Southern Beaches Recreational Water Quality 2023-2024 Annual Report

Figure 1 Overview of sampling locations in Sorell Council area. More detailed maps provided in Appendix 1

"Sorell Council pays their respect to the traditional and original owners of this land the Mumirimina people, to pay respect to those that have passed before us and to acknowledge today's Tasmanian Aboriginal community who are custodians of this land".

Report prepared by **Rachel Tenni in accordance with the *Public Health Act 1997 and Recreational Water Quality Guidelines* - August 2007.**

SORELL COUNCIL

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A NATURAL RECREATIONAL WATER BODIES

A-1 NAME AND LOCATION OF NATURAL WATER BODY AND PURPOSE.

Recreational water sampling undertaken by Sorell Council focuses on the broader Southern Beaches area between Connelly's Beach and Midway Point shown in Figure 1. Appendix 1 provides greater detail of all seven sampling locations. All Beaches are considered primary contact beaches with additional secondary contact such as fishing, boating and diving occurring at all sites. Primrose Beach is habitat for the Red Spotted Hand fish currently listed as critically endangered adding greater emphasis on monitoring the recreational water body for human induced pollutants. Red Ochre Beach North and South along with Tiger Head Beach are points where the ocean water is channeled and concentrated into Barilla Bay and Orielton Lagoon, both world renowned RAMSAR wetlands and home to oyster farming activities attached to a worldwide export industry. This highlights the importance of monitoring the recreational water bodies along this coastline due to the multi-faceted layers of public health safety and the unique world class environmental values.

Table 1 Sorell Council's Location and recreational purpose for water body use. All sites are primary contact sites.

Name and location of water body	Recreational Purpose for water body use
Connellys Marsh Knights Road	Swimming, Boating, Fishing, Snorkelling
Primrose Sands Beach: Petrel Street	Swimming, Boating, Fishing, Snorkelling
Park Beach: Park Beach Road Dodges Ferry	Swimming, Surfing, Fishing
Red Ochre South: Parnella Road Dodges Ferry	Swimming, Boating, Fishing
Red Ochre North: Tiger Head Rd Dodges Ferry	Swimming; Boating, Fishing, Environmental Values
Tigerhead Beach: Seventh Ave Dodges Ferry	Swimming, Boating, Fishing
McKinly St Beach Access Midway Point	Swimming, Boating, Fishing
Blue Lagoon	Secondary contact point (stormwater collection point)

A-2 DATE AND TYPE OF SAMPLING UNDERTAKEN AND RESULTS

Beaches and pools microbiological sampling was conducted in accordance with AS/NZS 5667, Water Quality -Sampling. Samples are collected in sterile containers provided by the Public Health Laboratory. Grab samples were used to collect water from a depth of approximately 300mm below the surface in water 600-1000mm deep. Aseptic techniques were used to avoid sample contamination.

The Animal management Officer (AMO) collected water samples. Rachel Tenni conducted sanitary surveys at the start of the summer sampling period and noted any changes throughout the season shown in table 5.

Weekly samples were collected, in accordance with the *Public Health Act 1997 and Tasmanian Water Quality Guidelines*, during the three month summer period 2023-2024 as detailed. No sampling was undertaken over the Christmas-New Year period.

Samples are stored and transported under refrigeration (iced esky) to the Laboratory, arriving within three hours of collection.

A-3 BEACH SAMPLING -TESTS AND ANALYSES PERFORMED

A-3.i MICROBIOLOGICAL TESTING

Samples were tested for Enterococci (Faecal streptococci); results obtained were presumptive unless a presumptive result indicated an exceedance of the 140 organisms/100mL. Risk classifications are based on Table 5.10 of the NH&MRC Guidelines for Recreational Water.

A-3.ii SANITARY SURVEY

Sanitary surveys show the influences that each Beach has in relation to tidal influence, housing density, stormwater infrastructure, geomorphology and land use (i.e. agriculture, grazing, cropping, residential, land clearing). Table 2 refers to the sanitary surveys performed at the start of each sampling season (December). The Southern Beaches sanitary surveys are performed annually to determine any changes/influences/causative effects on the water quality of the recreational beach.

Table 2 Sanitary survey of all beaches

Location	Sanitary Survey Risk	Risk
Connellys Marsh Beach	Boatsheds, yachts moored ~400m from sample site, OSWMS on nearby properties, river at southern end of beach running through heavily grazed farms with livestock grazing within the riparian zone and river proper.	Moderate-high
Primrose Sands Beach	Failing OSWMS above beach, vehicle movement on beach (prohibited activity), and Stormwater minimal infrastructure. Land clearing at boat ramp of Crown Land.	*Moderate (fair)
Park Beach	High density OSWMS large dune system for protection against seepage, toilet block nearest to sample site. High energy beach	Low
Red Ochre South Beach	Stormwater outfalls; birdlife habitat protected area Spectacle Head, boatsheds, gravelly beach, higher density housing with OSWMS, greater threat of nutrient enrichment from OSWMS	High
Red Ochre North Beach	Bird life, OSWMS, medium density housing Spectacle Head a known rookery for shorebirds.	Moderate-high
Tiger Head Beach (Seventh Ave)	Large Stormwater outfalls, unsewered area, high density residential with Onsite waste management systems. Within a major water catchment area.	High
McKinly St Midway Point	Large stormwater outfalls onto beach, Orielton Lagoon RAMSAR wetland protected area. Higher density urbanisation with increased gross litter being washed into waterway. Hard surface land clearing. History of sewerage failure from pump station situated above the beach	High
Blue Lagoon	Secondary contact point monitoring for stormwater quality	High

*moderate is also known as fair

A-4 RESULTS AND DISCUSSION OF SAMPLING ANALYSIS

Rainfall data was collected from the Sorell abattoirs rain gauge which is located at Ingham's Processing factory, Stroud Point Dunalley and Hobart Airport. The following table (table 3) shows the relationship between water quality results and rainfall during the 2023-2024 season using the Pearson's r correlation. The 2023-2024 summer sampling period showed three beaches with strong correlations between rainfall and microbiological analysis results. Tiger head Beach is a densely populated area and correlations between rainfall and pollution is expected due to the lack of robust filtering of stormwater run-off, increased impervious surfaces and a naturally occurring water catchment which ends at Tigerhead beach. The Stormwater along Seventh Avenue will be replaced with larger stormwater infrastructure in late 2024. The change in stormwater carrying capacity may affect the data in 2024-2025 summer season as direct run off will occur at a greater speed and velocity during rain events. The Pearson's R correlation often returns strong correlations to those beaches that have major anthropomorphic landscape changes. The beaches where water quality and rainfall show no correlation are often those beaches with little change or have a large percentage of natural pervious ground and remnant bushland intact to provide filters and absorption of run-off water prior to entering the beaches. Appendix 8 provides The Tasmanian climate summary for summer 2023-2024. No major changes in recreational water quality bacteriological sampling were identified.

Table 3 Pearson's r correlation for 2023-24 summer sampling season

Name and location of water body	Pearson r Correlation result.
Connellys Marsh Knights Road	0.0278 no negligible
Primrose Sands Beach: Petrel Street	0.1075 no negligible
Park Beach: Park Beach Road Dodges Ferry	-0.1147 no negligible
Red Ochre South: Parnella Road Dodges Ferry	0.4274 strong
Red Ochre North: Tiger head Rd Dodges Ferry	0.1354 no negligible
Tigerhead Beach: Seventh Ave Dodges Ferry	0.9829 very strong positive
McKinly St Beach Access Midway Point	0.7927 very strong positive

Pearson's r Correlation

If r = +.70 or higher Very strong positive relationship
+.40 to +.69 Strong positive relationship
+.30 to +.39 Moderate positive relationship
+.20 to +.29 weak positive relationship
+.01 to +.19 No or negligible relationship
-.01 to -.19 No or negligible relationship
-.20 to -.29 weak negative relationship
-.30 to -.39 Moderate negative relationship
-.40 to -.69 Strong negative relationship
-.70 or higher Very strong negative relationship

Table 4 uses a rolling five-year dataset for determining the 95th Hazen percentile (table 4). As determined by NHMRC and Tasmanian Recreational Water Quality Guidelines, the analysis shows four out of the seven southern Beaches remaining stable while two beaches improved and one beach declined in water quality from the previous summer season. The results are used in conjunction with sanitary survey data to determine classification of the beaches.

The rainfall data becomes an important part of our management of Council's stormwater system to accommodate varying flows at Sorell's main recreational water sites. There are up to five unfiltered stormwater outfalls surrounding the sample sites. Microbiological sampling results showed higher than usual bacterial detection however, the detection was generally below trigger value for all sites

with the exception of McKinley Street Midway point due to sewer overflows after high intensity rainfall events. The pump station has now been upgraded to include additional storage and alarms, which reduce the risk of overflows occurring in the future. During this season, Primrose Beach returned a poor result when no rainfall was recorded. After investigating by sanitary survey and further sampling, it was noted that a resident had cleared a major part of the crown land area of natural vegetation and the run off from this area appeared to enter the beach without filtering through the soil and vegetation prior to discharge. The owners onsite wastewater land application area is also near to the boat ramp and future investigations are required to ensure wastewater is being treated and absorbed within property boundaries to allow for nutrient uptake by natural processes within the soil and vegetation.

A multifaceted approach using sanitary surveys and other variables such as wind, tides, temperature, population, stormwater, concentration of onsite waste management systems, intensive land clearing and agriculture, inappropriate development, high density housing close to waterways/increase in hard surfaces and the **severe fragmentation** of native vegetation are all variables that may influence the water quality of the Southern Beaches. Rainfall event variables such as frequency, duration, volume and intensity influence the relationship of water quality and Southern Beaches as shown in previous reports.

Table 4 95th Hazen percentile figures from previous 5yrs

Site	***Connellys Beach***	***Primrose Sands***	***Park Beach***	***Red Ochre South***	***Red Ochre North***	***Tiger Head Beach***	***McKinly Beach***
Percentile	95	95	95	95	95	95	95
Minimum data points needed	10	10	10	10	10	10	10
Number data points you have	84	85	84	84	84	84	84
Data minimum	0	0	0	0	0	0	9
Data maximum	187	906	52	833	187	146	1050
Hazen result	**44.30**	**74.25**	**23.30**	**77.60**	**110.00**	**77.30**	**287.90**
****TRWQG category***	*A*	*A*	*A*	*A*	*A*	*A*	*C*
*****NHMRC category***	*B*	*B*	*A*	*B*	*B*	*B*	*C*
**Tasmanian Recreational Water Quality Guidelines 2007*							
***NHMRC 2006 to be used with classification matrix for faecal pollution of recreational water environments.*							

Table 5 represents the variation from 2022-2023 season to 2023-2024 season. Most sites were stable with minimal changes in water quality.

Table 5 Recreational Beaches monitored by Sorell Council. Red denotes Poor quality (>500MPN100mL/1), yellow denotes moderate quality (200-500MPN 100mL-1) and green denotes good water quality (<200MPN 100mL-1).

	Beaches/River	**2023/24 Beach Status based upon 5-year 95th Hazen percentile for Enterococci**	**Trend based upon 5-year 95th Hazen percentile for Enterococci**
1	Connellys Marsh	Good B	stable water quality from 41 (2018-2023) to 44.30 (2019-2024)
2	Primrose Sands	Good B	Slight decline from 63 (2018-2023) to 74.25 (2019-2024)
3	Park Beach	Good A	water quality stable 20 (2018-2023) to 23.30 (2019-2024)

4	Red Ochre South	Good B	stable water quality from 72.7 (2018-2023) to 77.60 (2019-2024)
5	Red Ochre North	Good B	water quality improvement from 140.3 (2018-2023) to 110 (2019-2024)
6	Tigerhead Beach	Good B	water quality stable from 78.95 (2018-2023) to 77.30 (2019-2024)
7	McKinly Beach	Moderate C (fair)	water quality slight improvement from 294.35 (2018-2023) to 287.90 (2019-2024)

A-5 SWIMMING BEACH CLASSIFICATION FOR START OF 2023-2024 SWIMMING SEASON.

The water quality classification for each Beach based on Table 5.13 – Classification matrix for faecal pollution in recreational water environments taken from the NHMRC – Guidelines for Managing Risks in Recreational Water. The Sorell Environmental Health Officer will use the Tasmanian Recreational Water Guidelines (green column) classification for the 2023-2024 summer season.

Table 6 Sorell Council Beach classifications for 2024-2025 based on 2023-24 summer sampling season.

Location	Sanitary survey risk	Water quality category based on 95% hazen percentile - 5year indicator organisms results	Combined Grade NHRMRC	Tasmanian Rec Water Guidelines classification
Connellys Beach	Moderate-high	B	Fair	Good
Primrose Beach	Moderate	B	Good	Good
Park Beach	Low	A	Very Good	Good
Red Ochre Beach (South)	High	B	Fair	Good
Red Ochre Beach (North) aka Blue Lagoon	Moderate-High	B	Good	Good
Tigerhead Beach (Seventh Ave)	High	B	Fair	Good
McKinly St, Midway Point	High	C	Poor	Moderate (Fair)

No changes to classification status this season.

A-6 NATURAL WATER BODY DISCUSSION ON POTENTIAL SOURCES OF POLLUTION

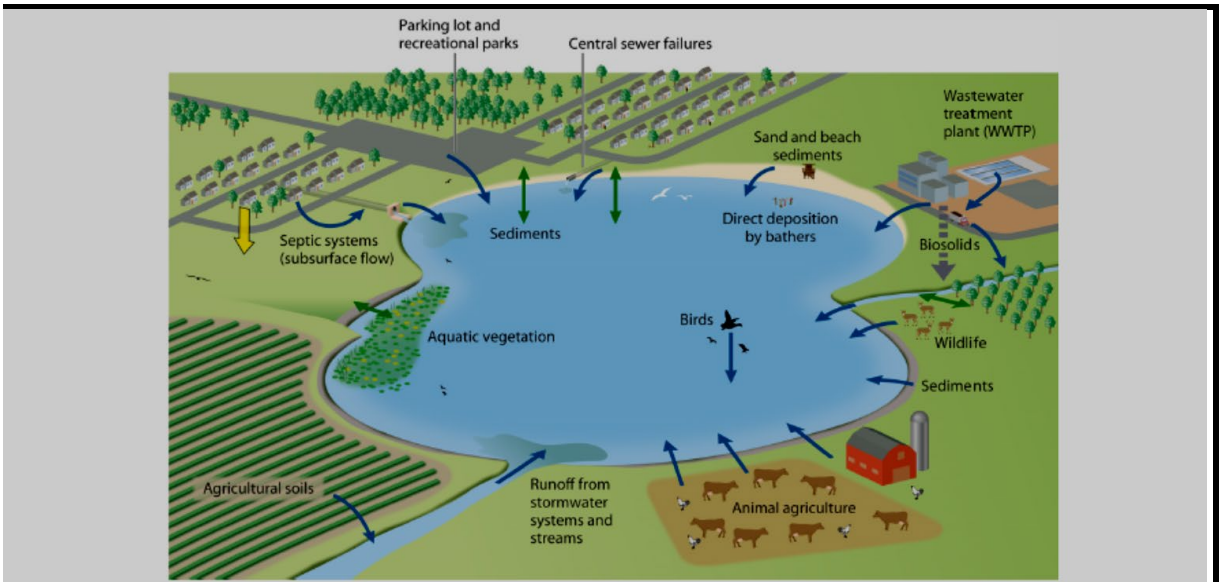

FIG 1 Sources of enterococci in water bodies (blue arrows) as well as sinks where enterococci are immobilized (yellow arrow) and areas of flux, in which enterococci can transition from a reservoir to the water column and vice versa (green arrows). Fluxes act as secondary sources or sinks depending upon the conditions.

Figure 2 Sources of enterococci is water bodies

The catchment areas of each of the recreational sampling sites (excluding McKinly St, which is serviced by reticulated sewerage) contain significant numbers of septic tanks and other on-site wastewater management systems. Some of which suffer varying levels of malfunction during periods of wet weather. Stormwater systems or creeks may convey pollutants discharged from on-site wastewater management systems to beach areas. Stormwater outfalls discharge in the vicinity of each of the recreational sampling sites, with the exception of Park Beach.

Dodges Ferry Lagoons. TasWater commissioned a Dodges Ferry Sewerage Technical Due Diligence Report in 2018. The report investigated the current status of the lagoons. This included the potential impacts from the 25yo sewage lagoon system to environment and public health. One finding concluded that a 'relatively high' risk of seepage within the underlying aquifers can potentially cause groundwater contamination and therefore increase the risk of pathogen contamination in nearby recreational waters. Increased nitrification has been recorded in nearby groundwater testing. TasWater is continuing to assess alternative options to upgrade the existing system increasing the treatment process to tertiary level and mitigate any contamination risk in the future. Sorell Council's environmental health and stormwater crew continue to monitor the condition and performance of the sewage lagoons.

Onsite Waste Management systems continue to play a significant role in recreational water quality due to the abundance and increased urbanisation of the Southern Beaches. Haphazard land clearing for residential dwellings has continued to increase dramatically with ribbon development occurring along the whole of the Southern Beaches from Dodges Ferry to Carlton Beach. This has seen vegetation cleared for hard surfaces, increased population, and higher visitation within the area. The introduction of the Southern beach On-site waste water and Stormwater Management Specific area plan has provided Council with a means to assess proposed developments onsite waste water management systems to ensure pollution from onsite waste water is mitigated through secondary

waste treatment via aerated waste treatment systems and raised sand filter beds. Both treatments provide nutrient reduction through evapotransipiration and uptake of excess nutrients through planting and the import of filtered sand beds. A strategy for wastewater management of The Southern beaches will commence in the 2024-2025 summer season. The authors are highly respected in the field of onsite waste management and will provide future recommendations for managing the ever increasing sewerage demand on the southern beaches due to the increased sewage expected with population growth.

A-7 NATURAL WATER BODY CONCLUSIONS/RECOMMENDATIONS

All sites are categorized as 'good' according to the Tasmanian Recreational Water Guidelines with the exception of McKinly Beach which is 'moderate' (Fair). The 2023/24 summer season recreational water quality of the Southern Beaches remained stable overall with one beach (Primrose) showing direct change in the sanitary survey, while all other recreational water bodies remained consistent with previous years. According to the Bureau Of meteorology (BOM), Southern parts of Tasmania experienced a drier than normal summer season and higher than average temperatures. This is similar to the 2022-2023 summer.

The continued sub divisions and development on small blocks increasing urbanisation of the Southern Beaches means less natural vegetation and landforms; reducing natural beneficial stormwater filtration. A major factor for the McKinley St classification can be attributed to increasing high volume stormwater flow concentrations from sudden storm events due to climate change. The sewer pump station has been upgraded to accommodate for the increased housing in Midway Point, McKinly Street. In general climate change and increased urbanisation may result in increased volumes of unfiltered runoff from hard surfaces, potentially resulting in lowering the recreational water quality, leading to poor health for humans and extinction of the already threatened handfish.

Sorell Council has currently identified issues specific to the Sorell LGA;

- Inconsistences in rain water tank specifications in permits issued across various urban subdivisions;
- Inconsistencies in design and installation of stormwater outlets to roadside drains;
- Creation of easements for existing stormwater infrastructure;
- Development in flood-prone areas; and
- Administrative Processes.

These inconsistencies have been highlighted with the approved 'Stormwater in New Developments Policy'. The Stormwater asset management Plan has tasked regulatory and environmental teams to create a water quality monitoring schedule in accordance with Sorell Council's Planning Policy and statutory obligations. This will provide data to guide Council's future stormwater policy to 'hopefully' require all future developments to increase the percentage of pervious surfaces as part of Water Sensitive Urban Design within their applications to ensure the necessary balance between human habitation and natural landscapes.

The introduction of strategic planning in Water Sensitive Urban Design (WSUD) continues to be a high priority. Sorell Council has identified future population growth and greater urban development in the Southern Beaches area. This will bring with it increased pollution, land clearing, greater hard surface areas resulting in increasing stormwater flows and faecal infiltration into the surrounding environment.

To future proof the Southern Beaches from declining water quality that can lead to gastrointestinal and respiratory infections causing illnesses such as diarrhea, skin rashes, ear pain, coughs, lung congestion and eye pain, it is important, where possible to create riparian zones from 10m to 40m in existing creeks, rivers and natural water catchment areas to provide natural filtration systems before stormwater enters the primary recreational ocean beaches. Swales, infiltration systems and constructed wetlands are excellent at capturing gross pollutants, however treatment trains (a sequence of stormwater treatments, designed to meet the needs of a particular environment in order to maximise results. Treatment trains are important when a treatment measure needs pre-treatments to remove pollutants, such as nutrients and fine sediment, which would otherwise impact its performance), rainwater tanks and onsite waste water systems remain the key to treating microbial pollutants before entering the recreational beaches. Sorell Council should educate land owners of their responsibility to maintain native vegetation along streams and riverbanks; to reduce fertilizer run off and to encourage sustainable development. Adhoc sub divisions close to sensitive aquatic areas have been approved to the detriment of the surrounding landscapes. Iron Creek has been neglected of any riparian zoning. According to long term local land owners, Platypus were once abundant in this catchment and have not been seen upstream for many years. It is recommended to sample Iron Creek for baseline data and investigate ways to work towards reestablishing healthy water catchment areas.

No stormwater pipes should be channeled directly to oceans unless a series of treatment ponds, and filtering systems have been implemented upstream prior to discharge. Onsite waste water must be treated while remaining within property boundaries to allow Council to achieve an uncontaminated clean environment for a safer and healthier future for Sorell Council area residents, visitors and the unique fauna and flora.

Sorell Council should adopt a proactive management plan for all protected coastal and inland waterways. One recommendation is to provide public tracks and trails alongside the main creeks and rivers to create a network of human connectivity while providing riparian zones and wildlife corridors. Waterways are an excellent way of improving the environmental health of the local area and public health of the communities who live within our area.

A-8 REFERENCES

1. Australian/New Zealand Standard 5667.1:1998. *Water Quality – Sampling. Part 1: Guideline on the design of sampling programs, sampling techniques and the preservation and handling of samples.*
2. *Enterococci in the Environment Muruleedhara N. Byappanahalli, Meredith B. Nevers, Asja Korajkic, Zachery R. Staley, and Valerie J. Harwood* Americian Society of Microbiology *and Molecular Biology Reviews December 2012 Vol 76. Downloaded from https://mmbr.asm.org/content/mmbr/76/4/685.full.pdf*
3. *Generation of Enterococci Bacteria in a Coastal Saltwater Marsh and Its Impact on Surf Zone Water*
4. *Quality* - S. B. G R A N T, Et Al University of California VOL. 35, NO. 12, 2001 / ENVIRONMENTAL SCIENCE & TECHNOLOGY – American Chemical Society 2001
5. *New South Wales Environmental Protection Agency, 1997, State of the Environment Report, chapter 3. On-line at: www.epa.nsw.gov.au*
6. *World Health Organisation, 2003, Guidelines for safe recreational water environments - Volume 1 – Coastal and Fresh Waters, World Health Organisation, Geneva.*
7. *Strategic Plan for Managing Southern Beaches Wastewater – Sorell Council (Jan 2006)*
8. *Bureau of Meteorology (BOM) 'Climate Data Online' website http://www.bom.gov.au/climate/current/season/tas/archive/202402.summary.shtml accessed October 2024.*
9. Assessing the effectiveness of water sensitive urban design in southeast Queensland. https://eprints.qut.edu.au/34119/1/Nathaniel_Parker_Thesis.pdf accessed August 6 2020
10. *GHD, 2018. Dodges Ferry Sewerage Technical Due Diligence Report. A joint initiative by TasWater and Sorell Council*

GUIDELINES

The Tasmanian Recreational Water Quality Guidelines 2007

National Health and Medical Research Council (NHMRC) "Guidelines for Managing Risks in Recreational Waters 2006

Australian Guidelines for Urban Stormwater Management (historical guidelines) https://www.waterquality.gov.au/guidelines/urban-stormwater.

Microbial Quality of Recreational Water Guidance Notes- Western Australia Department of Health and the University of Western Australia.

LEGISLATION

Public Health Act 1997

APPENDICES

APPENDIX 1 – COLOUR ATLAS RECREATIONAL WATER SAMPLING SITES

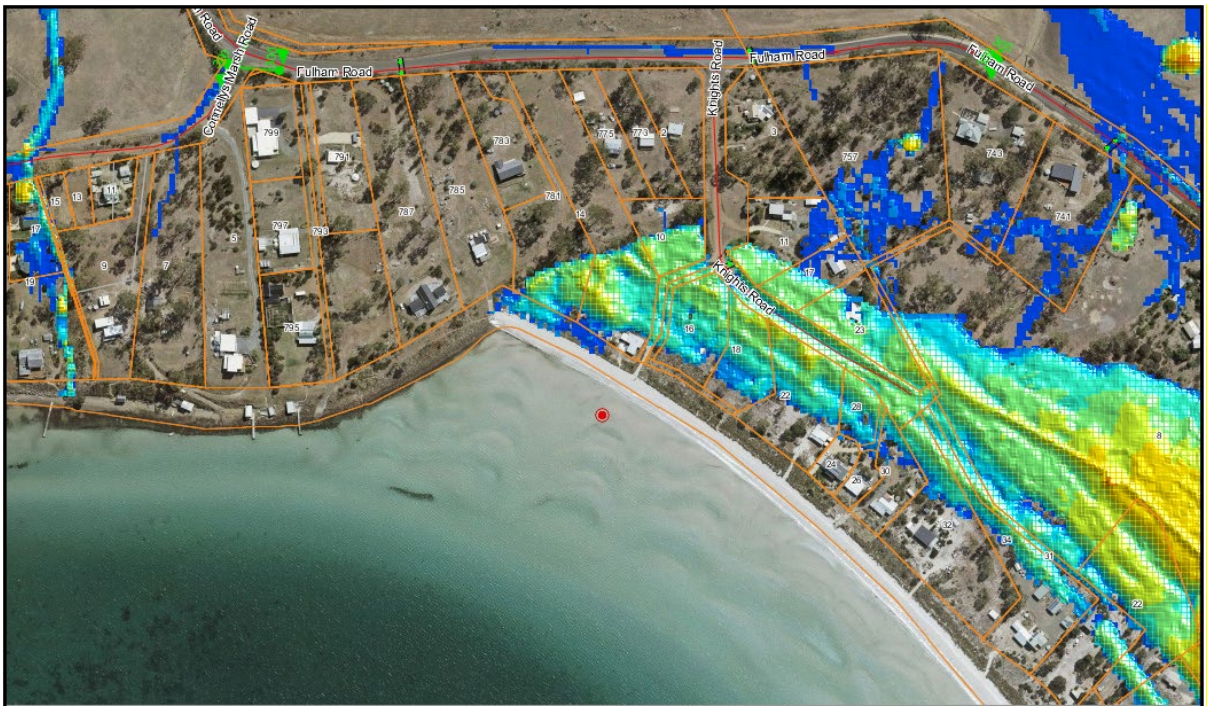

Figure 3 Connellys Marsh showing flood extent and stormwater infrastructure

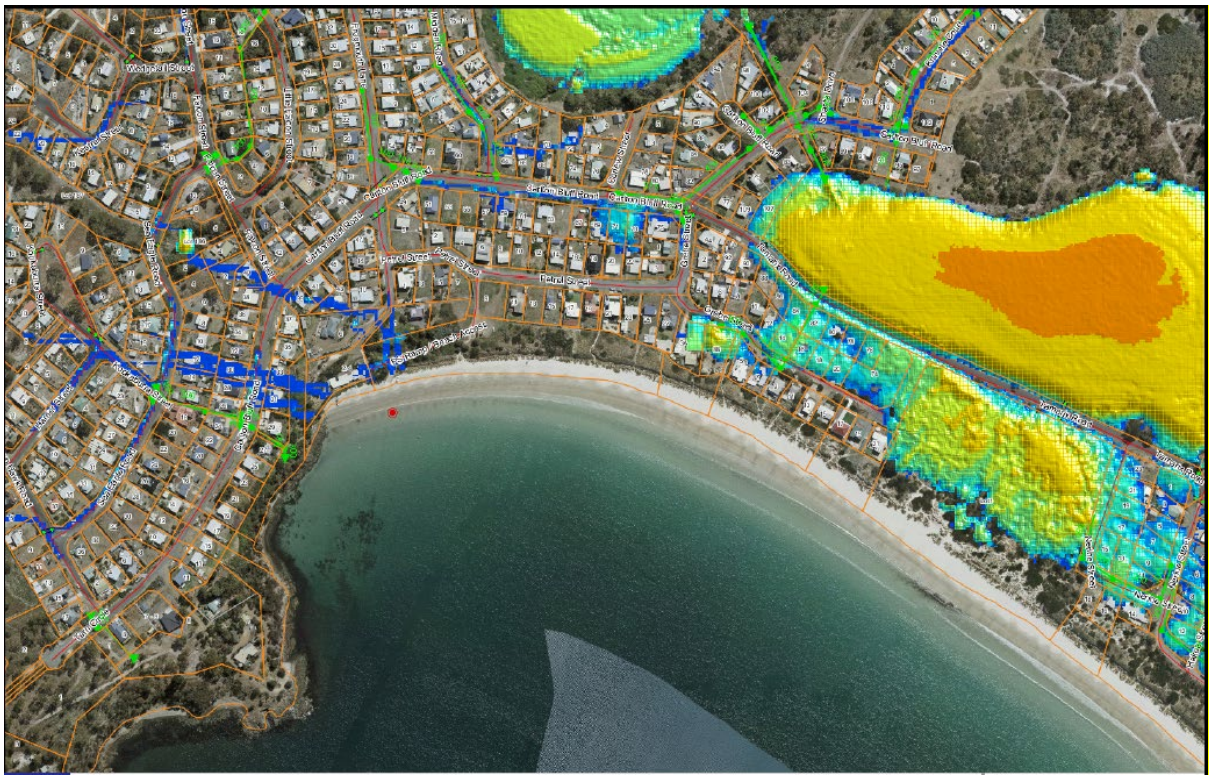

Figure 4 Primrose Sands Beach showing flood extent and stormwater infrastructure

Figure 5 Park Beach Carlton showing flood extent and stormwater infrastructure

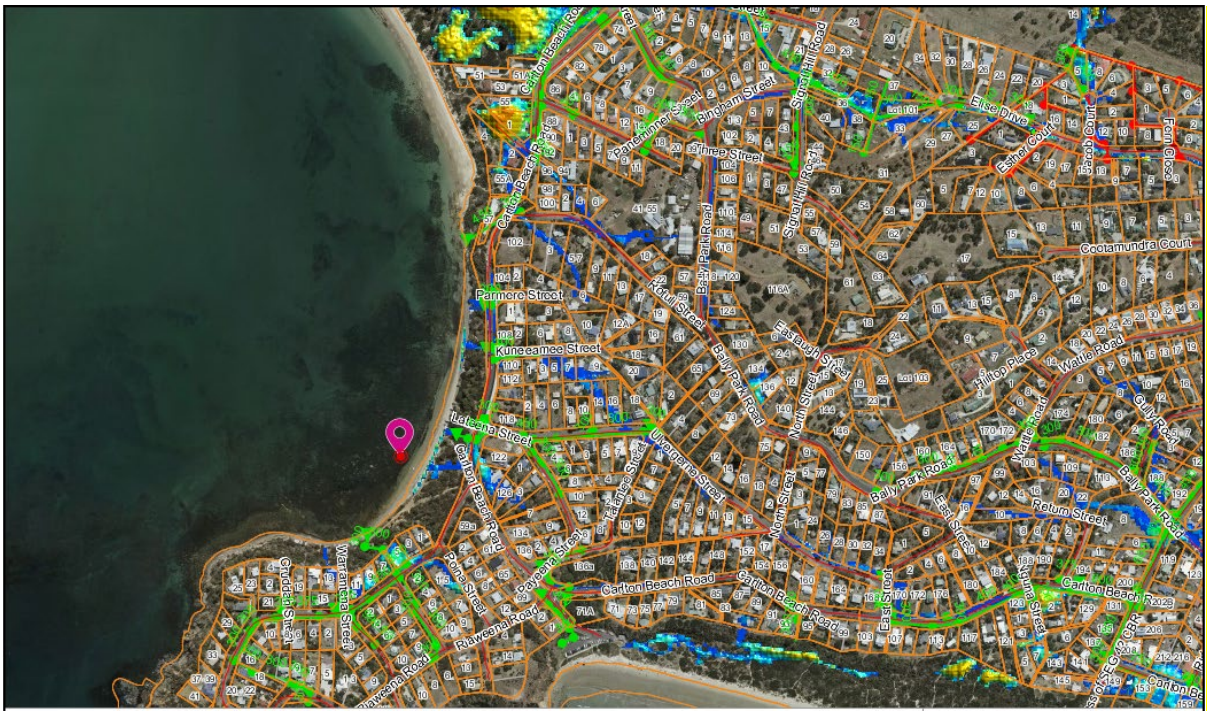

Figure 6 Red Ochre Beach South showing flood extent and stormwater infrastructure

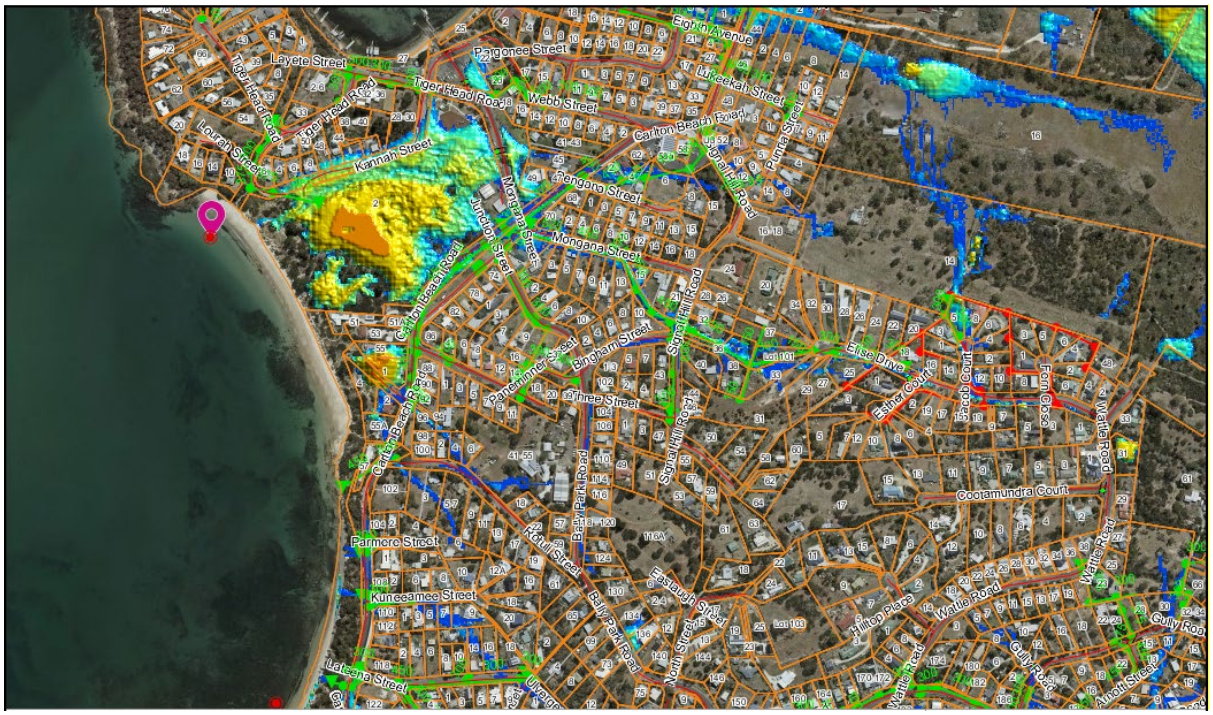

Figure 7 Red Ochre Beach North showing flood extent and stormwater infrastructure

Figure 8 Tiger Head Beach @ 7th Ave showing flood extent and stormwater infrastructure

Figure 9 McKinly St Beach sewer in red; stormwater in green, flood risk and waterway shown

APPENDIX 2 – SUMMARY OF RECREATIONAL WATER BODY SAMPLING RESULTS 2023-2024

Table 7 data results from 2023-24 summer season. Red denotes a failed water result, amber some contamination and pink minor reading.

Date 2023/2024	Connelly Beach	Primrose Beach	Park Beach	Red Ochre - South	Red Ochre - North	Tigerhead - 7th Av.	McKinly St Midway Point
5/12/2023	10	10	10	10	10	10	10
11/12/2023	10	10	52	10	10	10	10
18/12/2023	10	10	31	10	10	10	31
2/01/2024	10	85	10	74	148	20	20
8/01/2024	20	193	10	86	52	96	272
16/01/2024	10	10	10	10	10	10	10
23/01/2024	10	10	10	10	10	10	10
30/01/2024	63	10	10	10	110	10	10
6/02/2024	10	10	10	10	10	10	20
13/02/2024	10	10	10	10	86	10	228
15/02/2024	*resample of McKinley St Only*						88
20/02/2024	10	10	10	10	10	10	10
27/02/2024	10	906	10	10	10	10	10
29/02/2024		63	*resample Primrose beach only*				
5/03/2024	20	10	10	10	10	10	10
12/03/2024	10	74	10	10	10	20	10
19/03/2024	10	31	10	10	10	10	20
26/03/2024	41	10	10	121	20	10	10

APPENDIX 3 RAINFALL DATA

Table 8 Rainfall data taken from Sorell Abattoirs, Stroud Point and Hobart Airport rain gauges. The Bureau of Meteorology have removed quality control and no longer employ people to check data. All data is now taken using Automatic weather stations and no longer have paid weather observers or coop weather observers. Therefore the decision was made to utilise the three major AWS readings located nearest to the Southern Beaches recreational swimming areas.

Date 2023-2024	Total Rainfall(mm) taken from Sorell Abattoirs, Stroud Point Dunalley and Hobart Airport
5/12/2023	0
11/12/2023	0
18/12/2023	0.2
2/01/2024	0
8/01/2024	17.2
16/01/2024	0
23/01/2024	0.8
30/01/2024	0
6/02/2024	0
13/02/2024	2.2
15/02/2024	2.0
20/02/2024	0
27/02/2024	0
29/02/2024	2
5/03/2024	0
12/03/2024	2

The total rainfall for the four months Dec 2023 to-Mar 2024 varied from 58.4mm of rainfall at Hobart Airport to 104.4mm of rain at Stroud Point Dunalley and 91.4mm at Inghams Abattoirs Sorell.

APPENDIX 4 - GUIDELINE VALUES FOR MICROBIAL QUALITY OF RECREATIONAL WATERS

For marine waters, only faecal streptococci (Enterococci) showed a dose-response relationship for both gastrointestinal illness and Acute Febrile Respiratory Infection (AFRI). A recent reanalysis of this data using a range of contemporary statistical tools has confirmed that the relationships originally reported are robust to alternative statistical approaches.

The cut-off or bounding values (40, 200, and 500) are expressed in terms of the 95th percentile of numbers of faecal streptococci per 100 mL, and represent readily understood levels of risk, based on the exposure conditions of the key studies.

For the purpose of water-quality monitoring, the terms 'faecal streptococci', 'intestinal Enterococci' and 'Enterococci' are considered to be synonymous. Exposure to recreational waters with these measured indicators refers to body contact that is likely to involve head immersion, such as swimming, surfing, white-water canoeing, scuba diving and dinghy-boat sailing.

95th Percentile value of intestinal Enterococci / 100ml (rounded Values)	Basis of derivation	Estimated risk per exposure
$\leq$ 40 A	This range is below the NOAEL in most epidemiological studies.	<1% GI illness risk <0.3% AFRI risk The upper 95th percentile value of 40/100ml relates to an average probability of less than one case of gastroenteritis in every 100 exposures. The AFRI burden would be negligible.
41-200 B	The 200/100 ml value is above the threshold of illness transmission reported in most epidemiological studies that have attempted to define a NOAEL or LOAEL for GI illness	1-5% GI illness risk 0.3-1.9% AFRI risk The upper 95th percentile value of 200/100 ml relates to an average probability of one case of gastroenteritis in 20 exposures. The AFRI illness rate at this upper value would be less than 19 per 1000 exposures, or less than approximately 1 in 50 exposures.
201-500 C	This range represents a substantial elevation in the probability of all adverse health outcomes for which dose-response data are available.	5-10% GI illness risk 1.9-3.9% AFRI risk This range of 95th percentiles represents a probability of 1 in 10 to 1 in 20 of gastroenteritis for a single exposure. Exposures in this category also suggest a risk of AFRI in the range of 19-39 per 1000 exposures, or a range of approximately 1 in 50 to 1 in 25 exposures.

>500 D	Above this level, there may be a significant risk of high levels of minor illness transmissions.	>10% GI illness risk >3.9% AFRI risk There is a greater than 10% chance of gastroenteritis per single exposure. The AFRI illness rate at the 95th percentile point of >500/100ml would be greater than 39 per 1000 exposures, or greater than approximately 1 in 25 exposures.

Notes:

1. Abbreviations used: A-D are the corresponding microbial water quality assessment categories used as part of the classification procedure; AFRI = acute febrile respiratory illness; GI = gastrointestinal; LOAEL = lowest-observed-adverse-effect level; NOAEL = no-observed-adverse-effect level.
2. The "exposure" in the key studies was a minimum of 10 minutes of swimming involving three head immersions. It is envisaged that this is equivalent to many immersion activities of similar duration, but it may underestimate risk for longer periods of water contact or for activities involving higher risks of water ingestion (see also note 8)
3. The "estimated risk" refers to the excess risk of illness (relative to a group of non-bathers) among a group of bathers who have been exposed to faecally contaminate recreational water under conditions similar to those in the key studies.
4. The functional form used in the dose-response curve assumes no further illness outside the range of data (i.e., at concentrations above 158 intestinal enterococci/100ml). Thus, the estimates of illness rate reported above this value are likely to be underestimates of the actual disease incidence attributable to recreational water exposure.
5. The estimated risks were derived from sewage-impacted marine waters. Different sources of pollution and more or less aggressive environments may modify the risks.
6. This table may not relate to children, the elderly or the immunocompromised, who could have lower immunity and might require a greater degree of protection. There are presently no adequate data with which to quantify this, and no correction factors are therefore applied.
7. Epidemiological data on fresh waters or exposures other than swimming (e.g., high-exposure activities such as surfing, dinghy boat sailing or white-water canoeing) are currently inadequate to present a parallel analysis for defined risks. Thus, a single series of microbial values is proposed, for all recreational uses of water, because insufficient evidence exists at present to do otherwise. However, it is recommended that the length and frequency of exposure encountered by special interest groups (such as bodysurfers, board riders, windsurfers, sub-aqua divers, canoeists and dinghy sailors) be taken into account.
8. Where disinfection is used to reduce the density of index organisms in effluent and discharges, the presumed relationship between intestinal Enterococci (as an index of faecal contamination) and pathogen presence may be altered. This alteration is, at present, poorly understood. In water receiving such effluents and discharges, intestinal Enterococci counts may not provide an accurate estimate of the risk of suffering from gastrointestinal symptoms or AFRI.
9. Risk attributable to exposure to recreational water is calculated after the method given by Wyer et al. (1999), in which a $\log_{10}$ standard deviation of 0.8103 for faecal streptococci was assumed. If the true

standard deviation for a Beach is less than 0.8103, then reliance on this approach would tend to overestimate the health risk for people above the threshold level, and vice versa.

Note that the values presented in this table do not take account of health outcomes other than gastroenteritis and AFRI. Where other outcomes are of public health concern, then the risks should also be assessed and appropriate action taken.

10. Guideline values should be applied to water used recreationally and at the times of recreational use. This implies care in the design of monitoring programs to ensure that representative samples are obtained.

Page 70-71, Guidelines for Safe Recreational Water Environments – Vol 1 – Coastal and Fresh Waters – World Health Organisation, Geneva, 2003.

APPENDIX 5 CLASSIFICATION MATRIX FOR FAECAL POLLUTION OF RECREATIONAL WATER ENVIRONMENTS.

Table 5.13 Classification matrix for faecal pollution of recreational water environments*

		Microbial water quality assessment category (95th percentiles — intestinal enterococci/100 mL)				Exceptional circumstances[c]
		A ≤ 40	B 41–200	C 201–500	D > 500	
Sanitary inspection category (Susceptibility to faecal influence)	Very low	Very good	Very good	Follow up[b]	Follow up[b]	ACTION
	Low	Very good	Good	Follow up[b]	Follow up[b]	
	Moderate	Good[a]	Good	Poor	Poor	
	High	Good[a]	Fair*	Poor	Very poor	
	Very high	Follow up[a]	Fair*	Poor	Very poor	
	Exceptional circumstances[c]	ACTION				

a Indicates possible discontinuous/sporadic contamination (often driven by results such as rainfall). This is most commonly associated with the presence of sewage – contaminated stormwater. These results should be investigated further, and initial follow-up should include verification of the sanitary inspection category and ensuring that samples recorded include 'event' periods. Confirm analytical results, review possible analytical errors.

b Implies nonsewage sources of faecal indicators (eg livestock), which need to be verified.

c Exceptional circumstances are known periods of higher risk such as during an outbreak involving a human or other pathogen that may be waterborne (eg avian botulism — where outbreaks of avian botulism occur, swimming or other aquatic recreational activities should not be permitted), or the rupture of a sewer in a recreational water catchment area etc. Under such circumstances the classification matrix may not fairly represent risk/safety.

* In certain circumstances there may be a risk of transmission of pathogens associated with more severe health effects through recreational water use. The human health risk depends greatly on specific (often local) circumstances. Public health authorities should be engaged in the identification and interpretation of such conditions.

Figure 10 NH&MRC Guidelines for Managing Risks in Recreational Water

APPENDIX 6 TASMANIAN RECREATIONAL WATER QUALITY GUIDELINES

The Tasmanian Recreational Water Quality Guidelines, (the "Tasmanian Guidelines") adopted, by reference, the National Health and Medical Research Council (NHMRC) "Guidelines for Managing Risks in Recreational Waters 2006", (the "new NHMRC Guidelines"); provide a range of guideline values in respect of Enterococci sample statistics, which should be considered in combination with sanitary survey results, in assessing the suitability of recreational water bodies for primary contact recreation.

Whilst monitoring for Enterococci or Thermotolerant Coliforms is considered to provide evidence of faecal contamination in a water body; it does not provide anything more than an indication of the likely presence of viral contamination. Enteric viruses such as Hepatitis A, Norovirus, and Adenovirus may be present in wastewater and are all capable of causing illness in humans, often requiring very low infective doses to actually cause infection. These viruses represent the most likely risk to public health from primary contact recreation in water contaminated by wastewater effluents, even when the more easily detectable bacteria, such as Enterococci or Thermotolerant Coliforms are only detected at levels which are unlikely to result in direct bacterial infections.

This is especially significant where such recreational waters are known to be impacted by point sources of urban wastewater from unsewered areas and consequent high risk of human faecal contamination. To summarise, where otherwise low levels of faecal contamination are detected, there may well be a significant risk of transmission of viral infections, especially if the source of this faecal contamination is thought or known to be of human origin, rather than, for example, from native wildlife such as shore birds.

The NHMRC Guidelines are based in part upon a World Health Organisation publication (WHO, 2003, Guidelines for Safe Recreational Water Environments – Vol 1 – Coastal and Fresh Waters, Geneva) which provide an A to D risk management classification, based on 95th Percentile figures derived from monitoring program results. The classifications are based on the actual observed risk of developing illness such as Gastro Intestinal Illness (GI illness) and/or Acute Febrile Respiratory Infection (AFRI) after primary contact recreation in waters contaminated with a given range of Enterococcus bacteria of human faecal origin. This risk management classification is adopted by both the NHMRC and Tasmanian Guidelines. The NHMRC Guidelines provide in principle for a risk-based approach to recreational water quality classification, linking the decision making process to sanitary survey results combined with microbiological surveys, however neither the NHMRC Guidelines nor the Tasmanian Guidelines provide a clear and objective means of achieving this. The Tasmanian guidelines classify waters in the B category as "Good" despite studies elsewhere which demonstrate significant risks of infection in swimmers using waters in this category.

Cat. A – 95th Percentile <40 orgs/100mL equates to <1% GI illness risk & =<0.3% AFRI risk

Cat. B – 95th Percentile 41-200 orgs/100mL, equates to 1-5% GI illness risk & 0.35-3.95% AFRI risk

Cat. C – 95th Percentile of 201-500 orgs/100mL, equates to 5-10% GI illness risk & 1.9-3.9% AFRI risk

Cat. D – 95th Percentile of >500 orgs/100mL equates to >10%% GI illness risk & >3.9% AFRI risk.

The Tas Guidelines combine Categories A and B (i.e. 0-40 and 41-200) into a single "Good" Water Quality Indicator, with Category C described as "Moderate" and Category D as "Poor". They also provide for a requirement to resample within 48 hours of a sample returning a result greater than 140 Enterococci per 100mL and to "close" Beaches where two consecutive water results exceed 280. The NHMRC Guidelines by contrast define waters in both the C and D Categories as "Poor".

APPENDIX 7: SUMMARY OF EAST COAST WEATHER.

Data source Bureau Of Meteorology accessed October 2024.

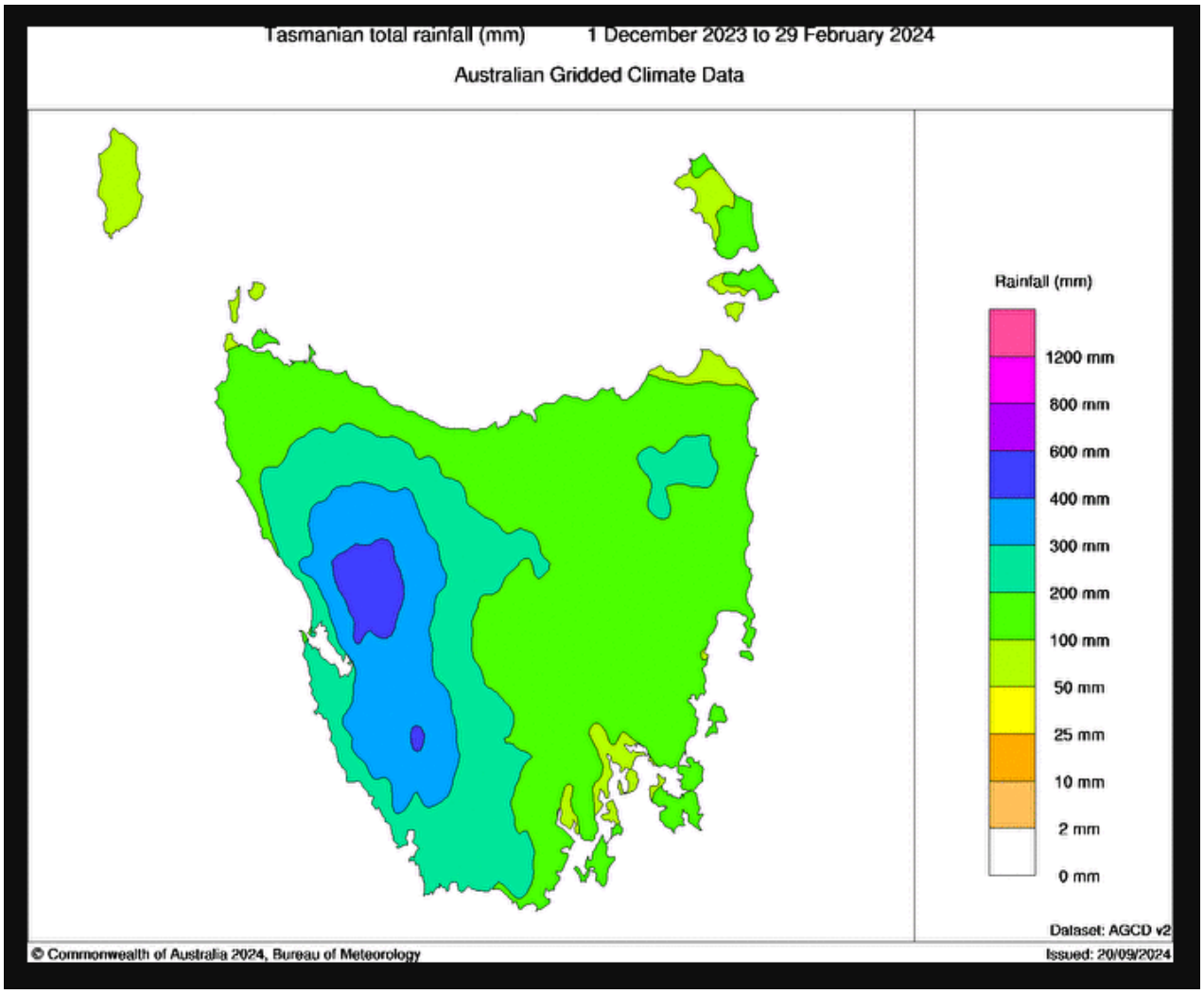

Figure 2 Summer rainfall graph showing below average rainfall for the 2023-2024 summer season

2023-2024 Summer monthly total rainfall			
Site	**Airport**	**Stroud Point Dunalley**	**Inghams**
December	33.8	23.6	52.6
January	36.2	66	25.6
February	3	5.4	2.6
March	11.8	9.4	10.6