



Catchment, Stormwater & River Management Branch

**INLAND WATER QUALITY MONITORING NETWORK**

**WATER QUALITY SUMMARY REPORT: SEPTEMBER 2022**

**E.coli**

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## 1 INTRODUCTION

The City's Inland Water Quality Monitoring Programme comprises over 100 sample locations on various inland systems (rivers, wetlands and estuaries). Monthly water samples collected from each location are analysed at Scientific Services in terms of a Service Level Agreement that the laboratory has with the Catchment, Stormwater and River Management Branch (CSRM). Both microbiological and physio-chemical analyses are undertaken on each sample, with a range of algal constituents also being analysed on samples collected from various wetland (vlei) or estuarine systems.

The microbial data used in this report as a reflection of general water quality in the inland systems forming part of the City's inland water quality monitoring network. This constituent provides an indication of faecal contamination which is proving to be a significant challenge that compromises the state of the urban freshwater environment due to a variety of sources (e.g. spills/overflows from the sewage reticulation network, runoff from informal settlement areas and, occasionally, inadequately treated wastewater).

Results are assessed in terms of the Department of Water and Sanitation (DWS) "Intermediate Contact Recreation Guidelines" which makes use of faecal coliforms as indicator organisms. "Intermediate" levels of contact include recreational activities such as sailing, canoeing, fishing, water skiing etc. Full body immersion for extended periods during swimming and diving are regarded as "Full Contact".

The DWS Intermediate Contact Guideline summarised in the text box below provides an indication of increasing public health risk with progressively high levels of faecal contamination.

The guideline makes use of 'faecal coliform counts' that is, however, no longer routinely measured, in many laboratories. *E.coli* is increasingly regarded as the preferred indicator as it provides a better indication of faecal pollution originating from warm-blooded organisms. *E.coli* may comprise up to 97 % of faecal coliform bacteria in human faeces.

<p><b>&lt; 1000 No/Very Low Risk</b></p>	<p><b>1 001 - 4 000 Slight Risk</b></p> <p><i>It may be expected that limited contact with water of this quality is associated with a risk of gastrointestinal illness.</i></p>	<p><b>&gt; 4 000 Increasing Risk</b></p> <p><i>Intermediate recreational contact with water can be expected to carry an increasing risk of gastrointestinal illness as faecal coliform levels increase.</i></p>
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Since this DWS, faecal coliform intermediate contact guideline has not always proven useful as a management and decision support tool to evaluate long-term trends; it has been adapted by CSRM as described in **Section 2**.

## 2 E.COLI INLAND WATER QUALITY MANAGEMENT GUIDE

The E.coli Inland Water Quality Management Guide has been developed based on both the aforementioned DWS Intermediate Contact Recreation Guideline, a study undertaken for CSRM in 2011<sup>1</sup>, the Berg Resource Quality Objectives study, and the recently completed Inland Water Quality Technical Report completed by an appointed team of specialists in the field of urban water quality and ecology.

Interpretation	Faecal Coliform ( <i>including E. Coli</i> ) CFU/100ml
'Target' <u>Full Contact</u> *	≤ 400
'Target' <u>Intermediate Contact</u>	≤ 1000
Acceptable Risk - <u>intermediate Contact</u>	≤ 2500
Tolerable Risk - <u>intermediate Contact</u>	2501-4000
Unacceptable Risk (Level 1)	4001 – 10 000
Unacceptable Risk (Level 2)	10 001 - 100 000
Unacceptable Risk (Level 3)	> 100 000

\* Note however that full contact activities (swimming/diving) are not recommended in urban waterways due to water quality challenges, possible presence of underwater obstacles and that no life-saving facilities exist on such systems.

Since the DWS guideline, upper threshold does not adequately reflect the range of results typically found in urban waterways the guideline is not useful in triggering appropriate strategic management responses to long-term water quality trends. The City's adaptation of the "Unacceptable" level which is aligned with the DWS 3rd category assigned to *E.coli* results > 4000 counts/100ml has thus been expanded into 3 sub-levels to guide the management response or course of action to address "Unacceptable" trends.

<sup>1</sup> City of Cape Town, Catchment, Stormwater and River Management Branch, (2011) Determination of additional resources to manage pollution in stormwater and river systems. Final Report. PD Naidoo and Associates (Project no. 090152).

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Unacceptable Categories	Comment / Strategic Management Response
<b>Level 1</b>	<ul style="list-style-type: none"> <li>• WQ <u>trends</u> in this range may be reflective of general urban diffuse runoff rather than a major point source of pollution</li> <li>• Address using stormwater / catchment management measures.</li> <li>• Ensure sewer spill responses are adequate and timely.</li> <li>• Continue to monitor to determine if additional pollution abatement intervention is necessary.</li> </ul>
<b>Level 2</b>	<ul style="list-style-type: none"> <li>• WQ <u>trends</u> in this high range are likely indicative of chronic pollution possibly from multiple source/s. *</li> <li>• If results are in this range for a single month / only during the rainy season, it is possible, that catchment wash-off (first flush) or surcharging sewers were causal factors.</li> <li>• Transversal approach to pollution abatement is necessary.</li> <li>• Extra budget may be required.</li> </ul>
<b>Level 3</b>	<ul style="list-style-type: none"> <li>• WQ <u>trends</u> in this extreme range likely indicate chronic ongoing pollution from multiple sources &amp;/or extreme incidents. *</li> <li>• Urgent management intervention to address the source/s of contamination.</li> <li>• Transversal approach to pollution abatement is necessary.</li> <li>• Significant funding likely to be required</li> </ul>

\* e.g. Non-compliant WWTW, sewer spills, informal settlement run-off

Note: the above adaptation facilitates evaluation of long-term trends and focusing in on particular problem areas within catchments.

Since faecal coliforms are no longer routinely analysed in the laboratory, measured levels of *E.coli* are used as a surrogate and compared to the management guide.

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### 3 OVERVIEW OF RESULTS

The table and graph below indicate the percentage of **monthly** results in each category described in the previous section.

Due to issues regarding the analysis of water quality samples for E.coli for the period May 2021 to January 2022, highlighted in grey in the graphs and tables below, the method for reporting the monthly inland water quality results has been.

Since February 2022, the assessment has been undertaken as a monthly percentage of the total monthly routine sample results.

	# samples analysed	% PER CATEGORY							% River and vlei samples ≤ 4000 E.coli	
		Target (intermediate) ≤1000	Acceptable Risk 1001 - 2500	Tolerable Risk 2501 - 4000	Unacceptable			% per month	% previous rolling 12 months	
					Level 1 4001 - 10 000	Level 2 10 001 - 100 000	Level 3 > 100 000			
Nov-2020	168	52.4%	5.4%	8.3%	8.3%	10.7%	14.9%	66.1	59.5	
Dec-2020	156	54.5%	3.8%	9.0%	7.7%	9.0%	16.0%	67.3	59.9	
Jan-2021	150	52.0%	4.7%	8.0%	4.0%	10.7%	20.6%	65	60	
Feb-2021	179	55.4%	3.9%	7.8%	5.0%	7.3%	20.7%	67	61	
Mar-2021	156	41%	8.3%	3.2%	7.7%	12.8%	26.9%	52.6	60.6	
Apr-2021	137	47.4%	1.4%	3.6%	8.0%	20.4%	17.5%	54	60.7	
May-2021	152	13.8%	3.3%	5.3%	8.6%	35.5%	33.6%	22.4	57.3	
Jun-2021	183	22.4%	4.4%	7.7%	7.1%	25.1%	33.3%	34.5	55.5	
Jul-2021	195	5.6%	4.6%	4.1%	8.7%	39.5%	37.4%	14.3	51.6	
Aug-2021	178	7.3%	6.2%	2.8%	18%	21.3%	44.4%	16.3	48.3	
Sep-2021	187	12.8%	7.5%	7.5%	12.3%	27.8%	32.1%	27.8	45.1	
Oct-2021	201	7.0%	4.0%	7.0%	16.9%	24.9%	40.3%	19.3	40.9	
Nov-21	188	49.5%	6.4%	4.8%	9.0%	17.6%	12.8%	60.6	40.6	
Dec-21	201	10.9%	4.5%	5.0%	13.4%	27.4%	38.8%	20.4	36.8	
Jan-22	177	7.9%	5.6%	3.4%	8.5%	26.6%	48.0%	16.9	33.1	
Feb-22	184	45.1%	4.9%	2.2%	2.7%	13.6%	31.5%	52.2	-	
Mar-22	187	46.0%	7.0%	1.6%	7.0%	10.2%	28.3%	54.5	-	
Apr-22	166	51.2%	6.0%	2.4%	4.8%	9.6%	25.9%	59.6	-	
May-22	198	50.5%	9.1%	1.0%	8.1%	15.2%	16.2%	60.6	-	
June-22	162	35.2%	5.6%	3.7%	7.4%	22.8%	25.3%	44.4	-	
Jul-22	172	37.2%	11.0%	3.5%	26.7%	8.1%	13.4%	51.7	-	
Aug-22	190	45.3%	7.4%	11.1%	6.8%	15.8%	13.7%	63.7	-	
Sep-22	214	49.5%	7.5%	3.7%	9.3%	14.5%	15.4%	60.7	-	

## 4 SDBIP PERFORMANCE

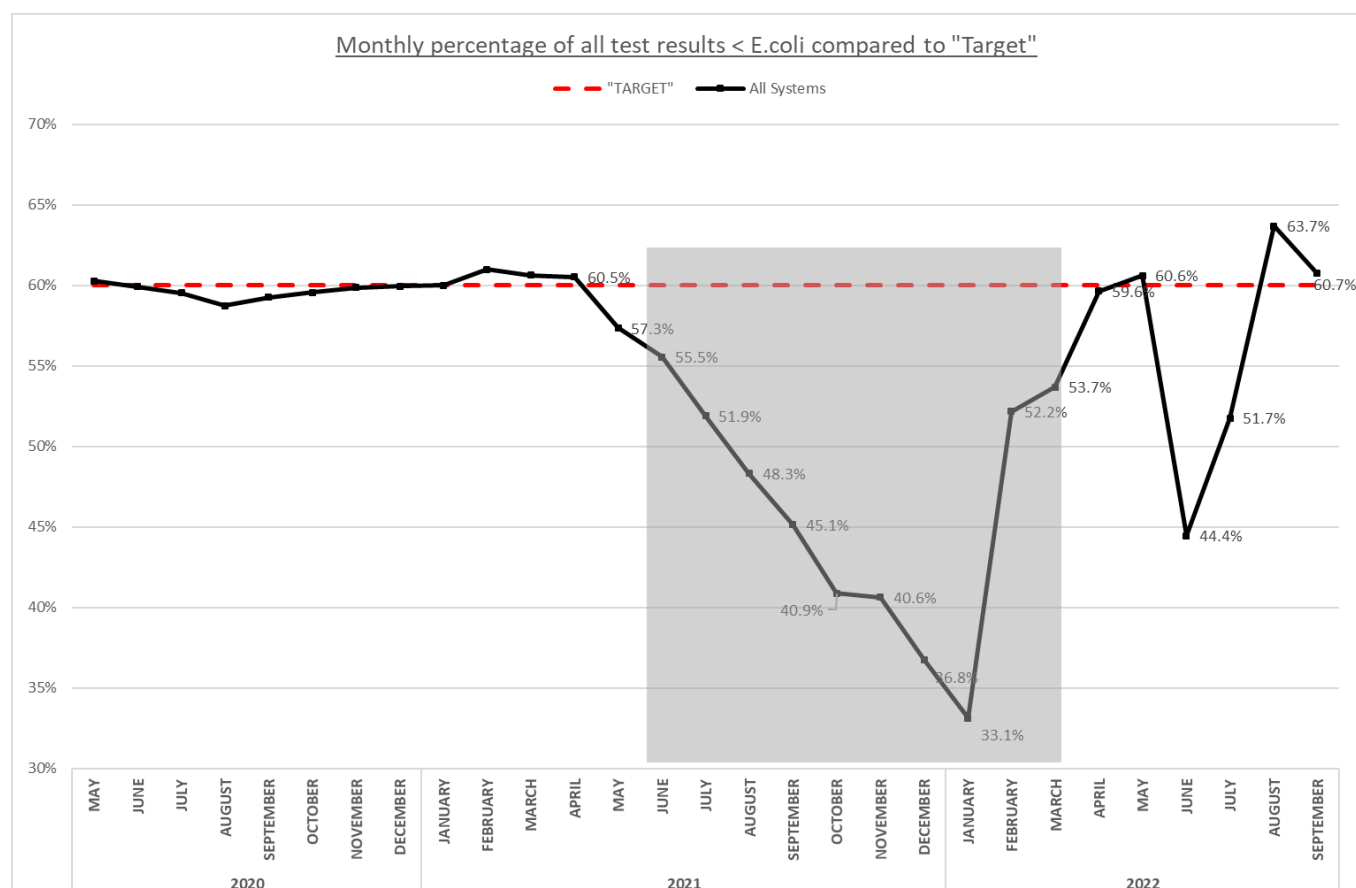
This section is a summary of inland water quality performance against the **SDBIP indicator**:

**“Percentage of test results  $\leq$  4000 *E.coli*”. The target percentage is 60%.**

### 4.1 Overall performance at a city-wide level

At a citywide scale (data from all monitored sites in 13 catchment areas grouped), performance calculated over a rolling 12-month period has fluctuated for a long period in the 59 to 62% range indicating transient attainment of the 60% Target up to May/June 2021.

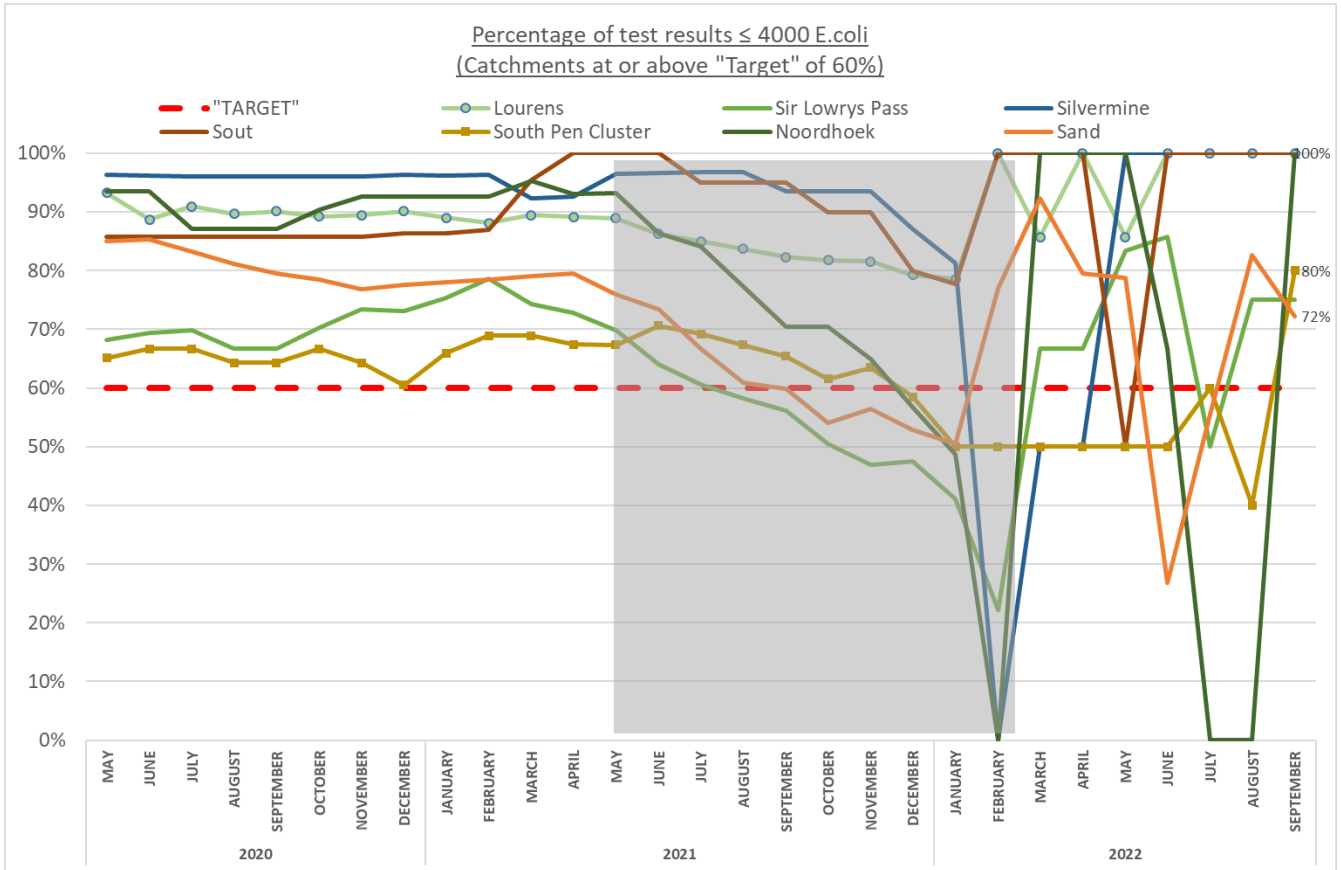
Since, February 2022, the monthly percentage  $\leq$  4000 *E.coli* has fluctuated with steep drops below the 60% target for June 2022 to 44%, an improvement to 52% for July 2022 and for July 2022 another noticeable improvement to 64% and above the Target limit.



The data underlying the above chart has been separated, in order to illustrate the performance of each of the various catchments of the inland water quality-monitoring programme separately.

## 4.2 Catchment performance: catchments above or at the target level

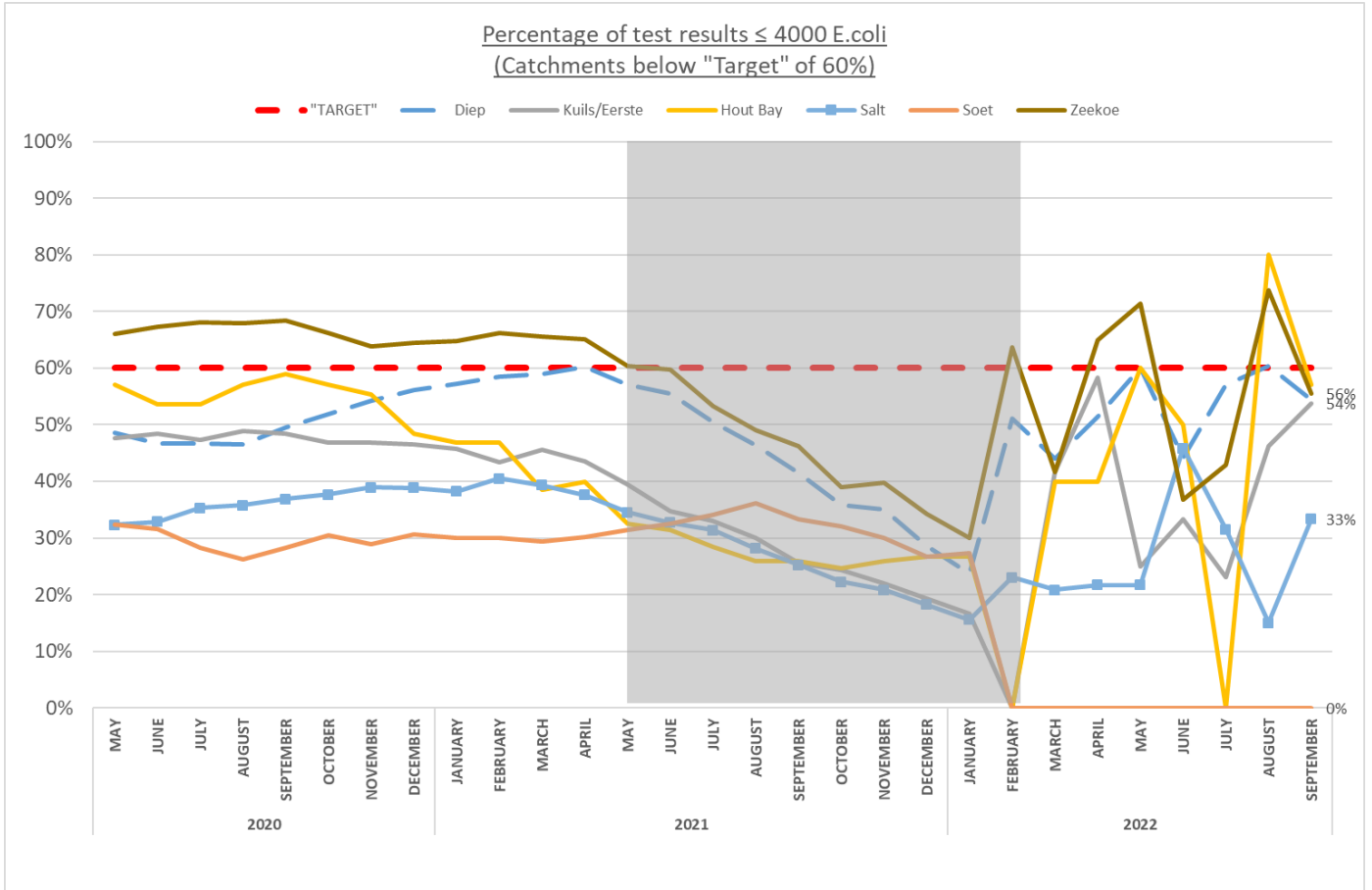
The 7 catchments included in this grouping whose E.coli results are above the 60% Target are the Lourens, Sir Lowrys Pass, Silvermine, Sout, Sand Rivers and South Peninsula cluster (latter includes Bokramspruit, Schusters and Else/Glencairn systems).





### 4.3 Catchment performance: Catchments below the target level

The 6 catchments included in this grouping are Diep, Kuils/Eerste, Hout Bay, Salt, Soet and Zeekoevlei.



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### 5 MONTHLY SUMMARY ASSESSMENT

This section is a summary assessment of inland water quality performance for the 14 grouped catchment areas over the past month:

River	September Samples Pass - Total	Ave Monthly Samples	Comment
<b>Diep River</b>	31 – 57	60 +	River WQ has improved from 44% in June to 57% in July and to 60% in August 2022. Decrease to 54% in Sept 2022.
<b>Kuils / Eerste</b>	7 – 13	12	River WQ is generally poor. WQ has improved from a declining trend since May 2022 to 54% in Sept 2022.
<b>Hout Bay</b>	4 - 7	Max 5	Not sampled in July 2022. August samples at 80% showing slight improvement on general monthly trend of around 50%. Sept samples decrease to 54% to around the average trend for the Hout Bay River.
<b>Lourens</b>	8 - 8	8	WQ generally good as majority of the catchment is not impacted upon by urban development.
<b>Mitchells Plain</b>	0 - 3	4	In line with WQ trend, WQ generally very poor – due to sewage flow conveyed by the stormwater drainage system. Defined SW drainage system no rivers. Not sampled in July – Sept 2022 – queried with SSB.
<b>Noordhoek</b>	3 - 3	3	No samples for July-August 2022 – queried with SSB.
<b>Salt River</b>	8 - 24	24	Generally poor WQ – slight improvement for September to 33%.
<b>Sand</b>	39 - 54	41	Significant improvement for August of 83% from June (27%) and 56% for July 2022, indicating a return to normal trend of above 75%. Sept at 72% around the normal trend.

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River	September Samples Pass - Total	Ave Monthly Samples	Comment
<b>Sir Lowry's Pass</b>	6 - 8	9	Steep decline in July from 86% in June to 50%. August and September indicates an improvement to 75%.
<b>Silvermine</b>	3 - 3	2	Generally, in line with WQ trend.
<b>Sout</b>	2 - 2	3	Generally, in line with WQ trend.
<b>South Peninsula</b>	4 - 5	4	Decline from 60% in July to 40% for August, general WQ trend is around 50% - to be monitored. Improvement in Sept 2022 to 80%.
<b>Zeekoei</b>	15 - 27	24	Significant improvement for August to 74% from previously declining trend, June (37%) and July (43%) indicating a return to normal trend of above 50%. Another deterioration in September 2022 to 56%.