



DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

State of the beaches 2018-2019

North Coast region

Beachwatch



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Published by:

Environment, Energy and Science (EES)
Department of Planning, Industry and Environment
59 Goulburn Street, Sydney NSW 2000
PO Box A290, Sydney South NSW 1232
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment, Energy and Science enquiries)

TTY users: phone 133 677, then ask for 1300 361 967

Speak and listen users: phone 1300 555 727, then ask for 1300 361 967

Email: info@environment.nsw.gov.au

Website: www.environment.nsw.gov.au

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Environment Line: 131 555 (NSW only)

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Recreational water quality has been monitored in the North Coast region since 2002 by Ballina Shire Council and Richmond Valley Council under the Department of Planning, Industry and Environment's Beachwatch Partnership Program. This report summarises the performance of 18 swimming sites on the north coast of New South Wales, providing a long-term assessment of how suitable a site is for swimming. Monitored sites include ocean beaches, estuarine areas including Shaws Bay, North Creek and Evans River, and swimming sites in Lake Ainsworth.

In 2018–2019, 78% of swimming sites in the North Coast region were graded as Good or Very Good. These sites were suitable for swimming for most or almost all of the time. This is a similar performance to the previous year, with North Coast lake/lagoon and estuarine swimming locations susceptible to impacts from wet weather conditions including significant rainfall events over summer.

North Coast region summary 2018–2019



The Serpentine
Photo: Beachwatch/EES,
DPIE

Beach monitoring 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 (two to four 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 North Coast region by Ballina Shire Council since 2002 and Richmond Valley Council since 2006.

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

Rainfall impacts

During 2018–2019, 18 swimming sites were monitored including ocean beaches, estuarine areas in Shaws Bay, North Creek and Evans River, and swimming sites in Lake Ainsworth.

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 2018–2019 are based on water quality data collected over the last two to four years. Rainfall over this period has been diverse:

- 2015–2016: wet summer, with well above average rainfall during January, including heavy rain and flooding in coastal areas
- 2016–2017: the wettest March on record for many coastal areas and intense storm activity over summer
- 2017–2018: variable rainfall with prolonged dry periods and mostly wet summer with significant rainfall events
- 2018–2019: rainfall was average to below average, except for a wet spring and isolated rain events.

See the section on **How to read this report** on page 32 for an explanation of the graphs, tables and Beach Suitability Grades.

While rainfall on the North Coast was below average over the winter months, some heavy rain fell on 6–7 June 2018, with Ballina and Evans Head recording 97mm and 75mm respectively.

The North Coast experienced a wet spring with well above average rainfall falling in September and October 2018. Notably, Ballina recorded 281mm for September, the highest monthly total rainfall on record. Ballina and Evans Head rainfall totals were more than double the long-term in October, with 218mm and 254mm recorded respectively.

Relatively dry weather conditions prevailed from November 2018 to April 2019, with almost all monthly rainfall totals below the long-term averages. Summer was particularly dry in the region, with Ballina recording its lowest summer rainfall total on record. January 2019 was extremely dry with less than three millimetres of rainfall at Ballina and Evans Head for the month.

Despite the drier conditions, several isolated thunderstorms brought heavy rain at times during the warmer months, including in mid-March and a few occasions in April 2019.

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 North Coast region

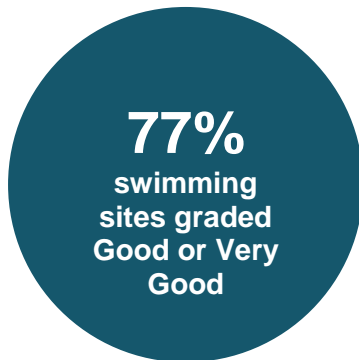
Swimming site	Site type	Beach Suitability Grade	Change
Ballina Shire Council			
Seven Mile Beach	Ocean beach	VG	●
Lake Ainsworth North	Lake/Lagoon	P [^]	●
Lake Ainsworth East	Lake/Lagoon	P	●
Lake Ainsworth South	Lake/Lagoon	G	●
Lake Ainsworth West	Lake/Lagoon	P	●
Shelly Beach	Ocean beach	G	●
Lighthouse Beach	Ocean beach	VG	●
Shaws Bay North	Estuarine	G	●
Shaws Bay East	Estuarine	G	●
Shaws Bay East Arm	Estuarine	G	●
Shaws Bay East Beach	Estuarine	G	●
Shaws Bay West	Estuarine	G	●
The Serpentine	Estuarine	G	●
Richmond Valley Council			
Airforce Beach	Ocean beach	VG	●
Main Beach	Ocean beach	VG	●
Shark Bay	Ocean beach	VG	●
Evans River	Estuarine	P	●
Elm Street Bridge North (Evans River)	Estuarine	G	●

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

[^] Provisional: Information required for the analysis is incomplete due to limited bacterial data or limited information on potential pollution sources in a beach catchment.

Ballina Shire Council

Overall results



Ten of the 13 swimming sites were graded as Very Good or Good in 2018–2019, a similar performance to the previous year.

Percentage of sites graded as Very Good or Good:

- 2018–2019: 77%
- 2017–2018: 77%
- 2016–2017: 90%
- 2015–2016: 80%.

Thirteen swimming sites were monitored by Ballina Shire Council. Sampling and laboratory analysis was fully funded by the council.

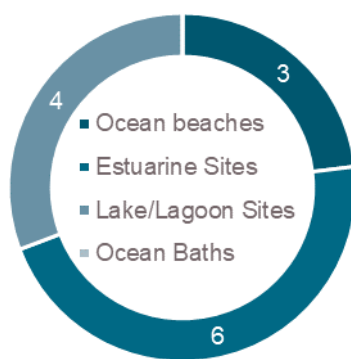
Three ocean beaches and The Serpentine were sampled weekly from November to February. Shaws Bay and Lake Ainsworth were sampled weekly throughout the year.

See the section on **How to read this report** on page 32 for an explanation of the graphs, tables and Beach Suitability Grades.

Best beaches

Seven Mile Beach and Lighthouse Beach.

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



Site types in Ballina Shire Council

Swimming sites monitored in the Ballina region include ocean beaches, estuarine areas in Shaws Bay and North Creek and lake/lagoon swimming sites in Lake Ainsworth, with each site type having a different response to rainfall-related impacts.

Estuarine and lake/lagoon swimming sites generally did 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 three days in estuarine areas, or if there are signs of stormwater pollution such as discoloured water or floating debris.

Ocean beaches

All three ocean beaches were graded as Very Good or Good in 2018–2019.



Beach Suitability Grades for Ballina Shire Council ocean beaches

Seven Mile Beach and Lighthouse Beach continued to be graded Very Good, as in previous years. These beaches had excellent water quality and were suitable for swimming almost all of the time.

Shelly Beach was graded as Good. Water quality at this site was of a high standard and suitable for swimming most of the time. While water quality at Shelly Beach has shown improvement over the past five years, there are several potential sources of faecal contamination nearby.

Estuarine beaches



Beach Suitability Grades for Ballina Shire Council estuarine beaches

All six estuarine swimming locations were graded as Good in 2018–2019: Shaws Bay North, Shaws Bay East, Shaws Bay East Arm, Shaws Bay East Beach, Shaws Bay West and The Serpentine. Water quality at these sites was mostly suitable for swimming in dry weather, with 90% or greater of dry weather samples within the safe swimming limit. Elevated enterococci levels were occasionally recorded following light rainfall and more often after heavy rainfall. Water quality at these sites can be impacted by upstream sources and can take longer to recover due to lower levels of flushing.

It is recommended that swimming should be avoided during and for up to three days following rainfall at estuarine swimming sites, or if there are signs of pollution such as discoloured water or floating debris.

Lake/lagoon swimming sites



Beach Suitability Grades for Ballina Shire Council lake/lagoon swimming sites

Lake Ainsworth South was graded as Good in 2018–2019. Water quality at this swimming location was often suitable for swimming during dry weather, with 95% of dry weather samples within in the safe swimming limit.

Lake Ainsworth North, Lake Ainsworth East and Lake Ainsworth West were graded as Poor, consistent with the previous year's result. Lake Ainsworth North was new to the program in 2017–2018 and the beach grade is provisional as the information required for the analysis is incomplete due to limited bacterial data.

Elevated bacteria levels were recorded at these lake swimming sites during dry and wet weather conditions. Despite the poor grades, between 69% and 81% of dry

weather samples were within the safe swimming limit. These sites may be impacted by a number of significant potential sources of faecal contamination including stormwater, and have low levels of flushing.

It is recommended that swimming should be avoided during and for up to three days following rainfall or if there are signs of stormwater pollution such as discoloured water or floating debris.

Management

Ballina Shire Council



Patrolled ocean beach
Photo: Beachwatch/EES,
DPIE

Ballina Shire Council is preparing coastal management programs (CMPs) for Lake Ainsworth and North Creek, using funding received in 2018 under the NSW Government's Coastal and Estuary Grants Program. Both CMP projects will investigate water quality issues such as bacterial contamination sources. The Lake Ainsworth CMP will also address the occurrence of blue-green algal blooms and best management practice to reduce the frequency of blooms. Stage 2 of the Lake Ainsworth CMP involved community engagement, confirmation of key issues and concerns, fieldwork to confirm current knowledge and completion of identified technical studies to fill key information gaps. The Stage 2 report is finalised and can be accessed via council's website.

The North Creek CMP is in Stage 1, which involves collation of existing information, preliminary risk assessment, implementation of a community communication portal, development of a community consultation strategy and scoping of technical studies to fill key information gaps.

Council's Shaws Bay Coastal Zone Management Plan (CZMP), certified by the NSW Minister for Planning and Environment, was gazetted on 24 June 2016. Council previously gained planning approval to undertake several of the actions nominated in the CZMP that will significantly improve the water quality, natural environment and public amenity at the bay. Several of these actions are now either completed or very near completion including stabilising back erosion, upgrading stormwater infrastructure and improving public access and amenity. The CZMP and works plans are available on council's website. Some of the sample sites at Shaws Bay may be reviewed as the management actions in the CZMP are implemented.

Council is also working to implement actions under the certified Richmond River CZMP. The recent reporting of the

poor water quality of the Richmond River has resulted in this being an increased priority for council and the community.

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 has recently completed projects to improve the water quality and hydrology of Chickiba wetlands and North Lakes stormwater retention ponds. These projects will provide benefits to the natural environment and public amenity. The Lake Ainsworth foreshore improvement works are underway with improved stormwater facilities now installed on the southern foreshore, and new stormwater facilities to be installed on the eastern foreshore. The upgraded stormwater facilities aim to improve the quality of stormwater before it enters Lake Ainsworth.

Ballina Shire Council has placed precautionary signage at Lake Ainsworth advising that this area may be affected by blue-green algal blooms. This signage is only displayed when algal levels are elevated and warnings are necessary, as per WaterNSW algae guidelines.

Under the previous *Coastal Protection Act 1979*, councils developed a **Coastal Zone Management Plan (CZMP)** to address coastal issues. Councils can continue to implement priority actions from certified CZMPs with funding assistance from the NSW Government's Coastal and Estuary Grants Program until 2021.

Ballina Shire Council is investigating the source of enterococci contamination in Lake Ainsworth in 2019, using microbial source tracking methods. Samples have been collected from several locations within the lake and will be tested for faecal sterols to identify if elevated enterococci are from human or animal sources. This information will be used to evaluate the risks and potentially identify management actions to improve water quality.

If sewage contamination is suspected at a swimming site, warnings are displayed advising that the area is unsuitable for swimming. Warnings remain in place until testing indicates the water quality is again suitable for swimming. Media releases are issued and council's website is updated during periods of heavy rain and minor flooding to advise which swimming sites are likely to be contaminated and impacted by stormwater runoff.



Lighthouse Beach
Photo: Beachwatch/EES,
DPIE

New wastewater treatment plants have been constructed and are operational at West Ballina and Lennox Head. The extensive commissioning period has been completed and council has obtained approval from the NSW Department of Primary Industries – Water to provide recycled wastewater via dual reticulation to dwellings in Lennox Head, Skennars Head, East Ballina and Cumbalum. Ballina's wastewater treatment plant is currently supplying bulk recycled water for irrigation purposes to sports fields and the Ballina Golf Course. This upgrade process has led to improved data collection, reporting and notification of non-compliances. These upgrades and dual reticulation will significantly reduce the volume, while also improving the quality of discharges to the environment.



Sampling sites and Beach Suitability Grades in Ballina Shire Council

Seven Mile Beach

Beach grade: **VG**



Seven Mile Beach extends for over eight kilometres and is patrolled over the summer period.

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

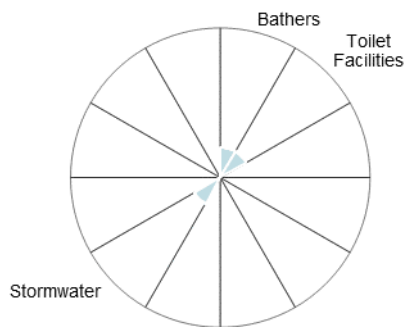
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 20mm or more of rainfall.

The site has been monitored since 2002.

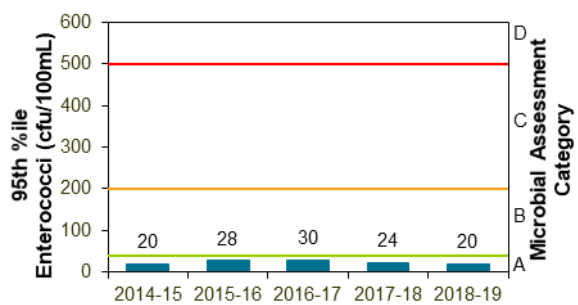
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2014 to Feb 2019	98%	96	Stable ●

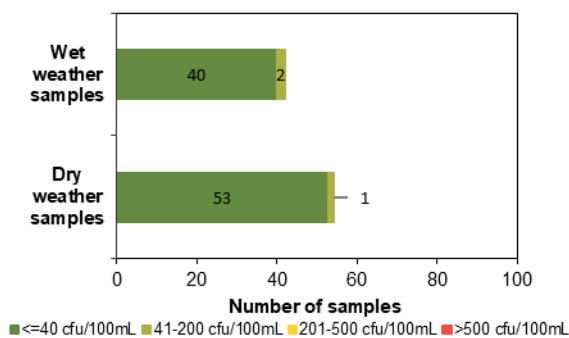
Sanitary inspection: Low



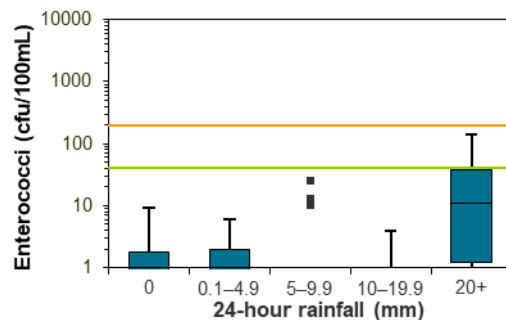
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Lake Ainsworth North

Beach grade: **P**[^]



Lake Ainsworth North is located at the northern end of Lake Ainsworth, near a pontoon.

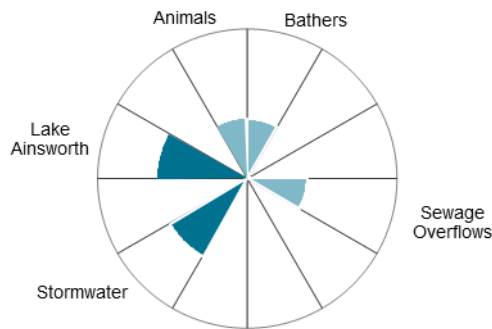
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with potential faecal contamination from stormwater and elsewhere within the lake.

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

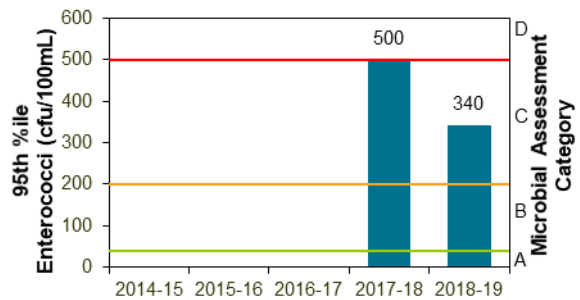
See 'How to read this report' for key to map. The site has been monitored since 2016.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Nov 2016 to Feb 2019	71%	92	Stable ●

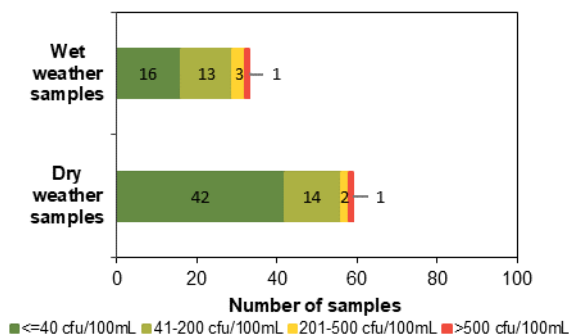
Sanitary inspection: Moderate



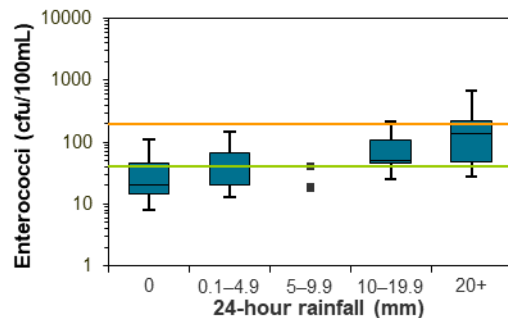
Microbial Assessment Category: C



Dry and wet weather water quality



Water quality in response to rainfall



Lake Ainsworth East

Beach grade: P



Lake Ainsworth East is located on the eastern shore of Lake Ainsworth, a coastal freshwater lake.

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 potential faecal contamination from elsewhere within the lake.

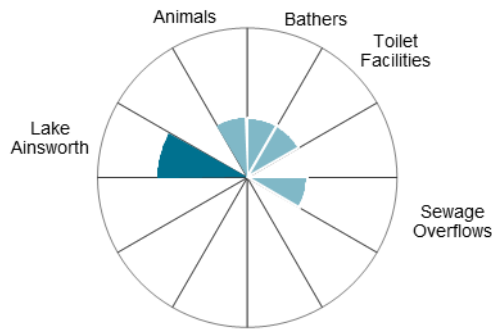
Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and regularly after 20mm or more of rainfall.

The site was monitored from 2002 until 2009, and since 2012.

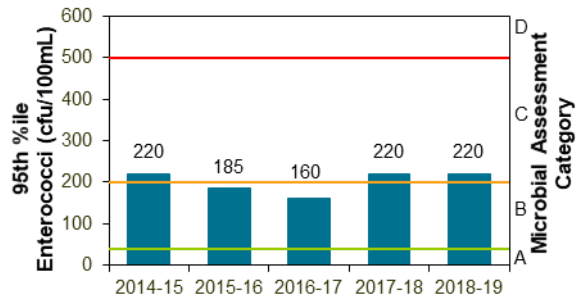
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Oct 2016 to Feb 2019	81%	100	Stable ●

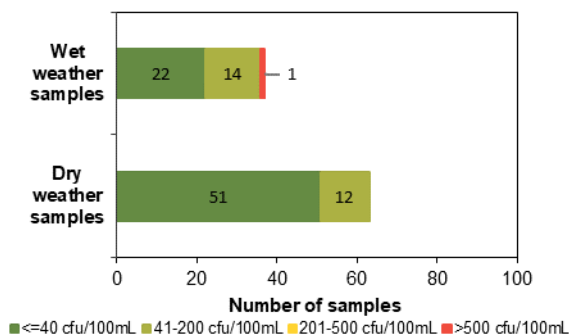
Sanitary inspection: Moderate



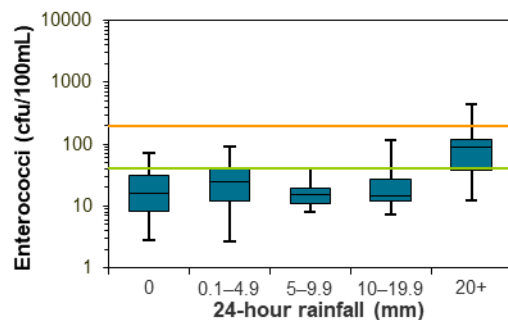
Microbial Assessment Category: C



Dry and wet weather water quality

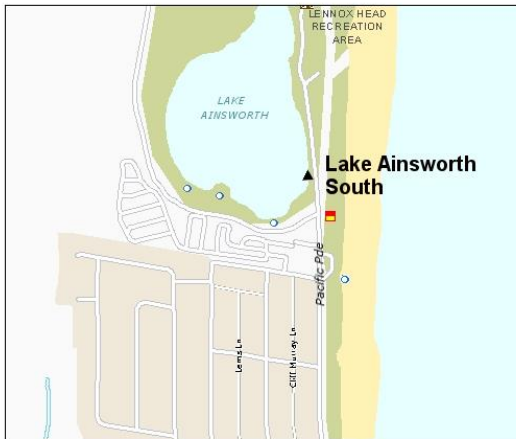


Water quality in response to rainfall



Lake Ainsworth South

Beach grade: G



Lake Ainsworth South is located on the southern shore of Lake Ainsworth, a coastal freshwater lake.

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 the lake itself.

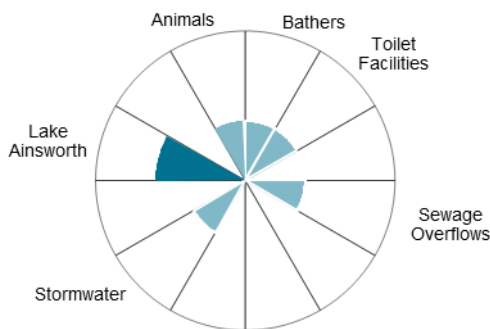
Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and frequently after 20mm or more of rainfall.

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

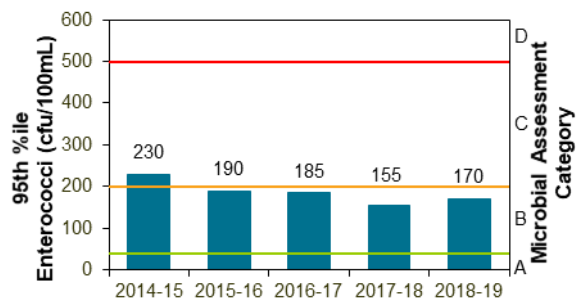
The site was monitored from 2002 until 2009, and since 2012.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Oct 2016 to Feb 2019	95%	100	Stable ●

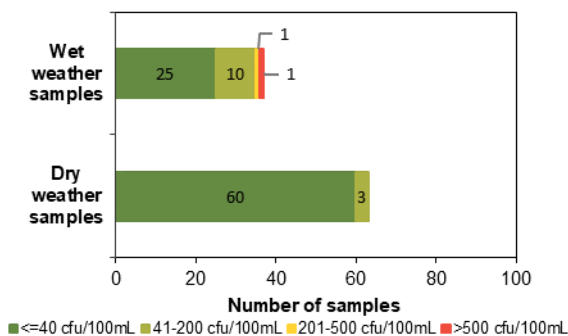
Sanitary inspection: Moderate



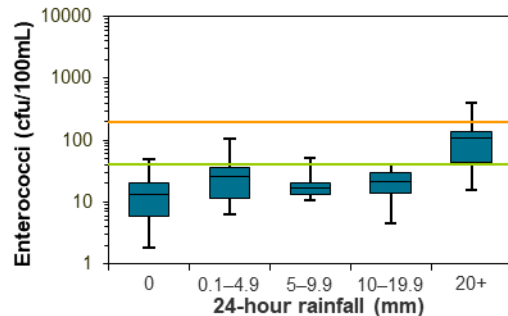
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Lake Ainsworth West

Beach grade: P



Lake Ainsworth West is located on the western shore of Lake Ainsworth, a coastal freshwater lake.

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 potential faecal contamination from elsewhere within the lake.

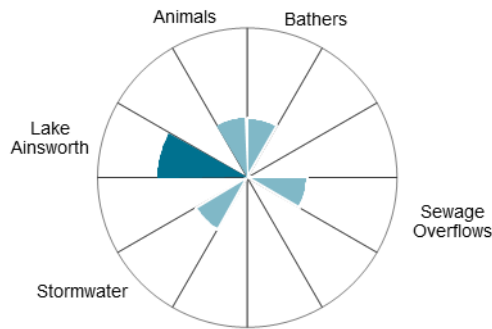
Enterococci levels had little response to rainfall, often exceeding the safe swimming limit across most rainfall categories.

The site has been monitored since 2002.

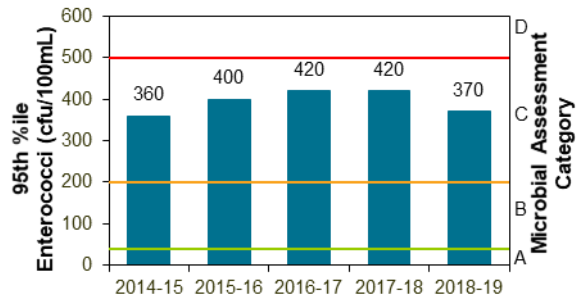
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Nov 2016 to Feb 2019	69%	100	Stable ●

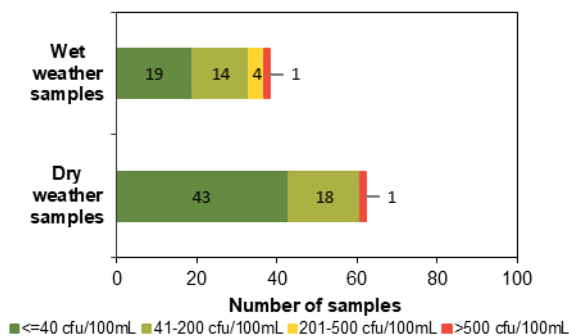
Sanitary inspection: Moderate



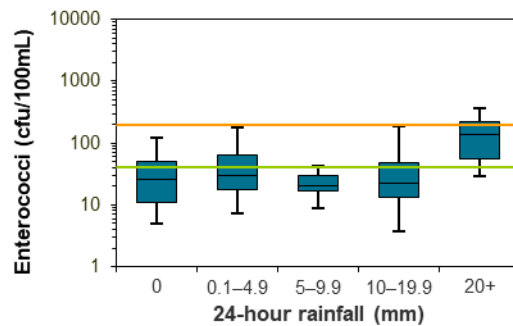
Microbial Assessment Category: C



Dry and wet weather water quality

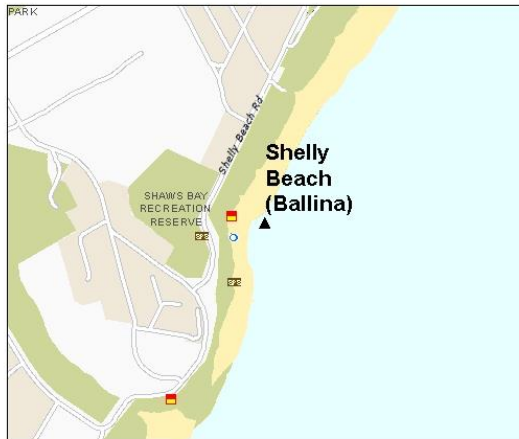


Water quality in response to rainfall



Shelly Beach

Beach grade: **G**



Shelly Beach is approximately 700 metres long and is patrolled during holiday periods.

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, from several potential sources of faecal contamination including stormwater.

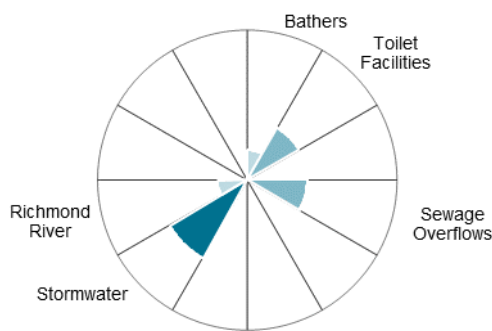
Enterococci levels increased slightly with increasing rainfall, but usually remained below the safe swimming limit across all rainfall categories.

The site has been monitored since 2002.

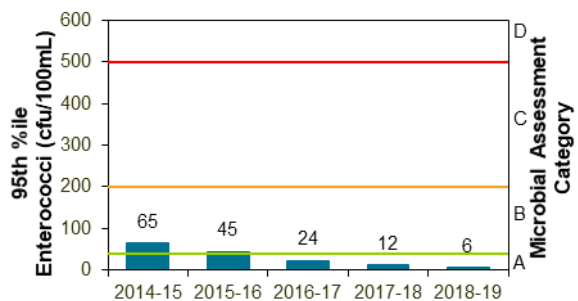
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2014 to Feb 2019	98%	98	Stable

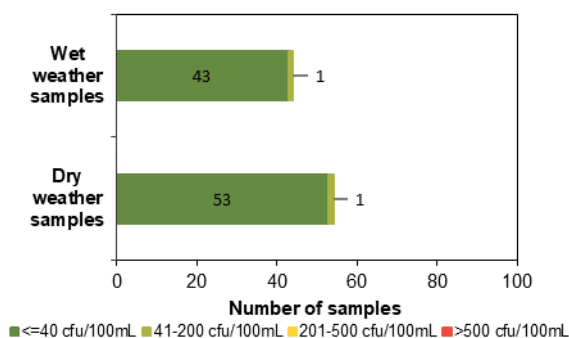
Sanitary inspection: Moderate



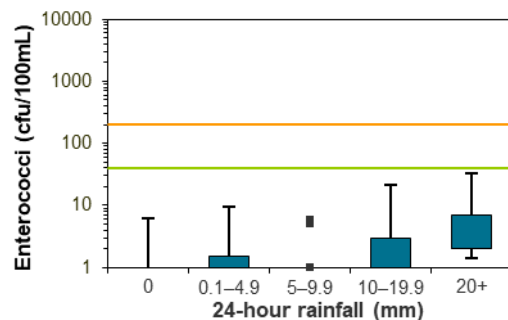
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Lighthouse Beach

Beach grade: **VG**



Lighthouse Beach is situated north of the sea wall at the mouth of the Richmond River and is patrolled during holiday periods.

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.

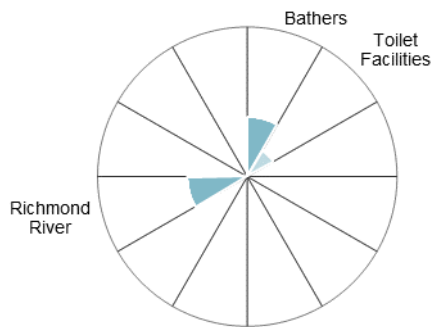
Enterococci levels increased slightly with increasing rainfall, but usually remained below the safe swimming limit across all rainfall categories.

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

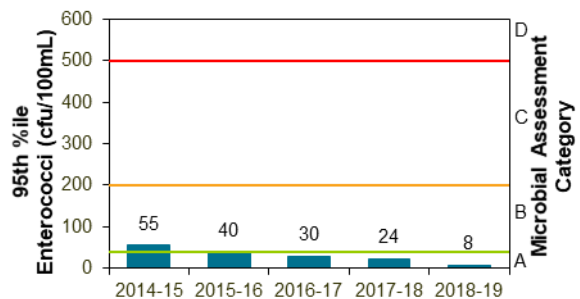
The site was monitored in 2002 until 2003, and since 2009.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2014 to Feb 2019	98%	98	Stable ●

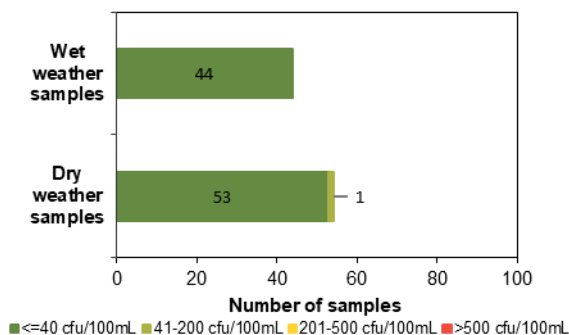
Sanitary inspection: Low



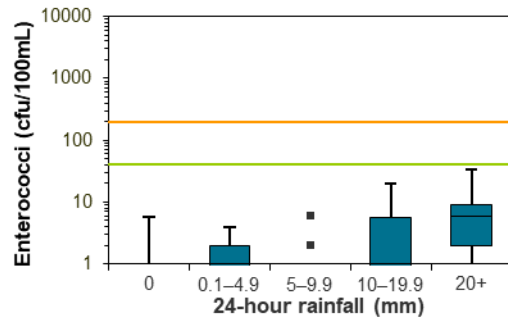
Microbial Assessment Category: A



Dry and wet weather water quality

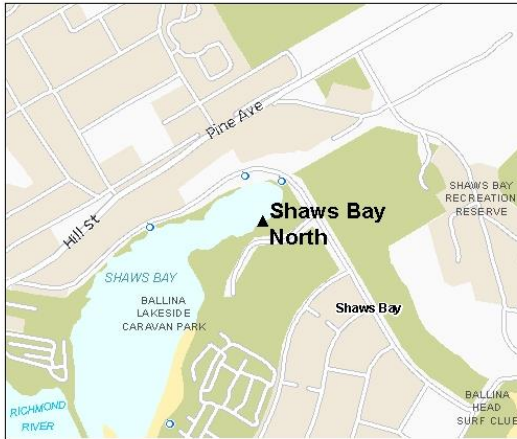


Water quality in response to rainfall



Shaws Bay North

Beach grade: G



Shaws Bay North is located on the northern side of Shaws Bay, an inlet near the mouth of the Richmond River.

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.

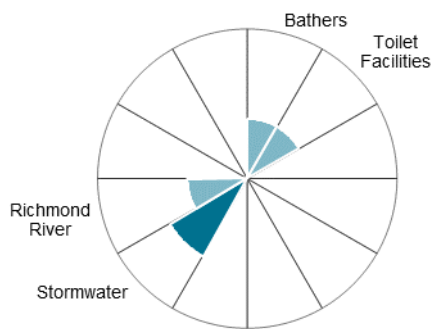
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and regularly after 5mm or more of rain.

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

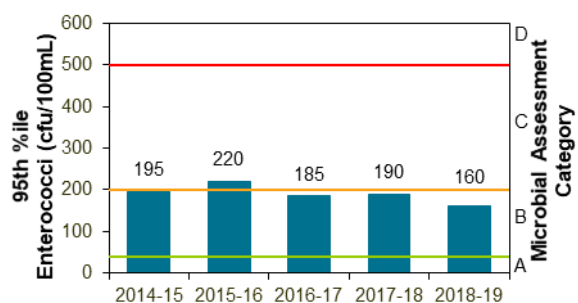
The site was monitored from 2002 until 2009, and since 2012.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Jul 2016 to Feb 2019	94%	100	Stable ●

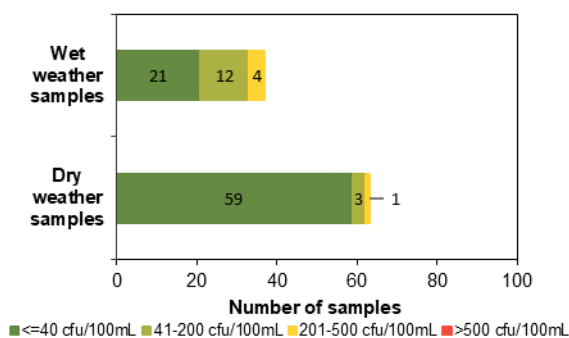
Sanitary inspection: Moderate



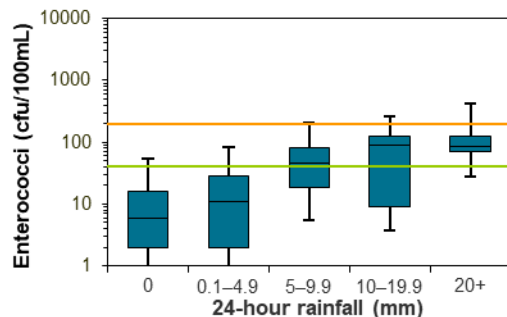
Microbial Assessment Category: B



Dry and wet weather water quality

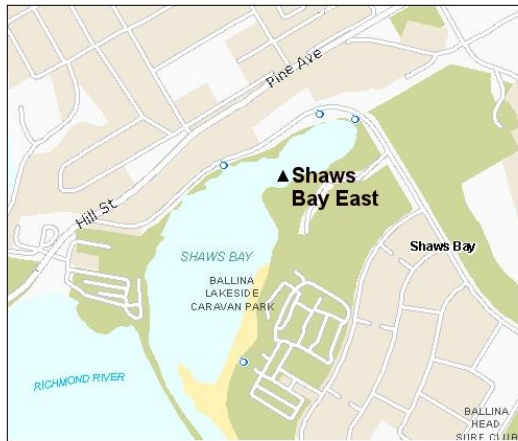


Water quality in response to rainfall



Shaws Bay East

Beach grade: G



Shaws Bay East is located on the eastern side of Shaws Bay, an inlet near the mouth of the Richmond River.

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.

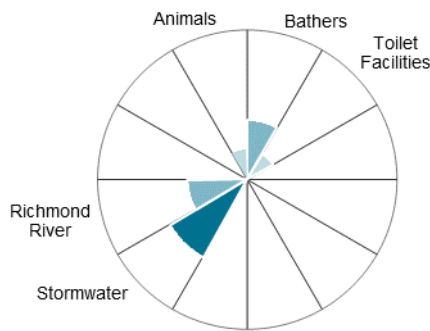
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and frequently after 20mm or more of rain.

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

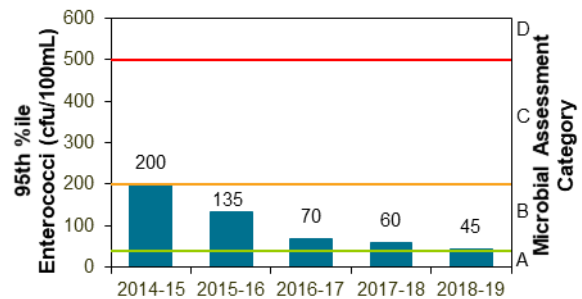
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Aug 2016 to Feb 2019	98%	100	Stable ●

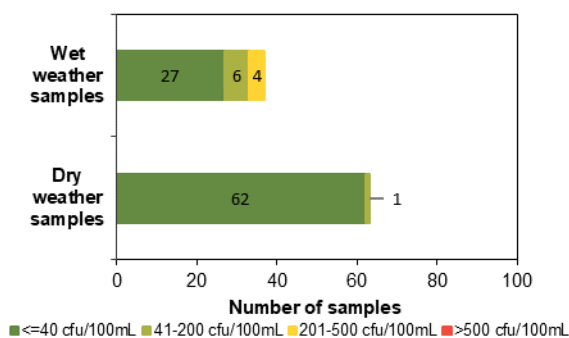
Sanitary inspection: Moderate



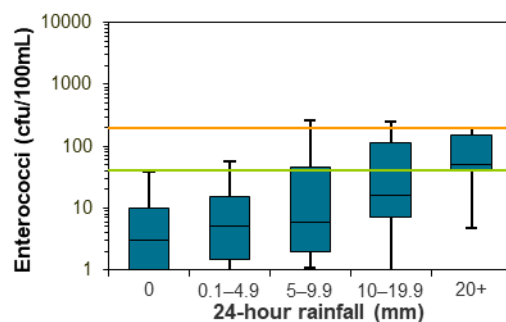
Microbial Assessment Category: B



Dry and wet weather water quality

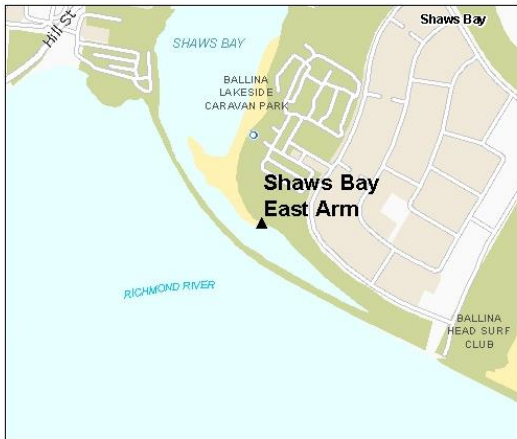


Water quality in response to rainfall



Shaws Bay East Arm

Beach grade: G



Shaws Bay East Arm is a sandy beach located on the southern side of Shaws Bay, an inlet near the mouth of the Richmond River.

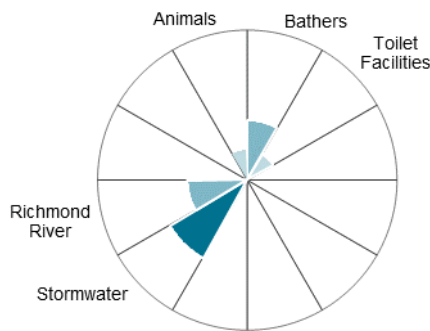
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with several potential sources of faecal contamination including stormwater.

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

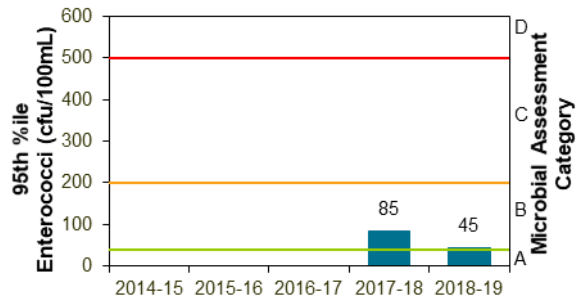
See 'How to read this report' for key to map. The site has been monitored since 2014.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Jul 2016 to Feb 2019	95%	100	Stable ●

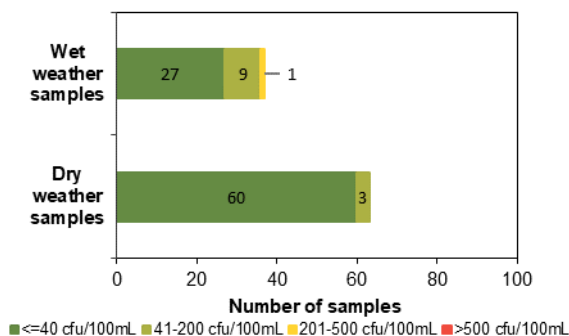
Sanitary inspection: Moderate



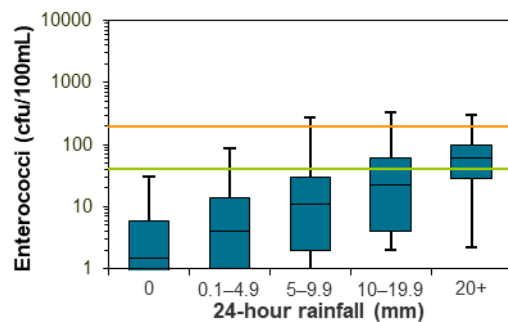
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Shaws Bay East Beach

Beach grade:



Shaws Bay East Beach is a sandy beach located on the eastern side of Shaws Bay, an inlet near the mouth of the Richmond River.

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 including stormwater.

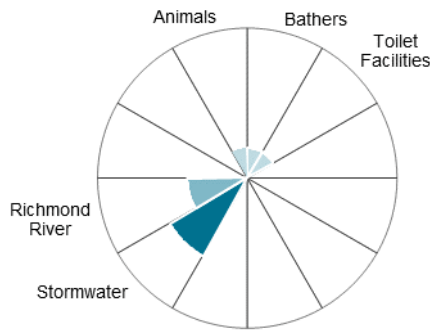
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and often after 5mm or more of rain.

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

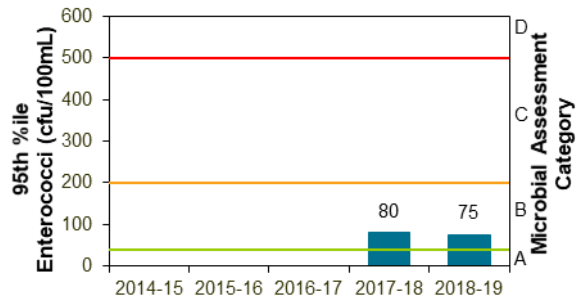
The site has been monitored since 2014.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Jul 2016 to Feb 2019	98%	100	Stable

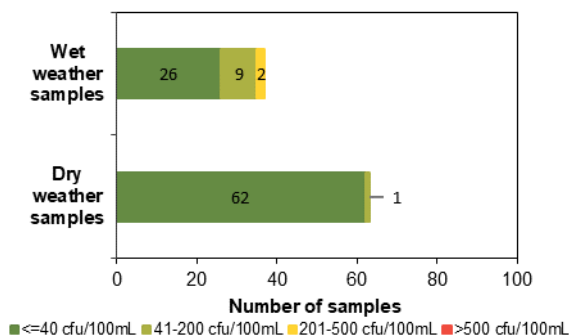
Sanitary inspection: Moderate



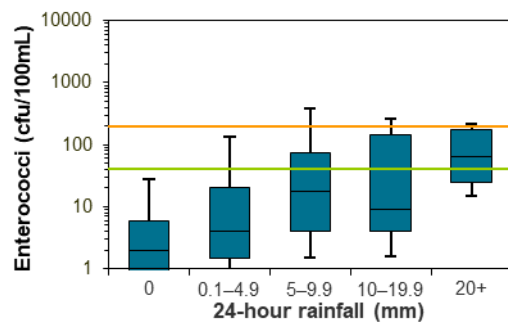
Microbial Assessment Category: B



Dry and wet weather water quality

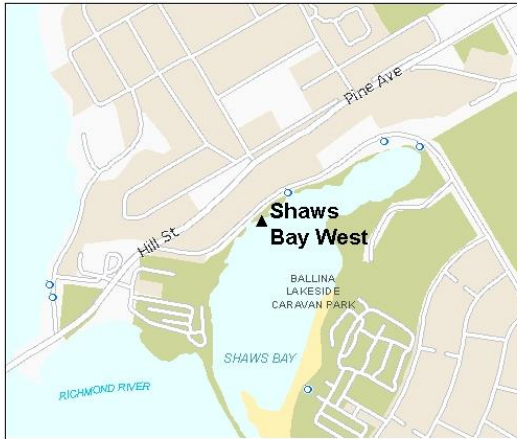


Water quality in response to rainfall



Shaws Bay West

Beach grade: G



Shaws Bay West is located on the western side of Shaws Bay, an inlet near the mouth of the Richmond River.

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.

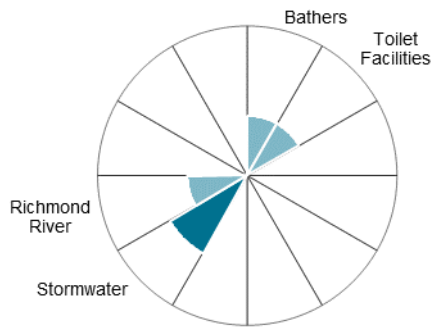
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and often after 5mm or more of rain.

The site was monitored from 2002 until 2009, and since 2012.

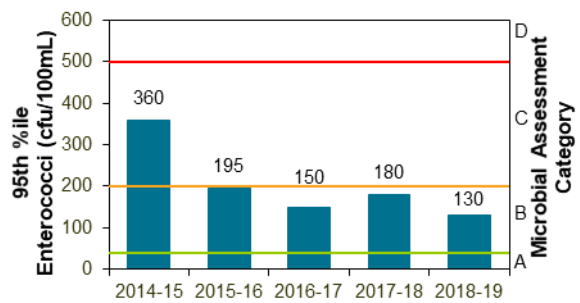
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Jul 2016 to Feb 2019	90%	100	Stable ●

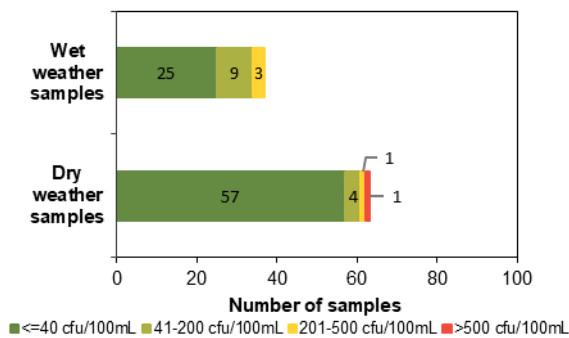
Sanitary inspection: Moderate



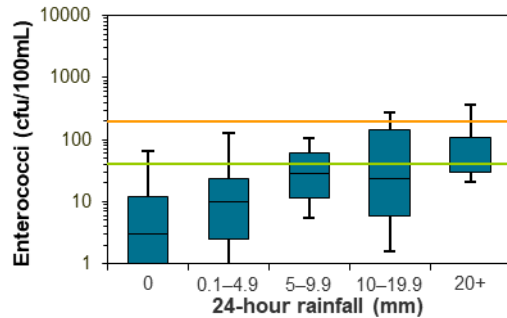
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



The Serpentine

Beach grade: **G**




The Serpentine is situated in North Creek, a tributary of the Richmond River.

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 river discharge.

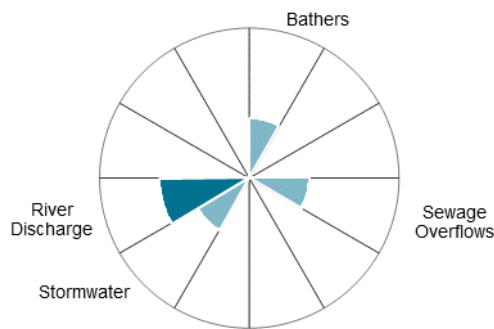
Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and regularly after 20mm or more of rain.

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

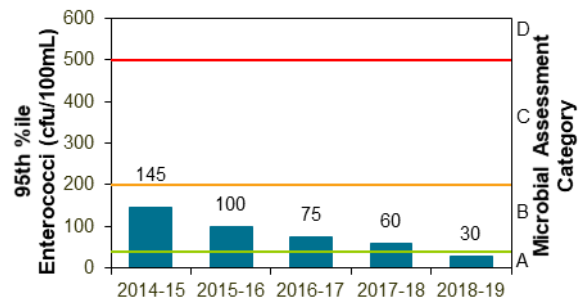
This site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	May 2015 to Feb 2019	100%	100	Stable 

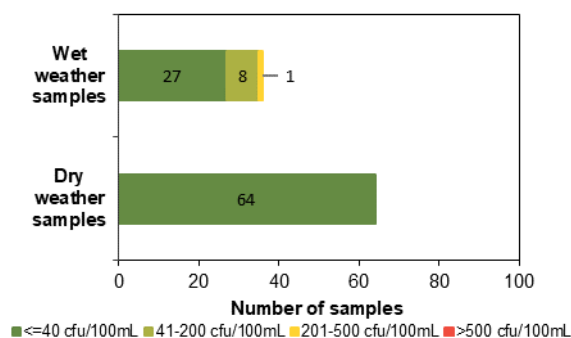
Sanitary inspection: Moderate



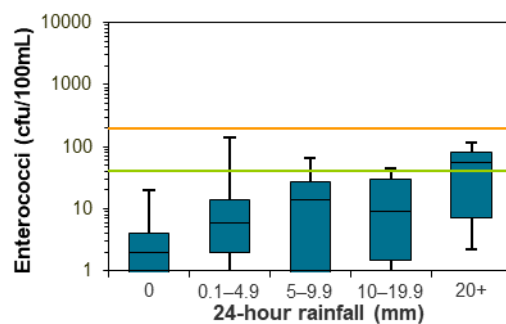
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Richmond Valley Council

Overall results



Four of the five swimming sites were graded as Very Good or Good in 2018–2019. This result is a similar performance to the previous year.

Percentage of sites graded as Very Good or Good:

- 2018–2019: 80%
- 2017–2018: 80%
- 2016–2017: 100%
- 2015–2016: 75%.

Five swimming sites were monitored by Richmond Valley Council. All sampling and laboratory analysis was fully funded by the council.

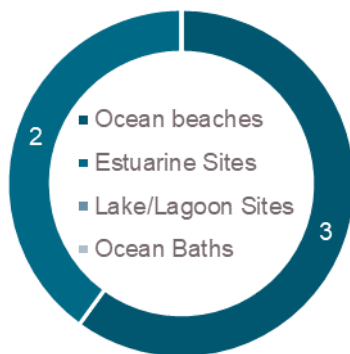
The three ocean beaches and Elm Street Bridge North were sampled weekly from October to March. Evans River is sampled weekly throughout the year.

See the section on **How to read this report** on page 32 for an explanation of the graphs, tables and Beach Suitability Grades.

Best beaches

Airforce Beach, Main Beach and Shark Bay.

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



Site types in Richmond Valley Council

Swimming sites monitored in the Richmond Valley Council region include ocean beaches and estuarine areas in Evans River, with each site type having a different response to rainfall-related impacts.

Estuarine swimming sites generally did not perform as well as ocean beaches, due to lower levels of flushing 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 three 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 Richmond Valley Council ocean beaches

All three ocean beaches were graded as Very Good: Airforce Beach, Main Beach and Shark Bay. Water quality at these beaches has been consistently excellent for many years and is suitable for swimming almost all of the time.



Beach Suitability Grades for Richmond Valley Council estuarine beaches

Estuarine beaches

Elm Street Bridge North in the Evans River was graded as Good. This is a similar result to the previous two years. Water quality was frequently suitable for swimming during dry weather conditions with 93% of samples within the safe swimming limit. Elevated enterococci levels were mostly recorded following rainfall.

Evans River, located downstream of Elm Street Bridge North, was graded as Poor in 2018–2019, the same as the previous year. Water quality at this site was mostly suitable for swimming during dry weather conditions, with 68% of samples within the safe swimming limit. Elevated enterococci levels were occasionally recorded in dry weather, and often during and following rainfall. High bacteria counts have mostly been recorded during and following moderate to heavy rainfall in the previous days. Discharge from a nearby large stormwater drain is also likely to impact water quality at this site when flowing.



Patrolled ocean beach
Photo: Beachwatch/EES,
DPIE

Management

Richmond Valley Council

Richmond Valley Council is responsible for four wastewater treatment plants (WWTPs). These are located at Casino, Coraki, Evans Head and Rileys Hill. The plants in Evans Head and Rileys Hill are fitted with UV disinfection. The Evans Head treatment system continues to service the Broadwater/North Woodburn area.

There are approximately 3800 onsite sewage management systems throughout the Richmond Valley Council local government area. Council runs an audit program of these systems, inspecting approximately 150 each year to ensure



Shark Bay
Photo: Beachwatch/EES,
DPIE

they are not polluting the environment or creating a health risk. High risk sites with systems close to sensitive receiving environments such as waterways are prioritised. Pre-purchase inspections of these systems are also undertaken upon request from the purchaser/vendor.

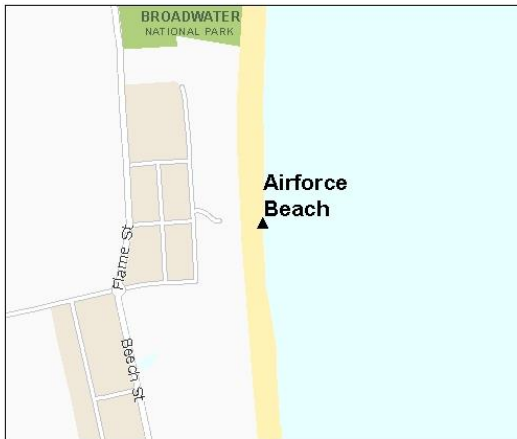
A genetic testing program has previously been undertaken by council identifying that animal/wildlife sources have contributed to the elevated microbial results in the Evans River.



Sampling sites and Beach Suitability Grades in Richmond Valley Council

Airforce Beach

Beach grade: **VG**



Airforce Beach is located on a 31 kilometre stretch of beach and is not patrolled by lifeguards.

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.

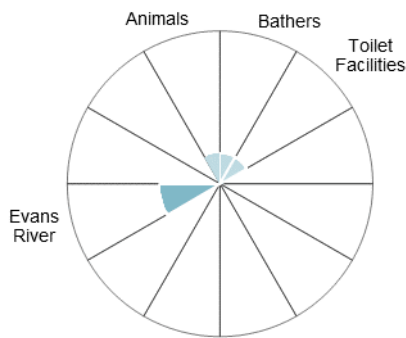
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 10mm or more of rainfall.

The site has been monitored since 2006.

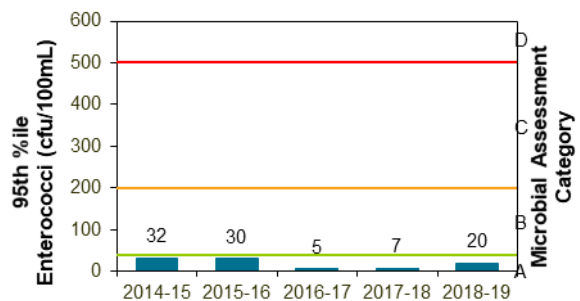
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Oct 2015 to Mar 2019	96%	100	Stable ●

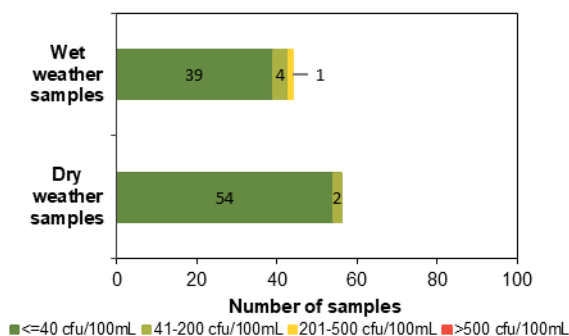
Sanitary inspection: Low



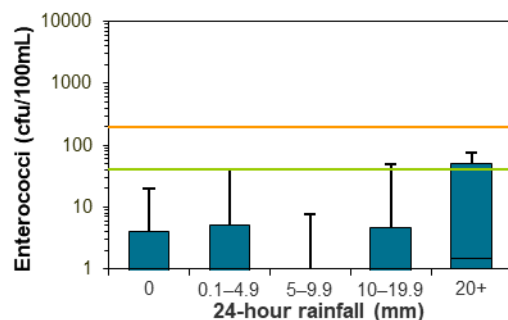
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Main Beach

Beach grade: **VG**



Main Beach is located at the southern end of a 31 kilometre stretch of beach and is patrolled during holiday periods.

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.

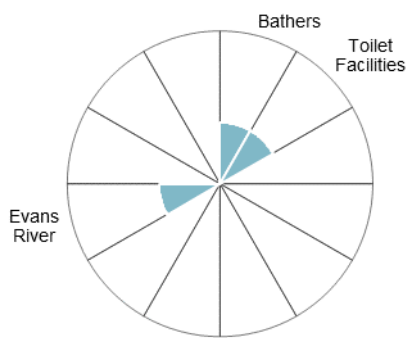
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to 10mm or more of rainfall.

The site has been monitored since 2006.

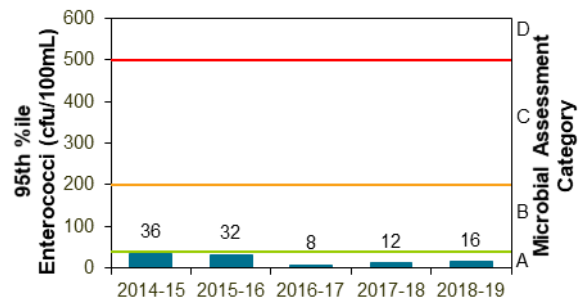
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	98%	100	Stable ●

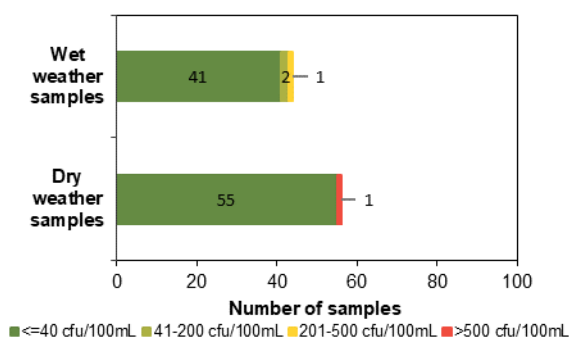
Sanitary inspection: Low



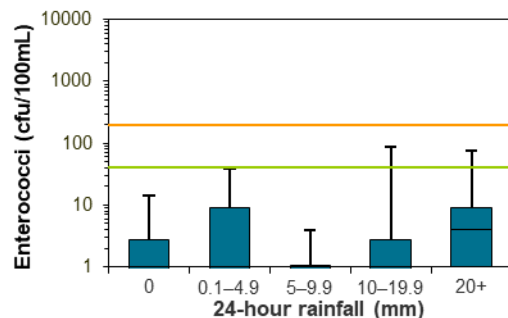
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Shark Bay

Beach grade: **VG**



Shark Bay is a small beach located between the southern entrance wall to the Evans River and the cliffs below Razorback Lookout, and is not patrolled by lifeguards.

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.

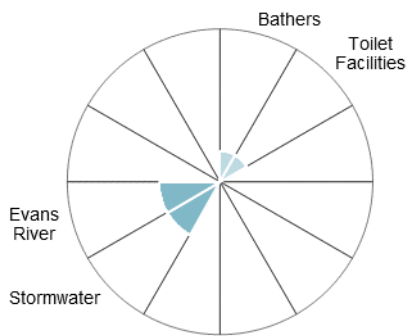
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to 10mm or more rainfall.

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

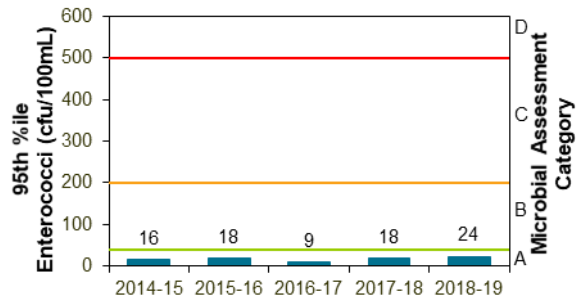
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Oct 2015 to Mar 2019	100%	100	Stable ●

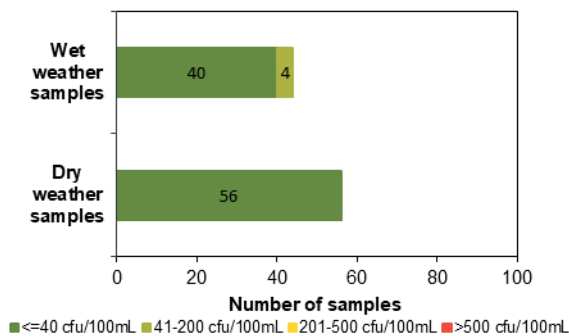
Sanitary inspection: Low



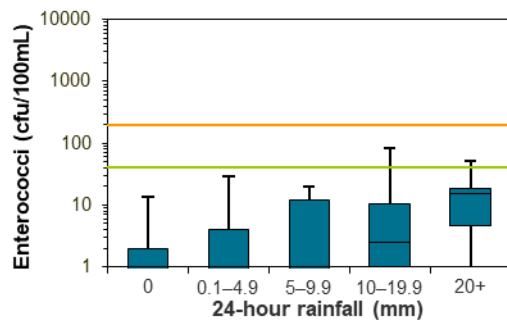
Microbial Assessment Category: A



Dry and wet weather water quality

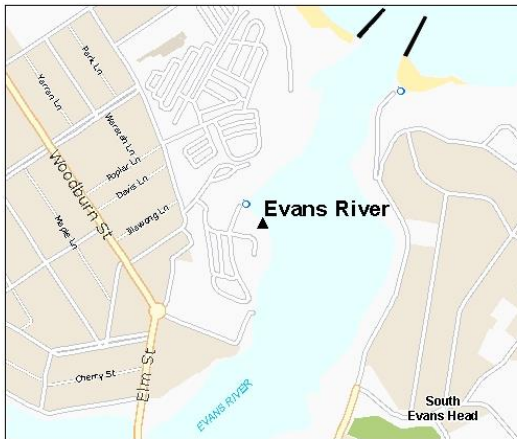


Water quality in response to rainfall



Evans River

Beach grade: P



Evans River sampling site is located upstream of the river mouth and near the caravan park.

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 potential faecal contamination from the Evans River and stormwater.

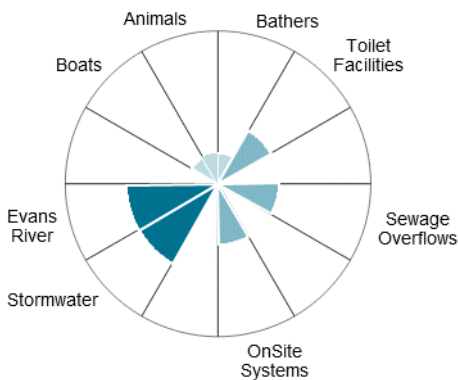
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after no rain, and often in response to light rainfall.

The site has been monitored since 2006.

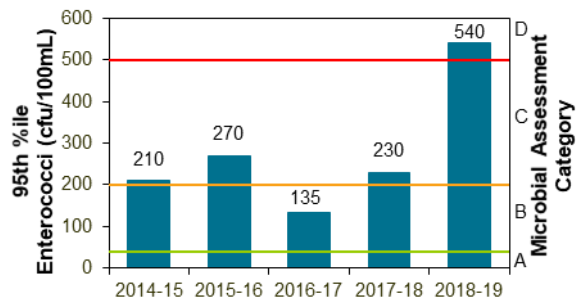
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Jul 2017 to Apr 2019	68%	100	Stable ●

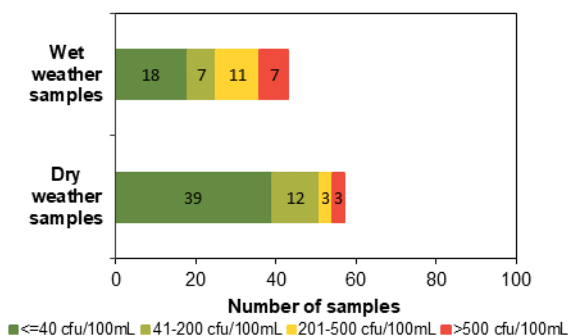
Sanitary inspection: Moderate



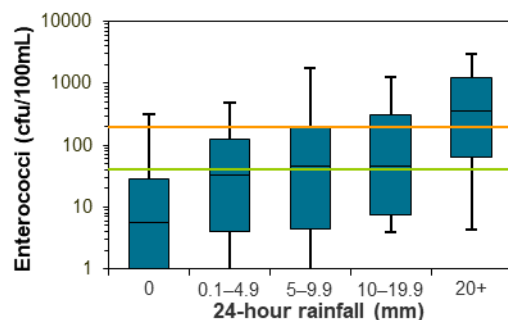
Microbial Assessment Category: D



Dry and wet weather water quality

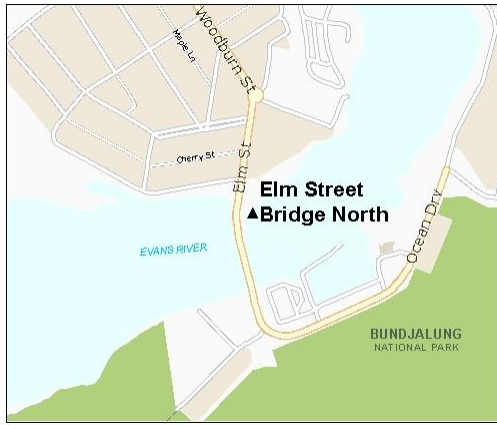


Water quality in response to rainfall



Elm Street Bridge North (Evans River)

Beach grade: G



Elm Street Bridge North (Evans River) is located on the eastern side of Elm Street Bridge in the Evans River.

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 the Evans River.

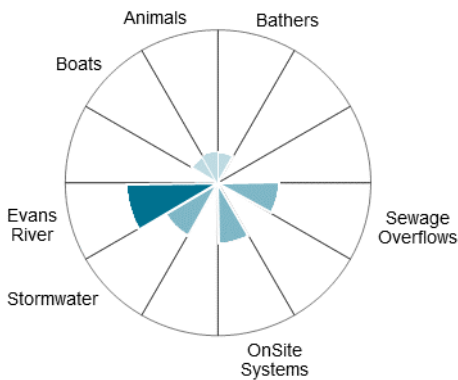
Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit in response to light rain.

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

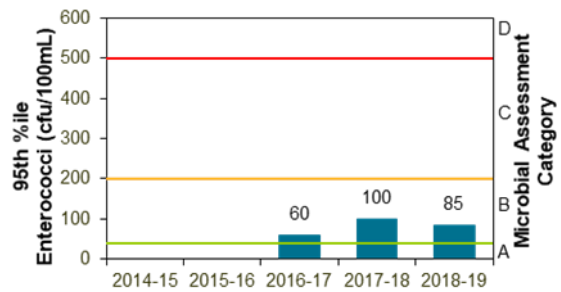
The site has been monitored since 2015.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Oct 2015 to Mar 2019	93%	100	Stable ●

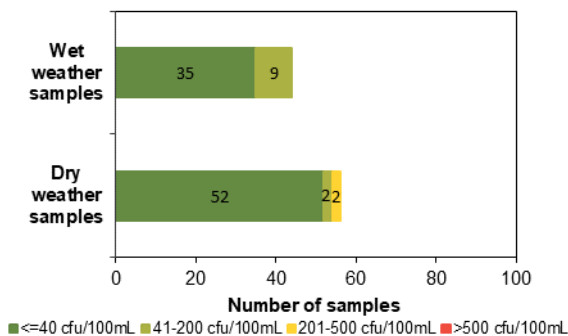
Sanitary inspection: Moderate



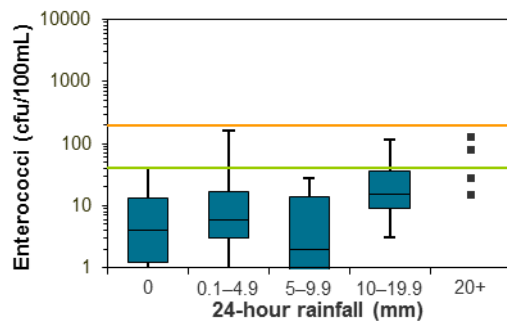
Microbial Assessment Category: B



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 five 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 three 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 three 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 three 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*¹ 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 Australia².

¹NHMRC 2008, *Guidelines for managing risks in recreational water*, National Health and Medical Research Council, Australian Government Publishing Service, Canberra, ACT.

²Department of Health, Western Australia 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, available at ww2.health.wa.gov.au/Articles/A_E/Environmental-waters-publications, accessed on 17/06/19.

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.

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.

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

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 four 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 percentile¹.

Risk of illness associated with Microbial Assessment Categories

Category	Enterococci (cfu/100mL)	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 four 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.

¹Wyer 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), pp.715–722.

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:
http://ww2.health.wa.gov.au/Articles/A_E/Environmental-waters-publications under *Forms and templates* [accessed 17/06/19].

Sanitary Inspection Category (SIC)

More information about the **sanitary inspection** process is available at:

www.environment.nsw.gov.au/topics/water/beaches/reporting-beach-water-quality/guidelines/sanitary-inspection.

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 five categories: Very Low, Low, Moderate, High and Very High.



Stormwater at Coogee Beach
Photo: Beachwatch/EES, DPIE

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.

Where there is a known history or evidence of sewage overflows or sewer chokes in the catchment they are identified as sources of potential faecal contamination, particularly if they are located close to the swimming location. In these instances, the risk posed by stormwater is adjusted accordingly to ensure the overall risk to public health is not overestimated.

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:

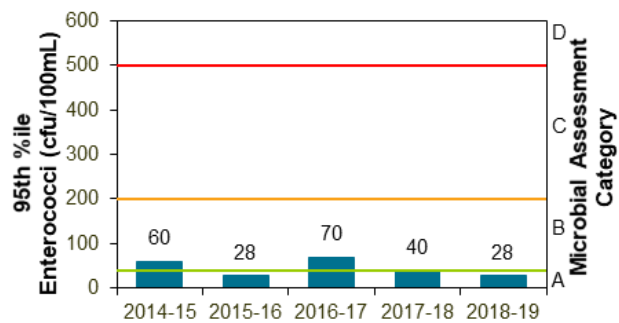
-  Stable
-  Improved
-  Declined

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

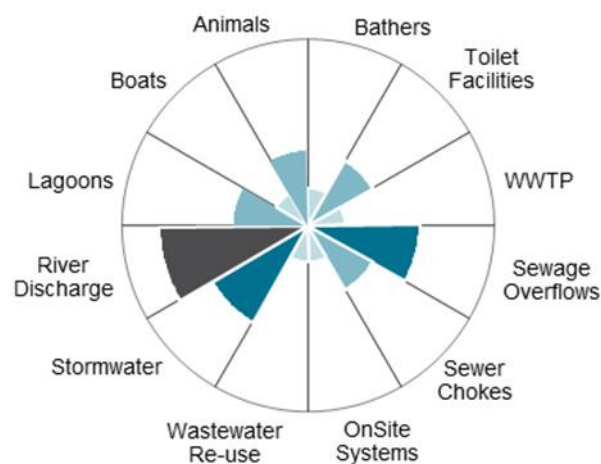
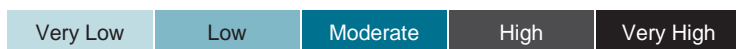
Microbial Assessment Category (MAC) chart

On each beach page, the MACs for the last five 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.



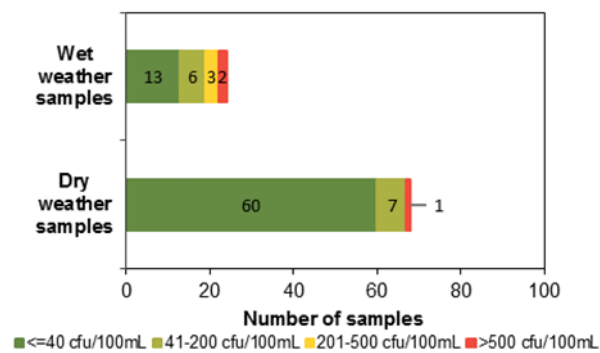
Sanitary Inspection Category (SIC) chart

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

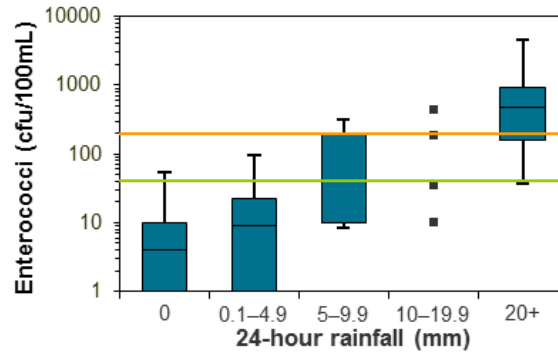
Enterococci levels in wet and dry weather conditions are presented for each swimming location as a bar graph. All data collected during the assessment period is included in the analysis. Dry weather is defined as no rainfall recorded in the previous 24 hours. Each bar is colour coded to show the number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



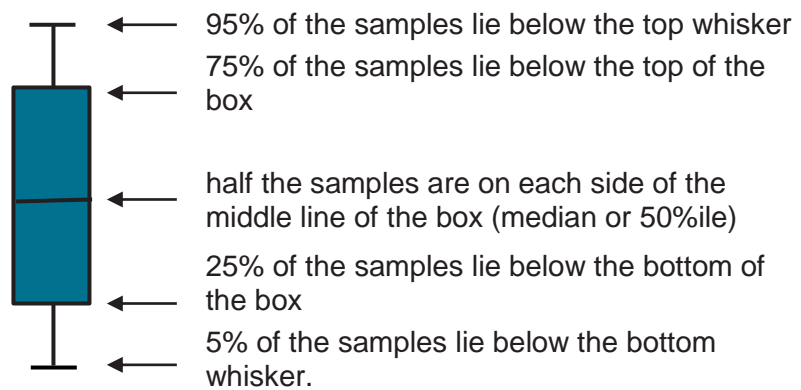
It is expected that swimming sites with lower levels of flushing show some elevated bacterial results in dry weather samples (no rainfall in the previous 24 hours) due to the longer time needed to recover from a rainfall event. At some estuarine and lake/lagoon swimming locations the impacts of stormwater pollution on beach water quality may be detected up to three 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 40cfu/100mL and 200cfu/100mL are indicated with a green and orange line, respectively. The 40cfu/100mL level is referred to as the 'safe swimming limit'. The enterococci data were obtained from the last five 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 five 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 (1cfu/100mL), 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 five-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 40cfu/100mL. 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 three 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