CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

INLAND WATER QUALITY REPORT

For the period October 2022 to September 2024
(2023 and 2024 reporting periods)

Making progress possible. Together.

ACKNOWLEDGEMENTS

This summary report was developed from the detailed Technical Report on the City of Cape Town's Inland Water Quality, focusing on the period October 2022 to September 2024 (reporting periods 2023 and 2024).

The report was contracted by the City to Lukhozi Consulting Engineers, who in turn subcontracted the project to Liz Day Consulting (LDC). LDC is a private consulting company, specialising in river and wetland assessment, management and rehabilitation.

LDC's team comprised Dr Liz Day (LDC), Mr Dean Ollis (Inland Waters Consultancy), Mr Tom Smyth (Infinity Environmental), Mr Jeremy Rose (Infinity Environmental) and Mr Ian Wilson (Spatial Mapping Solutions).

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FOREWORD

With an ever-growing body of literature indicating our vulnerability to the effects of climate change, it becomes more and more evident that we need to conserve and protect our current water resources for future generations. The ultimate vision for the Cape Town Water Strategy is to build long-term resilience against stressors affecting our water resources and to transition towards becoming a water-sensitive city by 2040. Improved water quality of our inland water systems is vital to achieving this vision.

In order to effectively manage inland water systems and adequately plan interventions for improvement, we need to know what is happening in our systems. The City's Inland Water Quality Monitoring Programme currently monitors 247 routine sampling points across its catchment areas for a suite of bacteriological, chemical and algal parameters. Inland water quality must be monitored and managed to assess water quality trends in our various catchments, monitor ecological health of these systems, assess human health impacts, identify areas of concern where pollution is evident and use these data to plan for interventions. Major contributors of urban water pollution are non-compliant discharges from wastewater treatment plants, sewerage spills from pump stations and overflowing manholes, runoff from informal settlements and solid waste. Other contributors include rapid urbanisation resulting in polluted runoff from hardened surfaces, runoff from agricultural areas and illegal discharges from industrial activities, which all contribute to the declining water quality in our inland waters.

This summary report has been published as a companion to the Technical Report entitled **"City of Cape Town Inland Water Quality Report: Focus Period 1 October 2022 to 30 September 2024 (2023 and 2024 reporting periods)"**. The reports have been published to promote transparency and inform the public on the status of our inland water resources. This report has revealed areas of concern and possible causes of pollution that need to be addressed from within the organisation through our various programmes and projects as detailed herein. The City's **Public Inland Water Quality Dashboard (arcgis.com)** has further promoted the City's transparency in providing data to the public and has gained great acknowledgements from a range of stakeholders since its launch in 2024.

The City of Cape Town has launched several key initiatives to combat waterway pollution and enhance the quality and ecological health of its inland waters. These include the Mayor's Priority Programme (MPP) for Sanitation and Inland Water Quality (S&IWQ), as well as various pollution abatement and strategic plans. Collectively, these efforts reflect the City's strong commitment to restoring and protecting urban catchment systems.

Recognising the value of Cape Town's unique natural environment, the City is prioritising interventions that safeguard inland waters and ensure the continued delivery of vital ecosystem services.

In support of these goals, the Water and Sanitation Directorate was allocated R4,7 billion in the 2024/25 financial year. The proposed capital budget for 2025/26 stands at R4,9 billion, underscoring the City's dedication to effective service delivery. This includes R1,81 billion for upgrading wastewater treatment plants and related infrastructure, R183 million for pump station refurbishments, and R345 million for sewer pipe replacements.

Cape Town's unique and diverse natural environment provides residents with valuable ecosystem goods and services. Protecting and restoring our inland waters are essential to building resilience and safeguarding ecosystems against stressors such as climate change and other environmental shocks.

Fostering public connection to these water systems – and raising awareness of their recreational, aesthetic, ecological and economic value – is key to encouraging shared responsibility in their management. Improving inland water quality is a collective effort, and residents play a vital role in preventing further degradation.

To achieve this shared goal, we must address pollution at its source, implement effective mitigation strategies through sound planning, and invest in the maintenance and upgrading of infrastructure. At the same time, we must create space for innovation to support a more sustainable and water-sensitive future.

Leonardo Manus
Executive director: Water and Sanitation
City of Cape Town

1. INTRODUCTION

The City of Cape Town ('the City') is responsible for the management of numerous rivers, artificial channels and wetlands, including open water vlei systems, estuaries and coastal lakes in its municipal boundaries. These are together referred to as its 'inland waters'.

The City has monitored the quality of water in these waterbodies since the 1970s, and its water quality database includes data from both long-term, routine monitoring points and those from *ad hoc* or project-specific monitoring.

Regular reporting on the results of water quality sampling is important, because it informs both City managers and members of the public or other interested parties about the state of the city's watercourses. Although the City's staff provide ongoing internal reporting on water quality in key catchments and flag issues of concern, independent assessment of water quality data is also useful to maintain public trust in the City's reporting as well as to allow for more detailed evaluation of all of the city's monitored inland water quality points.

Since 2020, the City has thus periodically appointed independent consultants to assess water quality data for its inland waters and to write up the results of these assessments in technical documents. These can be accessed via the City's website at **https://www.capetown.gov.za/Explore%20and%20enjoy/Nature-and-outdoors/Rivers-and-wetlands**. The reports deal only with data collected during routine (monthly to two-weekly) monitoring and do not deal with data from projects or once-off sample collections.

DID YOU KNOW?

The city's roughly 2 445 km^2 area includes:

- 16 630 km of pipes and culverts
- 890 detention ponds
- 236 stormwater treatment wetlands
- 1 910 km of natural rivers and streams
- around 567 km of lined and unlined open channels and canals
- 4 164 'natural and semi-natural' wetlands, including vleis and estuaries. **http://www.capetown.gov.za/family%20and%20home/transport-and-vehicles/road-safety/our-stormwater-system**

The technical water quality reports are, however, large, complex documents that deal in depth with water quality data and its implications for the management and use of the city's inland waterbodies. This summary report has thus been compiled to present the main findings of the latest Technical Water Quality Report in a shortened, non-technical form.

The time period considered in both reports includes the 2023 (October 2022 to September 2023) and 2024 (October 2023 to September 2024) reporting periods.

Please see the full technical report for this period, compiled by Liz Day Consulting, for more detailed analyses and summary data for individual monitoring points and catchments.

WHAT ABOUT COASTAL WATER QUALITY?

Coastal waters are also monitored by the City and are reported on separately.

See: **https://www.capetown.gov.za/Explore%20and%20enjoy/nature-and-outdoors/our-precious-biodiversity/coastal-water-quality**

Since the city's rivers, estuaries and stormwater pipelines discharge into the sea, inland water quality has a direct impact on coastal water quality.

Photo: Culvert at Strand

The water quality data on which the technical report is based are also available for free download by anyone, either from the City's Open Data Portal (**https://odp-Cityegis.opendata.arcgis.com/documents/inland-water-quality/about**) or via the easily accessible and visually presented Water Quality Dashboard, which was launched in November 2024: **https://cctegis.maps.arcgis.com/apps/dashboards/9f857f26b59d4aa3abf13ba4a7787d8b**

The city's inland waters are diverse and extensive.
Top: Kuils River. Bottom: Rehabilitated lower Liesbeek River.

2. CAPE TOWN'S CATCHMENTS AND WATERCOURSES

2.1. THE CITY'S CATCHMENTS

The city's numerous watercourses drain 21 major catchment areas, including the city bowl. These are shown in **figure 2.1**. Some of these areas in fact include a number of relatively small catchments, which are grouped together for management purposes. For example, the 'South Peninsula' catchment is made up of several separate river and wetland systems, such as the Else, Bokramspruit and Schuster's rivers.

WHAT IS A CATCHMENT?

A catchment is an area of land from where all rainfall either flows on the surface or seeps through the soil toward a central low point or an outlet. The catchment is bounded by high-points or watersheds.

Some parts of the city (e.g. the city bowl) have been so modified by urban development that they have few, if any, remaining open river channels, with most having been diverted into underground systems. Pollution passing into these systems can, however, still affect coastal water quality. For this reason, water quality in these catchments is monitored at their coastal stormwater outlets at least.

By contrast, the Mitchells Plain catchment would not have included any natural rivers prior to urbanisation. Rain falling in this part of the Cape Flats probably infiltrated through the sand or formed shallow, largely isolated wetlands. Today, however, the area is highly urbanised, and runoff from extensive hardened surfaces is stored in artificial detention ponds and conveyed to the sea through stormwater pipes and drains.

Seasonal wetlands such as the important Bamboesvlei wetlands in Ottery once dominated the Cape Flats. Today, however, many of these have been drained and now flow as artificial rivers or canals, such as the Big and Little Lotus rivers.

Not all catchments are currently monitored by the City. The Steenbras, Llandudno and Chapman's Peak catchments do not have major rivers or channelled stormwater flow and are not included in the monitoring programme, although activities in these catchments, as in all catchments, clearly have an impact on the quality of water entering the coastal zone.

The largest of the city's catchments are those of the Diep, Eerste and Salt rivers. In this report, these three catchments have been further divided into 'subcatchments', separating out their major tributaries (hence the Diep and Mosselbank subcatchments; the Kuils and Eerste subcatchments; and the Elsieskraal and Lower Salt River subcatchments). In fact, a large proportion of the Diep, Mosselbank and Eerste River subcatchments lie outside of the city's boundaries, while many of the smaller rivers also have their origins outside of the urban area, rising high up in the Table Mountain Nature Reserve and on other mountains surrounding much of the city.

The city's watercourses range from rivers through to wetlands and coastal lakes, to estuaries, as well as artificial or highly modified dams and vleis. Natural water quality can vary widely between these different systems. Thus, when assessing water quality data, it is important to understand which watercourses are being assessed.

In South Africa, a classification system has been developed to allow different aquatic ecosystems to be distinguished from each other (see Ollis et al., 2013). The system is a hierarchical one, which distinguishes first between marine, estuarine and inland systems, and then further categorises inland systems in terms of different types of rivers and wetlands. The present report deals only with inland and estuarine ecosystems. These are discussed and illustrated briefly below.

INLAND SYSTEMS

There are three broad types of inland systems, namely:

- **rivers**, which are flowing water systems where water is concentrated in distinct channels;
- **open waterbodies (or vleis)**, which are permanently inundated waterbodies where standing water is the main habitat; and
- **other wetlands**, characterised by permanently, seasonally or temporarily saturated soils, sometimes covered with shallow water and vegetated with plants that are adapted to life in saturated soils or standing water.

Of the above inland systems, **this report considers flowing systems** (i.e. rivers, artificial stormwater channels and canals) together, on a catchment-by-catchment basis. The main '**open water**' (or standing water) bodies (dams, lakes and vleis) that are routinely monitored by the City are considered separately, as the data for some water quality variables need to be interpreted differently in standing water as opposed to flowing systems.

OPEN WATERBODIES

Rietvlei, Zeekoevlei, Princess Vlei, Little Princess Vlei, Langvlei and Wildevoëlvlei are all lake-like open waterbodies or vleis. Most of these have been artificially modified to provide near-permanent standing water for recreational or aesthetic purposes.

View of Princess Vlei. (Photo: FOZR)

ESTUARIES

Before urbanisation, Cape Town's rivers all ultimately passed into the sea via estuaries or coastal lagoons. There are 10 estuaries in the city's boundaries, namely the Diep River (Milnerton Lagoon), Hout Bay, Wildevoëlvlei, Bokramspruit, Schuster's, Silvermine, Zandvlei, Eerste, Lourens and Sir Lowry's Pass estuaries. The Sout and Salt systems would also have formed estuaries/coastal lagoons under natural conditions, but these have long lost all natural estuarine function as a result of upstream changes, including canalisation up to the seashore.

Today, most of Cape Town's estuaries have been highly modified, with their river outlets having been converted into concrete canals and with none of the salt flux and tidal exchange necessary to meet the criteria for an estuary. At the time of this report, Zandvlei was the only remaining system that, despite significant levels of impact, retained real estuarine functionality.

Other naturally seasonal coastal lakes, which opened periodically to the sea during particularly wet periods (e.g. Rondevlei and Zeekoevlei), are now connected to the sea via artificial channels. These channelled outlets do not, however, have any estuarine function.

In this report, only Milnerton Lagoon and Zandvlei have been treated as functional estuaries. The other estuaries are either not routinely monitored at their outlets or their outlets are too altered to be expected to have any estuarine characteristics.

Figure 2.1

Cape Town's major subcatchments and watercourses. Note that the larger catchments (Eerste, Salt and Diep) have been subdivided into subcatchments, and that the mapped 'South Peninsula' catchment in fact includes the discrete Bokramspruit, Schuster's and Else catchments).

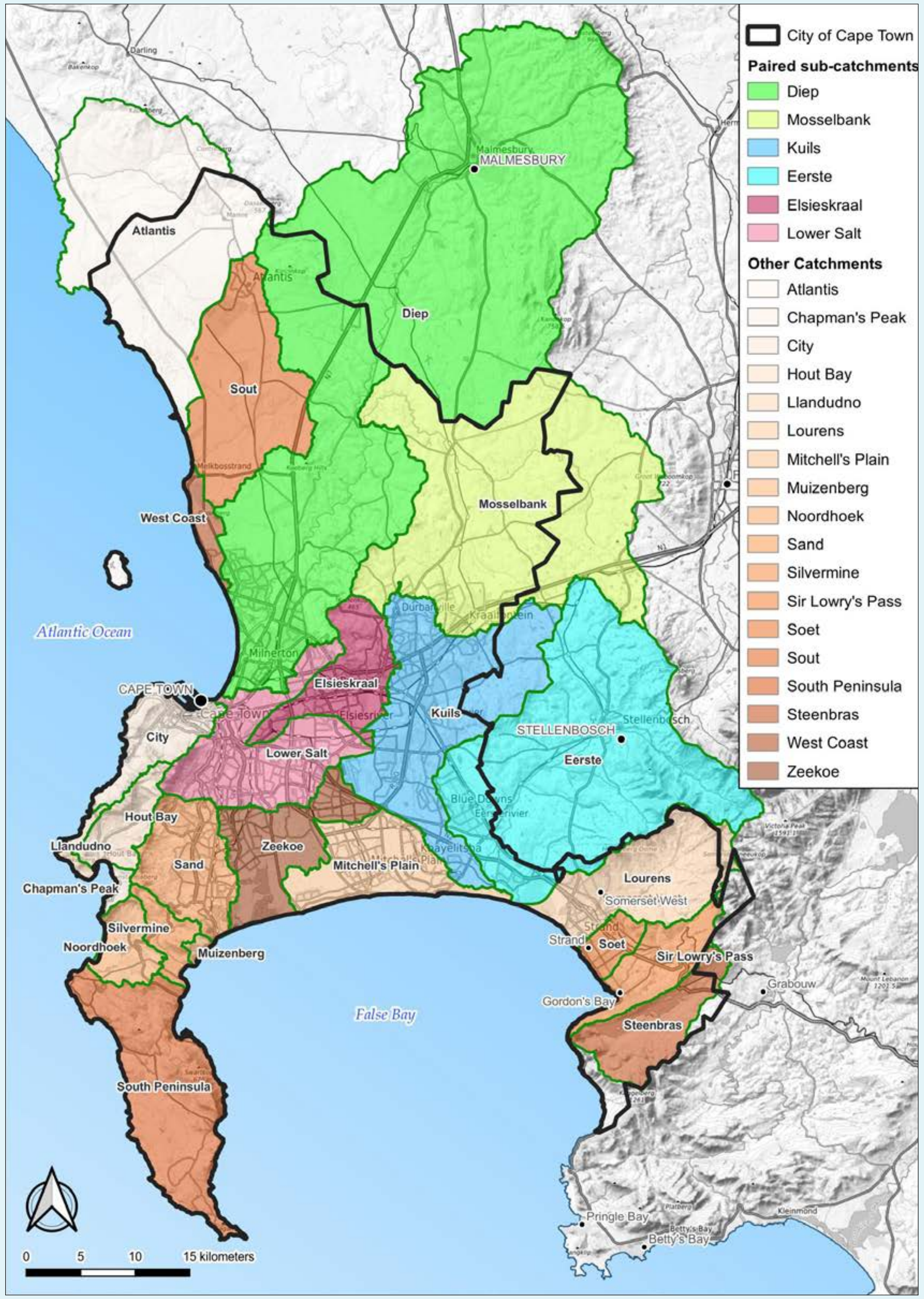
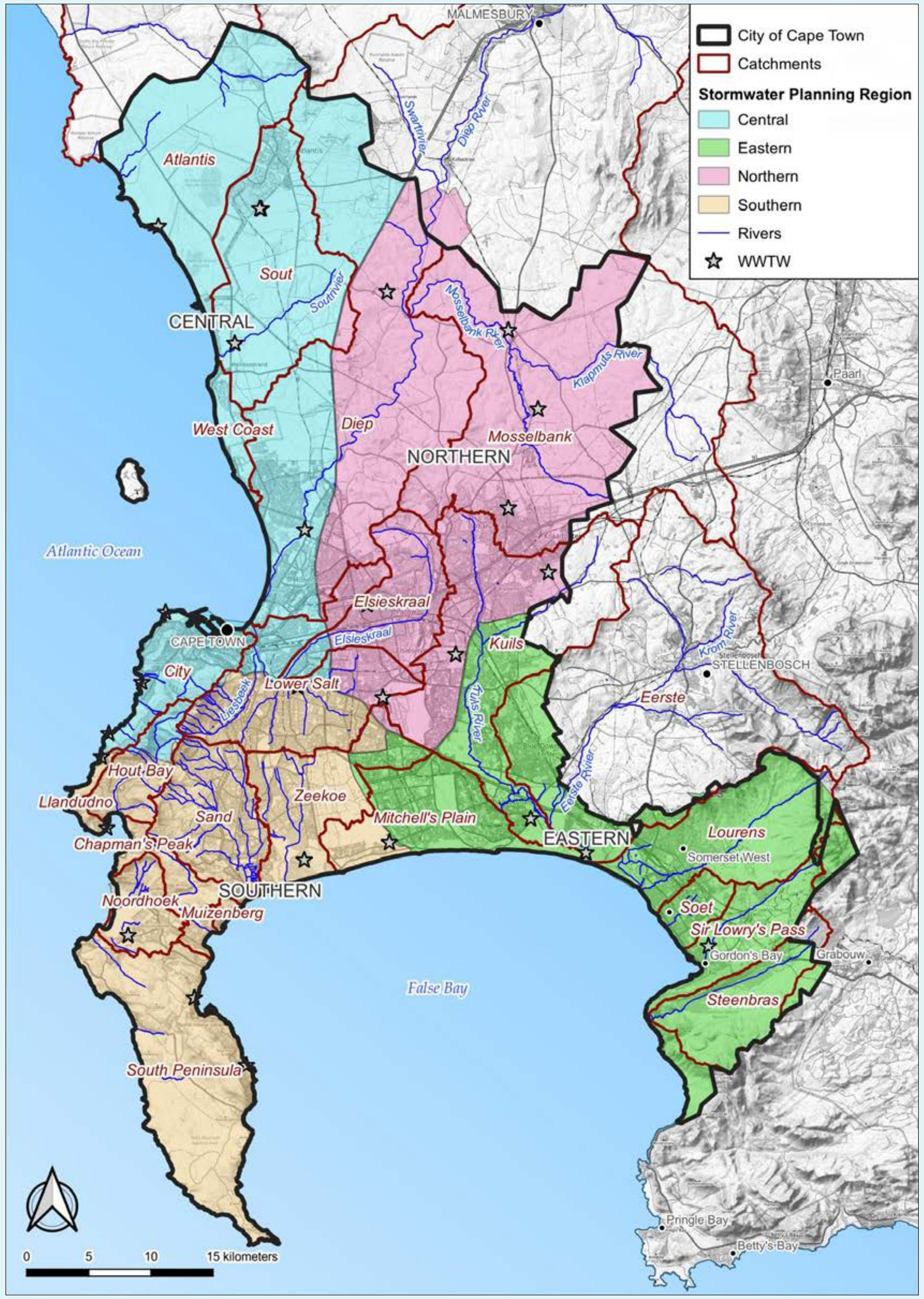


Figure 2.2

Relationship between the City's stormwater planning regions and its river catchments. The City's wastewater treatment works (WWTW) in each region are also shown.



2.2 THE CITY'S STORMWATER MANAGEMENT REGIONS

While Cape Town's rivers and other watercourses lie in catchments, defined by topography and separated by watersheds, the City manages them through its four **stormwater planning regions**, namely the Northern, Southern, Eastern, Central and Western regions. Each region has a separate manager responsible for stormwater management across the whole region. The stormwater regions do not take account of natural catchment boundaries.

The four stormwater planning regions are shown in **figure 2.2**.

ENGAGING WITH REGIONAL STORMWATER MANAGERS

If you have concerns about the condition or management of any watercourse in the city, the manager of that stormwater region should be your first port of call, as follows:

- Southern region:
  Luqmaan Abdulla (Acting)
  Luqmaan.Abdulla@capetown.gov.za
- Eastern region: Gehardt Muller
  GehardtRushby.Muller@capetown.gov.za
- Central region: Ben de Wet
  Ben.DeWet@capetown.gov.za
- Northern region: Johann Terblanche
  Johann.Terblanche@capetown.gov.za

2.3 THE ECOLOGICAL IMPORTANCE OF URBAN WATERCOURSES

Urban watercourses can play important roles as corridors of relatively natural habitat for indigenous fauna through often ecologically hostile urban landscapes. In Cape Town, many rivers also connect mountainous habitats with the coast, providing aquatic habitats that, in some areas, are of great biodiversity importance. The city lies in the heart of the Cape Fynbos Biome, and some of its aquatic ecosystems support species of plants and/or animals that occur in a restricted area and nowhere else in the world.

Some of Cape Town's rivers run through extensive greenbelts, valued for walking, running, cycling and riding. These areas provide green lungs in an otherwise hardened urban space, as well as cooling, which is increasingly important as climate change heats up urban areas.

*The Cape clawless otter (*Aonyx capensis*) has a global (IUCN) and regional listing of 'near threatened'. It occurs in many of Cape Town's rivers and wetlands, as well as along coastal areas, generally where there is also access to freshwater streams or seeps into the ocean. It feeds mainly on crabs, highlighting the importance of maintaining rivers with water quality and physical habitat that can support freshwater crabs, although otters will also feed on other fauna, including fish. Robust riverine corridors that provide shelter for otters and other fauna are important in otherwise sterile urban areas. (Photo: D. Gibbs)*

Aponogeton angustifolius *(Cape pondweed) is a Western Cape endemic wetland plant species that occurs in watercourses that dry out in summer. It is threatened by habitat loss, with many seasonal wetlands in urban areas in particular being infilled or changed to permanently wetted systems as a result of urban drainage. (Photo: T. Stock)*

WHAT HAPPENED TO CAPE TOWN'S NATURAL WATERCOURSES?

Before Cape Town was developed as a major metropolitan centre, the area supported extensive permanent wetlands, identifiable today only by remnant peat deposits; seasonal and/or temporary wetlands that were inundated for a few months of each year only; mainly seasonally flowing and a few permanent (or perennial) rivers; and several estuaries along the Table Bay or False Bay coastlines.

The most significant of the estuaries would have been those of the Eerste, Sand and Diep rivers. Under pre-development natural conditions, the Diep River estuary was the combined outlet of the Liesbeek, Black, Salt and Diep River systems, which flowed into Table Bay via a broad wetland marsh in the general region of today's Paarden Eiland (see Brown and Magoba, 2009: **https://www.wrc.org.za/wp-content/uploads/mdocs/TT-376-08_Part%201.pdf**).

Perennial (i.e. permanently flowing) rivers were those that rose in the mountains, with the main perennial systems being the Silvermine and Else rivers; the main stem and tributaries of the Diep River (Sand River catchment), Keyser and Liesbeek rivers; and the Lourens, Sir Lowry's Pass and Eerste rivers.

Most of the rivers that flowed through the vast, sandy Cape Flats, by contrast, were seasonal and often associated groundwater-fed wetlands, which would have been inundated when the primary (surface) aquifer rose above the level of surrounding surface depressions. These wetlands supported communities of small crustaceans and insects that were adapted to surviving life in seasonal systems, often using hibernation or diapause strategies, or having eggs able to withstand long periods of dryness.

A long history of urban development has resulted in the complete loss of and/or permanent changes to many of these systems in the city's boundaries. Low-lying seasonal wetlands and rivers have been the most severely impacted, mainly through:

- drainage and/or infilling of wetlands;
- diversions, channelisation and canalisation of rivers and valley-bottom wetlands;
- the passage of treated sewage effluent into naturally seasonal rivers, creating perennial, nutrient-enriched systems with different plant and animal communities, different responses to drought and floods, and different management requirements as a result; and
- the creation of canals and drainage channels to lower the water table and/or the floodline to allow development to encroach into naturally seasonally inundated areas, areas with a high water table, and areas prone to flooding (e.g. the Big and Little Lotus rivers in the Zeekoe catchment).

The Elsieskraal River has been canalised for most of its river reaches, flowing as an often polluted, ecologically sterile river system through the Bellville CBD, Parow, Goodwood, Maitland and Pinelands before discharging into the Black River.

The Black River, like the Kuils River and many other of the city's watercourses, was a naturally seasonal wetland system. River flows in these systems in summer comprise almost wholly treated and untreated sewage effluent.

3. CHALLENGES IN URBAN WATERCOURSE MANAGEMENT

Urban watercourses require management to protect a city's inhabitants from floods and flooding; to provide amenities such as safe recreational areas; to harness ecosystem services provided by natural aquatic ecosystems; and to safeguard biodiversity. Active management is required, because in most cities, most of the natural drivers that would have sustained rivers and wetlands have been destroyed or controlled by human development. In Cape Town, these natural drivers would have included floods, fire, drought, and grazing and trampling by large herbivores. These kinds of disturbances, together, would have maintained open river channels and wetlands. Without them, rivers and wetlands can be overgrown with reeds and other vegetation that need physical management by the City, and which threaten natural biodiversity and human safety and well-being.

Urban watercourses can play important roles in a city, and their overarching condition can have significant indirect impacts on issues such as human health, property value, security, amenity opportunities, flood risk, and maintenance and management costs such as litter and sediment removal.

For example, while properties in proximity to well-managed watercourses in good condition may benefit from enhanced property value, those in proximity to watercourses that are in poor condition, subject to litter, odour or aquatic plant invasion (including algal growth in standing waterbodies) are likely to experience a decline in property value (De Wit et al., 2009).

Urban watercourses generally reflect the condition of their catchments. In Cape Town, as in many other urban areas, water quality has changed considerably from the low-nutrient systems that probably characterised many of its fynbos rivers under natural conditions. Today, many of them are highly nutrient-enriched, and these nutrients promote the growth of (often alien) aquatic plants such as water hyacinth (*Pontaderia crassipes*).

Among the most profound issues affecting water quality in Cape Town, as well as in many other urban centres, is the impact of solid waste; treated and untreated sewage; and so-called 'greywater' (i.e. wastewater from domestic uses such as washing, cooking and bathing).

Treated and untreated sewage waste that enters Cape Town's watercourses is particularly problematic from a water quality perspective, as outlined below.

Under ideal conditions, domestic and industrial waste is conveyed to wastewater treatment works (WWTW), where it is treated to an acceptable standard and then either released back into the environment (usually into rivers or the sea); re-used in industry or for irrigation; or, in some areas, treated further for human consumption, sometimes by way of aquifer recharge. In practice, however, the management and treatment of human waste are often fraught with problems, particularly in developing countries.

Key issues relevant to waste management in Cape Town are:

- **informal settlements and backyard dwellings with inadequate or no sanitation,** resulting in sewage waste as well as greywater being discharged into roads or directly into stormwater systems – high densities of human populations in both informal settlements and backyard dwellings make this a major water quality (and human health) issue;
- **informal settlements in marginal land considered unsuitable for housing** – such land is often in low-lying areas, in or near seasonally inundated wetlands. The disposal of waste from residents is thus often directly into these areas, resulting in rapid pollution and degradation of sometimes important seasonal wetlands;
- **repeated sewer leaks and overflows from ageing infrastructure** in dense urban areas – these are often older areas, where infrastructure is now failing;
- **overflows from sewers as a result of sewage pump failure,** sometimes caused by power outages due to load-shedding or the illegal dumping of foreign objects into the sewage system;
- **poorly treated effluent discharged from WWTW into rivers,** contributing to significant enrichment and often low levels of oxygen and elevated ammonia, affecting river habitat quality and downstream systems, such as vleis and other wetlands. Without dilution by the receiving waterbody, even effluent that is treated to comply with legal standards (e.g. general effluent limits, as specified by the national Department of Water and Sanitation (DWS)), is likely to contain high levels of nutrients, as well as ammonia, and could also lead to poorly oxygenated waters as a result of high levels of organic decomposition – this is a particularly serious issue in naturally seasonal watercourses, where in summer all of the flow can sometimes comprise treated (or untreated) wastewater, with no dilution;
- **illegal connections in industrial or residential areas,** allowing waste that should be discharged into sewers to be passed instead into the stormwater systems – a common source of pollution in many more affluent residential areas is the passage of water backwashed from swimming pools into streets or the stormwater system, where it can result in the formation of persistent toxins (e.g. chloramines); and
- **poor levels of solid waste collection and high levels of illegal waste dumping,** resulting in the accumulation of waste along roads and open spaces, from where plastics and organic waste (e.g. from used nappies, offal and other waste sources) can wash into the stormwater system.

Litter accumulating in watercourses in Cape Town (Big Lotus River), from where it is washed into important wetlands (in this case Zeekoevlei, a Ramsar wetland).

Solid waste and raw sewage threaten human health and downstream wetlands in the Masiphumelele informal settlement.

Accumulated raw sewage in the Theo Marais channel, Diep River catchment, following months of sewage overflows from the Koeberg sewage pump station.

Polluted point-source inflows of sewage and greywater from unserviced settlements in the Big Lotus River catchment.

4. THE CITY'S INLAND WATER QUALITY MONITORING PROGRAMME

4.1 WHAT IS WATER QUALITY?

The term 'water quality' refers to the combined effects of the physical, chemical and biological attributes of a sample of water on a particular user. It is a measure of the condition of water, relative to the requirements of one or more species, or to any human need or purpose – that is, its 'fitness for use'.

Water quality is usually interpreted using standards or guidelines, developed around the specific effects of different aspects of water quality on a particular user group or purpose. Guidelines may focus on water quality criteria for safe human drinking water; aquaculture; industrial use; livestock watering; irrigation of different crop types; recreational use of water (e.g. swimming or water sports); and guidelines as to the effects of different concentrations of different water quality variables on aquatic plants and animals in natural ecosystems.

Since assessing water quality from a human health and/or ecological perspective requires data representing a range of physical, chemical and biological attributes, people with expertise in the fields of freshwater ecology, water chemistry and microbiology should ideally be tasked with interpreting the data.

4.2 WHY MONITOR WATER QUALITY IN URBAN WATERCOURSES?

Water quality monitoring, if carefully structured and rigorously carried out, can provide valuable insights into the long-term trajectory of water quality in waterbodies, including rivers and lakes/vleis. This is important for informing decisions about how to manage the risks that exposure to water may pose to different user groups (for example, are vleis generally fit for recreational uses such as swimming, rowing, sailing or canoeing?). It also provides information about the ecological health of these systems and, where long-term data are available, can provide an indication as to whether their condition is improving or deteriorating over time. Such information can, and should be, used to inform planning around the need for engineering or other interventions to address deterioration in any watercourses. It can also be used to assist Catchment, Stormwater and River Management (CSRM) regional managers in strategic planning around where to focus efforts to achieve maximum returns.

In addition, water quality data can be used to 'red flag' sudden onsets of pollution (caused, for example, by sewage leaks or illegal discharges); inform pollution-tracking efforts along watercourses; and provide evidence for compliance with licensing or permit conditions.

4.3 THE CITY'S INLAND WATER QUALITY MONITORING PROGRAMME

The City's water quality database goes back to the late 1970s for at least some monitoring points along its main rivers and wetlands/vleis. The 2019 Inland Water Quality Report (Day et al., 2020) analysed and discussed the full historical record of water quality data included in this extensive database.

The present report deals only with data generated from water quality monitoring over the past five years (October 2019 to September 2024), with an emphasis on data from the period October 2022 to September 2024.

These data are presented in 'reporting periods'. Each reporting period covers water quality data collected from 1 October in one year to 30 September in the following year. The 'naming year' is the year ending in September. Hence the period 1 October 2022 to 30 September 2023 is reporting period 2023.

Figure 4.1 shows the locations of all the current inland routine monitoring points utilised in this study, including sampling points located at major stormwater outfalls along the coast.

A range of chemical, algal and bacterial constituents are measured from water samples collected at these sites and the data are interpreted and reported on internally by the City's CSRM Branch, and externally in the Inland Water Quality reports. Note that the present report reflects only water chemistry and microbiological data, and not algal data, other than microcystin toxin data.

4.4 OBJECTIVES OF THE CITY'S WATER QUALITY MONITORING PROGRAMME

To date, the City's Water Quality Monitoring Programme has been designed to monitor changes in watercourses where water quality is likely to be a cause for concern. Many of the monitoring points are therefore downstream of WWTW effluent discharge points or in river reaches in catchments where runoff is likely to be contaminated. By contrast, some sampling points are located in watercourses that are used for religious rituals (e.g. baptisms) and/or recreational purposes (e.g. sailing, rowing and kayaking). Water quality data for such systems are used to provide information as to the level of risk associated with the use of these systems for such purposes.

An important outcome of this approach is that, rather than being a structured programme that generates an overall understanding of the condition of all of Cape Town's watercourses (i.e. so-called 'ambient water quality'), the data collected by the City have, until recently, over-emphasised problem areas, and have not provided an overarching view of water quality in the city's rivers and wetlands as a whole.

This issue has been considered by the CSRM, and an additional 65 sites, intended to provide a more holistic overview of water quality in the city's watercourses, have been included in the City's Water Quality Monitoring Programme with effect from October 2024. These data should be considered in the Inland Water Quality reports going forward.

The addition of new sites is not without problems either – these, and a workaround in terms of data assessment, are included in section 10 (recommendations).

4.5 WHICH VARIABLES ARE CONSIDERED IN THE INLAND WATER QUALITY REPORT?

Although the City's Scientific Services Branch (SSB) analyses a wide range of water quality variables, only those considered the most important general indicators of urban aquatic ecosystem health and human health risk are assessed in the Inland Water Quality Report, as listed below (abbreviations for some variables are shown in brackets):

- Major nutrients
  - Phosphorus in orthophosphates (PO4-P)
  - Phosphorus in total phosphorus (Tot-P)
  - Total inorganic nitrogen (TIN)
- Un-ionised (or 'free') ammonia (NH_3)
- Dissolved oxygen (DO)
- *Escherichia coli* bacteria (*E. coli*)
- Microcystin concentrations
- Chlorophyll-a (Chl-a)
- pH as an indicator of ammonia toxicity risk
- Electrical conductivity (EC) as a measure of salinity, specifically for waterbodies that have been classified as functional estuaries

The City's Inland Water Quality Report also considers **rainfall data** for various monitoring stations across the city. This is because knowing what rainfall has fallen in different parts of the city can help to understand water quality data. Rain can dilute river water, reducing the concentration of pollutants in the water. It can, however, also serve to wash pollutants into the river channels and, in some very polluted catchments, river water quality can be much worse immediately after rainfall, especially early on in the wet season when months of accumulated pollution can be washed into the rivers.

4.6 WHAT THE CITY'S WATER QUALITY DATA DO NOT SHOW

Water quality data show only what the quality of water was like **at the time of sampling** and at the **specific location where the sample was collected**. The data cannot be used to infer future water quality (for example, whether a waterbody will be fit for swimming a day or even an hour after sampling), or to show what it was like immediately before sampling. 'Plugs' of pollution, for example, may be missed, or accidentally targeted by the timing of sampling. Furthermore, where watercourses are seriously contaminated, point-source pollution streams may be difficult to identify, because of the high level of general contamination.

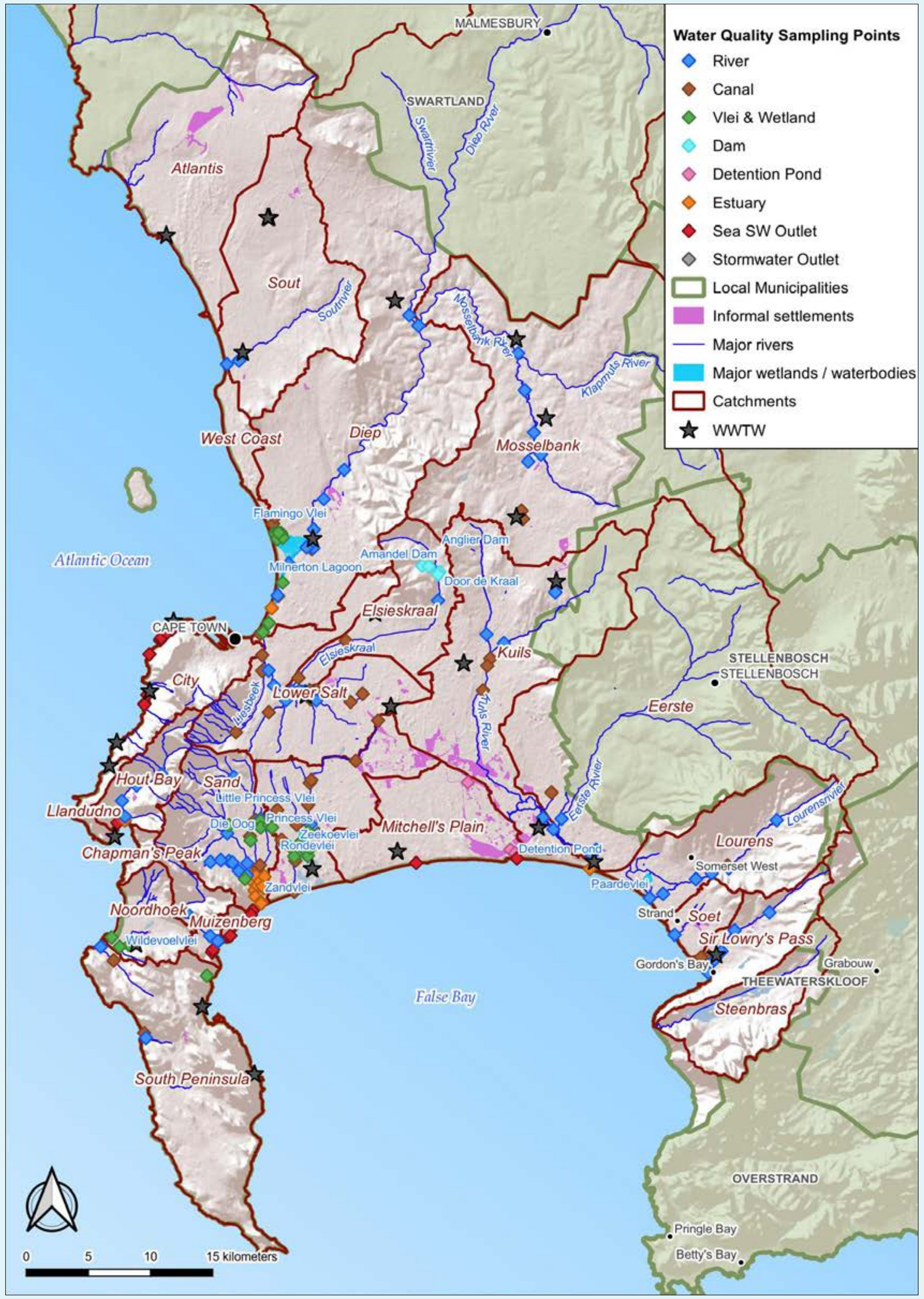
This means that the data provide a means of assessing risk associated with the use of particular waterbodies, but cannot be used to infer current conditions.

Water quality monitoring data also only provide information about the constituents that were actually measured – there may also be other kinds of pollutants in the water that are not measured. For example, the City's routine water quality monitoring does not include analyses of heavy metals, hydrocarbons, complex herbicides and pesticides, microplastics or other contaminants of emerging concern (CECs) (e.g. hormones and medicinal or other drugs) that may also be present in water.

Water quality data show only water quality at the time of sampling. Long-term datasets allow risk-based decision making about water quality, from a human health or ecological perspective, based on the frequency of samples measured in an 'acceptable' or 'unacceptable' risk category. (Photo: J. Rose)

Figure 4.1

Locations of the City of Cape Town's routine water quality sampling points on river and stormwater channels, canals, standing water systems (vleis and dams) and coastal stormwater pipeline outlets. WWTW locations and informal settlements are also indicated for context.



5. INTERPRETING WATER QUALITY DATA

5.1 GENERAL

The City's water quality data are interpreted both in terms of their implications for **aquatic ecosystem condition and likely management pressures** (e.g. the need for ongoing removal of reeds or aquatic weeds for flood control or to allow access to waterbodies or recreational activities), and from the perspective of risks to human health.

5.2 INTERPRETING AQUATIC ECOSYSTEM CONDITION

Tables 5.1 and **5.2** provide ranges in concentrations of key water quality variables from the perspective of what they indicate about **ecosystem condition**. These thresholds distinguish between **flowing water systems** (rivers, channels, canals and estuaries) and **open water systems** (dams, vleis, detention ponds and coastal lakes).

Table 5.1

Rating ranges for variables considered in this assessment of water quality in Cape Town's rivers.

Note abbreviations: PO4-P = orthophosphate phosphorus; TIN = total inorganic nitrogen; DO = dissolved oxygen; N:P = ratio of TIN:PO4-P; NH_3 = un-ionised ammonia.

City water quality categories	Interpretation of CWQC	PO4-P mg P/l	TIN mg N/l	DO mg/l	N:P	NH_3 mg/l
GOOD	TARGET	≤ 0,015 (oligotrophic)	≤ 0,70 (oligotrophic – mesotrophic)	> 7	> 25	≤ 0,007
FAIR		> 0,015–0,025 (mesotrophic)	> 0,70–1,00 (mesotrophic)	> 6–7		> 0,007–0,015
POOR	POOR	> 0,025–0,125 (eutrophic)	> 1,00–4,00 (mesotrophic –eutrophic)	> 4–6 OR > 12–15	10–25	> 0,015–0,1 (chronic toxicity)
UNACCEPTABLE	UNACCEPTABLE	> 0,125 (hypertrophic)	> 4,00 (eutrophic – concentrations > 10 mg/L classified as hypertrophic)	≤ 4 OR > 15	< 10	> 0,1 (acute toxicity)

Table 5.2: Rating ranges for variables considered in this assessment of water quality in Cape Town's vleis and dams

Note: TP = total phosphorus; TIN = total inorganic nitrogen; DO = dissolved oxygen; N:P = ratio of TIN:PO4P; NH_3 = unionised ammonia; CHL-A = chlorophyll-a.

City water quality categories	Interpretation of CWQC	Total phosphorus mg p/l	TIN mg N/l	DO mg/l	N:P	NH_3 mg/l	Mean annual Chl-a (mg/l)
GOOD	TARGET	≤ 0,015 (oligotrophic)	≤ 0,7	> 7	> 25	≤ 0,007	≤ 5
							> 5-10
FAIR		> 0,015-0,047 (mesotrophic)	> 0,7-1	> 6-7		> 0,007-0,015	> 10-20
POOR	POOR	> 0,047-0,130 (eutrophic)	> 1,0-4,0	> 4-6 OR: > 12-15	10-25	> 0,015-0,1 (chronic toxicity)	> 20-30
UNACCEPTABLE	UNACCEPTABLE	> 0,130 (hypertrophic)	> 4	≤ 4 OR: > 15	< 10	> 0,1 (acute toxicity)	> 30

5.3 PROBLEMS WITH DATA AVAILABILITY FOR ECOLOGICAL WATER QUALITY ASSESSMENT

An important data issue that affected reporting in both the present and the previous (2024) annual Inland Water Quality Report was the lack of total phosphorus data, which are important informants of assessments of standing water/lake or vlei ecosystem condition, and the high limit of quantification of orthophosphate phosphorus, above the threshold for the 'poor' category for this variable. This meant that no samples in the 2023 or 2024 reporting periods were rated better than 'poor' for this variable, and furthermore meant that changes in orthophosphate concentrations in Cape Town's least-impacted watercourses would not be picked up in the data, which essentially only allow assessment of moderately to highly polluted systems.

5.4 INTERPRETING WATER QUALITY DATA IN TERMS OF RISKS TO HUMAN HEALTH

Tables 5.3 and 5.4 indicate the thresholds used to show how risky various waterbodies may have been for people doing activities such as canoeing, fishing or sailing (called 'intermediate-contact' recreational activities). While these people might touch or swallow some water, they are not as likely to do so as people who swim (termed 'full-contact' recreation).

Two key variables are considered, namely *Escherichia coli* bacteria (an indicator of exposure to raw sewage and other sources of faeces from warm-blooded animals (i.e. birds and mammals)) and microcystin toxin concentrations associated with cyanobacteria (also called blue-green algae).

It is important to note that the City does not manage any of its waterbodies with the target of their being fit for full-contact recreation. Full-contact recreational use is not considered a realistic target at present.

Table 5.3: Guidelines for the interpretation of *Escherichia coli* data.

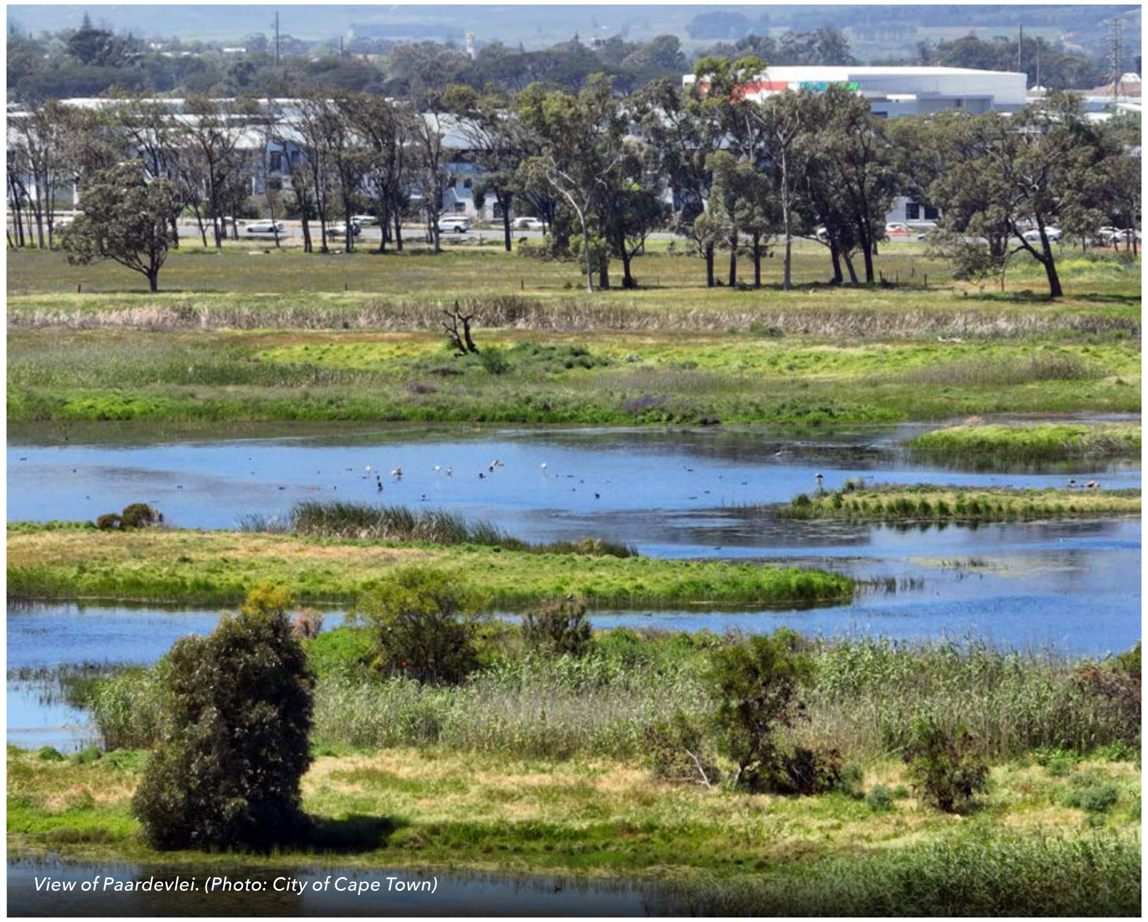
Note the inclusion of full-contact AND intermediate-contact thresholds, as well as the expansion of the 'unacceptable' range, to show different scales of pollution. This expanded scale was not used in the present report as a result of issues of reporting on '>' values, as discussed in section 3.8.10.

Interpretation	Inland systems Faecal coliform count (including *E. coli*)[1]
Target for maximum acceptable risk for full- contact recreation	≤ 400 [2]cfu/100 ml
Acceptable risk intermediate contact	1 001-2 500 cfu/100 ml
Tolerable risk – intermediate contact	> 2 500-4 000 cfu/100 ml
Unacceptable risk – intermediate contact – level 1	> 4 000-10 000 cfu/100 ml
Unacceptable risk – intermediate contact – level 2	> 10 001-100 000 cfu/100 ml
Unacceptable risk – intermediate contact – level 3	> 100 000 cfu/100 ml

[1] *cfu = colony-forming unit*

Table 5.4: Guidelines for interpreting concentrations of microcystin toxins in inland waters.

Interpretation	Microcystin concentration
Target (acceptable)	≤ 20 µg/L
Medium risk (unacceptable)	> 20–30 µg/L
High risk (unacceptable)	> 30–40 µg/L
Extreme risk (unacceptable)	> 40 µg/L


View of Paardevlei. (Photo: City of Cape Town)

6. WATER QUALITY IN CAPE TOWN'S RIVERS, VLEIS, DAMS AND ESTUARIES

This section summarises the results of some of the water quality analyses presented in the technical report. It focuses on the 2023 and 2024 reporting periods, and compares these data with data from the 2020 to 2022 reporting periods.

Please consult the technical report for details on data analysis assumptions, limitations, methodologies and for the full set of analyses of different water quality variables and discussion around their implications.

6.1 ASSESSMENT OF WATER QUALITY BASED ON NUTRIENT ENRICHMENT

6.1.1 THE ROLE OF NUTRIENTS IN AQUATIC ECOSYSTEMS

All ecosystems need nutrients to support growth. In aquatic ecosystems, the main nutrients are phosphorus and nitrogen, which occur in various forms. These two nutrients play important roles in determining the rate of plant growth, and are sometimes referred to as 'growth-limiting' nutrients. In freshwater ecosystems, phosphorus is the main growth-limiting nutrient, as some plants can access sufficient nitrogen from the air for growth. Other nutrients are also important for healthy growth, and these include sulphur, magnesium, potassium, calcium, iron and many others, often required only in very small amounts.

The City's Inland Water Quality Report deals only with phosphorus and nitrogen nutrients, which play a major role in determining aquatic ecosystem condition.

6.1.2 EFFECTS OF NUTRIENT ENRICHMENT ON AQUATIC ECOSYSTEMS AND THEIR MANAGEMENT

When aquatic ecosystems have abundant nutrients (particularly phosphorus in freshwater ecosystems), the rate of aquatic plant growth increases and the kinds of plants that occur in them may also change to favour fast-growing species. Thus, nutrient-enriched systems are often dominated by dense reedbeds in shallow waters, with deeper waters being characterised by floating plants on the surface where they can access light and nutrients. Blue-green algae (also called cyanobacteria) often prevail in such conditions, because they can access nitrogen from the air. Other non-algal plants (or macrophytes) growing on the water surface comprise fast-growing, generally invasive alien plants, such as water hyacinth.

These nutrient-enriched conditions are referred to as eutrophic or (when enrichment is particularly high) hypertrophic systems.

Excessive plant growth can have serious knock-on ecological and management implications:

- Blocking waterways, posing flood risks and affecting recreational activities, such as kayaking, rowing and sailing.
- Rapid accumulation of organic sediments in vleis and lakes as a result of die-off of fast-growing plants such as algae, which sink to the bottoms of vleis and lakes, forming thick layers low in oxygen and sometimes characterised by foul-smelling hydrogen sulphide and methane gases.
- Management costs – ongoing clearing of invasive vegetation and dredging of organic sediments come at high costs.

6.1.3 SOURCES OF NUTRIENTS

The main sources of nutrients into Cape Town's watercourses are as follows:

- Inputs of treated sewage effluent from any of the City's 16 WWTW that discharge into inland watercourses or estuaries – although most of the WWTW in fact met general effluent limits for orthophosphate in the 2023 and 2024 reporting periods, these limits are high (almost two orders of magnitude higher than the threshold for hypertrophic conditions). Treated effluent is thus a major source of nutrients into Cape Town's watercourses, particularly in summer when they make up most of the river flow in some systems.
- Overflows from sewage pump stations and/or low-lying sewer manholes into the stormwater system as a result of load-shedding or sewer line blockages.
- Runoff from catchment areas with high levels of backyard and/or informal settlements, with poor levels of sewage and stormwater servicing.

FORMS OF PHOSPHORUS IN AQUATIC ECOSYSTEMS

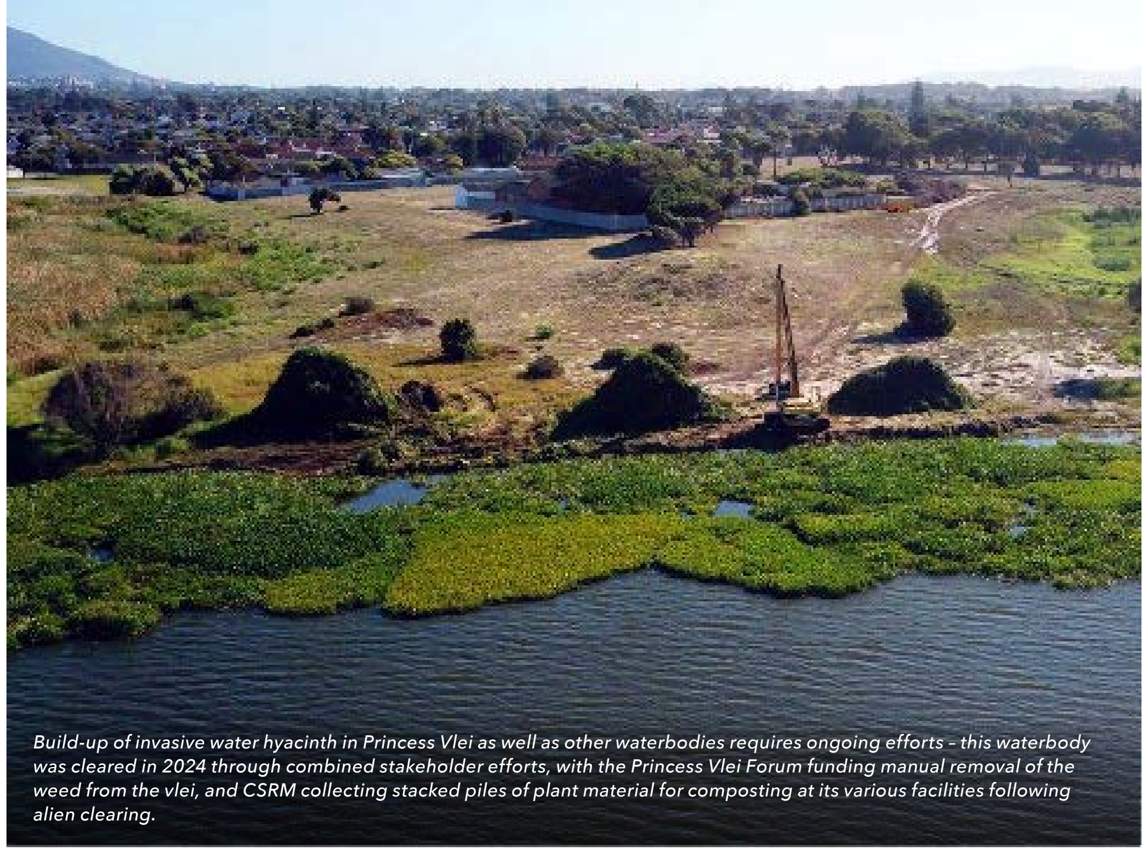
Phosphorus occurs in both inorganic and organic forms, and may be present in water as particulate or dissolved species. Dissolved **orthophosphate forms** are the only forms of inorganic phosphorus that can be utilised directly by plants.

Total phosphorus (Tot-P) is a measure of all the chemical species of phosphorus present in the water column. It includes dissolved forms, insoluble particulate forms and phosphorus already incorporated into phytoplankton (algae) or other fine particulate organic material. Total phosphorus is useful for understanding the nutrient (or trophic) status of aquatic ecosystems because it represents all the phosphorus potentially available for incorporation into active biomass.

Unfortunately, the City has been unable to measure Tot-P in its laboratories since December 2022.

- Illegal discharges of nutrient-enriched water into the stormwater system (e.g. factories, car washes. markets, informal butcheries and meat markets).
- Runoff from fertilised gardens and parks.
- Runoff from agricultural areas (e.g. Philippi horticultural area).
- Runoff, irrigation seepage or direct discharges from so-called sewage package plants used to treat sewage effluent on a small scale.
- In standing water systems (lakes, vleis), decomposing bottom sediments may also release phosphorus when oxygen levels are low or when they are stirred up by wind or boats.

The following sections present data considered in assessing phosphorus and nitrogen enrichment in Cape Town's watercourses between October 2020 and September 2024, with a focus on the 2023 and 2024 reporting periods.



Build-up of invasive water hyacinth in Princess Vlei as well as other waterbodies requires ongoing efforts – this waterbody was cleared in 2024 through combined stakeholder efforts, with the Princess Vlei Forum funding manual removal of the weed from the vlei, and CSRM collecting stacked piles of plant material for composting at its various facilities following alien clearing.

6.1.4 PHOSPHORUS STATUS IN CAPE TOWN'S WATERCOURSES: REPORTING PERIODS 2020 TO 2024

Orthophosphate data were analysed separately for flowing systems (river sites and Milnerton Lagoon, presented per catchment) and, in the absence of total phosphorus data, for standing water systems (vleis, dams, coastal lakes). Summary data are presented in **figure 6.1**, comparing all catchments for the 2024 reporting period only, and in **figures 6.2** and **6.3**, comparing data between 2020 and 2024.

The data showed that orthophosphate enrichment remained a key concern, affecting the condition of all of Cape Town's watercourses and with no real improvement evidenced in the 2024 reporting period, where 77% of 'flowing' (river/stormwater) samples were rated 'unacceptable' (hypertrophic) and median orthophosphate concentrations lay well above the hypertrophic threshold for this variable in all catchments save the Lourens and Silvermine catchments. Consideration of orthophosphate data provided the following insights:

- The worst-performing **catchments** comprised the Mosselbank, Mitchells Plain, Soet, Sout, Eerste, Kuils, Diep, Lower Salt and Zeekoe catchments, all characterised by high levels of informal settlements in at least some areas; rivers that are exposed to frequent sewage pump station overflows and sewage spills; and inflows from poorly performing WWTW – median orthophosphate concentrations in these catchments were more than an order of magnitude above the lower threshold for 'unacceptable' ratings.
- Marked **increases** in median orthophosphate concentrations in the Lower Salt, Mosselbank, Soet and Zeekoe catchments in the 2024 reporting period compared with previous years have been noted with concern. In the Zeekoe catchment in particular, the important Ramsar wetlands downstream (Zeekoevlei and Rondevlei) are particularly vulnerable to the ongoing impacts of eutrophication.
- The best-performing catchments were the Hout Bay, Silvermine and Lourens catchments, all of which had < 10% samples in the 'unacceptable' range – with the exception of Hout Bay, these data reflect catchments with generally low levels of urban settlement; few informal or backyard settlements; an absence of WWTW inflows, and extensive mountain catchments that receive high-quality runoff. **Nevertheless, some deterioration in water quality in the Silvermine catchment has been flagged as a concern,** with an increase in the frequency of 'unacceptable' ratings in the 2024 reporting period compared with previous years.
- Summer orthophosphate concentrations were generally higher than winter concentrations, reflecting evapo-concentration in rivers, as well as the fact that, in many systems, the only water flowing in the rivers in summer derived from treated or untreated sewage effluent, greywater from unserviced households and illegal discharges.
- Exceptions to the above were the Bokramspruit, Soet and Zeekoe catchments, where winter concentrations were highest and in which rainfall events outside of major floods may serve simply to wash more pollutants into the rivers, rather than diluting them.
- Of Cape Town's **standing water systems** (vleis, wetlands and detention ponds), the data showed that they are all highly phosphorus enriched, reflecting inflows from significantly more polluted rivers and stormwater systems, which load standing waterbodies with nutrients that accumulate over time in the waterbodies themselves, as well as in bottom sediments and living plant material.
- The overall proportion of samples rated as 'unacceptable' (i.e. hypertrophic range) increased between the 2024 and 2023 reporting periods, with deterioration in the condition of Rietvlei flagged as of particular concern.
- The costs of the marked orthophosphate enrichment in many of Cape Town's rivers are reflected in the high costs of removal of reeds and alien aquatic vegetation, such as water hyacinth, to reduce flood risk and protect indigenous biodiversity.

The City's current inability to measure total phosphorus and the SSB's high limit of quantification for orthophosphate have both been flagged as major concerns that limit the City's ability to track water quality trends accurately in standing waterbodies and particularly in the more sensitive catchments in better condition.

Silvermine river aerials. (Photo: City of Cape Town)

Figure 6.1

Data showing percentages of samples per catchment in rivers, canals and stormwater channels/outlets and other flowing systems (top graph) and in standing waterbodies (vleis and dams) in rated PO4-P categories (as per table 5.1). Number of samples is shown in bars.

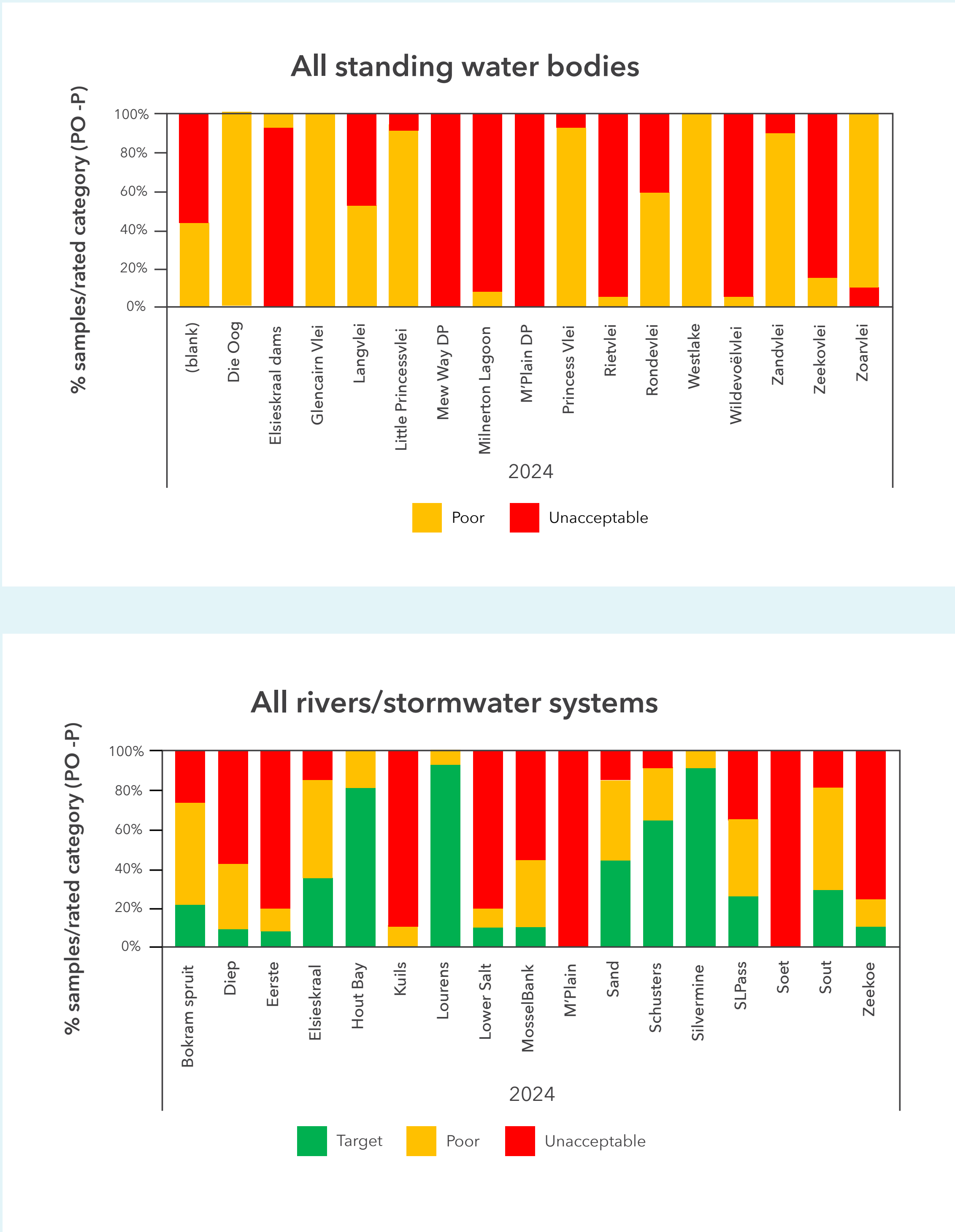


Figure 6.2

Percentage of orthophosphate (PO4-P) samples falling within each rated category for this variable, per catchment or subcatchment, between 2020 and 2022, and for the 2023 and 2024 reporting periods. Thresholds for rated categories as defined in table 5.1. Data presented for river/'flowing' water monitoring points. Subcatchments as shown in figure 2.1. Number of samples considered is shown in bars.

Figure 6.3

Percentage of orthophosphate (PO4-P) samples falling within each rated category for this variable, per monitored standing water system, between 2020 and 2022, and for the 2023 and 2024 reporting periods. Thresholds for rated categories as defined in table 3.1 for river systems, given the absence of total phosphorus data for standing waterbodies/vleis and detention ponds. Total number of samples considered is shown in bars.

6.1.5 NITROGEN NUTRIENT STATUS IN CAPE TOWN'S WATERBODIES: REPORTING PERIODS 2020 TO 2024

Nitrogen nutrient enrichment is assessed in inland water quality reporting mainly with reference to total inorganic nitrogen (TIN) concentrations, although the technical report also assesses other nitrogen forms and rations, including total ammoniacal nitrogen and TIN:PO4-P ratios.

In this summary report, only TIN data are presented, with **figure 6.4** comparing all catchments for the 2024 reporting period only, and **figures 6.5 and 6.6** comparing data between 2020 and 2024. The figures present compliance-type data for flowing systems (river sites and Milnerton Lagoon) as catchments, and for standing water systems (individual vleis, dams, coastal lakes).

Both the current assessment and previous Inland Water Quality reports have shown that nitrogen enrichment, assessed as TIN, is generally less severe than phosphorus pollution across Cape Town's water systems.

Nevertheless, in the 2024 reporting period, **54% of water quality samples from routinely monitored river/stormwater sites were rated 'unacceptable' with regard to their TIN concentrations** (a four percent increase from 2023 data), indicating that, while phosphorus is considered more problematic than nitrogen in driving ecosystem responses to eutrophication, nitrogen enrichment (particularly in its potentially toxic ammoniacal nitrogen form) is also at levels of concern in many parts of Cape Town's watercourses.

Furthermore:

- **Standing waterbodies** (vleis, dams) showed higher compliance with TIN targets than rivers and stormwater systems, with only 8% of samples rated 'unacceptable' in the 2024 reporting period.
- These 8% problem samples were located primarily in the highly polluted Mitchells Plain and Mew Way detention ponds, and Wildevoëlvlei, Zeekoevlei, Zoarvlei and Rondevlei systems, while TIN in the smaller vleis and wetlands was generally in the 'poor' to 'target' range.
- The ratio of TIN that comprises total ammoniacal nitrogen (NH4-N) is also an important measure considered in this report. That is because total ammoniacal nitrogen includes a proportion of un-ionised ammonia (NH_3), which can be toxic to some aquatic biota at relatively low concentrations. Hence, its dominance in TIN can reflect problems in ecosystem health (or condition). **Generally less nutrient-enriched rivers had lower NH4-N:TIN ratios, suggesting that where TIN loads are lower, more efficient nitrification takes place.** TIN was mostly in its ammoniacal nitrogen form in the worst-performing vleis/ponds, which are assumed to have been associated with ammonia toxicity at times.
- Most standing waterbodies also had low N:P ratios, indicating their susceptibility to blue-green algae blooms, with those most at risk being Wildevoëlvlei, Zeekoevlei, Zoarvlei, Rondevlei, Zandvlei, Rietvlei and the Mew Way and Mitchells Plain detention ponds; while vleis such as Little Princess Vlei and Princess Vlei were likely to be more resilient.

Please refer to section 5.3 of the technical report for more detailed analyses and discussion.

Figure 6.4

Data showing percentages of samples per catchment in rivers, canals and stormwater channels/outlets and other flowing systems (top graph) and in standing waterbodies (vleis and dams) in rated TIN categories (as per table 5.1). Number of samples is shown in bars.

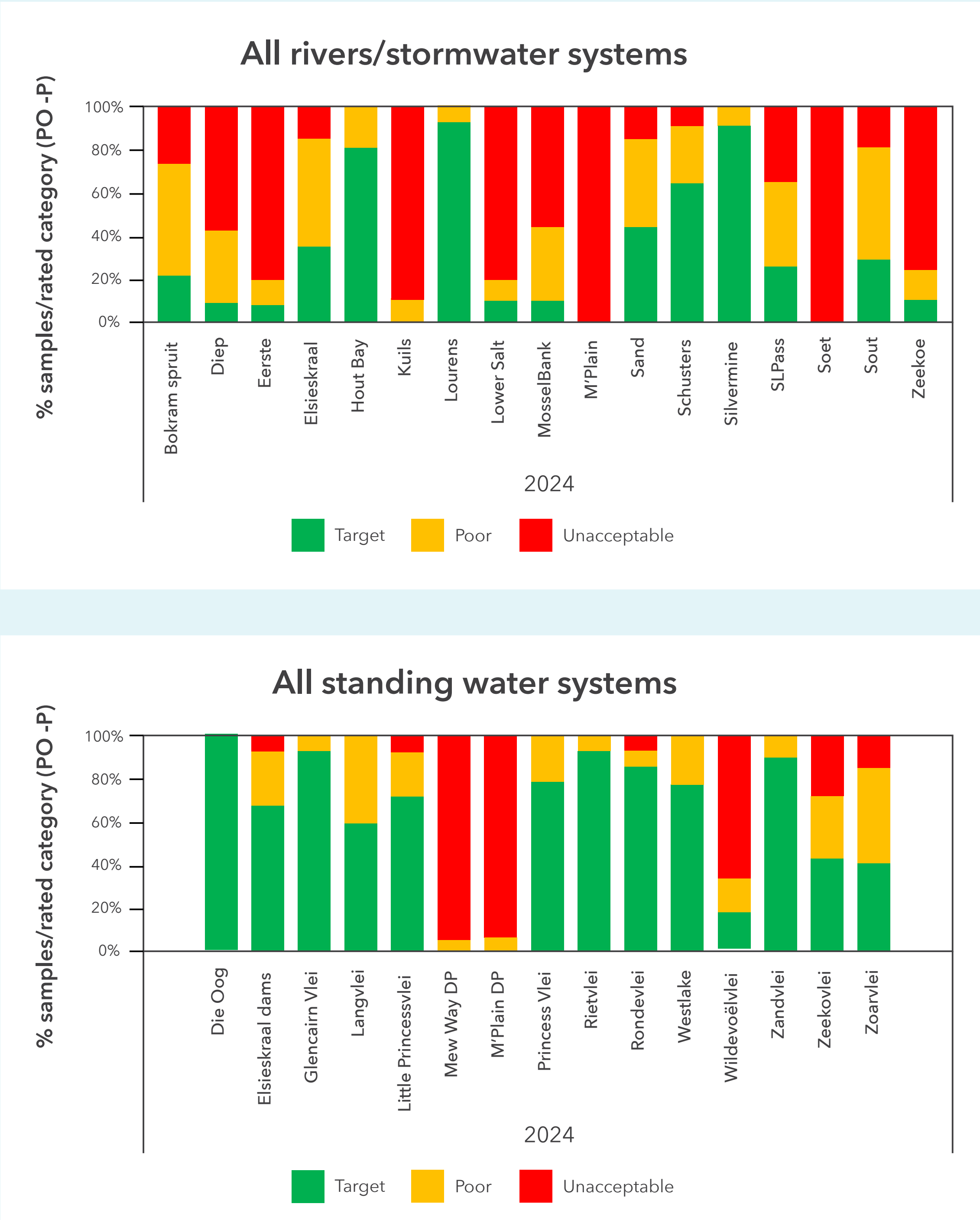


Figure 6.5

Percentage of total inorganic nitrogen (TIN) samples falling within each rated category for this variable, per subcatchment. Thresholds for rated categories as defined in table 3.2. **Data for river/'flowing' water monitoring points** in each subcatchment. Subcatchments as shown in figure 2.1.

Figure 6.6

Percentage of total inorganic nitrogen (TIN) samples falling within each rated category for this variable, per subcatchment. Thresholds for rated categories as defined in table 3.2. Data for standing water systems. All samples considered together in bottom right plot (all standing waterbodies).

6.2 SEWAGE AND WATER QUALITY

6.2.1 CONTEXT AND RELEVANCE TO THIS REPORT

Although raw sewage is most frequently reported on from the perspective of its risks to human health, in Cape Town (and many other cities with high levels of informal settlements, poorly performing wastewater treatment works and frequently failing sewage pump stations), both raw and treated sewage are also major drivers of broader aquatic ecosystem water quality, being associated with phosphorus loading; high (and often unmeasured) organic loads, associated with high chemical and biological oxygen demands; often elevated concentrations of (potentially toxic) free ammonia; generally high concentrations of inorganic nitrogen; and often high levels of suspended solids, often comprising mainly organic waste.

The implications of elevated nutrients associated with sewage inflows, among other sources, have already been discussed in section 6.1.

6.2.2 SOURCES OF SEWAGE CONTAMINATION IN CAPE TOWN

The 2025 Technical Report highlighted the following main sources of sewage contamination into Cape Town's watercourses and estuaries:

- Inflows of variously treated effluent from the City's 16 inland WWTW (see **figure 6.7**) – these inflows by far contribute the greatest loads of nutrients, particularly phosphorus, as well as (in many cases), suspended solids and bacteria into the city's watercourses.
- Overflows from sewage pump stations (or from low-lying manholes downstream of pump stations) as a result of blockages, pump station failure and from load-shedding power outages – unless diverted back into the sewerage system by pumping or other means, such waste finds its way into the stormwater system and into the city's watercourses.
- Periodic sewer blockages and manhole overflows that enter the stormwater system and thus pass into watercourses – blockages result variously from poor solid waste management, overflows from sewer manholes as a result of inflows of stormwater, vandalism, ageing infrastructure (reflecting a history of poor maintenance effort) and increasing volumes of raw sewage generated from rapidly expanding informal and backyard settlements.
- Contaminated stormwater runoff from poorly serviced informal settlements, where sewage is disposed of into canals and stormwater drains for want of alternative disposal options or because access to options to dispose of waste to sewers is unsafe (e.g. at night) or unhygienic (because of a build-up of solid waste and/or faecal waste).
- Runoff from urban areas with high levels of homeless people without alternative waste disposal options.
- Illegal connections of sewers into stormwater systems and old sewer designs allowing direct overflows into stormwater systems.
- Inputs from wildlife (baboons and birds) as well as livestock (e.g. feedlots in agricultural areas in and draining into rivers or other watercourses).
- Minor inputs from pavements, parks, etc. accessed by domestic animals (e.g. dogs).

Homeless people washing and collecting water from the polluted Elsieskraal River, Bellville CBD – these people are exposed to often high levels of E. coli.

Sewage overflows into the Theo Marais channel, leading to the Milnerton Lagoon (Diep River subcatchment) as a result of prolonged failure of the Koeberg pump station.

Informal settlements in Langa overhang the Jakkalsvlei River (Lower Salt subcatchment) and discharge night soil and other waste into the river.

Outflows of raw sewage enter the Big Lotus River, Zeekoe catchment, from the Sweet Home and other informal settlements.

IMPACTS OF TREATED SEWAGE EFFLUENT ON CAPE TOWN'S INLAND WATERCOURSES AND ESTUARIES

The technical report provides a brief assessment of final effluent data from the City's inland WWTW over the 2023 and 2024 reporting periods, and found that only five of the City's WWTW (Zandvliet, Borcherds Quarry, Wesfleur Domestic, Fisantekraal and Kraaifontein) consistently produced effluent within the Department of Water and Sanitation's 'general limits' for *E. coli*, with most of the other WWTW producing effluent with *E. coli* counts several orders of magnitude higher. Outlets from these WWTW pose significant risks to downstream users in contact with this water.

Chemical oxygen demand data were also assessed as a measure of highlighting risk to aquatic ecosystems from high levels of oxygen needed to break down or oxidise chemicals in effluent, which can reduce dissolved oxygen available for aquatic ecosystems. These data indicated that the most poorly performing WWTW in this regard feed into the following river aquatic ecosystems:

- Diep River estuary and Milnerton Lagoon (Potsdam WWTW)
- Black River and Salt River Canal (Athlone and Borcherds Quarry WWTW)
- Wildevoëlvlei (Wildevoëlvlei WWTW)
- Zeekoe Canal (Cape Flats WWTW)
- Mosselbank River (and lower Diep River) (Klipheuwel WWTW) – note, however, that the effluent volume from this system was relatively low, so downstream loading was not marked
- Eerste River estuary (Macassar WWTW)

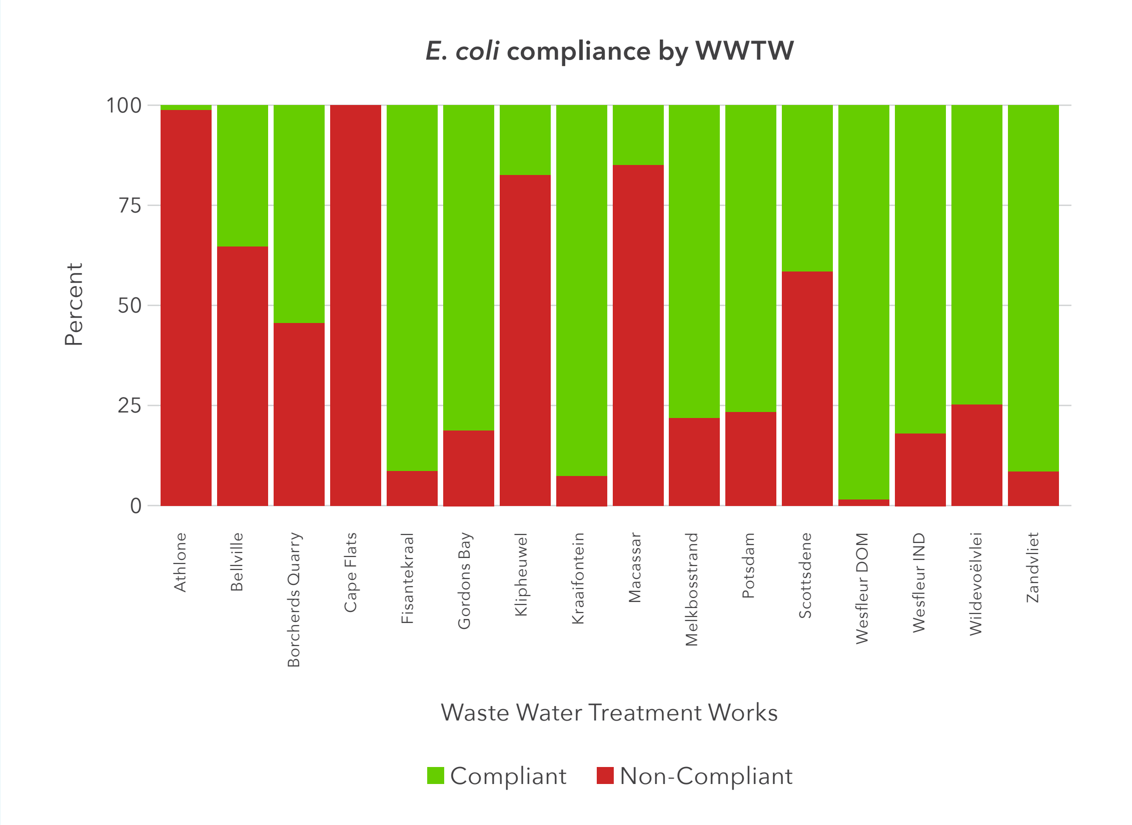
Of the above, the impacts of the Potsdam WWTW on the downstream systems are considered the most significant, having contributed largely to the recent collapse of this estuary and its once-important nursery for juvenile fish (Rose et al., 2023). Similarly, the Macassar WWTW, the effects of which are multiplied by inflows from the Bellville, Scottsdene and Zandvliet WWTW upstream in the catchment, has contributed to the severe degradation of the Eerste River estuary.

Moreover, while *E. coli* compliance was high in some WWTW (e.g. Potsdam), this was achieved by way of chlorination of final effluent. In aquatic ecosystems with high ammoniacal nitrogen as a result of polluted inflows, chlorination of effluent results in the formation of highly toxic chloramines in receiving waterbodies, further contributing to the collapse of some aquatic ecosystems (e.g. Eerste River estuary and Milnerton Lagoon).

The report notes that while the Cape Flats, Athlone and Borcherds Quarry WWTW essentially now feed into canalised artefacts of urban drainage, these systems nevertheless still play important roles in Cape Town's urban society, and poor effluent quality both actively detracts from the value of the areas through which they pass and has significant ecological costs – for example, the potential for estuarine fish to migrate up the Zeekoe Canal into the False Bay Nature Reserve (a Ramsar wetland of international importance) is compromised by large volumes of effluent outflows, often of very poor quality. Similarly, the Black River accumulates organic sludges from upstream inflows of inter alia treated effluent, with CODs well above the capacity of this system to effect aerobic decomposition.

Even generally compliant final effluent that meets general effluent limits is problematic, in that the effluent limits for orthophosphate are orders of magnitude above hypertrophic thresholds for aquatic ecosystems; and when they comprise the full flow into rivers or other watercourses in summer, they result in significant ecological and management impacts.

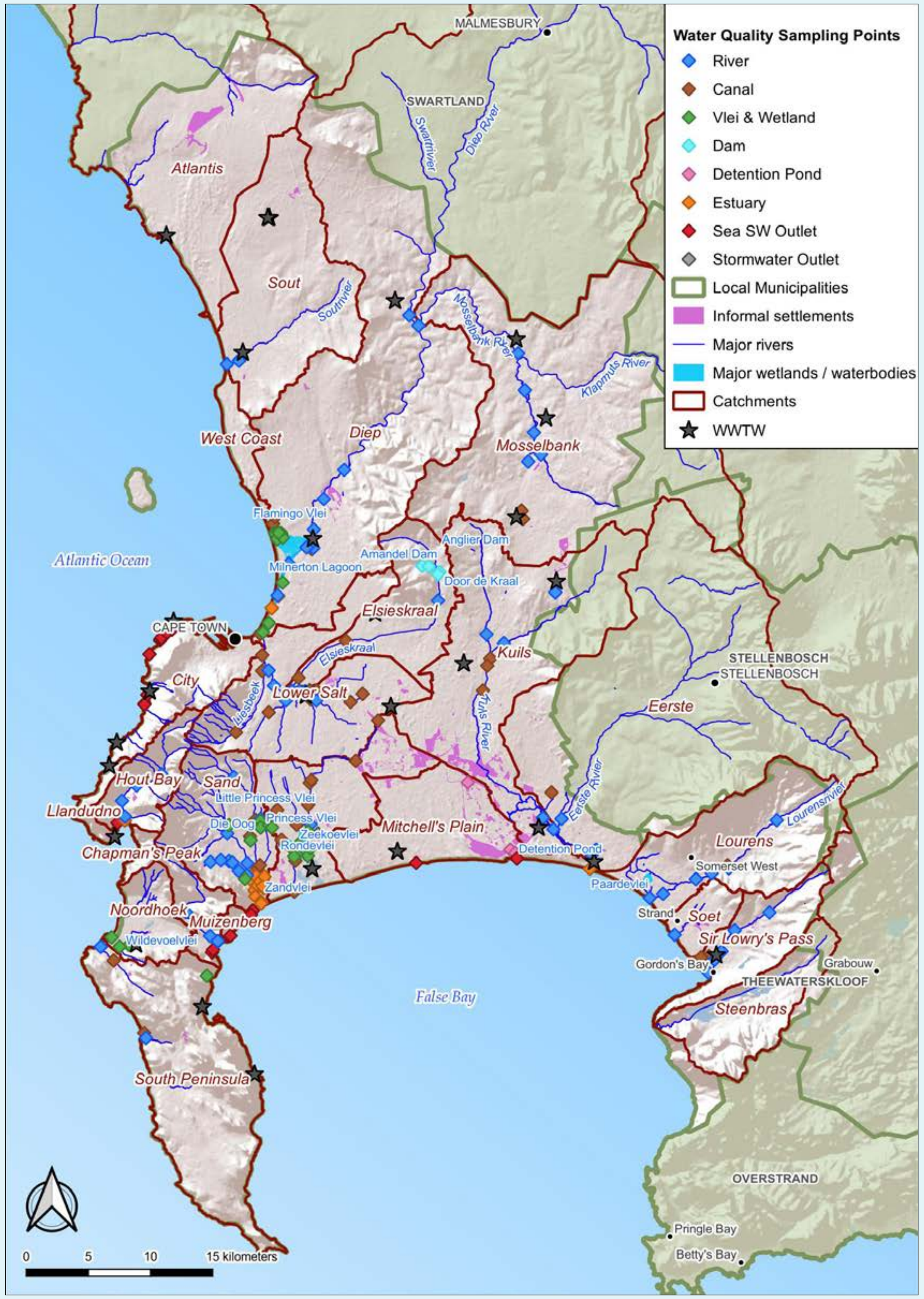
The report did, however, note that improved performance in some WWTW was apparent in both loading and effluent quality data (e.g. the recently upgraded Zandvliet WWTW).



Proportion of samples from the City's various inland WWTW where Escherichia coli samples complied with or did not comply with general effluent limits (data for the 2024 reporting period).

Figure 6.7

Map showing the locations of the City of Cape Town's WWTW and sewage pump stations, in the context of different catchments, subcatchments, rivers and major wetlands.



IMPACTS OF FAILING PUMP STATIONS ON CAPE TOWN'S WATERCOURSES

The technical report assessed data for sewage pump station overflows in the city's catchments and noted that:

- over the 2023 and 2024 reporting periods, a total of 875 pump station failures were recorded, with 566 of these recorded in the 2024 reporting period;
- the above included three catastrophic, 31 major, and 116 moderate pump station failures;
- of the three catastrophic spill events, two were in the Diep catchment – Koeberg Road and Table View East pump stations. Both spills occurred in the 2024 reporting year, and lasted more than 24 hours;
- the Diep subcatchment was by far the most impacted by pump station failures, which accounted for 19,6% of all failures in the two-year period, with the two worst performing pump stations in the city being in the Diep, and four of the top 10 pump stations with the most recorded spills also lying in the Diep subcatchment;
- importantly, the data showed that the Koeberg Road pump station accounted for more than double the number of spills of any other pump station in the city over the 2023 and 2024 reporting periods – **given the volume of flows handled at this pump station, this is of particular concern for the Diep River estuary** and is reflected in water quality data for the downstream Milnerton Lagoon; and
- the main reasons for failure of pump stations in the Diep subcatchment appear to have been pump overloads, overheating, electrical failure and clogging by rags. The catchment was affected by pump overloads more than any other catchment in the city, which are presumed to reflect the failure of infrastructure to keep up with rapid urban growth in this subcatchment.

Raw sewage surcharging from the Koeberg pump station – 2024 (Photo: J. Rose)

Recommendations from the technical report

- Since pump station overflows were linked primarily to electrical failure and stormwater ingress, as well as blockages from rags and other foreign objects, and mechanical failure, increased pump station maintenance and management across most of the city's subcatchments are recommended to address these issues.
- The ongoing passage of foreign material into pump stations is clearly an issue of concern and the report notes (and supports) that the City plans to include sediment and solid waste traps upstream of pump stations in the future, where space allows. However, the passage of solid waste into the wet wells of pump stations during screen cleaning is clearly a risk inherent in many pump stations at present, and could be rectified through measures such as double screens, even in systems where there is not space for sediment and solid waste trapping upstream.
- Manhole overflows are due to both pump station blockages and sewer blockages or collapses – measures such as proactive sewer cleaning and relining, as necessary, may assist in reducing these events. It is, however, clear that a dramatically improved approach to solid waste management is required at a Citywide scale to reduce knock-on impacts on sewerage systems and watercourse condition.

The report commended the City for its efforts in collation of data on pump station failures to allow informed, data-driven responses to address these impacts.

Rietvlei. (Photo: City of Cape Town)

6.2.3 INDICATORS OF SEWAGE CONTAMINATION

Escherichia coli measurements are the only measure used by the City as an **indicator** of the human health risk posed by exposure to raw sewage, particularly for drinking or recreational purposes. Consideration of this parameter is, therefore, of most relevance to Cape Town's established recreational vlei systems, where a range of water sports and/or other water-based activities are known to take place (i.e. Zandvlei, Zeekoevlei, Rietvlei, Milnerton Lagoon and Princess Vlei). These systems are discussed in more detail in section 6.3.

However, many people in Cape Town are exposed to raw sewage in waterbodies on a daily basis from both formal recreational waterbodies (e.g. Zandvlei, Zeekoevlei, Rietvlei, Milnerton Lagoon and Princess Vlei) as well as from informal contact with many other rivers, stormwater channels, vleis, lakes and detention ponds across the city, from activities such as walking or wading through them or, in some cases, even swimming in them; working in them (solid waste or plant removal); as well as, for large numbers of homeless city residents, accessing often polluted waterbodies for bathing, laundry or even drinking water.

For this reason, the technical report evaluates the risks associated with exposure to a broader array of rivers and vlei systems in Cape Town, and not necessarily just all major/established recreational waterbodies.

WHAT IS *ESCHERICHIA COLI*?

Escherichia coli (abbreviated *E. coli*) is a species of faecal coliform bacteria that is commonly found in the lower intestine of warm-blooded organisms (birds and mammals) and usually accounts for the majority of bacteria found in the faeces of these animals. Most *E. coli* strains are harmless, but some can cause serious gut and other infections in humans. Their presence in the water is used as an 'indicator' of faecal contamination of mammal or bird origin, and thus of other pathogens that may also be present in such faeces.

MANAGING RECREATIONAL WATERBODIES IN TERMS OF HUMAN HEALTH RISKS

Human health impacts from exposure to *E. coli* are most likely if polluted water is swallowed. Some activities, such as swimming or diving (classified as '**full-contact**' recreation), clearly pose more risk of swallowing water than activities such as fishing or kayaking (included among activities classified as '**intermediate-contact**' recreation. Passive recreation (e.g. bird-watching and sight-seeing from a distance) are classified as '**passive**' recreation and would not normally be associated with any risk of exposure to *E. coli*.

Note that the City does not manage any of its inland waterbodies for full-contact recreation activities.

Escherichia coli data can also usefully highlight point-source pollution into watercourses, where elevated *E. coli* is an indicator of contamination from untreated sewage, either from overflows from manholes, sewage pump stations, inflows from poorly serviced backyard or informal settlements, or non-compliant WWTW.

6.2.4 ASSESSMENT OF *E. COLI* DATA FROM THE CITY'S WATERBODIES

The technical report assessed only *E. coli* data for the 2020, 2023 and 2024 reporting periods. This was due to unreliable data over the 2021 and 2022 reporting periods, discussed more fully in that document that also raised various other issues of concern regarding *E. coli* reporting (see 2025 Technical Report: sections 3.11.7 and 3.11.9).

In this summary report, *E. coli* data are presented as compliance-type data, with **figure 6.8** comparing all catchments for the 2024 reporting period only, and **figures 6.9 and 6.10** comparing data between the 2020, 2022 and 2024 reporting periods for rivers/stormwater channels and standing water systems (vleis/detention ponds, etc.). The data are compared over the 2020 and 2023 to 2024 reporting periods only (see section 3.11.7). Data from the 2021 and 2022 reporting periods have been excluded as a result of unreliable laboratory analyses over this time, as discussed in section 3.11.7. Data for marine stormwater outlets are assessed for the 2024 reporting period only.

The data showed the following:

- For **rivers/flowing systems** (presented as catchments or subcatchments):
  - A **marked increase in both the frequency and the magnitude of sewage contamination** of Cape Town's rivers between 2020 and the 2023 to 2024 reporting periods, with 2024 showing a similar proportion of sites falling within the 'unacceptable' range compared with 2023 (60%) but with a higher proportion of these showing an increased magnitude of exceedance of the 'unacceptable' threshold (52% at level 2 'unacceptable' or higher versus 39% in 2023).
  - The **best performing catchments** comprised (in order) the Schuster's, Sout, Lourens and Silvermine catchments, with the Schuster's and Sout catchments having < 20% of samples within the 'unacceptable' range for *E. coli*. However, sewage inflows appear to have increased in both frequency and magnitude in the Lourens catchment, as well as in magnitude in the Silvermine catchment, between the 2020, 2023 and 2024 reporting periods. **These are serious red flags, as both of these catchments have hitherto been reflected in Inland Water Quality reports as the best performing catchments with generally good overall water quality.**
  - The worst-performing catchments in the 2024 reporting period comprised (in order) the Soet, Mitchells Plain (sea outfall), Lower Salt, Bokramspruit, Kuils, Eerste and Diep catchments – of these, **no samples in the entire monitoring year in either the Soet or the Mitchells Plain catchments were ever better than level 2 'unacceptable',** indicating permanent, high levels of sewage inflows into these systems. The Diep subcatchment was increasingly impacted by WWTW effluent inflows and the frequently failing Koeberg Road and Table View East pump stations.
  - After the Diep subcatchment, the next worst-performing catchments comprised (in order) the Zeekoe, Elsieskraal, Sir Lowry's Pass and Hout Bay catchments. Of these, the Elsieskraal catchment is not impacted by large informal settlements but is characterised by enclaves of homeless people living on streets and along watercourses, and contributing to watercourse degradation, along with a high frequency of sewage overflows into the river.
  - The Sir Lowry's Pass and Hout Bay catchments include both lesser contaminated upstream reaches and highly polluted downstream reaches, affected by inflows from extensive informal settlements and backyard dwellers; the Zeekoe catchment is characterised by high levels of inflow from informal and backyard settlements.
  - Encouragingly, data for the **Sand catchment** showed some reduction in the frequency of sewage impacts over the 2024 reporting period. However, the magnitude of reported impacts increased, suggesting periodic major inflows of raw sewage assumed to be associated with pump station failure.
  - **Overall, of the 21 catchments/subcatchments assessed, there was a reduction in the frequency and/or magnitude of measured *E. coli* contamination in only five catchments, namely the Mosselbank, Hout Bay, Elsieskraal and Schuster's catchments. All of the remaining catchments showed further degradation, often off an already low base, and the City's 60% 'acceptable' target was achieved in only four catchments in the 2024 reporting period (Schuster's, Lourens, Silvermine and Sout catchments), with the Silvermine and Sout catchments both showing significant deterioration compared with the 2020 and 2023 reporting periods.**
- **For stormwater outlets into the sea:**
  - The only sites that had no measured *E. coli* in the 2024 reporting period were outlets from the Lourens catchment and Bakoven (City Bowl catchment).
  - All of the other sites draining from the city bowl included high frequencies of highly contaminated flows (level 3 'unacceptable') and only three sites had ≤ 50% of their samples rated 'unacceptable', while the remaining sites all had between 65% and 90% of their samples rated 'unacceptable', reflecting inflows of water contaminated with sewage, both from periodic pump station or manhole overflows, or from wash-off from enclaves of informal settlements that increased in parts of the City Bowl since the 2020 Covid-19 pandemic.

- – Elsewhere in the city, stormwater runoff from the Mitchells Plain catchment was most contaminated, with the outlet from the Khayelitsha detention ponds off Baden Powell Drive and immediately downslope of the Monwabisi pump station having samples that were never better than 'unacceptable' level 2.
- – All of the other catchments, with the already noted exception of the Lourens River, showed periodic episodes of highly polluted outflows, which would contribute to the pollution of coastal waters.

- With regard to the routinely monitored **open-water systems** in the city:
  - With the exception of Zoarvlei and the highly contaminated Mew Way and Mitchells Plain detention ponds, these waterbodies generally showed **relatively low levels of sewage pollution** as measured by *E. coli* counts, with > 60% of samples in all systems lying within the 'acceptable' range for *E. coli* during the 2024 reporting period.
  - **Slight reductions in the frequency and/or magnitude** of measured sewage contamination were moreover noted for the 2024 reporting period in all but Die Oog, Langvlei, Westlake wetlands, Zoarvlei and the Mitchells Plain detention ponds. The data do, however, indicate that **all systems are subject to periodic pollution incidents when they are exposed to raw sewage flows.** These affect the fitness of these systems for recreational activities, at least at times.
  - Moreover, the citywide inflows of raw sewage into all catchments and standing waterbodies, at least at times, contribute to nutrient enrichment of these systems, with knock-on impacts of blue-green algal blooms and associated occasional microcystin toxicity in some recreational waterbodies, as well as excessive growth of reeds and alien vegetation (e.g. water hyacinth) and actual or potential ecosystem collapse in some systems (e.g. Milnerton Lagoon and Zeekoevlei (see technical report for details)), necessitating dredging and/or other costly interventions.

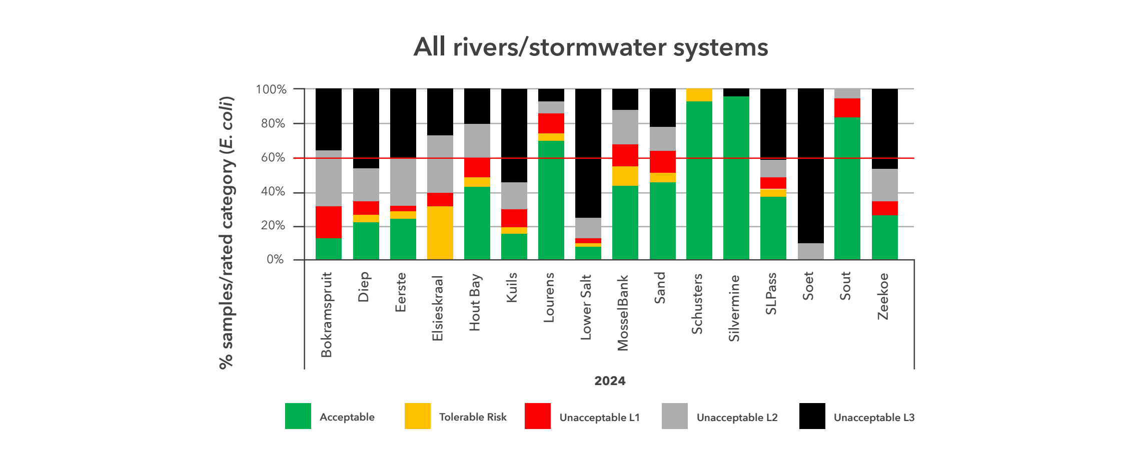
Recommendations in the technical report included the need for adjustments to routine assessment protocols for rivers to allow for more consistent reporting of actual *E. coli* concentrations.

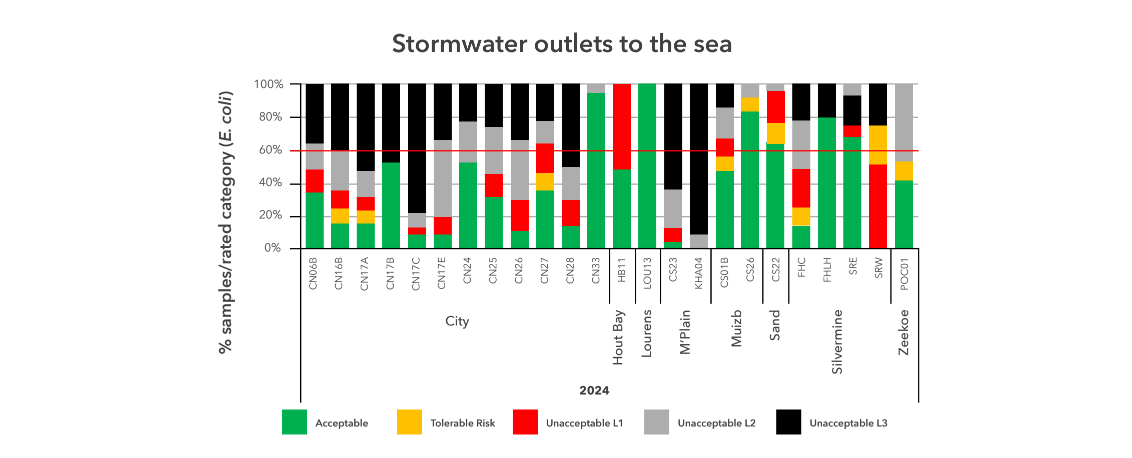
The report also (again) recommended that **enterococci analyses** should be included for at least recreational waterbodies, so that the City keeps up with global monitoring and reporting standards as well as to provide an alternative dataset with which to assess the magnitude and associated human health risks of sewage pollution into waterbodies in order improve confidence in *E. coli* data.

High levels of E. coli *characterise the Big Lotus River in its reaches from the N2 down to Govan Mbeki Road, and often beyond, although exposure to sunlight with distance downstream kills off* E. coli *and,* ***provided no new inflows of sewage occur****, concentrations of* E. coli *tend to decrease. Remember though that even where* E. coli *levels are low (including as a result of formal disinfection by chlorination or UV lighting), the other water quality impacts of sewage (e.g. nutrients, organic solids, other pathogens) remain.*

Figure 6.8

Data showing percentage of samples per catchment in rivers, stormwater channels and stormwater outflows into the sea, and for standing water systems using rated *E. coli* categories (as per table 5.3). Data for the 2024 reporting period.





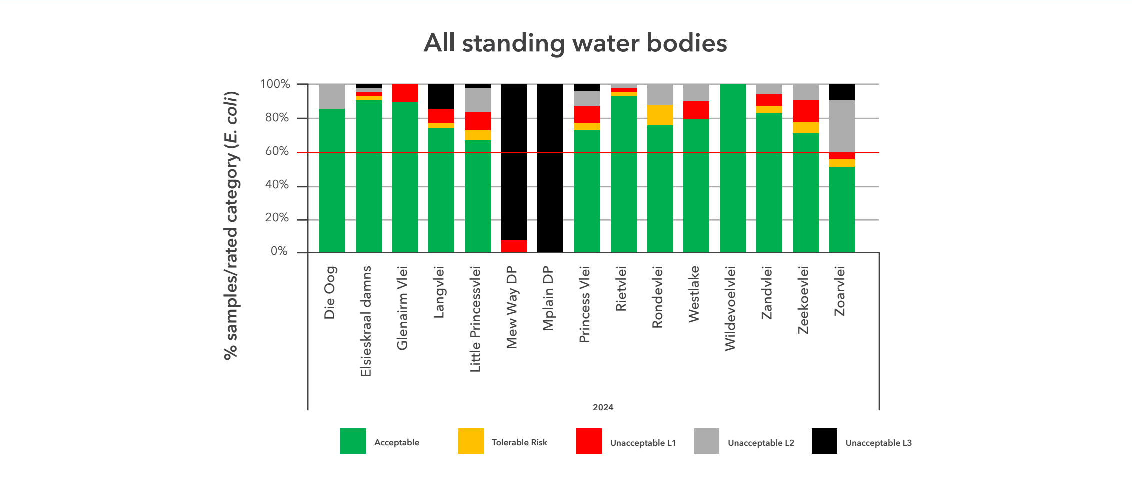
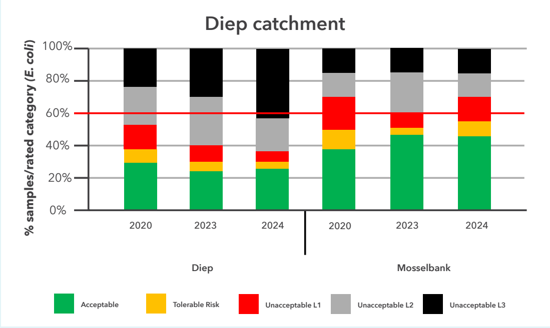
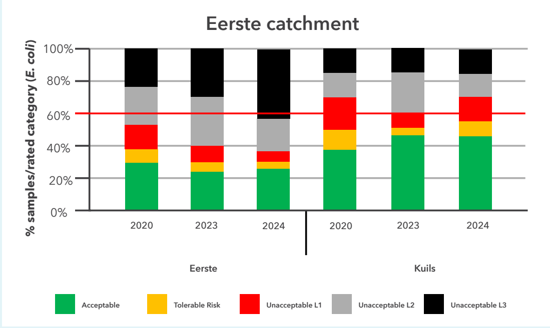
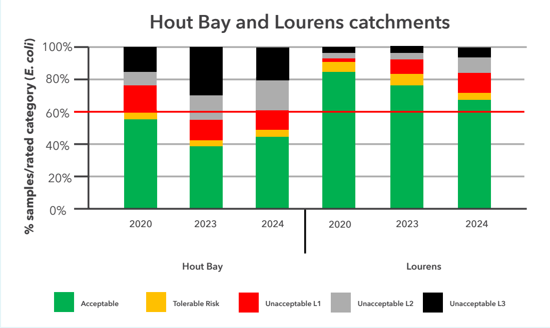


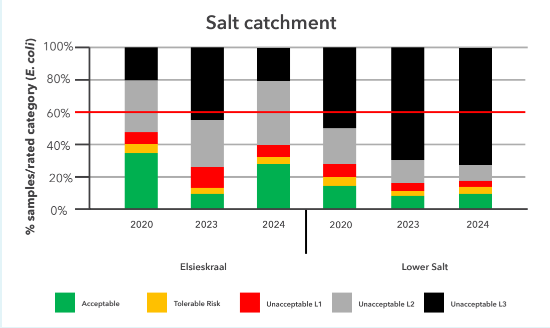
Figure 6.9

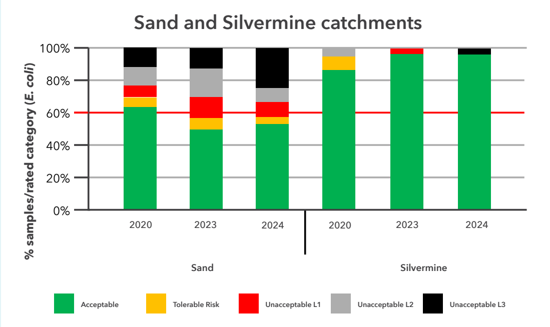
Percentage of *Escherichia coli* samples falling within each rated category for this variable, per catchment. Thresholds for rated categories as defined in table 3.4. **Data for river/'flowing' water monitoring points in each subcatchment**. Subcatchments as shown in figure 2.1. Dotted red line indicates City's '60% target' for *E. coli*. Graphs arranged alphabetically by catchment.

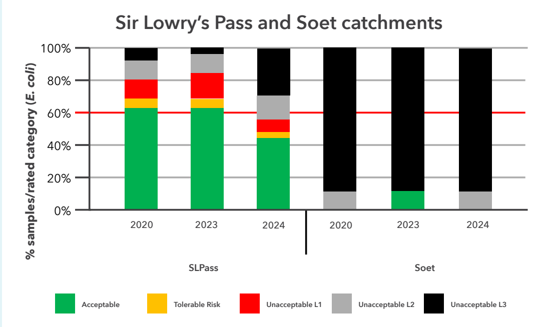


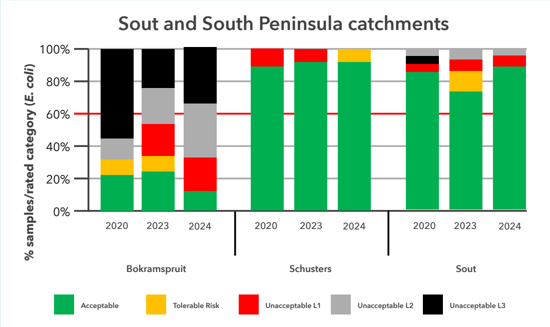












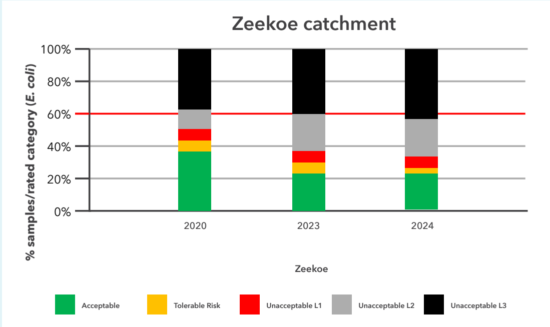
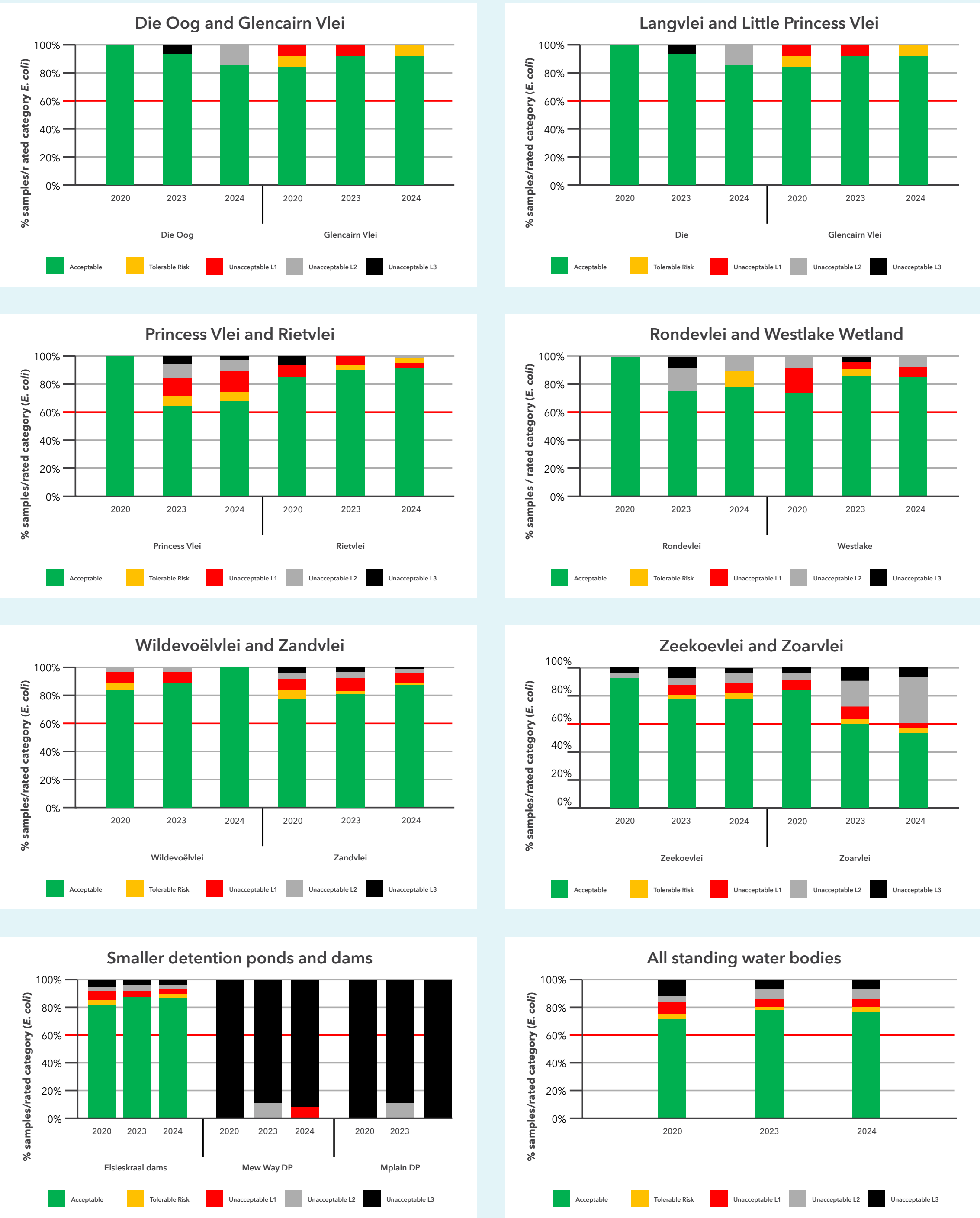


Figure 6.10

Percentage of *Escherichia coli* samples falling within each rated category for this variable. Thresholds for rated categories as defined in table 5.3. **Data for sample points in standing waterbodies/vleis and detention ponds.** Dotted red line indicates City's '60% target' for *E. coli*. Graphs arranged alphabetically.



6.3 *ESCHERICHIA COLI* DATA AS INDICATORS OF RISK TO HUMAN HEALTH IN THE CITY'S FORMAL RECREATIONAL WATERBODIES

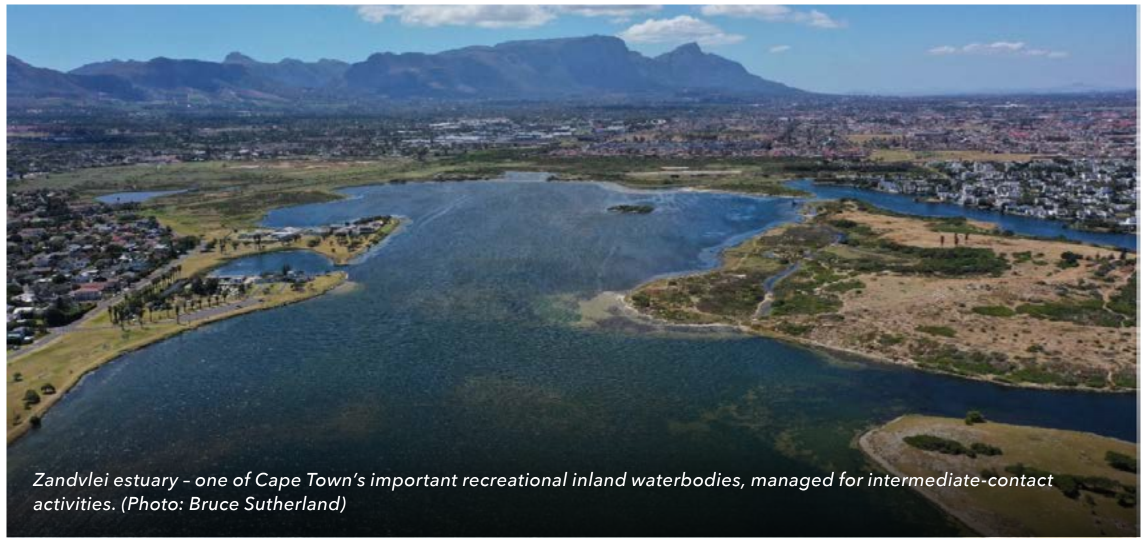
6.3.1 CAPE TOWN'S RECREATIONAL WATERBODIES

Among other issues, the technical report was also tasked with consideration of how polluted water in Cape Town's main inland recreational waterbodies might affect people's health (section 6 of the report). It looked at the following waterbodies, which are the only waterbodies in Cape Town that are actively managed for intermediate recreational use:

- Rietvlei
- Milnerton Lagoon
- Princess Vlei
- Zeekoevlei
- Zandvlei

With the exception of Princess Vlei, these vleis and estuaries are all used for various water sport activities, including sailing, kayaking, canoeing, kite-boarding, skiing, wind-surfing, rowing and fishing. All of these activities expose users to some level of health risk if water quality is compromised. Princess Vlei is not used for water sports. It is, however, used periodically for baptism ceremonies, requiring full immersion.

The above waterbodies are also accessed by workers and volunteers during solid waste removal, water hyacinth and other alien plant clearing, and management of indigenous but invasive reeds and other plants such as the bulrush (*Typha capensis*), common reed (*Phragmites australis*), *Schoenoplectus scirpoides* and sago pondweed (*Stuckenia pectinata*).



Zandvlei estuary – one of Cape Town's important recreational inland waterbodies, managed for intermediate-contact activities. (Photo: Bruce Sutherland)

6.3.2 OVERVIEW OF *E. COLI* DATA FOR INDIVIDUAL RECREATIONAL WATERBODIES

Summary *E. coli* compliance data (for all sites in each system) are shown in **figure 6.11**, while the maps in **figures 6.12** and **6.13** show (geometric) mean annual data for individual monitoring sites in and near each waterbody. These are colour-coded to show different levels of risk.

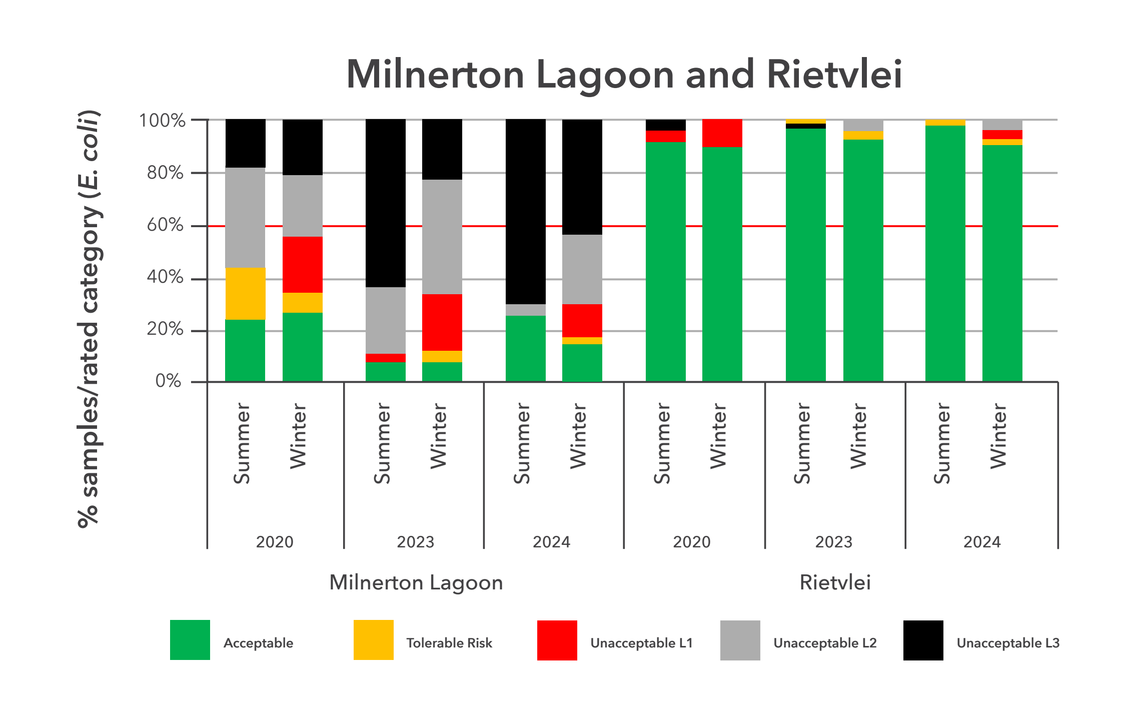
Drawing on these data, the 2025 Technical Report (which should be accessed for further details and discussion) showed the following:

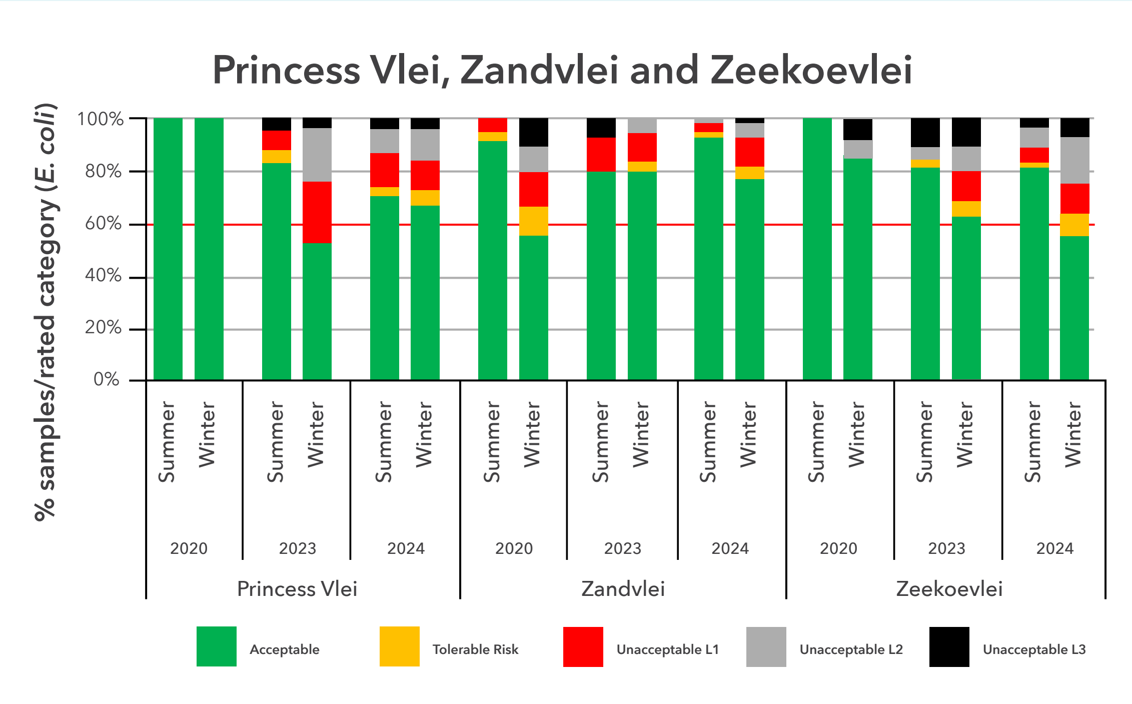
- **Milnerton Lagoon** experienced very high levels of sewage contamination (mainly 'unacceptable' levels 3 and 2) over all three reporting periods, with data showing **a major increase in the magnitude of sewage pollution in the 2024 reporting period**, shown by an increased proportion of samples rated as level 3 'unacceptable'. The data showed slight seasonal variation, with a lower proportion of winter samples rated as 'unacceptable' levels 3 and 2 in both the 2023 and 2024 reporting periods, possibly reflecting some wet season dilution at times. However, sewage inflows were probably driven mainly by near-continual inflows of raw sewage from pump station failures (particularly the Koeberg pump station in the 2023 and 2024 reporting periods) and non-compliant treated effluent from the WWTW.
- **The data suggest that, for most of the 2023 and 2024 reporting periods, Milnerton Lagoon was not a safe waterbody for even intermediate recreational use**, with at best 25% of samples being rated as 'acceptable' in the summer 2024 reporting period (assumed to reflect samples mainly from the lagoon mouth, with all other samples in that summer being rated as 'unacceptable' levels 2 and 3, reflecting major, sustained and highly polluted inflows into the lagoon.
- **Rietvlei** (also referred to as Flamingo Vlei in some documents) by contrast was rarely exposed to raw sewage over the three assessed reporting periods, although data for the 2024 winter reporting period showed an increase in the frequency of measured sewage inflows (< 10% of samples, but including some of high magnitude (level 2 'unacceptable'). It is assumed that such inflows would have contributed to the elevated orthophosphate previously described for this system. However, overall, these data reflect a cleaner upstream catchment, albeit still affected at times by overflows from pump stations and sewer manholes, with *E. coli* concentrations in the vlei being further moderated by extended detention time in the vlei (compared with the flowing Milnerton Lagoon) and dilution.
- **Rietvlei thus appears to have provided a relatively low-risk environment to recreational users, at least from the perspective of exposure to raw sewage.**
- There was a slight reduction in the frequency of measured *E. coli* at 'unacceptable' levels in **Princess Vlei** over the 2024 reporting period, compared with 2023, although just under 30% of samples in both summer and winter were still rated as 'unacceptable', and comparisons with the 2020 reporting period suggest that the vlei remains prone to more frequent pollution events than in the past.
- **Nevertheless, Princess Vlei als**o appears to have provided a relatively low-risk environment to intermediate-contact users, at least from the perspective of exposure to raw sewage. In Princess Vlei, these 'users' include both people undergoing baptism and workers engaged in manual clearing of water hyacinth and solid waste – full immersion for baptism is not considered intermediate contact.
- **Zandvlei** data for the 2024 reporting period showed some reduction in the magnitude of sewage inflows, based on a reduced frequency in measured *E. coli* samples rated as level 3 and level 2 'unacceptable', although still with 20% of samples in the 'unacceptable' range. Of these, in the 2024 reporting period, winter samples were more prone to high *E. coli* counts, potentially reflecting wet-season surface wash-off of dirty parts of the catchment (e.g. the upper Sand River) but probably reflecting periodic pump station failures as a result of blockages. A reduced frequency of pump station failures in the catchment as a whole has been driven by repairs to the (previously highly problematic) Raapkraal pump station and the addition of back-up power and telemetry in pump stations in Marina da Gama and Military Road (see technical report: section 8).
- On the basis of measured water samples, **recreational users of Zandvlei were generally not exposed to unsafe conditions, particularly in summer when water use was likely to be highest.** However, the periodic inflows of sewage into the waterbody are still regarded with concern, and need to be further reduced.
- Users of **Zeekoevlei** were exposed to more frequent *E. coli* inflows of a higher magnitude (more samples at level 2 'unacceptable') during the 2024 reporting period than over the previous assessed reporting periods, and **the data show a clearly deteriorating trajectory in this vlei since the 2020 reporting period.** The most frequent samples with *E. coli* rated as 'unacceptable' typically occur in winter, and these are assumed to reflect a combination of catchment wash-off and increased frequency of pump station failure as a result of stormwater ingress.
- **Overall, Zeekoevlei was usually safe for intermediate recreational use, but the data indicate increasing periods (15% to 40% for summer and winter 2024 respectively) when exposure to this water would have been unsafe.** As in Princess Vlei, users exposed to Zeekoevlei's waters include both a large number of water sport users, as well as teams of workers employed by the City and various community organisations such as FOZR for regular collection of solid waste, and removal of water hyacinth and reeds. At times, high measurements of *E. coli* in the vlei have led to its partial closure and to the cessation of water hyacinth removal (S Jacobs, FOZR, personal communication to Liz Day).

Generally, the data suggest that all of the city's recreational waterbodies periodically posed risks to human health during the 2023 and 2024 reporting periods, but were largely in an 'acceptable' condition, conducive to their recreational use. Milnerton Lagoon was, however, mostly in an 'unacceptable' condition, and its use for recreation would have posed likely risks to human health most of the time.

Figure 6.11

Percentage of *E. coli* samples falling within each rated category for this variable for each recreational waterbody. Thresholds for rated categories as defined in table 5.3.





Workers engaged in solid waste and invasive plant removal in Zeekoevlei may be exposed at times to high E. coli levels, resulting in work stoppages to protect their health. (Photo: FOZR)

6.3.3 ASSESSING *E. COLI* IN RECREATIONAL WATERBODIES ON A SITE-BY-SITE BASIS

The mapped data (**figures 6.12 and 6.13**) show the following:

- **Princess Vlei** sites were generally in an 'acceptable' condition.
- Mean annual **Zeekoevlei** data were similarly within an 'acceptable' range across the vlei, other than in the upper vlei, near to the mouth of the highly polluted Big Lotus River, where mean *E. coli* concentrations were in the 'unacceptable' range, highlighting the high level of risk associated with recreational use in this part of the vlei which was closed for recreational use as a result for much of the 2024 reporting period.
- Mean **Zandvlei** data were also within the 'acceptable' range across most of the estuarine wetland, other than at CR22 (a site downstream of the Westlake and Keyser River inflows, near the railway line, and presumed to be impacted by road runoff and periodic sewage manhole overflows – this is an ongoing trend at this site).
- Watercourses flowing into Zandvlei from the Westlake River were generally less polluted water but inflows from the Langvlei, Sand and Keyser River systems were more problematic.
- Monitored sample points in **Rietvlei** were all rated as within 'target' range – but the upstream catchment (Bayside channel) was clearly problematic and rated as 'unacceptable', and is assumed to be a factor contributing to the increase in *E. coli* concentrations in the vlei in the 2024 reporting period.
- Sample points in **Milnerton Lagoon** were all rated as 'unacceptable' and 'deteriorating', with the exception of RTV10 at the mouth where dilution and die-off of *E. coli* with exposure to cleaner seawater exchange improve water quality.

The 2025 Technical Report does, however, stress that summary *E. coli* data are complicated, in that even using geometric data means the data include (in some cases) a wide range of values between spill and non-spill periods, and even those sites rated green ('target') in the figures provided may have experienced sewage spills at times.

Figure 6.12

Percentage of *E. coli* samples falling within each rated category for this variable for each recreational waterbody. Thresholds for rated categories as defined in table 5.3.

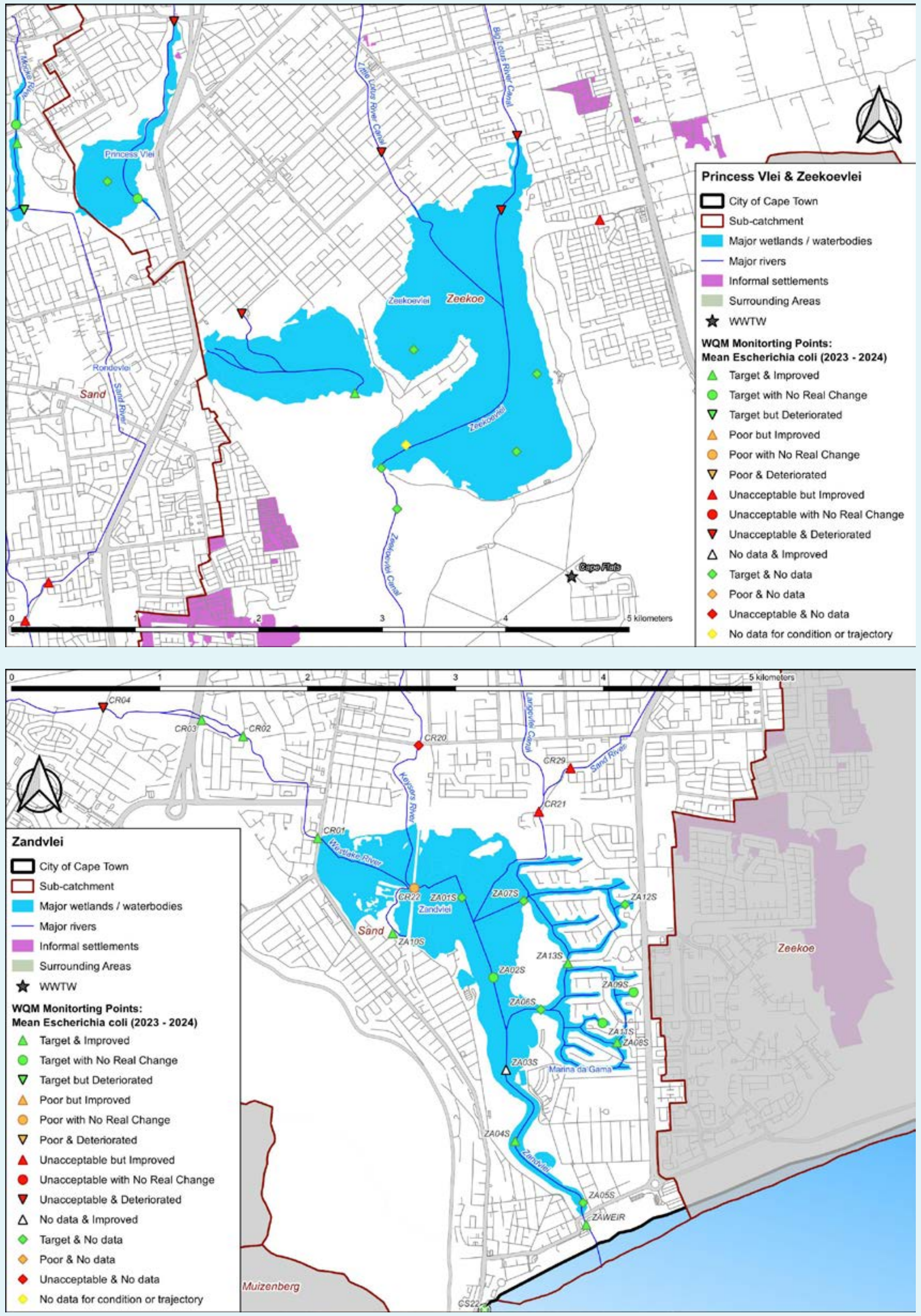
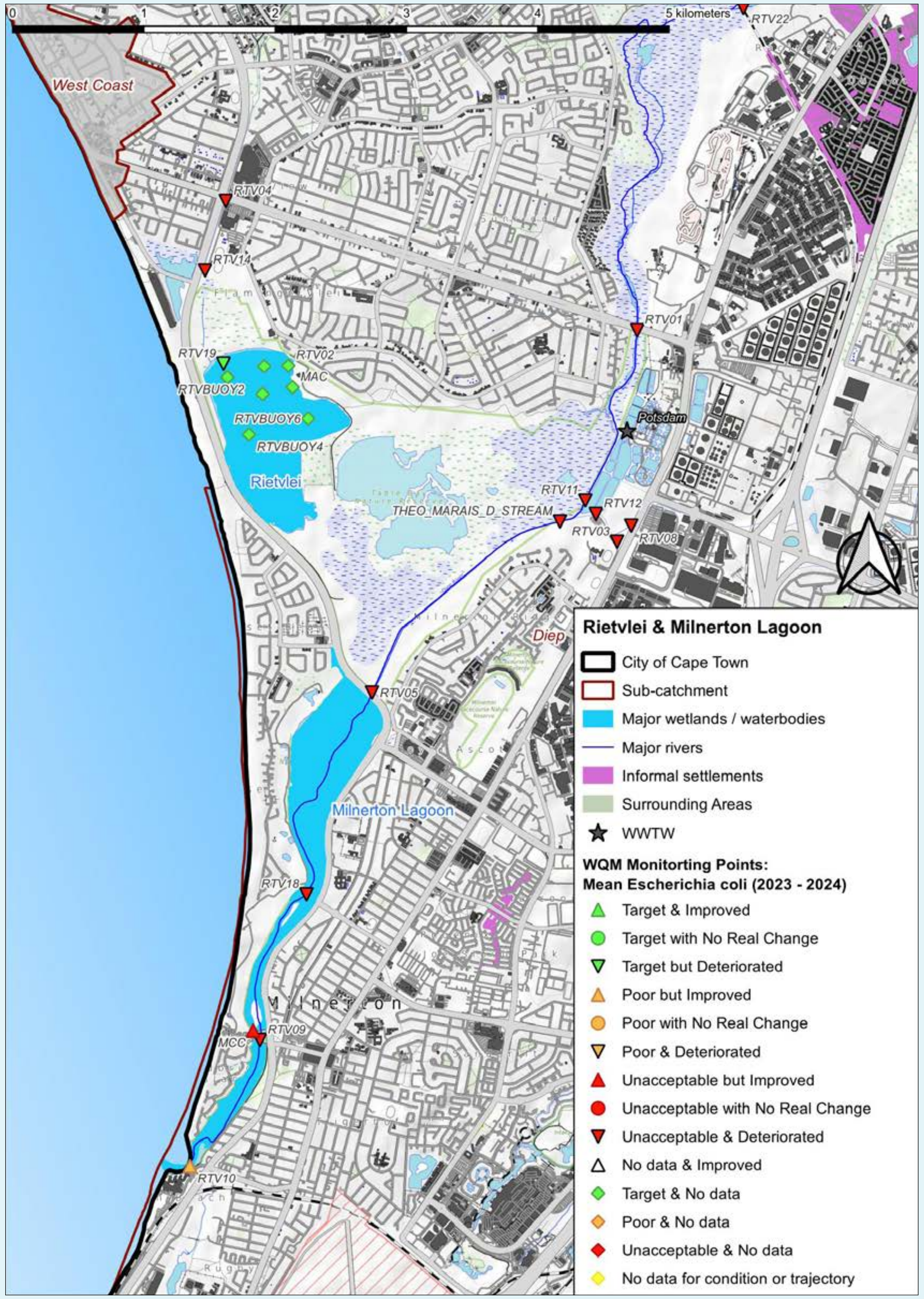


Figure 6.13

Geometric mean annual *E. coli* data, focusing on Milnerton Lagoon and Rietvlei for the 2023 and 2024 reporting periods.



6.4 HUMAN HEALTH RISKS FROM MICROCYSTIN TOXINS IN CAPE TOWN'S RECREATIONAL WATERBODIES

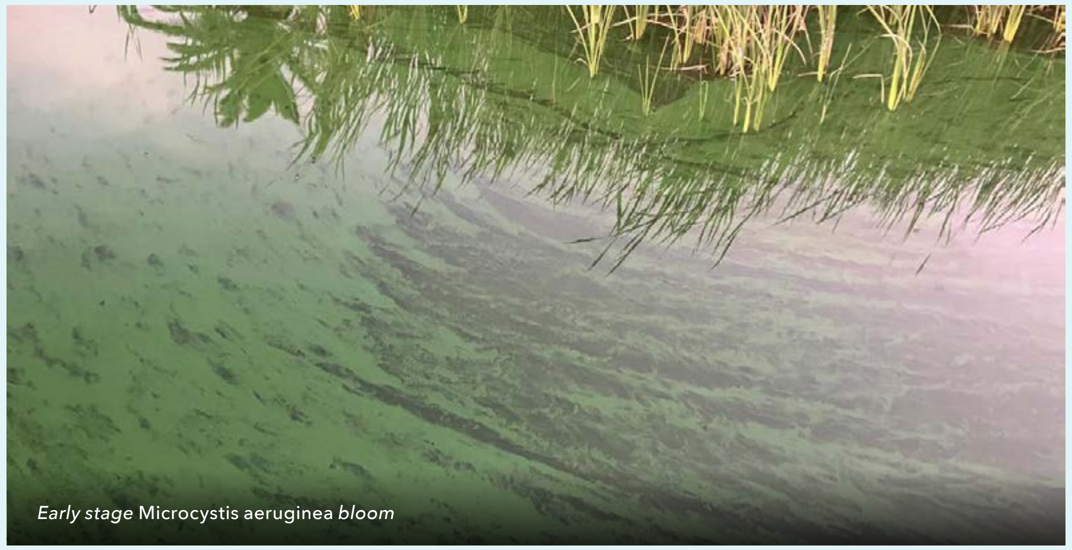
6.4.1 WHERE DO MICROCYSTIN TOXINS COME FROM?

Cyanobacteria (or blue-green algae) are a common and naturally occurring component of most recreational water environments. They are of potential public health concern because some types may, under certain conditions, produce microcystins, some of which are toxic.

Since microcystin toxin testing is expensive, it is not routinely included in the City's water quality tests but is instead undertaken when blue-green algal blooms have been detected. A 'bloom' is defined by the SSB as a cell count > 20 000 cells/ml. However, when field evidence suggests that bloom conditions are obvious (e.g. blue-green algal slicks), microcystin tests are carried out immediately, without the delay necessitated by counting of algal cell density.

BLUE-GREEN ALGAE – WHY THE NAME?

Blue-green algae (an algal division also referred to as cyanophytes or cyanobacteria) produce green surface scums under bloom conditions. The algal cells also contain a blue pigment (phycocyanin), which is mostly visible when algal cells, in bloom conditions, die and rupture, releasing the pigment into the water. This sometimes appears as if turquoise-coloured paint has been spilled into the waterbody (adapted from WHO 2021).



Early stage Microcystis aeruginea *bloom*

6.4.2 MICROCYSTIN TOXIN DATA

The 2025 Technical Report presents the results of analyses of water samples from Cape Town's recreational waterbodies for microcystin toxins, repeated here in summary form in **figure 6.14** for each of the city's recreational vleis.

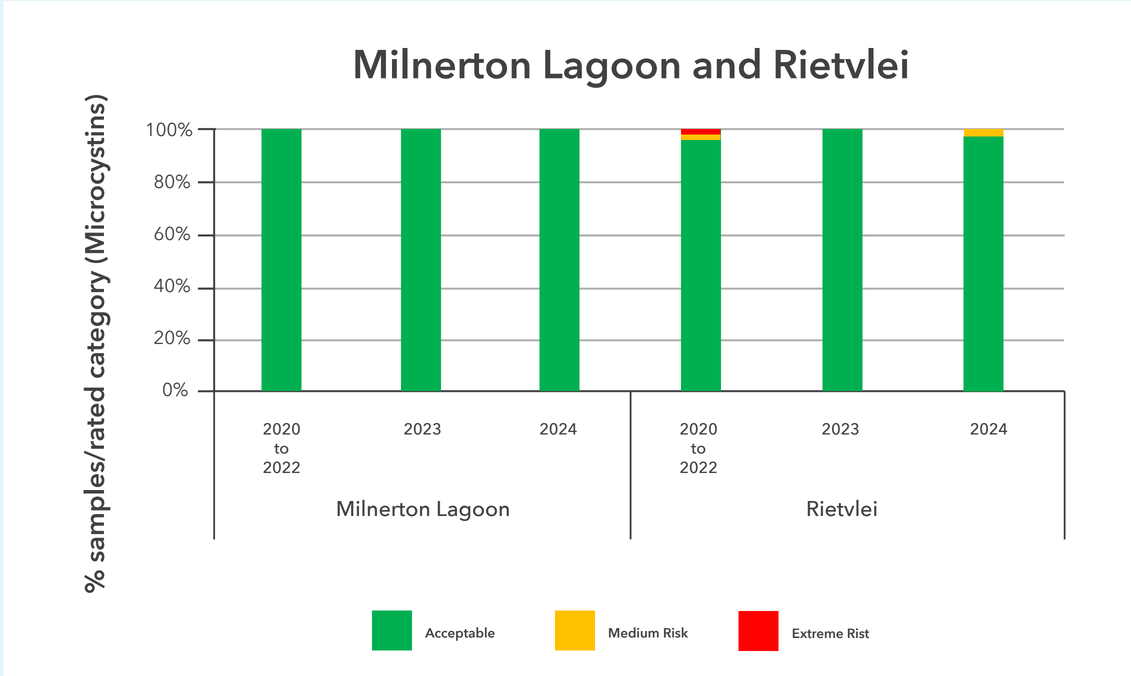
The data show that, although blue-green algal blooms were clearly present on numerous occasions over the 2023 and 2024 reporting periods, as indicated by the frequency of sample analysis at all vleis in the 2024 reporting period, **the only vlei in which microcystin toxins were recorded at concentrations of any concern in the 2024 reporting period was in Rietvlei, where a single sample was rated as of 'medium' risk.**

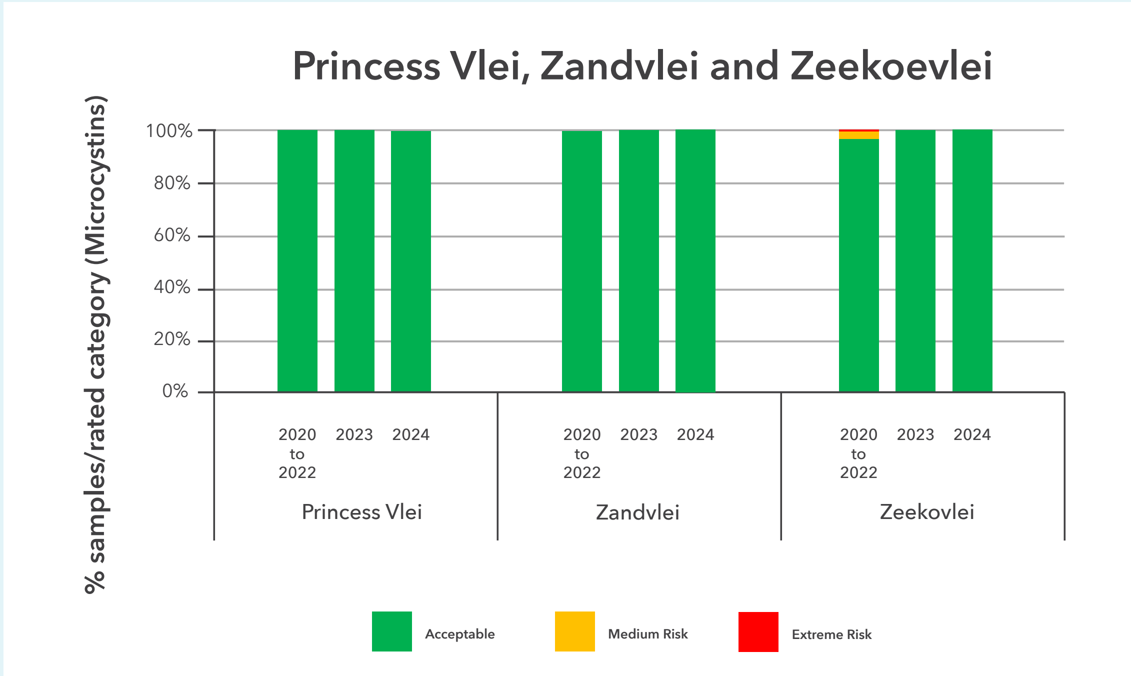
This means that, **despite periodic blue-green algal blooms, Cape Town's recreational watercourses were assumed to be relatively safe for human use over the 2023 and 2024 reporting periods, from the perspective of exposure during intermediate-contact use to microcystin toxins in water from these systems.**

However, the technical report notes that, at the time of writing the report, Zeekoevlei had been closed once in the 2025 reporting period as a result of very high microcystin toxins. This issue will need to be considered in the next reporting cycle.

Figure 6.14

Percentage of microcystin samples falling within each rated category for this variable, per recreational vlei. Thresholds for rated categories as defined in table 5.4.





6.5 GENERAL RECREATIONAL VLEI ECOSYSTEM CONDITION

Data already presented in section 5 suggest that the most pressing ecological issues affecting Cape Town's recreational vleis (and other standing waterbodies in Cape Town) comprise high levels of phosphorus **enrichment**, which lead to high levels of plant productivity, variously in the form of emergent reeds, floating and rooted aquatic weeds, and filamentous and single-celled algae. Management of these is associated with high costs, either in the form of ongoing annual or more frequent removal, or periodic dredging of organic sediments that have built up over decades (e.g. in Zeekoevlei).

Other water quality variables of potential concern at times include **high concentrations of total ammoniacal nitrogen, sometimes associated with free ammonia at levels of concern** (i.e. above acute toxicity thresholds/in the 'unacceptable' range).

As well as having significant negative impacts for aquatic ecosystems (e.g. chronic faunal health impacts from long-term exposure to elevated ammonia, methane and hydrogen sulphide in organic sediments and loss of habitat diversity from aquatic and emergent plant invasion), the above water quality impacts can also have profound impacts on the fitness of these waterbodies for recreational use.

This section provides a brief characterisation of water quality issues in each of the waterbodies **from an aquatic ecosystems perspective.**

Figure 6.14 presents summary compliance data for orthophosphate, TIN, dissolved oxygen, ammonia (NH_3) and chlorophyll-a, all used to characterise the systems ecologically. These figures illustrate the following broad patterns and issues, discussed in more detail in the technical report (sections 5 and 6):

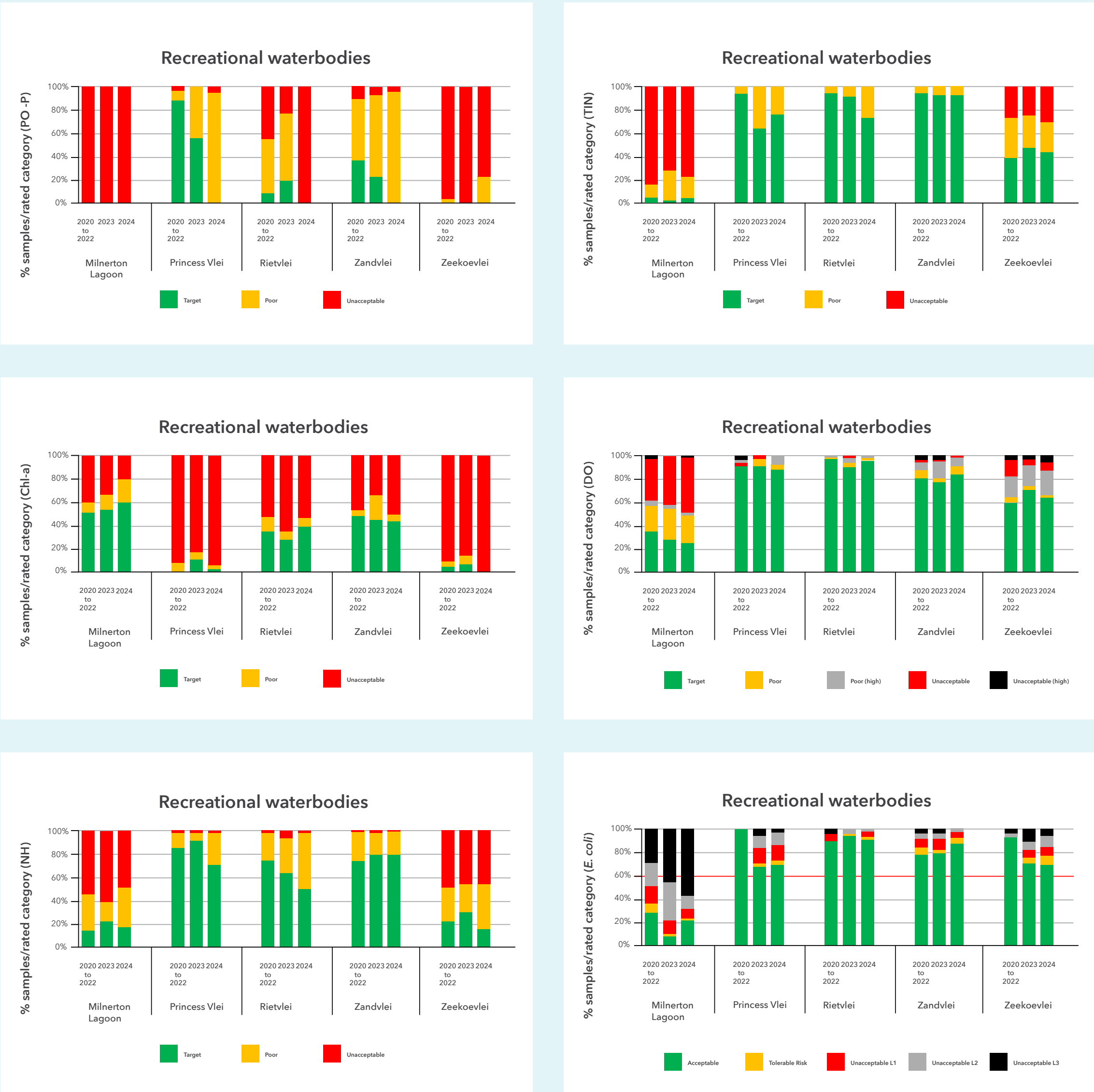
- Overall:
  - **Zeekoevlei and Milnerton Lagoon** were the worst performing of the recreational bodies, and were both characterised by very high orthophosphate concentrations and ammonia frequently above its acute toxicity threshold.
  - **Zeekoevlei and Princess Vlei** were both characterised by high concentrations of chlorophyll-a, indicative of high phytoplankton (algae) concentrations, which in Zeekoevlei are dominated by Microcystis aeruginosa.
  - Although all vleis experienced episodes of poor water quality at some time in the focal reporting periods, **Zandvlei, Rietvlei and Princess Vlei were generally in reasonably good ecological condition, with Zandvlei showing an improvement in compliance in all monitored variables over the 2024 reporting period except for chlorophyll-a.** Orthophosphate concentrations were, however, sufficient in all three systems to promote rapid growths of freshwater and estuarine aquatic weeds, including sago pondweed (*Stuckenia pectinata*) and spiral tasselweed (*Ruppia spiralis*), which are controlled by the City's mechanical weed harvesters.
  - **Milnerton Lagoon** was plagued by low DO and high TIN concentrations, with the latter mainly comprising ammonium nitrogen, as well as increasingly frequent, large inflows of raw sewage. The latter are assumed to derive primarily from inflows of often poorly treated sewage from the Potsdam WWTW, frequent overflows in the 2023 and 2024 reporting periods from the Koeberg sewage pump station upstream, and discharges of sewage and greywater from the Jo Slovo, Dunoon, Doornbach and other informal settlements or settlements with high levels of backyard dwellings.
  - **Rietvlei data** showed a marked increase in orthophosphate concentrations in the vlei over the 2024 reporting period, with a shift from the range for eutrophic ecosystems to conditions likely to promote hypertrophic ecosystems.

Water hyacinth (Pontaderia crassipes) increased in Princess Vlei and Zeekoevlei during the 2024 reporting period, necessitating ongoing clearing to prevent significant invasion of the waterbody. (Photo: FOZR)

Weed harvester used to control aquatic weeds on Zandvlei. A similar vessel is used in Rietvlei. Photo: City of Cape Town

Figure 6.15

Comparison of different recreational waterbodies, with figure showing the percentage of samples falling within each rated category for different variables. Thresholds for rated categories as defined in table 5.1 (for orthophosphate phosphorus), table 5.2 and table 5.3 (*E. coli*). Note that the high LOQ for PO4-P meant that no sample could be rated better than 'poor' (see technical report).



7. WATER QUALITY IN THE CITY'S PRIORITY CATCHMENTS

7.1 CAPE TOWN'S PRIORITY CATCHMENTS

While water quality is recognised as a concern in many of Cape Town's catchments, seven catchments/major subcatchments have been identified by the City as particularly problematic. These have been prioritised for focused interventions, intended to improve river and wetland ecosystem function in order to bring about an improvement in water quality. The priority catchments/subcatchments are:

- The Lower Diep River subcatchment (upstream of Milnerton Lagoon): Central and Northern stormwater management regions
- The Sir Lowry's Pass and Soet River subcatchments: Eastern stormwater management region
- The Lower Salt River subcatchment: Northern and Central stormwater management regions
- The Kuils and Eerste River subcatchments: Eastern stormwater management region
- The Hout Bay River subcatchment: Southern stormwater management region
- The Big and Little Lotus rivers (in the Zeekoe subcatchment): Southern stormwater management region
- The Sand catchment (upstream of Zandvlei): Southern stormwater management region

The above priority subcatchments also form the focus of three major City programmes, namely the City's Water Quality Improvement Programme (WQIP), the Liveable Urban Waterways (LUW) Programme and the Mayor's Priority Programme (MPP) on Sanitation and Inland Water Quality.

7.2 KEY ISSUES IN PRIORITY CATCHMENTS

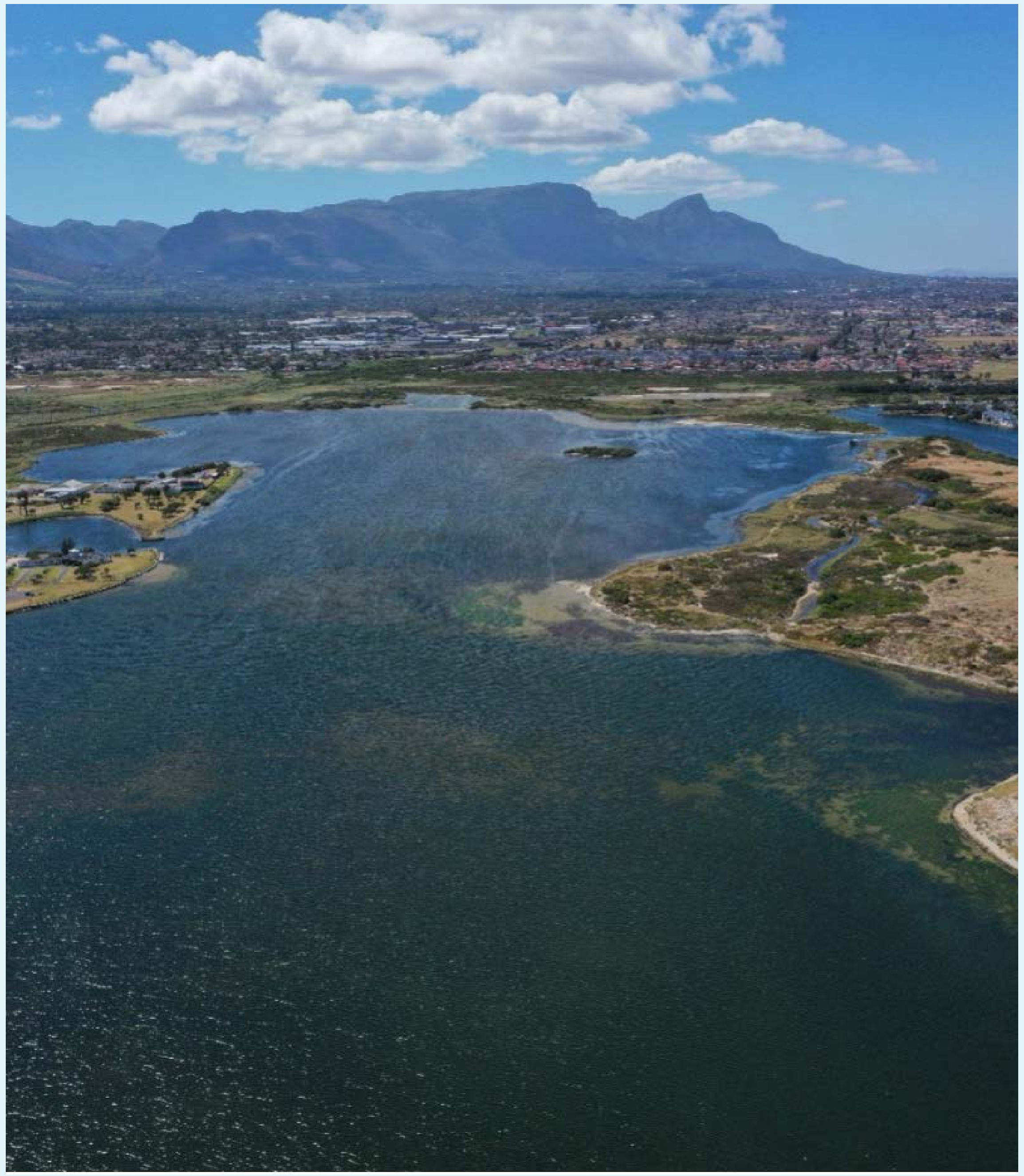
During discussions informing the 2025 Technical Report, the CSRM's regional management teams identified the following key issues, common to all of these areas:

- The most serious issues affecting water quality in Cape Town's rivers and wetlands comprise **solid waste and sewage**, and the passage of the latter into watercourses by way of dry-weather flows from settlements, stormwater flows, sewage pump station overflows, sewer manholes and failed sewer lines. These issues are controlled by other line departments, but the CSRM regional managers and their teams are at the receiving end of failed systems, and accountable for polluted watercourses and the ecological and other impacts of this pollution, but are powerless to effect change at source.

  This issue is flagged as a major concern in managing (or trying to improve) the city's watercourse condition, in light of the viewpoint held by many reticulation and WWTW officials – that there is no capacity in these systems to deal with raw sewage and greywater discharges, which must therefore be managed by the CSRM. This clearly has serious implications for water quality in receiving river and wetland environments, which do not have the assimilative capacity for such pollutant loading.

- Issues such as repeatedly failing pump stations, pump stations with inadequate capacity for low-flow sewage diversions to sewer, and the years required for upgrades to WWTW to be carried out, mean that important watercourses (e.g. the Lower Diep River and Milnerton Lagoon) are likely to remain direly polluted until at least the upgraded Potsdam WWTW comes on-line and the Koeberg pump station is upgraded, and even then these will remain severely impacted by pollution from unmanaged informal settlements.
- The Big Lotus River, Zeekoevlei, the Mosselbank River (downstream of the Bloekombos settlement), parts of the Lower Diep River catchment and the Lower Kuils/Eerste rivers and their wetlands are examples of watercourses that are at the mercy of expanding, largely unserviced urban informal settlements beyond the mandate or resources of CSRM to manage.
- Issues such as crime, vandalism, extortion and highly polluted, unsafe watercourses also hinder the effective implementation of PASAPs and their TAPs, which is further hampered by a culture of unaccountability in some City departments, with critical interventions required for essential sewer and stormwater maintenance and service delivery simply not taking place in some areas.
- Criminality in many areas (e.g. the Lower Salt and Upper Zeekoe catchments) hinder rapid responses to pollution events (e.g. pump station overflows), with response teams only able to access some areas safely in daylight, if then.
- Budget issues (e.g. 2024 moratoriums on overtime and out-of-hours work, as a result, at least in part, of Treasury budget cuts) affect response rates to sewage overflows and basic repair and maintenance issues, as well as pollution mitigation measures, such as over-pumping to sewers, which has also been stopped as a result of budgetary constraints.
- The focus of the City's attention has largely been on areas for which it has received directives or pre-directives from the DEADP for pollution of watercourses. These tend to be areas with high levels of public or political interest (e.g. Zeekoevlei, Milnerton Lagoon), while large areas with extremely high levels of pollution remain unmanaged (e.g. Bloekombos, Wallacedene, and areas of the Mosselbank and Kuils River subcatchments respectively).
- Expanding (largely unserviced) informal settlements in parts of catchments such as the Sir Lowry's Pass, Zeekoe, Hout Bay, Kuils and Diep catchments, as well as expanding backyard settlements in many catchments, including the Lower Salt subcatchment, place increasing burdens on solid waste management, while threatening stormwater quality as a result of the passage of greywater and blackwater into these stormwater systems.

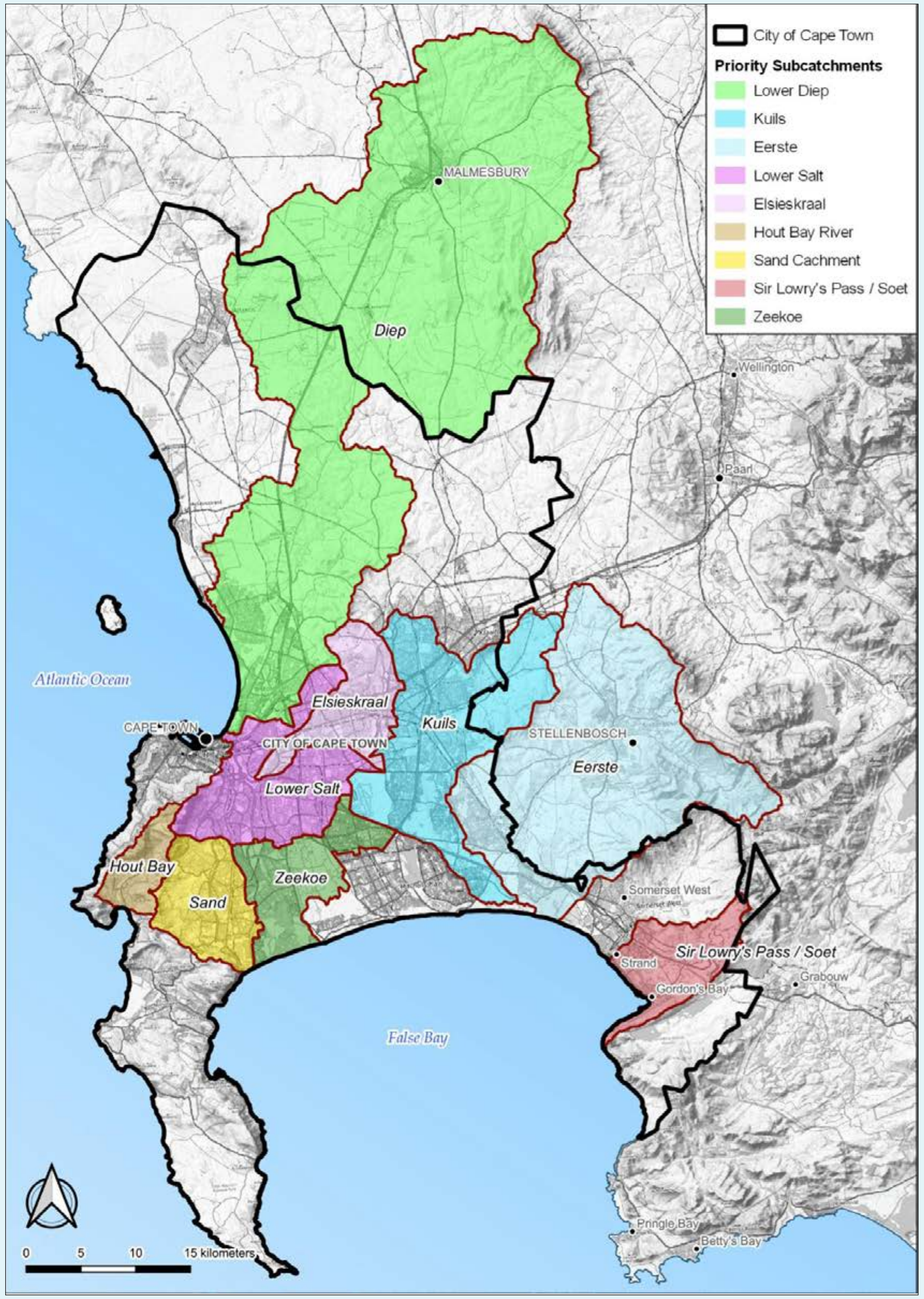
In this summary report, maps showing summary *E. coli* data are presented for each priority catchment, together with the key recommendations made for each catchment in the technical report. The technical report also includes mapped summary data per catchment for PO4-P, NH_3 and DO, and more detailed descriptions of the catchments and their issues.



Zandvlei, downstream of the Sand priority catchment. (Photo: Mr B Sutherland)

Figure 7.1

The city's priority catchments and subcatchments.



7.3 MAPPED *ESCHERICHIA COLI* DATA RESULTS AND KEY RECOMMENDATIONS FOR PRIORITY CATCHMENTS

The 2025 Technical Report provides detailed descriptions of each priority catchment, their key water quality issues and challenges, measures implemented or planned by the City to address these, the main challenges faced in implementing such interventions, and recommendations to consider going forward to improve intervention outcomes. **Readers with an interest in any of the priority catchments should consult section 8 of the technical report for these details.** The technical report provides detailed assessments of *E. coli* data per catchment/subcatchment, as well as of other mapped water quality variables. The report also highlights major challenges in each catchment, the City's ongoing and planned interventions, and the roles/inputs of organisations such as the Catchment Management Fora.

However, this section of the summary report focuses on *E. coli* data as one of the key indicators of sewage pollution in waterbodies. It also presents the main recommendations made in the technical report for each priority area.

7.3.1 DIEP RIVER SUBCATCHMENT

The lower reaches of the Diep subcatchment (the Diep River estuary, and specifically the section known as the Milnerton Lagoon) has been assessed in various recent studies (see technical report) as being in a state of ecosystem collapse, due to ongoing pollution of the system by inadequate treatment of wastewater at the Potsdam WWTW as well as significant sewage spills and overflows from failing pump stations, bulk sewer main collapses, and inadequately serviced informal settlements and residential areas in the catchment. These result in prolonged inflows of water with high chemical oxygen demand, high levels of (mainly organic) suspended sediments and high total ammonia concentrations, as well as high counts of faecal indicator bacteria (*E. coli*).

Figure 7.2 maps *E. coli* data for samples collected in this priority subcatchment during the 2024 reporting period as an indicator of health risks to people engaged in intermediate-contact recreational activities only. Colour coding of (geometric) mean annual data for each sample point in the subcatchment allows interpretation of the level of risk that would have been associated with the use of different sections of the subcatchment for intermediate recreational purposes. The data are compared with mean annual data for the 2023 reporting period, allowing the trajectory to be mapped as well, with > 25% change (increase or decrease) reflected as a 'deterioration' or 'improvement' respectively. Note that this summary approach does not indicate periods of much higher pollution, and readers are urged to access the more detailed data and reporting in the technical report.

A number of measures were recommended in the technical report to address water quality concerns raised from the available data and from discussions with the relevant regional stormwater managers (the Diep subcatchment cuts across the Central and Northern stormwater management regions). These measures all centre on the need to improve sewerage infrastructure, rather than to improve stormwater management *per se*. **This means that interventions required to improve water quality in the watercourses in the Diep subcatchment must be executed by other branches and departments and cannot be driven by CSRM alone.** Engagement by the CSRM with the City's Human Settlements, Wastewater Treatment Works, Sewage Reticulation, Waste Services, Engineering and Asset Management, and Law Enforcement branches/departments is thus essential to effect real long-term water quality change in this catchment going forward.

The technical report furthermore recommends that the following interventions be prioritised:

- Urgent interventions to improve the current quality of effluent discharged from the Potsdam WWTW, which has deteriorated significantly over the past year.
- Continued efforts to fast-track the upgrading and expansion of the Potsdam WWTW, the construction of the new bulk sewer outfall for Montague Gardens and the subsequent rehabilitation of the existing Montague Drive bulk sewer, and the upgrading of the Koeberg pump station, Phoenix pump station, and other sewerage infrastructure in the subcatchment.
- Diversion of the Kleine Stink River from the Dunoon and Doornbach informal settlements on the Diep River floodplain, and of the Milky Way channel flows from Joe Slovo Park and Phoenix, to sewer for treatment.
- Institutional and/or management changes that allow for greater agility and urgency in response to spills, breakdowns and failures in the sewerage system.
- Defence against informal settlement expansion in the remaining areas of the Diep River floodplain that have not been settled on, not only for ecological reasons, but also because inter alia they represent a rapidly shrinking resource urgently needed for improving urban flood resilience.
- A programme to identify and locate the sources of illicit industrial and sewage discharges in the Killarney and Montague Gardens industrial areas through, for example, deployment of flow loggers, on-the-ground tracking of flows in the stormwater reticulation system, and subsequent enforcement and intervention where issues are identified.

7.3.2 SOET RIVER CATCHMENT

This priority catchment is impacted by extensive informal settlements with high levels of solid waste and highly polluted runoff stemming from disposal of blackwater and greywater into the stormwater system, as well as dumped solid waste that causes frequent overflows from sewage pump stations and manholes, and periodic catastrophic failures of the Trappies sewer line.

Figure 7.3 maps *E. coli* data for samples collected in the catchment during the 2024 reporting period as an indicator of health risks to people engaged in intermediate-contact recreational activities only. Colour coding of (geometric) mean annual data for each sample point in the subcatchment allows interpretation of the level of risk that would have been associated with the use of different sections of the subcatchment for intermediate recreational purposes. The data are compared with mean annual data for the 2023 reporting period, allowing the trajectory to be mapped as well, with > 25% change (increase or decrease) reflected as a 'deterioration' or 'improvement' respectively. Note that this summary approach does not indicate periods of much higher pollution, and readers are urged to access the more detailed data and reporting in the technical report.

The polluted Milnerton Lagoon at the downstream end of the catchment – the lagoon is impacted primarily by poorly treated effluent from the Potsdam WWTW, as well as inflows of raw sewage from the Koeberg Road and other pump stations, and sewage and domestic waste from informal and backyard settlements in the catchment.

The technical report, which took cognisance of planned interventions by the City in this catchment, as well as by active interventions from local communities such as the Greenways Golf Estate, made the following comments and recommendations:

- The City's planned interventions, including upgrading of the Trappies sewer, would go a long way towards effecting measurable change in the catchment.
- The proposed inclusion of a river wardens programme in particular would be strongly supported, but should be implemented over longer timescales than the proposed initial three-month period.
- Implementation of other recommendations outlined in the PASAP would go a long way towards addressing pollution. However, the existing TAP lacks detail and structure, and most of the interventions are allowed for only in the long term, making them irrelevant from a pollution abatement perspective. As per the previous water quality report, it is recommended that the TAP be amended to include:

– specifications for the frequency of solid waste collection from informal settlements that are in line with the rate of solid waste accumulation;

– reduced timeframes for symptomatic interventions such as:

- low-flow diversions to sewer;
- the introduction of nano bubbler (or similar) techniques, even without enzyme inoculation; and
- canal enclosure studies, **design and implementation** (if supported by study outcomes).

- Attention should be paid to the implementation of the Asanda Wetland Park MMP in order to ensure that this project remains a City and community asset.
- The Soet Catchment Management Forum should be used as a mechanism to bring together different City directorates, departments and branches, along with civil society, to allow effective planning and implementation of measures to address the dire pollution that not only currently affects communities living in the catchment, but also has knock-on effects on the beaches and False Bay coastline, and the tourists and other recreational users of these areas.

7.3.3 LOWER SALT RIVER SUBCATCHMENT

This subcatchment is impacted by solid waste accumulations in and abutting watercourses, high levels of informal and backyard settlements, frequent sewage pump station failures, effluent inflows from the poorly performing Athlone WWTW, and high levels of criminality that impact on the City's ability to timeously address infrastructure breakdowns or other issues.

Figure 7.4 maps *E. coli* data for samples collected in the catchment during the 2024 reporting period as an indicator of health risks to people engaged in intermediate-contact recreational activities only. As above, colour coding of (geometric) mean annual data for each sample point in the subcatchment allows interpretation of the level of risk that would have been associated with the use of different sections of the subcatchment for intermediate recreational purposes. The data are compared with mean annual data for the 2023 reporting period, allowing the trajectory to be mapped as well, with > 25% change (increase or decrease) reflected as a 'deterioration' or 'improvement' respectively. Again, it is stressed that this summary approach does not indicate periods of much higher pollution, and readers are urged to access the more detailed data and reporting in the technical report.

The technical report took cognisance of planned interventions by the City in this catchment, including proposals to cover over some of its most polluted canals, which are prone to significant dumping of solid waste and night soils. The following main recommendations came from that report, which should be consulted for a more detailed account:

- The measures outlined in the TAP form a useful starting point for addressing major pollution in this subcatchment. However, the current TAP (being updated) lacks detail or auditable outcomes, and does not assign responsibility or timelines to specific City entities for its implementation. It is recommended that these issues be addressed in the updated TAP, which should also indicate cost implications of pollution abatement measures.

Black River at the confluence with the Bokmakierie Canal, downstream of the Athlone WWTW inlet.

- Like many of the city's subcatchments, the Lower Salt is managed by several CSRM regional managers. The technical report recommends that the current management system should be rationalised into one that is catchment-based to facilitate more holistic management and responsibility in City structures. In the interim, it is recommended that communication channels be formulated to ensure more effective coordination between the various management entities working in the Lower Salt subcatchment.
- Support for the newly formed catchment fora in this subcatchment is important, and could be a valuable tool for facilitating communications and assigning task-driven responsibilities and timelines to different City directorates, departments and branches, as well as in the formation of public-private partnerships to assist in management of waste and the introduction of meaningful recycling initiatives.
- As noted in previous reports, the subcatchment includes some river reaches that are less polluted, and water quality in these should be protected – these rivers include the Liesbeek River and its tributaries; the Black River (upstream of the Athlone WWTW) and the Kromboom River. Opportunities should be actively sought to implement SUDS treatment interventions in these parts of the catchment, designed for water quality polishing and removal of low pollution loads.
- The Inland Water Quality Dashboard should be used by CSRM regional managers in these areas to highlight changes in water quality indicative of pollution, and to initiate pollution tracking to identify pollution sources, before pollution becomes entrenched.

7.3.4 EERSTE/KUILS RIVER SUBCATCHMENT

This large priority catchment includes the Kuils River subcatchment and the downstream portion of the Eerste River subcatchment. It includes areas of rapidly expanding informal settlements, mostly into wetlands and the Kuils River floodplains. Large parts of the subcatchment are also rapidly being developed for low-income housing which, if poorly managed and policed, may exacerbate ongoing threats to water quality in adjacent watercourses (i.e. the Kuils River).

Figure 7.5 maps *E. coli* data for samples collected in the catchment during the 2024 reporting period as an indicator of health risks to people engaged in intermediate-contact recreational activities only. As above, colour coding of (geometric) mean annual data for each sample point in the subcatchment allows interpretation of the level of risk that would have been associated with the use of different sections of the subcatchment for intermediate recreational purposes. The data are compared with mean annual data for the 2023 reporting period, allowing the trajectory to be mapped as well, with > 25% change (increase or decrease) reflected as a 'deterioration' or 'improvement' respectively. It is again stressed that this summary approach does not indicate periods of much higher pollution, and readers are urged to access the more detailed data and reporting in the technical report.

The main recommendation of the technical report for implementation in this priority area is that PASAPs and TAPs be finalised for these subcatchments as a matter of urgency. These should include realistic targets with measurable and auditable outcomes, assignment of responsibility for implementation, and timeframes that convey the necessary sense of urgency for their implementation. The following measures, among others, should be considered for inclusion in the PASAPs:

- A sustained and measurable increase in solid waste collection in terms of both the frequency and volume of solid waste removal **at source** to prevent the build-up of organic, plastic and other waste in the subcatchments – this is supported by the CSRM's planned introduction of a waste interceptor in the Kleinvlei Canal.
- Pollution tracking in new and existing high-density housing areas to identify pollution streams and sources (e.g. to discern between pollution stemming from non-serviced backyard or informal housing elements versus that caused by blocked or vandalised infrastructure).
- Pollution tracking up to the closed stormwater system feeding into the Rietvlei Canal – since chronic flows are suspected in this area, this can be achieved effectively during dry weather conditions by the systematic opening up of manhole covers from the Rietvlei channel upstream, and tracking upstream to follow liquid flows in the system upstream, their source(s).
- Implementation of appropriate measures to address the sources of pollution identified – where these are raw sewage, their diversion to sewers must be considered at points close to source to prevent dilution by stormwater flows.
- Independent *in situ* inspections and assessment of water in the Rietvlei channel and at the Bellville WWTW effluent outlet to identify compliance issues.

Eerste River in the Kramat area, Macassar (2024).

- Urgent implementation of interventions to provide sewage and stormwater servicing to the rapidly expanding informal and backyard settlements in the area.
- Implementation of measures to minimise sewage pump station failures related to load-shedding and electrical faults, including:
  - attention to provision of the full complement of pump station pumps and spares required for all pump stations, but with particular attention paid to the Sarepta 2 pump station; and
  - redesign of pump station screening systems to allow for frequent maintenance without causing downstream blockages.
- Attention to the management and (where necessary) refurbishment or upgrading of existing WWTW to address existing poor levels of compliance.
- Implementation of the recommendations made by the City's Environmental Compliance Branch to address risks to the City of litigation or enforcement action by provincial and national authorities as a result of sustained pollution of the Kuils River.

7.3.5 HOUT BAY CATCHMENT

The 2025 Technical Report noted that the main sources of pollution in the Hout Bay catchment over the 2023 and 2024 reporting periods comprised (not in order of impact):

- smallholdings and horses in the middle reaches of the Hout Bay River;
- sewage overflows from blocked pipes and pump station failures, mainly in the middle to lower reaches of the catchment; and
- input and runoff of sewage-contaminated water into the stormwater system from the largely informal Imizamo Yethu settlement, which flows into the lower reaches of the Hout Bay River, as well as from the Hangberg area where a large portion of the formal housing is associated with backyard dwellings.

Figure 7.6 maps *E. coli* data for samples collected in the catchment during the 2024 reporting period as an indicator of health risks to people engaged in intermediate-contact recreational activities only. As above, colour coding of (geometric) mean annual data for each sample point in the subcatchment allows interpretation of the level of risk that would have been associated with the use of different sections of the subcatchment for intermediate recreational purposes. The data are compared with mean annual data for the 2023 reporting period, allowing the trajectory to be mapped as well, with > 25% change (increase or decrease) reflected as a 'deterioration' or 'improvement' respectively. Again, it is stressed that this summary approach does not indicate periods of much higher pollution, and readers are urged to access the more detailed data and reporting in the technical report.

The technical report showed that water quality was generally better upstream of the more urbanised portion of the catchment (at sites DR04 and DR06) than it was at sites further downstream. Nevertheless, the data showed that even these hitherto generally unimpacted upper-reach sites were both subject to infrequent sewage inflows of a high magnitude (level 2 'unacceptable') in the 2024 reporting period, also reflecting in elevated orthophosphate concentrations. The lower river sites (from Victoria Road downstream) remained highly contaminated and in the 'unacceptable' range for over 90% of the time in the 2024 reporting period.

The main recommendations of the technical report for implementation in this priority area include the following:

- An urgent focus on interventions to provide proper sanitation facilities to the Imizamo Yethu informal settlement, in conjunction with the provision of formalised housing.
- Facilitating access to funding for the recommended interventions already proposed in the Hout Bay catchment PASAP and associated strategic action plan, which could be through the formation of private-public partnerships and/or motivating for additional budget to be allocated to the Hout Bay catchment as one of the priority catchments in the city.
- Urgent attention to improving integrated transversal interventions to achieve pollution abatement – the recommendations by the HBRCF for the appointment of a dedicated transversal facilitator for these interventions in the Hout Bay catchment are supported.
- Urgent consideration of the use of package plants for the treatment of sewage from the Imizamo Yethu area as an interim measure, instead of relying on the use of low-flow diversions – this is an alternative strategy to that recommended by the Hout Bay Catchment Pollution Abatement Comprehensive Study, and takes cognisance of limited current capacity in the sewerage reticulation works for the (recommended) low-flow sewage and greywater diversions to sewer. The use of package plants would require a decanting facility in the Imizamo Yethu area, followed by treatment in appropriately designed package plants, and subsequent discharge of this treated water to the Hout Bay River.
- With regard to the above, **any proposed new formal developments in the Hout Bay catchment should also be required to install and use package plants for the treatment of sewage until there is sufficient capacity in the sewage reticulation network and the marine outfall has been upgraded, as necessary.**
- Urgent implementation of measures to address the current issues hampering the more frequent collection of solid waste from Imizamo Yethu.
- Increased attention to education and awareness raising among community members about water quality issues in the catchment, and the use of more innovative approaches to this through the involvement of environmental education specialists.

Less polluted upper reaches of the Hout Bay River at the City's monitoring point DR04. (Photo: F Aziz)

Visibly polluted lower reaches of the Hout Bay River a few hundred metres upstream from the Victoria Road bridge crossing (2025). Note also the proliferation of algal growth and invasive instream vegetation, and the close proximity of an undercut sewer.

7.3.6 SAND RIVER (ZANDVLEI) CATCHMENT

Unlike most other catchments – and all other priority catchments – in Cape Town, the Sand catchment is not impacted by any WWTW or (major) informal settlements. This means that its water quality is impacted primarily by overland and stormwater runoff, along with episodic sewage spills that make their way into its watercourses. The Sand River catchment was added to the priority catchment areas during compilation of the 2023 Water Quality Inland Report at the recommendation of CSRM, supported by the consultant team, mainly because it is the focal catchment for the pilot phase of the City's Liveable Urban Waterways (LUW) Programme (see section 8.3).

Figure 7.7 maps *E. coli* data for samples collected in the catchment during the 2024 reporting period as an indicator of health risks to people engaged in intermediate-contact recreational activities only. As above, colour coding of (geometric) mean annual data for each sample point in the subcatchment allows interpretation of the level of risk that would have been associated with the use of different sections of the subcatchment for intermediate recreational purposes. The data are compared with mean annual data for the 2023 reporting period, allowing the trajectory to be mapped as well, with > 25% change (increase or decrease) reflected as a 'deterioration' or 'improvement' respectively. Again, it is stressed that this summary approach does not indicate periods of much higher pollution, and readers are urged to access the more detailed data and reporting in the technical report.

The 2025 Technical Report notes that a number of actions are ongoing to improve water quality, and the general ecological state of Zandvlei and the aquatic ecosystems in the Sand catchment. Some of these have already resulted in improvements in the ecological health of the estuary, such as more effective saline intrusion and tidal interchange through better management of the estuary mouth, and a subsequent increase in the diversity of indigenous fish species as well as expansion in the range of sand prawns.

Notwithstanding the above, the technical report does, however, recommend the following:

- Rapid response protocols should be rolled out for all problem sewage pump stations in the catchment, using the Raapkraal protocol as a prototype, and thus facilitating the ongoing attention to the repairs to and upgrades of sewer infrastructure in this catchment.
- Proactive relining and clearing of sewer pipes in the catchment is supported and should continue as required.
- Improvement in the frequency and volume of solid waste collection in open spaces in some parts of the catchment is urgently required to prevent the passage of solid waste into watercourses. The Sand and Langvlei canals are particularly vulnerable to dumping of solid waste, which accumulates along the canal banks and bed.
- Dredging of the main portion of Zandvlei, which is currently being designed, should be implemented as a priority action in this catchment as this should help to lower nutrient levels (especially orthophosphate concentrations), raise DO levels and improve the hydrological functioning of the estuary.
- Land management in the upstream areas of the catchment should be improved to reduce erosion as a source of sediment, and ultimately reduce the frequency of future dredging requirements in the estuary going forward. This means that the City should engage with landowners, particularly golf courses, plantation, vineyard and other agricultural landowners, and SANParks regarding addressing erosion in these areas.
- Implementation of SUDS approaches should be encouraged throughout the catchment, as these interventions might achieve measurable impacts, at least in moderately impacted systems such as the Westlake and Keyser River systems and their upstream reaches in particular.
- The City should engage actively and supportively with the Sand River Catchment Management Forum and the various civil society groups active in the catchment.
- Refunding of the LUW projects in this catchment (as from early 2025) is strongly supported as a means towards achieving catchment-scale improvement in aquatic ecosystem condition and function.

Reedbeds and a floating litter boom on the Westlake River at the City's monitoring point CR22, immediately upstream of Zandvlei. (Photo: F Aziz)

7.3.7 ZEEKOE CATCHMENT: BIG AND LITTLE LOTUS RIVERS SUBCATCHMENTS

The Big and Little Lotus rivers are the main sources of surface flow into Zeekoevlei and the False Bay Nature Reserve (FBNR). The main water quality issues in the Big and Little Lotus rivers derive primarily from poor provision of solid waste management, and the lack of management of sewage and greywater produced in inadequately serviced areas. Faecal pollution is a threat to the health and dignity of local communities in the Big Lotus catchment, as well as to users of Zeekoevlei and the beaches along the False Bay coastline adjacent to the Zeekoe Canal outlet. Nutrients and other chemical pollutants associated with this water impact important downstream inland aquatic ecosystems (Zeekoevlei).

Figure 7.8 maps *E. coli* data for samples collected in the catchment during the 2024 reporting period as an indicator of health risks to people engaged in intermediate-contact recreational activities only. As above, colour coding of (geometric) mean annual data for each sample point in the subcatchment allows interpretation of the level of risk that would have been associated with the use of different sections of the subcatchment for intermediate recreational purposes. The data are compared with mean annual data for the 2023 reporting period, allowing the trajectory to be mapped as well, with > 25% change (increase or decrease) reflected as a 'deterioration' or 'improvement' respectively. It is again stressed that this summary approach does not indicate periods of much higher pollution, and readers are urged to access the more detailed data and reporting in the technical report.

The technical report recommends the following measures, which require cooperative buy-in across multiple City departments and branches, if there is to be any measurable improvement in water quality in the Big and Little Lotus rivers catchments, and by implication, in Zeekoevlei downstream:

- Urgent implementation of the catchment Transversal Action Plan (TAP) is strongly supported. This requires buy-in across multiple directorates, and the planned collaboration at ED level, to reach agreement on deliverables and key performance indicators (KPIs) for different line items in the TAP. A risk in the TAP's assignment of responsibility for different tasks to named individuals rather than official roles, is that staff turnover may quickly outdate the TAP, leaving some items void.
- Significantly increased focus on the frequency and volume of removal of solid waste at source – this is a complex issue and requires the focused attention of the Urban Waste Management Directorate. The inclusion of the Zeekoe catchment among the priority catchments for workstream 6 in the MPP is strongly supported. Pollution hotspots have been identified in the catchment, with input from the ZKCMF. These include large-scale accumulations of solid waste in the open channel past the Riemvasmaak informal settlement east of Buck Road – covering over of this channel to limit access for dumping, accompanied by increased access to toilets and provision of regular cleansing and waste removal services, is strongly recommended.
- Attention to addressing existing known effluent discharges into the Big Lotus Canal by diversion into sewers or alternative off-channel treatment (e.g. with package plants). The City is currently exploring these options – there is, however, urgency to effect change.

  Known significant point-source inflows are visible in the Big Lotus River at:

  - the culvert downstream of Duinefontein Road, bringing untreated effluent from the Sweet Home informal settlement – this is the largest known point-source pollution stream into the Big Lotus River;
  - Klipfontein Road culvert – this includes runoff from the Barcelona informal settlement, just downstream of the N2;
  - the culvert at NY5 Street, downstream of the cemetery in Gugulethu;
  - a culvert entering the river at NY3 Road, also in Gugulethu; and
  - inflows from the Riemvasmaak informal settlement east of Buck Road (Lotus River area).

  While diversion of polluted stormwater to sewer has been analysed as a generally unfeasible intervention for the City (Lukhozi, 2025), the Big Lotus River subcatchment already includes low-flow diversions to the WWTW via the Springfield Road diversion. Since dry weather inflows into the Big Lotus River from the Sweet Home area appear to be concentrated flows of raw sewage and greywater, it is arguable that the existing low-flow diversion would be more effective if it was switched to allow for the diversion of the concentrated Sweet Home waste stream, rather than the current diversion of just a small proportion of this waste downstream, in a diluted form. Urgent investigation of this approach is also recommended.

- A focus on interventions to provide solid waste collection and recycling opportunities, as well as sewage and stormwater servicing to the rapidly expanding informal and backyard settlements in the area.
- A focus on the provision of improved bunding and short-term storage of effluent at all sewage pump stations, but particularly those abutting the FBNR and the Big and Little Lotus rivers/canals.
- Proactive maintenance attention to the multiple pump stations in the catchment, given that by far the most failures in the 2024 reporting period were attributed to electrical and mechanical issues.
- A change in the City's regional structure, so as to align with hydrological (major river) catchments, rather than with the current stormwater, sewage reticulation and urban waste management regions, none of which relate to surface runoff and do not facilitate strategic pollution abatement at a catchment level.
- Improved communication with the FBNR PAAC and the ZKCMF regarding planned interventions and their timeframes to improve awareness among local interested and affected communities regarding City efforts to combat pollution, and challenges therein.
- Consideration of the implementation of recommendations for the inclusion of green infrastructure and nature-based solution (NbS) in parts of the catchment (see technical report for details and references), bearing in mind the water quality constraints to the efficacy of such measures in some parts of the catchment.
- Inclusion of additional monitoring points between the N2 and Govan Mbeki Road downstream of Jakes Gerwel Drive to allow the identification of point-source pollutants between these points.

Early results of new (2025) initiatives to clean up the Big Lotus River, spearheaded by The Litter Boom Project in collaboration with the City and the Zeekoe Catchment Management Forum.

Inflows of polluted water (greywater and raw sewage) into the Big Lotus River via the stormwater system from the Sweet Home informal settlement – addressing this major pollution source requires innovative thinking.

Figure 7.2

Mean annual ***E. coli*** data (geometric means), focusing on the **Diep River** subcatchment. Data coded as to human health risk (see table 5.3). See technical report for explanation of data analysis.

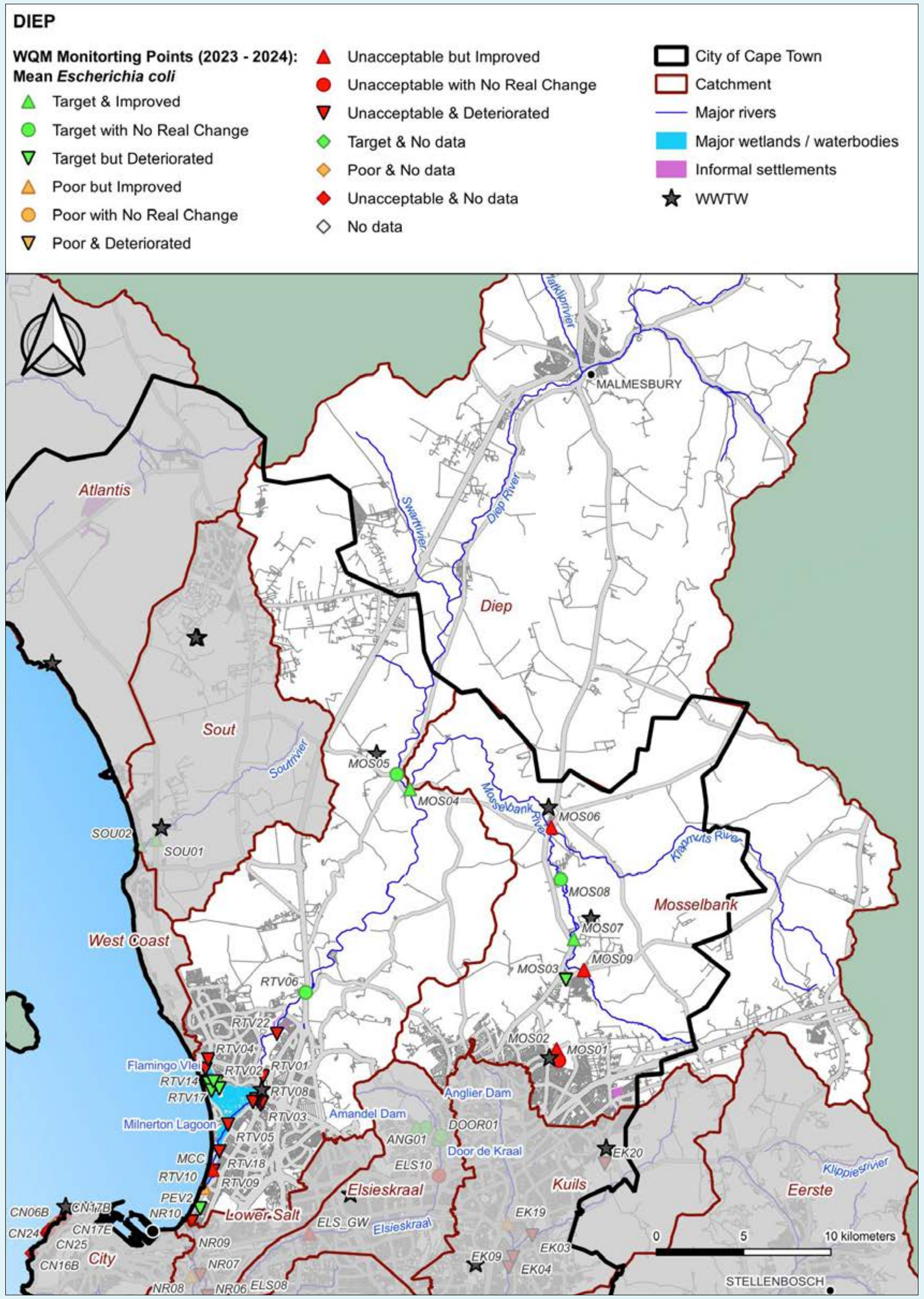


Figure 7.3

Mean annual ***E. coli*** data (geometric means), focusing on the **Soet River** catchment. Data coded as to human health risk (see table 5.3). See technical report for explanation of data analysis.

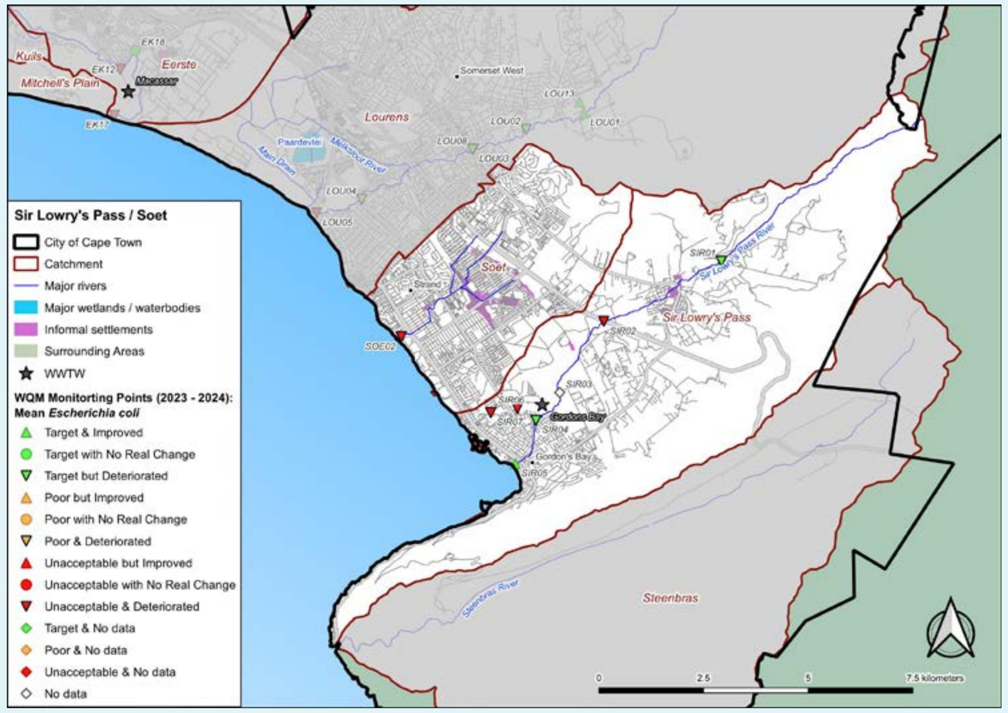


Figure 7.4

Mean annual ***E. coli*** data (geometric means), focusing on the **Lower Salt River** subcatchment. Data coded as to human health risk (see table 5.3). See technical report for explanation of data analysis.

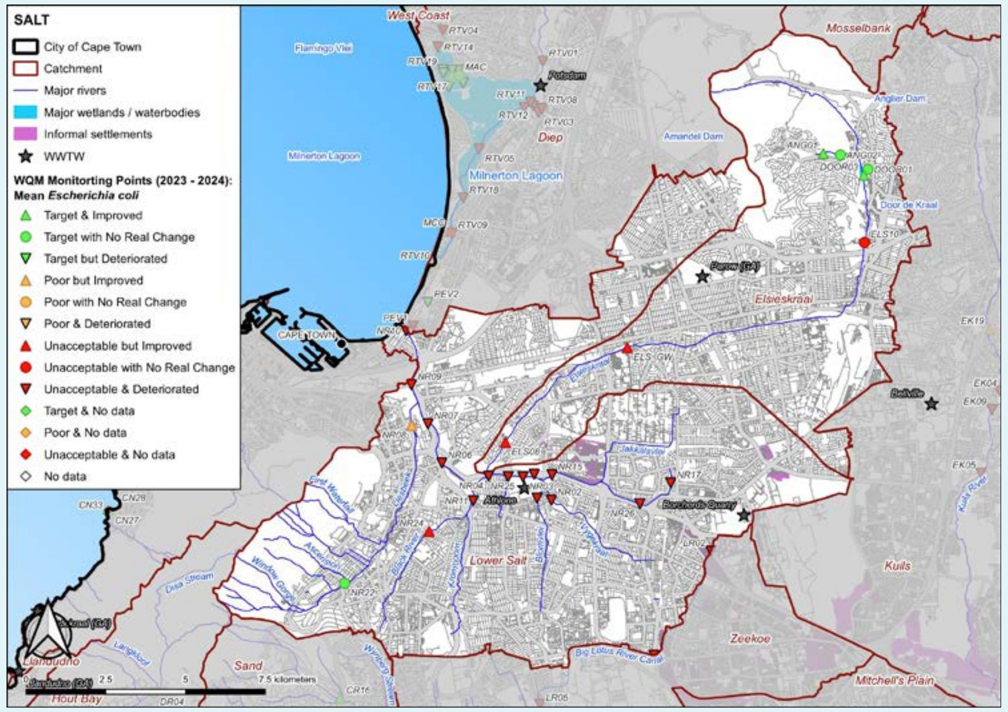


Figure 7.5

Mean annual ***E. coli*** data (geometric means), focusing on the **Eerste/Kuils River** subcatchment. Data coded as to human health risk (see table 5.3). See technical report for explanation of data analysis.

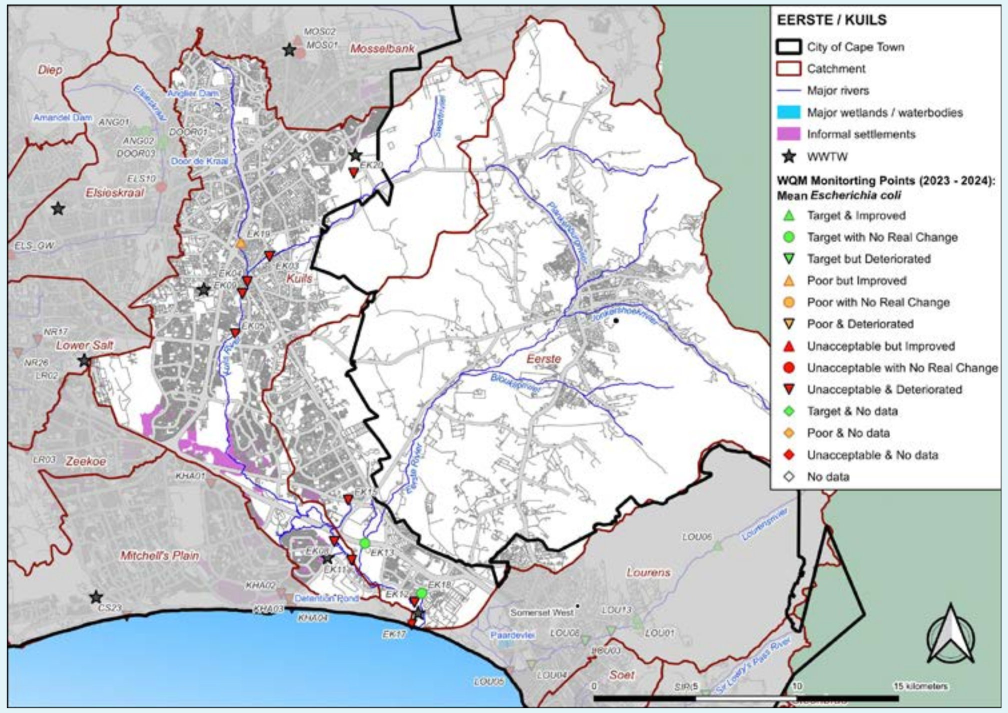


Figure 7.6

Mean annual ***E. coli*** data (geometric means), focusing on the **Hout Bay River** catchment. Data coded as to human health risk (see table 5.3). See technical report for explanation of data analysis.

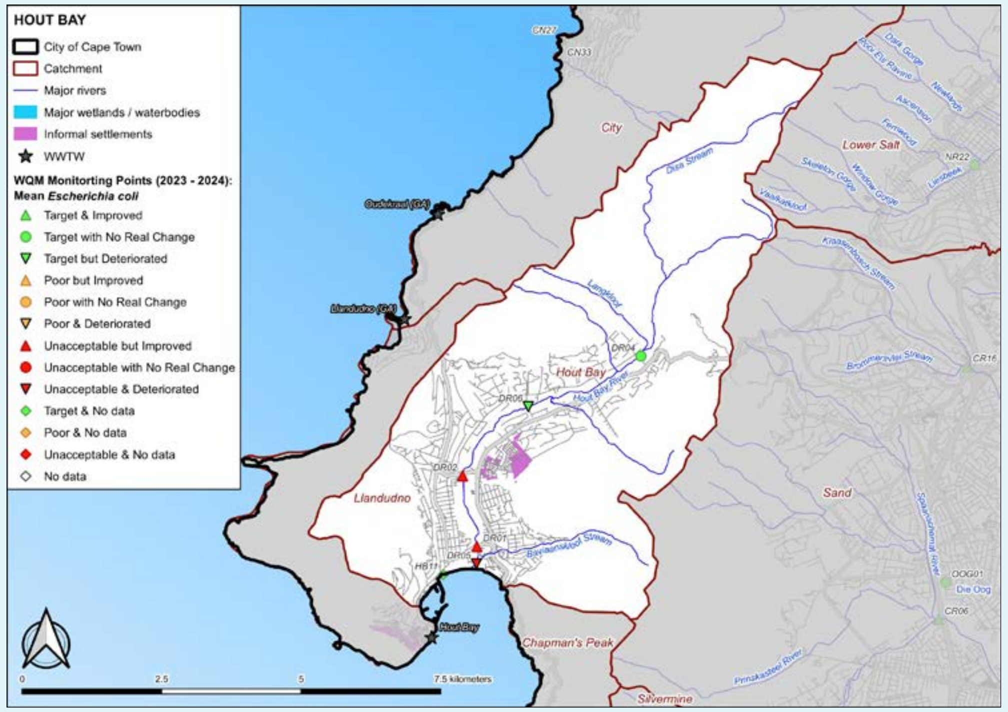


Figure 7.7

Mean annual ***E. coli*** data (geometric means), focusing on the **Sand River (Zandvlei)** catchment. See technical report for explanation of data analysis. Data coded as to human health risk (see table 5.3). See technical report for explanation of data analysis.

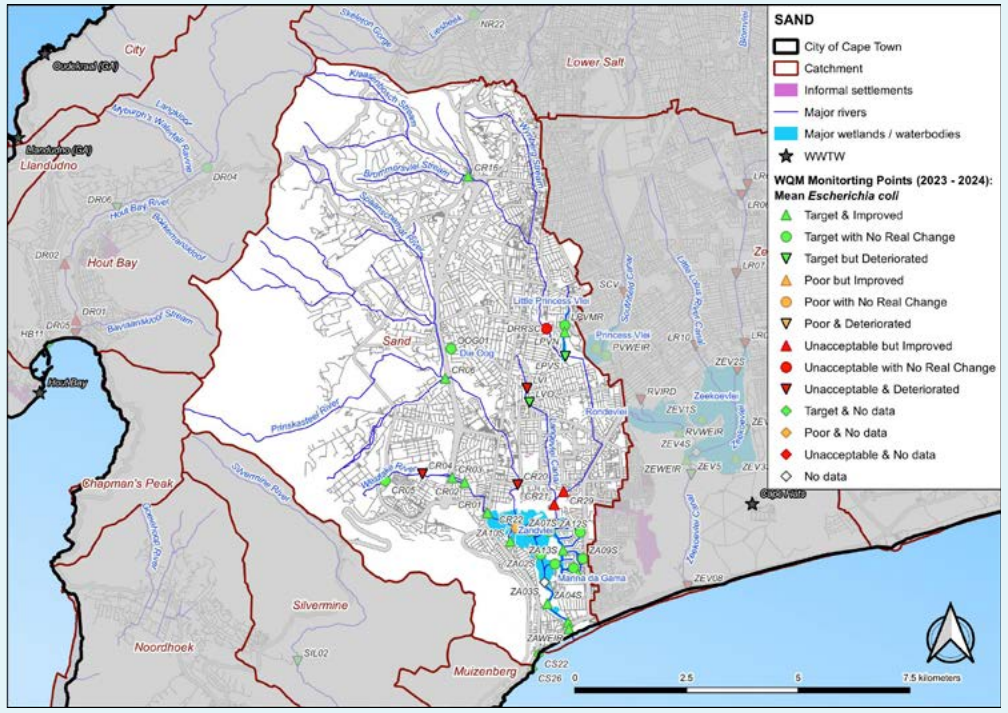
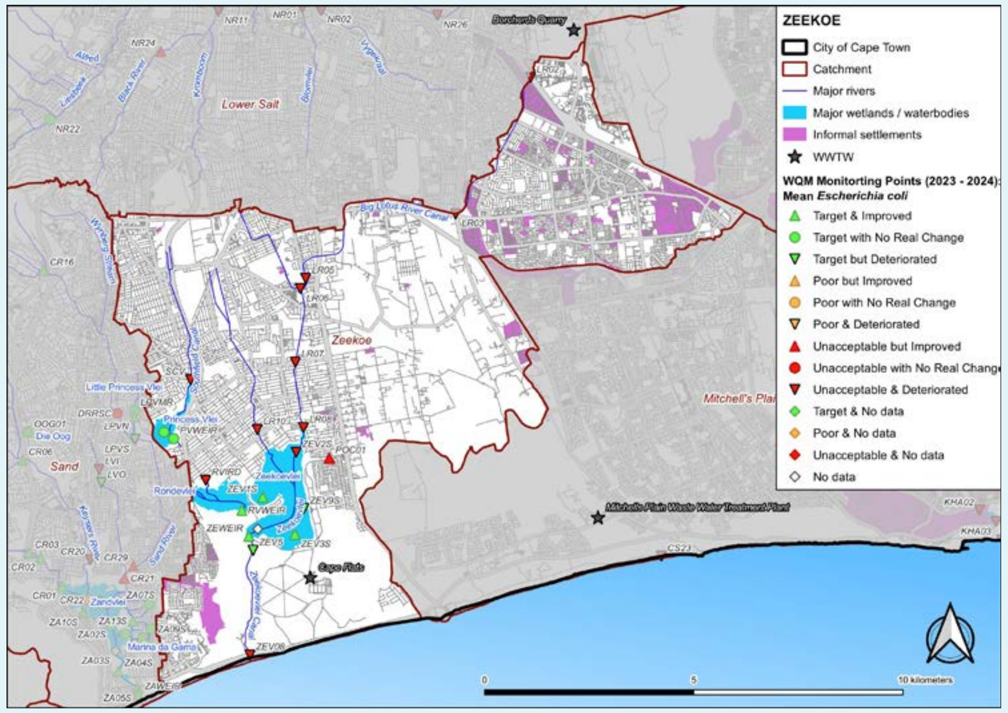


Figure 7.8

Mean annual ***E. coli*** data (geometric means), focusing on the **Zeekoe (Big and Little Lotus rivers)** subcatchment. Data coded as to human health risk (see table 5.3). See technical report for explanation of data analysis.



7.4 WHAT ABOUT NON-PRIORITY CATCHMENT AREAS?

As emphasised in previous annual Inland Water Quality reports, effective catchment management measures that prevent the pollution of the city's waterways and downstream receiving environments are as important in non-priority catchments as in priority catchments. The priority catchments addressed in this report include, with the exception of the Sand subcatchment (see section 8.7), most of the worst-performing, most problematic catchments in Cape Town. Missing from these is, however, arguably the Sir Lowry's Pass River catchment, which ought also to be included as an additional priority catchment. This system has severe upstream pollution issues, stemming at least in part from poor servicing of expanding backyard and informal settlements. In its reaches downstream of the T2, the City has commenced with a major river works project (the Sir Lowry's Pass River realignment project), which will result in channelisation of the river to provide space for floodplain development.

If water quality problems from upstream sewage infrastructure and the Sir Lowry's Pass Village persist, the required ecological mitigation measures that made this project ecologically acceptable at EIA phase will not be realised.

The remaining subcatchments were, at least over the reporting periods considered here, in a generally better condition from a water quality perspective. It is, however, very important that water quality in these systems does not deteriorate, and should ideally improve further. For this reason, it is strongly recommended that ongoing attention be paid to data for key indicative water quality parameters from sites in these systems, and any persistent (i.e. more than two consecutive months, or once-off but large-scale) deterioration in any of the monitored variables should be followed up by pollution tracking to identify likely pollution sources, followed up with interventions to address identified issues.

Such deterioration has been noted for the Lourens and, to a lesser degree, the Silvermine catchments in the 2024 reporting period (see section 5) and one of the important recommendations made in the technical report is for further investigation and preventative interventions in these catchments.

Input from local residents, friends groups, catchment management forums and other organisations relating to water quality concerns and known pollution 'hotspots' should be facilitated by the City.

Lower reaches of the only moderately impacted lower Silvermine River catchment at Clovelly, which nevertheless still requires maintenance interventions for its flood-control wetlands (pictured) and attention to point-source impacts. (Photo: Bruce Sutherland)

7.5 KEY TAKE-AWAY POINTS FROM CONSIDERATION OF WATER QUALITY IN PRIORITY CATCHMENTS

The following key points emerge from the above discussions:

- The most serious issues affecting water quality in Cape Town's rivers and wetlands comprise **solid waste and sewage**. These issues are controlled by other line departments, but CSRM regional managers and their teams are often at the receiving end of failed reticulation, WWTW and solid waste management systems, and thus are accountable for polluted watercourses and the ecological and other impacts of this pollution, while being powerless to effect change at source.
- All of the city's priority catchments include runoff from informal settlements with poor access to sewerage systems. This means that water quality in stormwater systems is in many areas compromised to levels where standard application of SUDS and other stormwater quality polishing/improvement approaches are unlikely to be effective – the Sand catchment is the exception to this, but even this includes small areas of informality and some suburbs with extensive backyard dwellers.
- Solid waste in the sewerage system is a major contributor to blocked sewers and pump stations, resulting in added watercourse pollution – the passage of inappropriate waste into sewers via toilets or manholes is an issue that cuts across all sectors of Cape Town's communities, regardless of income, although the problem materials themselves differ. Addressing this issue through significantly ramped-up solid waste collection and educating communities in all areas as to the impacts of foreign material in sewerage systems is strongly recommended.
- The City's current regional stormwater management system results in some catchments extending across two or more stormwater planning regions. This means that, in some cases, river catchments are managed by two or more CSRM regional managers, making integration of projects and responsibilities unwieldly, and accountability for catchment condition difficult to achieve.
- Similarly, sewerage reticulation activities are also not carried out on a (river) catchment basis – this again means that efforts in one part of a reticulation zone may be negated by a lack of coordination with upstream reticulation managers, or by different strategies and levels of effort in different areas.
- While progress has been made in many catchments, and in priority catchments in particular, with regard to the development of PASAPs and increasingly detailed TAPs by the CSRM, discussions with regional stormwater management teams highlighted the importance of ensuring buy-in from transverse City directorates or branches outside of CSRM to ensure that the required interventions are feasible and, if not, to ensure that feasible alternatives are identified and incorporated into the TAPs, along with assigned (and agreed-on) responsibilities to ensure that implementation of the TAPs has support across the multiple City directorates for which the S&IWQP MMP has relevance.
- In areas not subject to high levels of sewage-impacted stormwater, the City is encouraged to implement or require implementation of SUDS-type interventions and implement pollution tracking when water quality deterioration is detected. These measures will help to maintain the current relatively good status of water quality in these catchments, which comprise:
  - the Silvermine catchment;
  - the Lourens catchment;
  - the Schuster's catchment ;
  - the Liesbeek River and its tributaries in the Lower Salt subcatchment; and
  - parts of the Sand catchment.
- The City's reactivation of the planned LUW projects in the Sand catchment (as of the first quarter of 2025) is strongly supported in this report as a vehicle to achieve measurable water quality improvement from catchment-scale interventions in moderately impacted catchments, carried out in combination with pollution abatement strategies, such as sewer and pump station upgrades and repairs.

8. THE CITY'S APPROACH TO ADDRESSING WATER QUALITY ISSUES

8.1 THE CITY'S WATER STRATEGY

The City's 2020 Water Strategy is based on meeting five commitments, namely:

- safe access to water and sanitation
- wise use of water
- sufficient reliable water from diverse sources
- shared benefits from regional water resources
- transitioning to a water-sensitive city (by 2040)

WHAT IS A WATER-SENSITIVE CITY?

The City's Water Strategy describes this as a city "with diverse water resources and water infrastructure, making optimal use of stormwater and urban waterways for flood control, aquifer recharge, water reuse and recreation, according to sound ecological principles". The mechanism for achieving this would be through new incentives and regulatory mechanisms, as well as investments in new infrastructure.

The overarching vision is that Cape Town will become a city that optimises and integrates the management of water resources to improve resilience, competitiveness and liveability for the prosperity of its people. Achieving this vision will require a shift to water-sensitive urban design that encompasses all aspects of integrated urban water cycle management, including water supply, sewerage and stormwater management, as well as protecting natural ecosystems.

Water quality is a key component affecting the City's ability to honour each of these components. Polluted water resources are not fit for use without costly treatment, rendering the city's most scarce resource a waste product in many cases.

Addressing the severe pollution that characterises many of Cape Town's watercourses, and improving the ecological functioning and capacity of its watercourses to deliver ecosystem services, are thus all recognised by the City as critical milestones on its path to becoming a water-sensitive city.

This section describes and reports on progress in a number of the City's programmes, which have been developed specifically to address various aspects of the problem of pollution of Cape Town's watercourses and associated water resources.

8.2 PROGRAMMES TO IMPROVE WATER QUALITY IN CAPE TOWN'S WATERCOURSES

A number of programmes have been developed and prioritised in the City. These programmes are explored in more detail in the technical report (section 7) but comprise the following:

The Mayor's Priority Programme (MPP) on Sanitation and Inland Water Quality (S&IWQP) is one of five MPPs identified by the Executive Mayor and City Manager, and is an infrastructure-focused programme that was developed to try to address the pervasive issues of poor and deteriorating water quality in the city. It was developed as a strategic programme, aimed at improving urban sanitation generally, and through this and various other interventions improving the quality and ecological condition of the city's inland watercourses.

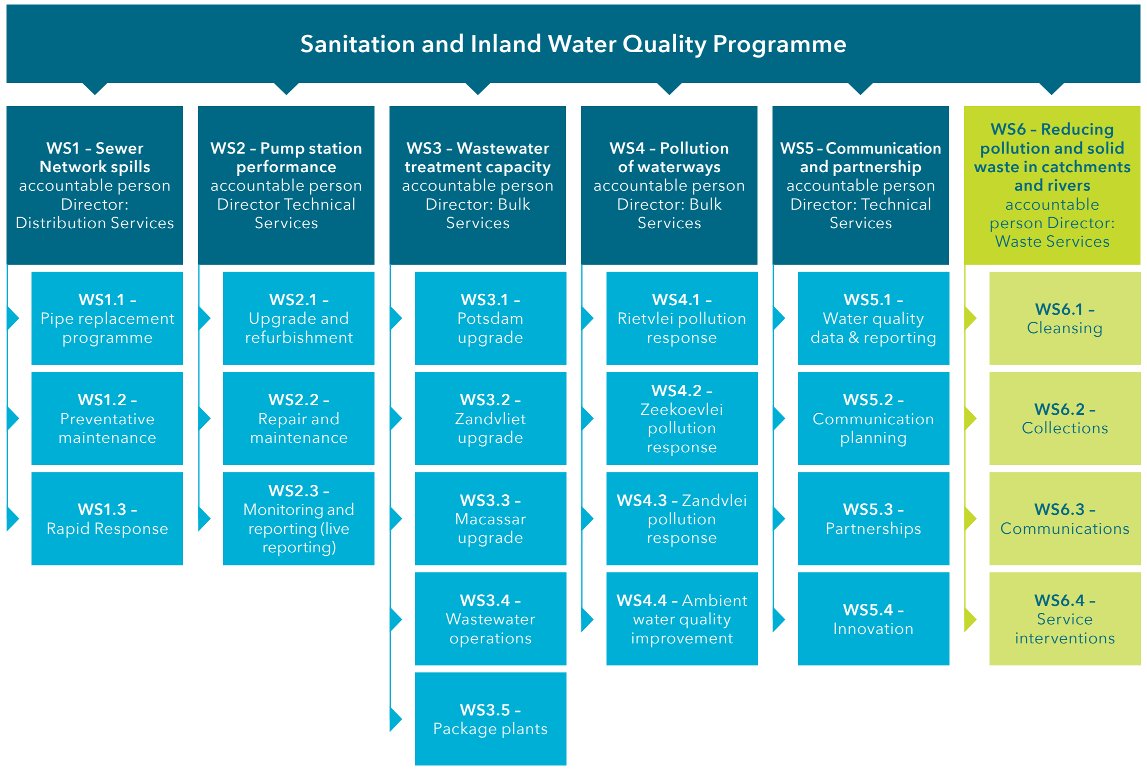
Six workstreams make up this MPP. Their structures and subprogrammes are summarised in **figure 8.1**, and described in more detail in section 7 of the technical report. Their effective and timeous implementation are intended to allow the MPP to improve the quality of life of Cape Town's residents, reduce the impact of sewage spills and wastewater effluent on the environment, and improve the reliability of infrastructure.

New to the MPP is **workstream 6** ("Reducing pollution and solid waste in catchments and rivers"). This was added to the other five workstreams during the 2024 reporting period, in response to the identification of uncontrolled and accumulating solid waste in Cape Town's catchments **as one of the pervasive issues driving poor water quality in the city, poor sanitation in urban slums and informal settlements, and blocking sewers, pump stations and stormwater systems.**

The technical report describes its inclusion in the MPP workstreams as a positive and proactive move.

Figure 8.1

The Mayor's Priority Programme (MPP) on Sanitation and Inland Water Quality is structured around six workstreams, each comprised of a number of subprogrammes. WS6 (highlighted in yellow) was introduced during the 2024 reporting period.



Central to bringing about the desired improvement in sanitation and inland water quality that drove the establishment of this MPP, are investments by the City in:

- the City's New Water Programme;
- refurbishment of existing water treatment plants (WTPs);
- sewage pump station upgrades;
- sewer network replacements; and
- wastewater treatment works (WWTW) upgrades and capacity increases.

Budgetary constraints are, however, clearly a major consideration in achieving the above investments and their desired outcomes, and were exacerbated by National Treasury budget cuts in early 2024, affecting Citywide finances. These resulted in funding being prioritised for key infrastructure projects in the MPP (sewer pipe replacement and expansion) and critical sewage pump station upgrades, while budgets for other major infrastructure were moved to operating budgets and will be implemented as public-private partnerships (PPPs).

Among programmes that were initially cut was the implementation of some of the Liveable Urban Waterways projects (see section 8.3). At the time of writing this report, these had, however, been included among priority projects for funding.

The 2025 Technical Report provides more detailed reporting on progress made in planning and implementing key components of the six workstreams.

8.3 THE LIVEABLE URBAN WATERWAYS PROGRAMME

8.3.1 BACKGROUND

The Liveable Urban Waterways (LUW) Programme is a strategic programme developed by the City with the aim of demonstrating how water-sensitive design, waterway rehabilitation and a new approach to waterway management can achieve multiple benefits for society, the environment and the economy.

Implicit in the LUW approach is the concept of the roll-out of projects at scale to achieve measurable impacts at a catchment scale.

WHAT IS A LIVEABLE WATERWAY?

In the LUW Programme, it

1. has acceptable water quality
2. makes space for the water
3. has a functioning ecology
4. connects the waterway to the water table and the floodplain
5. connects communities; and is used and enjoyed by communities
6. provides a range of ecosystem services, economic and social benefits

Seven core principles are intended to guide the LUW Programme and its individual projects:

- Collaboration and partnering
- Identification of waterways as connectors and catalysts
- Designing with nature
- Designing for many users
- Building in resilience
- Designing for attractive and usable public places
- Allowing for post-project care and maintenance

8.3.2 LUW PLANNING AND IMPLEMENTATION

After a hiatus in early 2024, when implementation/further planning around existing LUW projects was halted due to financial constraints, funding of LUW projects resumed in early 2025.

These projects are testing different rehabilitation and water-sensitive design approaches to demonstrate the shared benefits that nature-based solutions and green infrastructure can provide. The projects have all been designed in collaboration with communities.

Projects that are already under way with completed designs are located on the following systems:

- Sand catchment:
- Sand/Langvlei Canal
- Keyser River
- Spaanschemat River
- Grootboschkloof River
- Westlake River
- Wynberg stream
- Lower Salt subcatchment
- Vygekraal River

Once completed, the above projects will allow for the rehabilitation of approximately 13,3 km of river and 8 ha of wetland.

ASANDA WETLAND PARK

Implementation of designs for the Asanda Wetland Park was completed in the 2023 reporting period. The project included recreational facilities, wetland rehabilitation, stormwater infrastructure, and a pedestrian walkway across the wetland.

This site is currently in its maintenance phase, where vandalism, dumping of solid waste and security are significant issues.

Various interventions have also been proposed for the Upper Elsieskraal River – these are still in the feasibility, pre-concept phase.

In addition, funding by the C40 Cities Finance Facility (CFF) allowed identification of opportunities for implementing waterway rehabilitation, green infrastructure (GI) and nature-based solutions (NbS) through the LUW Programme.

The 2025 Technical Report commended the City for refunding the LUW programme in 2025 as an integral part of achieving key components of the City's Water Strategy.

Princessvlei. Photo: Bruce Sutherland

9. CONCLUSIONS

9.1 WATER QUALITY IN RIVERS AND OTHER MONITORED WATERBODIES

9.1.1 OVERVIEW FROM THE TECHNICAL REPORT

This summary report was compiled to pull out the main findings of the City's latest Inland Water Quality Report in a more easily digestible form than the analyses presented in the 2025 Technical Report.

The data presented in the technical report and summarised in this report clearly highlight that **the most problematic and pervasive water quality issue throughout the city's monitored rivers and other watercourses was (and remains) phosphorus enrichment.** No real improvement was evidenced in data from the 2024 reporting period, where 77% of 'flowing' (river/stormwater) samples were rated 'unacceptable' (hypertrophic) and median orthophosphate concentrations lay well above the hypertrophic threshold for this variable in all catchments, save the Lourens and Silvermine catchments.

Hypertrophic conditions in aquatic ecosystems, and slow-flowing or standing water systems in particular, contributed towards ecosystem deterioration as a result of *inter alia* the rapid growth of aquatic and emergent vegetation that requires ongoing control, and accumulations of organic material from decaying algae and other material in standing waterbodies, including some of the recreational vleis. These were in turn also often associated with knock-on socioeconomic and human health impacts, such as vlei closures due to high microcystin concentrations (Zeekoevlei) and high costs of vlei dredging and plant clearing.

Compounding problems with the monitoring and management of phosphorus contamination in the city's waterbodies were **problems with the data** themselves, in that the City has been unable to analyse samples for total phosphorus since December 2022, and the equipment used for the analysis of orthophosphate has a relatively high detection limit, above the threshold for 'poor'. **This means that early identification of deteriorating water quality in few better-performing catchments, such as the Silvermine and Lourens catchments, is not possible.**

With regard to the city's standing waterbodies, the technical report shows that these were also characterised by very low **N:P ratios**, conducive to dominance by blue-green algae (cyanobacteria). This was evidenced in **chlorophyll-a** data too, with only 35 to 40% of samples lying within the 'target' range for this variable in the 2023 and 2024 reporting periods. Despite these data, and although blue-green algal blooms were clearly present on numerous occasions in all monitored waterbodies over the 2023 and 2024 reporting periods, the only recreational vlei in which **microcystin toxins** were recorded at concentrations of any concern in the 2024 reporting period was Rietvlei, where a single sample was rated as of 'medium' risk.

Nutrient enrichment in many areas stemmed from variously treated sewage effluent discharges and inflows of raw sewage and greywater, mainly from informal settlements. This means that these flows were also often associated with high chemical and biological oxygen demand, reflecting in some systems having very low levels of dissolved oxygen to support desirable aquatic life. The worst hit of the assessed systems considered in this study comprised Milnerton Lagoon, the Soet catchment, Zoarvlei and the highly contaminated Mitchells Plain and Mew Way detention ponds.

Summary *E. coli* data presented in this report highlight how problematic raw sewage was across the city's waterbodies with 60% of river samples rated 'unacceptable' in the 2023 and 2024 reporting periods. Standing waterbodies were generally less impacted, and data showed that 80% of standing water sites were in the 'acceptable' range for *E. coli*.

Of concern is the fact that the data also show a marked increase in both the frequency and the magnitude of sewage contamination in Cape Town's rivers between 2020 and the 2023 and 2024 reporting periods, with 2024 showing a similar proportion of sites falling within the 'unacceptable' range compared with 2023, but with a higher proportion of these showing an increased magnitude of exceedance of the 'unacceptable' threshold. An increased frequency of *E. coli* concentrations in the 'unacceptable' range was noted in the Silvermine and Lourens catchments, and these are flagged as particular concerns in these generally least-polluted systems, which are assumed to still have high ecological sensitivity to nutrient enrichment.

The above notwithstanding, while data show that all of the city's recreational waterbodies periodically posed risks to human health during the 2023 and 2024 reporting periods, they were, however, largely in an 'acceptable' condition, conducive to their safe recreational use. **Milnerton Lagoon was, however, mostly in an 'unacceptable' condition, and its use for recreation would have posed likely risks to human health most of the time.** This recreational waterbody has subsequently been closed for recreational use for some time.

Water quality in Cape Town's rivers, canals and stormwater systems ('flowing systems') was generally much poorer than in standing waters, largely because, with the exception of the monitored Mew Way and Mitchells Plain detention ponds, the monitored standing water systems are generally not direct recipients of inflows of raw sewage and greywater, which makes its way into these systems via rivers and canals, and there is thus some dilution effect in the standing waterbodies as well as some natural amelioration through plant uptake and sedimentation. Data for stormwater outfalls along the coast moreover highlighted the likely impact of flows from some catchments, in particular for coastal areas.

9.1.2 HIGH-LEVEL SUMMARY DATA

By way of providing a very high-level summary of the condition and trajectory over the past five years of the city's catchments and its individual recreational waterbodies, summary data for key variables are presented in **table 9.1**. The data support the previous discussion, showing the following:

- Geometric mean ***Escherichia coli*** deteriorated (i.e. increased) in 12 of the city's catchments over the 2024 reporting period, with eight catchments having median condition ratings well within the range for 'unacceptable' human health risks. However, **note that the summary nature of** the tables means that particularly poorly (or better) performing parts of catchments are not accurately reflected, and, as indicated in more detailed datasets, all catchments were exposed at some times to *E. coli* at 'unacceptable' concentrations.
- Nevertheless, the data also show improvement in some catchments (Elsieskraal, Mosselbank, Schuster's and Sout catchments) with regard to this variable.
- Of the recreational waterbodies, while there was a deterioration in Rietvlei in terms of mean *E. coli* concentrations, Princess Vlei, Rietvlei, Zandvlei and Zeekoevlei were all generally within 'acceptable' limits for *E. coli* (although some parts of these systems were prone to sewage contamination at times), and Zandvlei showed actual improvement. Milnerton Lagoon was the exception to the above, with even mean concentrations well above the 'unacceptable' threshold ('unacceptable' level 2), and showed deterioration over the 2024 reporting period.
- **Orthophosphate** concentrations were problematic in all catchments in the 2023 and 2024 reporting periods, with five catchments reflecting > 25% year-on-year increases in median concentrations. Of these, three showed substantial deterioration, well within the 'unacceptable range' (Lower Salt, Mosselbank and Soet catchments).
- The absence of any catchments in an 'acceptable' condition with regard to phosphorus enrichment in the last two reporting periods reflects in part the high limit of quantification for orthophosphate (as phosphorus) analyses, which now lies within the range for 'poor' and prevents meaningful monitoring of changes in better-performing catchments.
- Median orthophosphate concentrations were also high in Milnerton Lagoon, Rietvlei and Zeekoevlei, reflecting hypertrophic conditions, but lower in Zandvlei and Princess Vlei.
- Free (toxic) **ammonia (NH_3)** concentrations increased in nine catchments, with the Hout Bay, Mitchells Plain, Noordhoek and Soet all having median concentrations above acute toxicity thresholds (i.e. 'unacceptable').
- Median **dissolved oxygen** (DO) concentrations were problematic only in the Soet catchment, but more detailed analyses show that it was problematic at times in most catchments.
- Of the recreational vleis, median DO was 'unacceptable' in Milnerton Lagoon in the 2024 reporting period, reflecting a collapsed ecosystem.

Note that more detailed (and useful) data analyses and summaries are provided in the technical report. Appendix C provides median annual data per site and per catchment, while appendix D provides box plots showing the range, median, mean and percentile data for most variables assessed.

Table 9.1

High-level summary of water quality condition and trajectory in all of the city's catchments (top table) over the past five years for all sites (flowing and standing waterbodies) in each catchment, and for recreational waterbodies (bottom table). Trajectory shown with arrowed symbols – green 'up arrow' means improving; red 'down arrow' means deteriorating; yellow dash means no real change. Only differences > 25% reflected as 'change'. Cells colour-coded as condition, as per tables 5.1 to 5.3 (see below), based on median annual data (geometric means for *E. coli*).

Note that the summary nature of the tables means that particularly poorly (or better) performing parts of catchments are not, however, accurately reflected.

Catchment	*E. coli*		Orthophosphate			NH_3			DO		
	2023	2024	2020-2022	2023	2024	2020-2022	2023	2024	2020-2022	2023	2024
Bokramspruit	Unacceptable (level 2)	Unacceptable (level 2) ↓	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) –	Poor	Poor ↑	Poor –	Acceptable/target	Acceptable/target –	Poor –
City		Unacceptable (level 1)									
Diep	Acceptable/target	Acceptable/target ↓	Unacceptable (level 1)	Unacceptable (level 1) ↑	Unacceptable (level 1) –	Poor	Acceptable/target ↑	Poor ↓	Acceptable/target	Acceptable/target –	Acceptable/target –
Eerste	Unacceptable (level 1)	Unacceptable (level 2) ↓	Unacceptable (level 1)	Unacceptable (level 1) ↑	Unacceptable (level 1) –	Poor	Poor ↑	Poor ↓	Poor	Poor –	Poor –
Else	Acceptable/target	Acceptable/target ↓	Acceptable/target	Acceptable/target ↓	Poor ↓	Acceptable/target	Acceptable/target –	Acceptable/target ↓	Acceptable/target	Acceptable/target –	Acceptable/target –
Elsieskraal	Acceptable/target	Acceptable/target ↑	Poor	Poor ↓	Poor ↑	Acceptable/target	Acceptable/target –	Acceptable/target ↓	Acceptable/target	Acceptable/target –	Acceptable/target –
Hout Bay	Unacceptable (level 1)	Poor –	Poor	Poor ↓	Poor –	Acceptable/target	Acceptable/target ↓	Acceptable/target –	Acceptable/target	Acceptable/target –	Acceptable/target –
Kuils	Unacceptable (level 2)	Unacceptable (level 3)	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) –	Poor	Poor –	Unacceptable (level 1) ↓ ↓	Acceptable/target	Acceptable/target –	Poor ↓
Lourens	Acceptable/target	Acceptable/target ↓	Acceptable/target	Poor ↓	Poor –	Acceptable/target	Acceptable/target –	Acceptable/target –	Acceptable/target	Acceptable/target –	Acceptable/target –
Lower Salt	Unacceptable (level 2)	Unacceptable (level 3) ↓	Unacceptable (level 1)	Unacceptable (level 1) ↑	Unacceptable (level 1) ↓	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) –	Poor	Poor –	Poor –
Mosselbank	Unacceptable (level 1)	Poor ↑	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) ↓	Poor	Poor ↑	Poor ↓	Poor	Poor –	Poor –
M'Plain	Unacceptable (level 3)	Unacceptable (level 3) ↓	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) –	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) –	Unacceptable (level 1)	Unacceptable (level 1) –	Poor –
Muizb											
Noordhoek	Acceptable/target	Acceptable/target ↑	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) ↑	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) ↑	Acceptable/target	Acceptable/target –	Acceptable/target –
Sand	Acceptable/target	Acceptable/target –	Poor	Poor –	Poor –	Acceptable/target	Acceptable/target ↓	Acceptable/target ↓	Acceptable/target	Acceptable/target –	Acceptable/target –
Schusters	Acceptable/target	Acceptable/target ↑	Poor	Poor –	Poor –	Acceptable/target	Acceptable/target ↓	Acceptable/target –	Poor	Poor –	Acceptable/target –
Silvermine	Acceptable/target	Acceptable/target ↓	Acceptable/target	Poor ↓	Poor ↓	Acceptable/target	Acceptable/target	Acceptable/target	Acceptable/target	Acceptable/target	Acceptable/target
SLPass	Acceptable/target	Unacceptable (level 1) ↓	Poor	Poor –	Poor –	Acceptable/target	Acceptable/target –	Acceptable/target ↓	Acceptable/target	Acceptable/target –	Acceptable/target –
Soet	Unacceptable (level 3)	Unacceptable (level 3) ↓	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) ↓	Unacceptable (level 1)	Unacceptable (level 1) ↑	Unacceptable (level 1) ↓	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) –
Sout	Acceptable/target	Acceptable/target ↑	Unacceptable (level 1)	Unacceptable (level 1) ↓	Unacceptable (level 1)	Acceptable/target	Acceptable/target –	Acceptable/target –	Poor	Poor –	Acceptable/target –
Zeekoe	Acceptable/target	Poor ↓	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) –	Poor	Poor ↓	Poor –	Acceptable/target	Acceptable/target ↑	Acceptable/target –

Waterbody	*E. coli*		Orthophosphate			NH_3			DO		
	2023	2024	2020-2022	2023	2024	2020-2022	2023	2024	2020-2022	2023	2024
Milnerton Lagoon	Unacceptable (level 2)	Unacceptable (level 2) ↓	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) –	Unacceptable (level 1)	Unacceptable (level 1) ↓	Poor ↑	Poor	Poor –	Unacceptable (level 1) –
Princess Vlei	Acceptable/target	Acceptable/target –	Acceptable/target	Acceptable/target ↓	Poor ↓	Acceptable/target	Acceptable/target –	Acceptable/target ↓	Acceptable/target	Acceptable/target –	Acceptable/target –
Rietvlei	Acceptable/target	Acceptable/target ↓	Unacceptable (level 1)	Poor ↑	Unacceptable (level 1) ↓	Acceptable/target	Acceptable/target ↓	Poor ↓	Acceptable/target	Acceptable/target –	Acceptable/target –
Zandvlei	Acceptable/target	Acceptable/target ↑	Poor	Poor –	Poor –	Acceptable/target	Acceptable/target –	Acceptable/target –	Acceptable/target	Acceptable/target –	Acceptable/target –
Zeekoevlei	Acceptable/target	Acceptable/target –	Unacceptable (level 1)	Unacceptable (level 1) –	Unacceptable (level 1) –	Poor	Poor –	Poor –	Acceptable/target	Acceptable/target –	Acceptable/target –

Acceptable/target | Poor | Unacceptable (level 1) | Unacceptable (level 2) | Unacceptable (level 3)

9.2 IDENTIFICATION OF KEY POLLUTION SOURCES

Key sources of pollution in Cape Town's inland watercourses have been highlighted in previous annual Inland Water Quality reports and remained similar over the 2023 and 2024 reporting periods. While there are many activities and land uses that contribute to cumulative water quality degradation in the city, the four listed below are considered by far the most significant, and unless they can be addressed or their impacts mitigated, there is little likelihood that the City will be able to effect meaningful and measurable improvement in water quality in most of its managed subcatchments.

The main pollution sources are:

1. **inflows of treated effluent from the City's (inland) WWTW**, which comprise by far the largest source of pollution into the city's watercourses;
2. **episodic overflows from sewage pump stations and surcharging manholes;**
3. **runoff of greywater and blackwater from informal settlements and areas with high levels of backyard settlements,** which affects many of Cape Town's catchments, but particularly the Diep, Zeekoe, Kuils, Sir Lowry's Pass and Noordhoek catchments, where in summer such flows, along with treated effluent in some areas, can account for almost all of river flows through affected catchments; and
4. **accumulations of large volumes of solid waste and illegal dumping of waste** that characterise many areas of the city's open spaces, roadways, pavements and watercourses, which block the stormwater system, affect the liveability of watercourses, or contribute to watercourse pollution indirectly by blocking sewage pump stations and sewers.

The polluted Soet River. (Photo: F Aziz)

9.3 THE CITY'S RESPONSES TO WATER QUALITY ISSUES

The above findings are not new – similar findings were presented in the 2020, 2023 and 2024 Inland Water Quality reports, and the MPP for Sanitation and Inland Water Quality recognises the urgent need to address these complex issues.

In particular, the City's **committed investment in WWTW infrastructure refurbishment, upgrades and innovation** (e.g. Zandvliet WWTW upgrades and the (currently in progress) Potsdam WWTW upgrades) and upgrading of major (and minor) sewer reticulation networks should, once on-line, contribute towards increasing separation of sewage from stormwater systems, including Cape Town's rivers, wetlands and estuaries.

Increased attention to the **collection of data that allows informed decision making** is evident in the increasing availability and improvement of quality of data for sewage pump station failures and their causes, as well as in the development of the Inland Water Quality Dashboard, allowing informed planning around catchment-level water quality interventions.

The City is also investing in other projects to redress aquatic ecosystem impacts stemming from a long history of catchment-scale pollution and other impacts, such as canalisation and wetland loss. Investment in **dredging of accumulated organic waste in Zeekoevlei** is an important step towards addressing the knock-on impacts of catchment-scale pollution, while the **planned lowering of the weirs** of Zeekoevlei and Rondevlei are investments that will reduce ongoing management costs and effort in these important systems in the future.

Addressing water quality in the city's watercourses does, however, require strategic, coordinated and complementary inputs from multiple directorates, branches and departments. This is complicated by the fact that these often have very different mandates and responsibilities.

An important initiative by many of the City's directorates and their departmental and branch officials over the past few years has been an **improvement in communication** with the general public regarding water quality issues and interventions to address them. While more could be done in this regard at a catchment level, the improvement in communications and acknowledgements of system failures and their causes to stakeholders should, over time, improve public trust in City data, reporting and associated decision making. The development and launching of the Inland Water Quality Dashboard in 2024 provides a useful and informative tool for both the City and the public. The City's spearheading of the formation of **catchment management forums** for several of Cape Town's major catchments should also, if actively engaged with, further help to drive City-public-private partnerships.

Inaugural meeting of the newly established (June 2025) Vygekraal Catchment Management Forum. (Photo: City of Cape Town)

10. KEY RECOMMENDATIONS FROM THIS REPORT

The technical report includes detailed recommendations for implementation by the City and, in some cases by its residents, to improve water quality in its rivers, estuaries and other waterbodies. These have been summarised very briefly in point form only in this report – **interested readers should consult section 9.4 of the technical report for a more thorough discussion and access to more detailed recommendations.**

Upfront it is, however, stressed that until the pervasive issues of pollution from WWTW and informal settlements can be addressed, it is unlikely that there will be a significant turnaround in water quality in many areas.

Drawing on analysed water quality data, as well as on comments and suggestions from City regional stormwater management teams, the technical report provides discussion of and recommendations to:

- reduce the impacts of point-source pollution on aquatic ecosystems, with different measures suggested to reduce pollution from:
  - major WWTW through improved maintenance as well as prioritised upgrades, and also with attention to incentivise reduced use of phosphorus-containing products in Cape Town's catchments;
  - informal settlements and suburbs with high levels of backyard settlements, including on- or off-site package plant treatment or strategic low-flow diversions to sewers and WWTW; and
  - overflows from pump station failure;
- reduce the passage of solid waste into stormwater systems and watercourses through improved collection frequency and effort, as well as through measures such as actively encouraging (through policy) waste recovery and repurposing (e.g. the use of 'green building aggregates');
- amend stormwater, sewerage reticulation and urban waste management structures to align management boundaries with city catchments;
- fast-track implementation of PASAPs and TAPs;
- actively conserve existing subcatchments or parts of subcatchments in relatively good condition (Silvermine, Lourens, (upper) Hout Bay catchments as well as parts of the Sand and Lower Salt (Liesbeek) subcatchments);
- conserve remnant floodplains and their wetlands (especially Kuils, Lower Eerste, Diep and Hout Bay);
- prioritise LUW Programme implementation;
- implement a number of (specified) changes to the City's Water Quality Monitoring Programme in terms of sampling sites (include Paardevlei) and water quality variables (in particular, improved resolution of PO4-P analysis; inclusion of total phosphorus and enterococci analyses; changes in *E. coli* dilution range for rivers);
- use water quality monitoring data to trigger pollution control interventions;
- include monitoring of flow data in water quality monitoring to allow calculation of loading and inform management interventions; and
- allocate catchment data to C3 sewage spill reporting datasets.
- In addition to the above, specific recommendations have been provided to improve inland water quality reporting going forward. One of the key recommendations made in order to simplify water quality reporting, is that the City reports on inland water quality using an updated version of its Water Quality Indices, developed in 2013 for such purposes. The indices output a single rating per water sample (A–F), which is based on the concentrations and condition thresholds of the full range of variables considered individually in the current Inland Water Quality Report.

Note that many of the above measures were included in previous reports. Some of these have already been implemented in part or are in planning by the City, but remain important interventions that will together help to bring about an improvement in Cape Town's inland water quality.

11. WHAT CAN YOU DO?

Finally, it must be stressed that water quality in Cape Town's watercourses is not determined solely by the City's interventions. Residents also need to play a role in reducing sources of pollution into watercourses.

Key focal areas include the following:

1. Responsible disposal of waste by binning, bagging or recycling it.
2. Reducing the volume of waste produced by thoughtful purchasing and attention to reuse and recycling of waste.
3. Reducing organic waste by composting.
4. Disposing of polluted water into the sewer and not the stormwater system – therefore dirty household wastewater, swimming pool backwash, bin washing water and other polluted water should be disposed of in the sink or toilet so that it enters the sewer network and travels to WWTW for treatment, rather than the stormwater system. Remember that water passed onto the road network enters the stormwater system.
5. Urgent reporting of sewage spills or sewage pump overflows in any areas to the City's 'Report a fault' (C3 notification) system by phoning 0860 103 089 or visiting **www.capetown.gov.za/servicerequests**.
6. Regular cleaning out of restaurant grease traps, as a build-up of fats in the sewer system is a major cause of blockages and sewer overflows.
7. Washing vehicles on soft, porous surfaces such as grass or sand from where the greywater gets absorbed into the soil, rather than on paved areas from where polluted water will flow directly into the stormwater system.
8. Disposing of used oil, paint and other products that contain harmful chemicals at a City-approved drop-off facility, and not into the stormwater system or sewer network.
9. Using eco-friendly products in gardens and for cleaning vehicles. When it rains, chemicals in fertilisers, pest control and cleaning products end up in the stormwater system, harming our rivers, streams, wetlands and the ocean.
10. Making a concerted effort to use low-phosphate detergents and other products, wherever possible, to help reduce the phosphate load on rivers, vleis and wetlands, and to help transition Cape Town towards a phosphorus-free city.
11. Getting involved – join your Catchment Management Forum or local Friends Group.

REMEMBER

Everything that passes into the stormwater system ends up in the city's watercourses and ultimately passes into the sea.

12. LIST OF FIGURES

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Making progress possible. Together.