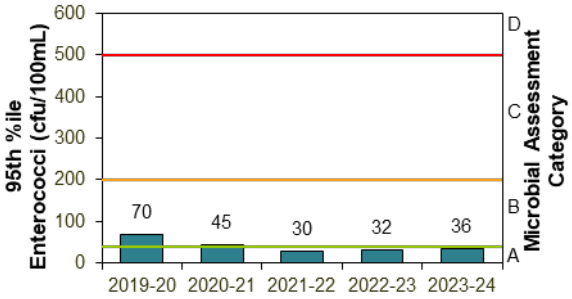
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	92%	100	Stable

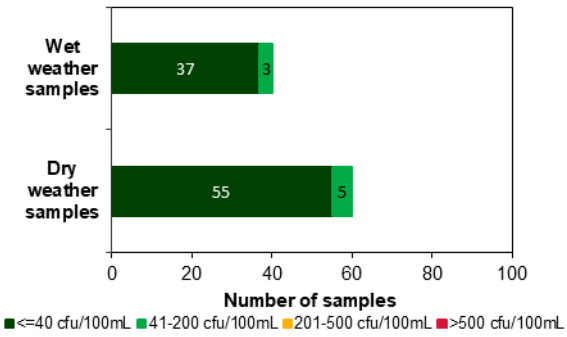
Sanitary inspection: Low



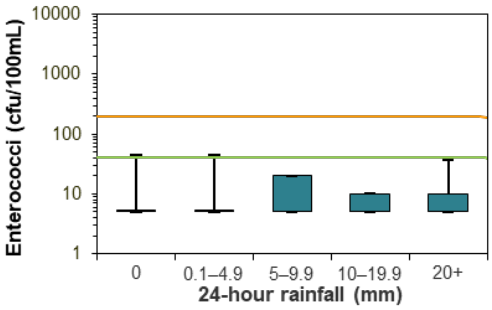
Microbial Assessment Category: A



Dry and wet weather water quality

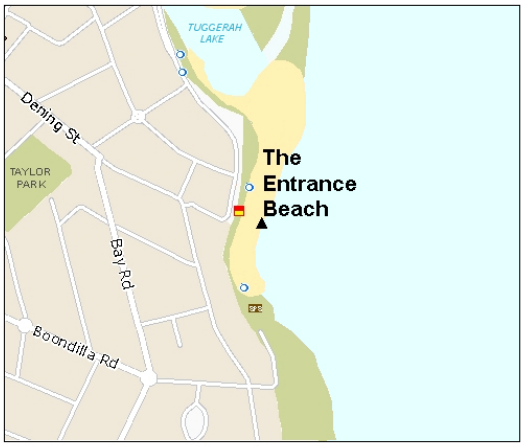


Water quality in response to rainfall



The Entrance Beach

Beach grade: G



See 'How to read this report' for key to map.

The Entrance Beach is located to the south of the entrance to Tuggerah Lake and is patrolled over summer.

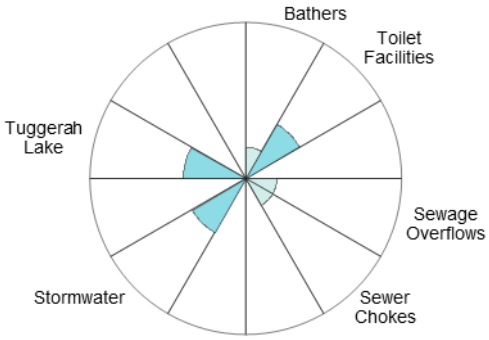
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with several potential sources of minor faecal contamination.

Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after no rain, and often after 20 mm or more of rain.

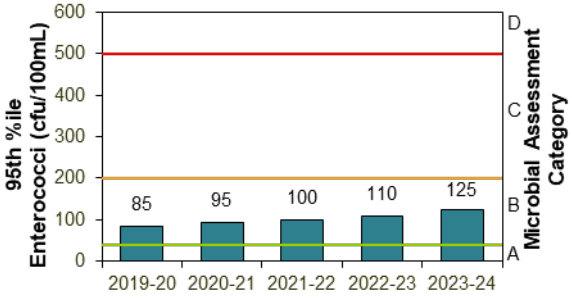
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	92%	100	Stable

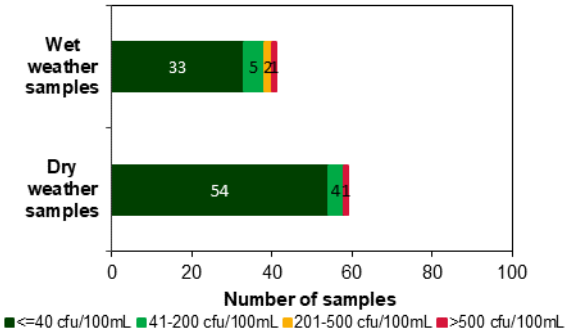
Sanitary inspection: Low



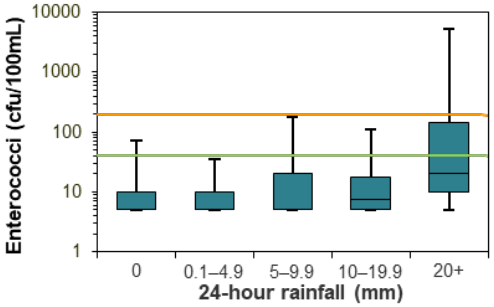
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



The Entrance Ocean Baths

Beach grade: G

See 'How to read this report' for key to map.

The Entrance Ocean Baths include a 50 m concrete pool and 2 smaller wading pools located at the southern end of The Entrance Beach, and are patrolled over summer.

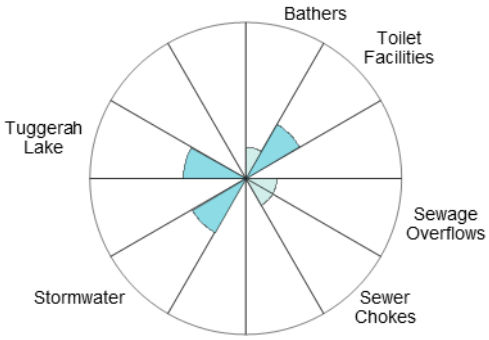
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with several potential sources of minor faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 5 mm or more of rain.

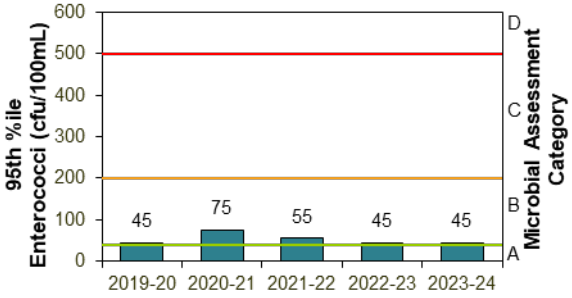
The site has been monitored since 2017.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean baths	Dec 2020 to Apr 2024	100%	100	Stable

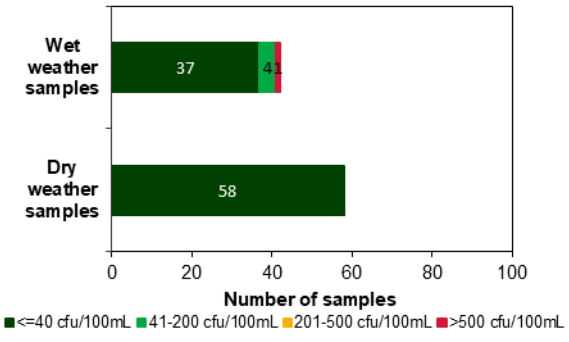
Sanitary inspection: Low



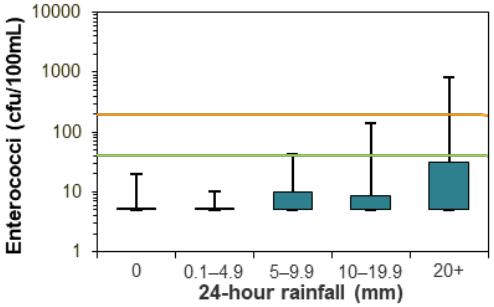
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Toowoon Bay

Beach grade: G

See 'How to read this report' for key to map.

Toowoon Bay is a relatively calm ocean beach protected by headlands and a tombola. The beach is patrolled during summer.

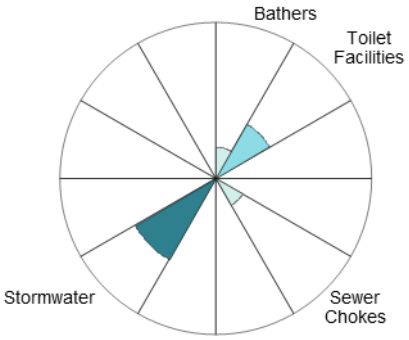
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with several potential sources of faecal contamination.

Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after no rain and regularly after 20 mm or more of rain.

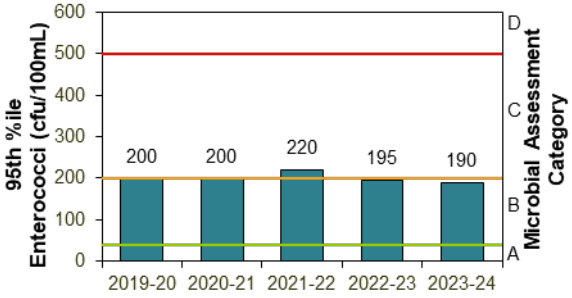
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	81%	100	Stable

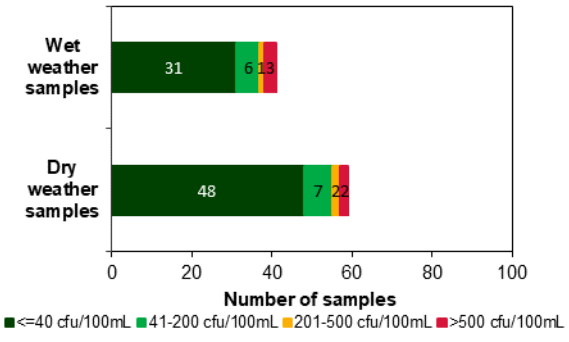
Sanitary inspection: Moderate



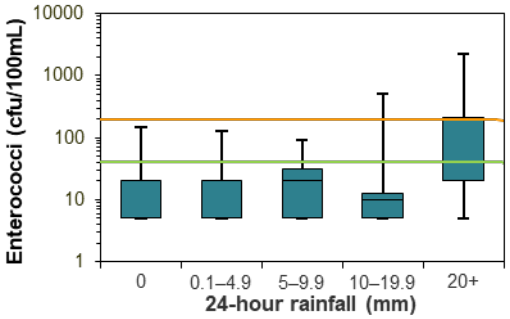
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Shelly Beach

Beach grade: G

See 'How to read this report' for key to map.

Shelly Beach is a popular patrolled beach, backed by a high dune system and golf course.

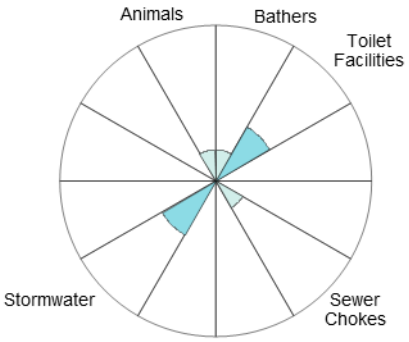
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of minor faecal contamination.

Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit in response to little or no rain, and often after 20 mm or more of rain.

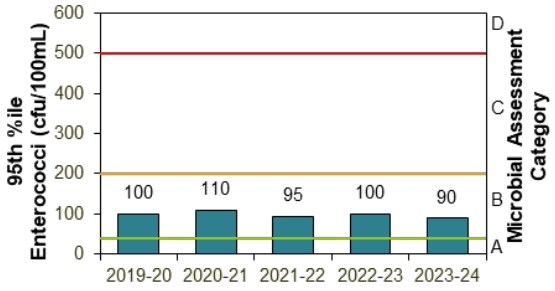
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	90%	100	Stable

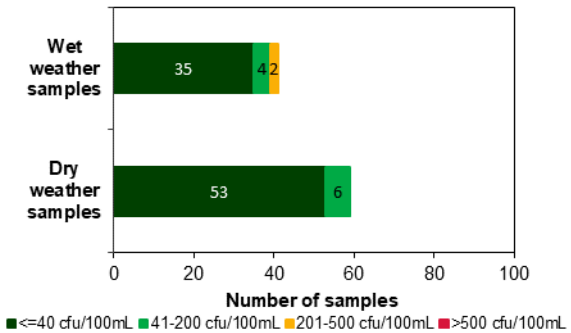
Sanitary inspection: Low



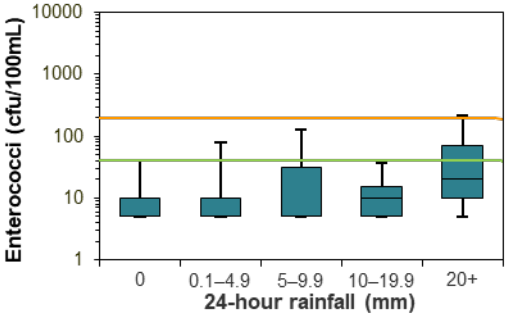
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Gwandalan

Beach grade: P

See 'How to read this report' for key to map.

Gwandalan is a netted swimming enclosure within Crangan Bay in southern Lake Macquarie.

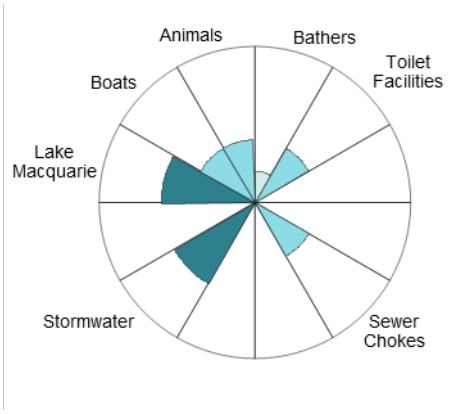
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater and sources from elsewhere within the lake.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit in response to no rain, and regularly after rainfall.

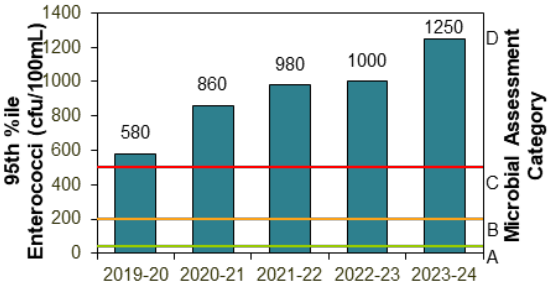
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Mar 2021 to Apr 2024	48%	100	Stable

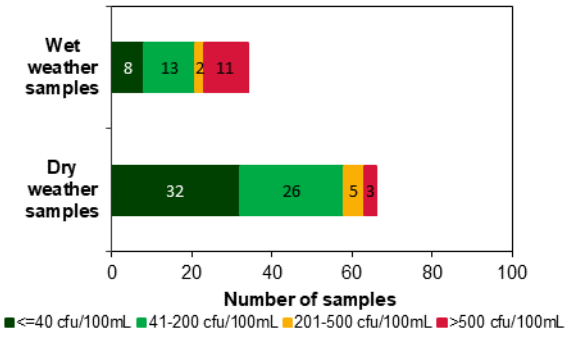
Sanitary inspection: Moderate



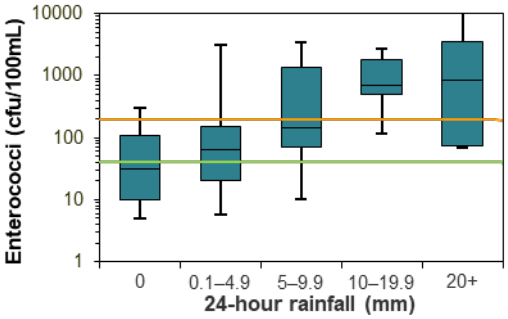
Microbial Assessment Category: D



Dry and wet weather water quality

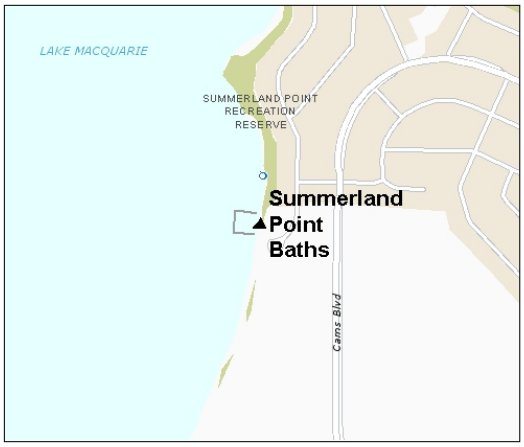


Water quality in response to rainfall



Summerland Point Baths

Beach grade: P



See 'How to read this report' for key to map.

Summerland Point Baths is a netted swimming area located at the southern end of Lake Macquarie.

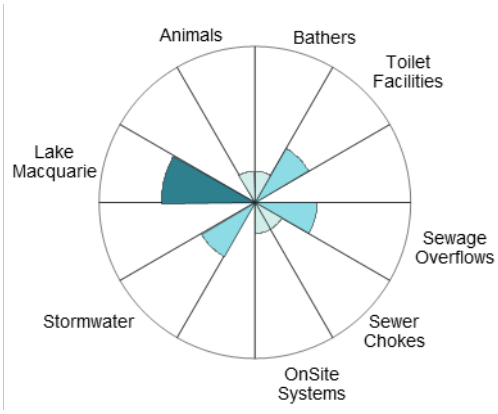
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to pollution, particularly after rain and occasionally in dry weather, with several potential sources of faecal contamination including sources from elsewhere within the lake.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to little or no rain, and often after 5 mm or more.

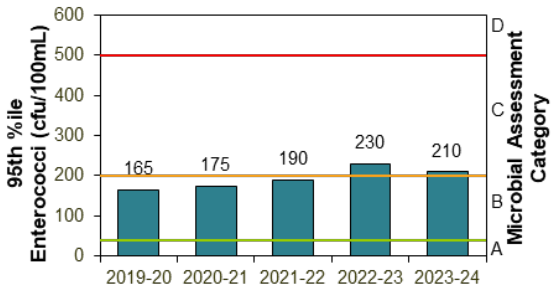
The site has been monitored since 2017.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Mar 2021 to Apr 2024	85%	100	Stable

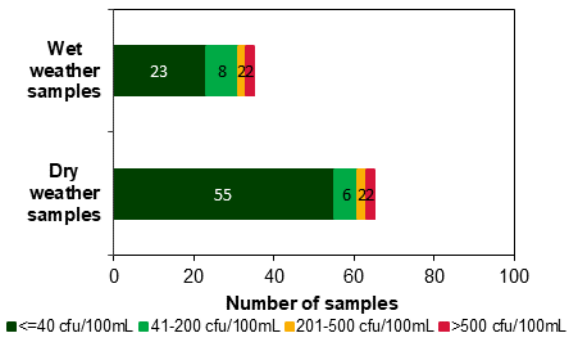
Sanitary inspection: Moderate



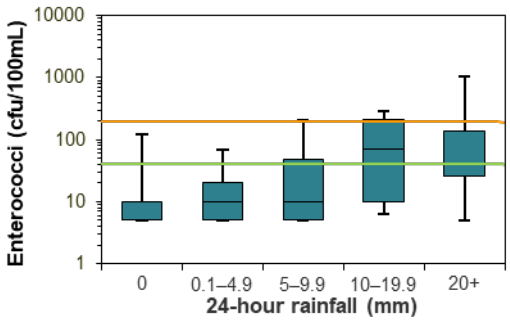
Microbial Assessment Category: C



Dry and wet weather water quality



Water quality in response to rainfall



Chain Valley Bay

Beach grade: P

See 'How to read this report' for key to map.

Chain Valley Bay is an enclosed swimming area located at the southern end of Lake Macquarie.

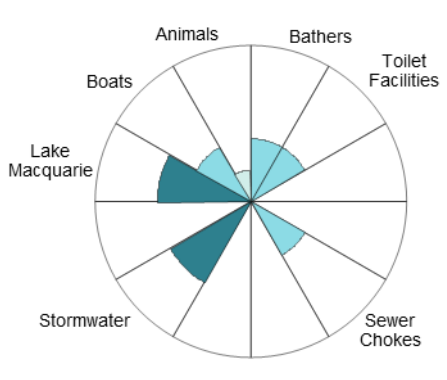
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions from several potential sources of faecal contamination including stormwater and from elsewhere within the lake.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit in response to little or no rain, and regularly after 20 mm or more.

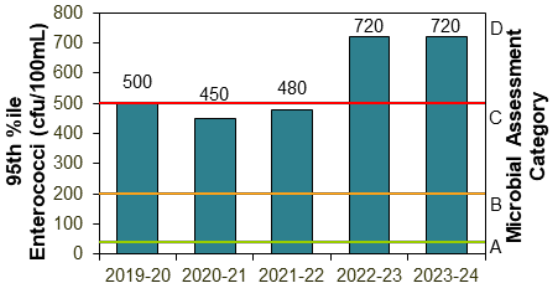
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Apr 2021 to Apr 2024	46%	100	Stable

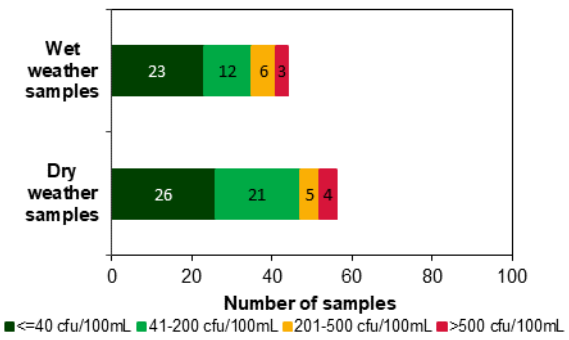
Sanitary inspection: Moderate



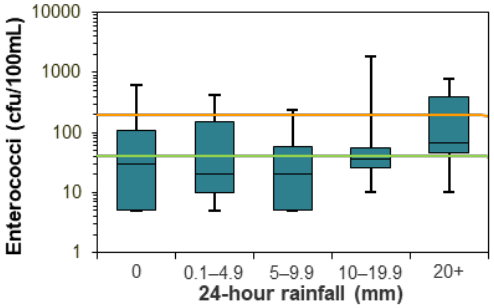
Microbial Assessment Category: D



Dry and wet weather water quality



Water quality in response to rainfall



Mannering Park Baths

Beach grade: P

See 'How to read this report' for key to map.

Mannering Park Baths is a netted swimming area located at Vales Point at the southern end of Lake Macquarie.

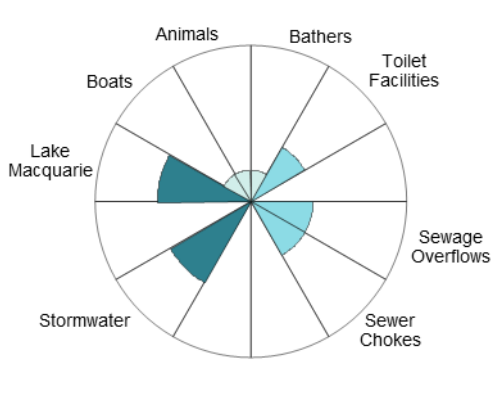
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater and from elsewhere within the lake.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after little or no rain, and regularly after rain.

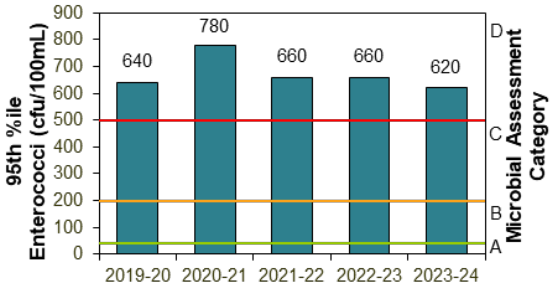
The site has been monitored since 2017.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Mar 2021 to Apr 2024	59%	100	Stable

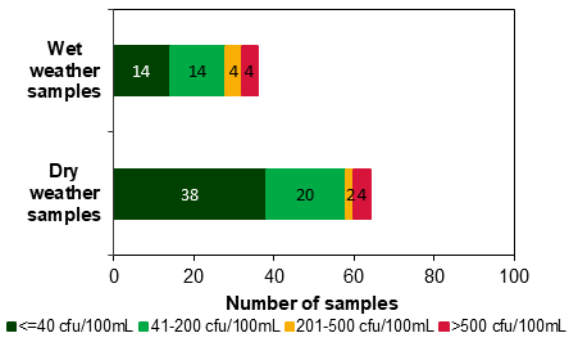
Sanitary inspection: Moderate



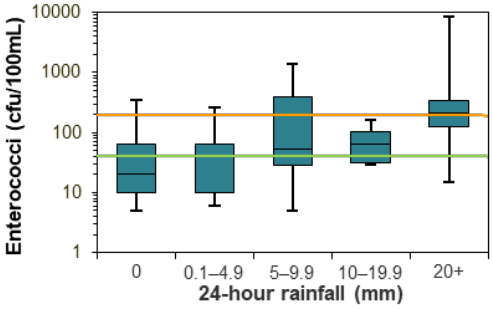
Microbial Assessment Category: D



Dry and wet weather water quality



Water quality in response to rainfall



Lake Munmorah Baths

Beach grade: P

See 'How to read this report' for key to map.

Lake Munmorah Baths is an enclosed swimming area in the north of Lake Munmorah.

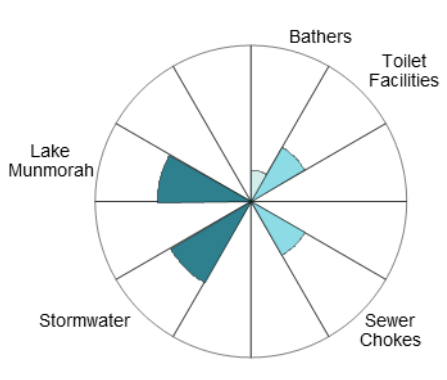
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater and from elsewhere within the lake.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after little or no rain and regularly after 5 mm or more of rain.

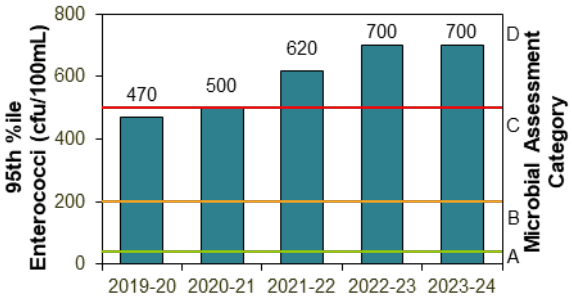
The site has been monitored since 2010.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Mar 2021 to Apr 2024	73%	100	Stable

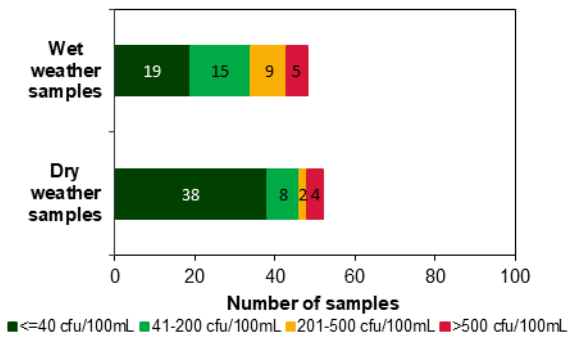
Sanitary inspection: Moderate



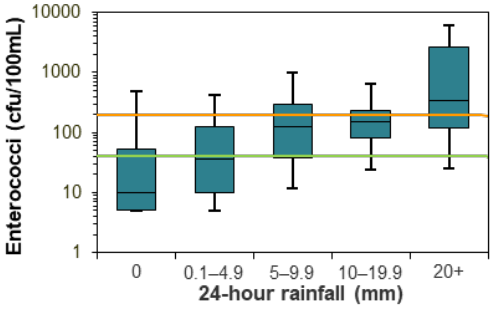
Microbial Assessment Category: D



Dry and wet weather water quality



Water quality in response to rainfall



Canton Beach

Beach grade: P

See 'How to read this report' for key to map.

Canton Beach is within Tuggerah Lake and is backed by a narrow reserve and picnic area.

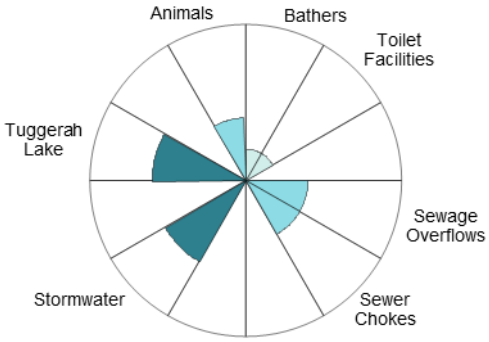
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater and from elsewhere within the lake.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after no rain, and regularly after rain.

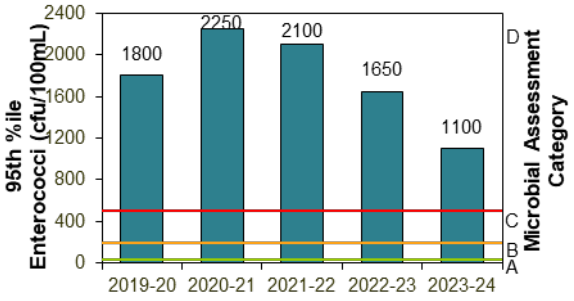
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Mar 2021 to Apr 2024	66%	100	Stable

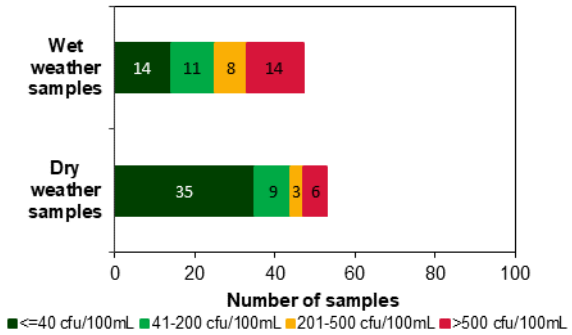
Sanitary inspection: Moderate



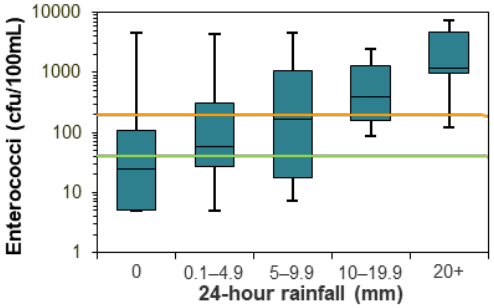
Microbial Assessment Category: D



Dry and wet weather water quality



Water quality in response to rainfall



Wamberal Beach

Beach grade: G

See 'How to read this report' for key to map.

Wamberal Beach is a long open beach backed by a lagoon and is patrolled over summer.

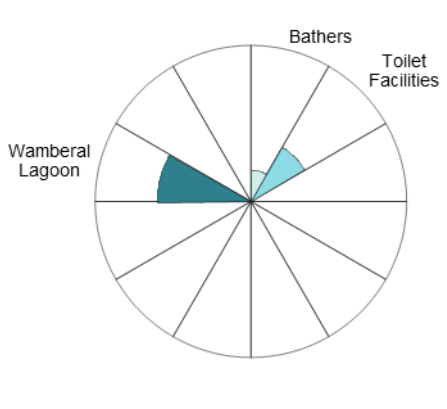
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with potential sources of faecal contamination including discharge from Wamberal Lagoon.

Enterococci levels increased slightly with increasing rainfall, regularly exceeding the safe swimming limit after 20 mm or more of rain.

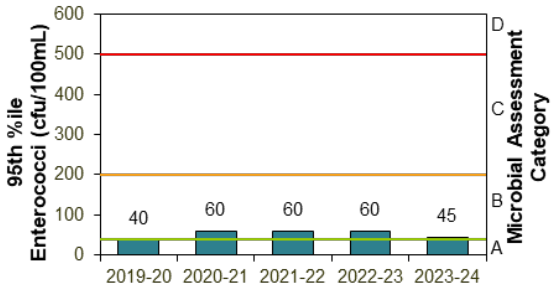
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	95%	100	Stable

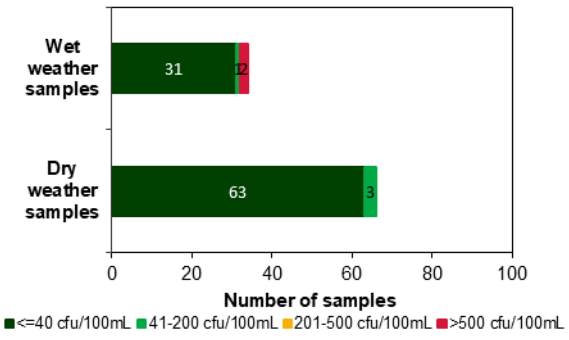
Sanitary inspection: Moderate



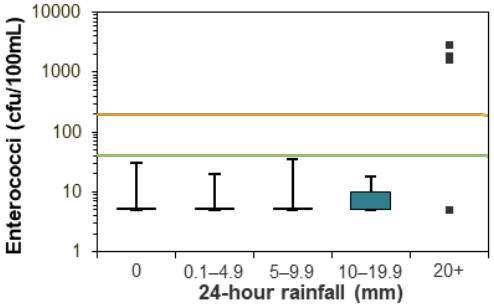
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Wamberal Lagoon

Beach grade: P

See 'How to read this report' for key to map.

Wamberal Lagoon is intermittently open to the ocean toward the southern end of Wamberal Beach.

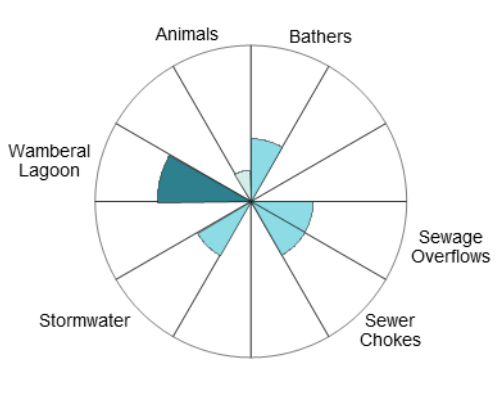
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including from elsewhere within the lagoon.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after no rain and regularly after 10 mm or more of rain.

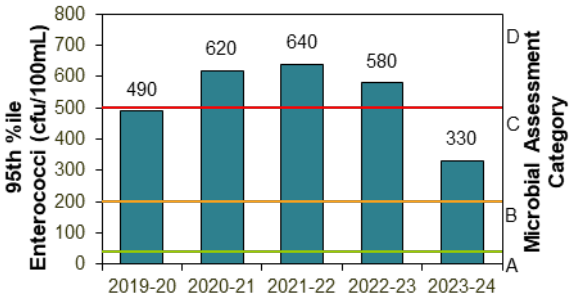
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lagoon	Mar 2021 to Apr 2024	74%	100	Stable

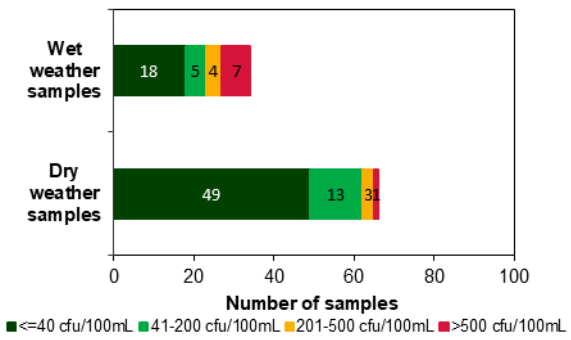
Sanitary inspection: Moderate



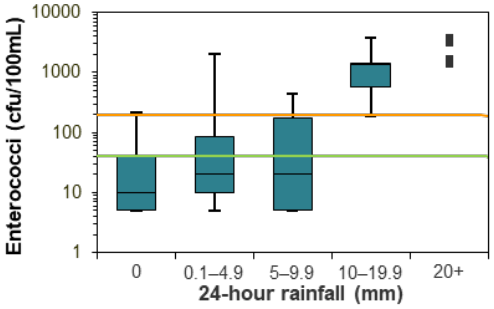
Microbial Assessment Category: C



Dry and wet weather water quality



Water quality in response to rainfall



Terrigal Beach

Beach grade: G

See ‘How to read this report’ for key to map.

Terrigal Beach is a very popular north-east facing beach and is patrolled during the warmer months.

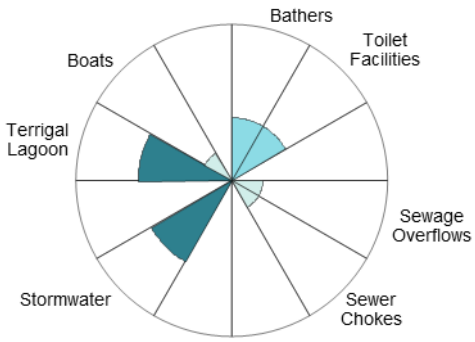
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with potential sources of faecal contamination including discharge from Terrigal Lagoon.

Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and often after 5 mm or more.

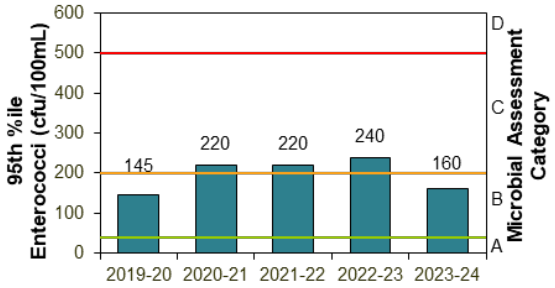
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	86%	100	Improved ↑

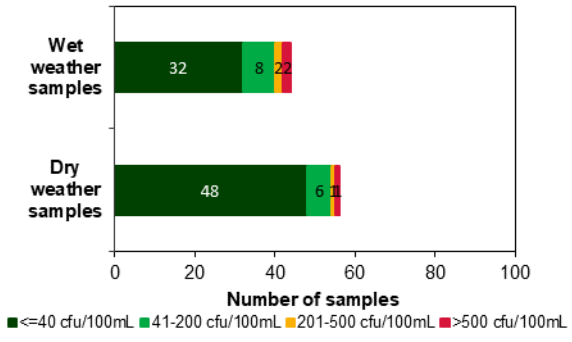
Sanitary inspection: Moderate



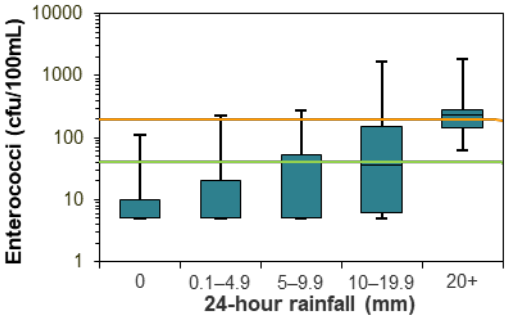
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Terrigal Lagoon

Beach grade: P

See 'How to read this report' for key to map.

Terrigal Lagoon is intermittently open to the ocean to the north of Terrigal Beach.

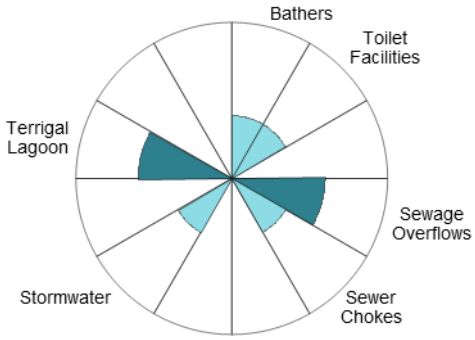
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including sewage overflows and from elsewhere within the lagoon.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after no rain, and regularly after rain.

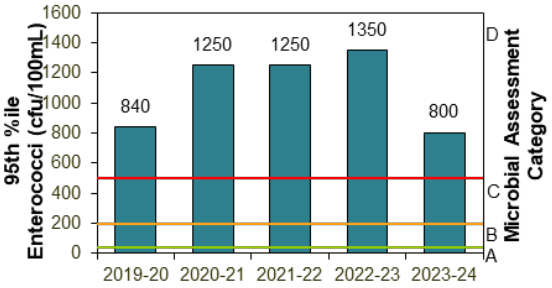
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lagoon	Mar 2021 to Apr 2024	65%	100	Stable

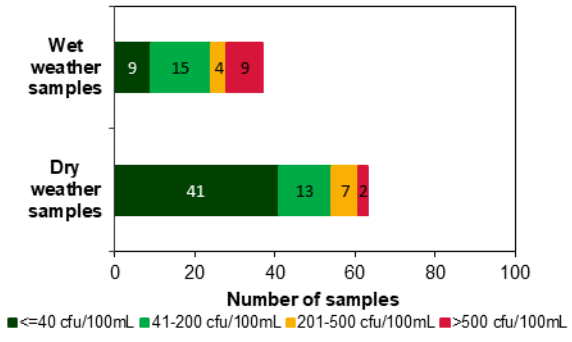
Sanitary inspection: Moderate



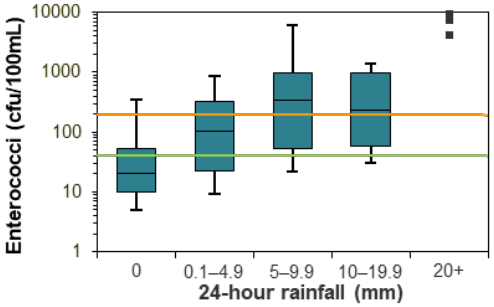
Microbial Assessment Category: D



Dry and wet weather water quality

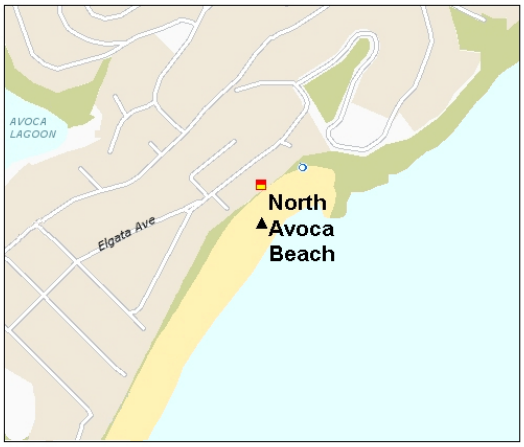


Water quality in response to rainfall



North Avoca Beach

Beach grade: G



See ‘How to read this report’ for key to map.

North Avoca Beach is at the northern end of the beach and is patrolled during the summer swimming season.

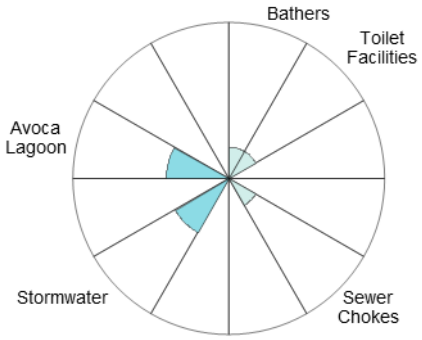
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of minor faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 5 mm or more of rain, and regularly after 20 mm or more.

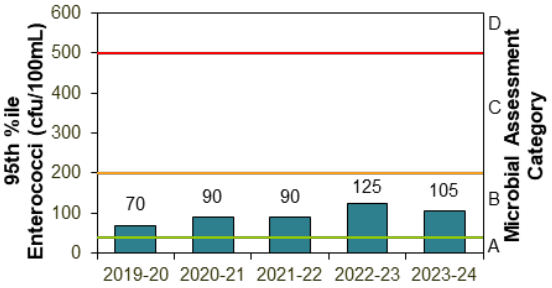
The site has been monitored since 2007.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	95%	100	Stable

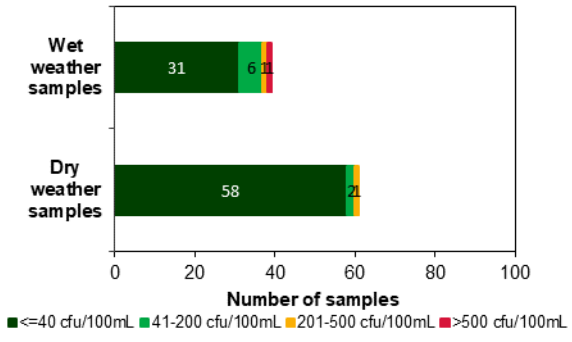
Sanitary inspection: Low



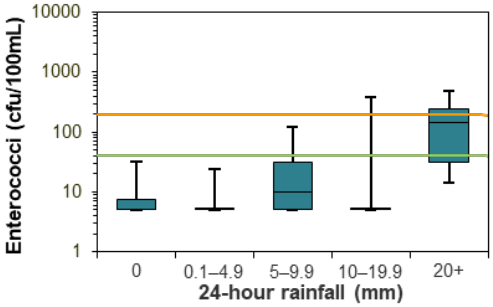
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Avoca Beach

Beach grade: G

See 'How to read this report' for key to map.

Avoca Beach is in the southern corner of the beach and is patrolled during summer.

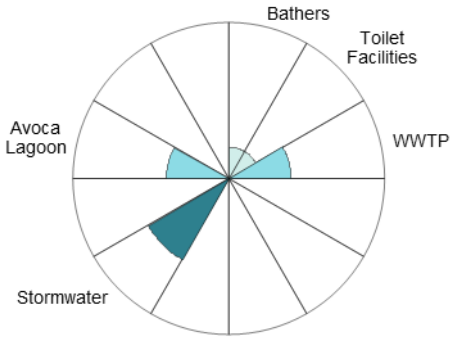
The Beach Suitability Grade of Good indicates microbial water quality is suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit in response 5 mm of rain, and regularly after 10 mm or more.

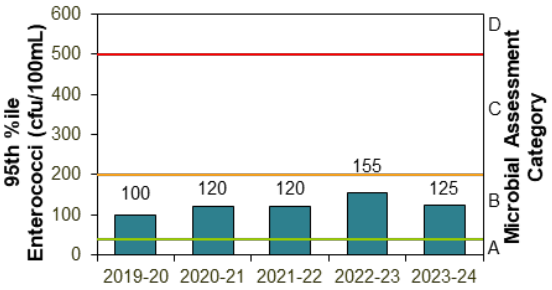
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	92%	100	Stable

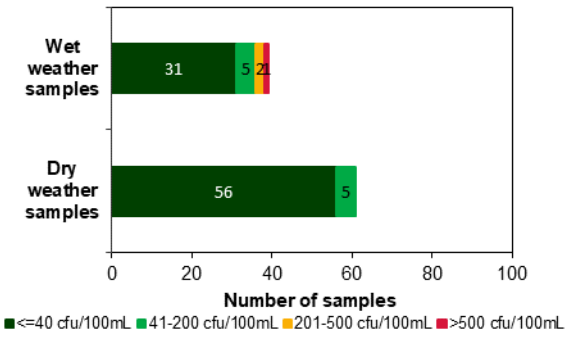
Sanitary inspection: Moderate



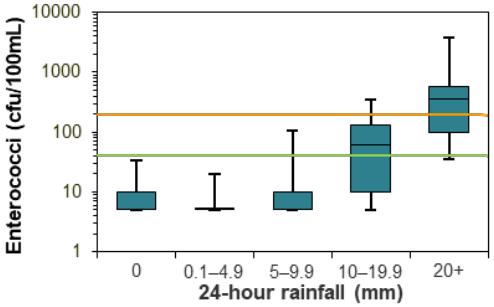
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Avoca Lagoon

Beach grade: P

See 'How to read this report' for key to map.

Avoca Lagoon is intermittently open to the ocean and located to the north of Avoca Beach.

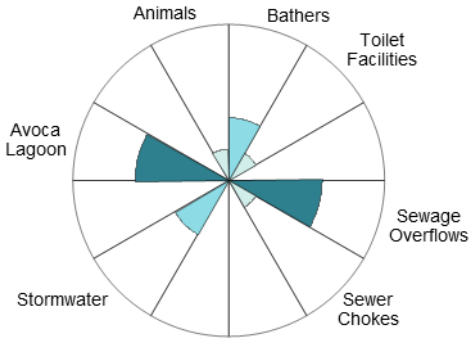
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and often during dry weather conditions, with several potential sources of faecal contamination including sewage overflows and from elsewhere within the lagoon.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after no rain, and regularly after rainfall.

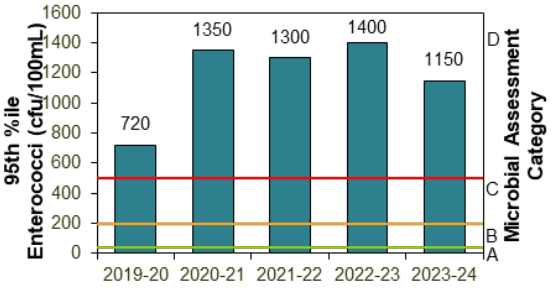
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lagoon	Mar 2021 to Apr 2024	50%	100	Stable

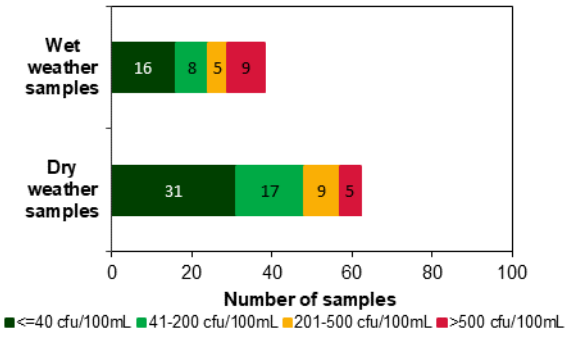
Sanitary inspection: Moderate



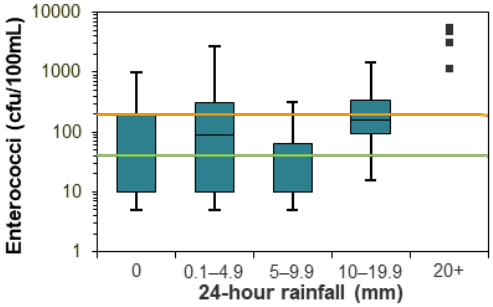
Microbial Assessment Category: D



Dry and wet weather water quality



Water quality in response to rainfall



Copacabana Beach

Beach grade: G

See ‘How to read this report’ for key to map.

Copacabana Beach is at the northern end of a 1 km stretch of beach and is patrolled during the summer swimming season.

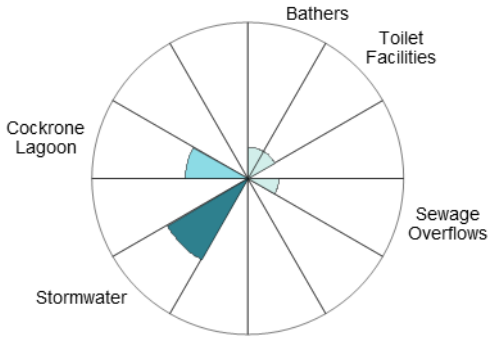
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and often after 10 mm or more.

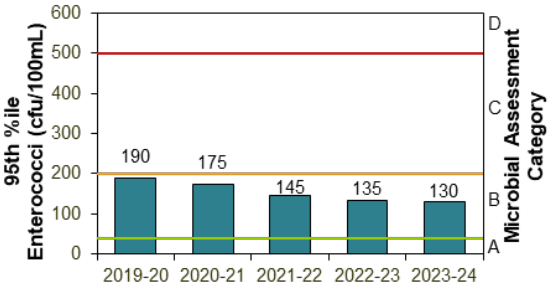
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	95%	100	Stable

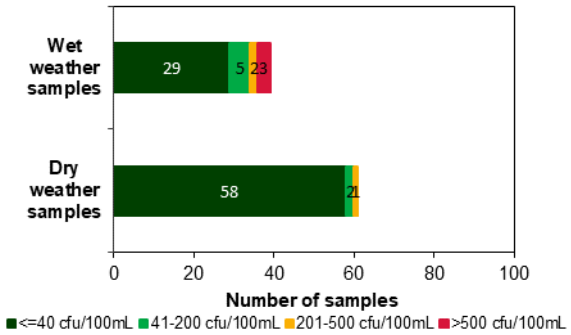
Sanitary inspection: Moderate



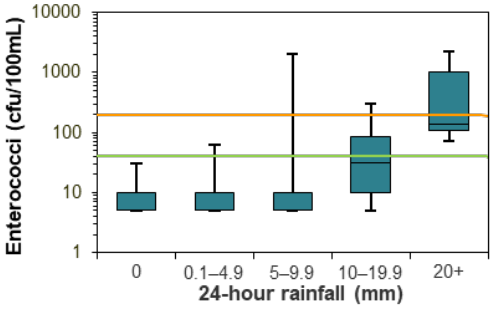
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Cockrone Lagoon

Beach grade: P

See 'How to read this report' for key to map.

Cockrone Lagoon is intermittently open to the ocean and is located between Copacabana and MacMasters beaches.

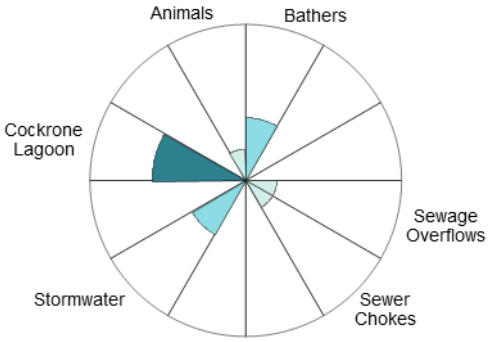
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including from elsewhere within the lagoon.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after little or no rain and frequently after 5 mm or more of rain.

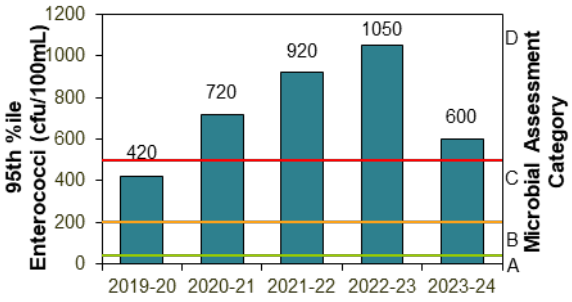
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lagoon	Mar 2021 to Apr 2024	55%	100	Stable

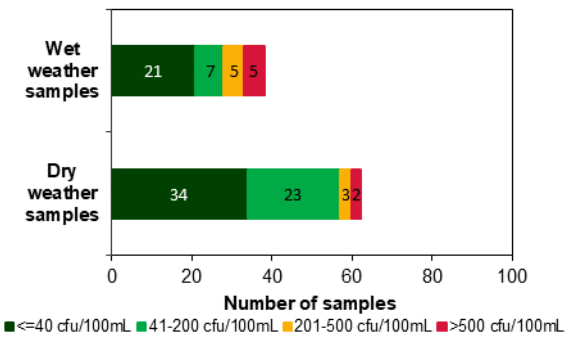
Sanitary inspection: Moderate



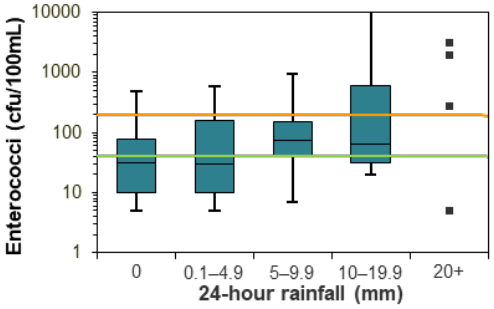
Microbial Assessment Category: D



Dry and wet weather water quality



Water quality in response to rainfall



MacMasters Beach

Beach grade: G

See 'How to read this report' for key to map.

MacMasters Beach is at the southern end of a 1 km stretch of beach and is patrolled during the warmer months.

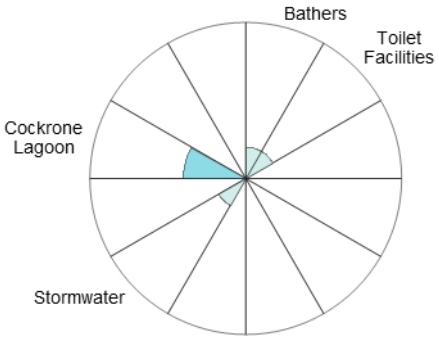
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after no rain, and regularly after 20 mm or more.

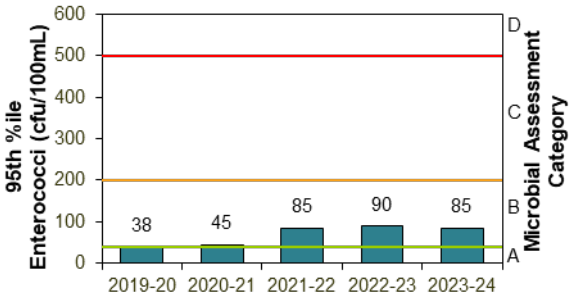
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	92%	100	Stable

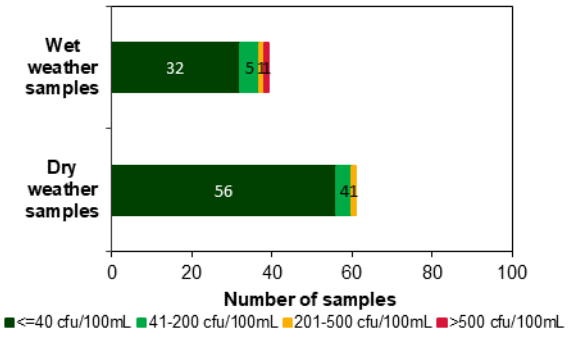
Sanitary inspection: Low



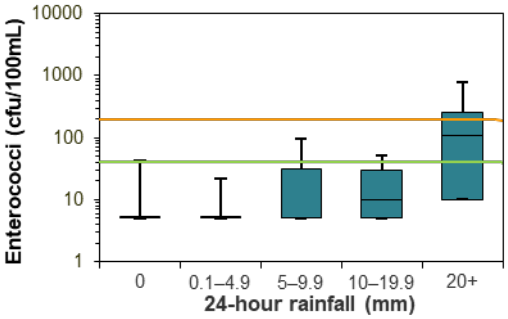
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Killcare Beach

Beach grade: G

See 'How to read this report' for key to map.

Killcare Beach is a south facing beach backed by vegetated dunes. It is patrolled over the summer swimming season.

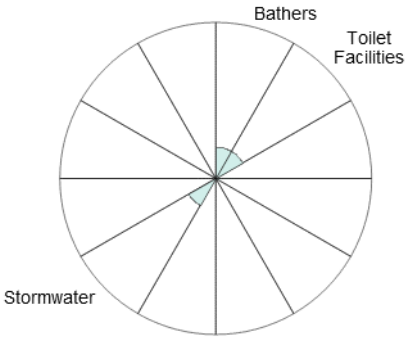
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 5 mm of rain, and often after 20 mm or more.

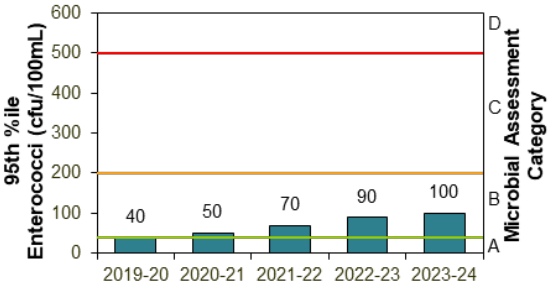
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	94%	100	Stable

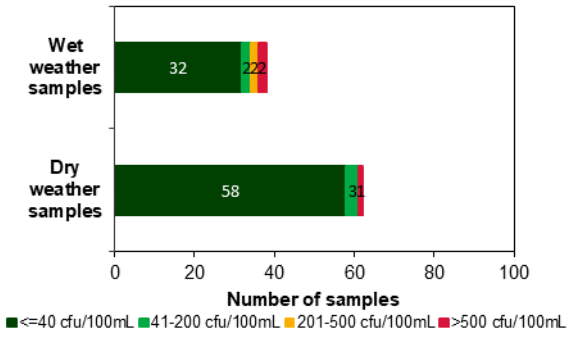
Sanitary inspection: Low



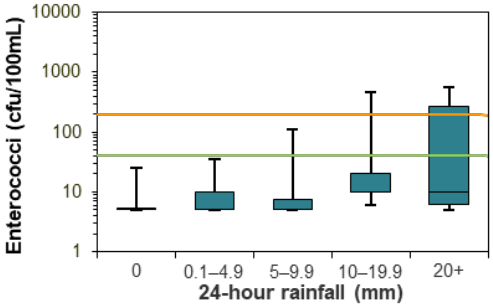
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Ocean Beach

Beach grade: G

See 'How to read this report' for key to map.

Ocean Beach is in Broken Bay near the entrance to Brisbane Water. The beach is patrolled during the summer swimming season.

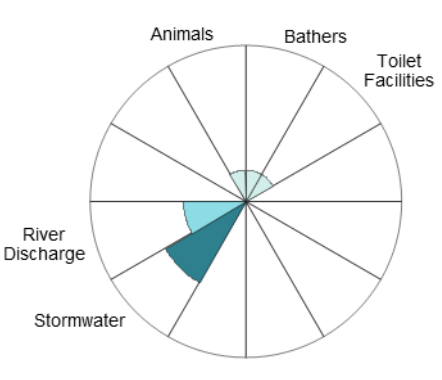
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and frequently after 10 mm or more.

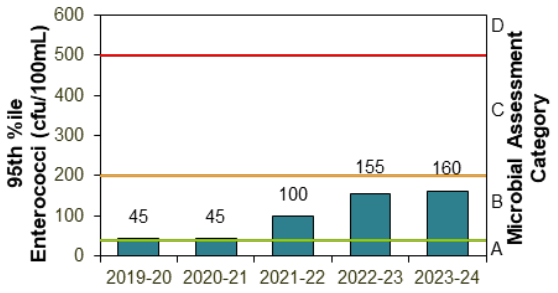
The site has been monitored since 2011.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	93%	100	Stable

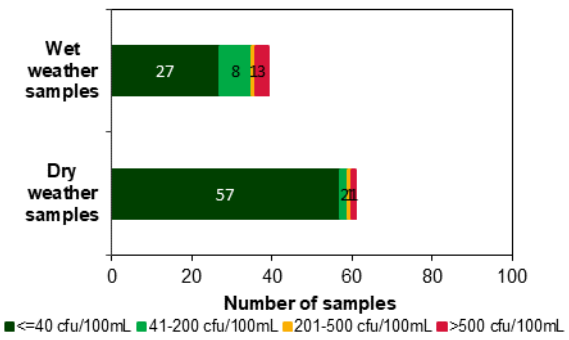
Sanitary inspection: Moderate



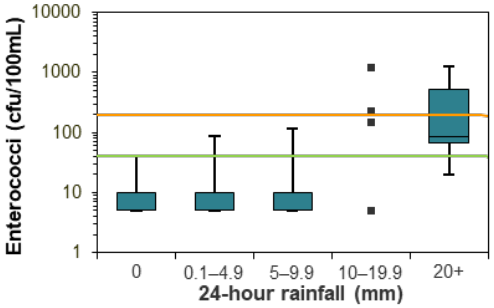
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Umina Beach

Beach grade: G

See 'How to read this report' for key to map.

Umina Beach is in Broken Bay near the entrance to Brisbane Water. The beach is patrolled during the summer swimming season.

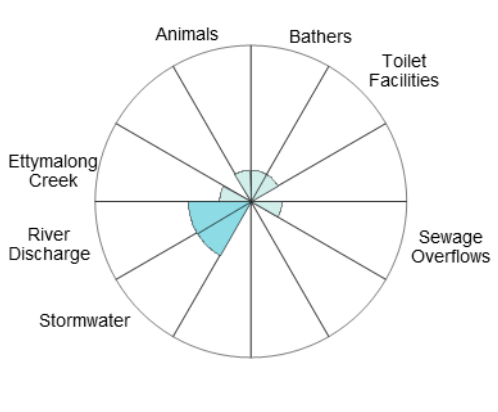
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination.

Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and often after 10 mm or more.

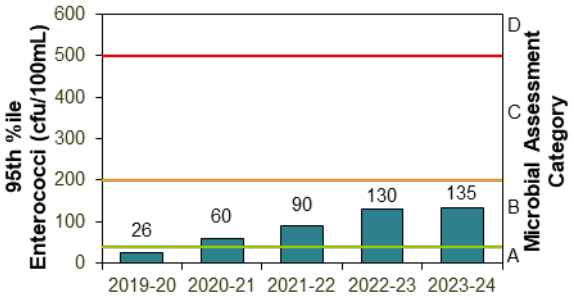
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2021 to Apr 2024	95%	100	Stable

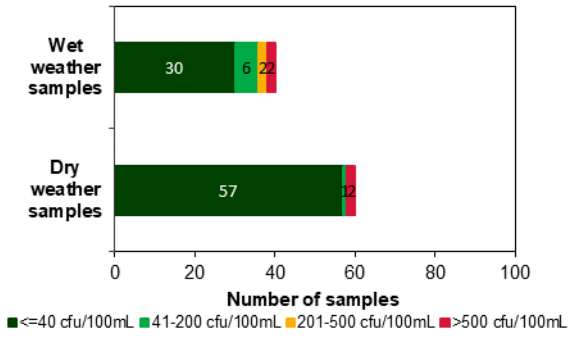
Sanitary inspection: Low



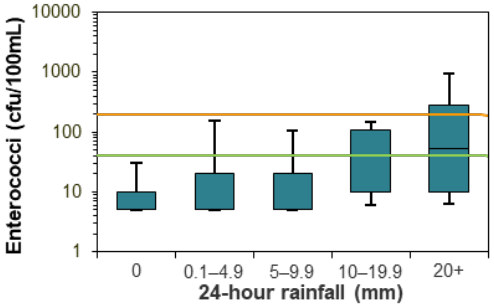
Microbial Assessment Category: B



Dry and wet weather water quality

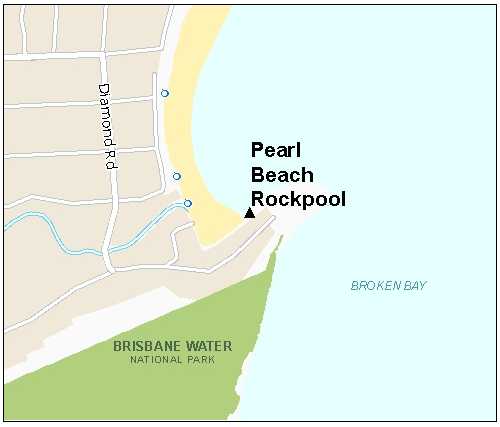


Water quality in response to rainfall



Pearl Beach Rockpool

Beach grade: G



See ‘How to read this report’ for key to map.

Pearl Beach Rockpool is a constructed ocean pool at the southern end of Pearl Beach.

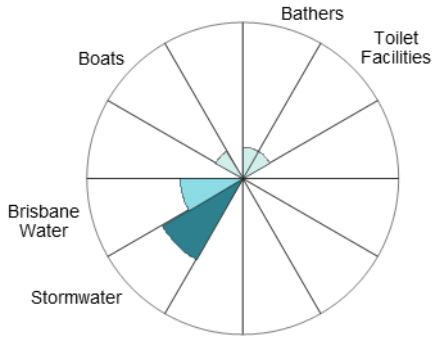
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to little or no rain, and regularly after 10 mm or more.

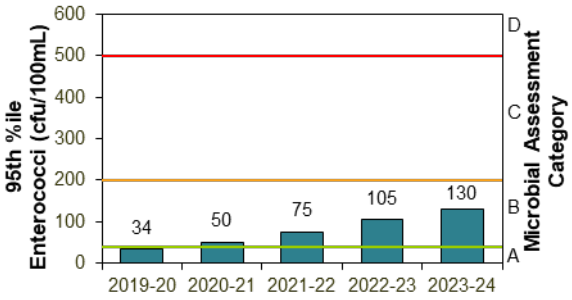
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean baths	Feb 2021 to Apr 2024	91%	100	Stable

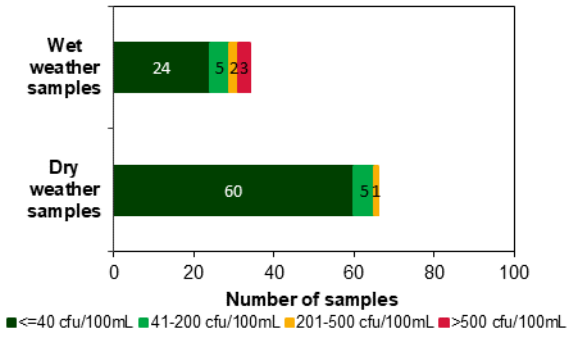
Sanitary inspection: Moderate



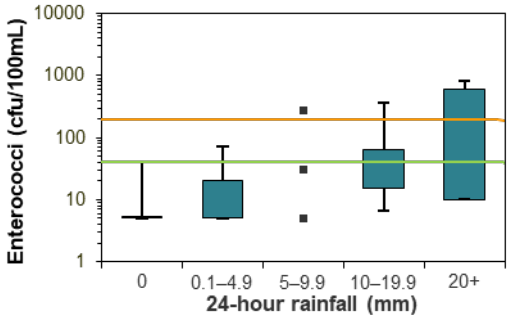
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Davistown Baths

Beach grade: P

See 'How to read this report' for key to map.

The Davistown Baths are a netted swimming enclosure in the channel between Brisbane Water and the Kincumber Broadwater.

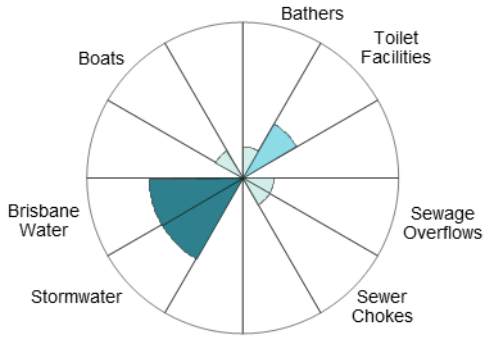
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater and from elsewhere within Brisbane Water.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after no rain, and regularly after rain.

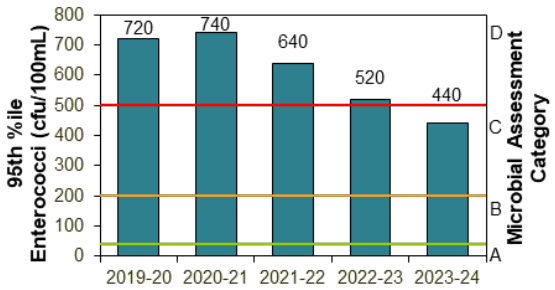
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Mar 2021 to Apr 2024	63%	100	Stable

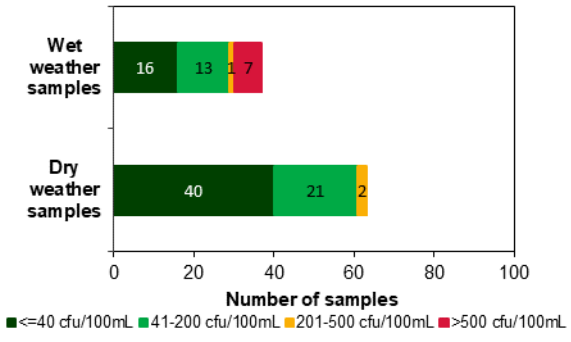
Sanitary inspection: Moderate



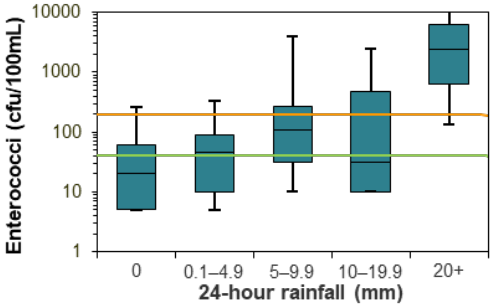
Microbial Assessment Category: C



Dry and wet weather water quality



Water quality in response to rainfall



Pretty Beach Baths

Beach grade: P

See 'How to read this report' for key to map.

Pretty Beach Baths is a netted swimming enclosure in Brisbane Water near the entrance to Broken Bay.

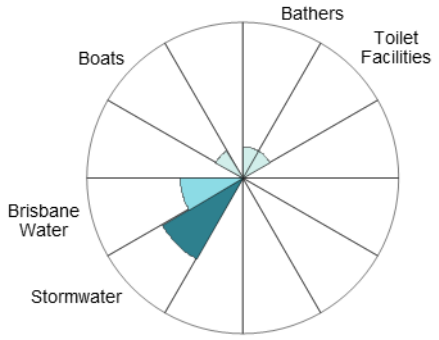
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater.

Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit in response to little or no rain, and regularly after 5 mm or more.

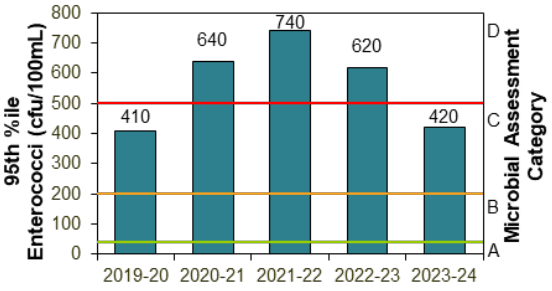
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Mar 2021 to Apr 2024	76%	100	Stable ◯

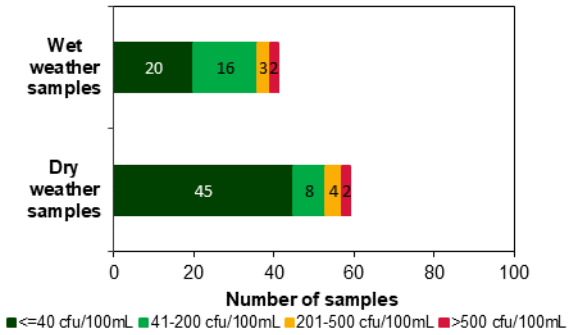
Sanitary inspection: Moderate



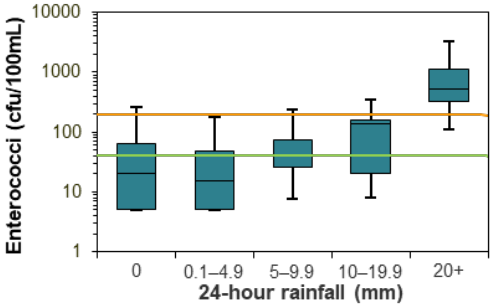
Microbial Assessment Category: C



Dry and wet weather water quality

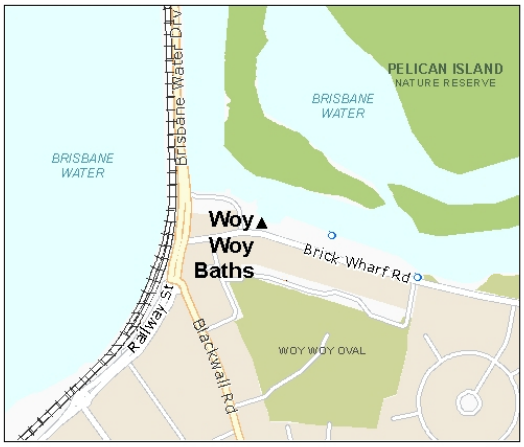


Water quality in response to rainfall



Woy Woy Baths

Beach grade: G



See 'How to read this report' for key to map.

Woy Woy Baths is a netted swimming area located in Woy Woy channel in Brisbane Water.

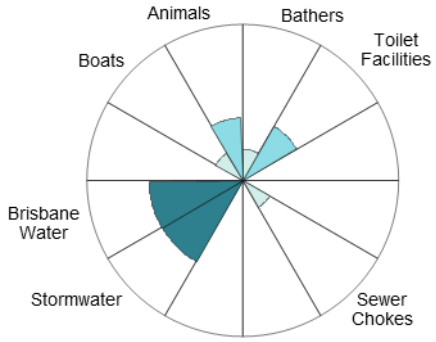
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater and from elsewhere within Brisbane Water.

Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after no rain, and often after rain.

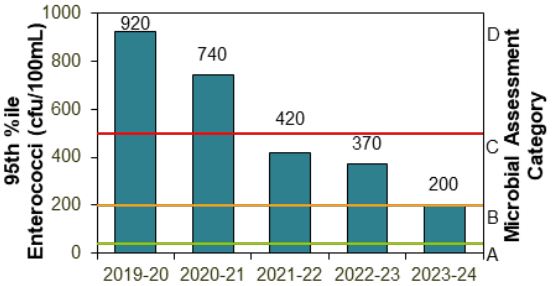
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Mar 2021 to Apr 2024	84%	100	Improved ↑

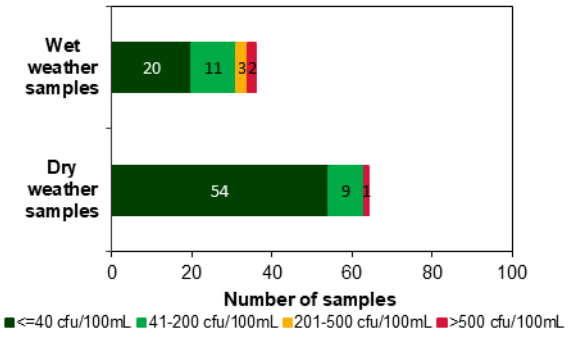
Sanitary inspection: Moderate



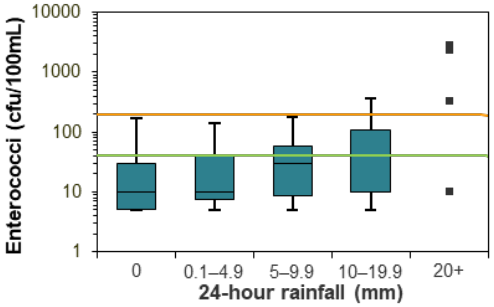
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Yattalunga Baths

Beach grade: P

See 'How to read this report' for key to map.

Yattalunga Baths is a netted swimming enclosure located in the upper reaches of Brisbane Water.

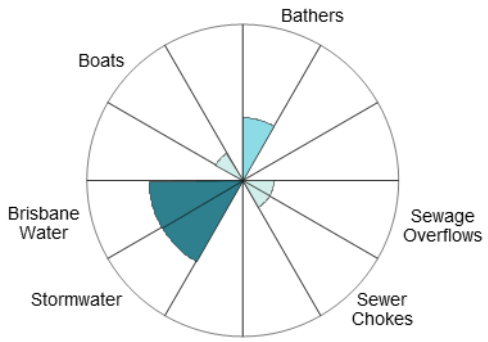
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater and from elsewhere within Brisbane Water.

Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after no rain, and often after rain.

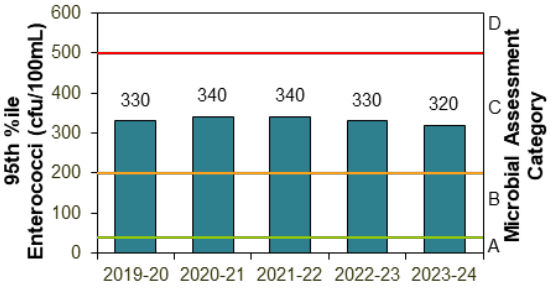
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Mar 2021 to Apr 2024	78%	100	Stable

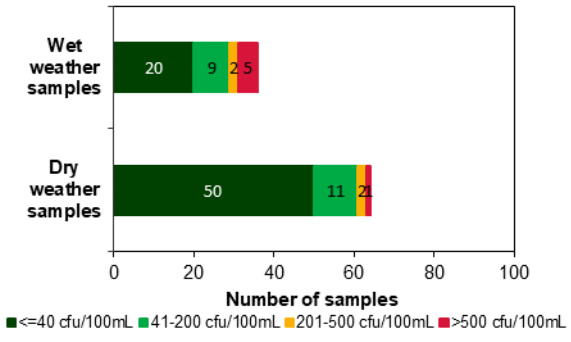
Sanitary inspection: Moderate



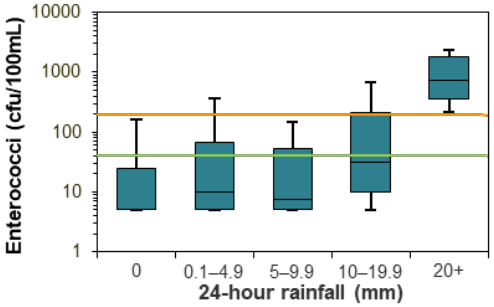
Microbial Assessment Category: C



Dry and wet weather water quality



Water quality in response to rainfall



How to read this report

Beach Suitability Grades

Beach Suitability Grades provide an assessment of the suitability of a swimming location for recreation over time and are based on a combination of sanitary inspection (identification and rating of potential pollution sources at a beach) and microbial assessment (water quality measurements gathered over previous years). There are 5 grades ranging from Very Good to Very Poor:

VG Very Good

Location has generally excellent microbial water quality and very few potential sources of faecal pollution. Water is considered suitable for swimming almost all of the time

G Good

Location has generally good microbial water quality and water is considered suitable for swimming most of the time. Swimming should be avoided during and for up to one day following heavy rain at ocean beaches and up to 3 days at estuarine sites

F Fair

Microbial water quality is generally suitable for swimming, but because of the presence of significant sources of faecal contamination, extra care should be taken to avoid swimming during and for up to 3 days following rainfall or if there are signs of pollution such as discoloured water or odour or debris in the water

Some Beach Suitability Grades in this report are **provisional**, as the information required for the analysis is incomplete due to limited bacterial data or limited information on potential pollution sources in the catchment.

P Poor

Location is susceptible to faecal pollution and microbial water quality is not always suitable for swimming. During dry weather conditions, ensure that the swimming location is free of signs of pollution, such as discoloured water, odour or debris in the water, and avoid swimming at all times during and for up to 3 days following rainfall

VP Very Poor

Location is very susceptible to faecal pollution and microbial water quality may often be unsuitable for swimming. It is generally recommended to avoid swimming at these sites almost all of the time.

Follow Up

Sometimes a location's sanitary inspection and water quality data produce incongruent results. These locations are classified as 'Follow Up'. Further assessment will be required to obtain the necessary data to provide a definite classification in accordance with national guidelines.

The guidelines

The National Health and Medical Research Council's guidelines for managing risks in recreational water (NHMRC 2008) were adopted for use in New South Wales in May 2009. These guidelines have been adopted in all Australian states and territories and are supported by guidance notes developed by the Department of Health Western Australia (WA Department of Health 2007).

Enterococci

The national guidelines advocate the use of enterococci as the single preferred faecal indicator in recreational waters.

These bacteria are excreted in faeces and are rarely present in unpolluted waters. Enterococci have shown a clear dose–response relationship to disease outcomes in

marine waters in the northern hemisphere. In accordance with the guidelines, Beachwatch tests for enterococci only. The enterococci density in water samples is analysed in the laboratory using method AS/NZS 4276.9:2007 (Standards Australia 2007).

Enterococci are measured in colony forming units per 100 mL of sample (cfu/100 mL).

Beach Suitability Grades are determined by using the following matrix:

		Microbial Assessment Category			
		A	**B**	**C**	**D**
Sanitary Inspection Category	**Very Low**	Very Good	Very Good	Follow Up	Follow Up
	Low	Very Good	Good	Follow Up	Follow Up
	Moderate	Good	Good	Poor	Poor
	High	Good	Fair	Poor	Very Poor
	Very High	Follow Up	Fair	Poor	Very Poor

* Follow up occurs when sanitary inspection and water quality data produce potentially incongruent results; further assessment will be required.

Using the Beach Suitability Grade classification matrix, sites assigned a moderate Sanitary Inspection Category can only be rated as Good or Poor, with no option of Fair grades. This can create the impression of a large change in water quality when in fact there need only be a slight increase in bacterial counts to push it over the threshold, with no significant increase in the risk to public health.

Microbial Assessment Category (MAC)

There are 4 Microbial Assessment Categories (A to D) and these are determined from the 95th percentile of an enterococci dataset of at least 100 data points. Each MAC is associated with a risk of illness determined from epidemiological studies. The risks of illness shown below are not those associated with a single data point but are the overall risk of illness associated with an enterococci dataset with that 95th percentile (Wyer et al. 1999).

Risk of illness associated with Microbial Assessment Categories

Category	Enterococci (cfu/100 mL)	Illness risk*
A	≤40	GI illness risk: <1% AFR illness risk: <0.3%
B	41–200	GI illness risk: 1–5% AFR illness risk: 0.3–1.9%
C	201–500	GI illness risk: >5–10% AFR illness risk: >1.9–3.9%
D	>500	GI illness risk: >10% AFR illness risk: >3.9%

* GI = gastrointestinal illness; AFR = acute fever and rash

Calculating the MAC

The 95th percentile is a useful statistic for summarising the distribution of enterococci data at a site. It embodies elements of both the location of the distribution (how high/low the enterococci counts are) and the scale of the distribution (how variable the enterococci counts are).

The 95th percentile values for each of the 4 Microbial Assessment Categories were determined by the World Health Organization using enterococci data collected from swimming locations across Europe. These values will represent different probabilities of illness if the distribution of enterococci data from swimming locations in New South Wales differs from the European distribution.

In recognition of this issue, Dr Richard Lugg (Department of Health, Western Australia) has developed a Microsoft® Excel tool for calculating a modified 95th percentile that takes into account the distribution of data. The WA Department of Health recommends a minimum of 65 samples, collected from a particular site over 5 consecutive years, to provide sufficient confidence and reliability in the 95th percentile data output. This tool has been used to calculate the 95th percentile values

presented in this report and has been adopted for use by other state governments in Australia.

The tool can be downloaded from the WA Government's 'Environmental waters publications' webpage, under *Forms and templates*.

Sanitary Inspection Category (SIC)

More information about the **sanitary inspection** process is available in the Beachwatch Protocol for assessment and management of microbial risks in recreational waters, found on the department's website.

The aim of a sanitary inspection is to identify all sources of faecal contamination that could affect a swimming location and assess the risk to public health posed by these sources. It is an assessment of the likelihood of bacterial contamination from identified pollution sources and should, to some degree, correlate with the bacterial water quality results obtained from sampling.

The main sources of faecal contamination considered in the sanitary inspection are: bathers, toilet facilities, wastewater treatment plants (WWTPs), sewage overflows, sewer chokes, onsite systems, wastewater re-use, stormwater, river discharge, lagoons, boats and animals.

Rivers, lakes and estuaries themselves can be potential sources of faecal contamination to sites located in these waterbodies, with contaminated water from upstream or surrounding areas impacting water quality at the swimming location. This source is captured in river discharge or lagoon category, and shown as the waterbody in the sanitary inspection charts.

Through the sanitary inspection process, beaches are categorised to reflect the overall likelihood of faecal contamination. There are 5 categories: Very Low, Low, Moderate, High and Very High.

Stormwater drain flow

Photo: Beachwatch/DCCEEW

Stormwater in urban areas often contains sewage from leakages, overflows or sewer chokes when the sewerage system fails.

Sewage overflows can occur in wet weather when the network has exceeded capacity due to rainwater entering the system. The mix of sewage and rainwater discharges from designated overflow points and drains to waterways, usually via the stormwater system. Overflows from the sewerage system can also occur in dry weather due to mechanical failure or power outage.

Sewer chokes occur due to blockages in the pipes usually due to tree roots, oil, grease or debris. This causes sewage to back up and escape via sewer inspection points, designed overflow structures or cracks in the pipes, then drain to waterways, usually via the stormwater system.

Explanation of tables

Each region contains tables listing all monitored swimming sites including site type, beach grade and change in grade from the previous year.

The following symbols are used to show the change in beach grade from the previous year:

○ Stable

▲ Improved

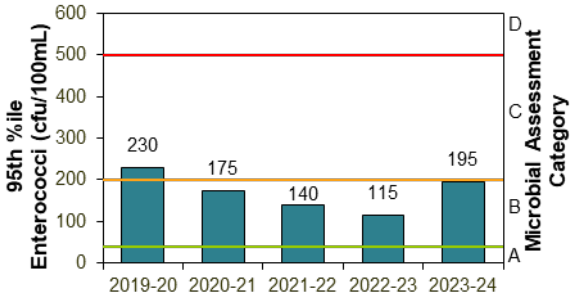
▼ Declined

A provisional grade indicates the assessment is based on limited data collected during the assessment period and should not be compared to the beach grade from the previous year.

Explanation of graphs, charts, and information bars on beach pages

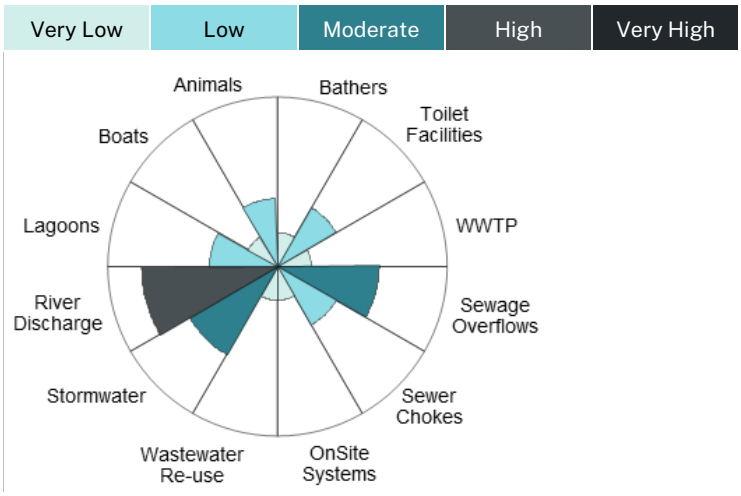
Microbial Assessment Category (MAC) chart

On each beach page, the MACs for the last 5 years are displayed on a simple bar chart. The MAC for the current year is based on enterococci data collected during the assessment period. The bars are labelled with the 95th percentile value for each year and the thresholds dividing the A, B, C and D categories are marked in green, amber and red for reference.



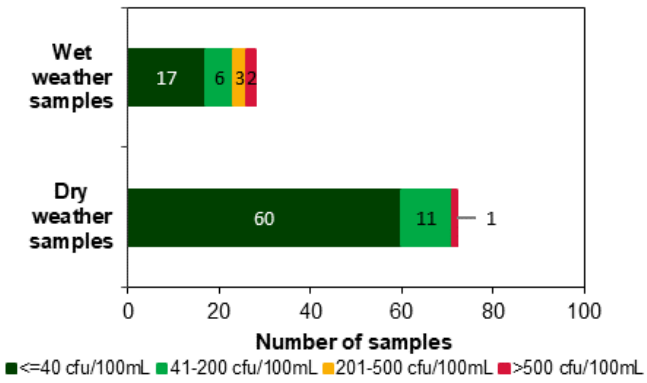
Sanitary Inspection Category (SIC) chart

The results of the sanitary inspection for each swimming location are presented in a radar pie chart. The chart shows the likelihood that each identified pollution source will contribute to faecal contamination at a swimming site, as indicated by the size and colour of the segment, ranging from very low (lightest colour) to very high (darkest colour) as shown below. The sum of these contributions is the overall likelihood, or Sanitary Inspection Category.



Wet and dry weather water quality chart

Enterococci levels in wet and dry weather conditions are presented for each swimming location as a bar graph. All data collected during the assessment period is included in the analysis. Dry weather is defined as no rainfall recorded in the previous 24 hours. Each bar is colour coded to show the number of enterococci results up to 40 cfu/100 mL, between 41 and 200 cfu/100 mL, between 201 and 500 cfu/100 mL and greater than 500 cfu/100 mL. These categories reflect the Microbial Assessment Category thresholds and are coloured on the graph as dark green, light green, amber and red respectively.

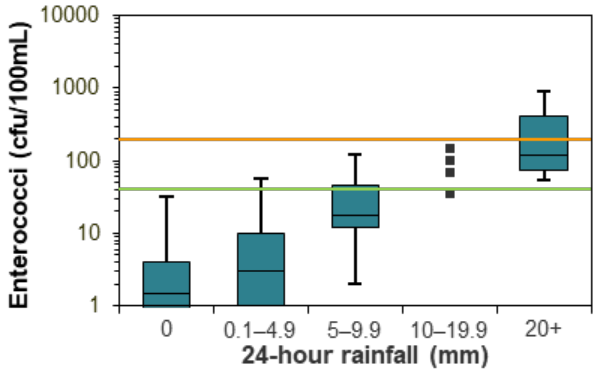


It is expected that swimming sites with lower levels of flushing will show some elevated bacterial results in dry weather samples (no rainfall in the previous 24 hours) due to the longer time needed to recover from a rainfall event. At some estuarine and lake/lagoon swimming locations the impacts of stormwater pollution on beach water quality may be detected up to 3 days after rainfall.

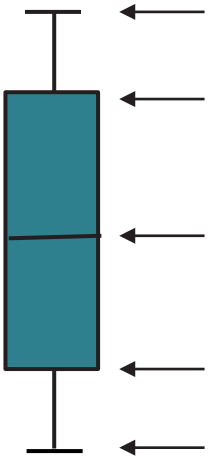
Water quality in response to rainfall

Trends in enterococci levels in response to rainfall are shown using a box plot. For reference, enterococci levels of 40 cfu/100 mL and 200 cfu/100 mL are indicated with a green and orange line, respectively. The 40 cfu/100 mL level is referred to as the ‘safe swimming limit’. The enterococci data were obtained from the last 5 years of monitoring. Rainfall data were obtained from rain gauges situated close to the sample site and are 24-hour totals to 9 am on the day of sampling. If there are fewer than 5 enterococci data points in a rainfall category, individual data points are presented instead of a box plot. At sites

where many results are below the detection limit (1 cfu/100 mL), only the upper portion of the box plots will be visible.



Each part of the box plot represents a significant percentile value of the sample population:



95% of the samples lie below the top whisker

75% of the samples lie below the top of the box

half the samples are on each side of the middle line of the box (median or 50%ile)

25% of the samples lie below the bottom of the box

5% of the samples lie below the bottom whisker.

Information bars

Information bars on each beach page provide a summary of details about the swimming site.

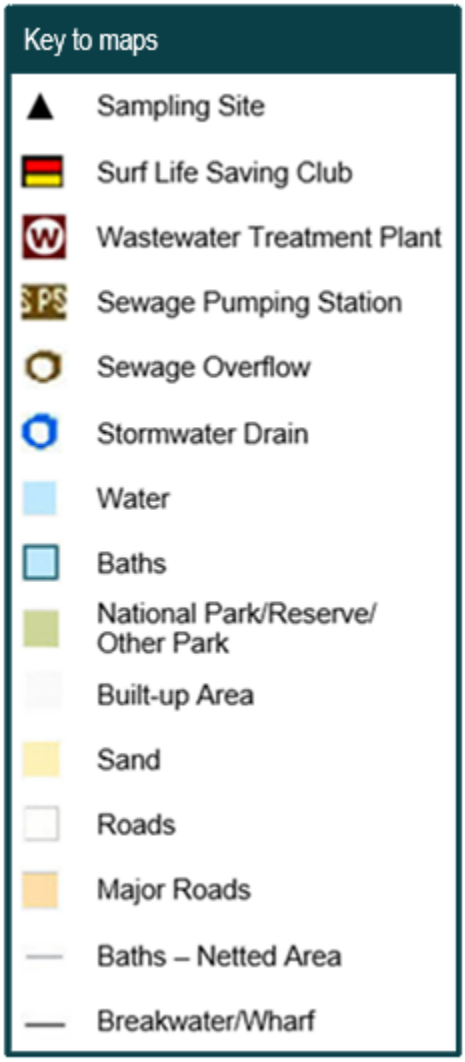
The **assessment period** shows the timeframe in which the water samples were collected. The NHMRC guidelines state beach grades should be determined from the most recent 100 water quality results collected within a 5-year period. The assessment period varies between sites depending on sampling frequency.

Dry weather samples suitable for swimming (**dry weather swimmability**) shows the percentage of water samples with enterococci levels below 40 cfu/100 mL. Dry weather is defined as no rainfall in the previous 24 hours.

Swimming sites with lower levels of flushing often have a lower percentage of dry weather samples within the safe swimming limit due to the impacts of rainfall detected up to 3 days after the event.

Explanation of maps

A map of individual swimming locations is presented on each beach page. The scale of the maps is 1:10,000. Each map shows the location of the sampling site, land use and features such as surf lifesaving clubs. Potential pollution sources such as stormwater drains, sewage pumping stations, wastewater treatment plants, lagoons, rivers and creeks, are shown where accurate data is held.



References

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Standards Australia (2007) *AS/NZS 4276.9:2007, Water microbiology Method 9: Enterococci – Membrane filtration method (ISO 7899-2:2000, MOD)*, Standards Australia International Ltd, Sydney and Standards New Zealand, Wellington.

WA Department of Health (2007), *Microbial quality of recreational water guidance notes in support of chapter 5 of* the National Health and Medical Research Council *guidelines for managing risks in recreational water, 2006,* Department of Health, Western Australia and The University of Western Australia, October 2007, ww2.health.wa.gov.au/Articles/A_E/Environmental-waters-publications, accessed 23/06/23.

Wyer MD, Kay D, Fleisher JM, Salmon RL, Jones F, Godfree AF, Jackson G and Rogers A (1999) 'An experimental health related classification for marine waters', *Water Research*, 33(3):715–722.

More information

- Beachwatch NSW on X (formerly Twitter)
- Beachwatch NSW on Facebook
- Beachwatch webpage
- Coastal management program progress
- Sanitary inspection of beaches
- Subscribe to daily pollution forecast emails
- Towards Safer Swimming: Terrigal Beach and Haven
- Tuggerah Lakes Water Quality
- WA Government environmental water publications
- Central Coast Council's audit of sewer and stormwater network and remediation works