



# INLAND WATER QUALITY MONITORING PROGRAMME

## FREQUENTLY ASKED QUESTIONS

### *Introduction*

In its new Water Strategy, the City of Cape Town (the City) has committed itself to becoming a water sensitive city by 2040. A water sensitive city is a city where rivers, canals, streams, wetlands and vleis (collectively called waterbodies) are accessible, inclusive and safe to use. While some of our urban waterbodies are in a relatively good or near-natural state, seven catchments face serious challenges, and overall, the data show that we have a long way to go to achieve our goal of being a water sensitive city.

The City recognises the importance of sharing information. This is particularly important to build trust in the citizens of our city. It is also important so that communities understand the level of risk they are exposed to so they can make informed decisions about things that impact their lives. Inland water quality is of particular interest as it directly or indirectly affects all citizens of the city.

It is against this backdrop that the City implements its inland water quality monitoring programme, and is committed to full transparency regarding the monitoring results and possible causes that should be addressed.

In the past, the City generally did not make the raw data available to the public unless specifically requested through the Access to Information process or the Research Request process. The City does make analysed water quality information publicly available via the monthly report presented to the Water and Waste Portfolio Committee, and these are available on the City's website. Furthermore, in 2020, the City published a comprehensive technical report and a summary report – Water Quality of Rivers and Open Waterbodies in the City of Cape Town: Status and historical trends with a focus on the period April 2015 to March 2020. Both of these reports are published on the City website. Please visit <https://www.capetown.gov.za/search?q=inland%20water%20quality%20report>

The City will now make appropriate data available to the public, in an easily accessible, timeous and consistent manner, to ensure that accurate information is in the public domain, and to demonstrate the City's transparency and willingness to be held accountable. The City will now publish the results of the inland water quality monitoring programme on the City's Open Data Portal. Please visit <https://odp-cctegis.opendata.arcgis.com/>

This Frequently Asked Questions (FAQ) document is intended to be used by the public to provide some clarity on the inland water quality monitoring programme and the interpretation of the results.

The City will review the data sharing process periodically and commits to making improvements. We welcome your comments and suggestions in this regard, and these can be emailed to [water@capetown.gov.za](mailto:water@capetown.gov.za)

### ***What is water quality and why do we monitor it?***

The concept of water quality considers the combined effects of the physical, chemical and biological attributes of a water sample on a particular user. As such, it serves as a measure of its “fitness for use” for an intended purpose.

Ambient water quality refers to the quality of water in natural waterbodies. Under natural or un-impacted conditions, different waterbodies will have different water quality characteristics. For instance, many wetlands or vleis are naturally more nutrient-enriched and possibly have a higher salt content than rivers as a result of nutrient imports from animals such as birds, tidal influences, or the accumulation of sediments and plant matter over long periods of time.

Fortunately, Cape Town does have some waterbodies that are in a near natural or relatively un-impacted state, usually those found in the upper reaches of less developed catchments and rivers flowing from mountains. For example the upper Silvermine River flows through the Table Mountain National Park and is one of the best quality rivers in Cape Town. Similarly, the upper parts of the Liesbeek River and Lourens River are in a relatively good state.

If carefully structured and rigorously performed, water quality monitoring can provide valuable insights into the long-term trajectory of water quality in waterbodies. These insights, in turn, inform decisions about the risk that water quality may pose to different user groups. For example, are vleis generally fit for recreational use such as swimming, rowing, sailing or canoeing. In Cape Town the recreational waterbodies are Zandvlei, Zeekoevlei, Rietvlei, Milnerton Lagoon and Princessvlei.

Water quality monitoring also provides information about the ecological health of these systems. Water quality data can help identify which waterbodies are prone to ongoing pollution, which would point to a need for further investigation to identify causes and solutions. Moreover, the data can “red-flag” sudden onsets of pollution that may, for instance, be caused by sewage leaks or illegal discharges, provide evidence for compliance with licensing or permit conditions, and inform water quality and waterway remediation efforts.

### ***What are the causes of poor water quality and pollution?***

The combined effects of centuries of urbanisation, land use, developments in catchments and adjacent to waterbodies, and the general lifestyle of people in the modern age all contribute to the water quality of waterbodies. Unfortunately, these issues have taken their toll leading to poor water quality in many of Cape Town's waterbodies.

One of the most profound impacts on water quality in Cape Town, as in many other cities, is that of waste and urban runoff. Treated and untreated sewage has a particularly harmful effect on our waterbodies. Under ideal conditions, domestic and industrial liquid waste is

conveyed to wastewater treatment works (WWTWs), where it is treated to an acceptable (licensed) standard. It is then either released back into the environment (usually into rivers or the sea), reused in industry, construction or as an irrigation supply, or, in some areas, treated further for human consumption. In practice, the management and treatment of waste and urban runoff is often fraught with problems, including the following:

- The unlawful establishment of informal settlements on land considered unsuitable for housing (such as in low-lying flood-prone areas, or in or near seasonally inundated wetlands). This impedes service delivery, which means that residents tend to dispose of their household waste, greywater and sewage directly into the environment, resulting in pollution.
- Repeated sewer leaks and overflows from sewage infrastructure, largely due to by-law contraventions and, to a lesser extent, factors affecting sewer condition.
- Overflows from sewage pump stations which may be caused by mechanical, electrical or instrumentation failures, foreign objects, generator failures and load-shedding.
- Inadequately treated wastewater discharged from WWTWs into rivers. This water contributes to significant nutrient enrichment, low levels of oxygen and high ammonia, which affect river biota and habitat quality and downstream users.
- Illegal connections in industrial or residential areas. These allow waste that should be discharged into sewers to be passed into stormwater systems instead. A common source of pollution in some residential areas is water backwashed from swimming pools into the stormwater system, or people disposing of oils and paints into the stormwater system.
- High levels of illegal waste dumping, littering and inconsistent use of the City's refuse management services. As a result, waste accumulates along roads and open spaces, from where plastics and organic waste wash into the stormwater system and waterbodies.
- Runoff from roads, built up areas, agricultural areas, gardens and parks that washes litter, nutrients, organic wastes, oils and hydrocarbons, sediments, fertilisers and pesticides into the stormwater system and waterbodies.
- Runoff and discharges from settlements and agricultural areas beyond Cape Town's borders.

### ***What is the inland water quality monitoring programme?***

Over the years, the City has collected various kinds of water quality data on its waterbodies, in some cases, going back to the late 1970s. A total of some 162 sites are currently routinely monitored through monthly collection of water samples for analysis by the City's Scientific Services Branch at their water quality testing laboratories located at the Athlone WWTW. Please refer to the map and KMZ file on the Open Data Portal for a list of the routinely sampled monitoring points.

The inland water quality monitoring programme is structured around the collection of data from waterbodies where water quality is a likely cause for concern. Therefore, many of the monitoring points are downstream of WWTW effluent discharge points, and in river reaches in catchments where runoff is likely to be contaminated. Sampling points are also located in waterbodies that are used for recreational purposes including Zandvlei, Zeekoevlei, Rietvlei, Milnerton Lagoon and Princessvlei.

Some catchments do not have any monitoring sites. These are catchments that are not necessarily considered problematic from a water quality perspective (such as minor rivers along the Atlantic seaboard), do not have significant river systems (such as the Atlantis catchment), or where natural rivers have been almost entirely piped into the stormwater system (such as the city bowl).

### **What are the limitations of the inland water quality monitoring programme?**

Analysis of water quality samples collected from a waterbody only shows the state of water quality at the time of sampling, and at the specific location where the sample was collected. It does not tell us anything about water quality immediately before or after sampling, or in other areas around the sampling point. It also only provides information about the constituents that were actually measured by the laboratory. There may be other kinds of pollutants in the waterbody as well.

This means that pollution “plugs” (short-term discharge incidents) may be missed or targeted by the timing of sampling. Other factors such as seasonality, rainfall and tidal influence may also affect the sample results. Therefore, a long-term monitoring programme undertaken at, for instance, monthly or fortnightly intervals provides a general overview of water quality patterns and trends in the monitoring network. An individual sample result may not be particularly useful unless it is assessed and understood within the context of the broader sample programme and importantly the catchment and waterbody itself.

The samples do not usually identify where pollution comes from or when the pollution occurred. To determine this is complex and will often require further sampling and water quality analysis, site visits and comprehensive assessments of many factors in the catchment and the waterbody. The City’s pollution abatement plans are used to identify sources of pollution.

It is important to note that not every catchment and waterbody in Cape Town is sampled in the monitoring programme. Therefore, the inland water quality monitoring programme does not provide an overall idea of “ambient” water quality in Cape Town. In fact, because the monitoring focuses mainly on poorly performing systems, the water quality data arguably exaggerate the level of waterbody pollution in the city to some extent.

### **What parameters are monitored?**

A range of chemical, algal and bacterial constituents are measured. Not all of the constituents are sampled each month at each sampling point. The commonly tested constituents, and why they are of importance, is described below:

***Escherichia coli (E.coli)*** – The main indicator parameter used to monitor water quality from a health perspective. *E.coli* is a bacterium found in faecal matter of warm blooded animals including humans.

**Chlorophyll A** – A measure of how much algal biomass is in a water sample. It is generally only measured in vleis and dams.

**Microcystin toxins** – A variety of toxins can be released by some Cyano-bacteria under certain conditions.

**Ammonia, Unionised Ammonia** – An important compound in the nitrogen cycle, and unionised ammonia can be toxic to aquatic biota under certain conditions.

**Chemical Oxygen Demand (COD)** – A measure of the amount of oxygen that can be consumed by reactions in a water sample. A COD test can be used to quantify the amount of organics and pollutants in a water sample.

**Conductivity** – A measure of the ability of a water sample to transfer an electrical current, which is used as an indication of the dissolved salt content in a water sample.

**Dissolved Oxygen, Oxygen Saturation** – An important compound to sustain aquatic life.

**Sum of Nitrate and Nitrite** – Nitrogen in its various forms is an important part of the nitrogen cycle, and is a nutrient that allows for plant growth.

**Ortho-phosphate** – Phosphorus in its various forms is an important part of the phosphorus cycle, and is a nutrient that allows for plant growth.

**pH** – A measure of how acidic or basic a water sample is.

**Suspended Solids** – A measure of organic and inorganic particles of all sizes that are found in the water sample. Generally total suspended solids (TSS) are particles that are larger than 2 microns, and anything smaller than 2 microns is considered a dissolved solid.

**Temperature** – A measure of the water temperature at the time of the sampling.

### ***How are the water quality samples analysed?***

After the samples have been collected they are transported to the City's Scientific Services Branch laboratories located at the Athlone WWTW. From here they are analysed by trained laboratory technicians and scientists using state-of-the art technology and scientifically accepted procedures. Once the testing yields a result, this is uploaded into the Laboratory Information Management System (LIMS). The Scientific Services Branch is ISO/IEC 17025 SANAS accredited which ensures that strict quality controls are in place for generating accurate and reliable water quality results. This includes traceability of all sampling, analysis and data generation from LIMS.

## **What does the City do with the results?**

The results of the sampling are used by City officials for various purposes including:

- Tracking the long-term trajectory of water quality in a catchment or waterbody.
- Guiding decisions to restrict access to recreational waterbodies.
- Identifying potential point sources of pollution.
- Guiding investigations and pollution abatement plans.
- Monitoring the benefits of waterway rehabilitation projects.
- Monitoring the benefits of water quality remediation efforts.
- Reporting to the Water and Waste Portfolio Committee.
- Reporting to regulators such as the Provincial Department of Environmental Affairs and Development Planning or the National Department of Water and Sanitation.
- Preparing the Inland Water Quality and Know Your Coast reports, that are made publically available.
- Sharing the data with interested stakeholders, particularly researchers, consultants, activist and interest groups.

## **What do the results mean?**

The analysis of water quality data is a complex undertaking. To consider water quality from a human health or ecological perspective, one needs to evaluate a range of physical, chemical and biological attributes of the water. This often requires an integrated understanding of how these constituents interact. Therefore, water quality data should ideally be interpreted by people with expertise in the fields of freshwater ecology, microbiology and water chemistry in the context of urban catchment landscapes and associated land uses.

Water quality assessments from an ecological perspective focus on variables that could contribute to toxicity to aquatic organisms, or could influence habitat quality or availability (such as excessive plant growth that alters habitat type). For example, a salt pan frequented by numerous wading birds might rate very poorly from a human health perspective as a result of high levels of salt and bacteria. At the same time, however, it could rate in a near-natural condition ecologically, being a relatively un-impacted example of the "salt pan wetland" type.

From a human health perspective, the presence of the bacterium *Escherichia coli* (*E.coli*) is used as the primary indicator of risk to human health. *E.coli* is a bacterium commonly found in the gut of warm-blooded animals and humans, and its presence could be indicative of faecal matter in the water, potentially from sewage. Its presence in a water sample does not guarantee that the water is contaminated with sewage as *E.coli* could also come from bird and animal sources.

Water quality samples are usually interpreted according to standards or guidelines relating to a particular user group or purpose. These may include guidelines for human drinking water (SANS 241), domestic animal drinking water, irrigation, recreational water use (e.g. swimming or water sports), as well as guidelines relating to the aquatic environment (e.g. plants and

animals). These guidelines are published by the National Department of Water and Sanitation. [https://www.dws.gov.za/iwqs/wq\\_guide/index.asp](https://www.dws.gov.za/iwqs/wq_guide/index.asp)

Guidelines for inland waters are scaled according to the different levels of risk associated with different types of recreational activity. The guidelines identify three recreational user groups with different risk profiles, namely:

- **Full-contact recreation** – Full body water contact and includes full immersion activities such as swimming and diving.
- **Intermediate-contact recreation** – Includes all forms of contact recreation not listed under full-contact recreation such as water skiing, wading, wind surfing, canoeing and angling.
- **Non-contact recreation** – Includes all forms of recreation that do not involve direct contact with water such as picnicking and hiking along waterbodies. It also refers to the scenic and aesthetic appreciation of water by those residing or holidaying on the shores of a waterbody. No water contact occurs, so public health effects associated with water quality are of little relevance to this user group.

<b>PUBLIC HEALTH AND RECREATIONAL USE CATEGORIES</b>	<b>FAECAL COLIFORM COUNT (CFU/100ml)*</b>	<b>MANAGEMENT IMPLICATIONS</b>
Maximum acceptable risk for full-contact recreation**	≤400	Generally safe for full-contact recreational water use.
Acceptable risk for intermediate-contact recreation	≤2 500	Generally safe for intermediate-contact recreational water use.
Tolerable risk for intermediate-contact recreation	2 501 – 4 000	Increasing levels of risk of gastro-intestinal illness as faecal coliform levels increase.
Unacceptable risk	>4 000	Not safe for intermediate-contact recreation.

\* Bacterial concentrations in water are usually expressed as numbers of colony-forming units (cfu) per 100 ml of water sample.

\*\* Note that the City does not generally recommend full-contact use in any of its inland waterbodies.

### ***Where can I get more detailed information about inland water quality?***

Please visit [www.capetown.gov.za](http://www.capetown.gov.za) and search for "Inland water quality" or "Think water". Here you will find various resources including the most recent Inland Water Quality reports, information on stormwater, water and sanitation services in Cape Town and various guideline documents.

### ***Does the City monitor coastal water quality?***

The City has a comprehensive coastal water quality monitoring programme. Information on Cape Town's coastline, coastal water quality, beaches and coastal amenities can be found online by visiting [www.capetown.gov.za](http://www.capetown.gov.za) and searching for "Our unique coastline" or "Coastal water quality". The regular Know Your Coast report is particularly useful.

### ***What is the City doing to improve the water quality of Cape Town's waterbodies?***

The City has recognised the major risk that poor water quality of our inland waterbodies poses to the residents of, and visitors to Cape Town. In its new Water Strategy, the City has committed to become a water sensitive city by 2040, and there is a lot of work to be done to meet this ambitious goal. The City has already, and will continue to increase its allocation of resources and support to plan and implement the necessary interventions to help improve water quality in Cape Town's waterbodies. For example, the City is upgrading a number of waste water treatment works (WWTW) and is also investing in sewer and sewage pump station upgrades and improvements in sewer system operations.

The Executive Mayor Geordin Hill-Lewis has selected Sanitation and Inland Water Quality as one of his top four Mayoral Priority Programmes for his term of office. This Programme consists of various work streams that set out how the City aims to address pollution and poor water quality. These consist of short, medium and long-term interventions and projects across various departments. Examples of some interventions and projects include:

- Capacity improvements at WWTWs;
- Upgrades, repairs and maintenance of sewers and sewage pump stations;
- Dredging of certain vleis;
- Rehabilitation of certain canals;
- Partnerships and engagement with catchment forums and other interest groups;
- Pollution abatement strategies and action plans for priority catchments.

Some tasks will be easy to undertake in the short term. Many others, however, will require significant capital budget and are to be undertaken over longer timeframes. Therefore, incremental improvement in ambient water quality of our urban waterbodies will be a long journey for the City and its partners. The efforts will initially focus on the following priority catchments, which the City has identified as facing significant water quality challenges.



- Diep River (including Milnerton Lagoon and Rietvlei)
- Soet River
- Salt River
- Kuils/Eerste Rivers
- Hout Bay River
- Big and Little Lotus Rivers (including Zeekoevlei)
- Sand Catchment (including Zandvlei)

The other programme of relevance is the Liveable Urban Waterway Programme (LUW). This is also a transversal programme that aims to rehabilitate our waterways using nature-based solutions, green infrastructure and water sensitive design approaches. A number of projects are already underway in the Sand catchment that will collectively contribute to an improvement in ecosystem health and better water quality in Zandvlei.

### ***What can I do to help improve the water quality of my local waterbody?***

As a resident of Cape Town there are many things you can do to help protect our waterbodies. Everyone living and working in Cape Town has a shared responsibility to keep our water resources and infrastructure clean and well-maintained.

- The main causes of sewer and stormwater system blockages are the careless and illegal dumping of material such as rubble, household appliances, domestic rubbish, rags and garden refuse, as well as littering. The majority of sewer overflows could be prevented by ensuring that waste is put in the right place and isn't flushed, poured or dumped into the sewer system. All residents and businesses should make use of the City's refuse collection services, drop-off sites and landfill sites for appropriate disposal of solid waste. Remember to "Bin It, Don't Block It". Please visit [www.capetown.gov.za/blocked-sewers](http://www.capetown.gov.za/blocked-sewers)
- Remember that any polluted water that runs off your business or residential property into the street will pass into the stormwater system, flow down to our rivers or wetlands, and ultimately end up in the ocean. This includes things like swimming pool backwash water and dirty water generated from washing your bin, washing your car or hosing down your drive way. It also includes solid and liquid waste from businesses, including informal smaller businesses. You may think that your contribution is so small that it won't be noticed or make a difference, however when many people think the same then the collective negative impact is very noticeable.
- Dirty household wastewater should be disposed of in the sink or toilet so that it enters the sewer network and travels to WWTWs for treatment (rather than the stormwater system which is connected to waterbodies and the sea). Don't flush nappies, sanitary products, wipes, earbuds, condoms, hair, rags or newspapers down the toilet or drain. These block the sewer network, which result in overflows of raw sewage into the environment.
- Unwanted food belongs in the bin, not down the sink or drain. Fruit and vegetable waste and egg shells can be used to make compost. Wipe cooking fat off pans and pots with newspaper or paper towels – do not pour it down the sink or stormwater drain.

- Used motor oil and paint products that contain harmful chemicals should be disposed of at a City-approved drop-off facility and not disposed in the stormwater drains.
- Use eco-friendly products for your garden and for cleaning vehicles. When it rains, chemicals in fertilisers, pest control and cleaning products end up in the stormwater system.
- Clean up pet waste. If not, the rain may wash this into the stormwater system, which is likely to cause increased *E. coli* levels.
- Wash your vehicle on a soft surface, where the dirty water gets absorbed into the soil. Do not wash it on hard surfaces near a road drain, as the dirty water will run directly into the stormwater system. Make sure that your local car wash facility also takes steps to prevent runoff of dirty water.
- Don't litter and pick up any litter on and around your property and put it in a nearby bin.
- Restaurants should regularly clean out grease traps. The build-up of fats in the sewer system is a major cause of blockages and sewer overflows.
- Disposal of factory or manufacturing effluent (liquid waste) into the stormwater or sewer system is illegal. Manufacturers should contact the City to check whether their wastewater may be disposed of into the sewer and treated at the WWTWs, or should be disposed of at a hazardous landfill site instead (if the manufacturing waste could be harmful to the municipal wastewater treatment process).
- Do not let wash water, silt or cement-laden runoff from factories, industrial or commercial premises or building sites flow into the street, as this will enter the stormwater system.
- Should you notice a sewage spill or overflow, report this problem on the City's "Report a fault" (C3 notification) system. Include a basic description of the problem plus an accurate location (street address or map pin) so that the City can easily locate and deal with the cause of the spill. Report illegal dumping, sewer overflows, vandalism and burst pipes in one of these ways:
  - SMS 31373
  - email [water@capetown.gov.za](mailto:water@capetown.gov.za)
  - call 0860 103 089
  - visit a walk-in centre
  - go to the City website [www.capetown.gov.za/servicerequests](http://www.capetown.gov.za/servicerequests)

### ***How can I get involved in water quality monitoring?***

Cape Town's residents and environmental interest groups can also assist the City with environmental monitoring by becoming involved with citizen science initiatives such as mini-SASS (Southern African Scoring System) surveys. Visit <http://www.minisass.org> for river monitoring and <https://ispot.org.za/> for biodiversity record keeping.

Consider joining or donating to a local Friends Group or volunteer group, many of which do excellent work in the cleaning, protection and care of Cape Town's waterbodies. For example the Friends of the Liesbeek, Mosselbank River Conservation Team, Friends of Constantia Valley Greenbelts, Riverine Rovers, Zandvlei Trust, Help Up, Renew the Elsieskraal and the Pristine Earth Collective, to name a few. Please contact the City's Environmental Management Department at [enviro@capetown.gov.za](mailto:enviro@capetown.gov.za); or the Catchment, Stormwater and River Management Branch at [water@capetown.gov.za](mailto:water@capetown.gov.za) for further details and ways you can get involved.