



CITY OF CAPE TOWN
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MARINE OUTFALLS IN CAPE TOWN: BACKGROUND INFORMATION AND FAQs

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GENERAL INFORMATION AND HISTORY OF CAPE TOWN'S MARINE OUTFALLS

Q: How many marine outfalls does the City of Cape Town operate?

A: The City operates three marine outfalls, which are located offshore at Hout Bay, Green Point and Camps Bay.

Q: When were these marine outfalls built?

A: The Camps Bay marine outfall was commissioned in 1977.
The Hout Bay marine outfall was commissioned in 1993.
The Green Point marine outfall in its current form was completed in 1993.

Q: How was sewage disposed of at these three locations prior to the marine outfalls being built?

A: Previously at all three sites sewage was disposed into the sea via short pipes over the beaches. This practice was undertaken since the very first permanently established human settlements at all three locations.

Q: What is the design capacity of each of the marine outfalls?

A: Camps Bay has a design capacity of approx. 5 MI/day (operates at around 50% of that).
Green Point has a design capacity of approx. 40 MI/day (operates at about 60-65% of that).
Hout Bay has a design capacity of approx. 9 MI/day (operates at around 60% of that).

Q: How much preliminary treated sewage in total is discharged daily in Cape Town from the three marine outfalls and how does this compare internationally?

A: The City discharges around 30 MI/day from the three marine outfalls. Sydney, Australia (by comparison) discharges up to 950 MI/day. This is treated to primary level, which is one stage of treatment more than preliminary treatment.

Q: How much do the three marine outfalls discharge relative to the City's land-based Waste Water Treatment Works (WWTWs)?

A: In percentage terms, Cape Town's marine outfalls contribute approximately 5% of the total amount of waste water produced in Cape Town. 95% of Cape Town's waste water is produced from land-based WWTWs. While these WWTWs may be land-based, effluent from these WWTWs are discharged into river systems, which then ultimately enter into the sea.

Q: Does pre-treatment take place for marine outfalls?

A: Yes. Cape Town's marine outfalls have preliminary treatment in the form of screenings removal. The preliminary treatment includes the removal of waste water constituents such as rags, sticks, floatables, grit and grease that may cause maintenance or operational problems with the treatment operations, processes and ancillary systems.

The current operation at the outfalls also includes two stages of screening, namely coarse and fine (3 mm) screens, as part of the preliminary treatment of the raw waste water.

Q: Is the City considering further pre-treatment of waste water before it is discharged into the marine environment?

A: Yes. The City has commissioned a study that will determine the feasibility of various higher level pre-treatment interventions. The report for this study is anticipated to be complete by June 2023.

Q: Are there any other marine outfalls in the coastal waters of Cape Town which are not operated by the City of Cape Town?

A: Yes. There is a marine outfall located on the eastern shore of Robben Island and which is administered by the Robben Island Museum. Effluent, which is currently macerated, is discharged 465m offshore from Robben Island into Table Bay. There are currently plans underway to build a WWTW on Robben Island with a throughput capacity of 300m³ per day.

MARINE PROTECTED AREAS AND MARINE OUTFALLS

Q: When were the marine outfalls built in relation to the proclamation of the Table Mountain National Park Marine Protected Area (TMNP MPA), and do Cape Town's marine outfalls discharge into the TMNP MPA?

A: The TMNP MPA was proclaimed in 2004, a full 27 years after the Camps Bay marine outfall was commissioned. The outfall at Camps Bay discharges into a Control Zone in the TMNP MPA and not into a Sanctuary or No Take Zone of the TMNP MPA. The Hout Bay outfall was commissioned in 1993, 11 years before the MPA was declared. The Hout Bay marine outfall discharges into the TMNP MPA. The Green Point Marine Outfall was commissioned in 1993 and does not discharge effluent into the TMNP MPA.

It must be noted that at all three locations, waste water has never been disposed of differently since the construction of the marine outfalls. Prior to the construction of the marine outfalls, waste water was discharged over the shoreline.

Q: How is it possible to allow a marine outfall to discharge into the TMNP MPA?

A: During the investigation and motivations to declare the TMNP MPA, the Camps Bay marine outfall and its operation was not identified as an impediment or risk to the TMNP MPA in terms of its marine and environmental impact. No reference was made to the need for, or requirement to, consider decommissioning the Camps Bay marine outfall during the declaration of the TMNP MPA. The TMNP MPA was therefore declared with the full knowledge of a pre-existing marine outfall at Camps Bay.

REGULATION OF MARINE OUTFALLS

Q: Are marine outfalls regulated by law?

A: Yes. Each marine outfall is required to have a Water Use License in terms of the National Water Act (Act 36 of 1998) as well as Coastal Waters Discharge Permit in terms of the National Integrated Coastal Management Act (Act 24 of 2008).

Q: What is the purpose of the Water Use License (WUL) and Coastal Waters Discharge Permit (CWDP)?

A: The WUL and CWDP are required by national government to ensure that marine outfalls operate according to, and within, various parameters and requirements set by the National Department of Water Affairs as well as the National Department of Forestry, Fisheries and the Environment. The WUL and CWDP also set strict monitoring requirements for the three marine outfalls, which are the responsibility of the operator (in this case the City of Cape Town) to uphold in the use of these marine outfalls.

Q: What is the current permitting status of the marine outfalls?

A: Hout Bay has a Coastal Waters Discharge Permit. Camps Bay and Green Point have each been issued with Coastal Waters Discharge Permits, which are under finalisation pending appeal processes. All three have Water Use Licences.

MARINE SCIENCE SPECIALIST STUDIES

Q: What marine science studies did the City commission to better understand the impact of marine outfalls in Cape Town?

A: The City commissioned the following specialist marine science studies over the last six years:

- The Technical Report on Marine Outfall Monitoring and Assessment ([CSIR, 2017](#))
- Detailed dispersion modelling for each marine outfall ([PRDW, 2020/2021](#))
- Six seasons (winter/summer) of Seawater Quality Monitoring ([CLS, 2020-2022](#))
- Preliminary Biodiversity Assessment at Camps Bay Marine Outfall ([CLS, 2022](#))
- Initial Benthic Macrofauna Survey at Camps Bay Marine Outfall ([CLS, 2022](#))

- Assessment of Pharmaceutical Compounds in Cape Town's Coastal Waters in both Winter and Summer ([CSIR, 2021](#))

Q: What other marine outfall reports were commissioned by the City?

A: An expert panel was asked to prepare an Environmental Summary Report for [Camps Bay](#), [Green Point](#) and [Hout Bay](#) marine outfalls using the data and findings from the aforementioned marine science studies. This panel of experts included the following:

- Dr Robin Carter (40 + years marine science expertise)
- Lisa Holden (10+ years marine science expertise)
- Dr Barry Clark (30+ years marine science expertise)
- Dr Brent Newman (25 + marine chemist expertise)

Q: Were these environmental summary reports reviewed by an independent expert?

A: Yes, these environmental summary reports were reviewed by Dr Lynn Jackson (40+ years Marine Science expertise).

Q: Can I see all the reports and data produced by these marine science experts?

A: The marine scientists' results, analysis and findings inform the City's position around the outfalls and are available at <https://bit.ly/Coastalwaterquality>. Alternatively, log onto www.capetown.gov.za, search for "coastal water quality" and scroll down to the section on "marine outfalls".

FINDINGS OF THE MARINE SCIENCE STUDIES

Q: What were the key findings of these specialist marine science studies?

A: Seven major studies were undertaken by different marine science experts (all investigating different measurable aspects) over the last six years. They found commonality and replicability in their findings – including bacterial samples, toxicity samples, mussel growth monitoring, animal tissue samples, preliminary biodiversity surveys, chemicals of emerging concern (CEC) studies, dissolved oxygen and detailed numerical modelling – that the pollution is concentrated in the allowable mixing zone located close to the diffuser, and does not yet show evidence of significant or deleterious environmental impacts. Their overall key conclusion is that: ***"the marine outfalls are meeting their design objectives in reducing potential deleterious ecological and/or human health effects of discharged effluent by taking advantage of increased effluent dilution offered by deep water"***.

Q: What are the other key take away findings from the studies and environmental summary reports?

A: Additional key findings include the following:

- All three outfalls are operating in accordance with their original design, which is to dispose of preliminary treated waste water (screened waste water) by using deep water dispersion so that the ocean assimilates waste without exceeding its environmental capacity.
- Data collected from multiple studies and supported by detailed numerical dispersion modelling indicates that the effluent discharged through the Green Point, Camps Bay and Hout Bay outfalls is not having a major, deleterious or significant ecological impact in the Cape Town outfalls study area.
- Detailed numerical dispersion modelling and extensive water sampling shows that the [South African Water Quality Guidelines for Coastal Marine Waters: Guidelines for Recreational Use](#) are not exceeded anywhere along the shoreline due to the effluent from the marine outfalls.
- Detailed numerical dispersion modelling and analysis of over 4 000 water samples shows that:
 - o **Green Point**
 - The minimum number of dilutions achieved at the edge of the 256m radius mixing zone is 528 in winter/spring and 628 in summer/autumn.
 - o **Camps Bay**
 - The minimum number of dilutions achieved at the edge of the 274m radius mixing zone is 3480 in winter/spring and 2700 in summer/autumn.

- The low port discharge rates and low port velocities result in the effluent being trapped near the seabed, resulting in the lowest dilutions and highest bacterial counts occurring near the seabed.
- **Hout Bay**
 - The minimum number of dilutions achieved at the edge of the 272m radius mixing zone is 1500 in winter/spring and 1970 summer/autumn
 - Plume has lowest dilutions and highest bacterial concentrations at mid-depth
 - Dungeons big wave surf-spot may be exposed at times to bacterial levels that exceed the national guidelines for short duration events
- For further information and context surrounding dilution results from the marine outfall analysis, please refer to the [PRDW, 2020/2021](#) reports.

OTHER KEY FINDINGS

Q: What were some of the key findings of the marine science studies?

A: Other important findings included the following:

- 196 marine toxicity tests were completed – all were found to be non-toxic to marine biota.
- 12 bags of mussels were moored around each outfall every winter and every summer for three years (six sets of 12 mussel bags across two seasons, over three years) –there was no statistically significant difference in growth rates or in the accumulation of metals in the mussel tissue close to the marine outfalls vs control sites located in relatively isolated areas away from known pollution sources.
- Preliminary and initial biodiversity assessment data shows little to no impact on marine biodiversity (abundance and diversity) at Camps Bay.
- Preliminary macrofauna survey shows a possible and likely localised impact directly around the diffuser but needs to be confirmed. This impact is limited to a narrow geographical area and has not resulted in either a mono species environment or the presence of unexpected species in the benthos. It is therefore not considered environmentally significant.
- The marine outfalls are discharging CECs – so are all the City's WWTWs, which produce approx. 95% of the City's waste water. There is no technology available globally that can remove CECs at the scale of a city from waste water in a manner that is practically and financially possible. This is a global challenge and is not only a marine outfall issue. Near-shore concentrations of CECs are highest in rivers, stormwater and estuaries. Currently the only way to stop this contamination would be for people to stop using all chemicals, including pharmaceuticals commonly used in daily medication.
- Contribution to eutrophication and algal blooms by the outfalls is "miniscule".
- There is no evidence yet of long-term build-up of organic or inorganic contaminants in the sediment.
- There is no evidence of dissolved oxygen stress in the water column.
- Marine outfalls though have a very high (negative) public perception impact.
- Marine outfalls significantly impact on (negative) public perception on the quality of the coastal environment in Cape Town.

MARINE OUTFALLS, ALGAL BLOOMS AND SEAL BEHAVIOR

Q: Do marine outfalls cause algal blooms?

A: On average, the three western seaboard marine outfalls (Green Point, Camps Bay, and Hout Bay) discharge 2.62 x 10¹⁰ millimoles (mM) of ammonia-nitrogen to the sea per year (estimated from data in CSIR, 2017 and the PRDW 2020 reports).

However, natural upwelling in the region is the major source of inorganic nutrient supply to the euphotic zone. The Atlantic seaboard outfalls lie in the Cape Point upwelling cell, the southernmost of the major upwelling nodes on the west coast. See [Environmental Summary Report for Camps Bay](#) that provides the scientific basis for this.

There are approximately 19 natural upwelling events of varying intensities and durations per year in the Southern Benguela Current region, which may inject 2.0×10^{14} mM N to the euphotic zone.

It was therefore concluded that contributions of discharged effluent ammonia and nitrogen to regional eutrophication is at most **minuscule** and that, in the vicinity of the outfalls, metocean conditions and seabed topography largely limit algal bloom development and consequences. See page 21 of the [Environmental Summary Report for Camps Bay](#), which provides further information on this.

Q: Are the sewage outfalls increasing domoic acid levels in our waters?

A: There is no evidence yet documented that domoic acid (which is produced by a naturally occurring species of algae) has increased in our waters in any way. The species of algae that can/does produce domoic acid has always been present as part of the algal species diversity and is not new. This type of algae is common around the world.

Q: Is domoic acid a problem and causing aggressive behaviour of seals towards humans?

A: National government (Department of Forestry, Fisheries and the Environment), the state veterinarian and research organisations are yet to definitively identify domoic acid as accumulating in seals to any level of concern. Domoic acid has not been linked to seal aggression by any state or research organisation, and this is currently a working hypothesis.

REMOVAL OF CHEMICALS OF EMERGING CONCERN FROM WASTE WATER

Q: Is it possible to remove chemicals of emerging concern (CECs) from wastewater?

A: Yes, by means of advanced water treatment processes typically used for drinking water production. It is important to note that this kind of treatment process still produces a "toxic brine" containing many of the removed chemicals that still has to be disposed of somewhere. None of our waste simply disappears.

Q: Why can't the City apply the same technology to all wastewater produced in Cape Town?

A: The limiting factor is cost and affordability. The estimated capital cost for an advanced treatment process is R25 million/ ML per day of treated capacity.

PRESENCE OF CHEMICALS OF EMERGING CONCERN IN MARINE BIOTA

Q: Does the presence of CECs in marine biota (such as fish, penguins, sea weed etc.) mean that these CECs originate exclusively from effluent discharged from marine outfalls?

A: No. While marine outfalls contribute to the presence of CECs in the marine environment, they are by no means the only contributor. There are a range of other contributors, including effluent discharged from WWTWs into rivers (which ultimately discharge into the sea and which amounts to approx. 95% of wastewater produced in Cape Town), industrial and urban run-off into stormwater systems which discharge into the sea, agricultural run-off into river systems etc. For detailed research on the contribution of urban stormwater systems to the presence of CECs in the receiving environment please refer to the following study as an example: [Urban Stormwater: An Overlooked Pathway of Extensive Mixed Contaminants to Surface and Groundwaters in the United States](#). Unfortunately, due to the numerous pathways with which CECs can enter the marine and coastal environment, CECs are now ubiquitous in both populated and remote areas of the marine and coastal environment and which is a global phenomenon. For example, a scientific study in Cape Town identified the presence of CECs at Diaz Beach, which is located at the tip of Cape Point and is one of the most isolated areas of Cape Town: See [Assessment of Pharmaceutical Compounds in Cape Town's Coastal Waters: Winter and Summer](#) for further

information on this. Another study, and indicative of this phenomena being a global challenge, identified the [presence of toxic anthropogenic pollutants in the deepest ocean on Earth](#).

MARINE OUTFALLS AND BLUE FLAG STATUS

Q: What is the Blue Flag status of Clifton and Camps Bay, and who monitors the water quality for Blue Flag beaches?

A: Both Camps Bay and Clifton have had Blue Flag Status for over 10 years. Water quality samples for determining and awarding Blue Flag Status are not taken by the City at these beaches. Coastal Water quality samples are instead taken and analysed by an independent laboratory. Results are submitted to the Wildlife and Environment Society of South Africa (WESSA) for evaluation.

Q: Has the presence of marine outfalls impacted the ability of Camps Bay and Clifton to retain their Blue Flag status?

A: No. As indicated previously, Camps Bay and Clifton have retained their Blue Flag Status for over 10 years. While these beaches have at times lost their status, these incidents have only been for a short duration and were a result of land-based incidents of sewage spills. The monitoring of coastal water quality at these beaches is undertaken by an independent laboratory and analysed in accordance with the [South African Water Quality Guidelines for Coastal Marine Waters: Guidelines for Recreational Use](#). Their consistent achievement of Blue Flag status is indicative of the presence of marine outfalls not impacting coastal water quality in terms of the Blue Flag requirements.