Beachwatch

State of the beaches 2021–22

Illawarra Region

Department of Planning and Environment

NSW GOVERNMENT

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Contents

Recreational water quality has been monitored in the Illawarra region since 1996 by Sydney Water, and by Wollongong City Council and Kiama Municipal Council under the Department of Planning and Environment's Beachwatch Partnership Program. This report summarises the performance of 21 swimming sites in the Illawarra region of NSW, providing a long-term assessment of how suitable a site is for swimming. Monitored sites include ocean beaches and a designated swimming site in Lake Illawarra.

In 2021–2022, 100% of swimming sites in the Illawarra region were graded as Good or Very Good. These sites were suitable for swimming for most or almost all of the time. This is an excellent result, similar in performance to previous years, and despite a very wet summer and autumn, with significant wet weather events and flooding impacts.

Illawarra region summary 2021–2022

Beach monitoring in NSW

Bellambi Beach
Photo: Beachwatch/DPE

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 NSW 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 Illawarra region by Sydney Water since 1996, and Wollongong City Council and Kiama Municipal Council since 2011.

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

Rainfall impacts

During 2021–2022, 21 swimming sites were monitored including ocean beaches and a designated swimming site in Lake Illawarra.

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 2021–2022 are based on water quality data collected over the last 2–4 years. Rainfall over this period has been diverse:

- 2018–2019: extended dry weather conditions except for isolated wet months

- 2019–2020: long dry periods, with some isolated wet weather events and a very wet February
- 2020–2021: variable rainfall with some wet months
- 2021–2022: a very wet summer and autumn, including significant wet weather and flooding events.

See the section on **How to read this report** on page 42 for an explanation of the graphs, tables and Beach Suitability Grades.

Rainfall on the Illawarra coast was well below average for winter 2021. A significant wet weather event occurred from 24–25 August 2021, with Bellambi and Kiama recording 2-day totals of 61 mm and 84 mm respectively.

During spring 2021 rainfall was above average for the season. Kiama recorded double the long-term monthly average rainfall for November with 163 mm of rain.

Total summer rainfall was well above average in the Illawarra region. Kiama recorded more than double the average summer rainfall, and Bellambi received close to double the average summer rainfall, with 712 mm and 599 mm for the season. February 2022 was significantly wet, with the days of very heavy rainfall occurring towards the end of the month.

Wet weather conditions continued in March, with Kiama recording more than 4 times the long-term monthly average rainfall for March with 829 mm of rain. The consecutive days of very heavy rainfall in late February and in March resulted in major flooding in the region. Beachwatch issued an extreme wet weather pollution alert on the Illawarra daily beach pollution forecast during March 2022, advising stormwater pollution and floodwaters may be impacting swimming sites for an extended period, with lifeguard reports of floating debris and discoloured water continuing after the rain had ceased.

Rainfall totals for April 2022 were above average, with more than double the long-term monthly average rainfall recorded at Bellambi and Kiama, with 269 mm and 218 mm. Beachwatch issued an extreme wet weather pollution alert in early April following a heavy rain event from 7–8 April until the flooding and stormwater impacts had subsided.

Algal blooms

Marine algal bloom present in the water

Photo: Chad Weston/NPWS, DPE

Water NSW reported the occurrence of marine algal blooms, *Noctiluca scintillans*, in December 2021 at Wollongong and Lake Illawarra. Marine algae advisories were issued on the Beachwatch and Water NSW website.

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 Illawarra 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 Illawarra region

Swimming site	Site type	Beach Suitability Grade	Change
Wollongong City Council			
Stanwell Park Beach	Ocean beach	VG	○
Coledale Beach	Ocean beach	G	○
Austinmer Beach	Ocean beach	VG	○
Thirroul Beach	Ocean beach	G	○
Bulli Beach	Ocean beach	G	○
Woonona Beach	Ocean beach	VG	○
Bellambi Beach	Ocean beach	G	○
Corrimal Beach	Ocean beach	G	○
North Wollongong Beach	Ocean beach	G	○
Wollongong City Beach	Ocean beach	VG	○
Coniston Beach	Ocean beach	VG	○
Fishermans Beach	Ocean beach	VG	○
Port Kembla Beach	Ocean beach	G	○
Shellharbour City Council			
Entrance Lagoon Beach	Lake/Lagoon	G	○
Warilla Beach	Ocean beach	G	↓
Shellharbour Beach	Ocean beach	VG	○
Kiama Municipal Council			
Boyds Jones Beach	Ocean beach	G	○
Bombo Beach	Ocean beach	G	↓
Surf Beach Kiama	Ocean beach	G	○
Werri Beach	Ocean beach	VG	↑
Seven Mile Beach (Gerroa)	Ocean beach	G	↓

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

Wollongong City Council

100%
ocean beaches graded Good or Very Good

Overall results

All 13 swimming sites were graded as Very Good or Good in 2021–2022. Excellent results have also been recorded in previous years.

Percentage of sites graded as Very Good or Good

	2019–2020	2020–2021	2021–2022	Trend
Ocean beaches (13 sites)	100%	100%	**100%**	

Eleven locations were monitored by Sydney Water. Samples were collected every sixth day throughout the year at 9 locations, and 2 locations were monitored every sixth day between October and April.

Two locations were monitored by Wollongong City Council. Samples were collected every sixth day (excluding weekends) between October and April and sampling and laboratory analysis was fully funded by the council.

See the section on **How to read this report** on page 42 for an explanation of the graphs, tables and Beach Suitability Grades.

Best beaches

Stanwell Park Beach, Austinmer Beach, Woonona Beach, Wollongong City Beach, Coniston Beach and Fishermans Beach.

These sites had excellent water quality and were suitable for swimming almost all of the time.

Ocean beaches were the only site type monitored in the Wollongong region.

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

Site types in Wollongong City Council

Ocean beaches

Beach Suitability Grades for Wollongong City Council ocean beaches

All 13 ocean beaches continued to be graded as Very Good or Good in 2020–2021.

Six beaches were graded as Very Good: Stanwell Park Beach, Austinmer Beach, Woonona Beach, Wollongong City Beach, Coniston Beach and Fishermans Beach. Water quality at these beaches has been of a very high standard for many years and is suitable for swimming almost all of the time.

Coledale Beach, Thirroul Beach, Bulli Beach, Bellambi Beach, Corrimal Beach, North Wollongong Beach and Port Kembla Beach were graded as Good. Water quality at these sites was frequently suitable for swimming during dry weather conditions. Bacterial levels generally increased with increasing rainfall, regularly exceeding the safe swimming limit after heavy rainfall. Many of these sites have several, or more significant, potential sources of pollution such as stormwater or upstream sources discharged from creeks or lagoons. Discharges from storm sewage treatment plants (SSTPs) at Bellambi and Port Kembla may also affect the water quality at nearby beaches Bellambi, Corrimal and Port Kembla following heavy rainfall.

It is recommended that swimming be avoided at these beaches during and for up to one day following rainfall, or if there are signs of pollution such as discoloured water, flowing drains or floating debris.

Management

Wollongong City Council

The Lake Illawarra Coastal Management Program (CMP) has been prepared in partnership by Wollongong City Council, Shellharbour City Council and the Department of Planning and Environment (DPE), with funding provided under the NSW Government's Coastal and Estuary Grants Program. The CMP has been adopted by both councils and was certified by the NSW Government in November 2020. This CMP has identified water quality management as a high priority and actions aimed at improving water quality are well underway. These projects include the development of a risk-based stormwater framework for Lake Illawarra, the development of a Bank Management Study to treat erosion hotspots, rehabilitation of natural areas around the lake, and ongoing water quality monitoring for estuary health. Many of these projects are taking place in partnership with Shellharbour City Council and the NSW Government.

A **coastal management program** (CMP) outlines a long-term strategy for managing the coast, in line with the *Coastal Management Act 2016*.

The NSW Government provides guidance and funding through the Coastal and Estuary Grants Program for local councils to prepare and implement CMPs.

Wollongong City Council has commenced preparation of a CMP for the open coastline and estuaries, and it is currently in the scoping phase. The purpose of the CMP is to set the long-term strategy for the coordinated management of our coast, guided by the *Coastal Management Act 2016*.

Council also coordinates the implementation of the Wollongong Coastal Zone Management Plan (CZMP) and has received funding under the NSW Government's Coastal and Estuary Grants Program to implement its recommendations. During 2021–2022 these implementation works included the commencement of the construction of a new seawall at North Wollongong Beach and continuation of dune stabilisation and bushland restoration works at Port Kembla, Perkins Beach and Bellambi estuary.

Wollongong City Council has previously installed several stormwater quality improvement devices and is continuing to maintain these. This includes devices in waterways that drain to the patrolled beaches in the Wollongong local government area. Council is planning to install a device at Port Kembla Beach and design a new device for installation at Belmore Basin, located between Wollongong City and North Wollongong patrolled beaches.

The No Butts Trail project, a community education project about cigarette butt litter, was implemented along the coastline from Stanwell Tops to Windang in early 2021, supported by the NSW Environment Protection Authority's Waste Less Recycle More initiative. More than 30 cigarette butt receptacles were installed and are being maintained by council. Another litter prevention project was undertaken by

council, the Surfrider Foundation and the Cleanwater Group who partnered in a project to install 12 ocean-friendly Drain Buddies at key locations around Wollongong Harbour.

Boyds Jones Beach
Photo: Beachwatch/DPE

As part of an ongoing program with Corrective Services NSW, council undertakes weekly litter collection along the foreshore, beaches and creeks, as well as collection after coastal storms. Material collected includes plastics, cans, paper, polystyrene and large litter items.

Riparian work is continuing along Hargraves Creek, Stanwell Creek, Whartons Creek, Slacky Creek, Collins Creek, Bellambi Creek, Bellambi Lagoon, Towradgi Creek and Fairy Creek, aimed at improving water quality and overall catchment health. Additional natural area restoration sites include Mullet Creek, Brooks Creek, Minnegang Creek, American Creek, Allans Creek, Cabbage Tree Creek and foreshore work around Lake Illawarra, as well as dune restoration works at Stanwell Park, Bellambi, Towradgi Beach, Fairy Meadow, City Beach, Port and Perkins Dunes. Works also include waste collections as part of council's volunteer programs.

Sydney Water

To reduce the incidence of wet weather sewage overflows in beach catchments from Austinmer to Port Kembla, Sydney Water increased the capacity of pipes and pumps and included storage tanks. Sydney Water has also inspected, cleaned and repaired those sewer mains in beach catchments from Austinmer to Port Kembla that have a high likelihood of discharging sewage to waterways if they become blocked. When significant tree root intrusion to the public sewer from the private sewer was identified, property owners were asked to remedy the problem.

Sampling sites and Beach Suitability Grades in Wollongong City Council

Stanwell Park Beach

Beach grade: VG

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

The beach is 700 m long and is backed by dunes and a reserve. Lifeguards patrol the beach from September to April.

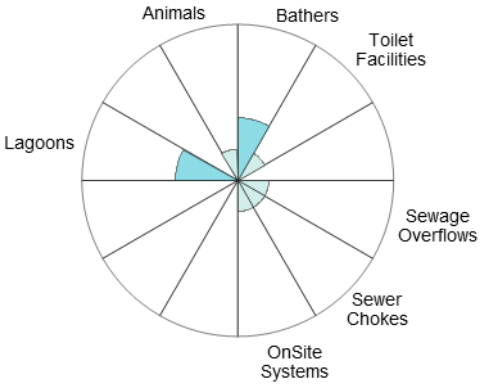
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few significant sources of faecal contamination.

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

The site has been monitored since 2011.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2017 to Apr 2022	98%	100	Stable

Sanitary inspection: Low



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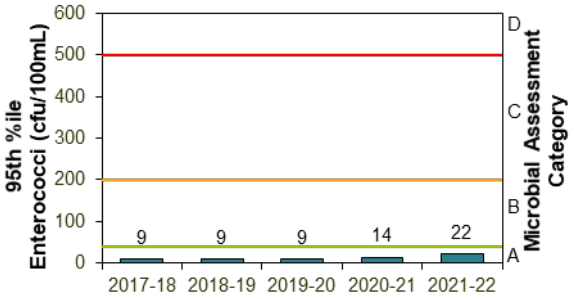
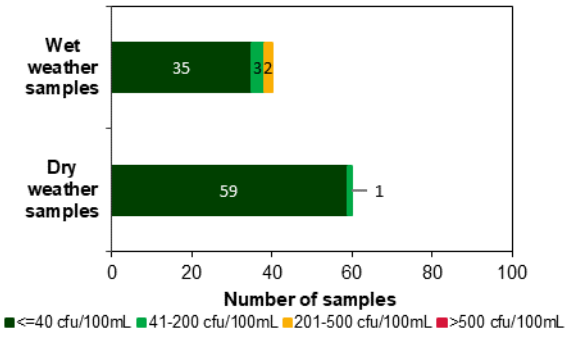
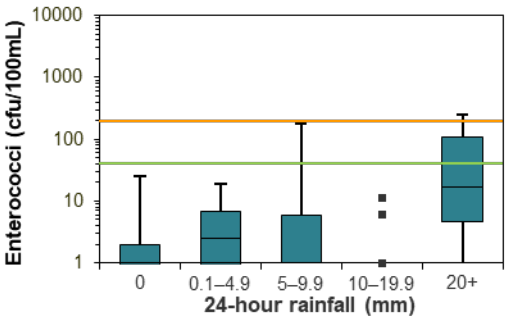


Dry and wet weather water quality



Water quality in response to rainfall



Coledale Beach

Beach grade: G

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

Coledale Beach is 300 m long and is backed by a small grass reserve and campsite. Lifeguards patrol the beach from September to April.

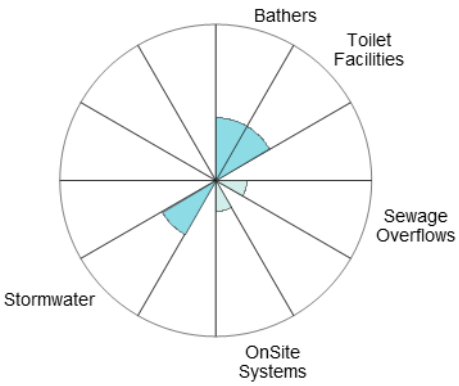
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with several potential sources of faecal contamination.

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

The site has been monitored since 2011.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2017 to Apr 2022	98%	100	Stable

Sanitary inspection: Low



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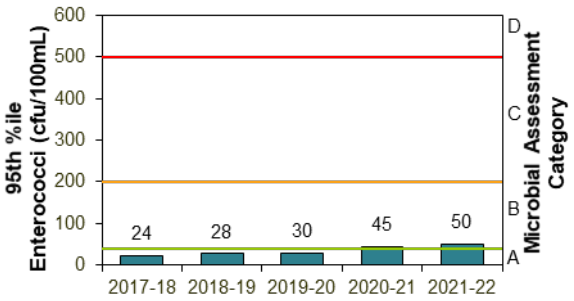
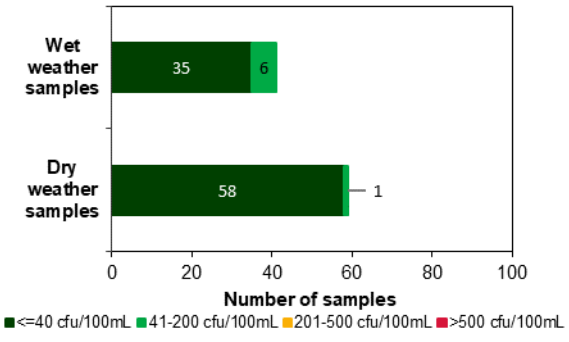
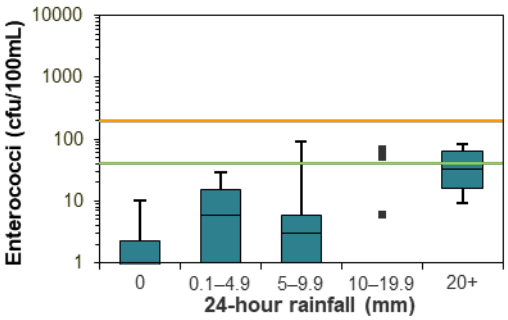


Dry and wet weather water quality



Water quality in response to rainfall



Austinmer Beach

Beach grade: VG

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

Austinmer is a small beach with ocean baths on the southern rock platform. Lifeguards patrol the beach from September to April.

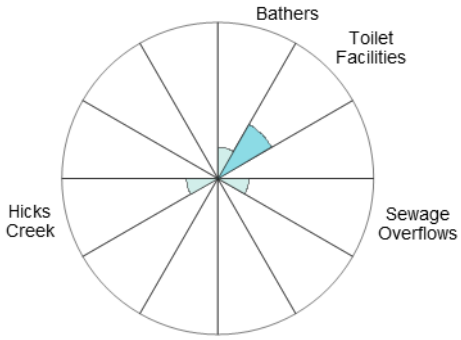
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few significant sources of faecal contamination.

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

The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2019 to Apr 2022	100%	100	Stable

Sanitary inspection: Low



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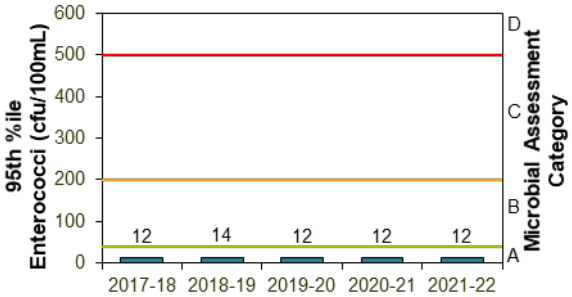
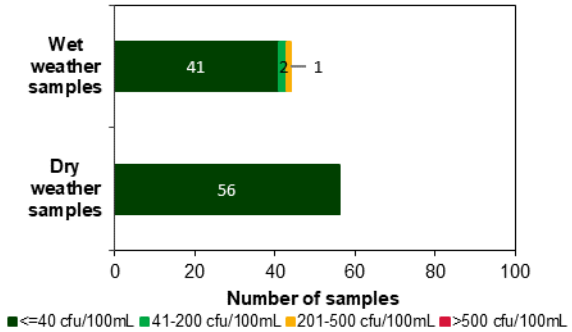
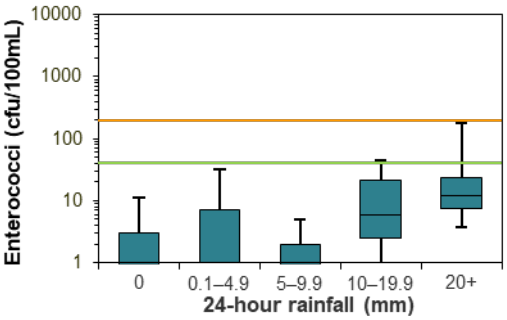


Dry and wet weather water quality



Water quality in response to rainfall



Thirroul Beach

Beach grade: G

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

Thirroul Beach is 1 km long and backed by a grassed reserve. Lifeguards patrol the beach from September to April.

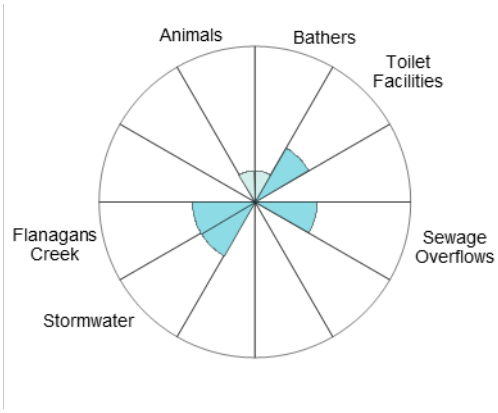
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, from several potential sources of faecal contamination including stormwater and Flanagans Creek.

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

The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2019 to Apr 2022	98%	100	Stable

Sanitary inspection: Moderate



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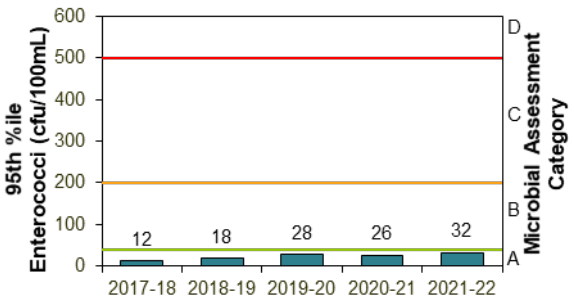
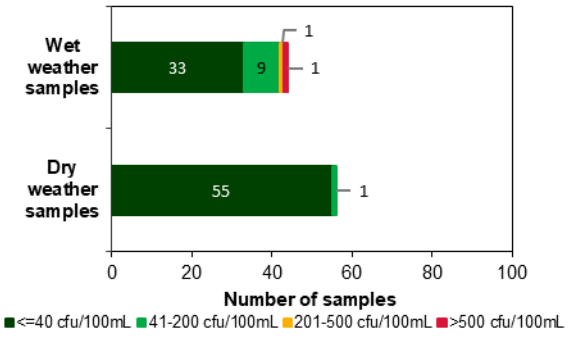
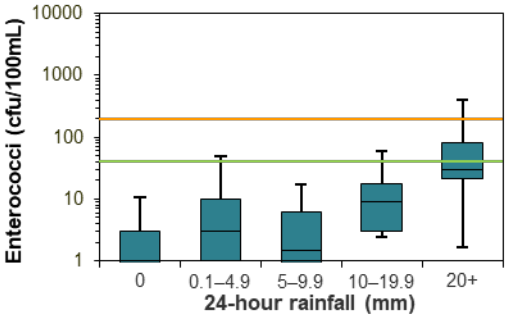


Dry and wet weather water quality



Water quality in response to rainfall



Bulli Beach

Beach grade: G

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

Bulli beach is at the northern end of a 900 m long beach. The beach is patrolled from September to April.

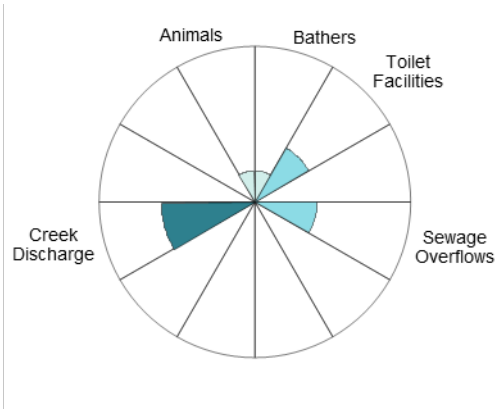
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination, including discharge from Whartons Creek.

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

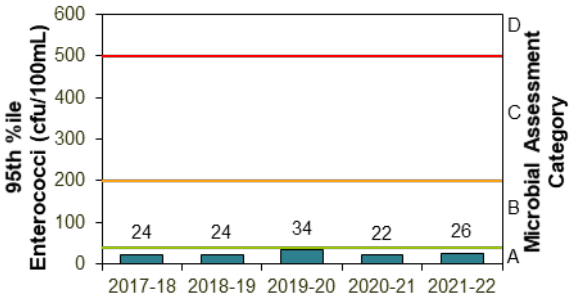
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	98%	100	Stable

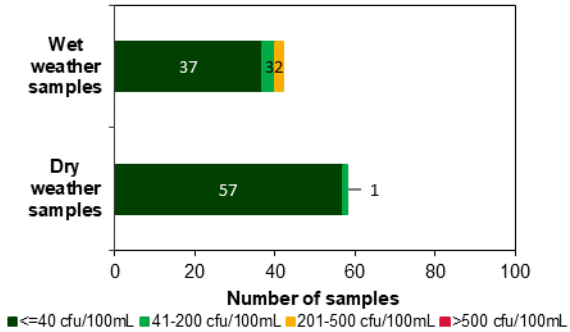
Sanitary inspection: Moderate



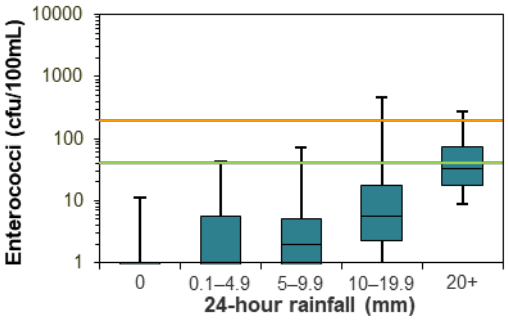
Microbial Assessment Category: A



Dry and wet weather water quality

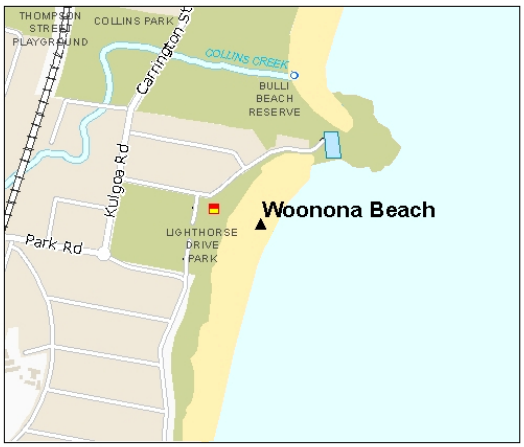


Water quality in response to rainfall



Woonona Beach

Beach grade: VG



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

Woonona Beach is at the northern end of a 2 km stretch of beach. Lifeguards patrol the beach from September to April.

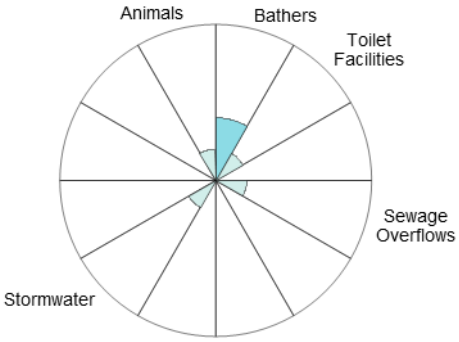
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

Enterococci levels generally increased with increasing rainfall, often exceeding the safe swimming limit in response to 20 mm or more of rain.

The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	100%	100	Stable

Sanitary inspection: Low



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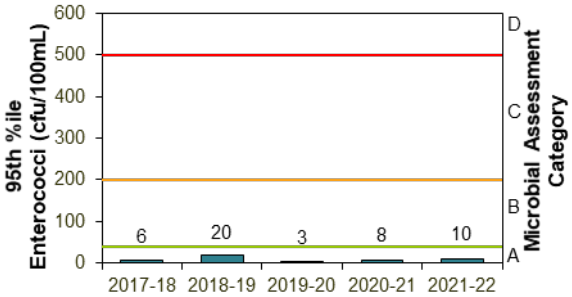
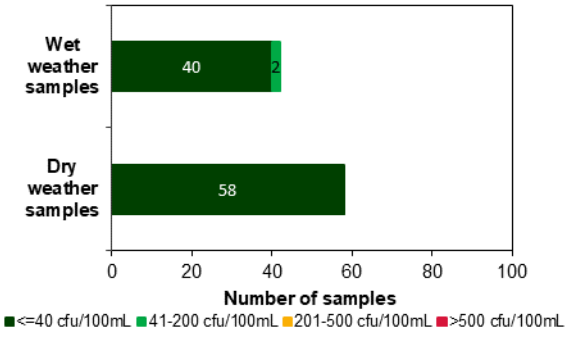
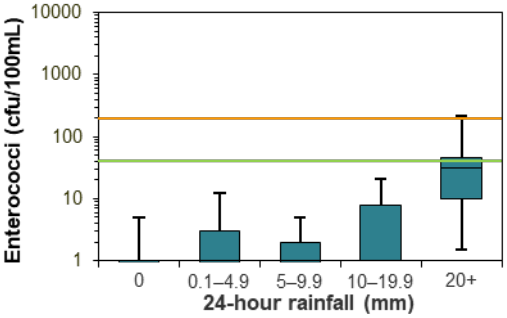


Dry and wet weather water quality



Water quality in response to rainfall



Bellambi Beach

Beach grade: G

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

Bellambi Beach is at the southern end of a 2 km stretch of beach. Lifeguards patrol the beach from September to April.

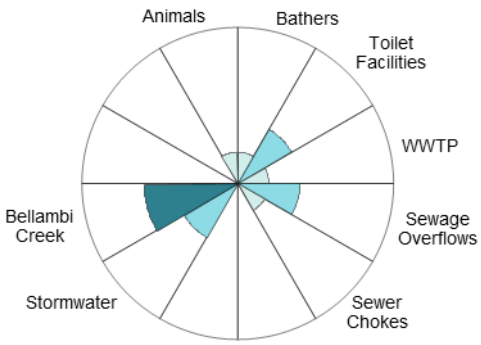
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination, including discharge from Bellambi Gully.

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

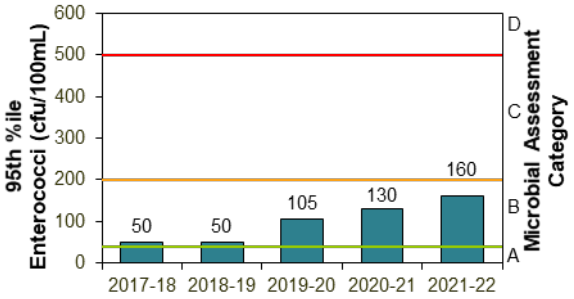
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	98%	100	Stable

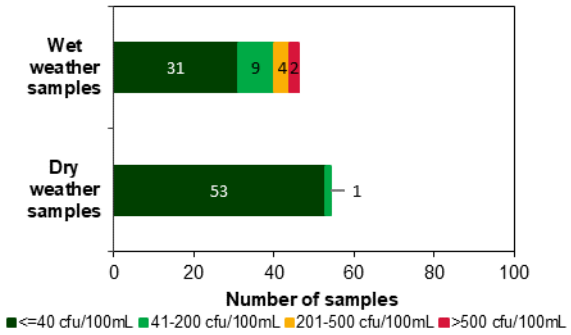
Sanitary inspection: Moderate



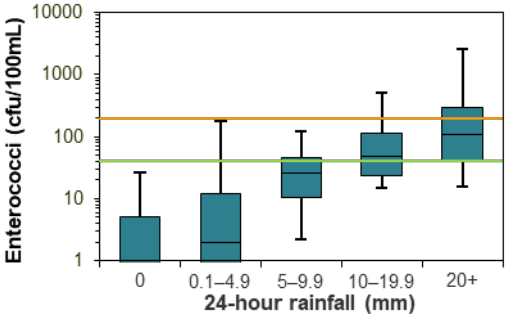
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Corrimal Beach

Beach grade: G

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

The beach is 1.4 km long and is backed by a reserve and caravan park. Lifeguards patrol the beach from September to April.

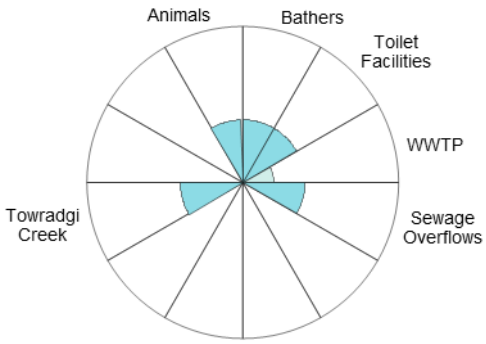
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination, including Towradgi Creek.

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

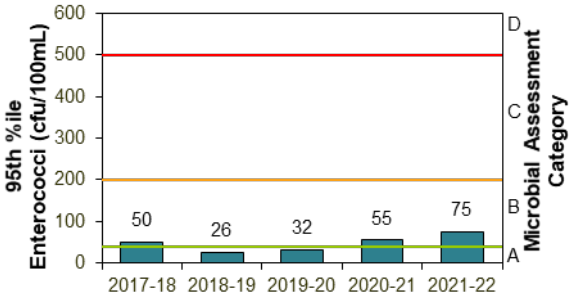
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	94%	100	Stable

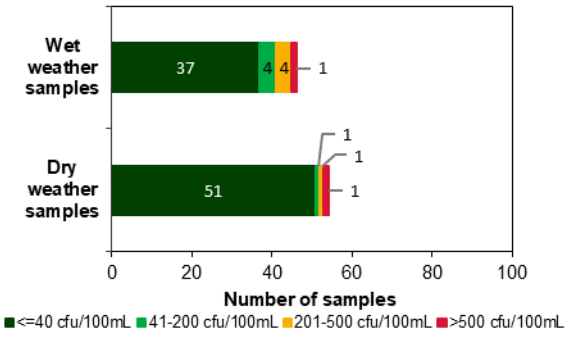
Sanitary inspection: Moderate



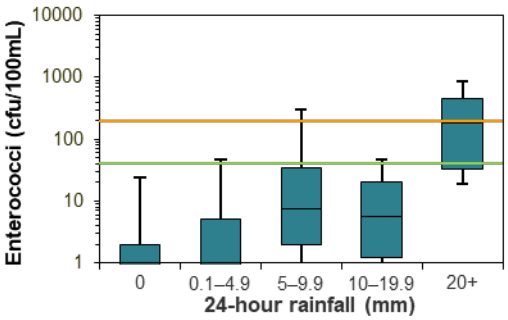
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



North Wollongong Beach

Beach grade: G

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

North Wollongong Beach is 500 m long and is backed by steep bluffs, a reserve and a picnic area. Lifeguards patrol the beach all year round.

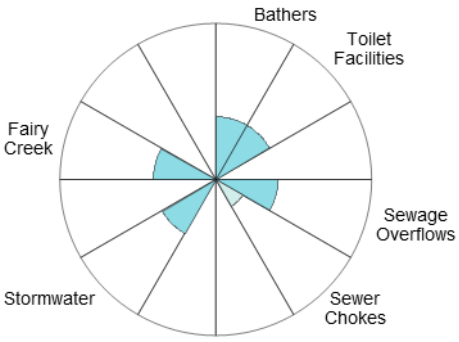
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after heavy rain, with several potential sources of faecal contamination.

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

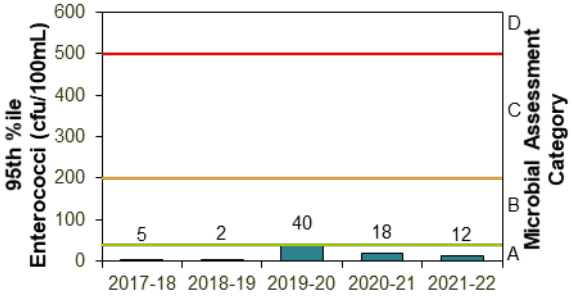
The site has been monitored since 1996, excluding 1997–1998.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	100%	100	Stable

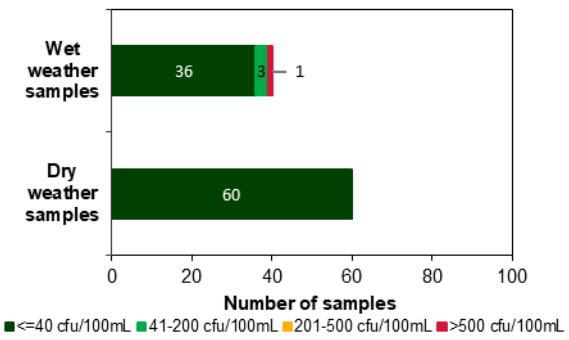
Sanitary inspection: Moderate



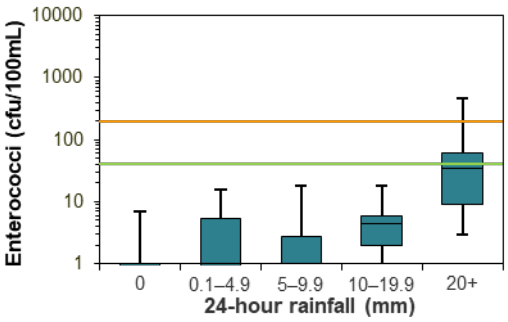
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Wollongong City Beach

Beach grade: VG

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

Wollongong City Beach is at the northern end of a 4 km stretch of beach. Lifeguards patrol the beach from September to April.

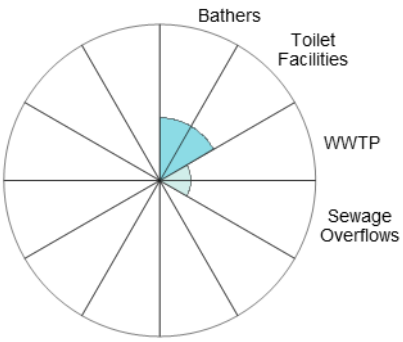
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

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

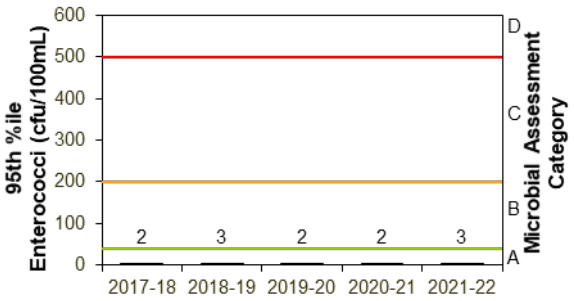
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	100%	100	Stable

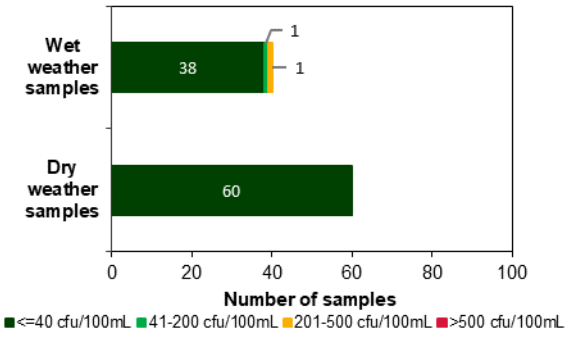
Sanitary inspection: Low



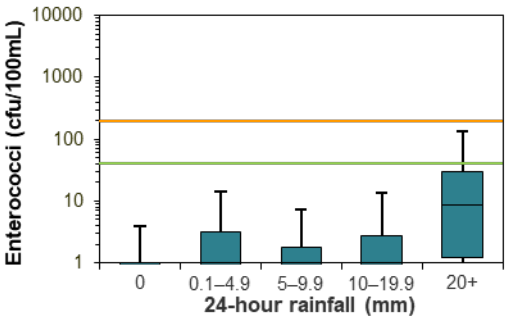
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Coniston Beach

Beach grade: VG

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

Coniston Beach is in the middle of a 4 km stretch of sand, to the north of Port Kembla, and backed by a golf course.

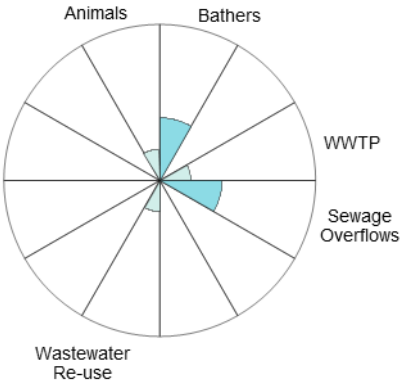
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of significant faecal contamination.

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

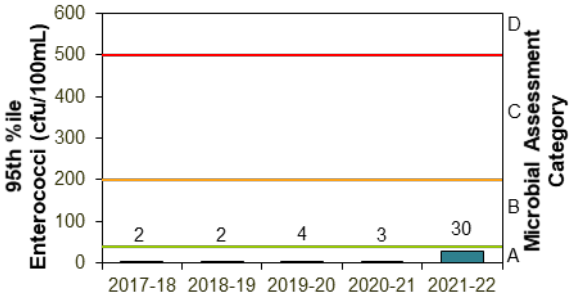
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	95%	100	Stable

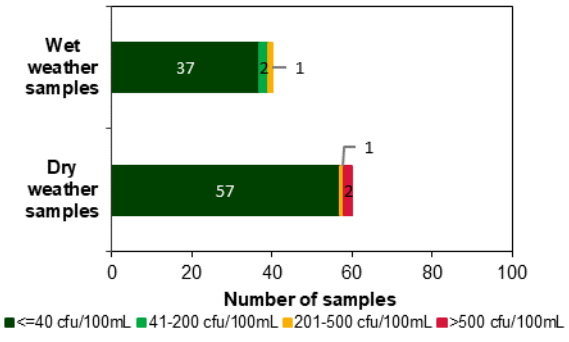
Sanitary inspection: Low



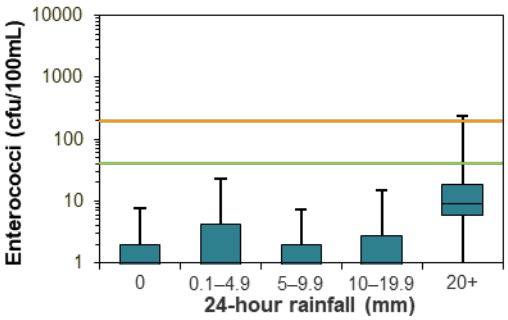
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Fishermans Beach

Beach grade: VG

Fishermans Beach is a small, north-east facing beach backed by high cliffs.

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

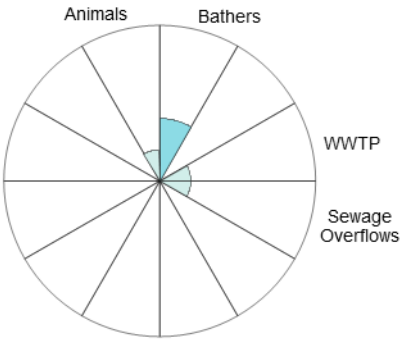
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to 20 mm or more of rain.

The site has been monitored since 1996.

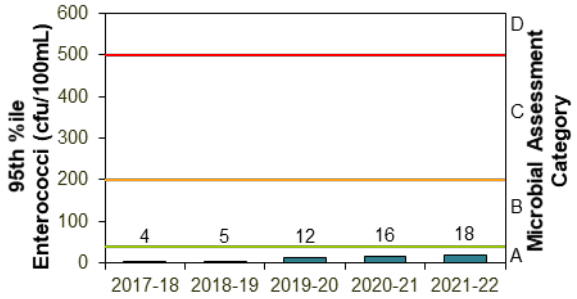
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	98%	100	Stable

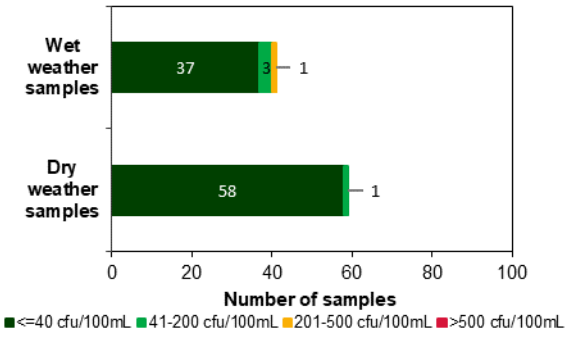
Sanitary inspection: Low



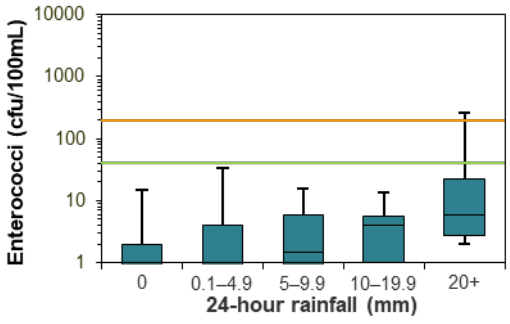
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Port Kembla Beach

Beach grade: G

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

Port Kembla Beach is in the northern corner of a long stretch of beach. Lifeguards patrol the beach from September to April.

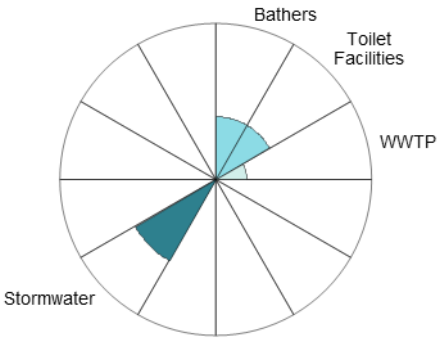
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

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

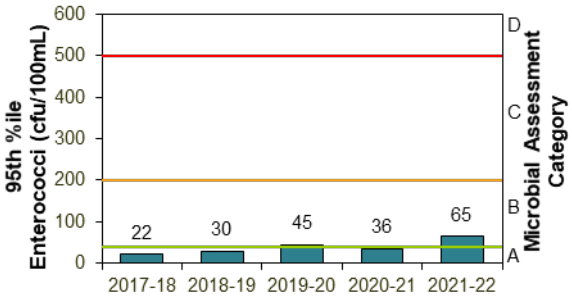
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	100%	100	Stable

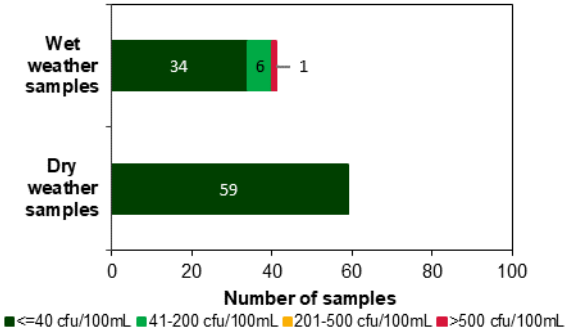
Sanitary inspection: Moderate



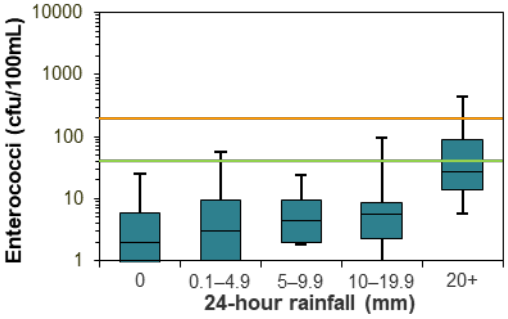
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Shellharbour City Council

Overall results

100%
ocean beaches graded Good or Very Good

All 3 swimming sites were graded as Very Good or Good in 2021–2022. This is an excellent result and consistent with previous years.

Percentage of sites graded as Very Good or Good

	2019–2020	2020–2021	2021–2022	Trend
Ocean beaches (2 sites)	100%	100%	**100%**	
Lake/ lagoon sites (1 sites)	100%	100%	**100%**	

Three swimming sites were monitored in the Shellharbour local government area.

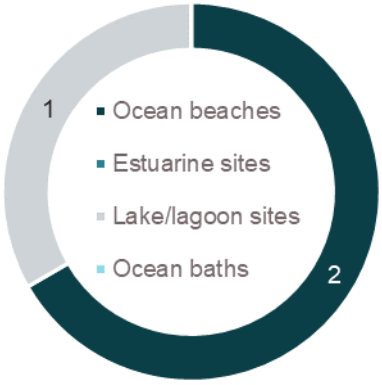
All 3 locations were monitored by Sydney Water. Samples were collected every sixth day throughout the year.

See the section on **How to read this report** on page 42 for an explanation of the graphs, tables and Beach Suitability Grades.

Best beaches

Shellharbour Beach.

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



Site types in Shellharbour City Council

Swimming sites monitored in the Shellharbour region include ocean beaches and a lake/lagoon swimming site in Lake Illawarra, with each site type having a different response to rainfall-related impacts.

In general, lake/lagoon swimming sites do not perform as well as ocean beaches, 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 lake/lagoon areas, or if there are signs of stormwater pollution such as discoloured water or floating debris.

Ocean beaches

Beach Suitability Grades for Shellharbour City Council ocean beaches

Shellharbour Beach continued to be graded as Very Good in 2021–2022, consistent with previous years. This site had excellent water quality and was suitable for swimming almost all of the time.

Warilla Beach was downgraded to Good from Very Good in 2021–2022. While microbial water quality was suitable for swimming 100% of the time during dry weather conditions, elevated enterococci levels were regularly recorded following heavy rain.

It is recommended that swimming be avoided at ocean beaches during and for up to one day following rainfall, or if there are signs of pollution such as discoloured water, flowing drains or floating debris.

Lake/lagoon swimming sites

Beach Suitability Grades for Shellharbour City Council lake/lagoon swimming sites

Entrance Lagoon Beach continued to be graded as Good in 2021–2022, as in previous years. Water quality at this site was mostly suitable for swimming during dry weather conditions, with 83% of dry weather samples within the safe swimming limit when there had been no rain in the previous 24 hours. Enterococci levels increased with increasing rainfall and were often recorded after light rain. The swimming site is located within the entrance of Lake Illawarra and has lower levels of flushing. Due to this, the site can retain pollution inputs and take longer to recover from the impacts of stormwater. Water quality at this site may be impacted by contaminants discharged from Lake Illawarra, and stormwater during and following rainfall.

Swimming should be avoided during and for up to 3 days following rainfall, or if there are signs of pollution such as discoloured water, flowing drains or floating debris.

Management

A **coastal management program** (CMP) outlines a long-term strategy for managing the coast, in line with the *Coastal Management Act 2016*.

The NSW Government provides guidance and funding through the Coastal and Estuary Grants Program for local councils to prepare and implement CMPs.

Shellharbour City Council

The Lake Illawarra CMP, developed in partnership with Wollongong City Council, Shellharbour City Council and DPE, was adopted by both councils and certified by the NSW Government in November 2020. The CMP outlines the strategic aims for managing Lake Illawarra and includes actions for managing specific threats to estuary health.

In recognition of land-use pressures and threats, and in response to the values held by the community, water quality is a key consideration within the CMP and actions aimed at improving water quality are underway. These projects include the development of a risk-based framework for Lake Illawarra, the development of a Bank Management Study to treat erosion hotspots, rehabilitation of natural areas around the lake, ongoing water quality monitoring for estuary health and most recently a project addressing litter management surrounding the lake. These projects are taking place in partnership with Wollongong City Council, the NSW Government and NSW Environment Protection Authority.

Shellharbour City Council has commenced preparation of a CMP to cover the Shellharbour Coastline and Elliott Lake, and is in Stage 1: Scoping Study draft. The purpose of the CMP is to set the long-term strategy for the coordinated management of our coast, guided by the *Coastal Management Act 2016*.

Council has 3 active grant projects addressing actions out of the existing CZMP. During 2021–2022 these works included the commencement of the Warilla Beach seawall renewal, littoral rainforest restoration at Bass Point, dune restoration at Warilla and sand scraping at key beaches to improve their amenity and reduce erosion.

Additionally, Shellharbour Council and Wollongong Council in conjunction with DPE are near completion on the development of a risk-based framework for the Lake Illawarra catchment. This framework will identify a range of stormwater treatment processes to achieve the new stormwater management targets and reflect contemporary best practices for integrated water cycle management and develop guidelines on how they can be applied to urban developments in Lake Illawarra.

Entrance Lagoon Beach
Photo: Beachwatch/DPE

Over the last couple of years, Shellharbour City Council collaborated with the University of Wollongong, Wollongong City Council, Shoalhaven City Council, Kiama Municipal Council and Lendlease on the Smart Water Management Project. During 2020 water quality sensors were installed to monitor stormwater and gross pollutant traps within the waterways remotely. These devices have provided a live data stream of the quality of waterways without the need for staff to be in the field. The project has demonstrated how smart technology can be used to enhance the natural environment, community liveability and build resilient communities and urban infrastructure. This year in 2022 the collaborating councils and the University of Wollongong will discuss the development and enhancement of the project in the next stage.

Stormwater monitoring continued under council's existing stormwater management program and city-wide stormwater improvement program. Monitoring assists with assessing the environmental health of the city's major waterways, evaluating the effectiveness of stormwater treatment measures, and identifying any water quality concerns. The improvement program incorporates the delivery of engineered stormwater quality solutions, environmental rehabilitation projects, water monitoring of major waterways and community education.

The Illawarra Shoalhaven Joint Organisation (ISJO), Enabling Water Sensitive Communities project was continued during 2021, funded by DPE and Local Government NSW's Increasing Resilience to Climate Change program. The project objectives were to establish a regional Framework for Water Sensitive Cities which was completed and endorsed by the ISJO board mid-2021. The framework will support the 4 member councils in improving water management in local development planning and delivering resilient water infrastructure to meet future demands.

Council is about to commence a coastsnap citizen science beach monitoring program for beaches within the Shellharbour local government area. These projects address enhancing dune resilience to coastal hazards, restored access to council foreshores for community usage, and monitoring our changing coastline due to coastal influences.

Sydney Water

Sydney Water has inspected, cleaned and repaired sewer mains that have a high likelihood of discharging sewage to Shellharbour Beach if they become blocked. When significant tree root intrusion to the public sewer from the

private sewer was identified, property owners were asked to remedy the problem.

Sampling sites and Beach Suitability Grades in Shellharbour City Council

Entrance Lagoon Beach

Beach grade: G

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

Entrance Lagoon Beach is on the southern shore of the entrance to Lake Illawarra and is partly enclosed by a rock breakwater.

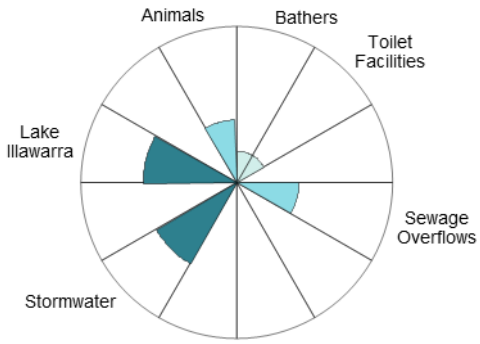
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater and upstream sources in Lake Illawarra.

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

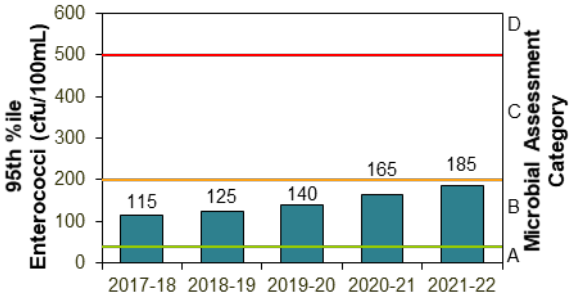
The site has been monitored since 2007.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Aug 2020 to Apr 2022	83%	100	Stable

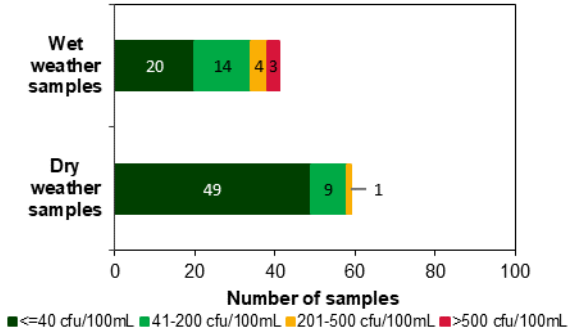
Sanitary inspection: Moderate



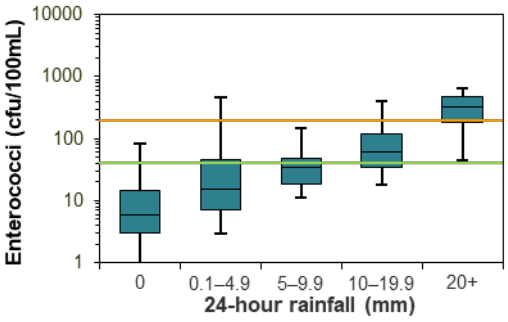
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Warilla Beach

Beach grade: G

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

Warilla beach is almost 2 km long, protected by prominent headlands. Lifeguards patrol the beach from September to April.

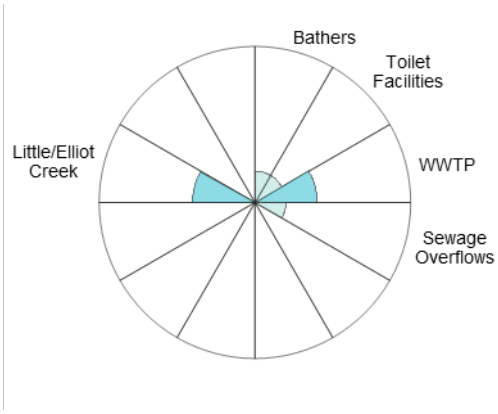
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination.

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

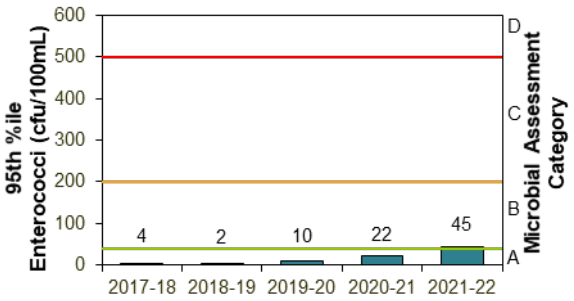
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	100%	100	Declined

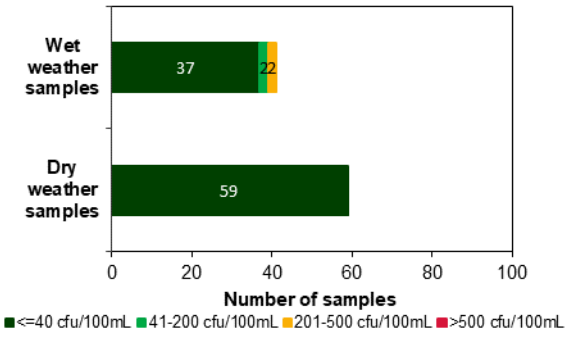
Sanitary inspection: Low



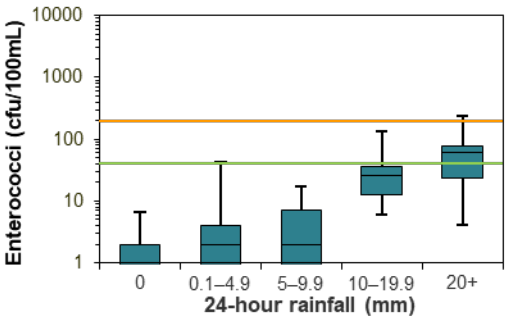
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Shellharbour Beach

Beach grade: VG

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

Shellharbour Beach is at the southern end of a small, east facing beach. Lifeguards patrol the beach from October to April.

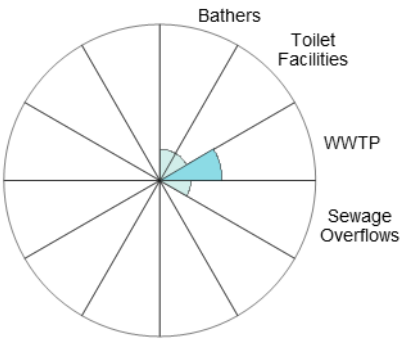
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few significant sources of faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response rainfall.

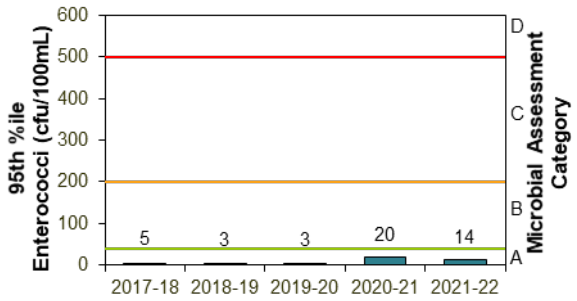
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	100%	100	Stable

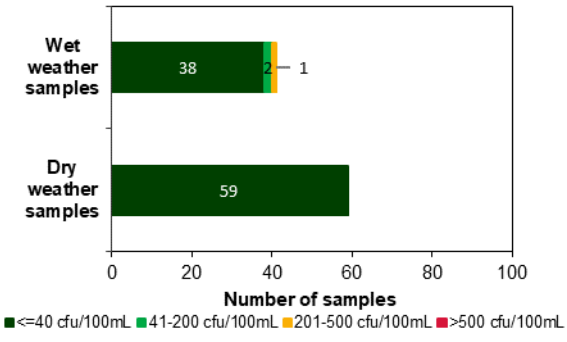
Sanitary inspection: Low



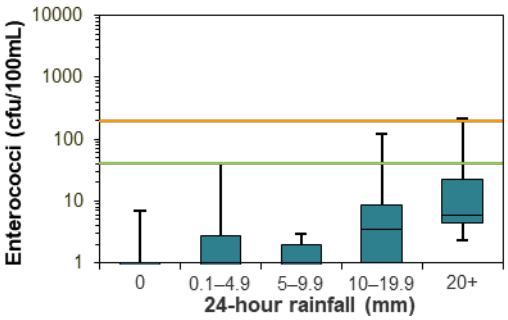
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Kiama Municipal Council

100%
ocean beaches graded Good or Very Good

Overall results

All 5 swimming sites were graded as Very Good or Good in 2021–2022. This is an excellent result and consistent with previous years.

Percentage of sites graded as Very Good or Good

	2019–2020	2020–2021	2021–2022	Trend
Ocean beaches (5 sites)	100%	100%	**100%**	

Five swimming sites were monitored in the Kiama local government area.

Four locations were monitored by Sydney Water with samples collected every sixth day. Three of these locations were monitored throughout the year. One location was monitored between October and April.

One location was monitored by Kiama Municipal Council. Samples were collected weekly between October and April and sampling and laboratory analysis was fully funded by the council.

See the section on **How to read this report** on page 42 for an explanation of the graphs, tables and Beach Suitability Grades.

Best beaches

Werri Beach.

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

Ocean beaches were the only site type monitored in the Kiama region.

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

Site types in Kiama Municipal Council

Ocean beaches

Beach Suitability Grades for Kiama Municipal Council ocean beaches

All 5 ocean beaches were graded as Very Good or Good in 2021–2022.

Werri Beach was upgraded to Very Good from Good in the previous year. This site had excellent water quality and was suitable for swimming almost all of the time.

Boyds Jones Beach, Bombo Beach, Surf Beach Kiama and Seven Mile Beach were graded as Good in 2021–2022. Bombo Beach and Seven Mile Beach (Gerroa) downgraded from Very Good to Good due to a decline in microbial water quality. While these beaches were mostly suitable for swimming during dry weather conditions, elevated enterococci levels were occasionally recorded following light rain, and more often after moderate to heavy rainfall.

It is recommended to avoid swimming during and for at least one day following rainfall or if there are signs of stormwater pollution such as discoloured water and floating debris.

Management

Kiama Municipal Council

Kiama Municipal Council is continuing the development of a CMP for the open coast of the local government area, with funding and technical assistance from the NSW Government's Coastal and Estuary Grants Program. Development of the CMP includes coordination and consultation with state agencies to identify coastal hazards and risks and their potential for impact on assets, infrastructure and environmental values of the Kiama coast, including potential impacts associated with sea level rise. The CMP is currently looking at the development of management actions to deal with these risks.

A **coastal management program** (CMP) outlines a long-term strategy for managing the coast, in line with the *Coastal Management Act 2016*.

The NSW Government provides guidance and funding through the Coastal and Estuary Grants Program for local councils to prepare and implement CMPs.

Council also coordinates the implementation of CZMPs for the Minnamurra and Crooked River estuaries. Part of this is working with other agencies and stakeholders to improve riparian management and quality of runoff from land, which impacts the creeks, rivers and open coast waters, as well as helping to manage bank erosion. During 2020–2021, council received funding under the NSW Government's Coastal and Estuary Grants Program to complete a 3-year weed control program and rehabilitation of endangered ecological communities on Baileys Island, Gerroa. Works are continuing under this program, with the second year program of works completed in June 2022.

Council has also obtained grant funding under the NSW Government's Coastal and Estuary Grants Program for a bank stabilisation project at Blue Angle Creek and to assess which erosion control improvement works are required along the Minnamurra estuary foreshore including existing rock walls. The Blue Angle Creek bank stabilisation project has been rescheduled for later in 2022, due to delays associated with La Niña weather events over the summer and into autumn of 2021–2022. The Minnamurra estuary foreshore and rock wall assessment is complete.

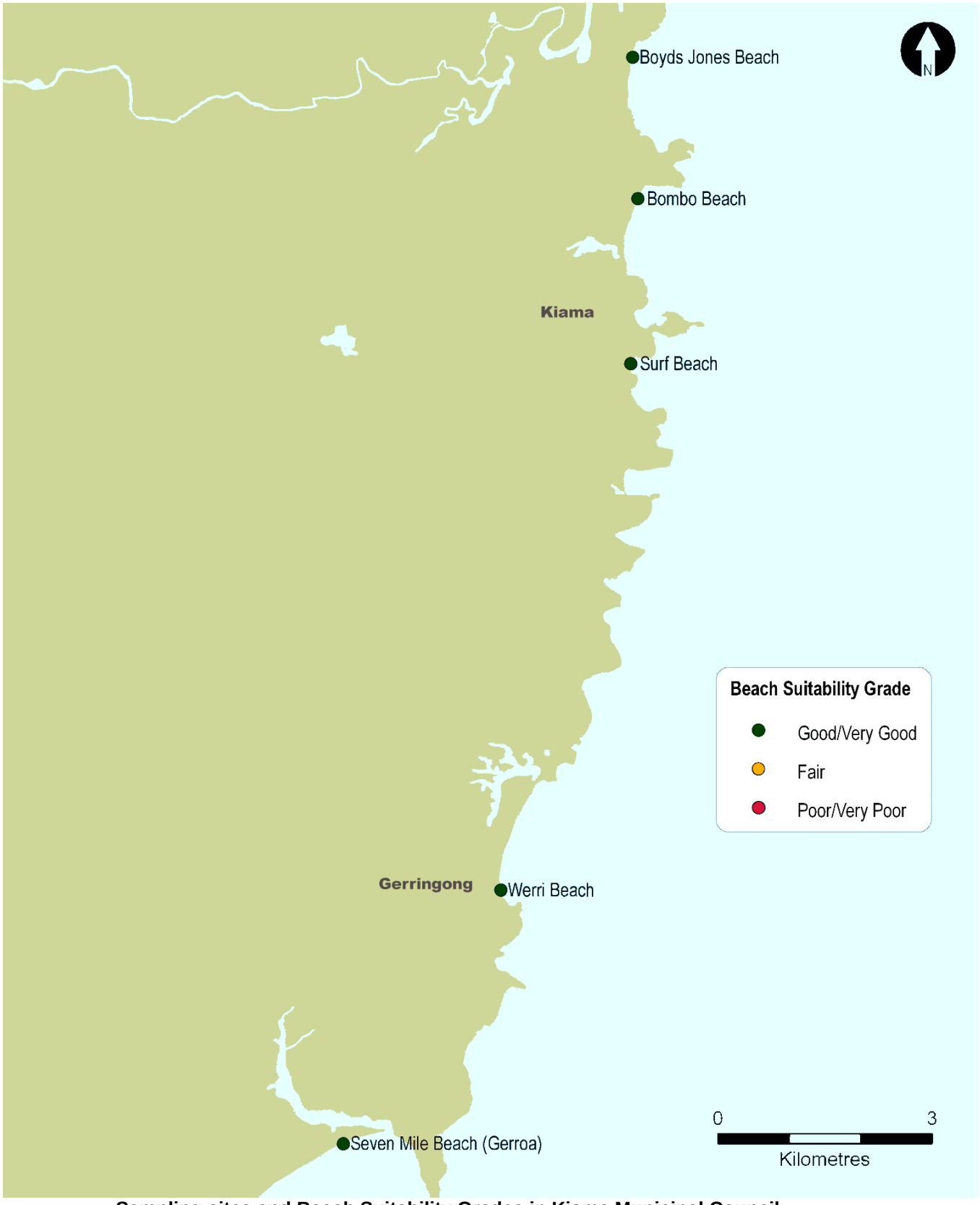
Council maintains stormwater filtration units in the Black Beach and Surf Beach catchment and around the townships of Minnamurra, Gerringong, Gerroa and Jamberoo, which prevent gross pollutants, sediments, oil and grease entering the waterways and beaches.

Council undertakes a scheduled program of inspections for all the onsite sewage management facilities in the local government area. Systems are risk rated and inspected annually for high risk systems and every 4 years for low risk systems. Most onsite sewage management facilities are on rural land in the upper catchments.

Werri Beach
Photo: Beachwatch/DPE

Council responds to and investigates stormwater pollution complaints and takes action under the *Protection of the* Environment Operations Act 1997, Local Government Act 1993 or other means, depending on the issue. Many reported issues relate to erosion and sediment controls for development sites, pollutants in stormwater drains and concerns raised by the public relating to activities that could pollute the stormwater system and associated coastal waters.

Council is continuing to undertake monitoring of surface and groundwater at its rehabilitated landfill sites at Minnamurra and Gerroa, as required by the site Environment Protection Licences. The ongoing monitoring aims to identify trends in groundwater and surface water ammonia concentrations over time and take appropriate management actions to minimise and avoid harm to the environment.



Sampling sites and Beach Suitability Grades in Kiama Municipal Council

Boyds Jones Beach

Beach grade: G

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

Boyds Jones Beach is 1 km long, east facing and backed by dunes. Lifeguards patrol the beach from October to April.

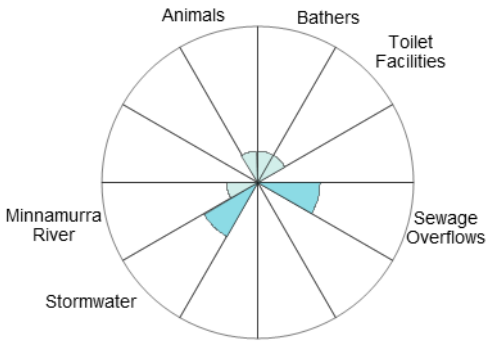
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination.

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

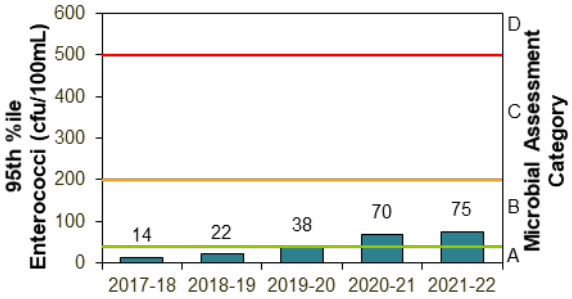
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	93%	100	Stable

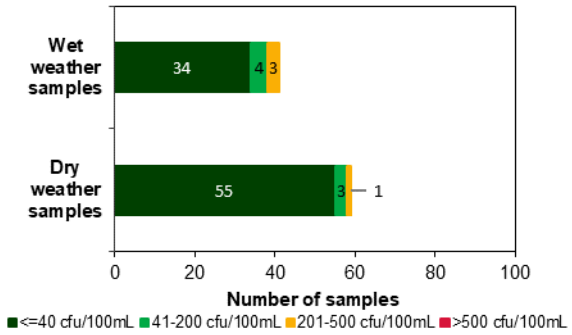
Sanitary inspection: Low



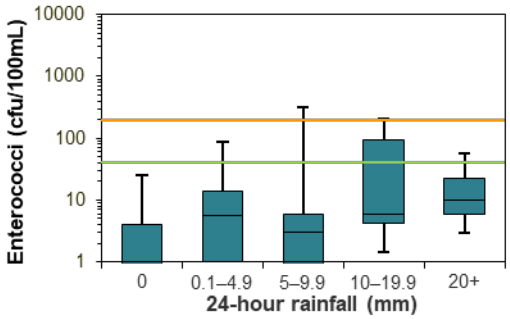
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Bombo Beach

Beach grade: G

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

Bombo Beach is backed by a narrow reserve, railway and freeway. Lifeguards patrol the beach over the summer school holidays.

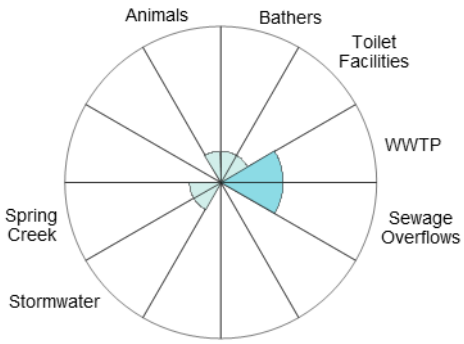
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination.

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

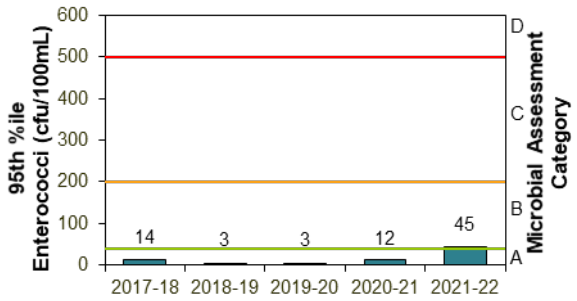
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	98%	100	Declined

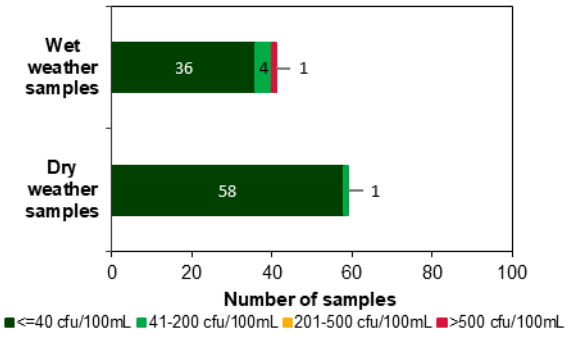
Sanitary inspection: Low



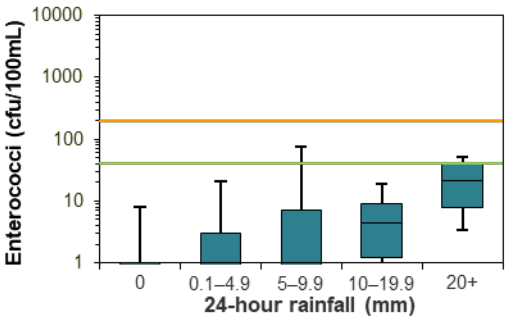
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Surf Beach Kiama

Beach grade: G

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

Surf Beach in Kiama is 250 m long and backed by a park and surf club. Lifeguards patrol the beach from September to April.

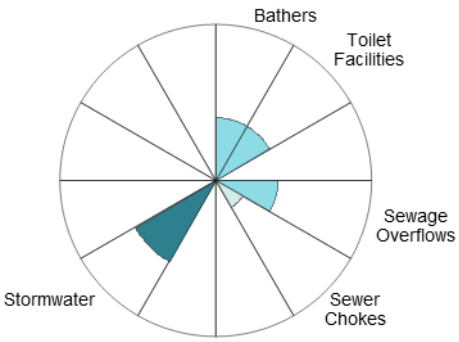
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

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

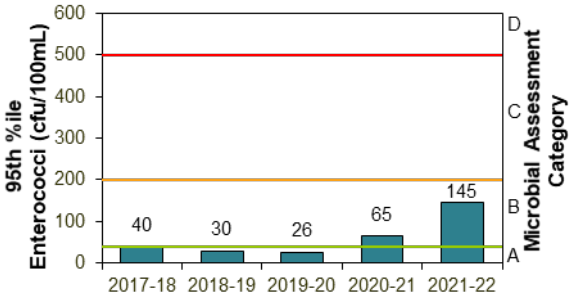
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2019 to Apr 2022	88%	100	Stable

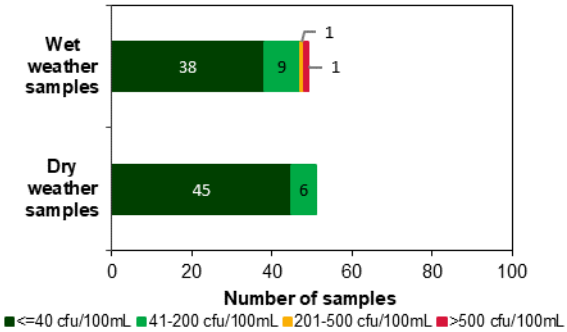
Sanitary inspection: Moderate



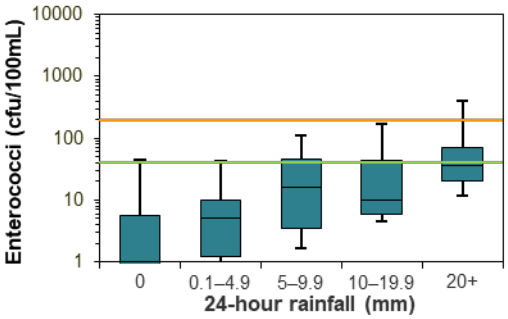
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Werri Beach

Beach grade: VG

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

Werri Beach is 1.7 km long with an ocean pool on the southern rock platform. It is patrolled over the summer school holidays.

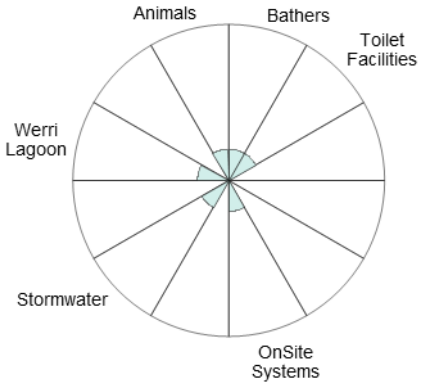
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of significant faecal contamination.

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

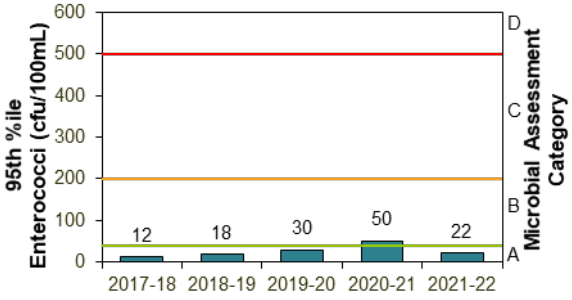
The site has been monitored since 1996.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Aug 2020 to Apr 2022	98%	100	Improved ↑

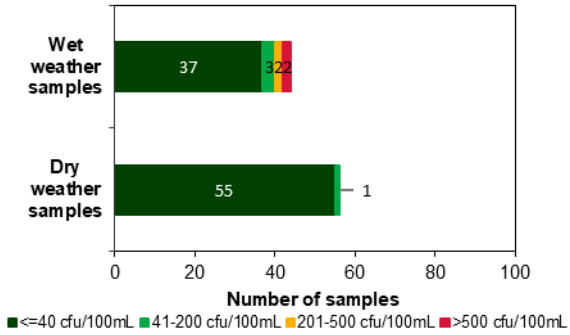
Sanitary inspection: Low



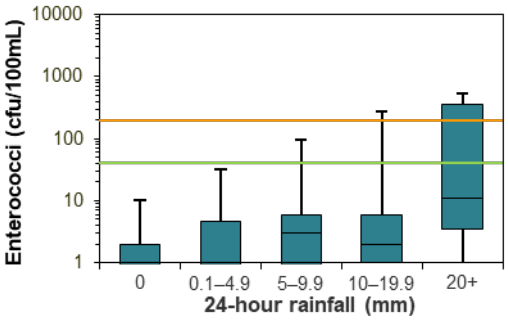
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Seven Mile Beach (Gerroa)

Beach grade: G

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

Seven Mile Beach at Gerroa is at the northern end of a long open beach. Lifeguards patrol during the summer school holidays.

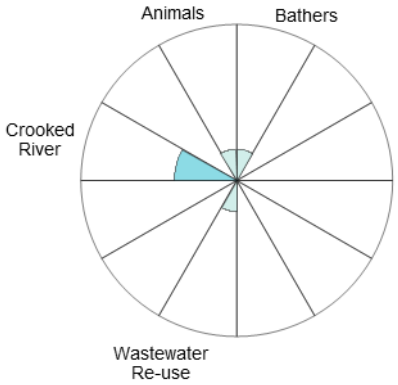
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination.

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

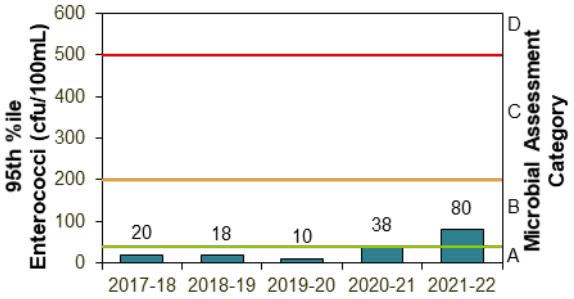
The site has been monitored since 2011.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Oct 2019 to Apr 2022	100%	100	Declined

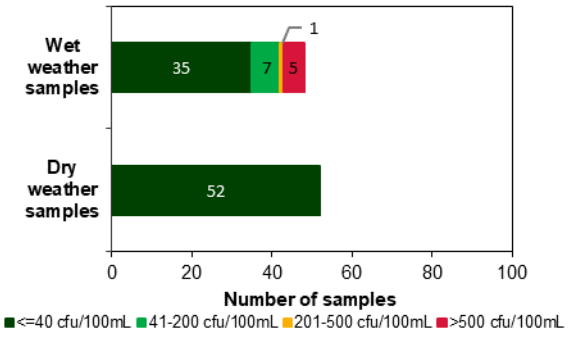
Sanitary inspection: Low



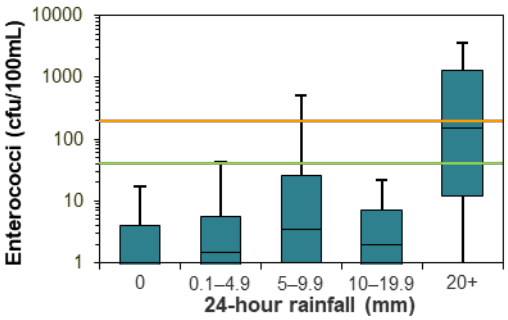
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



How to read this report

Beach Suitability Grades

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

VG Very Good

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

G Good

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

F Fair

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

P Poor

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

VP Very Poor

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

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 NSW 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 marine 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

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 NSW 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. 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 on the DPE 'Sanitary inspection of beaches' webpage.

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

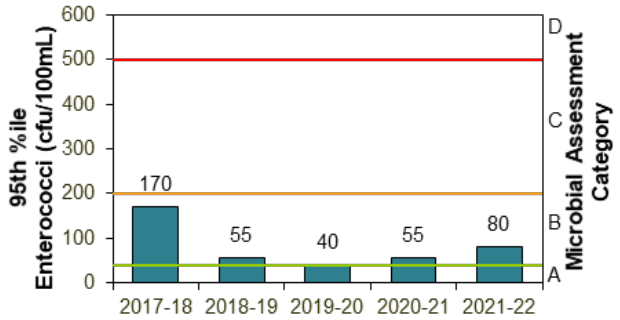
Declined

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

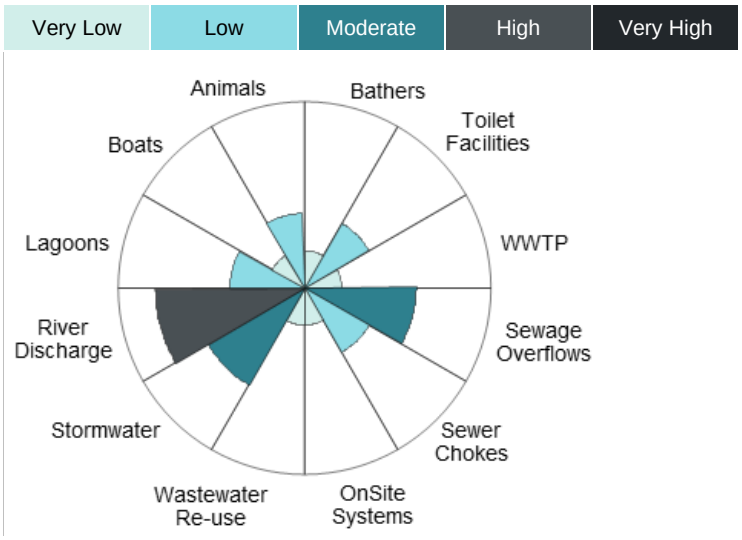
On each beach page, the MACs for the last 5 years are displayed on a simple bar chart. The MAC for the current year is based on enterococci data collected during the assessment period. The bars are labelled with the 95th percentile value for each year and the thresholds dividing the A, B, C and D categories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



Sanitary Inspection Category (SIC) chart

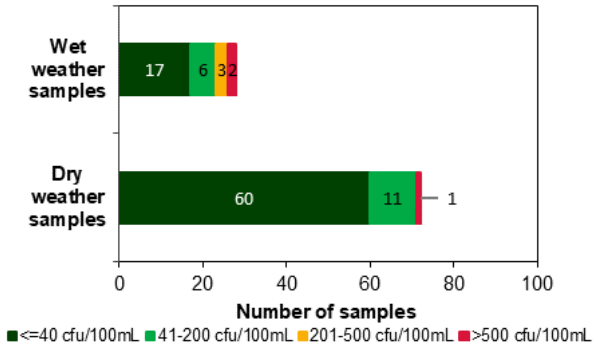
The results of the sanitary inspection for each swimming location are presented in a radar pie chart. The chart shows the likelihood that each identified pollution source will contribute to faecal contamination at a swimming site, as indicated by the size and colour of the segment, ranging from

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

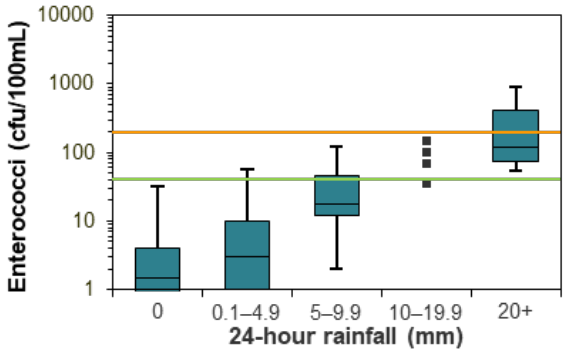
Enterococci levels in wet and dry weather conditions are presented for each swimming location as a bar graph. All data collected during the assessment period is included in the analysis. Dry weather is defined as no rainfall recorded in the previous 24 hours. Each bar is colour coded to show the number 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.



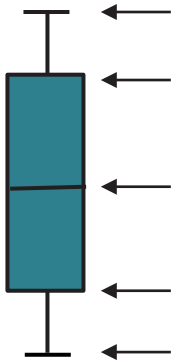
It is expected that swimming sites with lower levels of flushing will show some elevated bacterial results in dry weather samples (no rainfall in the previous 24 hours) due to the longer time needed to recover from a rainfall event. At some estuarine and lake/lagoon swimming locations the impacts of 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 9am on the day of sampling. If there are fewer than 5 enterococci data points in a rainfall category, individual data points are presented instead of a box plot. At sites where many results are below the detection limit (1 cfu/100 mL), only the upper portion of the box plots will be visible.



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



95% of the samples lie below the top whisker

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

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

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

5% of the samples lie below the bottom whisker.

Information bars

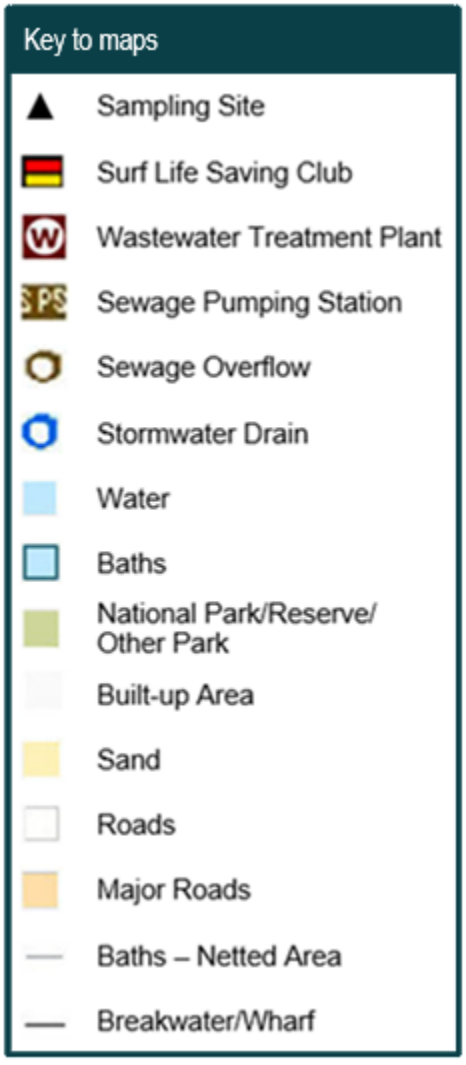
Information bars on each beach page provide a summary of details about the swimming site.

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

Dry weather samples suitable for swimming (**dry weather swimmability**) shows the percentage of water samples with enterococci levels below 40 cfu/100 mL. Dry weather is defined as no rainfall in the previous 24 hours. Swimming sites with lower levels of flushing often have a lower percentage of dry weather samples within the safe swimming limit due to the impacts of rainfall detected up to 3 days after the event.

Explanation of maps

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



References

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, accessed 23/06/22.

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

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- Beachwatch webpage
- Coastal management program progress
- Sanitary inspection of beaches
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