



Draft for Consultation

Public consultation document

Bermuda water and wastewater regulatory structure

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Definitions

BMD	Bermudian Dollar
DENR	Department of the Environment and Natural Resources
DoH	Department of Health
DWI	Drinking Water Inspectorate
EA	Environmental Authority
FPSC	Florida Public Services Commission
GSS	Guaranteed Standards Scheme
MPW	Ministry of Public Works
OfReg	Utility Regulation and Competition Office
Ofwat	Water Services Regulatory Authority
RA	Regulatory Authority

Executive summary

This document is intended to be used for consultation with stakeholders on the proposed water and wastewater regulatory structure led by the Ministry of Public Works (MPW). This document summarizes the preliminary recommendations MPW and its consultant, Castalia Advisors, developed to improve Bermuda's water and wastewater regulatory structure.

The introduction presents the history of the regulatory structure project as well as the process for determining recommendations and consulting with stakeholders and the public. Bermuda's current system has served it well, however, there are several gaps and inefficiencies that can be improved to make the water and wastewater sectors more efficient and sustainable.

We present the current state and future state of Bermuda's water and wastewater sectors. In the proposed future state, our key recommendations include making the Regulatory Authority (RA) the economic regulator responsible for the water and wastewater sectors. This includes having the RA approve, monitor, and enforce tariffs and service standards, as well as monitor competition among water truckers and septage haulers. The RA will also become the main agency for consumer complaints in the water and wastewater sectors. Other recommendations in the future state include transferring some of the regulatory enforcement roles of the Department of Health (DoH) and the Department of Environment and Natural Resources (DENR) to the RA. This means that the RA would, under the future state framework, enforce drinking water quality standards and wastewater treatment and discharge standards. These standards would still be set and monitored by DoH and DENR.

Before concluding, the document explains how the preliminary recommendations address each of the problems identified by MPW during stakeholder and public consultations.

1 Introduction

The Government of Bermuda has tasked MPW with developing recommendations to improve Bermuda's water and wastewater regulatory structure. Bermuda's traditional approach to water services and water sector management has served the island well, but opportunities for improvement exist. If the sector remains unchanged, there is a risk of negative public health and environmental outcomes, higher costs for Bermudian households and businesses, and impacts on the country's reputation as a premier vacation destination and a location for global business.

Opportunities for improvement identified by MPW include a review of wastewater standards with the goal of changing how wastewater is discharged into the ocean, improving water resilience, strengthening enforcement of drinking water quality standards, encouraging public providers of water and wastewater services to keep costs low and encouraging all water and wastewater service providers to provide reliable service and adequate access.

In this public consultation document, we present a summary of the preliminary recommendations.

- In Section 1, we introduce the iterative process of the regulatory project and how we arrived at the current recommendations. We present the sector objectives underlying the regulatory project. We then define what regulation is and where it is relevant for this initiative
- In Section 2, we present the current state of Bermuda's water and wastewater regulatory structure
- In Section 3, we present the proposed future state of Bermuda's water and wastewater regulatory structure. This section will detail our recommendations for the new regulatory structure
- In Section 4, we define how our recommendations will address the identified areas for improvement.

1.1 Process

MPW has engaged Castalia, a strategy consulting firm specializing in water sector policy, to assist with the review of Bermuda's water and wastewater regulatory structure. As part of the review, MPW and Castalia have analyzed the water and wastewater sectors in four case study countries. These countries include the United Kingdom, the Cayman Islands, the United States (specifically the state of Florida), and New Zealand.

After conceptualizing opportunities for change and improvement in Bermuda's water and wastewater sector, MPW consulted key stakeholders in the sector in addition to holding public consultations. During the first stakeholder consultations, several key problems were identified, including:

- Greaseballs on Bermudian beaches
- Drinking water rationing, plant closures, and distance from distribution points complicate water trucker deliveries

- During times of water stress, some water truckers may take water from questionable sources
- Some service providers are not investing adequately in infrastructure maintenance in the water and wastewater sector
- There are institutional capacity constraints for monitoring drinking water quality and wastewater discharge standards
- There appear to be government departments with overlapping legislative mandates that need to be streamlined to provide clear responsibilities in the water and wastewater sectors.

This round of stakeholder and public consultations is being held to gather feedback on this draft document. After conducting this round of stakeholder and public consultations, MPW will then submit its initial assessment and drafting instructions to the Cabinet to inform the updated regulatory framework.

1.2 Sector objective

Water is one of Bermuda's most precious and scarce resources. Managing it effectively requires a common vision for its stewardship and use. A clear and concise objective for the sector will help stakeholders agree on the regulatory principles needed to ensure the security of the country's water for current and future generations of Bermudians. The following are the proposed sector objectives for the revised regulatory framework:

Ensure quality, reliable, affordable water services that protect the environment and human health and are resilient, efficient, and sustainable.

Each term in this draft sector objective can be further defined as follows:

- **Quality** – Water and effluent quality standards for piped water and wastewater meet or exceed international standards. Households with cisterns, wells, and/or cesspits are encouraged to meet minimum quality standards.
- **Reliability** – Piped water supply is available with minimal service disruption. The utility can provide sufficient bulk water supplies to truckers to meet household demand, including during times of peak demand. Operations and maintenance expenses are sufficient to achieve the full useable lifespan of infrastructure assets and minimize downtime.
- **Affordability** - All Bermudians should have access to a minimum level of water and sanitation services at a tolerable cost. When feasible, piped networks and sewerage will provide these services. In other cases, a well-regulated industry of tankers and vacuum trucks will serve households and other customers.
- **Environment** – Water abstraction, production, and distribution; on-site sanitation and sewerage; and solid waste management do not adversely affect Bermuda's land, air, coastal waters, or groundwater supplies.
- **Human health** – Quality standards, and their enforcement, are sufficient to ensure water supplies from all sources are fit for their intended purpose. Water supply should be free of pathogens and other contaminants. All wastewater should be treated to prevent contamination of groundwater supplies and coastal bathing waters.

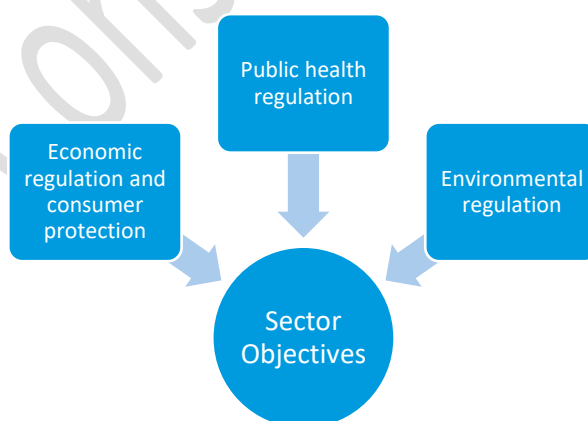
- **Resiliency** – Infrastructure and services can withstand and recover from natural disasters such as hurricanes and other shocks. Bermuda’s traditional system of rainwater harvesting can adapt to increasingly variable rainfall caused by climate change. Infrastructure is designed to meet estimated peak demand.
- **Efficiency** – Services are provided at the lowest possible cost by consolidating systems to achieve economies of scale. Service providers will be required to develop capital investments programs to ensure an appropriate level of capacity, while maintaining flexibility for future expansion as needed. Service providers reduce ongoing operations and maintenance expenses through effective management and continuous innovation.
- **Sustainability** – Tariffs are sufficient to achieve full cost recovery, and systems are designed to be scalable to meet future demand and estimated population growth. The removal of groundwater is below the recharge rate. The water service providers will be encouraged to generate minimal greenhouse gas emissions and use “circular economy” approaches to reduce the sector's environmental footprint and increase resilience.

1.3 What is regulation?

Regulation can be defined as, “legal restrictions on the normal freedom of operations of people and enterprises.”¹ Regulation is an essential component of a well-functioning water sector because it is needed to address the problem of natural monopoly. Because water and wastewater services are difficult to replace or substitute, providers have no disincentive to charge consumers higher prices. Regulation prevents overcharging by water service and wastewater service providers by setting guidelines on how service providers conduct their business and what price they can charge for their essential services.

Figure 1.1 below shows how economic regulation relates to several other types of regulation.

Figure 1.1: Defining different types of regulation in the water sector



¹ Groom, Eric; Halpern, Jonathan; Ehrhardt, David. 2006. Explanatory Notes on Key Topics in the Regulation of Water and Sanitation Services. Water Supply and Sanitation Sector Board discussion paper series; no. 6. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/17236>

Economic regulation and consumer protection

Economic regulation is a subset of regulation that applies legal controls on a sector, in this case, the water and wastewater sector, to mitigate the impact of a natural monopoly. Economic regulation in the form of tariff approval is needed to address natural monopoly in the water and wastewater sector.

Water and wastewater utilities are often natural monopolies. Currently, there are limited competitive pressures driving water and wastewater utilities to keep their prices down and reflect efficient costs. Introducing economic regulation will help to remedy the lack of competition by mandating utilities use efficient costs when submitting their tariff proposals. There are also political and social pressures for government services to not charge appropriate rates affecting general market rates.

Economic regulation overlaps with several areas of regulation that are relevant to this project, including consumer protection, safety and public health, social objectives, and environmental protection. Consumer protection is the process of ensuring consumers of water and wastewater services are receiving safe, reliable, and efficient service at a reasonable cost. Regulatory agencies can help to ensure consumer protection by managing customer complaints. This includes receiving, managing, and analyzing complaint information to actively resolve problems and hold service providers accountable, where necessary.

Public health regulation

Public health regulation, in the context of Bermuda's water and wastewater sector, is the imposition and monitoring of guidelines to ensure service providers provide safe products and services. This includes protecting public health by ensuring drinking water is biologically and chemically safe to drink. It also includes implementing or strengthening the monitoring regime to ensure service providers meet the guidelines. Service providers should be encouraged to follow the guidelines (i.e., the certainty of enforcement action resulting from non-compliance should encourage service providers to adhere to guidelines protecting public health). Public health regulation also includes the setting, monitoring, and enforcement of wastewater reuse standards and setting design and construction standards for water collection facilities such as cisterns.

Environmental regulation

Environmental regulation, in the context of Bermuda's water and wastewater sector, is the imposition of restrictions on service providers to affect Bermuda's natural resources adversely. Environmental regulation ensures balance and sustainability by setting and monitoring abstraction quantities. Abstraction is the removal of water from a source such as aquifers or underground freshwater lenses.

Environmental protection also helps to protect flora and fauna by setting and monitoring wastewater treatment and discharge standards. Environmental regulation also includes setting design and construction standards for cesspits and septic tanks. Given that Bermuda's natural beauty is important for both Bermudian citizens and tourism, updated wastewater standards are needed to protect the environment and the economy.

1.4 Defining several regulatory terms used in this document

For the purposes of this document and regulatory framework, regulation is set, approved, licensed, monitored, and enforced. Below we defined each of these key functions and what each means in practice:

- **Setting** – Is the process of defining and codifying regulations to be imposed on regulated entities. For example, in the drinking water sector, the regulator can set standards on the chemical or biological limits for certain minerals or limit bacteria in drinking or wastewater. In terms of economic regulation, the regulator may set service standards such as minimum response times to customer complaints.
- **Approving** – For economic regulation, approving typically occurs in the context of a water or wastewater tariff review. For example, under the proposed regulatory framework, the regulator reviews the regulated entity's tariff submission and will either approve the tariff proposed, allowing the utility to charge the price it proposes for its services, or the regulator will reject the tariff proposal and require the utility to reassess its tariff proposal.
- **Licensing** – Is the process of granting a license to an entity allowing it to provide service. In the context of this project, the regulatory agency will license individual firms providing water and wastewater services, providing oversight and ensuring compliance with applicable standards and regulations.
- **Monitoring** – Is the process where a regulator checks that service providers meet the set regulatory standards. The monitoring regulatory agency should be aware of non-compliance in the industry.
- **Enforcement** – Is the process where a regulatory entity penalizes non-compliant service providers with the intent to remedy the non-compliance and any impacts from it.

The entity setting regulations need not be the regulatory entity that monitors or enforces them. In many cases, it is beneficial to have different regulatory entities setting, approving, licensing, monitoring, and enforcing. Breaking up responsibilities avoids giving any one agency too much influence over a sector, delegates specific duties to avoid overburdening any individual agency, and provides additional clarity on specific roles in the sector.

2 Current state

Below we describe the current state of Bermuda's water and wastewater regulatory structure. Bermuda's current framework has served the island well for over 400 years and is unique in its use of rainwater. However, responsibility for regulating the water sector is spread across several entities.

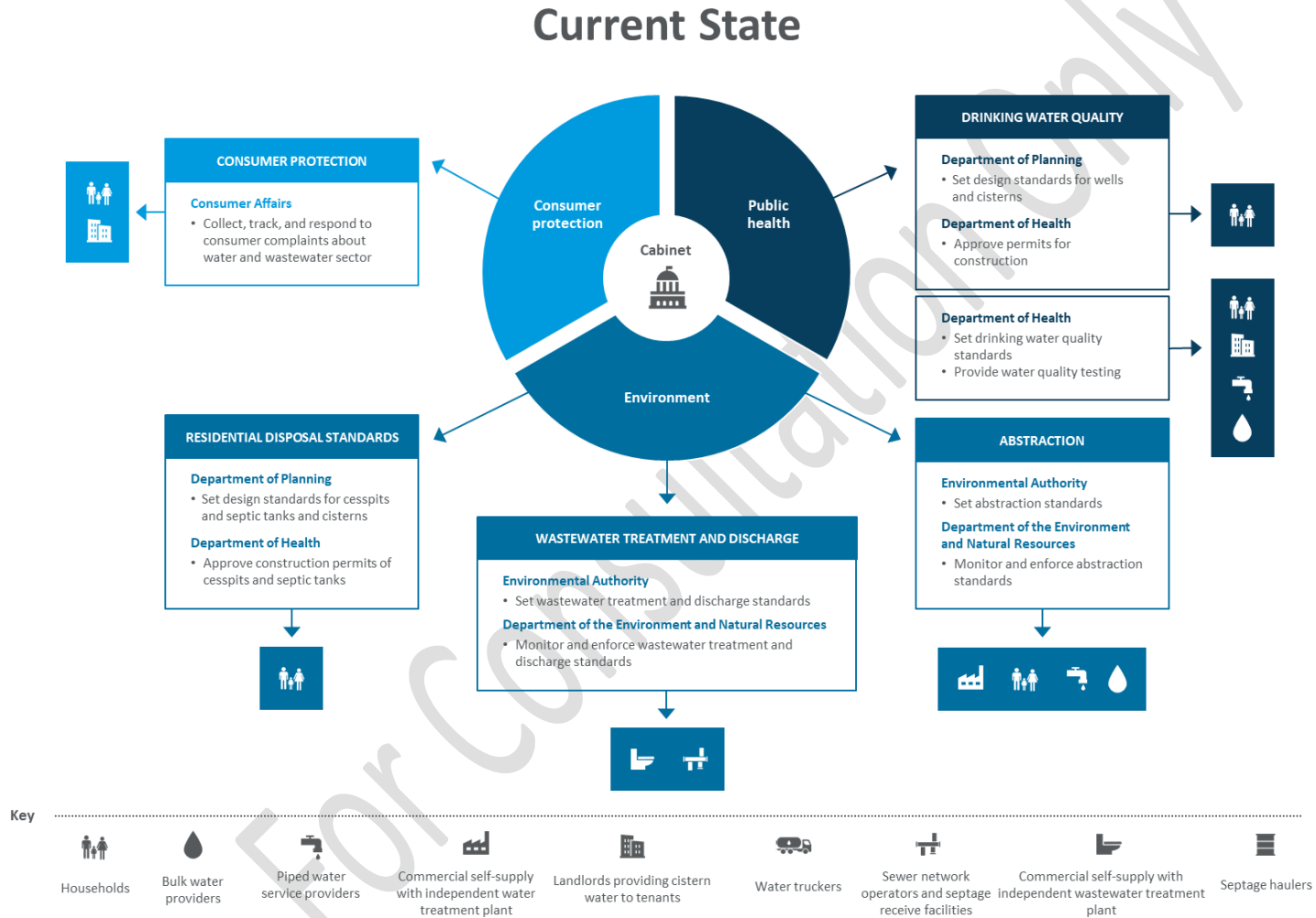
In addition, unlike its peers, Bermuda has no economic regulation of its water sector. Regulatory agencies conducting monitoring and enforcement of drinking water quality and wastewater and discharge standards suffer from a lack of resources and capacity.

Within the current regulatory structure, there are many opportunities for improvement that can make Bermuda's water and wastewater sectors more efficient and sustainable in the future.

Figure 2.1 below presents Bermuda's current water and wastewater regulatory structure and responsibilities.

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Figure 2.1: Current water and wastewater regulatory structure



2.1 Economic regulation

There is no economic regulation of Bermuda's water and wastewater sector and no regulatory institution coordinating or overseeing economic regulation in the water or wastewater sectors. Competition is not monitored, nor are prices for services such as water trucking or septage hauling.

Tariffs

Not all drinking water tariffs are regulated in Bermuda. Service providers set their own tariffs, but their decisions are not subject to legal control. The fact that Bermuda does not have water or wastewater tariffs sets it apart from comparable jurisdictions.

Water tariffs are set or approved by a regulatory agency in all case study countries studied. In the Cayman Islands, tariffs are set, monitored, and enforced by the multisector utility and construction regulator OfReg. In England, the independent non-ministerial Government department, Ofwat, sets, monitors, and enforces tariffs. In Florida, either the Board of County Commissioners or the Florida Public Service Commission (FPSC) will set, monitor, and enforce tariffs. In New Zealand, tariffs are set by territorial authorities. Compliance is monitored and enforced by public health authorities.

Service standards

Water service standards generally include minimum billing requirements, service continuity, and response to customer complaints. Drinking water and wastewater service standards are not regulated in Bermuda.

All the case study countries studied had some form of drinking water and wastewater service standards. In the Cayman Islands, setting, monitoring, and enforcement of service standards is the responsibility of OfReg. In England, the Secretary of State for Environment and Food and Rural Affairs sets drinking water and wastewater service standards. The standards are monitored and enforced by Ofwat. In Florida, the FPSC sets, monitors, and enforces service standards in many Florida counties. Local ordinances set some service standards under the Board of County Commissioners. In New Zealand, territorial authorities set, monitor, and enforce service standards.

Consumer protection

The Department of Consumers Affairs manages all consumer complaints in the water and wastewater sector, including:

- Drinking water quality complaints
- Drinking water and wastewater service quality complaints
- Nuisance complaints for wastewater, such as smells or greaseballs
- Complaints about water truckers and septage haulers.

In Bermuda, the Department of Consumer Affairs tracks all the above complaints. However, it lacks enforcement powers in the water and wastewater sector. Therefore, the Department of Consumer Affairs cannot directly engage in any consumer protection measures and simply refers complaints to other institutions.

In case study countries, all countries have a means for customers to lodge complaints about service providers. In the Cayman Islands, customers can lodge service standard complaints to

OfReg, which has the authority to invite a response to the complaint by the service provider. After reading the complaint and the response, OfReg decides the outcome.

In England, the water quality regulator, the Drinking Water Inspectorate (DWI), is responsible for managing customer complaints and consumer protection. Ofwat, England's water sector economic regulator, created the Guaranteed Standards Scheme (GSS) which defines the rights customers are owed by market participants. The GSS also mandates that when water and wastewater companies do not meet these rights, they must automatically compensate affected customers. DWI can consider other enforcement if a complaint is lodged.

In Florida, FPSC monitors customer complaints and can pursue enforcement action. When a complaint is lodged, the FPSC will assign a staff engineer to work with the consumer and utility to determine the cause of the complaint.

In New Zealand, a new water regulator, Taumata Arowai, was established in 2021. Under the Water Services Act of 2021, customers gain the legal right to have complaints about drinking water services addressed by their water utility. Customers have a further right to escalate their complaints to Taumata Arowai.

2.2 Environmental regulation

Environmental regulation in Bermuda covers abstraction of water, wastewater treatment and discharge standards, and the design and construction of cesspit and septic tanks.

Water abstraction

In this section we discuss how water abstraction rules are currently set, monitored, and enforced in Bermuda. Generally, these rules are set by the Environmental Authority (EA) and monitored and enforced by the Department of Energy and Natural Resources (DENR).

Setting water abstraction rules

Groundwater abstraction is governed by a water abstraction rights regime administered by the EA and enforced by DENR.

Monitoring water abstraction rules

The Water Resources Act 1975 grants the Minister and the EA monitoring powers. The Minister can serve a notice to a right holder requiring it to keep and periodically provide records to the Minister. The Minister can specify records relevant to measuring water abstraction, conservation, and best use of water in Bermuda.²

Commercial water supply businesses must monitor their abstraction rates for wells, well-fields or zones as specified by the EA and report data to DENR on a quarterly basis. DENR reviews these reports and ensures that these businesses comply with the conditions set out in their water abstraction right.

Domestic water rights are granted for wells serving individual households or small businesses and are valid for five years. The EA sets an abstraction limit based on the number of facilities attached to the well.

² Section 26, Water Resources Act 1975.

DENR may also independently verify right holders' abstraction. Public officers authorized by the Minister have powers to enter right holders' premises for the purposes of independently measuring water abstraction.³

Enforcement of water abstraction rules

DENR acts in support of the EA to enforce compliance and water abstraction rights conditions.

If a right holder fails to comply with express or implied conditions of their water right, abstracts unauthorized quantities of water, or commits an offense against the Water Resources Act 1975, the EA must first determine whether the non-compliance can be remedied. If it can be remedied, the EA must issue a notice to the right holder describing the default and any remedial actions. If the non-compliance cannot be remedied, the EA may revoke the right.⁴

The EA may also prosecute right holders who do not comply with enforcement notices or fail to provide the information sought by the Authority.⁵ If convicted, the right holder is subject to a fine of BMD \$5,000 and a fine of BMD \$1,000 for each day the offense continues.⁶

Wastewater treatment and discharge

This section discusses how Bermuda's wastewater treatment and discharge standards are set, monitored, and enforced.

Setting wastewater treatment and discharge standards

Regulations do not prescribe wastewater treatment or discharge standards for controlled plants. Rather, these standards are set by the EA on a case-by-case basis via operating license conditions. The EA determines the level of treatment required based on the risk of potential negative environmental impacts, considering the following factors:

- Projected wastewater flow rate and number of individuals using the system
- The type of wastewater generated, and
- The proximity of the discharge to any sensitive receiving site.

Monitoring of wastewater treatment and discharge standards

The operating license holder is responsible for monitoring its compliance with the wastewater treatment and discharge standards outlined in its license. The license holder must report this information to the EA via DENR. The operating license will specify the reporting frequency (with annual reporting set as a minimum) and the reporting format.

Licenses specify the frequency of sampling and the parameters that must be tested. For example, the City of Hamilton's WWTP operating license states that it must measure several biological and chemical wastewater qualities monthly.

Enforcement of wastewater treatment and discharge standards

DENR, on behalf of the EA, is responsible for enforcing treatment and discharge standards.

DENR has two enforcement tools. Under Section 13 of the Clean Air Act 1991, failure to comply with a term or condition of an operating license can result in the issuance of a stop order.

³ Section 27, Water Resources Act of 1975.

⁴ Section 19, Water Resources Act of 1975.

⁵ Sections 26 and 30, Water Resources Act of 1975.

⁶ Section 37, Water Resources Act of 1975.

Failure to comply with such an order can lead to imprisonment of up to 12 months and a fine of up to \$50,000. Under the Water Resources Act, the discharge of non-compliant effluent into the ocean or groundwater that results in pollution or fouling of groundwater or seawater may lead, upon conviction, to a fine of BMD \$10,000.⁷

Setting of design standards and construction approval

The Department of Planning within the Ministry of Home Affairs is responsible for setting standards for building design and construction in Bermuda. Standards relevant to the design of cesspits and cisterns are described in the Bermuda Residential Building Code 2014. The code provides specific guidance to architects, builders, and homeowners on acceptable materials, design, and placement of these systems to minimize negative public health and environmental impacts.

For cesspits, a permit is required from the Department of Planning before starting construction. During the construction process, an environmental health officer from DoH will visit the site prior to the excavation of the pit, after excavation, and after final construction. A similar permitting and inspection process is required for water tanks.

2.3 Public health regulation

Public health regulation in Bermuda's water and wastewater sector focuses on the setting, monitoring, and enforcement of drinking water quality standards and design and construction of cisterns.

Setting of drinking water quality standards

Drinking water quality standards apply to public and private service providers and bottled water suppliers. Bermuda's drinking water quality standards are roughly in line with standards set by the US, the UK, and WHO.

Monitoring of drinking water quality standards

Monitoring of drinking water quality standards is the responsibility of DoH. DoH resources limit their ability to monitor drinking water quality actively. Public and private service providers are encouraged to test their drinking water frequently. However, no regulation exists requiring service providers to do so.⁸

DoH provides a voluntary testing service for residential cisterns. Individuals concerned about water quality in their cisterns can send a sample to the Central Government Laboratory for bacterial and chemical testing.⁹

Enforcement of drinking water quality standards

DoH is responsible for enforcing drinking water quality standards. The Public Health Act of 1949 provides several enforcement mechanisms for resolving water quality problems. If a drinking water quality problem is identified, DoH can require service providers to shut off operations until water quality improves or issue a boil water order. DoH has the authority to

⁷ Section 37, Water Resources Act 1975.

⁸ Correspondence with DoH. 30 August 2021.

⁹ *Safe Tank Water*. Guidance Document W01. Ministry of Health. 2017.

require that residential cisterns be cleaned if the water inside does not meet quality standards.¹⁰

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¹⁰ Correspondence with DoH. 30 August 2021.

3 Summary of the future state

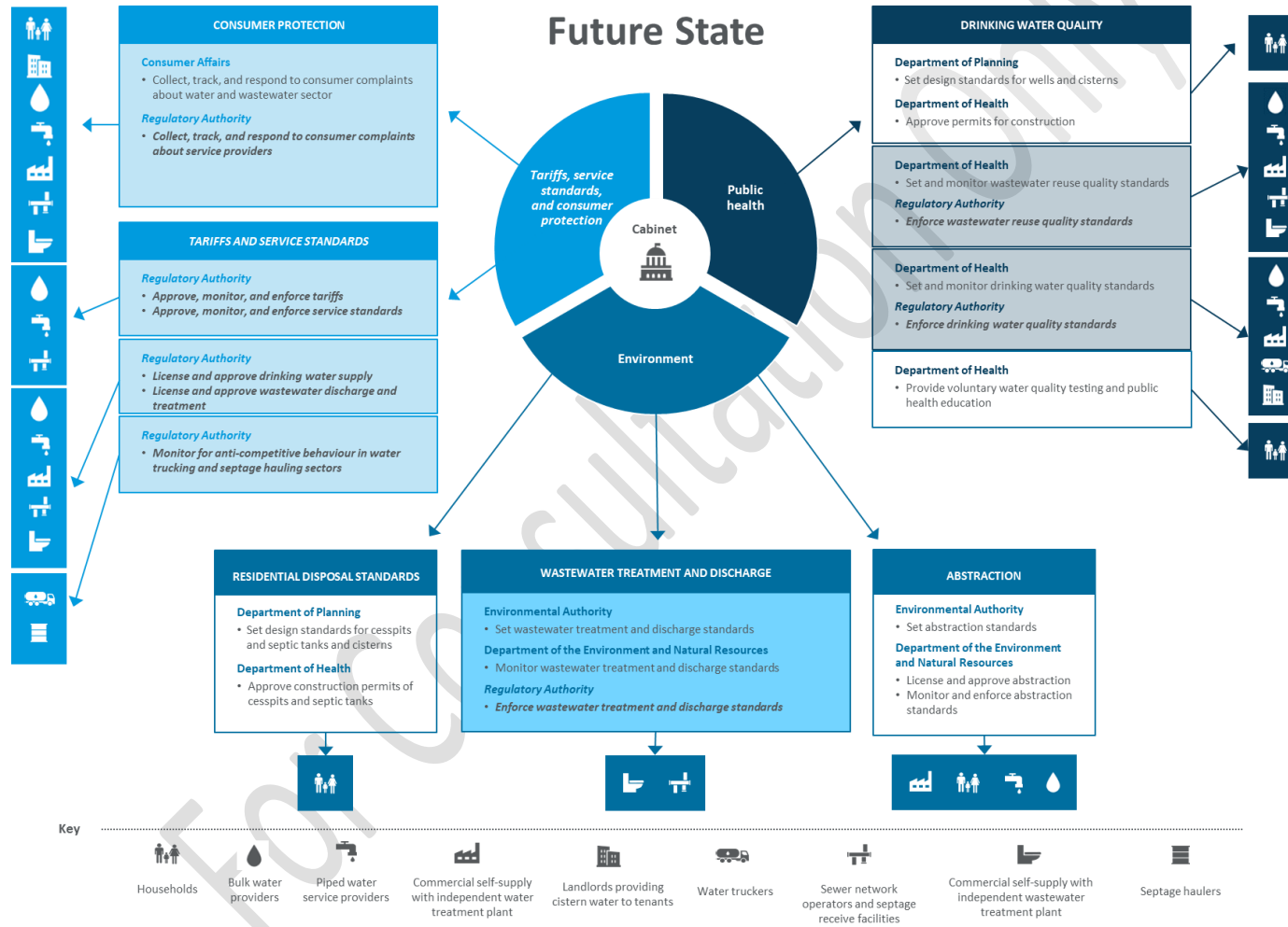
This section describes recommendations and the proposed future state of Bermuda's water and wastewater regulatory structure. The regulatory approach is meant to be light- touch and uses existing institutions to address gaps in the current structure. The approach has been refined for the unique needs of Bermuda's water sector, which has multiple service providers and relies extensively on household rainwater harvesting.

In the future state:

- **The RA will become the designated economic regulator for the water and wastewater sectors** because there is a need for a water and wastewater sector regulator to mitigate the impact of a natural monopoly and lack of competition. The RA can effectively regulate the water and wastewater sectors because of its experience currently regulating the electricity, telecom, and undersea cable sectors.
- **The RA will also become the new agency for most consumer complaints about water and wastewater and for consumer protection.** This measure will encourage service providers to resolve customer complaints because the complaints are being funneled to the agency that has enforcement powers.
- **The RA will also gain a new responsibility to monitor for anti-competitive behavior in the water trucking and septage hauling sectors.** Competition monitoring in the water trucking and septage hauling sector is currently a gap in Bermuda's regulatory oversight, and it may be negatively impacting consumers in the form of higher prices.
- **The RA will oversee the enforcement of drinking water quality and wastewater treatment and discharge standards and the issuing of operating licenses.** The RA will take over these responsibilities from DoH and DENR to better share capacity and divide responsibility across the sectors.
- **The new regulatory framework also considers wastewater reuse, which was previously unregulated in Bermuda.** DoH will set new wastewater reuse standards.

Figure 3.1 below presents Bermuda's future water and wastewater regulatory structure and responsibilities.

Figure 3.1: Proposed future state of water and wastewater regulatory structure



3.1 Economic regulation

Under the new regulatory structure, Bermuda's economic regulation of the water and wastewater sector will be expanded to ensure greater efficiency. The goal remains a light-touch regulatory structure.

Operating licenses

The RA will issue operating licenses.

Tariffs

The RA will approve, monitor, and enforce drinking water tariffs. The new drinking water tariffs will apply to piped water supply operators, bulk water suppliers, and commercial self-supply with a well or independent treatment plant above a specified threshold.

Wastewater tariffs will also be approved, monitored, and enforced by the RA, the new wastewater tariffs will apply to sewer network providers and septage receiving facilities and commercial self-supply with an independent treatment plant above a specified threshold.

The regulated entities specified above in the drinking water and wastewater sectors will submit their tariff proposals to the RA for approval. The tariff proposals should reflect efficient costs of service and a reasonable rate of return. The RA will either approve the tariff proposal or request that the regulated entity revise its proposal. Compliance with the approved tariff will be monitored and enforced by the RA.

Service standards

Services standards will be set, monitored, and enforced by the RA. Drinking water service standards will apply to piped water supply operators, bulk water suppliers, and commercial self-supply with a well or independent treatment plant above a specified threshold.

Consumer protection

The RA will take over the Department of Consumer Affairs' previous responsibilities to track complaints in the water and wastewater sector. This includes tracking:

- Drinking water quality complaints
- Drinking water and wastewater service quality complaints
- Nuisance complaints for wastewater, such as smells or greaseballs
- Complaints about water truckers and septage haulers.

The general method for raising consumer complaints with the RA will follow the steps below:

- Consumer raises issue with the service provider
- Consumer escalates to the RA if the issue is not resolved within 60 days
- Consumer completes complaint form on the RA's website
- An RA consumer advocate will reach out to the consumer
- RA will resolve issues with service providers within 30 days or take further action, including arbitration, adjudication, or dismissal.

As previously mentioned, the responsibility of tracking water and wastewater complaints related to landlord-tenant relations will remain with the Department of Consumer Affairs.

3.2 Environmental regulation

Under the proposed future regulatory framework, environmental regulation will remain largely the same as the current system. The key difference in the recommended structure is the RA will oversee enforcement of wastewater treatment and discharge standards.

Water abstraction

Setting water abstraction rules

The EA will continue to set water abstraction standards. These abstraction standards apply to any person or entity wishing to abstract groundwater resources.

Monitoring water abstraction rules

DENR will continue to monitor water abstraction rules.

Enforcement of water abstraction rules

DENR will continue to enforce water abstraction rules.

Licensing and approving the abstraction of water

DENR will continue to license and approve the abstraction of water sector-wide.

Wastewater treatment and discharge

Setting wastewater treatment and discharge standards

New wastewater treatment and discharge standards will be proposed under this project; however, the regulatory structure for setting the standards will remain the same. EA will continue to set wastewater treatment and discharge standards. These standards will apply to any residence or entity that discharges wastewater into the environment.

Monitoring of wastewater treatment and discharge standards

DENR will continue to monitor wastewater treatment and discharge standards. Recommendations will emphasize the need to build capacity at DENR to monitor these standards.

Enforcement of wastewater treatment and discharge standards

The RA will assume the new responsibility of enforcing wastewater treatment and discharge standards. DENR will transfer this responsibility to the RA. In the proposed regulatory structure, the RA will enforce wastewater treatment and discharge standards using the guidance and recommendations provided by subject matter experts at DENR. In the monitoring process described above, if DENR observes non-compliance with applicable standards, it will refer the breach to the RA. The RA will study the breach and determine whether fines, penalties, or other enforcement measures are necessary.

Setting design standards

The Department of Planning will continue to set design standards for household wastewater treatment and disposal methods, such as septic tanks and cesspits.

Approving construction permits

DoH will continue to approve construction permits for household wastewater treatment and disposal methods such as septic tanks and cesspits.

3.3 Public health regulation

Under the proposed future framework, public health regulation will change to enhance the monitoring and enforcement of drinking water quality standards. New drinking water quality and wastewater reuse standards will be proposed, and enforcement responsibilities will shift from DoH to the RA.

Setting of drinking water quality standards

Changes to existing drinking water quality standards will be proposed under this project; however, the regulatory structure for setting the standards will remain the same. DoH will continue to set drinking water quality standards. These drinking water quality standards will apply to piped water supply operators, bulk water service providers, independent water treatment plants above a specified threshold, landlords supplying drinking water to tenants, and water truckers.

Monitoring of drinking water quality standards

Under the proposed regulatory framework, DoH will continue to monitor drinking water quality standards.

Enforcement of drinking water quality standards

The RA will assume the responsibility of enforcing drinking water quality standards. DoH will hand over this responsibility to the RA. The RA will enforce drinking water quality standards in the proposed regulatory structure using the guidance and recommendations provided by subject matter experts at DoH. In the monitoring process described above, if DoH observes non-compliance with applicable standards, it will refer the breach to the RA. The RA will study the breach and determine whether fines, penalties, or other enforcement measures are necessary. Recommendations will emphasize the need to build capacity at the RA to enforce these standards.

Setting of wastewater reuse standards

New wastewater reuse standards will be proposed under this project to help efficiently use Bermuda's scarce water resources by harnessing wastewater reuse for certain purposes. These purposes may include flushing water for toilets in public buildings, water for golf courses and lawns, water for agriculture, and other purposes.

DoH will set wastewater reuse standards. These standards will apply to piped water supply providers and commercial self-supply with independent water treatment plants.

Monitoring wastewater reuse standards

DoH will take on the responsibility of monitoring wastewater reuse standards.

Enforcement of wastewater reuse standards

The RA will enforce wastewater reuse standards using the guidance and recommendations of subject matter experts at DoH. While monitoring wastewater reuse standards, if DoH observes non-compliance, it will refer the incident to the RA. The RA will then decide whether to pursue fines, penalties, or other enforcement actions.

Voluntary drinking water testing and public education

DoH will continue to provide voluntary drinking water quality testing to residents. Under the new regulatory framework, DoH will also undertake public health education programs related to drinking water and wastewater reuse.

Setting design standards for cisterns and wells

The Department of Planning will continue to set design standards for cisterns and wells used by Bermudian households.

Approving construction permits

DoH will continue to approve a construction permit for cisterns and wells used by Bermudian households.

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4 How are problems addressed

Using input from the current regulatory structure and from the stakeholder consultations, a list of areas for improvement in Bermuda's water and wastewater sector was prepared. The list of areas for improvement is presented below. How the proposed regulatory framework addresses each of the areas for improvement is discussed below.

Wastewater treatment plants discharge into the ocean

Wastewater treatment plants are discharging minimally treated sewage through two outfalls¹¹, one operated by the Corporation of St. George's and the other by the Corporation of Hamilton. The St. George's outfall is currently being decommissioned¹². The Tynes Bay Septage Facility has limited screening capabilities and is connected to the sewer network that leads to the Front Street Wastewater treatment plant.

The Corporation of Hamilton operates the larger of these outfalls, which discharges wastewater and occasionally grease into the Atlantic Ocean. When easterly winds blow, greaseballs can form and wash up on south-shore beaches. In addition to impacting the aesthetic value of the beaches, greaseballs are also a potential public health risk.

The Department of Health tests seawater and monitors for greaseballs at 15 sites across Bermuda on a weekly basis using the United States Environmental Protection Agency guidelines. Only 0.4 percent of sample reports (13 out of 3,312) taken by the Department of Health since 2014 have identified greaseballs.¹³

Grease often comes from restaurants that do not use grease traps and dispose of used oils in drains. As part of its fats, oils, and grease policy developed in 2015, the Corporation of Hamilton replaced its wastewater filtering screens and hired a retired health inspector to work with restaurants to enforce the use and regular cleaning of grease traps. This has significantly reduced the amount of grease reaching the Front Street plant. As part of its operating license, the plant is required to add additional micro-filtering screens and equipment for chemical disinfection¹⁴. The Corporation of Hamilton has budgeted for these investments, which have not yet been implemented.¹⁵

¹¹ A marine outfall is a pipeline for discharging wastewater into the ocean, relying on seawater's salinity and dilution for safe disposal. They are significantly less expensive than more advanced treatment technologies. However, if they are not properly designed, marine outfalls can cause environmental and public health risks.

¹² Bernews, "Minister Burch: Water & Wastewater Plan Update", 12 May 2021

¹³ Department of Health data with calculations by Mott MacDonald, 26 July 2021

¹⁴ Department of Environment and Natural Resources, "Corporation of Hamilton Sewage Plant Operating License (OL-142)"

¹⁵ The Royal Gazette, "City of Hamilton upgrades sewage filtering screens", 6 August 2021

How the future state addresses this problem: Strengthen monitoring and enforcement of wastewater treatment standards.

The recommendations formalize existing wastewater treatment standards and improve the process for monitoring and enforcing these standards, which reduce the conditions that contribute to greaseballs.

The Government acknowledges the Corporation of Hamilton and semi-private entities' efforts in implementing changes that have led to a significant reduction in the number of incidences of greaseballs since 2015.

Bermudians do not get as much water as they would like when rainfall is low

Unlike most countries, Bermuda gets most of its water from rainwater harvesting, with piped and trucked water supplementing demand. Though rainwater harvesting has functioned well for over 400 years, the approach has been and will continue to be impacted by climate change.

Climate change is expected to lead to more severe storms and longer dry spells in Bermuda. Though total rainfall is likely to increase, it will be in the form of more severe storms and hurricanes, which can contaminate household cisterns with salt water. During dry spells, household cisterns are depleted, and demand for trucked water spikes, which has led to rationing in some cases.

In addition, demand for water has risen while the capacity for rainwater harvesting has remained mostly constant. Demand for water in Bermuda has tripled in the last 50 years, increasing from 10 imperial gallons per person per day in 1968 to 30 imperial gallons in 2002.¹⁶ However, the maximum amount of rainfall that can potentially be collected is limited by the combined surface area of Bermuda's rooftops, which has been impacted by the increased use of multistory housing. As a result, rainwater alone is unlikely to meet demand.

How the future state addresses this problem: Empower the RA to oversee resilience in the water sector.

The recommendations establish the RA as the water sector economic regulator to oversee resilience. The RA will ensure planning for sustainable and resilient use of water resources during droughts and normal times. The RA will have the mandate to incorporate resilience into the tariff-setting process.

Tenants using cistern water, as well as customers of piped and trucked water, risk consuming unsafe water
Standardized, consistent water quality testing for piped and a percentage of the public and private water companies performs trucked water. Bermuda Waterworks Limited tests water quality daily and has an in-house laboratory providing real-time results. Other potable water suppliers may also test regularly, but standards across the industry vary. The risk of consuming unsafe water exists.

Additionally, most Bermudians drink unfiltered cistern water, exposing them to potential health risks. Homeowners are ultimately responsible for the quality of the water in their cisterns. To measure their drinking water quality, they can have their water tested by the Department of Health and private labs for bacterial and salt content, although no labs in Bermuda offer chemical

¹⁶ Government of Bermuda Sustainable Development Unit, "Charting Our Course: Sustaining Bermuda", 2008

testing. However, it is more difficult for tenants in rental housing to assess the safety of the water they drink.

In 2018, due to uncertainty over drinking water quality, the United States Centre for Disease Control recommended visitors to Bermuda avoid drinking tap water.¹⁷ Additionally, a 2013 survey found 88 percent of residential tap water was contaminated by bacteria commonly transmitted through bird feces.¹⁸ Salmonella Mississippi bacteria cause about 150 reported cases of gastroenteritis each year.¹⁹ Seven out of ten cases are in children under five years old, who are at greater risk.²⁰ Older people are also at greater risk, a concern given Bermuda's aging population. However, the problem is not currently severe. In 2019, about 0.2 percent of the population in Bermuda reported a waterborne illness compared to 2.4 percent in the United States.²¹

How the future state addresses this problem: Transfer drinking water quality standards enforcement to the RA.

Under the new regulatory structure, the responsibility for enforcement of drinking water quality standards will be switched from the DoH to the RA. This ensures more capacity at the DoH for monitoring compliance with drinking water quality standards among service providers. RA will be required to enforce penalties for non-compliance with drinking water quality standards. DoH will provide recommendations and assistance to the RA where subject matter expertise is needed.

Trucked water will need to be tested by an approved water testing body to comply with drinking water quality standards unless it is purchased from a piped water operator subject to testing requirements. This is to prevent the selling of unsafe water during times of water stress.

Public providers of piped water and wastewater services lack incentives to keep costs low

Competition between sellers helps keep costs low. When there is little or no competition, businesses are less likely to provide efficient services at the lowest cost possible. Like water utilities in other countries, public and private service providers in Bermuda do not have competition. While the owners of private service providers will push managers to control costs, public service providers do not face the same pressure. When their costs are high, citizens pay more for services, either directly through tariffs or indirectly through taxes.

Non-revenue water, a measure of utility efficiency, is the percentage of water produced that is lost due to leaks, meter inaccuracies, and other reasons. When the non-revenue water rate is high, utilities have higher costs since they must produce more water to make up for these losses.

¹⁷ *The Royal Gazette*, "US issues tap water warning", 15 March 2018

¹⁸ De Leon, Mota-Meira, Pirkle, Rouja, "Highly prevalent contamination with bacterial faecal indicator species in Bermudian drinking water", *International One Health Conference*, March 2015

¹⁹ Bermuda Ministry of Health, "Health in Review", Second Edition, Government of Bermuda, 2017

²⁰ De Leon, Mota-Meira, Pirkle, Rouja, "Not the Usual Suspect: S. Mississippi and Gastroenteritis in Bermuda", 2015

²¹ IHME, *Global Burden of Disease*, 2019

How the future state addresses this problem: *Permit the RA to approve tariffs to give public service providers more certainty when projecting costs and revenue.*

Under the new regulatory structure, the RA will become the water and wastewater sector economic regulator. This recommendation will improve the current structure by approving the price public providers are allowed to charge and allowing these entities to project revenue with more certainty. This enables public providers to more accurately assess their capacity to plan network expansions to prevent overinvestment or underinvestment.

There is a risk that public providers of piped water and wastewater services could charge less than their cost of service

Public service providers in Bermuda set their own prices, unlike utilities in many other countries. Higher tariffs are unpopular, so there is a risk they could set their tariffs below what it costs to provide piped water and sewerage.

However, costs that cannot be covered through tariffs are indirectly paid through higher taxes. This discourages efficient consumption, as consumers do not see the true cost of service. Since everyone pays higher taxes because of low tariffs, heavy users of water are also subsidized at the expense of households that are not connected to the network.

How the future state addresses this problem: *Permit the RA to approve tariffs to allow public service providers to charge a fair price and insulate them from political pressure.*

Under the new regulatory structure, the RA will become the water and wastewater sector economic regulator. This recommendation will improve the current structure by approving, monitoring, and enforcing a mandatory tariff that all providers must charge. Public providers will be able to charge a price in line with their costs so long as the underlying tariff is approved by the RA. Designating the RA as the regulator will also insulate public providers from direct political pressure to keep prices lower than would be efficient.

There is a risk that private providers of piped water and wastewater services price their services above the cost

Like public water and wastewater service providers, private providers set their own prices in Bermuda. Since they are selling a basic daily need in a market without competitors, there is the risk that private service providers could charge prices far above their cost of service.

How the future state addresses this problem: *Permit the RA to approve tariffs to prevent private providers from charging above the costs.*

Under the new regulatory structure, the RA will become the water and wastewater sector regulatory agency. This recommendation will improve the current structure by setting the price private providers are allowed to charge, preventing them from charging unreasonably higher than their costs.

Providers of piped water and wastewater services may not be providing adequate access, reliability, and customer service

Without competition, service providers are less likely to provide high-quality service and expand coverage to less-profitable areas. In addition, if public providers cannot charge what it costs to provide services, there is a risk that they may postpone maintenance or infrastructure investments, reducing the quality of service and limiting their ability to connect with new customers.

How the future state addresses this problem: *Designate the RA as the consumer complaint agency for the water and wastewater sector to streamline the complaint process and ensure market participants are encouraged to address consumer issues.*

Under the new regulatory structure, the RA will become the water and wastewater sector regulatory agency and consumer complaint agency. This recommendation will improve the current structure by providing consumers with an enforcement agency to report complaints. Because the RA can enforce fines and economic penalties on piped water and wastewater providers, service providers will be encouraged to provide reliable services and customer service. As the resilience planning agency, the RA can also require service providers to make investments to strengthen resilience.

There is a risk that water truckers and septage haulers could price their services above cost.

Since most households rely primarily on rainwater harvesting and cesspits, water truckers and septage haulers are an important part of Bermuda's water sector, although there is a risk that limited competition could lead to higher prices for customers.

In a market with many competing businesses, each one is pushed to provide the highest quality service at the lowest price to attract customers. If new businesses cannot easily enter the market or businesses agree on a common price, then competitive pressure decreases.

The Bermuda Water Truckers Association sets a standard price per tank load for its members.²² Additionally, the Ministry of Transport is not issuing new water trucker licenses, which limits the number of businesses providing trucked water.²³ In a series of focus groups conducted in 2013, many Bermudians expressed concerns about high prices for trucked water.²⁴

Compared to the number of water truckers, there are few septage haulers in Bermuda, which may also lead to limited competition.

How the future state addresses this problem: *Empower the RA to monitor anti-competitive practices among water truckers and septage haulers.*

Under the new regulatory structure, the RA will become the agency for customer complaints, and it will monitor anti-competitive behavior in the water trucking and septage hauling sectors. This recommendation will improve the current structure by providing consumers with an enforcement agency to manage consumer complaints. The RA will monitor anti-competitive pricing in the water trucking and septage hauling sectors and take measures where necessary to preserve a competitive marketplace.

²² *The Royal Gazette*, "Cost of a water truck load set to reach \$80", 11 February 2011

²³ *Bernews*, "Moratorium: Water Truck Licences", 30 January 2012

²⁴ Ministry of Works & Engineering, "Bermudian and Guest Worker Water Conservation Attitudes and Practices", October 2007



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