



## Beachwatch

# State of the beaches 2022–23

Central Coast Region

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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 Planning and Environment'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 2022–2023, 53% of swimming sites in the Central Coast region were graded as Very Good or Good, including 14 ocean beaches and 3 ocean baths. These sites were suitable for swimming for most or almost all of the time. This is a similar performance to the previous year and reflects the wet weather conditions and heavy rainfall events over winter and spring. 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 2022–2023



Toowoon Bay

Photo: Beachwatch/DPE

## 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 2022–2023, 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 2022–2023 are based on water quality data collected over the last 2–4 years. Rainfall over this period has been diverse:

- 2019–2020: average to below average rainfall, except for isolated wet months
- 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.

See the section on **How to read this report** on page 47 for an explanation of the graphs, tables and Beach Suitability Grades.

Winter rainfall totals on the Central Coast were above average in 2022 with most rain falling in July. Wyong (Mount Elliot) had its wettest July on record with 456 mm of rainfall recorded. Most of the rain fell in the first week of July with heavy rainfall and major flooding to the Hawkesbury–Nepean catchment. During this significant wet weather event, daily rainfall totals of up to 89 mm were recorded at Gosford.

Spring rainfall totals on the Central Coast were above average, largely due to a very wet September and October. October rainfall was more than double the long-term average at Norah Head and Avoca due to several heavy rain events. Notably, daily rainfall totals of 69 mm and 64 mm were recorded at Norah Head and Avoca Beach, respectively. Dry conditions returned in November with well below average rainfall and extended dry periods. Gosford recorded a total of 25 mm of rainfall in November, which is less than one third of the long-term average.

Dry conditions continued on the Central Coast during summer with below average monthly rainfall totals in many areas from December 2022 to February 2023. Despite the dry conditions, storms and heavy rainfall events occurred during this time with daily rainfall totals of 74 mm, 65 mm and 64 mm recorded at Avoca, Swansea and Gosford, respectively, in February 2023.

Average to below average rainfall was experienced from March to April 2023 in the region. Periods of dry conditions were interrupted by heavy rainfall events at the end of March and start of April. Avoca Beach recorded a daily rainfall total of 106 mm during this time.

## Flooding and water quality



Flood debris washed up on Umina Beach in March 2022

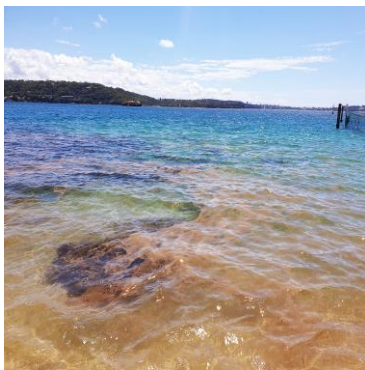
Photo: Beachwatch/DPE

Monitoring by Central Coast Council showed flooding events impacted swimming sites beyond the flood zones, making 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 floodwater events than the ocean beaches.

In 2022, major flooding events on the Hawkesbury River resulted in floodwaters impacting water quality at ocean beaches at the southern end of the Central Coast.

While microbial levels returned to normal at many swimming sites, there was still a large amount of debris or other hazards, such as murky water, which posed a risk to recreational activities.

## Marine algal blooms



Marine algal bloom present in the water

Photo: Chad Weston/  
NPWS, DPE

Water NSW reported the occurrence of marine algal blooms, *Trichodesmium* sp., in March 2023 that may have impacted beaches in the Central Coast region. A caution alert was also issued for Brisbane Water for *Alexandrium pacificum* from October to December 2022. Marine algae advisories were issued on the Beachwatch and Water NSW websites.

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, 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
<b>Central Coast Council</b>			
Lakes Beach	Ocean beach		
Cabbage Tree Bay Rockpool	Ocean baths		
Soldiers Beach	Ocean beach		
North Entrance Beach	Ocean beach		
The Entrance Beach	Ocean beach		
The Entrance Ocean Baths	Ocean baths		
Toowoan Bay	Ocean beach		
Shelly Beach	Ocean beach		
Gwandalan	Lake/Lagoon		
Summerland Point Baths	Lake/Lagoon		
Chain Valley Bay	Lake/Lagoon		
Mannering Park Baths	Lake/Lagoon		
Lake Munmorah Baths	Lake/Lagoon		
Canton Beach	Lake/Lagoon		
Wamberal Beach	Ocean beach		
Wamberal Lagoon	Lagoon		
Terrigal Beach	Ocean beach		
Terrigal Lagoon	Lagoon		
North Avoca Beach	Ocean beach		
Avoca Beach	Ocean beach		
Avoca Lagoon	Lagoon		
Copacabana Beach	Ocean beach		
Cockrone Lagoon	Lagoon		

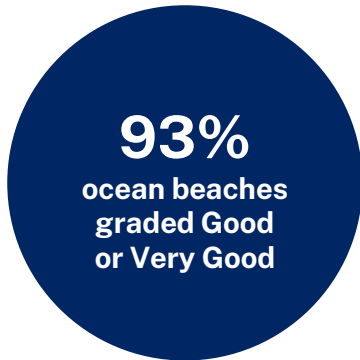
NSW State of the beaches 2022–2023

Swimming site	Site type	Beach Suitability Grade	Change
<b>Central Coast Council (continued)</b>			
MacMasters Beach	Ocean beach		
Killcare Beach	Ocean beach		
Ocean Beach	Ocean beach		
Umina Beach	Ocean beach		
Pearl Beach Rockpool	Ocean baths		
Davistown Baths	Estuarine		
Pretty Beach Baths	Estuarine		
Woy Woy Baths	Estuarine		
Yattalunga Baths	Estuarine		

Beach Suitability Grade					Change		
							
Very Good	Good	Fair	Poor	Very Poor	Improved	Stable	Declined

# Central Coast Council

## Overall results



Seventeen of the 32 swimming sites were graded as Very Good or Good in 2022–2023, which is consistent with the previous year. While the overall performance is lower than other regions, the result 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

	2020–2021	2021–2022	2022–2023	Trend
Ocean beaches (15 sites)	93%	87%	<b>93%</b>	
Estuarine sites (4 sites)	0%	0%	<b>0%</b>	
Lake/lagoon sites (10 sites)	10%	10%	<b>0%</b>	
Ocean baths (3 sites)	100%	100%	<b>100%</b>	

See the section on **How to read this report** on page 47 for an explanation of the graphs, tables and Beach Suitability Grades.

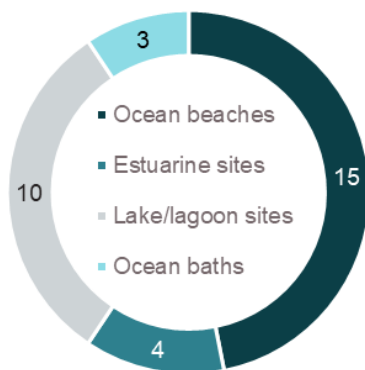
Thirty-two swimming sites were monitored by Central Coast Council. All sampling and laboratory analysis was conducted and fully funded by the council. All sites are sampled weekly between October and April and monthly from May to September.

### Best beaches

#### 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.



Site types in Central Coast region

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



Beach Suitability Grades for Central Coast ocean beaches

North Entrance Beach was graded as Very Good in 2022–2023, consistent with the previous year. Water quality at this site was suitable for swimming almost all of the time.

Thirteen of the 15 ocean beaches were graded as Good: Lakes Beach, Soldiers Beach, The Entrance Beach, Toowoan Bay, Shelly Beach, Wamberal Beach, North Avoca Beach, Avoca Beach, Copacabana Beach, MacMasters Beach, Killcare Beach, Ocean Beach and Umina Beach. Toowoan Bay was upgraded from Poor in the previous year. Water quality at these sites is suitable for swimming most of the time but can be susceptible to pollution following rainfall.

Terrigal Beach was graded as Poor in 2022–2023, consistent with the previous year. Despite the Poor grade, water quality at this site was mostly suitable for swimming in dry weather conditions, with 90% of samples within the safe swimming limit when no rain had fallen in the previous 24 hours.

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.

Following some remediation work, Terrigal Beach was graded as Good for 2 consecutive years (2018–2019 and 2019–2020). In 2020–2021 and 2021–2022 Terrigal Beach returned to a Poor grade reflecting the extreme wet weather conditions of these 2 La Niña years impacting water quality at the beach. Despite being graded as Poor again in 2022–23, water quality at Terrigal Beach has improved in the last year with 94% of all samples collected since May 2022 with bacteria levels suitable for swimming. However, as beach grades are a long-term assessment of water quality based on the most recent 100 water samples, those collected since February 2020, during La Niña conditions, are also included in the assessment and continue to influence the result.

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

Four estuarine swimming sites in Brisbane Water continued to be graded as Poor in 2022–2023: Davistown Baths, Pretty Beach Baths, Woy Woy Baths and Yattalunga Baths. This result is consistent with previous 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.



**Beach Suitability Grades for Central Coast estuarine beaches**

Microbial water quality at Davistown Baths, Pretty Beach Baths and Woy Woy 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. Despite the Poor grades, Woy Woy Baths and Davistown Baths have shown trends of improved microbial assessments in recent years with management actions improving water quality at these sites.

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

Summerland Point Baths, Gwandalan, Chain Valley Bay, Mannering Park Baths, Lake Munmorah Baths and Canton Beach were graded as Poor.

Summerland Point Baths was downgraded from Good in the previous year. This result reflects a higher proportion of samples collected at this site during wet weather conditions in the 2022–2023 assessment period compared to the 2021–2022 assessment period, with 39% and 36% respectively. Despite the Poor grade, microbial water quality 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.

Gwandalan, Chain Valley Bay, Mannering Park Baths, Lake Munmorah Baths and Canton Beach continued to be graded as Poor, a similar result to the previous years. Microbial water quality was often suitable for swimming during dry weather conditions, with between 53% and 66% of samples within the safe swimming limit when no rain had fallen in the previous 24 hours. However, elevated enterococci levels were often recorded after light rainfall and continued to increase with increasing rainfall. Despite the Poor grade, Canton Beach has shown trends of improved microbial assessments in recent years with management actions improving water quality at this site.



**Beach Suitability Grades for Central Coast lake/lagoon swimming sites**

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 continued to be graded Poor in 2022–2023: Wamberal Lagoon, Terrigal Lagoon, Avoca Lagoon and Cockrone Lagoon. This result is consistent with previous years.

Microbial water quality at these sites was often elevated in dry weather conditions, and regularly exceeded the safe swimming limit following light 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.

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 2022–2023. 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 and Pearl Beach Rockpool were frequently suitable for swimming during dry weather conditions, with 100% and 93% of dry weather samples within the safe swimming limit, respectively. Elevated enterococci were recorded following heavy rain.



Cabbage Tree Bay Rockpool was often 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:** G



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 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 little rain, and often after 10 mm of rain.

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

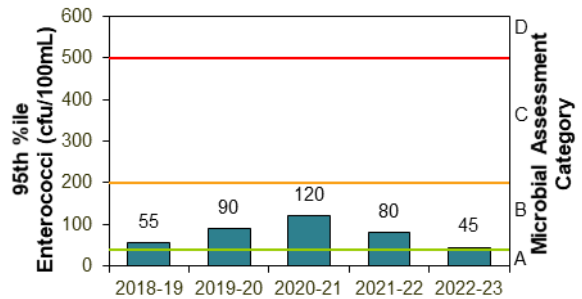
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	98%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

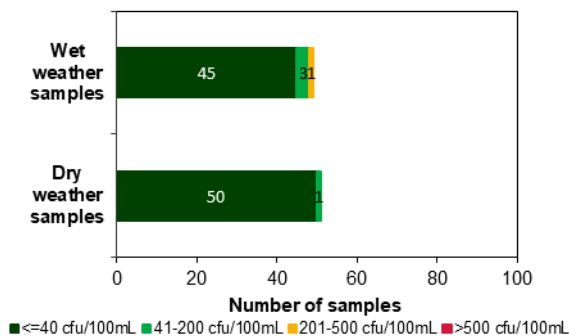
### Sanitary inspection: Low



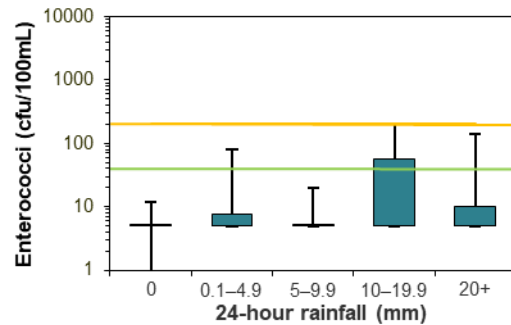
### Microbial Assessment Category: B



### Dry and wet weather water quality

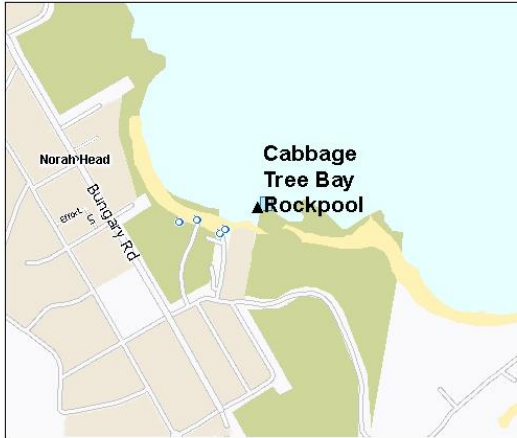


### Water quality in response to rainfall



# Cabbage Tree Bay Rockpool

**Beach grade:** G



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.

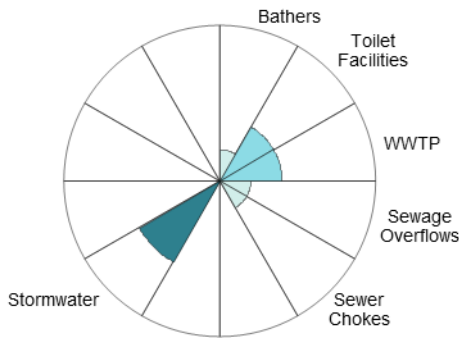
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and often after 10 mm or more.

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

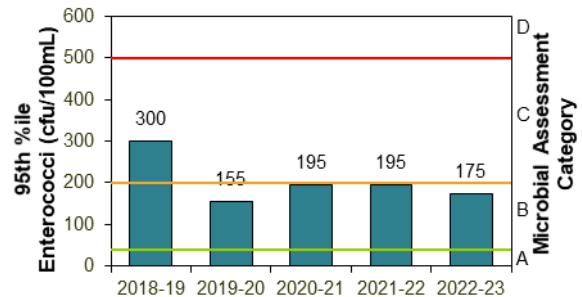
The site was monitored from 2002 until 2005, and since 2017.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean baths	Feb 2020 to Apr 2023	88%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

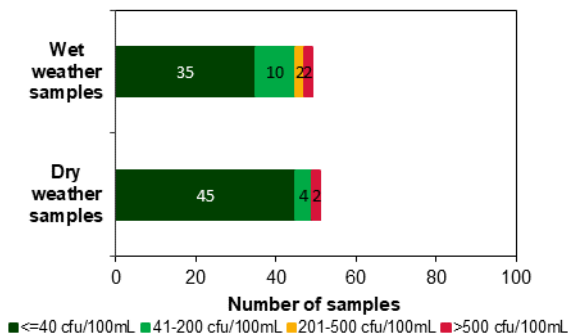
## Sanitary inspection: Moderate



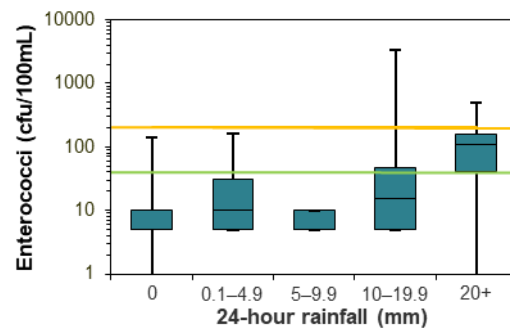
## Microbial Assessment Category: B



## Dry and wet weather water quality



## Water quality in response to rainfall



# Soldiers Beach

**Beach grade:** G



Soldiers Beach is a popular beach surrounded by reserve 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 several potential sources of minor faecal contamination.

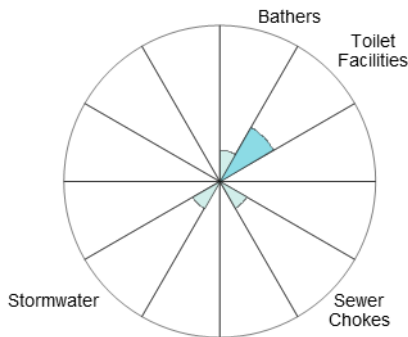
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 10 mm or more of rain.

The site has been monitored since 2002.

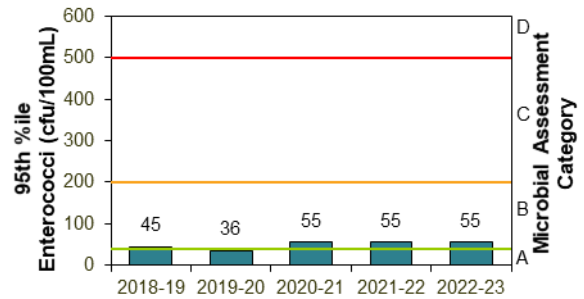
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status	
Ocean beach	Feb 2020 to Apr 2023	94%	100	Stable	○

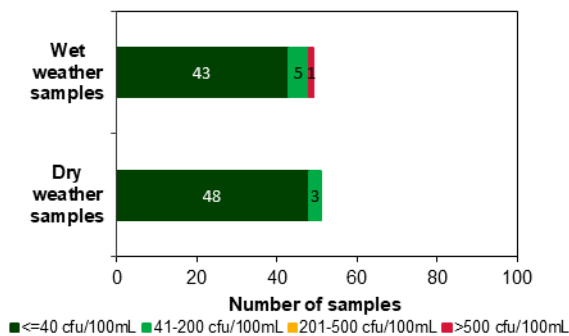
### Sanitary inspection: Low



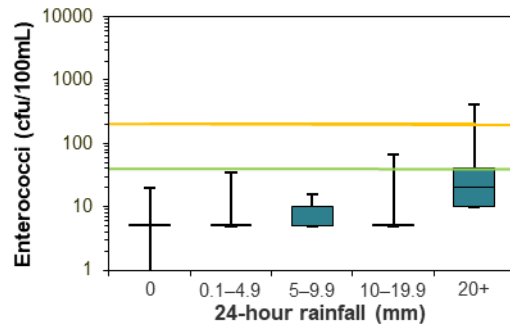
### Microbial Assessment Category: B



### Dry and wet weather water quality

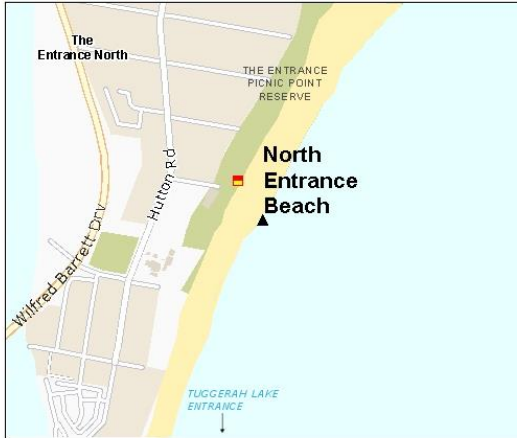


### Water quality in response to rainfall



# North Entrance Beach

**Beach grade:** VG



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.

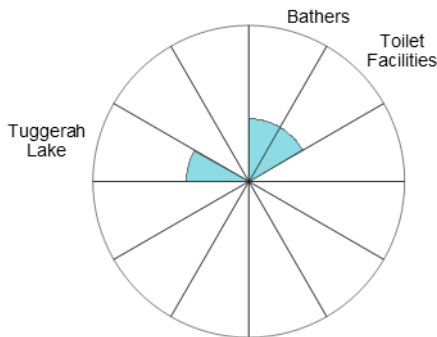
Enterococci levels had little response to rainfall and generally remained below the safe swimming limit.

The site has been monitored since 2002.

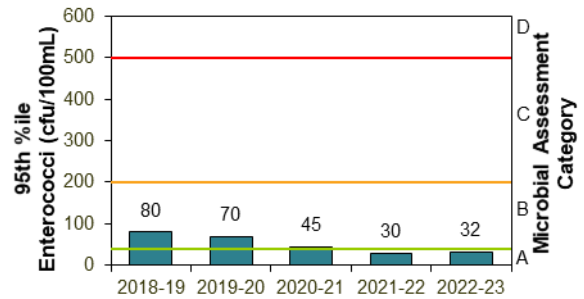
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	93%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

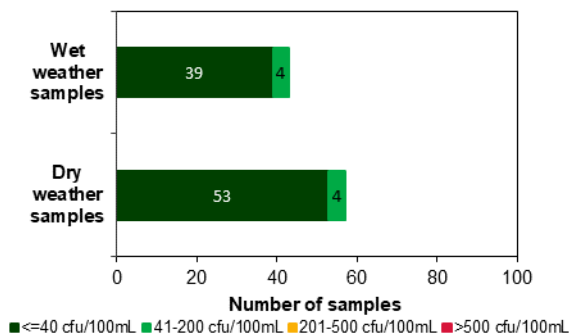
### Sanitary inspection: Low



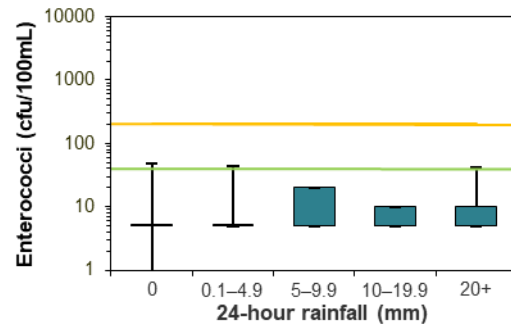
### Microbial Assessment Category: A



### Dry and wet weather water quality



### Water quality in response to rainfall



# The Entrance Beach

**Beach grade:** G



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.

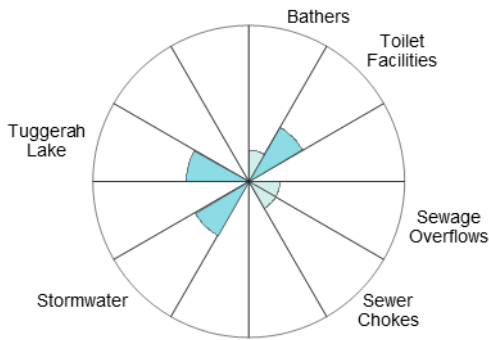
Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after 5 mm of rain, and regularly after 20 mm or more of rain.

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

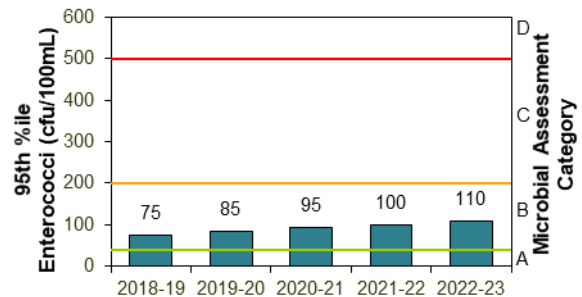
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	93%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

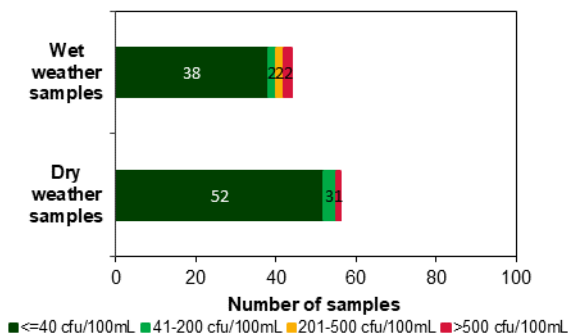
## Sanitary inspection: Low



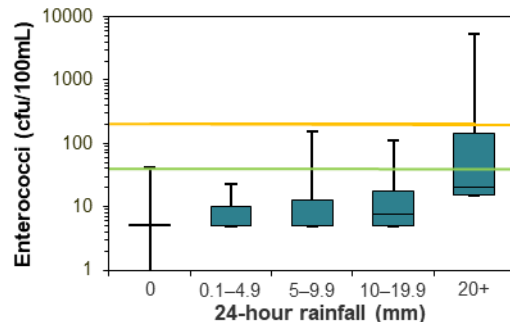
## Microbial Assessment Category: B



## Dry and wet weather water quality



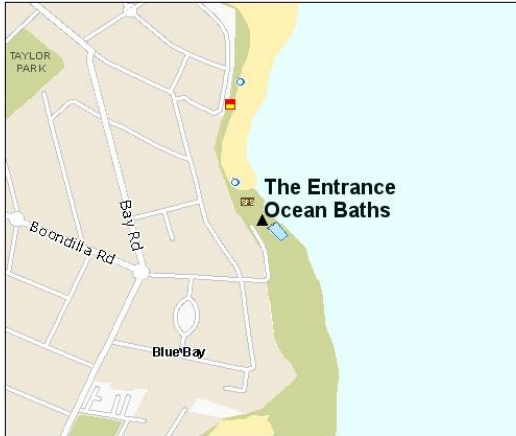
## Water quality in response to rainfall





# The Entrance Ocean Baths

**Beach grade:**



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.

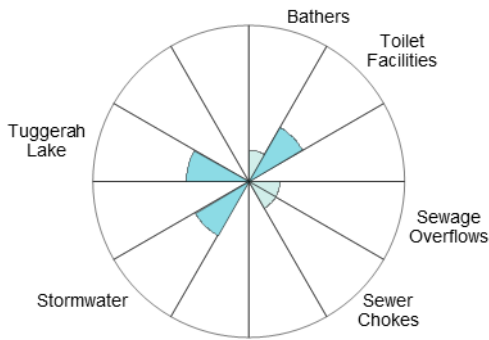
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 10 mm or more of rain.

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

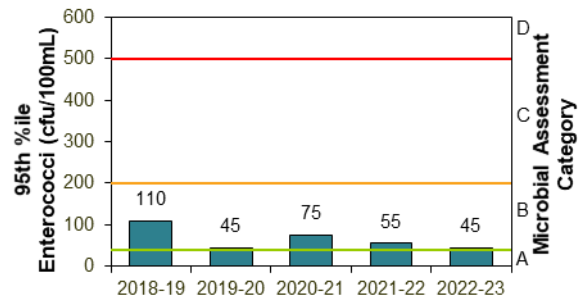
The site has been monitored since 2017.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean baths	Oct 2019 to Mar 2023	100%	100	Stable

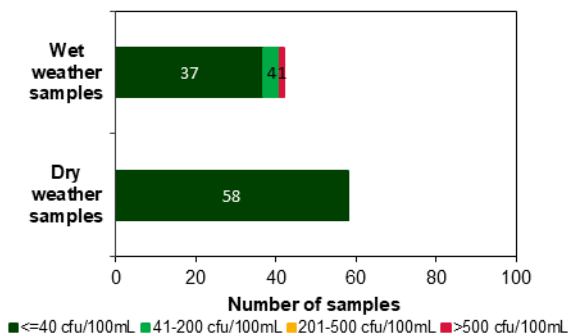
## Sanitary inspection: Low



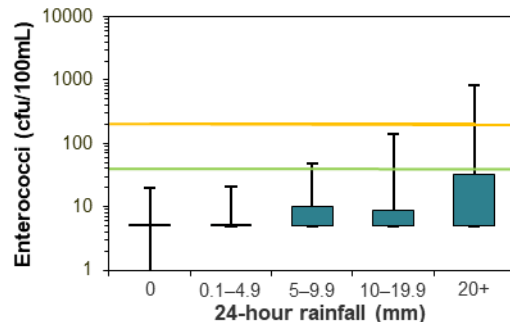
## Microbial Assessment Category: B



## Dry and wet weather water quality



## Water quality in response to rainfall



# Toowoan Bay

**Beach grade:** G



Toowoan 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.

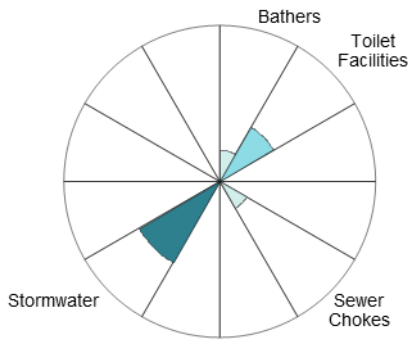
Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after no rain and regularly after 20 mm or more of rain.

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

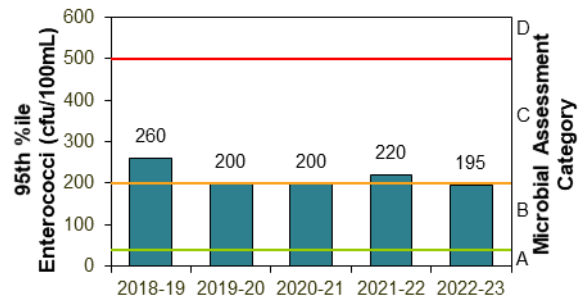
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	82%	100	Improved <span style="font-size: 2em;">↑</span>

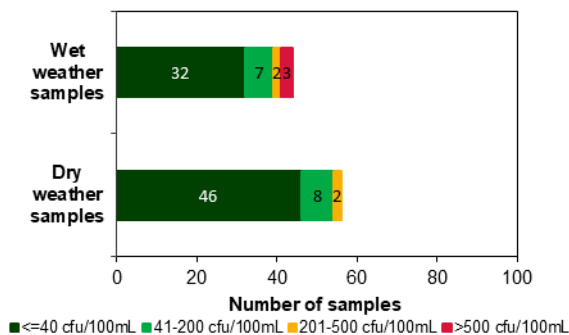
## Sanitary inspection: Moderate



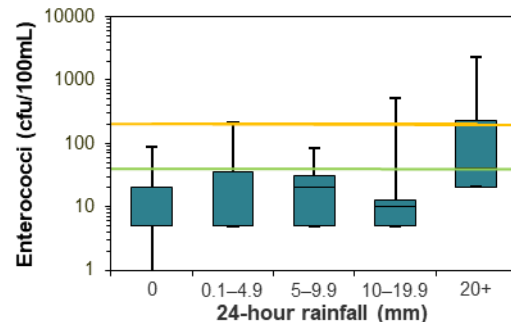
## Microbial Assessment Category: B



## Dry and wet weather water quality



## Water quality in response to rainfall



# Shelly Beach

Beach grade:



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

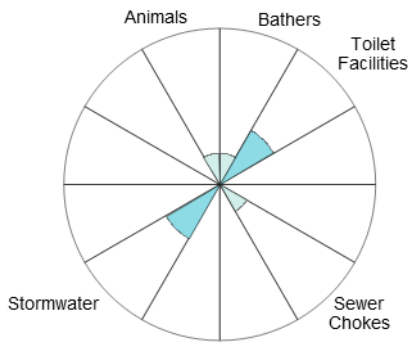
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of minor faecal contamination.

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.

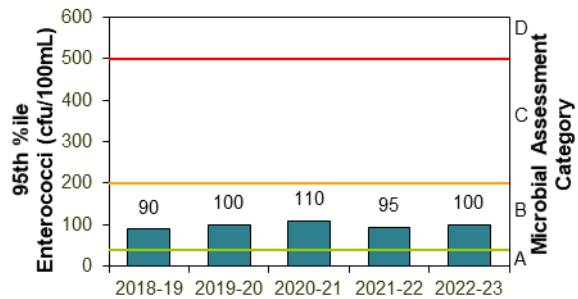
See 'How to read this report' for key to map. The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	93%	100	Stable

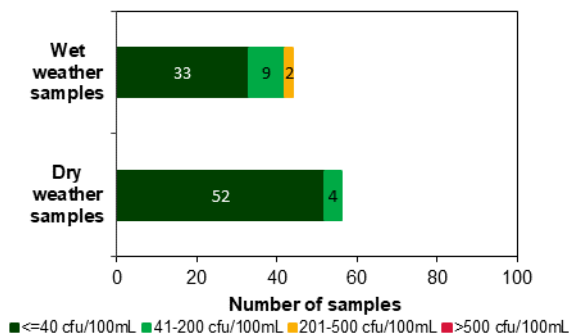
### Sanitary inspection: Low



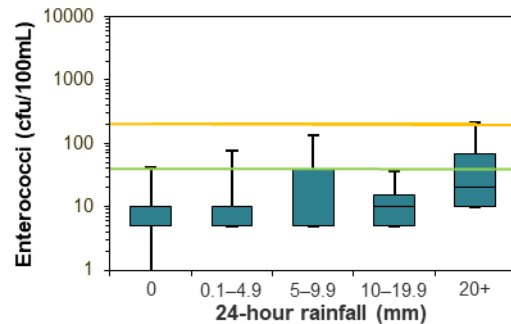
### Microbial Assessment Category: B



### Dry and wet weather water quality



### Water quality in response to rainfall



# Gwandalan

**Beach grade:** P



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.

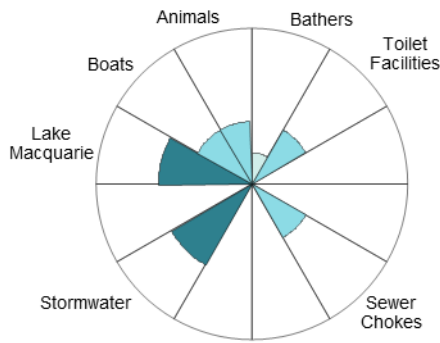
Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit in response to no rain, and regularly after rainfall.

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

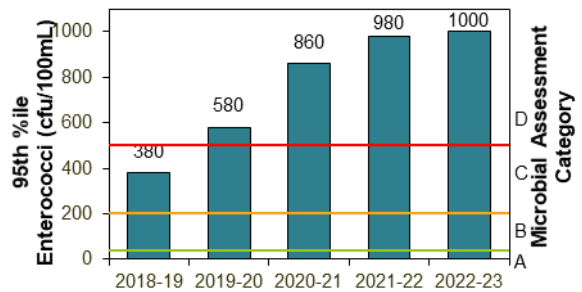
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Feb 2020 to Ap 2023	57%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

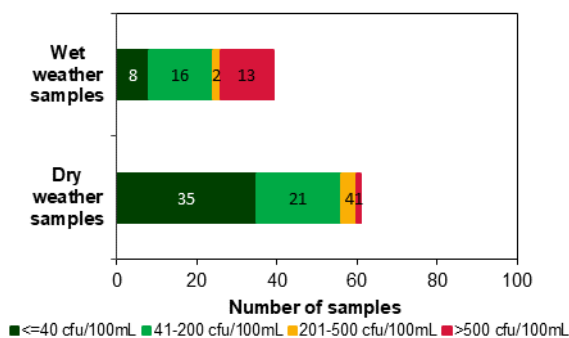
## Sanitary inspection: Moderate



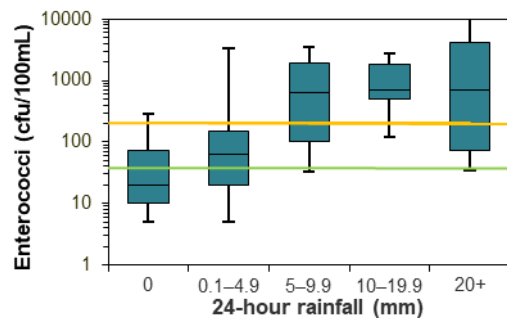
## Microbial Assessment Category: D



## Dry and wet weather water quality

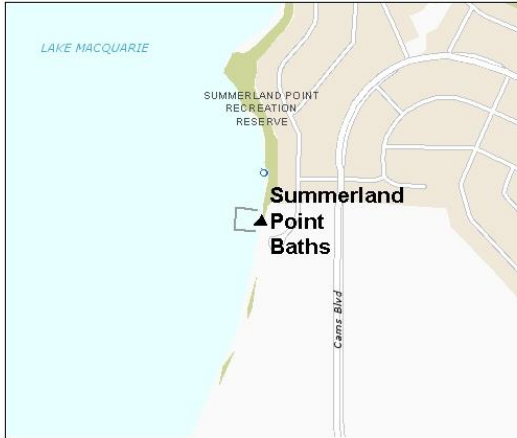


## Water quality in response to rainfall



# Summerland Point Baths

**Beach grade:** P



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.

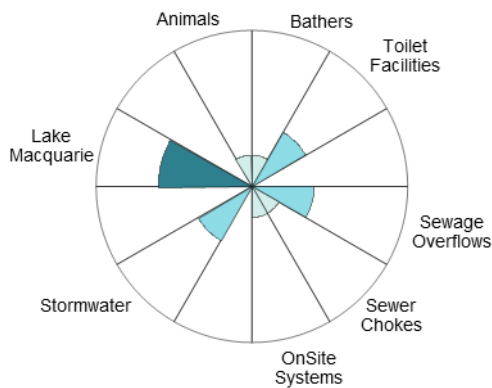
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to little or no rain, and regularly after 5 mm or more.

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

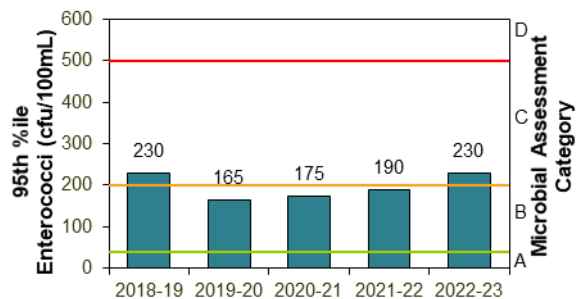
The site has been monitored since 2017.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Jan 2020 to Apr 2023	85%	100	Declined <span style="font-size: 2em;">↓</span>

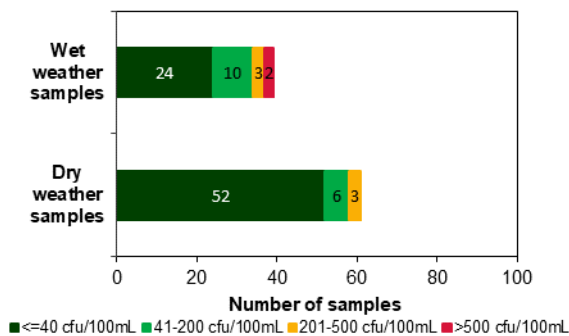
## Sanitary inspection: Moderate



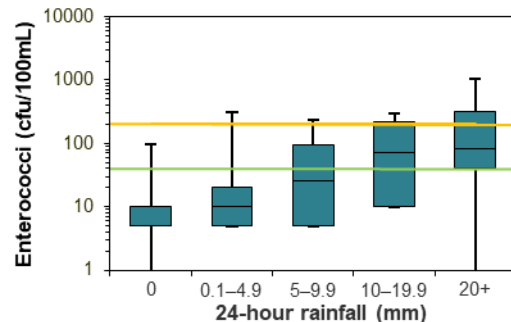
## Microbial Assessment Category: C



## Dry and wet weather water quality



## Water quality in response to rainfall



# Chain Valley Bay

**Beach grade:** P



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.

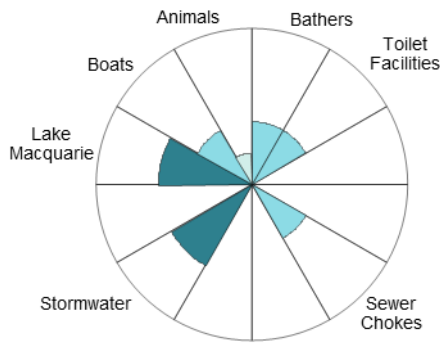
Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit in response to little or no rain, and regularly after 20 mm or more.

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

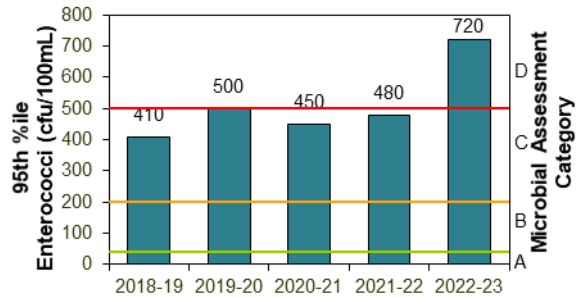
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Feb 2020 to Apr 2023	53%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

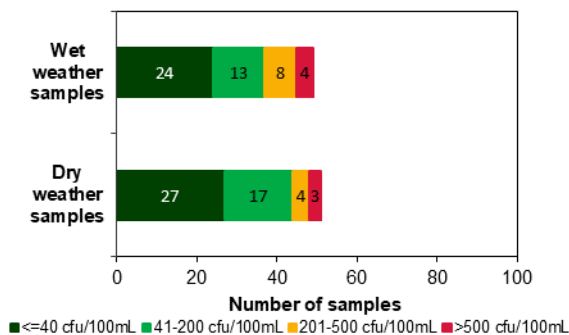
## Sanitary inspection: Moderate



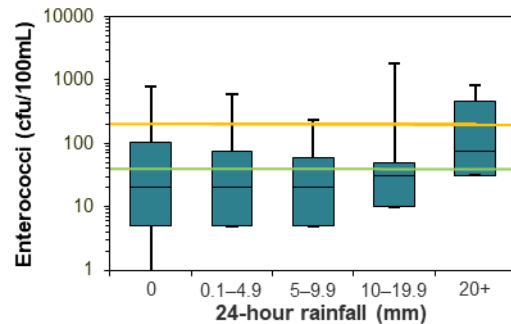
## Microbial Assessment Category: D



## Dry and wet weather water quality

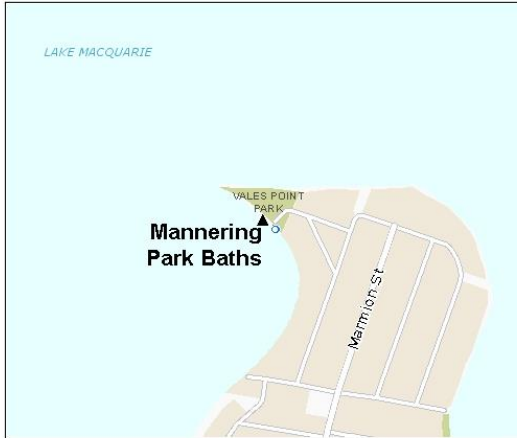


## Water quality in response to rainfall



# Manning Park Baths

**Beach grade:** P



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

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

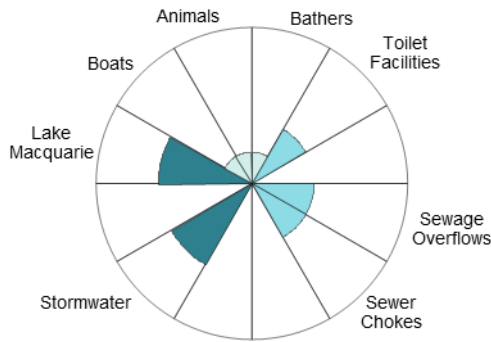
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater and from elsewhere within the lake.

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

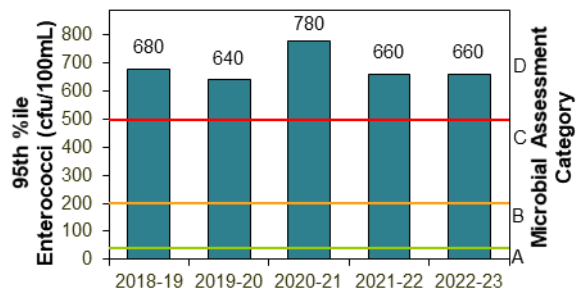
The site has been monitored since 2017.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Jan 2020 to Apr 2023	55%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

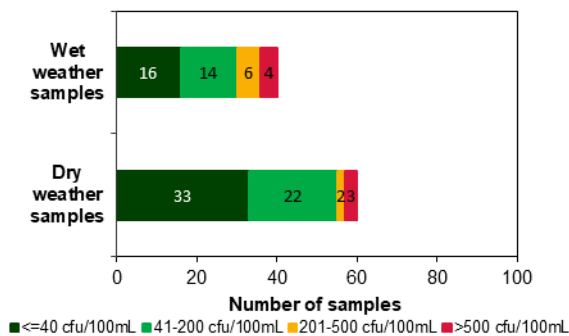
## Sanitary inspection: Moderate



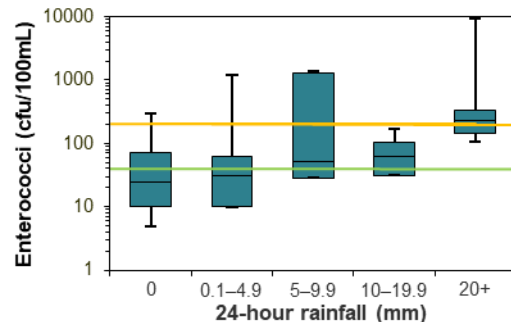
## Microbial Assessment Category: D



## Dry and wet weather water quality

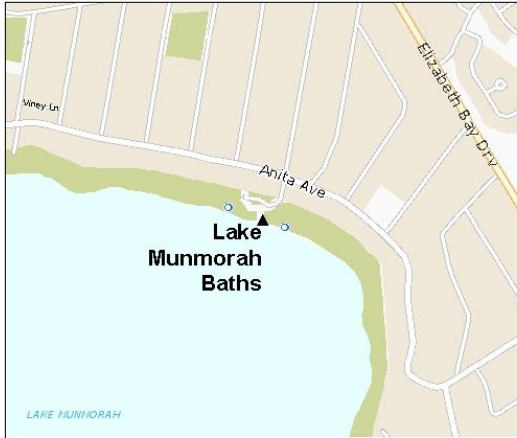


## Water quality in response to rainfall



# Lake Munmorah Baths

**Beach grade:** P



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.

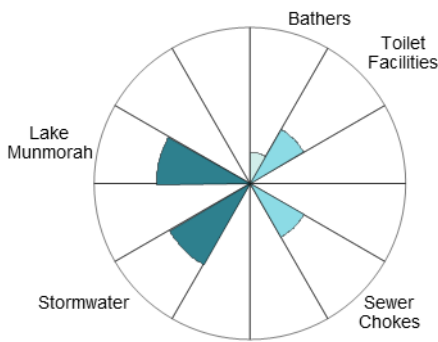
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after no rain and frequently after 5 mm or more of rain.

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

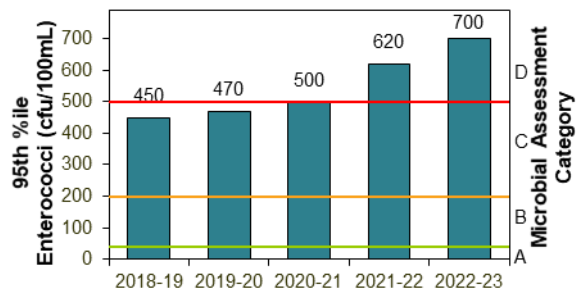
The site has been monitored since 2010.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Feb 2020 to Apr 2023	66%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

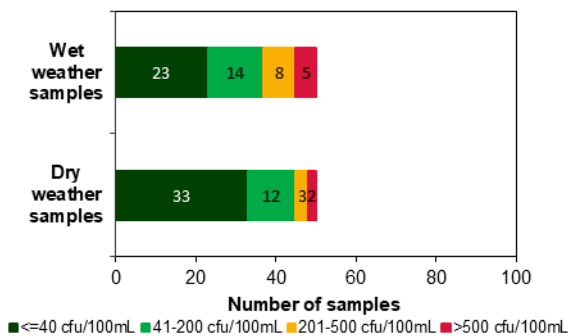
## Sanitary inspection: Moderate



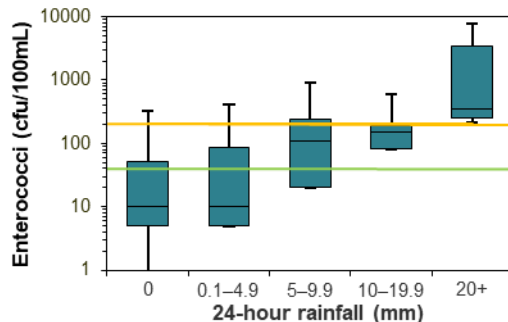
## Microbial Assessment Category: D



## Dry and wet weather water quality



## Water quality in response to rainfall





# Canton Beach



**Beach grade:**



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.

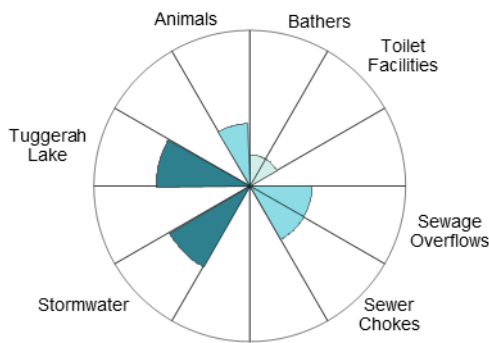
Enterococci levels increased with increasing rainfall, regularly exceeding the safe swimming limit after no rain, and frequently after light rain.

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

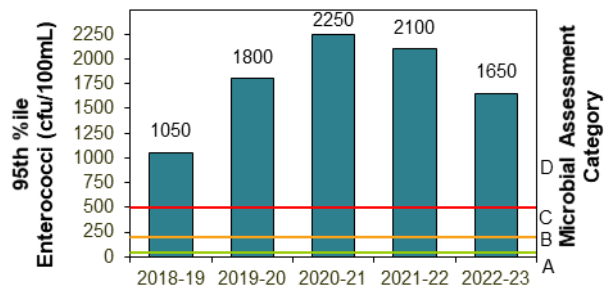
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Feb 2020 to Apr 2023	56%	100	Stable

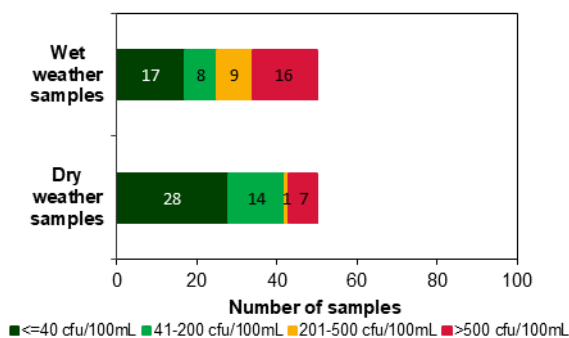
## Sanitary inspection: Moderate



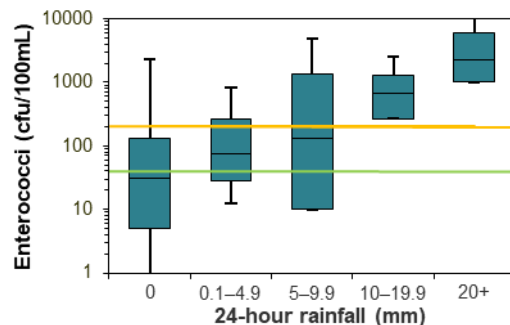
## Microbial Assessment Category: D



## Dry and wet weather water quality



## Water quality in response to rainfall



# Wamberal Beach

**Beach grade:** G



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

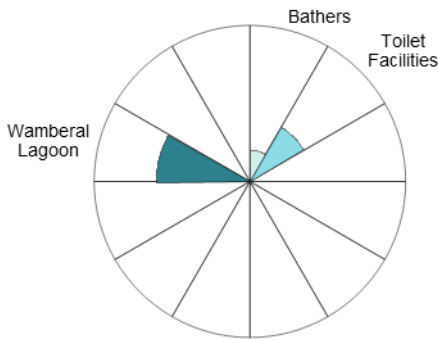
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with potential sources of faecal contamination including discharge from Wamberal Lagoon.

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

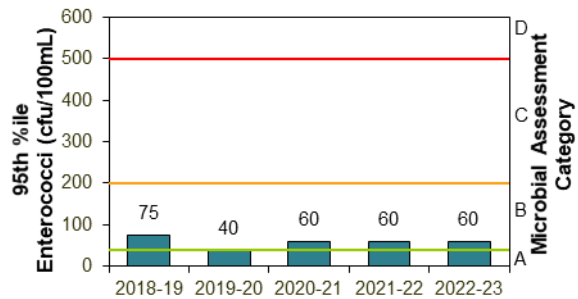
See 'How to read this report' for key to map. The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	94%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

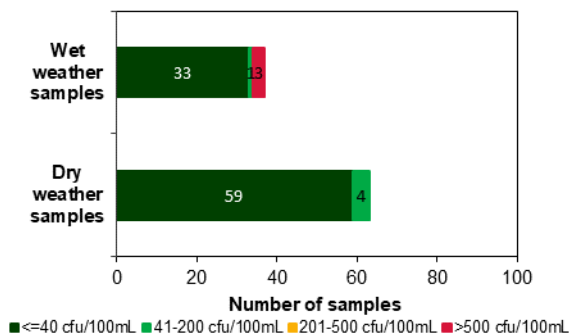
## Sanitary inspection: Moderate



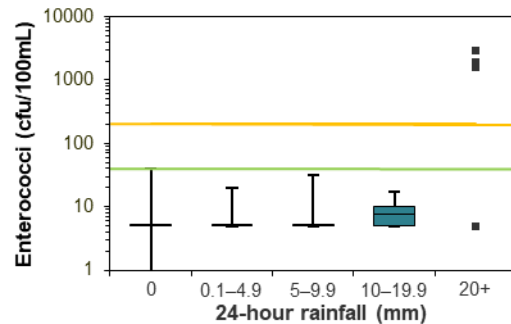
## Microbial Assessment Category: B



## Dry and wet weather water quality



## Water quality in response to rainfall



# Wamberal Lagoon

**Beach grade:** P



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.

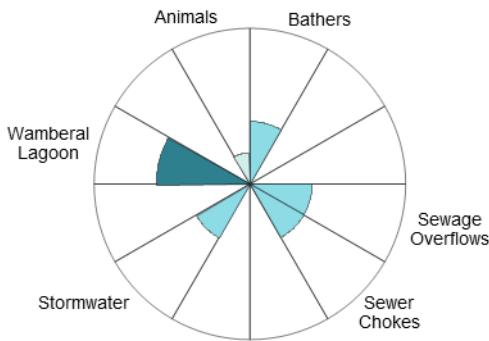
Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after no rain and regularly after light rain.

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

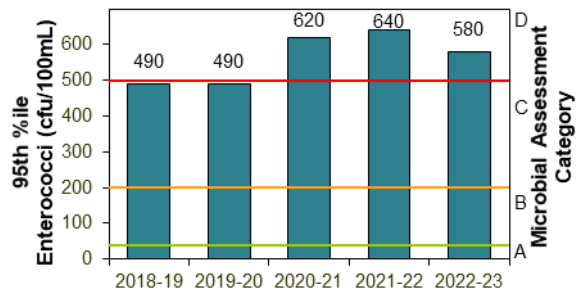
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lagoon	Feb 2020 to Apr 2023	63%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

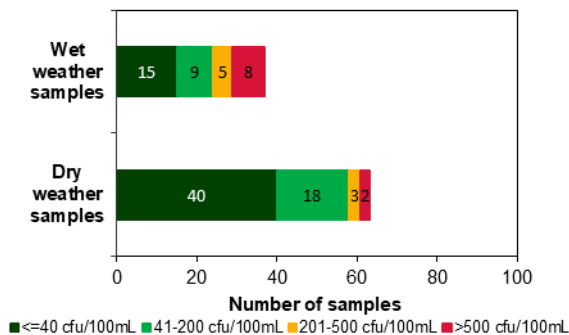
## Sanitary inspection: Moderate



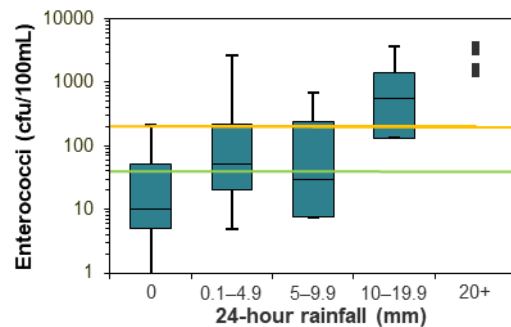
## Microbial Assessment Category: D



## Dry and wet weather water quality



## Water quality in response to rainfall



# Terrigal Beach

**Beach grade:** P



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

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 Terrigal Lagoon.

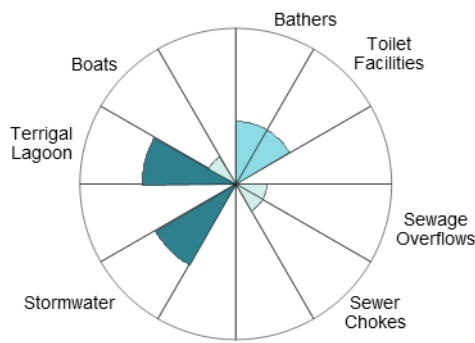
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and often after 5 mm or more.

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

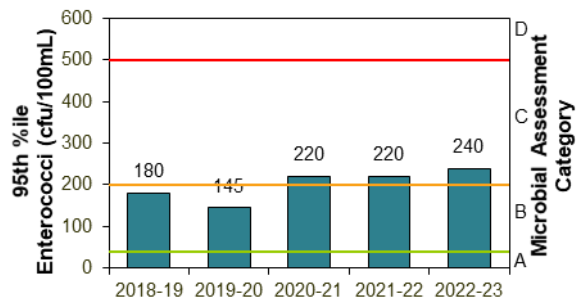
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	90%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

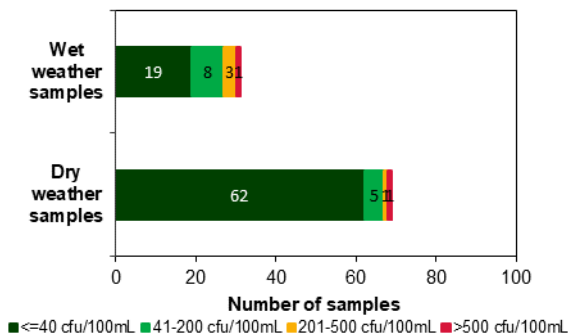
## Sanitary inspection: Moderate



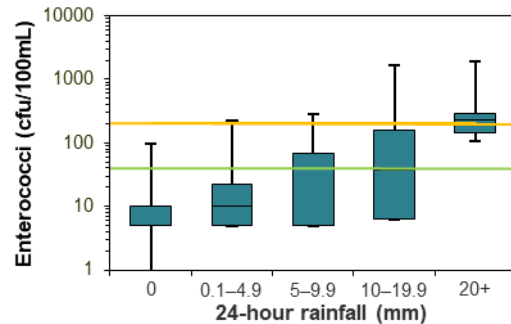
## Microbial Assessment Category: C



## Dry and wet weather water quality



## Water quality in response to rainfall



# Terrigal Lagoon

**Beach grade:** P



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.

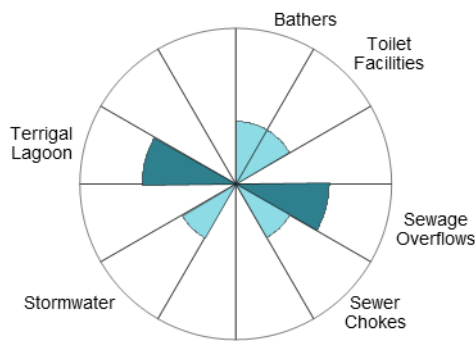
Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after no rain, and regularly after light rain.

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

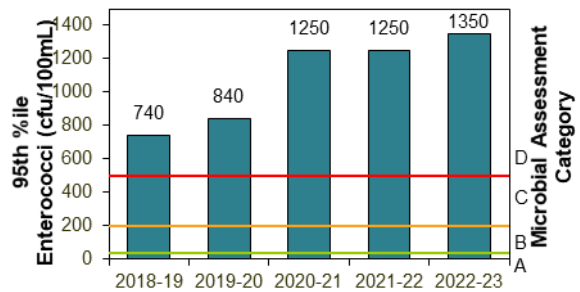
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lagoon	Feb 2020 to Apr 2023	56%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

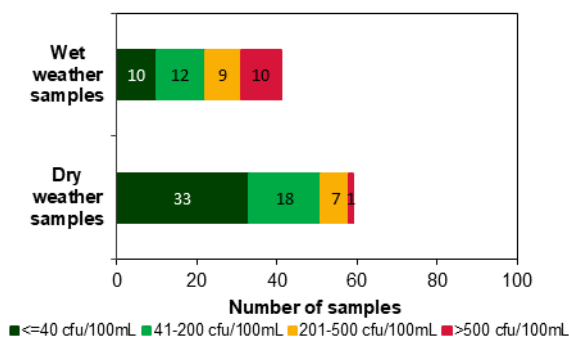
## Sanitary inspection: Moderate



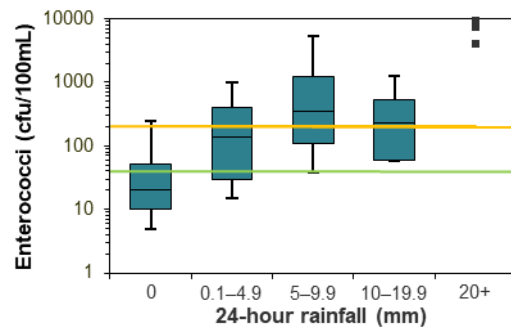
## Microbial Assessment Category: D



## Dry and wet weather water quality



## Water quality in response to rainfall



# North Avoca Beach

**Beach grade:**



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.

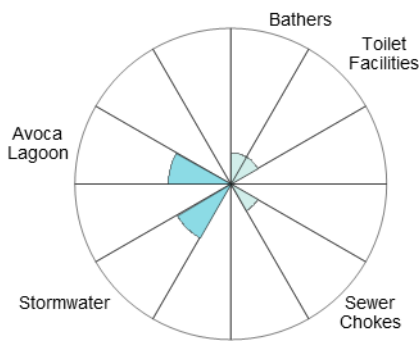
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 5 mm or more of rain, and frequently after 20 mm or more.

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

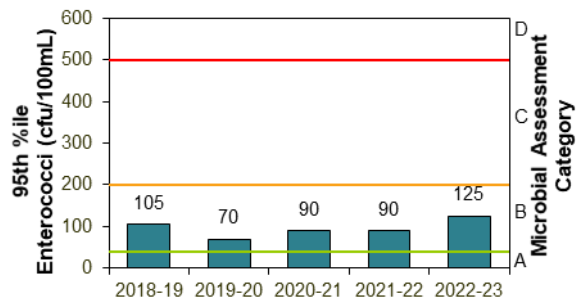
The site has been monitored since 2007.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	93%	100	Stable

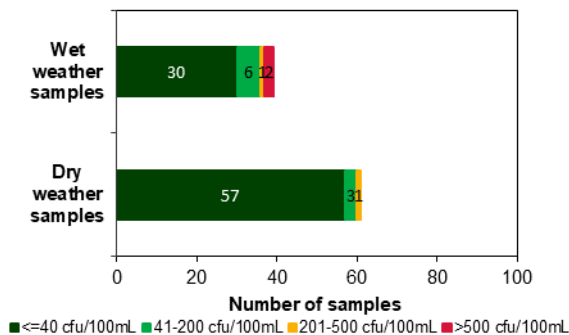
### Sanitary inspection: Low



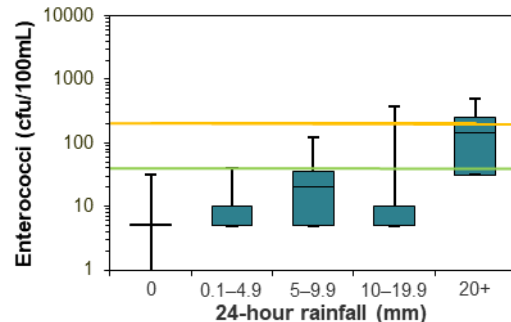
### Microbial Assessment Category: B



### Dry and wet weather water quality

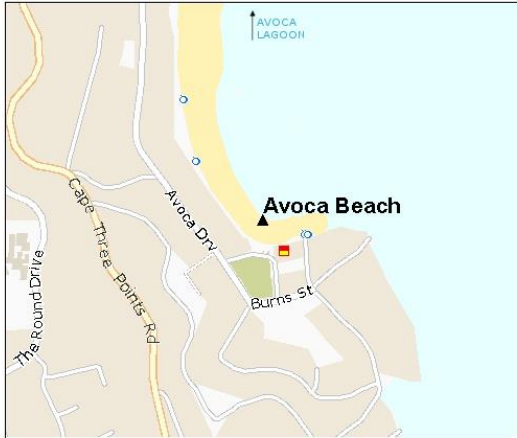


### Water quality in response to rainfall



# Avoca Beach

**Beach grade:** G



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

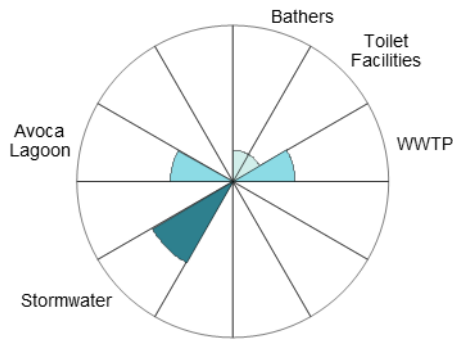
The Beach Suitability Grade of Good indicates microbial water quality is suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

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.

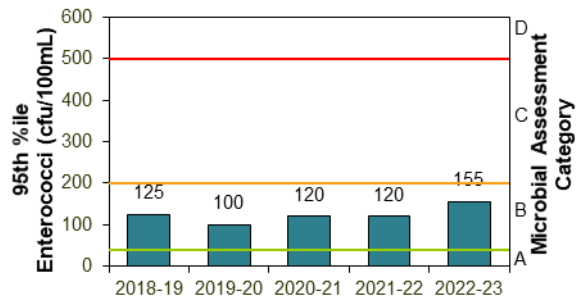
See 'How to read this report' for key to map. The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	95%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

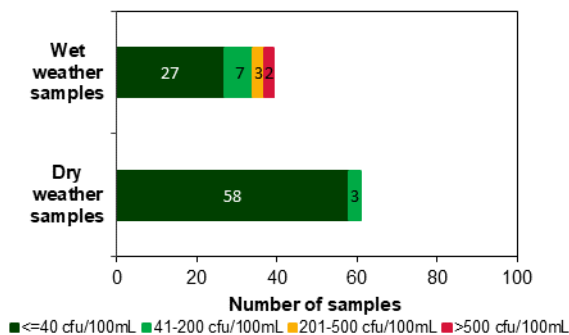
## Sanitary inspection: Moderate



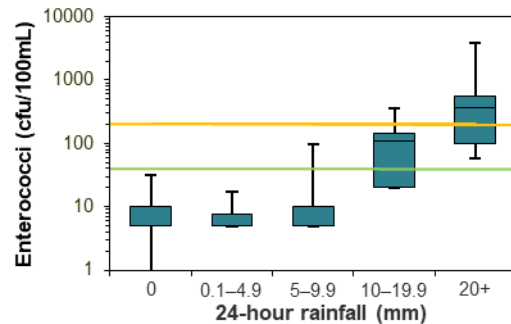
## Microbial Assessment Category: B



## Dry and wet weather water quality



## Water quality in response to rainfall



# Avoca Lagoon

**Beach grade:**



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.

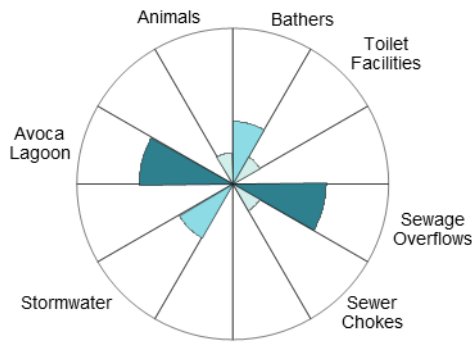
Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after no rain, and regularly after rainfall.

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

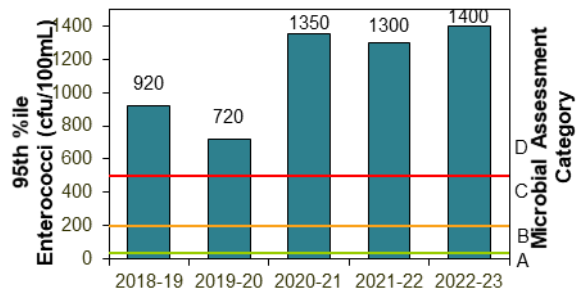
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lagoon	Mar 2020 to Apr 2023	50%	100	Stable

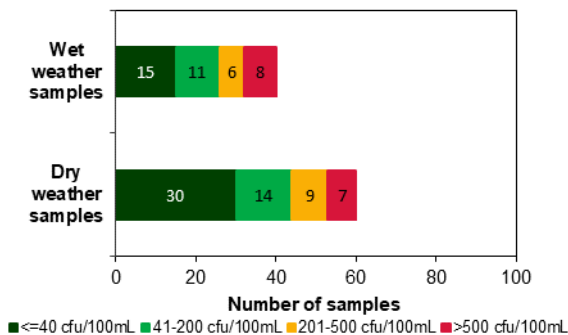
## Sanitary inspection: Moderate



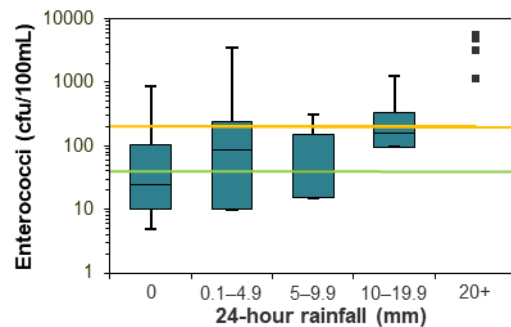
## Microbial Assessment Category: D



## 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.

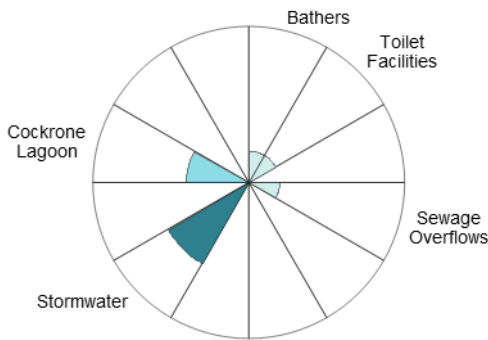
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

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

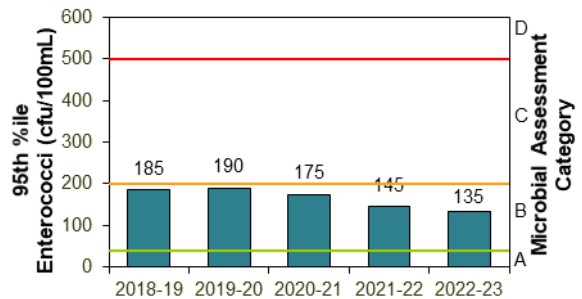
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	97%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

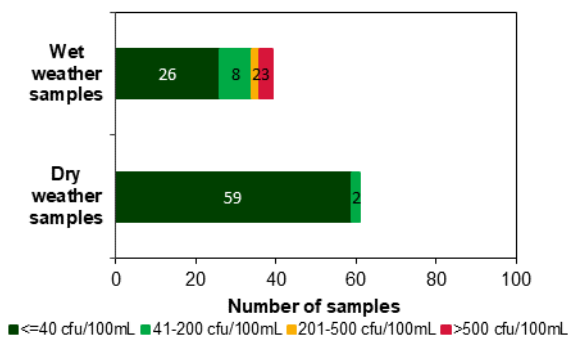
### Sanitary inspection: Moderate



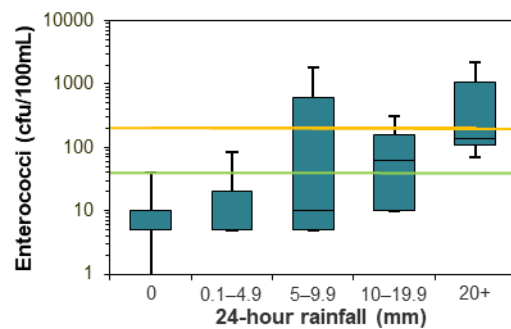
### Microbial Assessment Category: B



### Dry and wet weather water quality



### Water quality in response to rainfall



# Cockrone Lagoon

**Beach grade:** P



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.

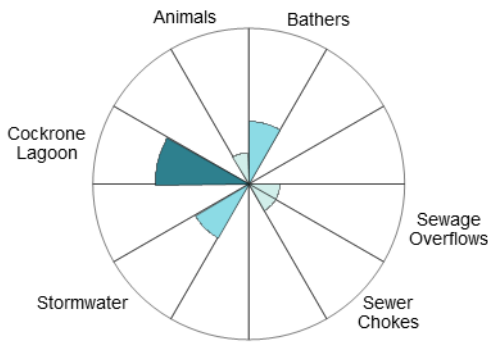
Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after no rain and regularly after rainfall.

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

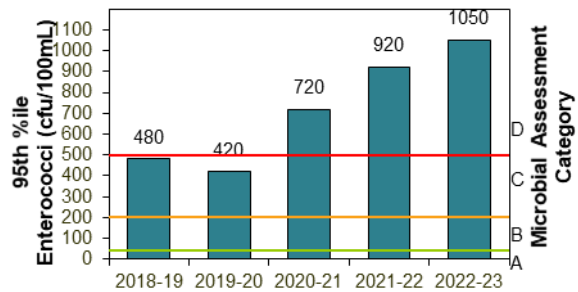
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lagoon	Feb 2020 to Apr 2023	48%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

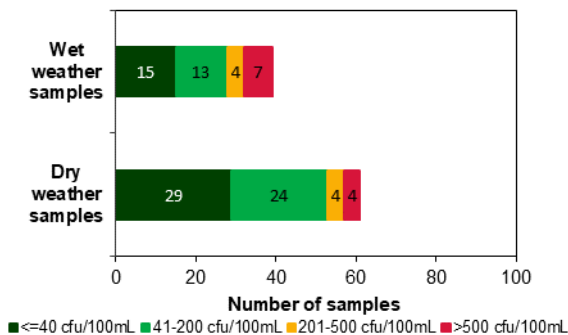
## Sanitary inspection: Moderate



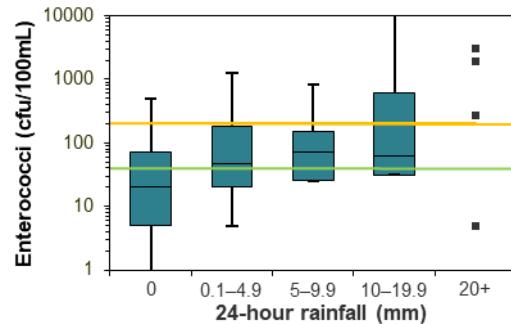
## Microbial Assessment Category: D



## Dry and wet weather water quality



## Water quality in response to rainfall



# MacMasters Beach

**Beach grade:** G



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.

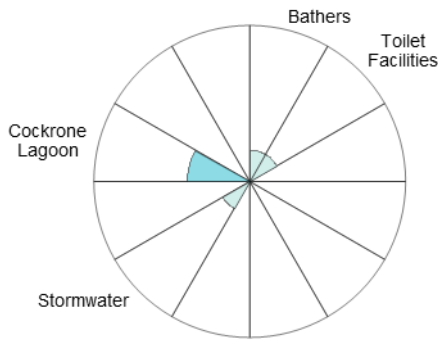
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 5 mm of rain, and regularly after 20 mm or more.

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

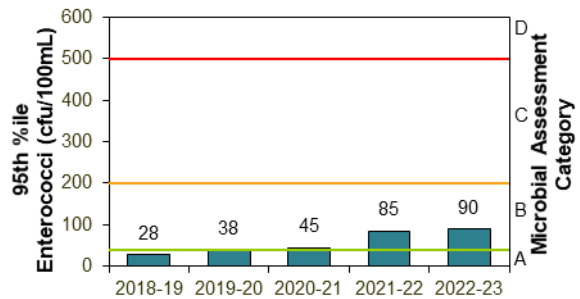
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Feb 2020 to Apr 2023	93%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

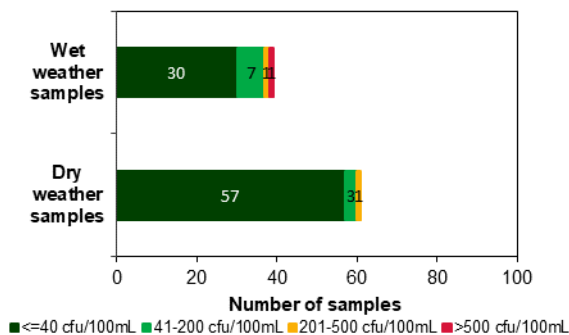
## Sanitary inspection: Low



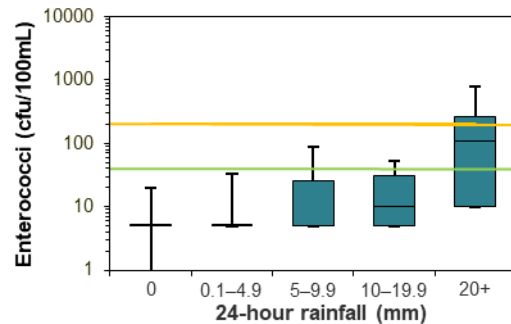
## Microbial Assessment Category: B



## Dry and wet weather water quality



## Water quality in response to rainfall



# Killcare Beach

**Beach grade:** G



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.

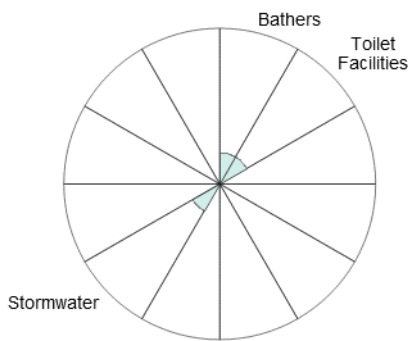
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 5 mm of rain, and regularly after 20 mm or more.

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

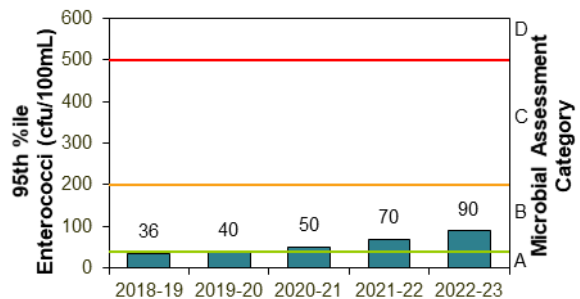
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Jan 2020 to Apr 2023	94%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

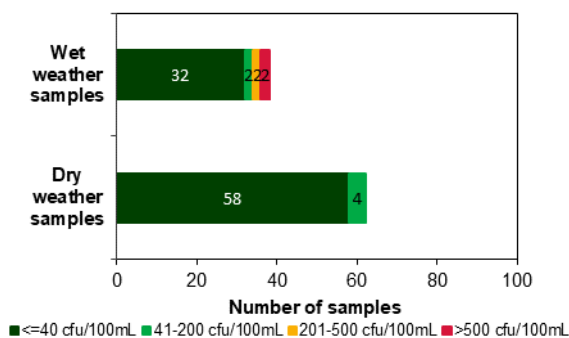
### Sanitary inspection: Low



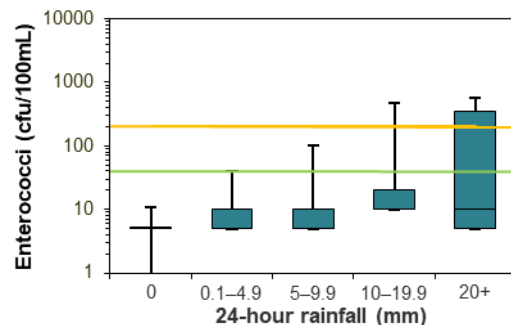
### Microbial Assessment Category: B



### Dry and wet weather water quality



### Water quality in response to rainfall



# Ocean Beach

**Beach grade:** G



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.

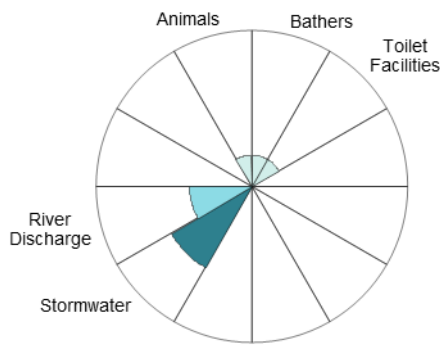
Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and frequently after 10 mm or more.

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

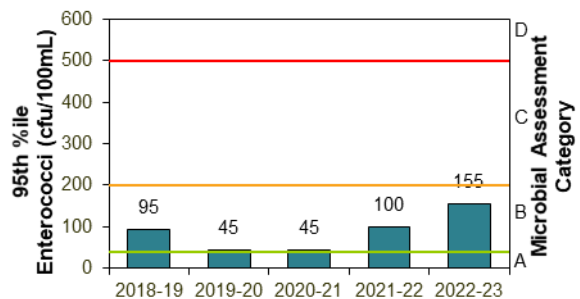
The site has been monitored since 2011.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Jan 2020 to Apr 2023	92%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; vertical-align: middle;"></span>

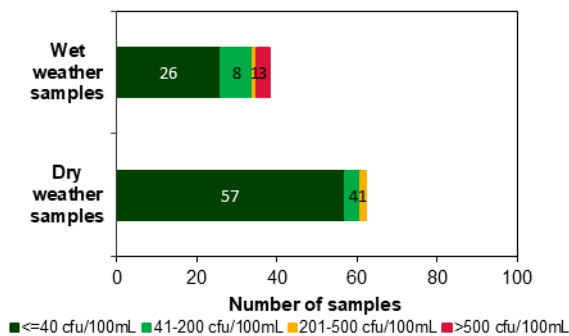
## Sanitary inspection: Moderate



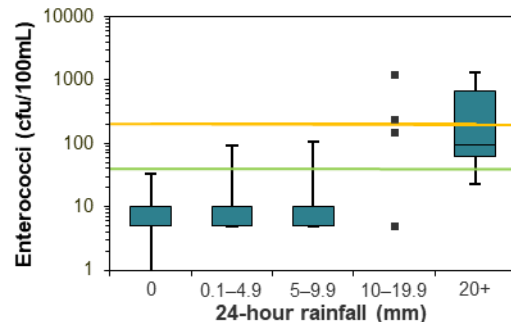
## Microbial Assessment Category: B



## Dry and wet weather water quality



## Water quality in response to rainfall



# Umina Beach

Beach grade:



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.

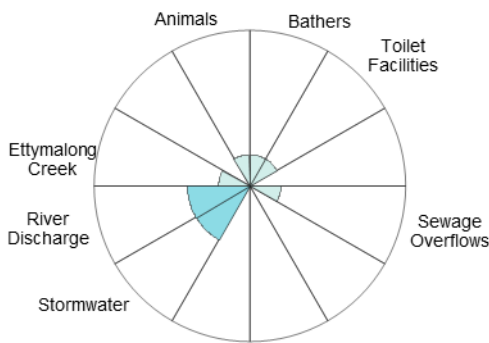
Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and often after 10 mm or more.

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

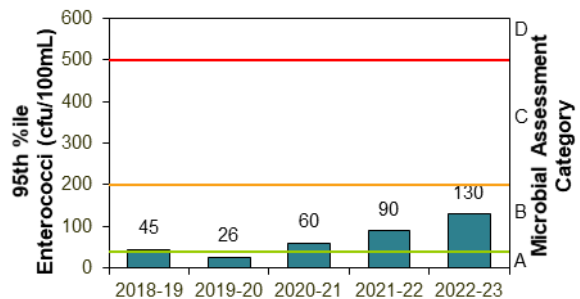
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Jan 2020 to Apr 2023	97%	100	Stable

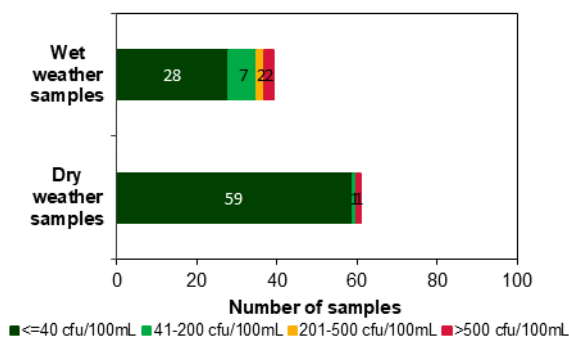
## Sanitary inspection: Low



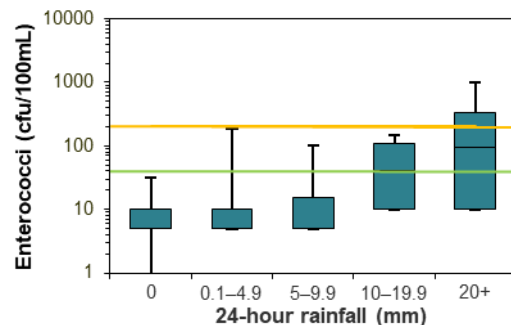
## Microbial Assessment Category: B



## Dry and wet weather water quality

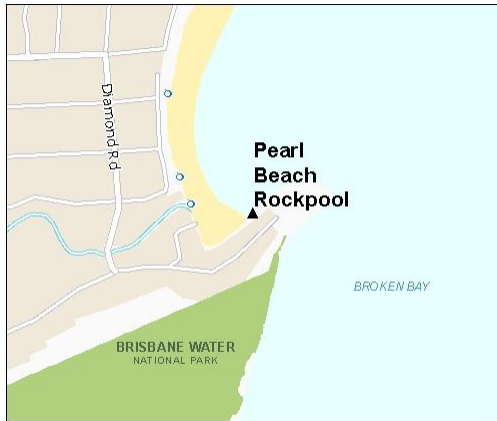


## Water quality in response to rainfall



# 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.

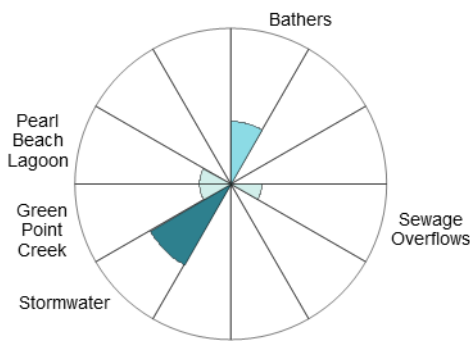
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

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

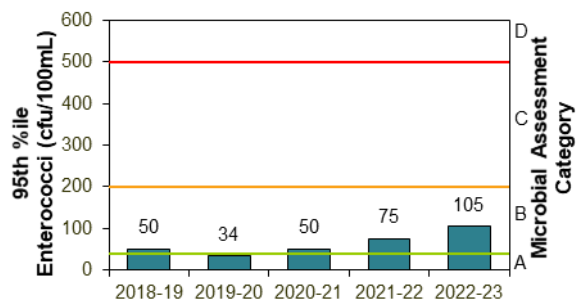
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean baths	Dec 2019 to Apr 2023	93%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

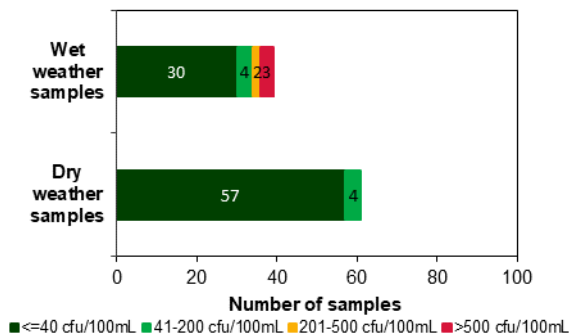
## Sanitary inspection: Moderate



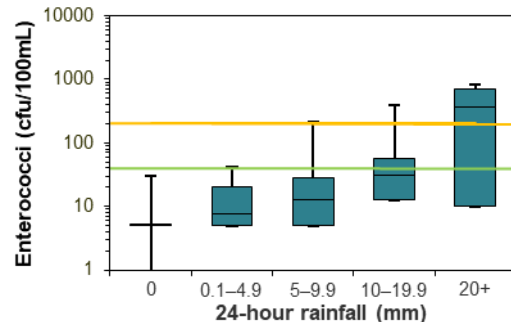
## Microbial Assessment Category: B



## Dry and wet weather water quality

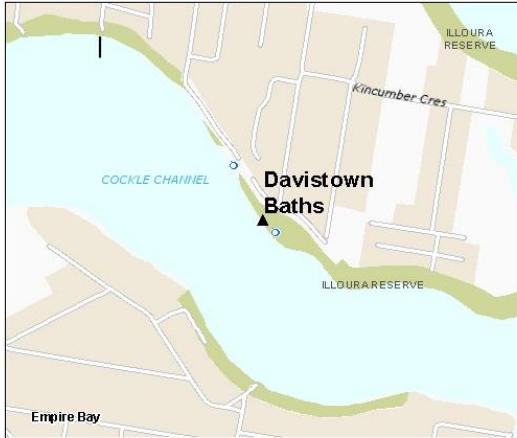


## Water quality in response to rainfall



# 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.

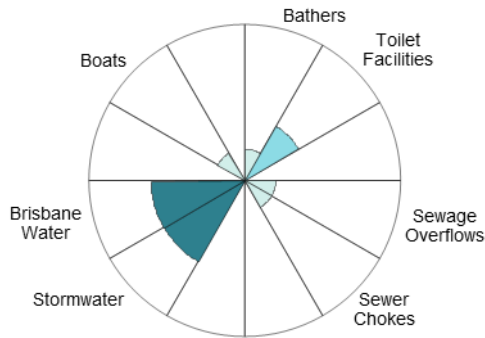
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater and from elsewhere within Brisbane Water.

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

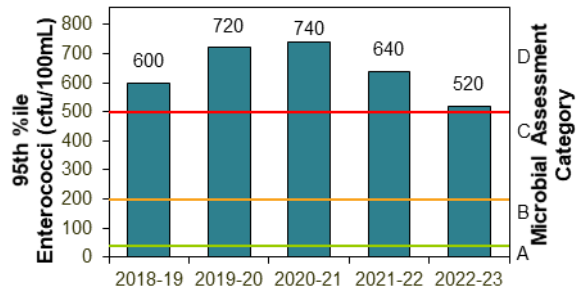
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Feb 2020 to Apr 2023	64%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

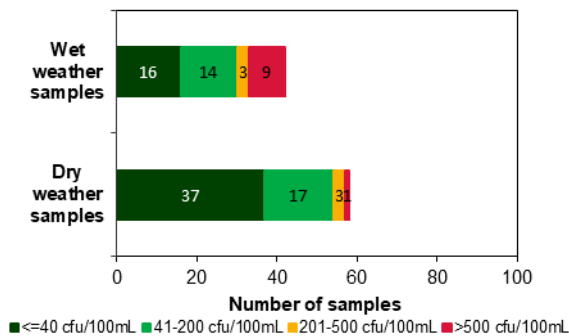
## Sanitary inspection: Moderate



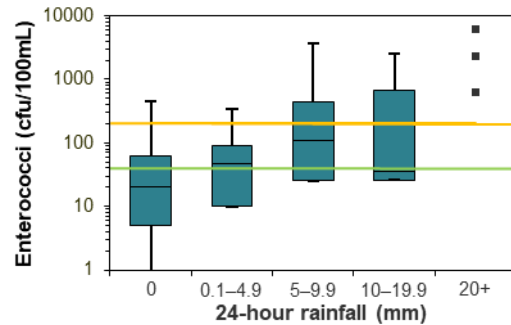
## Microbial Assessment Category: D



## Dry and wet weather water quality



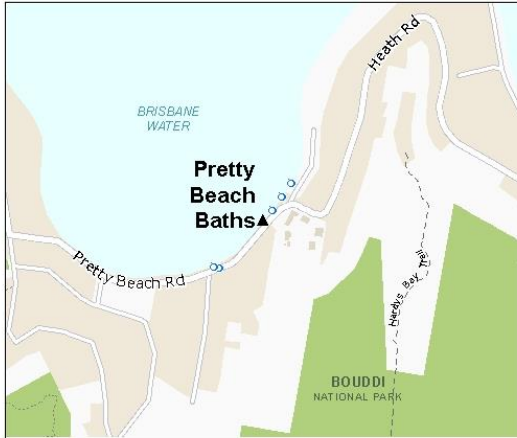
## Water quality in response to rainfall





# 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.

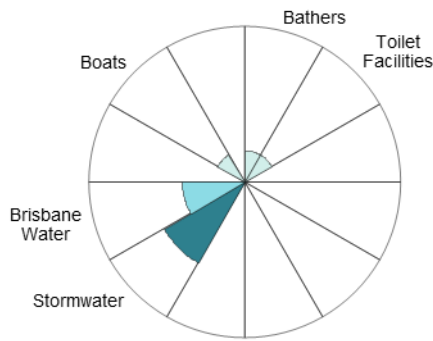
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater.

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.

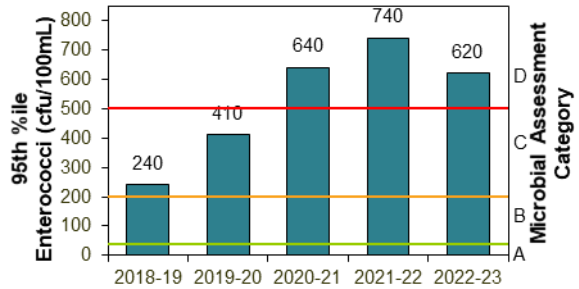
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Jan 2020 to Apr 2023	70%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

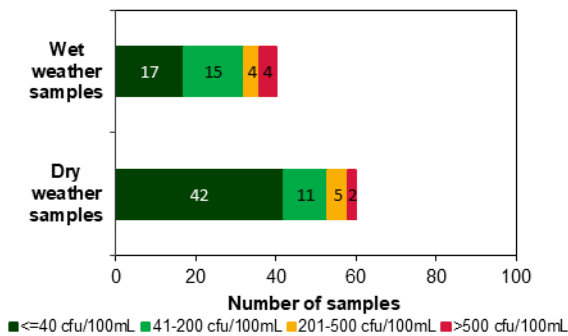
## Sanitary inspection: Moderate



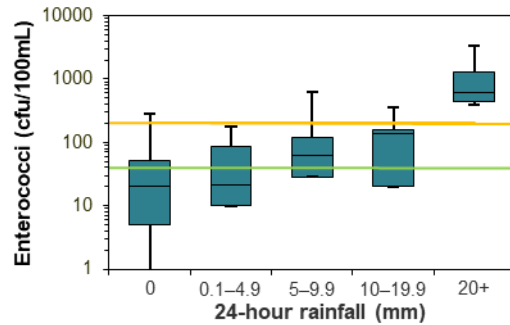
## Microbial Assessment Category: D



## Dry and wet weather water quality

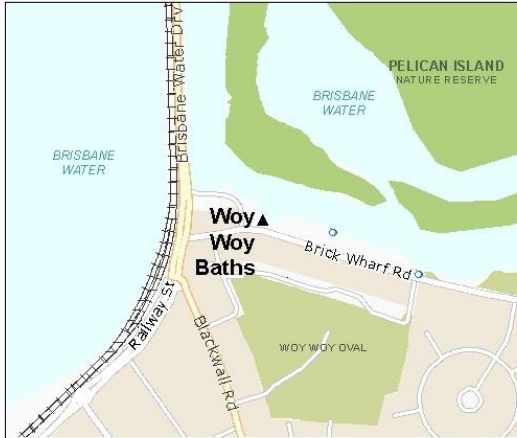


## Water quality in response to rainfall



# Woy Woy Baths

**Beach grade:** P



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

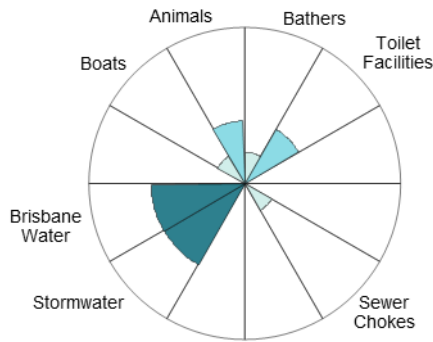
Enterococci levels increased with increasing rainfall, often exceeding the safe swimming limit after little or no rain, and regularly after 5 mm or more.

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

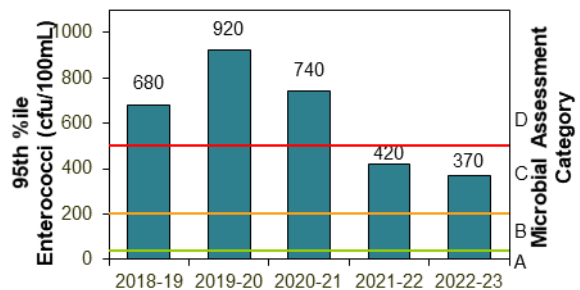
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Jan 2020 to Apr 2023	73%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

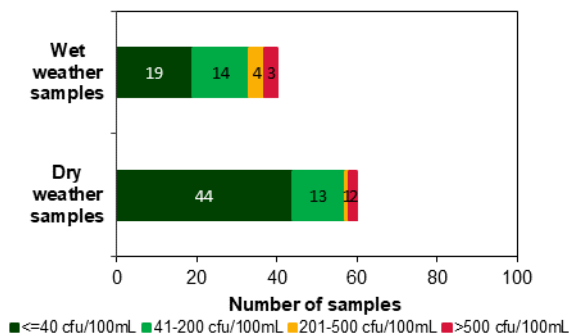
## Sanitary inspection: Moderate



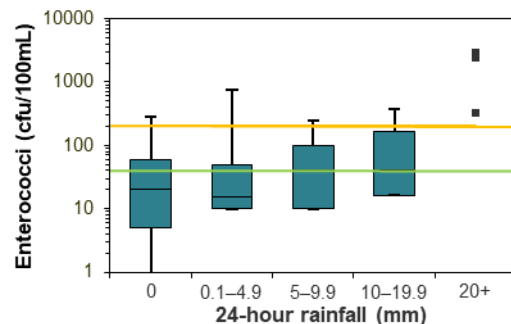
## Microbial Assessment Category: C



## Dry and wet weather water quality



## Water quality in response to rainfall



# Yattalunga Baths

**Beach grade:** P



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.

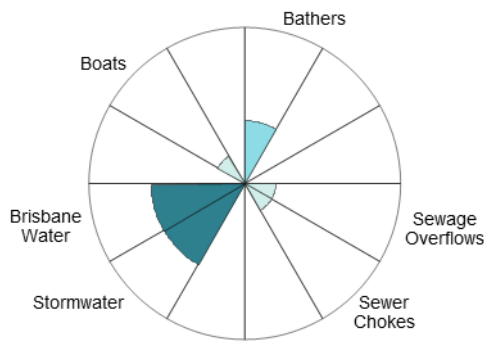
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after no rain, and often after rainfall.

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

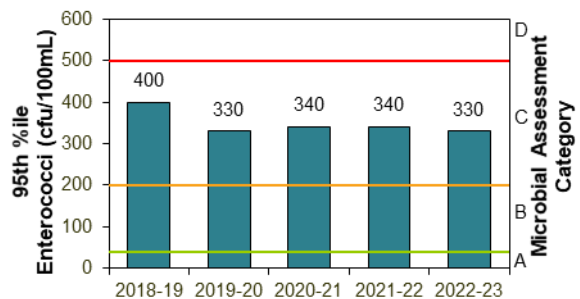
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Jan 2020 to Apr 2023	78%	100	Stable <span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span>

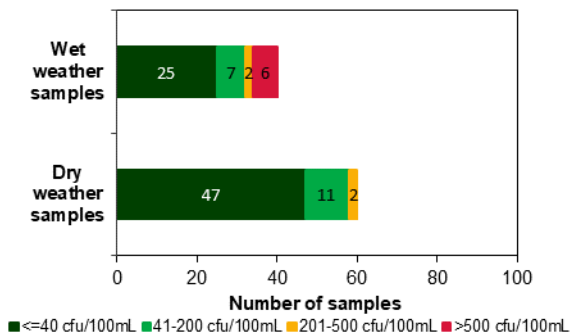
## Sanitary inspection: Moderate



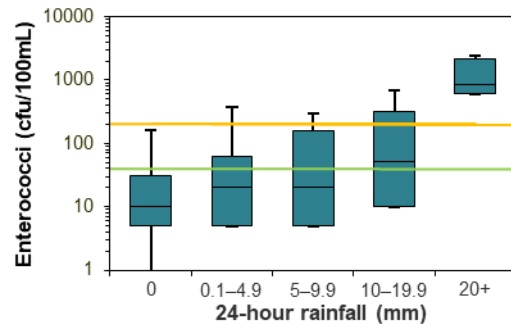
## Microbial Assessment Category: C



## 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:

### 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

### 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

### 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

### 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

### 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

Some of the 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 a beach catchment.

### 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/DPE

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.

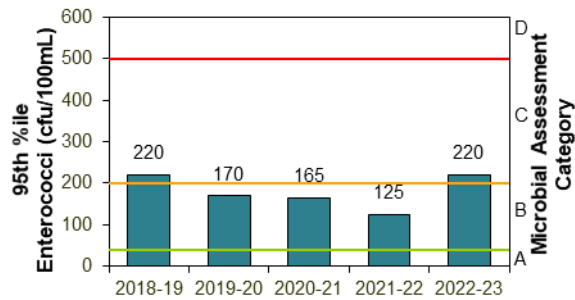
## Explanation of graphs, charts, and information bars on beach pages

### 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

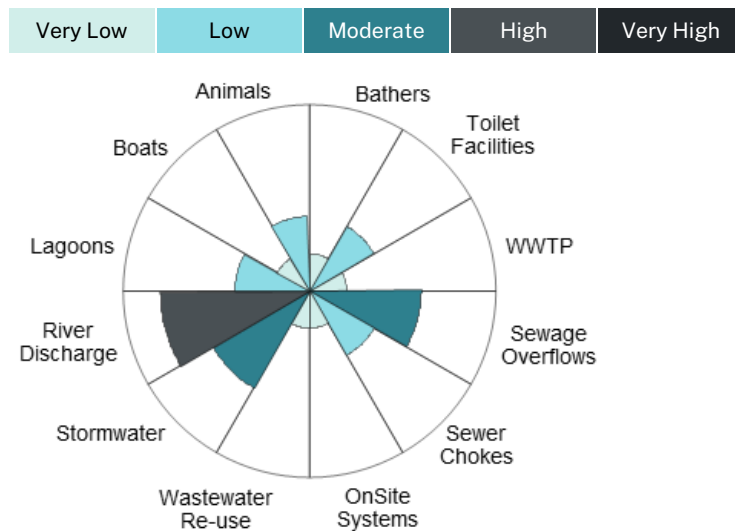


percentile value for each year and the thresholds dividing the A, B, C and D categories are marked in green, amber and red for reference.



### Sanitary Inspection Category (SIC) chart

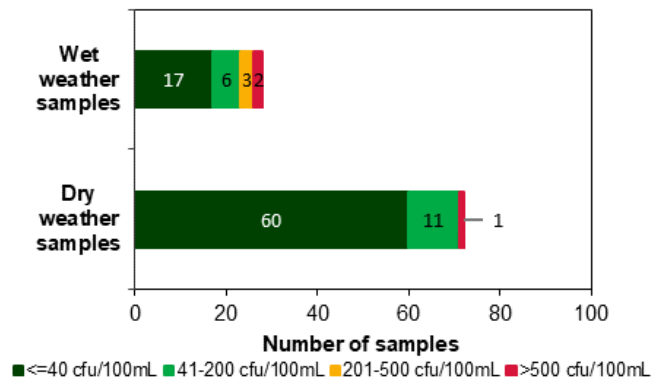
The results of the sanitary inspection for each swimming location are presented in a radar pie chart. The chart shows the likelihood that each identified pollution source will contribute to faecal contamination at a swimming site, as indicated by the size and colour of the segment, ranging from very 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

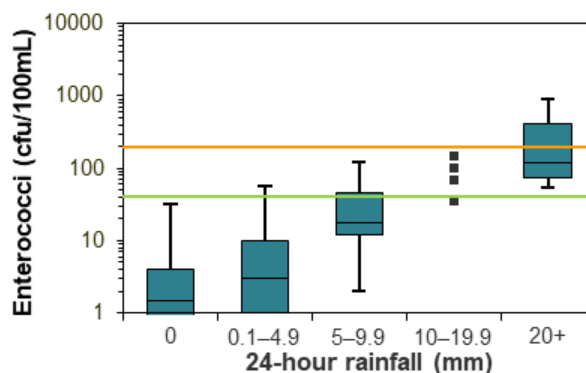
201 and 500 cfu/100 mL and greater than 500 cfu/100 mL. These categories reflect the Microbial Assessment Category thresholds and are coloured on the graph as dark green, light green, amber and red respectively.



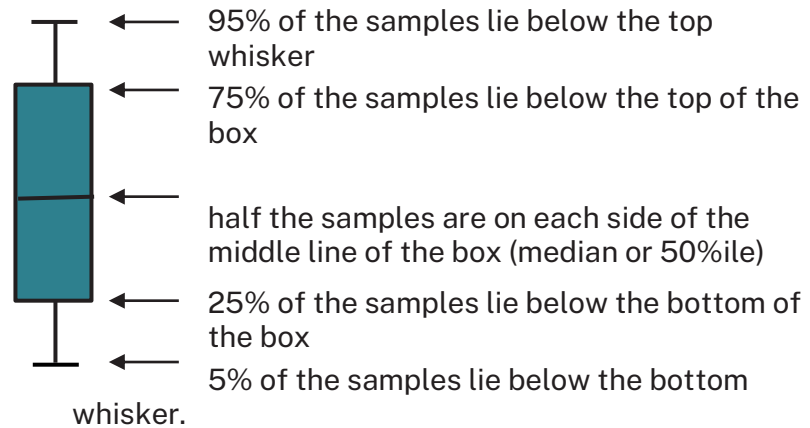
It is expected that swimming sites with lower levels of flushing will show some elevated bacterial results in dry weather samples (no rainfall in the previous 24 hours) due to the longer time needed to recover from a rainfall event. At some estuarine and lake/lagoon swimming locations the impacts of 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:



## 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.

### Key to maps

	Sampling Site
	Surf Life Saving Club
	Wastewater Treatment Plant
	Sewage Pumping Station
	Sewage Overflow
	Stormwater Drain
	Water
	Baths
	National Park/Reserve/ Other Park
	Built-up Area
	Sand
	Roads
	Major Roads
	Baths – Netted Area
	Breakwater/Wharf

## References

NHMRC (2008) *Guidelines for managing risks in recreational water*, National Health and Medical Research Council, Australian Government Publishing Service, Canberra, ACT.

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](http://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 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](#)