



# ENVIRONMENTAL PROTECTION DEPARTMENT ANNUAL REPORT 2017



ENVIRONMENTAL PROTECTION DEPARTMENT



# Executive Summary

The Environmental Protection Department (EPD) strives to protect residents, visitors and the environment from the harmful effects of radiation and pollution, through the promotion of sustainable practices, environmental stewardship, partnerships and the enforcement of legislation. In 2017, the EPD undertook several activities to achieve this goal. The following is a summary of the activities undertaken.

- The Air and Noise Pollution Control Section received 25 complaints related to ambient air quality and ten complaints about noise. Approximately, 59% of the complaints received in 2017 were investigated. With regards to ambient air quality complaints, the majority of complaints pertained to vehicle maintenance facilities (VMFs). The section also conducted an inventory of vehicle maintenance facilities, a passive monitoring assessment of Holetown and two rural areas and prepared reports on past ambient air quality assessments. Concerning the management of noise pollution, an assessment of the Oistins area was conducted.
- The BDCS received 1,672 building development applications in 2017. The majority of the applications pertained to residential developments. The section processed 1,630 applications comprising application received in 2017 and application submitted in the previous years. In addition to reviewing applications, the BDCS conducted inspections of preliminary wastewater treatment systems and began the process of digitising and electronically storing some of the building development applications.
- Forty-four derelict buildings were identified and removed at a cost of \$ 128,514.50 BDS. However, the Derelict Buildings and Vehicles Section did not coordinate the removal of any derelict vehicles due to the absence of a suitable site to dispose of the metal waste. The section also received and approved 54 requests for permission to remove asbestos-containing materials and/or fibreglass.
- Twenty-three development-related documents, namely: terms of references, environmental impact assessments, environmental scoping studies and consultation files were received in 2017. Eighteen development-related documents were reviewed and the comments were provided to the Chief Town Planner by the end of 2017. The Department also continued its development of guidelines for renewable energy developments in Barbados such as wind and solar farms.
- With respect to the management of marine pollution, the Marine Pollution Control Section received and investigated five complaints; the majority of these complaints were related to wastewater discharges. The section also worked to finalize reports for six regulatory inspections; coordinated the annual clean-up of the Morgan Lewis Beach on September 17 and undertook activities to update the National Oil Spill Contingency Plan.
- With respect to multilateral environmental agreements, the Department reported to the Secretariat of the Basel Convention on the Control of Transboundary Movements of

Hazardous Wastes and their Disposal on activities undertaken according to the objectives of the Basel Convention in 2015 and began to prepare the report for 2016. Similarly, the EPD reported on the activities undertaken in 2016 regarding the Chemicals Weapons Convention. The Department also undertook three initiatives geared towards improving the management of persistent organic pollutants (POPs), and continued efforts to support the implementation of the GHS in Barbados.

- The EPD received and addressed 23 requested for disposal advice; processed 48 applications for the importation of radioactive materials and vetted 26 applications for the importation of pesticides. A limited number of landfill inspections were done throughout the year because the details of the merger of the Solid Waste and Hazardous Materials Section with the Derelict Programme were being finalised and a Standard Operating Procedures for the merged section was being prepared.
- Under the Nearshore Monitoring Program, samples of marine water were collected from 18 South and West Coast Beaches. All of the beaches, except for Site #2 at Holetown, conformed to the standards for faecal coliform and enterococci under the proposed Marine Pollution Control (Discharge) Regulations. Concerning physicochemical and nutrients parameters, the average concentrations of total phosphorous, turbidity and TSS for both the South and West Coasts exceeded the respective ambient standard. However, the average levels of pH were within the acceptable range of 7 – 8.7 for both coasts.
- Under the Groundwater Monitoring Programme, water samples were taken and analysed from 17 wells and two springs across the island from which the island's potable water supply is derived. The results were compared to the World Health Organizations (WHO) Drinking Water Guidelines. It was found that:
  - three public supply wells in the West Coast Catchment registered average chloride concentrations that exceeded the WHO guideline value of 250 mg/l;
  - all of the wells had average Nitrate-N concentrations that were less than the WHO guideline of 10 mg/l;
  - all of the supply sources recorded average concentration of sulphates that were below the WHO guideline value of 500 mg/l;
  - the majority of water for the various supply sources had tastes that would be classified by the WHO drinking water guidelines as "Excellent" or "Good" since the average concentrations of the total dissolved solids (TDS) were less than 600 mg/l;
  - eight of the public supply wells recorded maximum concentrations of Faecal Coliforms that were above the WHO guideline value of 0 CFU/l.
- To raise awareness about the EPD and environmental issues, the Department publish a newsletter; coordinate a tour for students of the Graydon Sealy Secondary School; and published an updated version of its brochures, which outline the Department's functions.

- Officers of the Department participated in technical and administrative training courses and represented the Department and or Barbados at local, regional and international workshops, meetings and conferences.

The outlook for 2018 is that the Department will face challenges stemming limited human resources and inadequate legislative instruments. However, the EPD will continue to strive to minimize the negative impact of development on the environment through the promotion of sustainable practices and enforcement of prevailing environmental standards and regulations.

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## **1 Overview**

The overarching goal of the Environmental Protection Department (EPD) is to protect residents, visitors and the environment from the harmful effects of radiation and pollution, through the promotion of sustainable practices, environmental stewardship, partnerships and the enforcement of legislation.

To achieve this goal, the Department carries out regulatory functions in the areas of ambient air quality management, building development control, management of derelict buildings and vehicles, hazardous materials management, implementation of multilateral environmental agreements, marine pollution control, noise pollution control, solid waste management and water quality management. The EPD also plays a role in emergency planning and response and undertakes public education and awareness activities to engender environmental stewardship in the citizenry.

The Department comprises eight sections: seven technical sections and an administrative section.

During the period under review, January to December 2017, there were reductions to the Department's budget and the activities were executed with less than the full complement of staff as some posts remained vacant and one officer retired. However, despite the limited human resources, the competent and resourceful staff was the lynchpin for the level of EPD's achievement in 2017.

## **2 Air and Noise Pollution Control**

The Air and Noise Pollution Control Section (ANPCS) is responsible for implementing and administering the air and noise pollution control programme. The goal of the air and noise pollution control programme is to protect the public from harmful air pollutants and noise, which can have negative health effects and degrade their quality of life. The section conducts technical research into air quality issues, conducts environmental noise assessments and investigates complaints related to outdoor air pollution and environmental noise pollution.

Three people staff the section: one senior officer and two environmental technicians. The third post for an environmental technician was vacant during 2017.

### **2.1 Activities of the Section**

During 2017, the ANPCS undertook the following activities.

- Investigated air and noise pollution complaints;
- Conducted assessments of ambient air quality; and
- Conducted noise assessments.

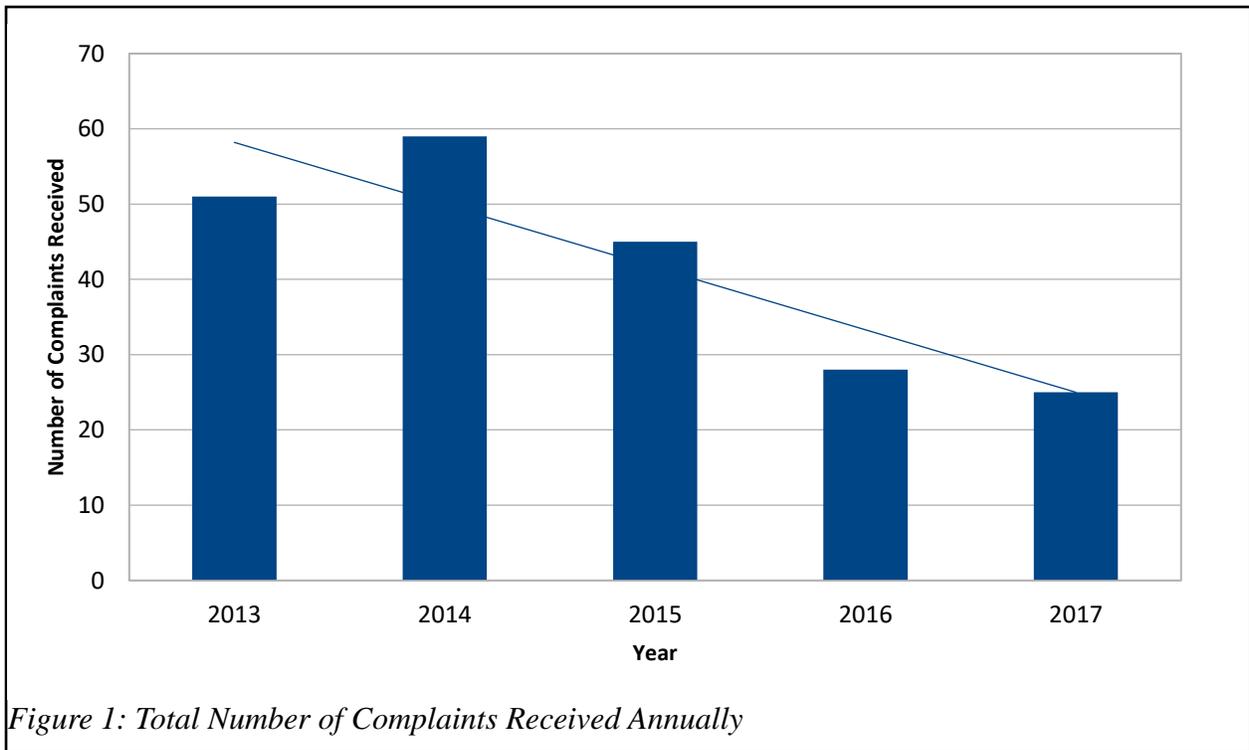
### 2.1.1 Complaints and Investigations

Complaints received by the ANPCS were classified as emissions from industrial stacks, manufacturing operations, nuisance, vehicular maintenance facilities (VMFs) and noise. Table 1 presents the definitions of these classifications.

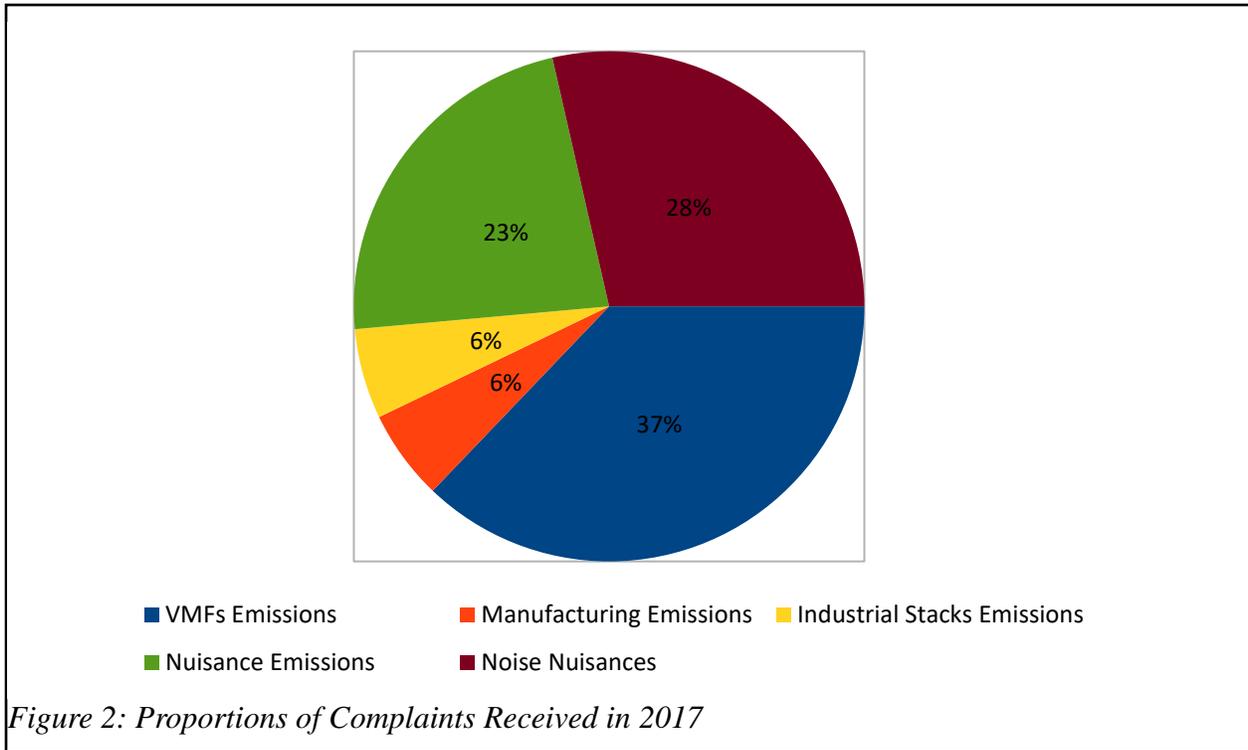
Table 1: Classification of complaints

Classification	Definition
<i>Industrial Stacks</i>	Emissions from industrial sources that negatively affect the ambient air quality in its vicinity.
<i>Manufacturing Operations</i>	Emissions from manufacturing sources that negatively affect the ambient air quality in its vicinity e.g. furniture manufacturing, wrought ironworks.
<i>Nuisance</i>	Emissions from miscellaneous sources that negatively impact the ambient air quality in its environs e.g. open burning of materials, chemical odours, and fugitive emissions.
<i>Vehicle Maintenance Facilities</i>	Emissions from vehicle maintenance facilities and any location where vehicle or auto-body repair is conducted that result in the emission of toxic sprays or odours that negatively impact the ambient air quality in its vicinity.
<i>Noise</i>	Instances of unwanted sound.

Since 2014, there has been a decline in the number of complaints received by the section (see Figure 1). The proclamation of the Safety and Health at Work Act, 2005, and the transfer of responsibility for indoor air quality (IAQ) matters to the Labour Department may have been the primary contributors to this trend.



In 2017, the ANPCS received 35 complaints – 25 pertained to ambient air quality and ten to noise pollution. Complaints about vehicle maintenance facilities accounted for 52% of the ambient air quality complaints received. The figure below shows a breakdown of the complaints received.



The complaints received by the ANPCS were further divided into new and continuing complaints. New complaints were those lodged with the section for the first time. Continuing complaints were those that were lodged with the section before and the section has received subsequent complaints from the same or other complainants for the same alleged offender. Approximately, 6% of the complaints received were continuing complaints and the remainder were new complaints.

Concerning investigations, the section investigated 102 complaints in 2017 (74 related to ambient air quality and 28 related to noise), which involved 113 site visits, preparing reports on those visits and issuing 45 enforcement notices. Approximately, 59% of the complaints investigated were received in 2017; the remainder were lodged with the Department in previous years. The majority of complaints investigated pertained to VMFs and noise nuisances.

The high proportion of complaints received and investigated which pertained VMFs suggested that greater regulation is needed for this type of operation. At the time of this report, there was an absence of suitable legislation to effectively address the operations of VMFs.

### 2.1.2 Ambient Air Quality Assessments

Poor ambient air quality can impact negatively on human health and the environment. In terms of human health, impacts can include respiratory problems and allergic reactions in susceptible individuals. Impacts on the environment can include property damage, lower crop yields and groundwater pollution. However, there is limited data on the extant levels of ambient air quality pollutants in the environment.

Without data on the existing quality of ambient air or pollution sources, the development of appropriate policies and regulations for the management of ambient air quality is difficult. To address this issue, the ANPCS continued work to assess the ambient air quality across the island and characterize sources of air pollution. Below is a summary of various assessments that section undertook in 2017.

- **National Inventory of Vehicle Maintenance Facilities.** The purpose of the inventory was to gather data from VMFs to augment existing data. Data was collected from 120 facilities and included, *inter alia*, details about the operation of the business such as the operating hours, number of employees and years of operation at the location; environmental pollution control devices used; the quantities of materials stored at the site and the methods of storage; waste disposal practices; and the safety and emergency procedures. The project found that: the majority of the facilities did bodywork and spray painting; very few facilities had permission from the Town and Country Development Planning Office (18%) or from the EPD (11%) to operate at the location; most of the facilities were located in residential areas; 87% of the operations stored chemicals onsite, and just over half (52%) used pollution control devices. Using the results of the inventory, the section began work on the policy to govern the operations of VMFs. Additionally, the section started a dialogue with the Barbados Investment Development Corporation (BIDC) regarding the development of facilities in industrial parks for part-time rental to small operators to conduct vehicular maintenance activities.
- **The Hometown and Two Rural Areas Ambient Air Quality Passive Monitoring Assessment.** The project was designed to characterize the levels of sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>) and volatile organic compounds (VOCs) generated by the combustion of fossil fuels and other industrial activities occurring in the Hometown area and two rural areas – Farley Hill National Park, St. Peter and Gun Hill Signal Station located in St. George. Samples were collected daily over one year from seven locations: five in Hometown and one each at Farley Hill and Gun Hill. The locations were selected based on the different types of activities, that is, commercial, industrial, residential activities or combination thereof that were common to the areas. By the end of 2017, the report on the assessment was being finalized and should be completed in 2018.
- **Compilation Report on Past Studies.** The ANPCS worked on a combined report for three ambient air quality passive monitoring projects that were undertaken between 2012 and 2016. The Bridgetown Ambient Air Quality Passive Monitoring Study and the Oistins/Speightstown Ambient Air Quality Passive Monitoring Study, which ran from June 2012 to May 2013 and August 2013 to July 2014 respectively. The goal of both these projects was to characterize the concentrations of sulphur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>) and the top five (5) volatile organic compounds (T5VOC). The Hometown and Two Rural Areas Ambient Air Quality Study conducted from February 2015 to January 2016; characterized NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub> and total volatile organic compounds (TVOCs). Once completed, the report will be used to support the Department's efforts for continuous monitoring of the quality of the ambient air in Barbados. Continuous monitoring will act as a tool to determine peak pollutant concentrations, which will allow

the EPD to characterize the state of the ambient air to systematically achieve the goals set out in the Barbados National Strategic Plan through focused planning and development processes.

### **2.1.3 Noise Assessments**

The ANPCS designed and implemented a noise characterization study of the Oistins area to gather baseline data and characterize the sound levels which persons were exposed to while in or near Oistins. The project involved daily monitoring over a week at three sites – Christ Church Post Office, Pentecostal Assemblies of the West Indies and Inter-American Development Bank – as well as short term monitoring at two sites – Oistins Bay Gardens and near Welches close to a residential area. Additionally, meteorological data and traffic counts, among other things, were also collected. A report on the assessment was prepared and should be finalized in 2018.

The section began initial preparations to conduct a similar assessment of the Speightstown area in 2018.

### **2.1.4 Other Activities**

In addition to the aforementioned activities, the ANPCS also undertook or was involved in the following. The section:

- Coordinated the calibration of one of the sound level meters to ensure accurate and reliable results;
- Deployed, retrieved and shipped the filter media under the Global Atmospheric Passive Sampling (GAPS) Programme;
- Prepared and delivered presentations to the public on the Bridgetown Noise Project and Bridgetown Ambient Air Project; and
- Provided technical advice on various environmental impact assessments, consultation files and the Physical Development Plan Amended 2017.

Officers from the section also represented the Department on various committees such as the Ozone Steering Committee and the Maintenance of Government Property Working Group.

## **3 Building Development Control**

Building Development Control involves, *inter alia*, ensuring that proposed buildings are adequately ventilated and assessing the impact(s) that the development may have on the general environment and neighbouring properties. To this end, the Building Development Control Section (BDCS) seeks to ensure that all residential, commercial and industrial development in Barbados comply with local and international standards such as the Health Services Act, Cap 44 and regulations relating to building development control, the Groundwater Protection Policy, and the environmental policies and guidelines sanctioned by the Cabinet of Barbados.

### **3.1 Major Activities**

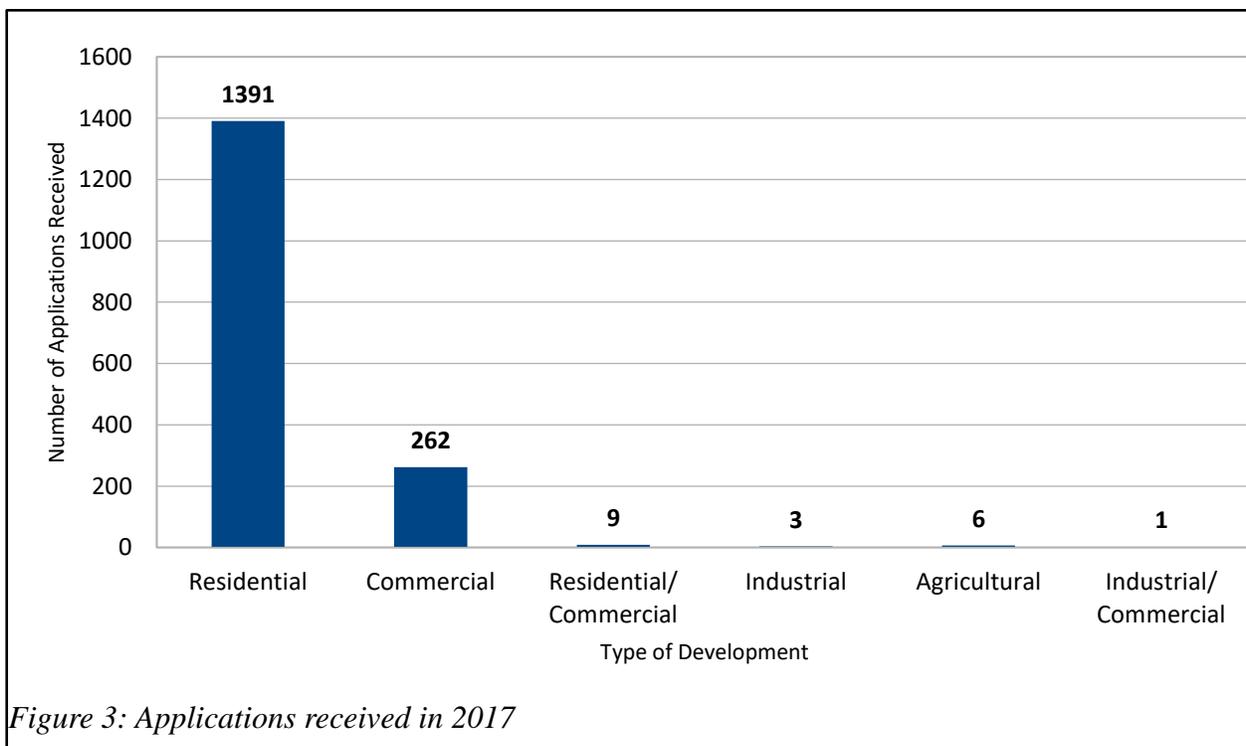
The main activities of the BDCS for 2017 were as follows:

- Processing building development applications;
- Conducting compliance inspections of commercial, industrial and institutional buildings;
- Conducting compliance inspections of preliminary wastewater treatment systems;
- Improving the electronic storage of building development applications; and
- Developing standards and guidelines.

### 3.1.1 Processing of Building Development Applications

Building applications are received directly from the Town and Country Development Planning Office (TCDPO) or they are submitted directly to the EPD by applicants or agents. In 2017, the BDCS received 1,672 applications.

Figure 3 depicts the number of applications received in 2017 based on the intended purpose of the development. Applications for residential developments accounted for the majority (~83%) of the applications received by the BDCS in 2017.



Applications vetted by the BDCS may be approved, approved with conditions, refused, withdrawn or acknowledged. Acknowledged applications are those which do not fall under the purview of the Health Services (Building) Regulations. The BDCS processed approximately 44% of the 3,747 applications within the section – the 1,672 received in 2017 plus 2,075, brought forward from the previous year. The majority of the processed applications were either approved

or approved with conditions. The table below summarizes the decisions that were taken for the various types of applications processed.

*Table 2: Decisions Taken on Applications Processed in 2017*

<b>Classification</b>	<b>Approved</b>	<b>Refused</b>	<b>Approved with conditions</b>	<b>Withdrawn</b>	<b>Acknowledged</b>	<b>Total</b>
<i>Residential</i>	1231	55	152	9	8	1455
<i>Commercial</i>	45	25	56	14	25	165
<i>Residential/ Commercial</i>	4	1	1	1	0	7
<i>Industrial</i>	0	0	0	0	0	0
<i>Agricultural</i>	0	2	1	0	0	3
<i>Industrial/ Commercial</i>	0	0	0	0	0	0
<b>Total</b>	<b>1280</b>	<b>83</b>	<b>210</b>	<b>24</b>	<b>33</b>	<b>1630</b>

By the end of 2017, 2,117 applications were waiting to be processed. Since 2013, over 1,600 applications were rolling over to the subsequent year. The number of unprocessed applications rolling over to a subsequent year is of concern because this number, when combined with applications that the Department will receive in the year, places considerable strain on the limited human resources of the section. The main factor that contributed to a large number of pending applications in 2017 was that the posts within the section remained vacant when officers went on leave. Additionally, one post became vacant during the year due to retirement.

### **3.2 Inspections of commercial, industrial and institutional buildings**

There were no requests for compliance inspections of commercial, industrial and institutional buildings in 2017.

### **3.3 Inspections of preliminary wastewater treatment systems**

In 2017, 226 applications were approved with septic tanks. However, the BDCS only conducted 19 inspections of septic tanks and filter beds to ensure that the construction and installation of these disposal systems complied with the required standards.

Two reasons were believed to contribute to the small proportion of septic tanks inspected. First, construction may not have started for all of the applications approved with septic tanks and consequently, there was no need for a septic tank inspection.

The second reason for the small proportion of septic tanks inspected stemmed from the procedure by which the Department is notified to inspect the devices before commissioning. The current procedure requires that applicants complete and submit a “Building Start Notification”, which is included in the approval package. Unfortunately, most applicants do not complete and submit the “Building Start Notification” to the BDCS. Consequently, the BDCS was not in a position to

visit and verify that those developments requiring septic tanks and filter beds have the systems built to specification. Going forward the section will look to work more closely with the officers of the Chief Town Planner to address this situation.

### **3.4 Electronic storage of building development applications**

The BDCS procured a scanner to digitise building development applications to facilitate them being stored electronically. Electronic storage of files could reduce the space needed to store the physical files and allow the section to keep records of all applications for future reference. In 2017, 910 applications were scanned and saved.

### **3.5 Develop standards and guidelines**

Draft guidelines for rainwater storage tanks were prepared in 2017 and are awaiting final approval. The section also began to prepare guidelines for:

- Restaurants and food establishments;
- Daycare facilities; and
- Animal husbandry.

Guidelines for medical facilities were still pending.

### **3.6 Other Activities**

In addition to the aforementioned, the BDCS also undertook or was involved in the following activities. The section:

- Liaised with other government agencies such as the Child Care Board and Ministry of Health regarding building development and environmental issues.
- Assisted the Water Quality Section with their sampling for the Wide Screen Programme.

## **4 Management of Derelict Buildings & Vehicles**

The Derelict Buildings and Vehicles Section (DBVS) comprises one Senior Environmental Inspector and three Environmental Inspectors (EIs). The section bears responsibility for the administration of the Derelict Building and Vehicles Removal Programme. This programme serves to:

- enhance and preserve the aesthetics of Barbados; and
- reduce the presence of breeding sites for mosquitoes, rats and other disease vectors in the interest of public health.

This is achieved through the identification, monitoring and removal of derelict buildings and vehicles across the island.

## **4.1 Major Activities**

In 2017, the DBVS undertook the following:

- Identification and removal of derelict buildings;
- Identification and removal of derelict vehicles; and
- Facilitating the environmental sound disposal of asbestos and fibreglass.

### **4.1.1 Removal of Derelict Buildings**

A derelict building is an abandoned, dilapidated, unoccupied building structure which is considered to be a public nuisance because it may provide a home for rodents and vermin and a haven for illegal activities.

Derelict buildings are identified by EIs or reported to the EPD by Environmental Health Officers and the public. The EIs investigate identified buildings to determine if they are derelict and collect photographic evidence. If the buildings are deemed to be derelict, a notice is served via registered mail to the owner or owner's agent requiring them to renovate or remove the structure. The notice specifies the period during which the owner of the building must comply. The Department then publishes a listing of derelict buildings in a daily newspaper as required by Section 11 (1a) of the Health Services Act, Cap 44. If the owner is unable to comply during the specified period, a stay of execution may be requested by the owner of a derelict building to carry out cleaning, repairs or renovations. If the owner of a derelict building does not comply with a notice or request a stay of execution, the building may be demolished and the cost for the demolition of the building may be recovered from the owner as a debt due to the Crown.

During 2017, 44 derelict buildings were identified and removed at a cost of \$ 128,514.50 BDS; of which \$2,544.50 were recovered.

### **4.1.2 Removal of Derelict Vehicles**

An abandoned automobile, truck or other vehicular parts which may harbour rodents and other vermin is considered a derelict vehicle. Derelict vehicles can be a public nuisance and negatively impact human health and quality of life.

No derelict vehicles were disposed of in 2017. Since the closure of the Bagatelle Bulky Waste Disposal Site in 2013, there has been no legally operated site to dispose of metal waste appropriately. This created a challenge for the Department with respect to the disposal of derelict vehicles. Consequently, the removal of derelict vehicles was suspended.

### **4.1.3 Disposal of Asbestos and Fibreglass**

During 2017, the DBVS received and approved 54 requests for permission to remove asbestos-containing materials and/or fibreglass. The materials were disposed at the facility at Rock Hall, St. Philip. Officers of the derelict section supervised the removal and disposal process.

Exposure to asbestos and fibreglass poses a health hazard and must be prevented by dust control and the use of devices to guard against inhalation of the fibres. Consequently, the removal of asbestos-containing materials and fibreglass are supervised by officers from DBVS to ensure that

prevailing guidelines are followed by contractors, workers and other persons engaged in the removal and disposal of asbestos.

## **5 Development Related Documents**

Development related documents (DRDs) refer to the information used to assess the potential impact of future developments. DRDs include consultation files, terms of reference and environmental impact assessments to name a few.

Environmental Impact Assessments seek to identify potential negative impacts of development at the planning stage so that measures can be put in place to eliminate or otherwise reduce and manage those impacts. The EPD is a member of the EIA Review panel under the auspices of the TCPDO and advises the Chief Town Planner on matters concerning environmental management.

The Environmental Technical Officers (ETOs) review environmental impact assessment and other development-related documents and provide comments to the Chief Town Planner. Apart from the aforementioned functions, the section also plays a role in public education (Section **Error! Bookmark not defined.**), multilateral environmental agreement (Section 7) and the overall administration of the Department. The ETOs consist of a Senior Environmental Technical Officer, one Environmental Technical Officer and one Technical Officer.

The other technical sections also participated in the review of DRDs when necessary.

### **5.1 Activities of the Section**

The main activity planned for the period was to review EIAs and development related documents and provide comments to the Chief Town Planner.

#### **5.1.1 Processing of Development Related Documents**

During the year, the Department received 23 development-related documents (DRDs) and reviewed and provided comments on 18 of these documents. The remainder of the DRDs received were not processed by the end of 2017. A breakdown of the documents processed is presented below.

Table 3: Breakdown of DRDs processed for 2017

Type of DRD	Number Processed
Consultation Files	8
Terms of Reference	0
Environmental Scoping Studies	1
Environmental Impact Assessments	1
Monitoring Reports	8
Social Impact Assessments	0
Other	0
<i>Total</i>	<i>18</i>

### 5.1.2 Other Activities

Additionally, officers to the ETO section updated draft guidelines for siting, construction, operation and disposal of renewable energy systems.

## 6 Marine Pollution Control

The Marine Pollution Control Section (MPCS) is responsible for administering the Marine Pollution Control Act CAP 392A (MPCA). The section seeks to prevent, reduce and control pollution of the marine environment of Barbados from whatever source. This is achieved by enforcing the MPCA; investigating reports from the public regarding potential occurrences of marine pollution; developing programmes, projects and policies to control marine pollution; and educating the public about marine pollution and its harmful effects.

The MPCS comprises two officers – a Senior Marine Pollution Officer and a Marine Pollution Officer. Another two posts of Marine Pollution Officer were vacant in 2017.

### 6.1 Activities of the Section

In 2017, the MPCS:

- Continued its Marine Litter Monitoring Programme;
- Reported on regulatory and compliance inspections;
- Maintained the National Oil Spill Contingency Plan; and
- Investigated marine pollution complaints.

#### 6.1.1 Marine Litter Monitoring Programme

The Marine Litter Monitoring Programme aims to collect data that could be used to increase public awareness of issues associated with marine litter and aid the Department to develop long–

term management strategies for marine litter. Moreover, the programme contributes to a cleaner, safer and more aesthetically pleasing beaches in Barbados.

Morgan Lewis Beach in St. Andrew has been the site for the National Marine Litter Monitoring Programme since 2005. This beach is impacted by litter from land-based run-off and what has washed ashore from the open ocean.

In 2017, the MPCS finalized the report for the 2016 clean-up of the Morgan Lewis Beach which was held on International Coastal Clean-up (ICC) day, Saturday, September 17, 2016. The report noted that 65 volunteers collected 5,621 items weighing 819 pounds. The most frequently collected items were plastic pieces, plastic bottle caps, and plastic beverage bottles.

During the year, the MPCS also planned, coordinated and conducted the 12<sup>th</sup> clean-up at Morgan Lewis Beach St. Andrew. Approximately, 145 people comprising residents of Shorey Village, St. Andrew; non-governmental organizations; private-sector agencies; government departments; and lovers of the environment attended and assisted with the clean-up. By the end of 2017, the report on the clean-up was being compiled.

One of the section's goals for the programme in 2017 was to enlist a community group to take charge of the planning and coordination of the clean-up of the beach as well as collecting the clean-up data. It was believed that handing the programme over to a community group would engender greater environmental stewardship and allow the section to replicate a similar monitoring programme in another coastal community. Unfortunately, a community group could not be identified to take over the programme. However, efforts will continue to find such a group.

### **6.1.2 National Oil Spill Contingency Plan**

The Oil Spill Contingency Plan (hereafter referred to as the "Plan") aims to prevent or, where prevention is not possible, mitigate and minimize adverse environmental impacts of oil pollution. The Plan establishes organisational and decision-making structures make provisions for coordinating the acquisition and deployment of necessary resources and facilitates the application of available expertise to provide an effective response in the event of an oil pollution incident or the threat of an oil pollution incident. The Plan mandates the establishment of pre-agreed priorities and strategies for viable response to likely oil spill scenarios; and protection of vulnerable areas and resources in the event of an oil spill.

In 2017, the MPCS solicited information from various stakeholders to update the Plan. The section collected information pertaining to:

- the inventory of available equipment, vehicles or vessels for oil spill response as well as the contact information for the persons who were able to authorize access to and use of the equipment, vehicles or vessels;
- existing agency-specific response plans; and
- updated data such as the names, posts and contact information for members of the National Oil Spill Response Committee (NOSRC).

With respect to the NOSRC, the functions of this Committee include, *inter alia*, evaluating preparedness for response to an oil spill incident, providing advice on funding mechanisms for

the Plan and developing and implementing mechanisms to ensure that the roles and responsibilities of stakeholders are clearly understood by all stakeholders identified in the National Plan. There was one meeting of the committee in 2017. The meeting discussed, among other things, the following documents.

- A memorandum of understanding (MOU) for industries in regards to sharing resources;
- A MOU for suppliers of equipment and personal protection equipment;
- A protocol for volunteers who would assist in the event of an oil spill; and
- A protocol for the Media.

### **6.1.3 Regulatory and compliance inspections**

Regulatory inspections seek to characterize polluting sources by identifying those aspects of a company's operations that have the potential to harm the environment. This is a requirement under Section 4 of the MPCA. Once these sources are identified, the section notifies the operator of areas of non-compliance with applicable legislation or policy and the required action to come into compliance.

The MPCS conducts compliance inspections at least six months after the final regulatory notice from a regulatory inspection is issued to an establishment. A compliance inspection is done to determine the extent to which the entity implemented the required action(s).

No regulatory or compliance inspections were performed in 2017. However, the officers of the MPCS worked to finalize reports of regulatory inspections conducted at Barbados Bottling Company, Berger Paints, Pine Hill Dairy, B&B Distribution, Chickmont Foods Limited and the Super Centre Meat Facility.

The delay in the finalizing the reports was due to the workload of the officers in the section and the process of redesigning the format of the regulatory notices.

As of December 31, 2017, work was still going to finalize the aforementioned reports.

### **6.1.4 Complaints and Investigations**

The MPCS investigates complaints about poor environmental practices that can impact negatively on the marine environment. Complaints can be lodged by individuals or organisations. Complaints are classified as Oil Pollution, Wastewater Discharge, Fish Kill, Scuttling of Vessels, Algal Bloom or Other.

In 2017, the MPCS received and investigated five complaints pertaining to marine pollution. The majority of these complaints (3) were related to "Wastewater Discharges". The remaining complaints were classified as "Oil Pollution" and "Other". The "Other" complaints involved possible impact on the nearshore at Barbados Light and Power Company Limited (BL&P) on Spring Garden, St. Michael. Additionally, the section investigated a fish kill incident, which was reported in the local newspaper.

Enforcement notices were served to alleged offenders identified from four of the investigations.

Between 2013 and 2017, there was an overall decline in the number of complaints received by the MPCS: 21, 11, 17, 23, and 5 complaints were received in 2013, 2014, 2015, 2016 and 2017 respectively. Similarly, there were decreases in the proportions of complaints classified as Oil Pollution, Wastewater Discharge, Algal Bloom and Other (see Figure 4). Over the period, there were no complaints lodged with the section regarding Fish Kills, Sediment or the Scuttling of Vessels.

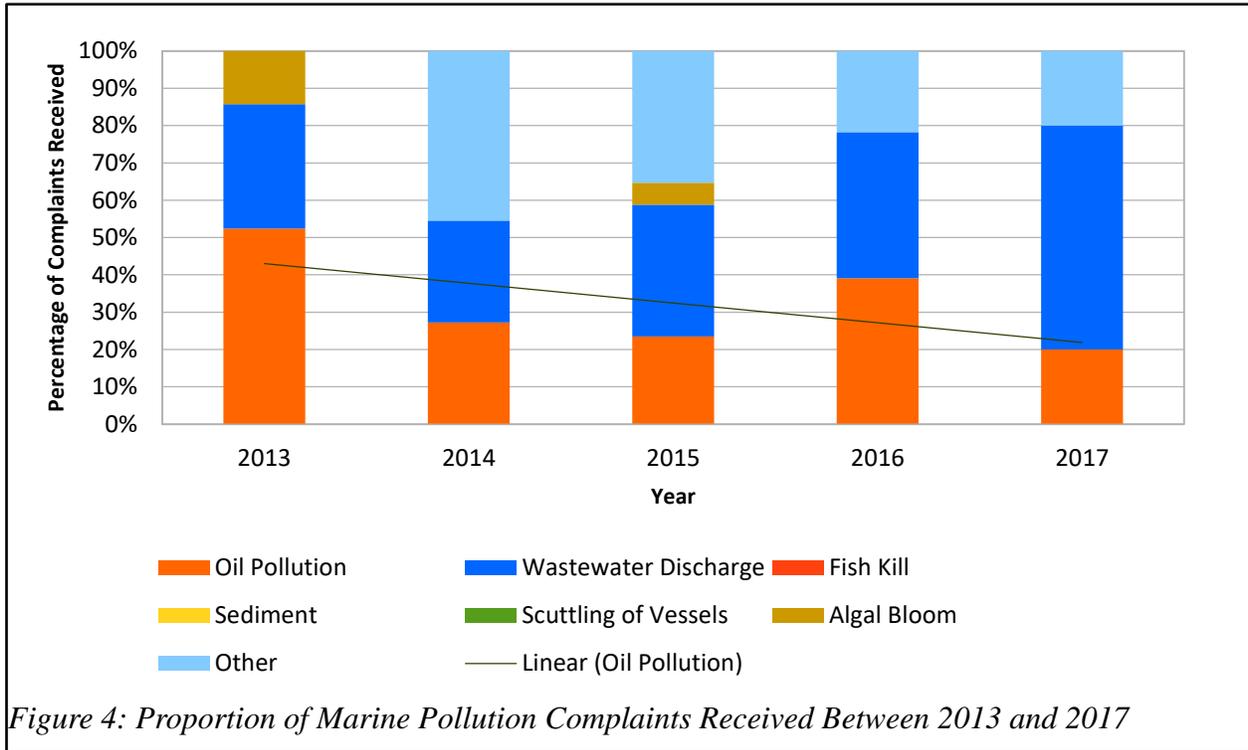


Figure 4: Proportion of Marine Pollution Complaints Received Between 2013 and 2017

Although the number of complaints has decreased over the past five years, the ability of the MPCS to bring closure to complaints is still limited because the attendant regulations, under the Marine Pollution Control Act, have not come into force. Without the relevant regulations, there is little impetus for an offender to curtail their negative behaviour.

### 6.1.5 Other Activities

In addition to the aforementioned activities, the MPCS also undertook or was involved in the following. The MPCS:

- Monitored and prepared report on activities relating to the decommissioning of fuel tanks or soil remediation at various SOL and RUBIS service Station and ESSO Holborn Terminal to ensure compliance with prevailing environmental policies and regulations.
- Updated its complaints database.
- Conducted technical reviews of applications and files that fell under the management of marine pollution control.

- Reviewed and commented on water quality monitoring reports submitted by various agencies as part of the management of wastewater discharges in Barbados.

## **7 Multilateral Environmental Agreements**

Coordination of the activities aimed at implementing the multilateral environmental agreements (MEAs) is executed by the Environmental Technical Officers; Marine Pollution Control Section; and the Solid Waste and Hazardous Materials Section.

MEAs are legally binding agreements between three or more states relating to environmental issues. The EPD is responsible for the following MEAs:

- Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention) and specifically the Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region and the Protocol Concerning Pollution from Land-based Sources and Activities to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (LBS Protocol);
- Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal;
- The Stockholm Convention on Persistent Organic Pollutants (POPs); and
- Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons or Chemicals Weapons Convention (CWC).

Additionally, the Department is responsible for the Strategic Approach to International Chemicals Management (SAICM). SAICM is a policy framework for international action on chemical hazards. It supports the achievement of the goal to ensure that by 2020 chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health. The Department also has some reporting responsibilities for the national obligations under the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the London Convention).

### **7.1 Activities for 2017**

The activities undertaken by the Department for the year 2017 were as follows. The Department:

- Monitored the transboundary movement of hazardous waste under the Basel Convention;
- Undertook projects under the Stockholm Convention;
- Took steps to implement national obligations under Chemicals Weapons Convention; and
- Continued efforts to support the implementation of the Globally Harmonized Systems of Classification and Labelling of Chemicals (GHS) in Barbados.

### **7.1.1 Basel Conventions**

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is a comprehensive global environmental agreement on hazardous and other wastes. The Convention aims to protect human health and the environment against the adverse effects resulting from the generation, management, transboundary movements and disposal of hazardous and other wastes. The Basel Convention came into force in 1992 and Barbados has been a Party since 1995.

The EPD's role in the Basel Convention is to provide technical assistance and guidance to waste generators, to ensure that hazardous waste is treated and disposed of in an environmentally sound manner. Where local disposal is not possible given the technical and infrastructural constraints of the island, the Department regulates the movement of hazardous and other wastes out of the country, in keeping with the guidelines of the Basel Convention. Annual reports are generated for submission to the Basel Convention Secretariat, which helps to provide data to determine future initiatives required to strengthen the Convention. The Department also serves as the local implementation arm for undertaking projects, training and technology transfer.

During 2017, the Department submitted the Basel Convention Annual Report for the calendar year 2015 to the Secretariat of the Convention after it was approved by Ministry of Environment and Drainage. The Department also prepared the Annual Report on activities related to the Basel Convention for 2016. The 2016 report noted, among other things, that there was no importation of hazardous or other wastes but exportation of hazardous wastes and other wastes (10.2 tons of obsolete pesticides) took place in the reporting year. Moreover, the report noted there was still no legislation in Barbados to implement the provisions of the Basel Convention. The 2016 report was submitted to the Ministry of Environment and Drainage for approval.

Despite the absence of suitable legislation for the implementation of the Basel Convention, officers of the Department delivered presentations to stakeholders to raise awareness about the benefits and provisions of the Convention.

### **7.1.2 Stockholm Convention**

The Stockholm Convention on Persistent Organic Pollutants (POPs) is a global treaty to protect human health and the environment from a category of highly dangerous organic chemicals. Exposure to Persistent Organic Pollutants (POPs) can lead to serious health effects including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater disease susceptibility and even diminished intelligence. Given their long-range transport, no one government acting alone can protect its citizens or its environment from POPs. In response, the Stockholm Convention, which was adopted in 2001 and entered into force in 2004, requires Parties to take measures to eliminate or reduce the release of POPs into the environment.

The Environmental Protection Department is responsible for the implementation of the Convention. In 2017, the Department undertook activities aimed at fulfilling the obligation of the Convention.

#### **7.1.2.1 Development and Implementation of a Sustainable Mechanism for POPs**

During 2017, the EPD undertook the following activities under the project, “Development and Implementation of a Sustainable Management Mechanism for POPs in the Caribbean”.

The Inventory Initiation Meeting was convened on February 22, 2017. The objective of the meeting was to engage key stakeholders to inform them about the process of conducting the POPs inventories and updating the NIP for Barbados. It was attended by representatives from the Basel Convention Regional Centre for the Caribbean, the Caribbean Public Health Agency (CARPHA) and local stakeholders. Subsequently, the process of engaging the services of personnel in Barbados to assist CARPHA with conducting the inventories was completed and the POPs inventories were prepared.

Meetings of the Project Working Committee were also convened to discuss the project’s progress reports and the draft inventories. Additionally, representatives from the EPD attended the Regional POPs Inventory Validation Meeting, where the POPs inventories for Barbados were provisionally accepted.

#### **7.1.2.2 GMP II Project**

The project “Supporting the Implementation of the Global Monitoring Plan of POPs in Latin America and Caribbean States” commenced in 2016 and is scheduled to conclude in June 2019. The objectives of the project are to strengthen local laboratory capacity to test for POPs; contribute to the generation of data for the global monitoring plan, and support the building of regional analytical capacities.

In 2017, the EPD continued activities for a project to build local laboratory capacity to test for POPs in various media. Activities that were undertaken by the section included:

- Coordinating the collection of samples of breast milk from 51 first-time mothers;
- Retrieving and deploying sampling media from the passive air samplers located at the Caribbean Institute of Meteorology and Hydrology, Husbands, St. James;
- Collecting samples of vegetables, pork, fish, soil and sediment for analysis; and
- Reporting to the project coordinators regarding progress made.

#### **7.1.2.3 Global Atmospheric Passive Sampling Project**

Monitoring under the Global Atmospheric Passive Sampling (GAPS) project continued with the deployment and collection sampling media conducted quarterly. The collected media were sent overseas and analysed by Environment Canada. The GAPS network is a global research survey that monitors the presence of POPs and other chemicals in the air. The data obtained are used by countries to establish temporal trends and to determine if the measures used to reduce the levels of pollutants in the atmosphere are being effective.

#### **7.1.2.4 Incinerator Assessment Study**

In 2015, the Department began a project to assess the environmental impacts of the operations of the waste incinerator located at the Grantley Adams International Airport (GAIA). Arrangements were made with the Faculty of Science and Technology (FST) of the University of the West Indies Cave Hill Campus to collect and analyse samples from the incinerator. However, delays in obtaining information regarding the incinerator from the representatives from GAIA and challenges collecting the necessary samples prevented completion of the project. In 2017, the Department decided to extend the project deadline to the end of the 2018-2019 financial year and make arrangements with an international laboratory to analyse the samples.

#### **7.1.3 Chemical Weapons Conventions**

The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (Chemical Weapons Convention) aims to eliminate an entire category of weapons of mass destruction by prohibiting the development, production, acquisition, stockpiling, retention, transfer or use of chemical weapons by State Parties<sup>1</sup>. States Parties, in turn, must take the steps necessary to enforce prohibition with respect to persons within their jurisdiction. Via a Cabinet decision in 2009, the Department was charged with administering Barbados' obligations under this Convention.

During 2017, the EPD prepared the annual report for activities undertaken in 2016 regarding Barbados' obligations under the Convention. 2016 reported highlighted that Barbados does not have a national programme for the implementation of protective measures against chemical weapons. However, the report noted that the Government was in the process of drafting a Chemical, Biological, Radiological, Nuclear (CBRN) Plan, which would address chemical weapons. The report was completed and submitted to the Ministry of Environment and Drainage for onward submission of the Technical Secretariat of the Convention through the Ministry of Foreign Affairs.

The Department also prepared and circulated correspondence to stakeholders requesting the necessary information to compile the 2017 annual report.

#### **7.1.4 Implementation of the GHS**

The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is a logical and comprehensive approach for defining hazards of chemicals, applying hazard criteria (using an agreed methodology to classify chemicals) and communicating hazard information on labels and Safety Data Sheets (SDS). The ultimate goal of the GHS is to ensure that information on chemicals hazards is made available to workers and consumers in a harmonized and comprehensible format in countries around the world

In 2017, the implementation of the activities identified as a means of utilizing the unspent funds under the project "Strengthening Capacities for Strategic Approach to Chemicals Management (SAICM) Implementation and Supporting the GHS Capacity Building in Barbados" continued. These activities were:

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<sup>1</sup>States Parties is the term used to describe countries that have signed onto the Convention.

- the development of a public awareness campaign for the GHS; and
- a guidance document to inform the development of GHS legislation.

Merville Lynch Productions completed the materials for the public awareness campaign, namely, the GHS jingle; TV, radio and print advertisements; refrigerator magnets; posters; a Facebook Page and YouTube channel. The materials were aired on CBC TV, broadcast on the radio stations of CBC, Starcom Network and Habmar Investment Inc. and advertisements were placed in Barbados Today, the Nation newspaper and the Barbados Advocate. Distribution of the posters and magnet did not occur.

With respect to the guidance document, the Consultant, Aleeza Moseley and Co submitted drafts of the socio-economic report and guidance document.

By the end of 2017, the Department was still reviewing the documents pertaining to the legal guidance and Merville Lynch Productions was preparing the script for the “Man-on-the-Street” video, which will assess the effectiveness of the GHS campaign to raise public awareness.

### **7.1.5 London Convention**

The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention), seeks to promote the effective control of all sources of pollution of the marine environment and encourages Parties to the Convention to take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

Under Article 6 of the Convention, Parties to the Convention must designate an appropriate authority. The authority shall, among other things, issue permits for the dumping of specified materials, keep records of the nature and quantities of all matter permitted to be dumped and the location, time and method of dumping and report such activity to the Secretariat of the Convention. The EPD is the designated authority for the Convention.

In 2017, the Department reported to the Ministry of International Transport, for onward submission to the Secretariat of the Convention, that during the period October 1, 2016, to October 1, 2017, no permits were issued authorizing the disposal of wastes at sea.

### **7.1.6 Other Activities**

The EPD, in conjunction with the Ministry of Agriculture, Food, Fisheries and Water Resources, prepared and submitted a project proposal to the Special Programme for funding. The project entitled, “Improvement of Chemical and Pesticide Management in Barbados to Support the Implementation of Chemicals and Waste Related Multilateral Environmental Agreements (MEAs)” aimed to enhance Barbados’ capacity to fulfil its obligations under the Stockholm and Basel Conventions by identifying and capitalizing on synergies between the MEAs and national priorities, improving inter-agency/sector cooperation, improving reporting through the systematic collection and management of data, and establishing and/or strengthening the relevant policies and institutional arrangements to support their implementation.

Concomitantly, the project would support the implementation of the SAICM by fostering greater cooperation amongst government agencies and between the private and public sectors to collect data for effective management of chemicals of national concern (POPs, hazardous waste, mercury, pesticides etc.) and by regulating the activities of public and private actors and other handlers of pesticides with regards to select chemicals.

Additionally, the project would identify existing institutional capacity that could be exploited or capacity that needed to be installed to support the effective implementation of the Rotterdam and Minamata Conventions if or when Barbados became Party to them.

The key project outputs included:

- An integrated action plan approved by the Cabinet of Barbados for synergistic actions to achieve implementation of the Basel, Stockholm Conventions and SAICM and to support future implementation of the Minamata and Rotterdam Conventions;
- An operational information management system for chemicals of national concern including pesticides along with a user manual and a cadre of officers trained in the use of the system;
- Programmes for the training and certification of pest control operators and the training of other handlers of pesticides; and
- A cadre of stakeholders trained in the methodologies and tools of integrated/strategic environmental assessment, and policy development and implementation.

Unfortunately, the project was not selected for funding by the Secretariat of the Special Programme. However, the EPD will seek to identify other avenues to fund the project.

## **8 Management of Solid and Hazardous Materials**

The Solid Waste and Hazardous Materials Section (SWHMS) is responsible for the regulation of solid waste management facilities and disposal of hazardous substances. This is achieved by inspecting solid waste disposal sites; advising the public on the safe storage, use and disposal of hazardous substances; helping businesses and industries to identify and manage hazardous waste and developing policies for the management of hazardous substances. Additionally, the section monitors and facilitates the shipment of hazardous substances abroad for environmentally sound disposal under the protocols of the Basel Convention and reports this activity to the Secretariat of the Convention.

During 2017, the SWHMS was staffed by one officer – a Senior Environmental Protection Officer. The other post assigned to this section, the post of Environmental Protection Officer, was vacant.

### **8.1 Activities of the Section**

In 2017, the SWHMS:

- vetted applications for the importation of radioactive materials;
- assessed pesticide applications;

- offered advice on the disposal of hazardous substances; and
- conducted inspections of Government operated landfills and disposal sites.

### **8.1.1 Processed applications for the importation of radioactive materials**

The Department of Commerce issues licences for the import of radioactive material into the island. In partial fulfilment of the requirements to obtain the license, importers of radioactive materials must obtain approval from the EPD.

In 2017, the Department received, processed and endorsed 48 applications to import radioactive materials for medical purposes.

### **8.1.2 Pesticide applications**

In 2017, the SWHMS received and vetted 26 applications for the importation of pesticides into Barbados. Recommendations were made to the Chair of the Pesticide Control Board to approve 24 of those applications while two applications were recommended for refusal. The applications were refused due to insufficient information on the ingredients in the pesticides and the potential impacts on the environment and or human health.

### **8.1.3 Disposal Advice**

Disposal advice is a general enquiry about how to dispose of a substance. The advice was provided on a case-by-case basis, taking into account several factors such as the quantities and toxicity of the waste to be disposed of. If a chemical could not be disposed of locally, the owner of the waste was instructed to ship the chemical out of the country to an approved facility following the procedure set out by the Basel Convention to which Barbados is Party.

During 2017, the SWHMS received and addressed 24 requests for disposal advice. Requests for assistance were primarily from commercial entities and the Ministry of Education.

There were two main challenges encountered with respect to the provision of disposal advice. Firstly, with the closure of the Bulky Waste Facility at Bagatelle in St. Thomas, there are no suitable sites to appropriately dispose of electronic and bulky waste. Consequently, advising the public on how to dispose of these items was a challenge and there needs to be a policy to address the disposal of this type of waste to reduce the potential for illegal dumping.

Secondly, limited human resources retarded the process of researching the chemicals to be disposed of and following-up on additional information needed to facilitate the evaluation of the request for disposal advice promptly.

### **8.1.4 Inspected government-operated landfills and disposal sites**

To ensure that the operations of the government-operated sites comply with environmental best management practices, the EPD regulated disposal of waste at several disposal sites operated by the Sanitation Service Authority (SSA). These disposal sites were:

- Mangrove Pond Landfill, St. Thomas;
- the former Bulky Waste Facility, Bagatelle, St. Thomas;
- Asbestos Disposal Site, Rock Hall, St. Philip; and

- Blood and Grease Disposal Site, Lonesome Hill, St. Peter.

In addition to the disposal locations listed above, the section monitored and regulated the activities at Edgumbe Quarry. This location was used for the disposal of construction and demolition waste and vegetative matter.

The SWHMS conducted routine inspections of the government-operated disposal sites in July of 2017. Some of the observations made during the inspections included thick vegetation at one location that made a determination of illegal dumping activity or damage to the site fence difficult; and illegal dumping around some disposal sites. A report on the observations was prepared for the site visits and any concerns observed were brought to the attention of the SSA.

There were no landfill inspections done throughout the year, except in July, since the details of the merger of the Solid Waste and Hazardous Materials Section with the Derelict Programme were being finalised and a Standard Operating Procedures for the merged section was being prepared. However, site visits to the Mangrove Pond Landfill and Lonesome Hill Disposal site were conducted on August 18, 2017, to assess the condition of these sites after the passage of Tropical Storm Harvey.

### **8.1.5 Inspection of Waste Brokers**

There were no inspections of recycling preparation entities (or waste brokers) throughout the year since the details of the merger of the Solid Waste and Hazardous Materials Section with the Derelict Programme were being finalised and a Standard Operating Procedures for the merged section was being prepared.

Normally, the section would conduct quarterly inspections of known waste brokers facilities such as Solid Waste Solutions & Services; Caribbean e-Waste Management; Paradise Green Energy; Recycling Preparation Inc; B's Recycling; Amelot Oil; Scrap Man Recycling; Verde Oil; and Ace Recycling.

### **8.1.6 Other Activities**

In addition to the aforementioned activities, the officers of the SWHMS:

- Supervised:
  - the destruction and disposal of 77 gaming machines at the Mangrove Pond Landfill along with personnel from Sanitation Service Authority and Barbados Revenue Authority; and
  - the disposal of expired pharmaceuticals.
- Provided advice on an investigation of dumping of vegetation and other materials in the watercourse along with personnel from the Drainage Division, Ministry of Housing and Lands and Lands and Surveys Department.
- Updated the database for radioactive material import applications.
- Participated in a consultative meeting with stakeholders requesting advice and guidance on procedures for opening a Screen printing business.

- Developed a Microsoft Excel Database for the National Inventory for Radioactive Sources.
- Developed a Microsoft Excel database of all of the activities to building capacity with respect to IAEA, which Barbados has participated in as well as the names of the persons who attended those activities.

## **9 Water Quality Management**

The responsibilities of the Water Quality section are to monitor:

1. the quality of the ground/potable water at the source;
2. the quality of the nearshore marine water at several beaches to assess whether the microbial quality of the marine environment is suitable for recreational purposes;
3. the quality of the nearshore marine water at several beaches to assess nutrient quality; and
4. discharges from wastewater treatment facilities.

Three officers staff this section: one Senior Environmental Protection Officer and two Environmental Protection Officers. The section was also assisted by an Environmental Inspector, who was assigned to the section.

### **9.1 Activities of Section**

Activities regarding water quality management for the year 2017 were as follows:

- Monitor the quality of water from potable and agricultural wells and springs.
- Monitor near-shore water quality.
- Conduct a wide-screen analysis of the groundwater resources.
- Monitor wastewater treatment plants.

#### **9.1.1 Groundwater Monitoring**

##### ***9.1.1.1 Monitoring of Public Supply Wells***

To assess the quality of the drinking water in Barbados, water samples were taken from 17 wells and two springs across the island. The EPD collected approximately half of the samples and the Barbados Water Authority collected the remaining samples. The sampling locations are presented in Table 4.

Table 4: Sampling Locations for Public Supply Sources

Belle Catchment	Hampton Catchment	West Coast Catchment	Springs
Applewhaites	Bowmanston	Alleynedale	Benn Spring
Applewhaites Well Field	Carrington	Ashton Hall	Codrington College
Belle	Hampton	Carlton	
Constant		Haymans	
New Market		Molyneaux	
Sweet Vale # 2		Trents	
Waterford		The Whim	

Samples were taken monthly. The Belle catchment was sampled on the first Tuesday of each month, followed by the Hampton catchment on the second Tuesday and the West Coast and Springs on the third and fourth Tuesday respectively.

Two hundred and seventy-two groundwater samples were collected in 2017. The samples collected were tested for twenty-one (21) water quality parameters and, where applicable, the results compared to the World Health Organisation (WHO) Guidelines for Drinking Water (all parameters do not have guideline values). Five parameters that have implications for the health and aesthetic quality of potable water were selected for discussion. These parameters, the associated WHO guideline values, possible sources and their implications are listed in Table 5.

The results of the water quality analysis of the springs were also compared with the WHO Drinking Water Quality Guidelines since the water from springs is used for recreational purposes and consumption by a sector of the society.

Table 5: Selected Water Quality Parameters and their Associated Sources and Health Implications

PARAMETER	STANDARD	SOURCES	IMPLICATIONS
Chloride	250 mg/l	In excessive amounts, it can be an indicator of saline intrusion or pollution from industrial waste or sewage.	High levels may give water an objectionable taste. High concentrations can be corrosive to metal distribution pipes and release heavy metal ions into the water.
Faecal Coliform	0 CFU <sup>2</sup> /100 ml	Indicator of faecal contamination from a warm-blooded animal.	Gastrointestinal illness and other waterborne diseases.
Nitrate expressed as Nitrogen (Nitrate-N)	10 mg/l	Indicator of pollution from agriculture, fertilizer, sewage, and industrial wastewater.	May cause methemoglobinemia particularly in infants less than six months of age.
Sulphates	500 mg/l	General indicator of pollution.	High sulphates concentrations may cause transitory diarrhoea.
Total Dissolved Solids (TDS)	Taste Thresholds <300 mg/l – excellent 300-600 mg/l – good 600-900 mg/l – fair 900-1200 mg/l – poor >1200 mg/l – unacceptable	Indicator of dissolved organic and inorganic substances.  General indicator of pollution.	High total dissolved solids may result in an aesthetically displeasing taste, colour and odour and encrusting of distribution pipes. Low total dissolved solids may result in an insipid taste and cause corrosion of distribution pipes and the release of heavy metal ions into the water.

### 9.1.1.1.1 Chlorides

Average chloride concentrations were observed to be lowest in the Belle catchment and highest in the West Coast catchment (Figure 5). All the public supply wells in Belle and Hampton Catchments and the two springs that are used for public supply recorded average chloride concentrations that were markedly below the WHO guideline value of 250 mg/l. However, three of the seven public supply wells in the West Coast Catchment registered average chloride concentrations that exceeded the standard.

The Whim P.S recorded the highest average chloride concentration of 351.6 mg/l. The Trents P.S was offline for most 2017; only two samples were collected during the year. This may have been a factor in the uncharacteristically low average chloride concentrations observed.

<sup>2</sup>CFU stands for Colony Forming Units

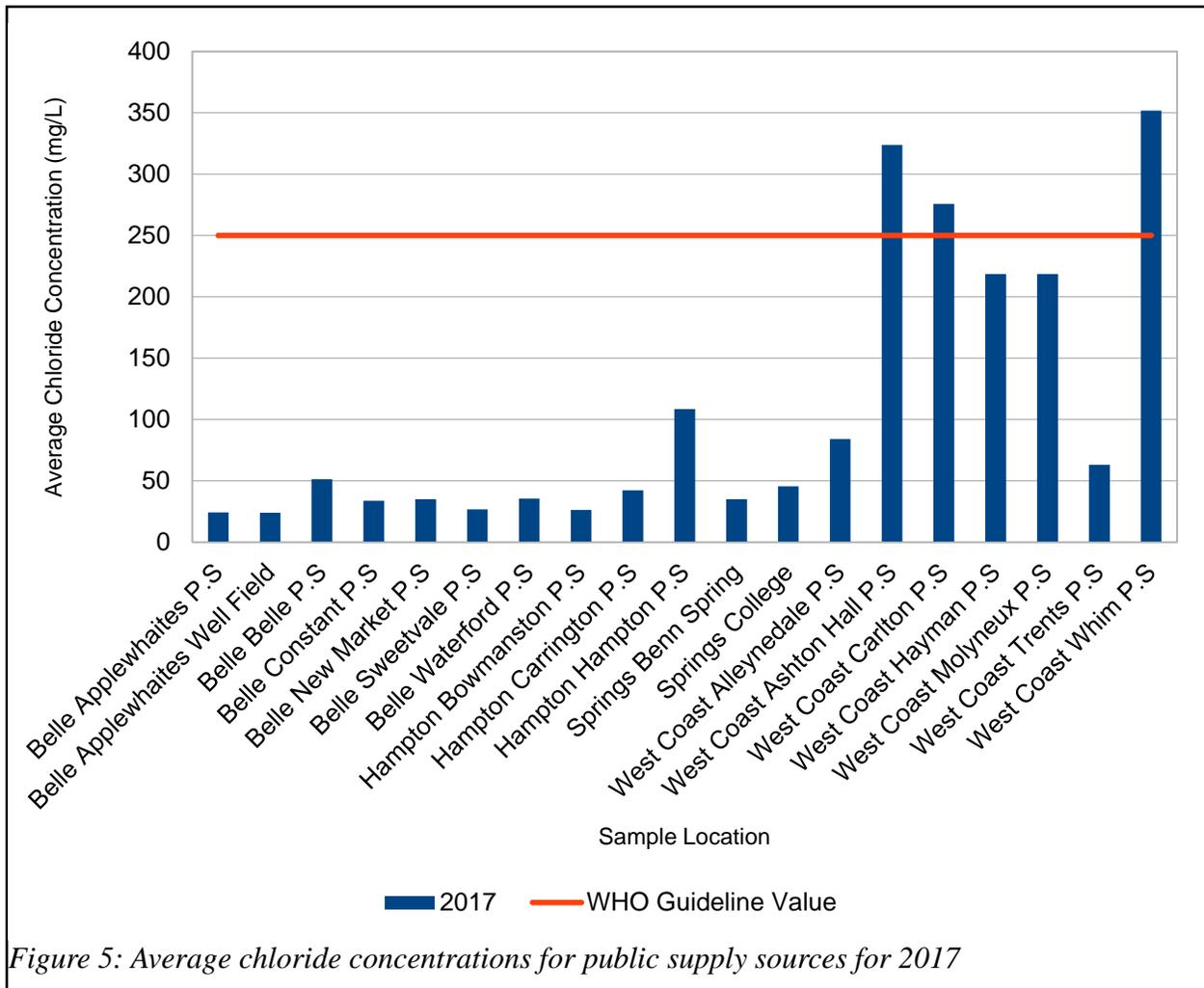
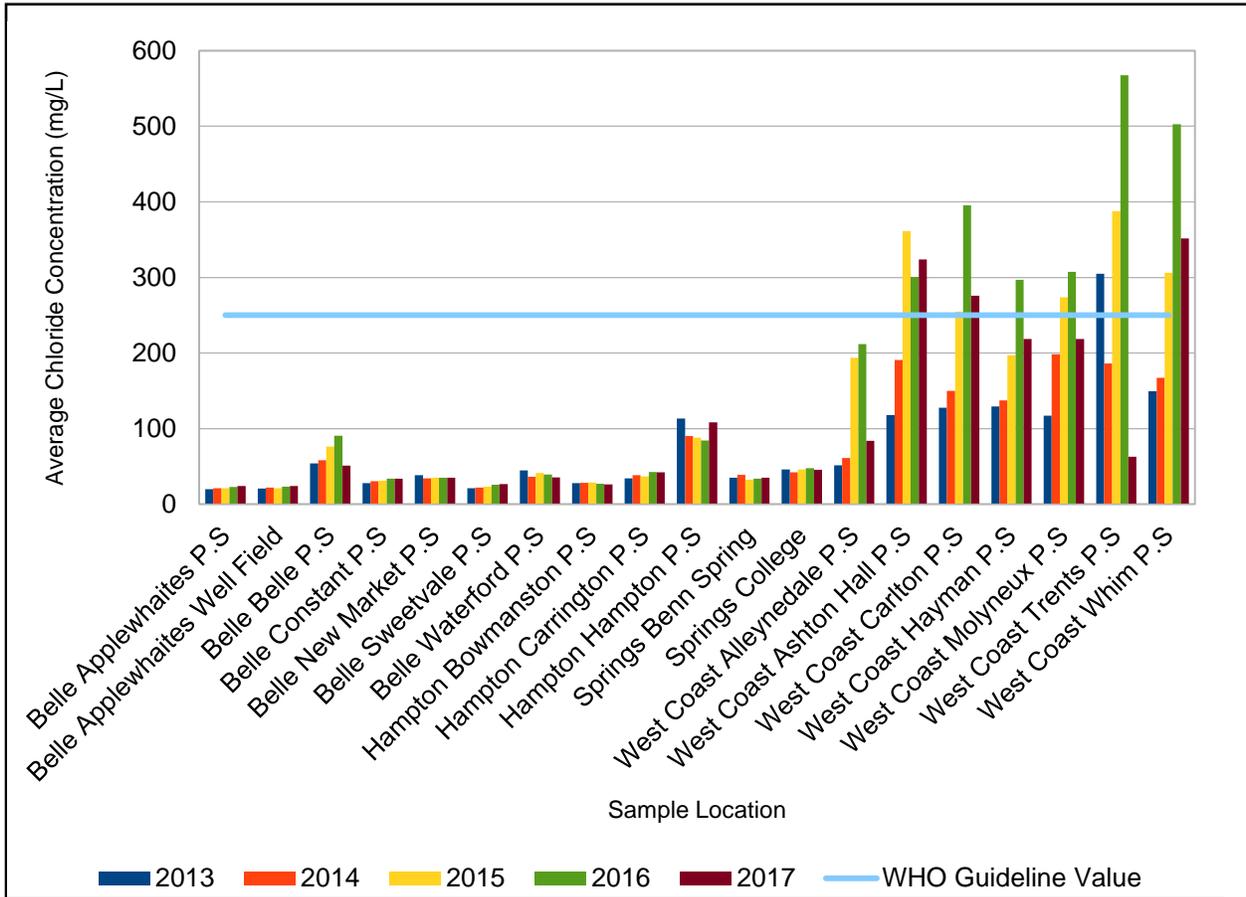


Figure 5: Average chloride concentrations for public supply sources for 2017

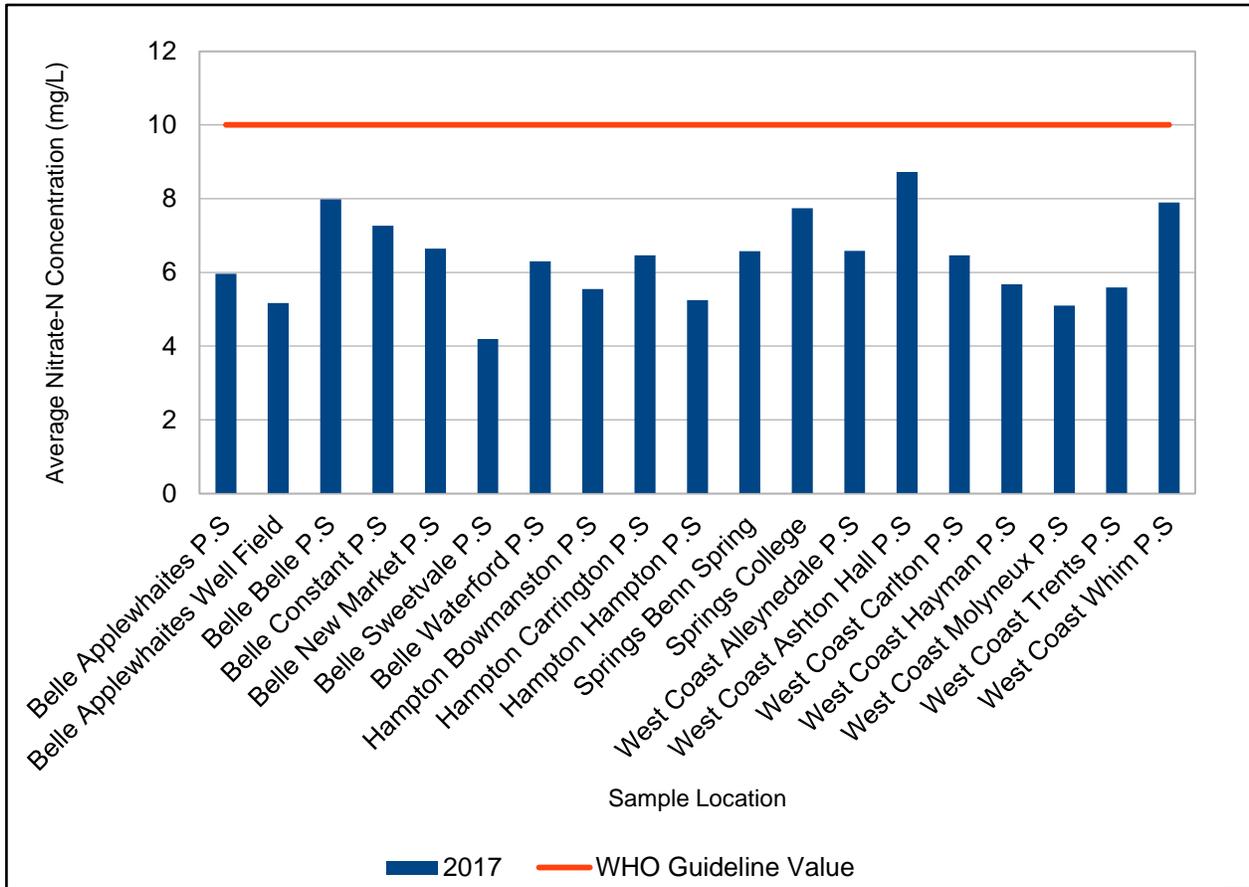
From Figure 6, it is evident that over the period 2013 to 2017 most of the supply wells had similar annual average chloride concentrations. With respect to the public supply sources in the West Coast Catchment, the average chlorides concentrations in 2017 were noticeable less than those observed in 2016. One possible explanation was that there was considerably less rainfall in 2016 than in 2017. The limited rainfall would have hindered recharge of the aquifers in the catchment resulting in a greater concentration of chlorides.



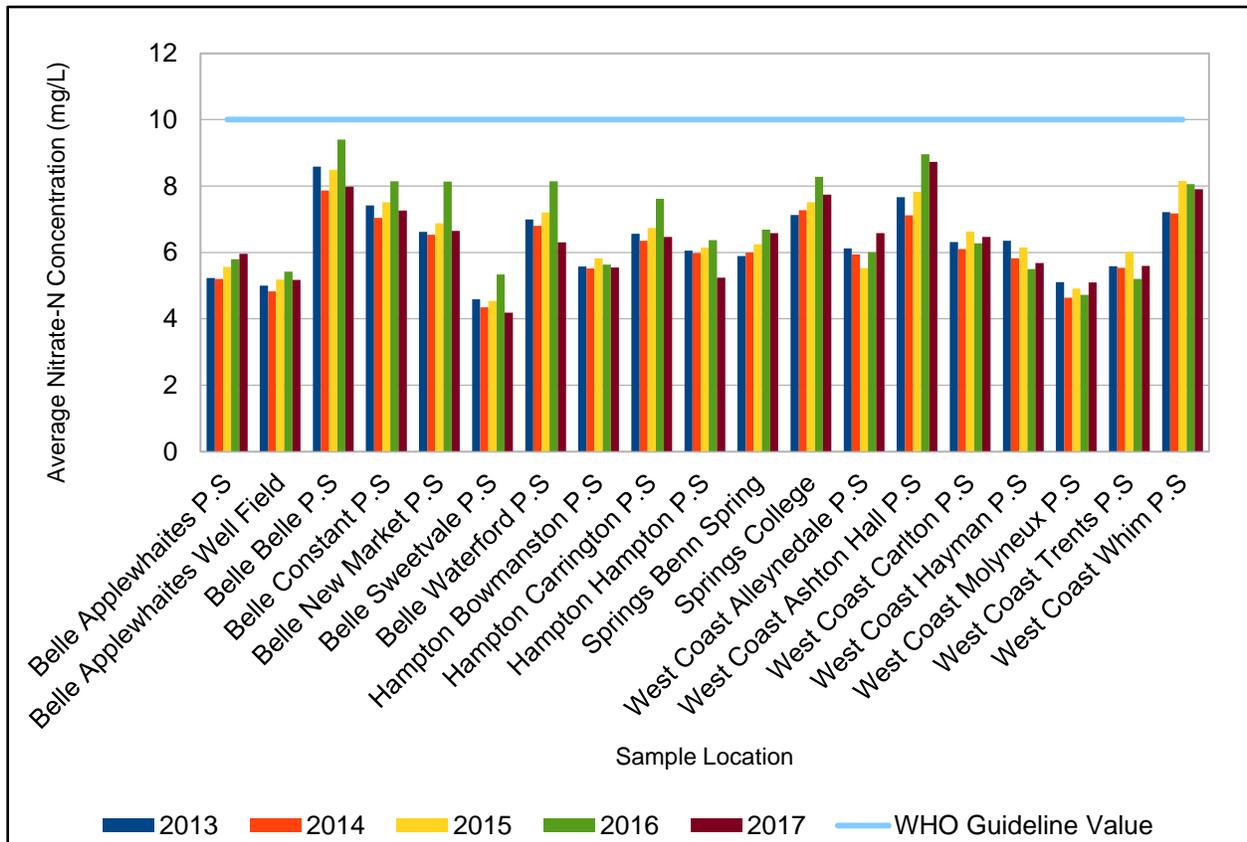
### 9.1.1.1.2 Nitrate expressed as Nitrogen (Nitrate-N)

In 2017, all of the public supply sources recorded average Nitrate-N concentrations that were less than the WHO guideline value of 10 mg/l (Figure 7).

The Ashton Hall P.S recorded the highest average Nitrate-N concentration of 8.7 mg/l. Other wells, which registered elevated average Nitrate-N concentrations (>7 mg/l), were Belle P.S, which recorded with a value of 8.0 mg/l; Whim P.S, which recorded a value of 7.9 mg/l; Codrington College, which recorded a value of 7.7 mg/l; and Constant P.S, which recorded a value of 7.3 mg/l.



For most of the public supply sample locations, the average Nitrate-N concentration observed in 2017 were similar to those observed over the period 2013 to 2016 (Figure 8). The sustained elevated Nitrate-N concentrations at the Belle P.S, Constant P.S, Ashton Hall P.S, and Whim P.S and Codrington College are an indication that measures need to be taken to prevent those levels from reaching or exceeding the WHO guideline value.



### 9.1.1.1.3 Sulphates

For 2017, Ashton Hall P.S recorded the highest average concentration of sulphates, 54.4 mg/l, of all the public supply sources. This value was significantly less than the WHO guideline of 500 mg/l.

Similarly, all of the average concentrations for sulphate over the period 2013-2017 were also less than the WHO guideline value. This illustrated that the supply sources in Barbados were not being overly impacted by sulphates.

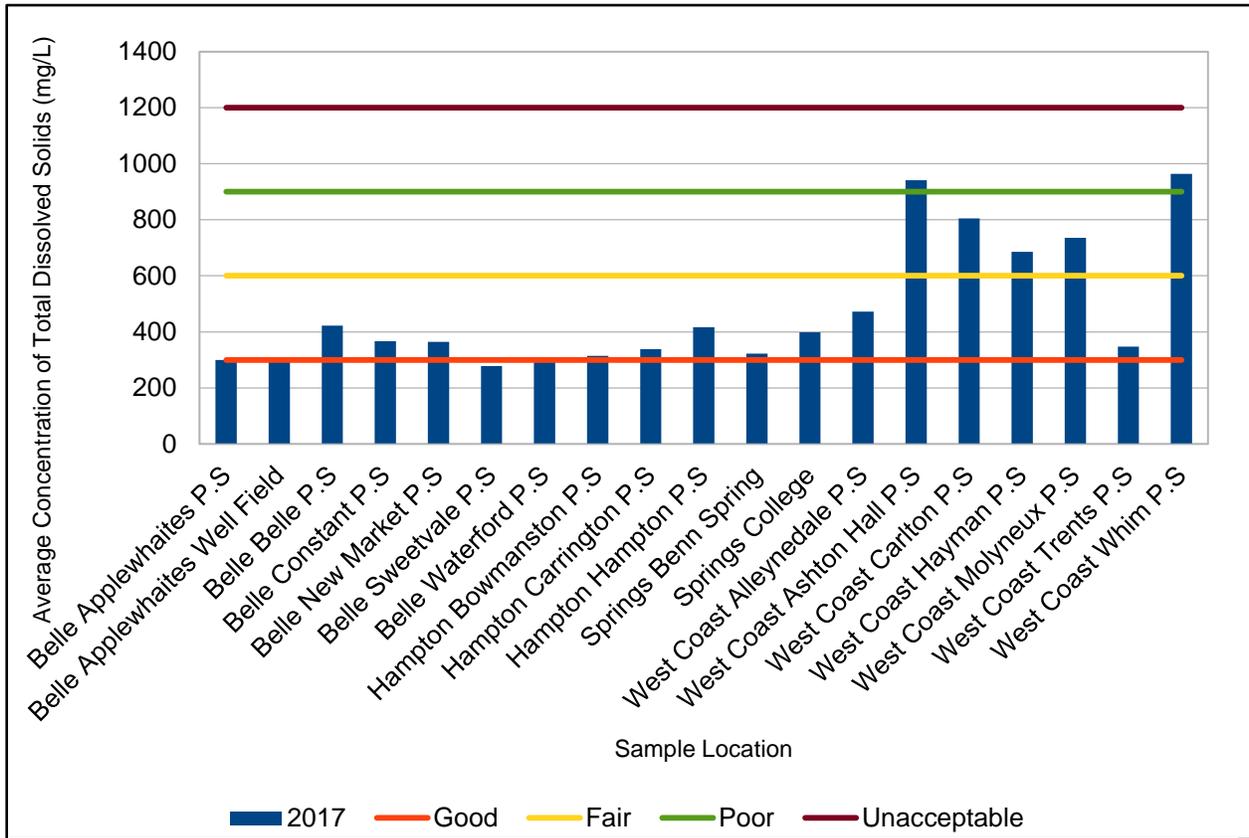
### 9.1.1.1.4 Total Dissolved Solids

The majority of the public supply sources recorded average concentrations of total dissolved solids that were below 900 mg/l (Figure 9). Three sample locations, Applewhaites P.S, New Market P.S, and Waterford P.S, registered average concentrations below 300 mg/l. Water from these locations would be classified as “Excellent” under the WHO drinking water guidelines.

Eleven sample locations recorded average concentrations between 300 and 600 mg/l. Under the WHO drinking water guidelines, water from these locations would have taste classified as “Good”.

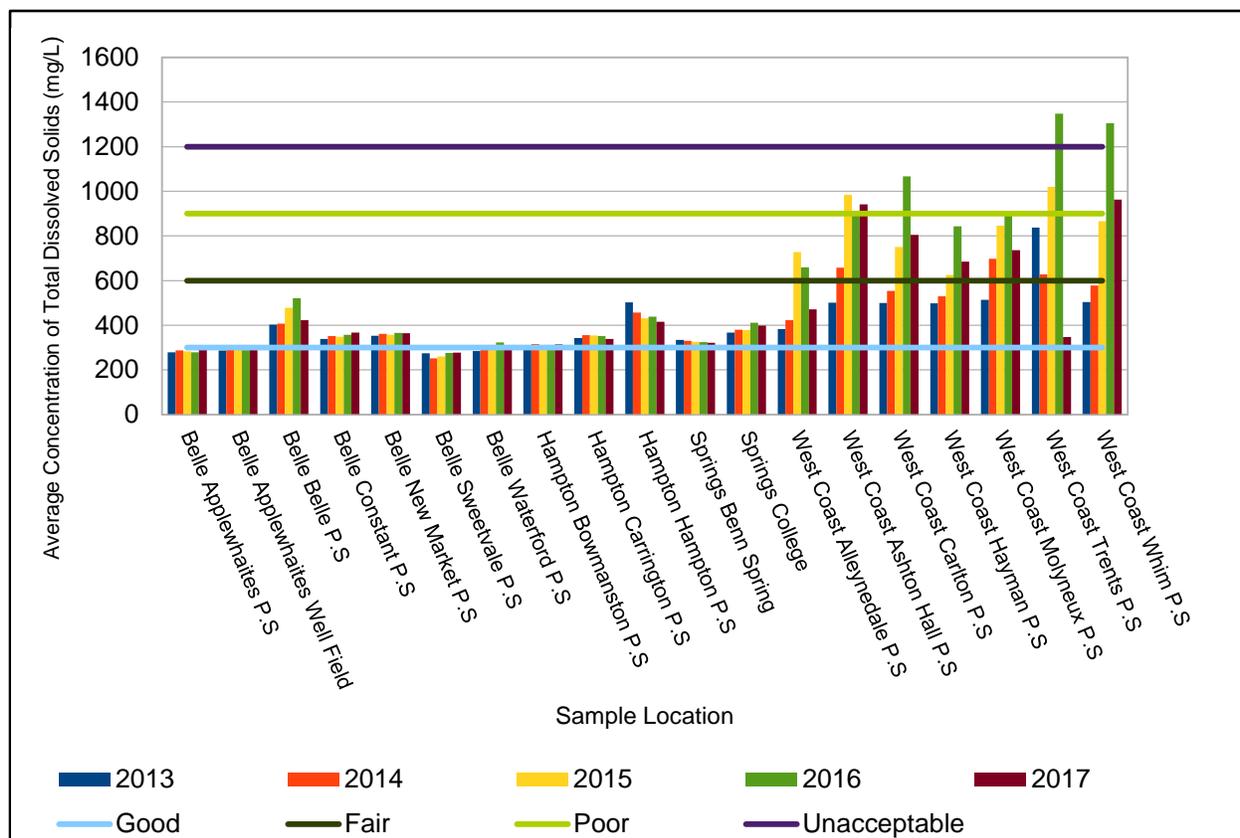
Three sample locations recorded average concentrations between 600 and 900 mg/l. Under the WHO drinking water guidelines, water from these locations would have taste classified as “Fair”.

Two locations (Ashton Hall P.S and Whim P.S) recorded average concentrations above 900 mg/l but less than 1200 mg/l. Therefore, water from these locations would have taste classified as “Poor” under the WHO drinking water guidelines.



Over the period 2013 to 2016, the average concentrations of TDS were greatest in the West Coast Catchment and least in the Belle Catchment; this pattern was also observed in 2017 (Figure 10). Some West Coast locations general experience saline intrusion and this may have been the cause of the elevated concentrations of TDS in comparison to the other catchments areas.

Except for public supply sources in the West Coast Catchment, the average TDS concentrations observed in 2017 were comparable with those recorded from 2013 to 2016. The public supply sources in the West Coast Catchment recorded average concentrations of TDS that were significantly less than those recorded in proceeding years.

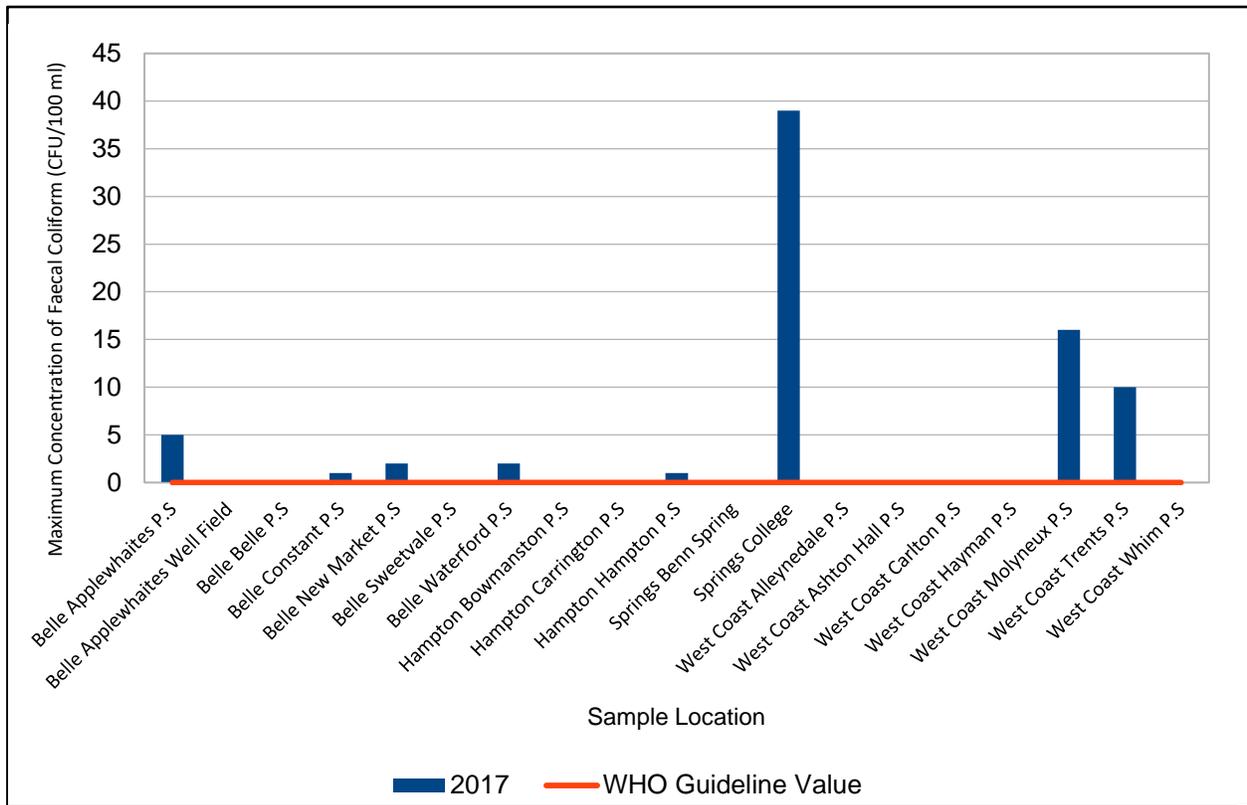


### 9.1.1.1.5 Faecal Coliform

Faecal Coliform is an indicator of faecal contamination. It is used to indicate the potential presence of disease-causing agents. To prevent exposure of the public to such illnesses, water from public supply sources is chlorinated before distribution. If the chlorination is effective, microorganisms should be destroyed, and consequently, the levels of Faecal Coliforms in the drinking water should be zero. The WHO drinking water guideline for Faecal Coliforms is zero Colony Forming Units/100 ml.

Figure 11 depicts the maximum concentrations of faecal coliforms recorded at chlorinated sampling sites in 2017. As is evident from the figure, eight of the public supply sources recorded maximum concentrations of faecal coliform above the WHO drinking water guideline. It should be noted that the samples from Molyneux P.S and the spring at Codrington College were collected before the chlorination point and this may have contributed to the high faecal coliform concentrations observed at those locations.

For the remaining six locations, Applewhaites P.S, Constant P.S, Waterford P.S, Hampton P.S and Trents P.S, the concentration of faecal coliforms observed might have been the result of ineffective chlorination. However, an investigation should be conducted to determine the reason(s) for the faecal coliform concentrations at those locations to exceed the WHO drinking water guideline value.



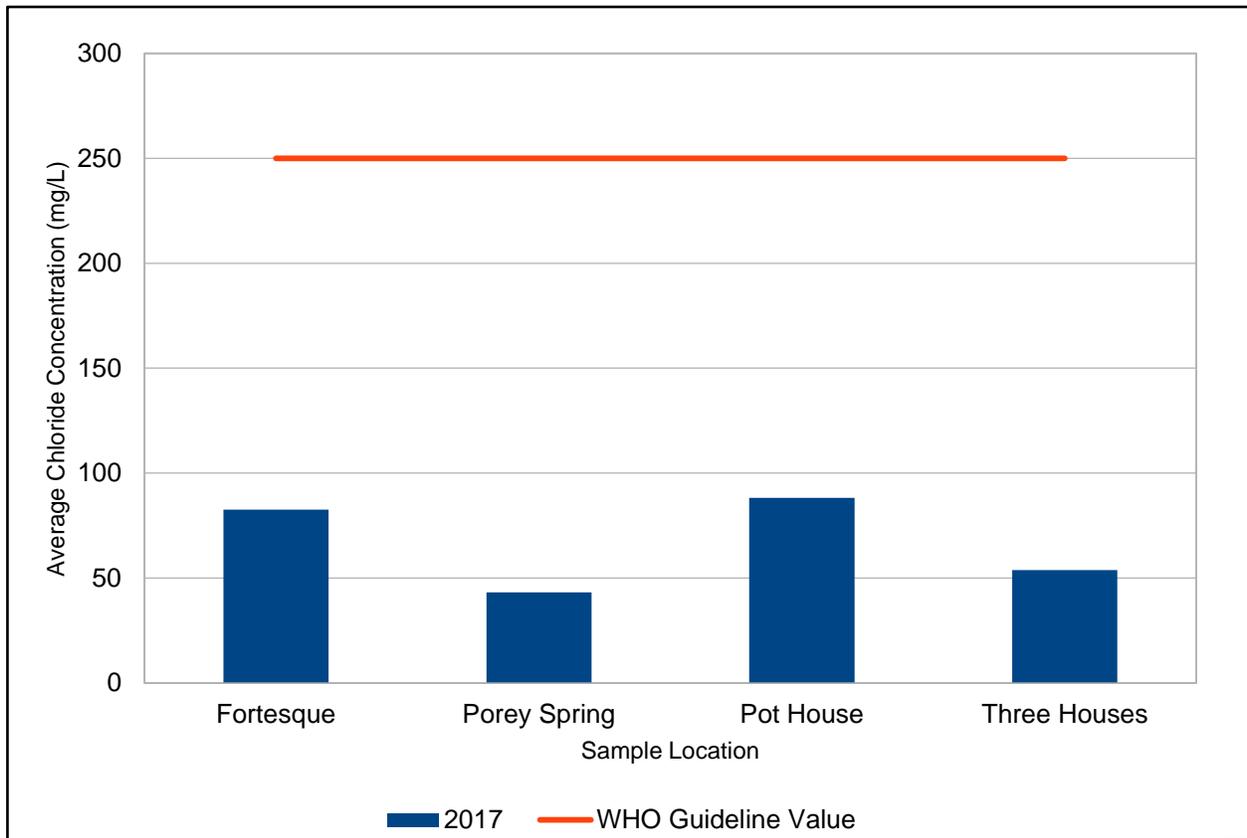
### 9.1.1.2 Monitoring of Natural Springs

In addition to the two springs, which are used to supply drinking water, samples were collected from four additional springs. These springs are located at Fortesque, Porey Spring, Pot House and Three Houses. These springs are not used as a source of public drinking water supply. However, a portion of the society does utilize the water from these locations for some domestic purposes. Consequently, a summary of some of the parameters used for the drinking water sources is presented below, to highlight any threats that might be posed to people utilizing water from these springs. Moreover, an analysis of water from these locations can provide useful insight as to how the groundwater is being impacted.

No samples were collected from the spring at Bath in 2017 because the path to the site was blocked and the site was overgrown with vegetation. The site needs to be cleared so that sampling can resume. The Department contacted the Ministry of Transport and Works with regards to clearing the site. To date, no action has been taken.

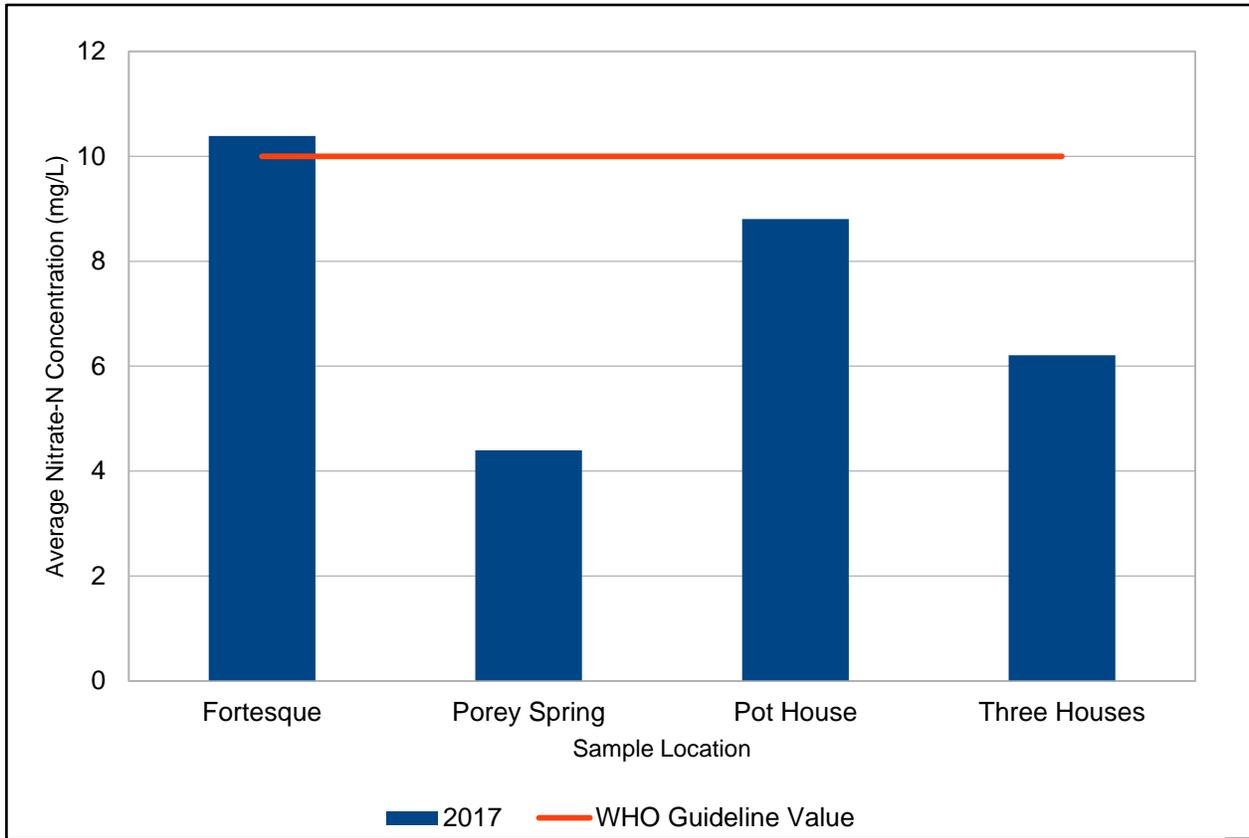
#### 9.1.1.2.1 Chlorides

Figure 12 depicts the average chloride concentrations for the four non-public supply springs. All of the recorded average chloride concentrations were below the WHO drinking water guideline for chloride of 250 mg/l. Pot House recorded the highest average chloride concentration of 88.1 mg/l whereas Porey Spring recorded the lowest value of 43.2 mg/l.



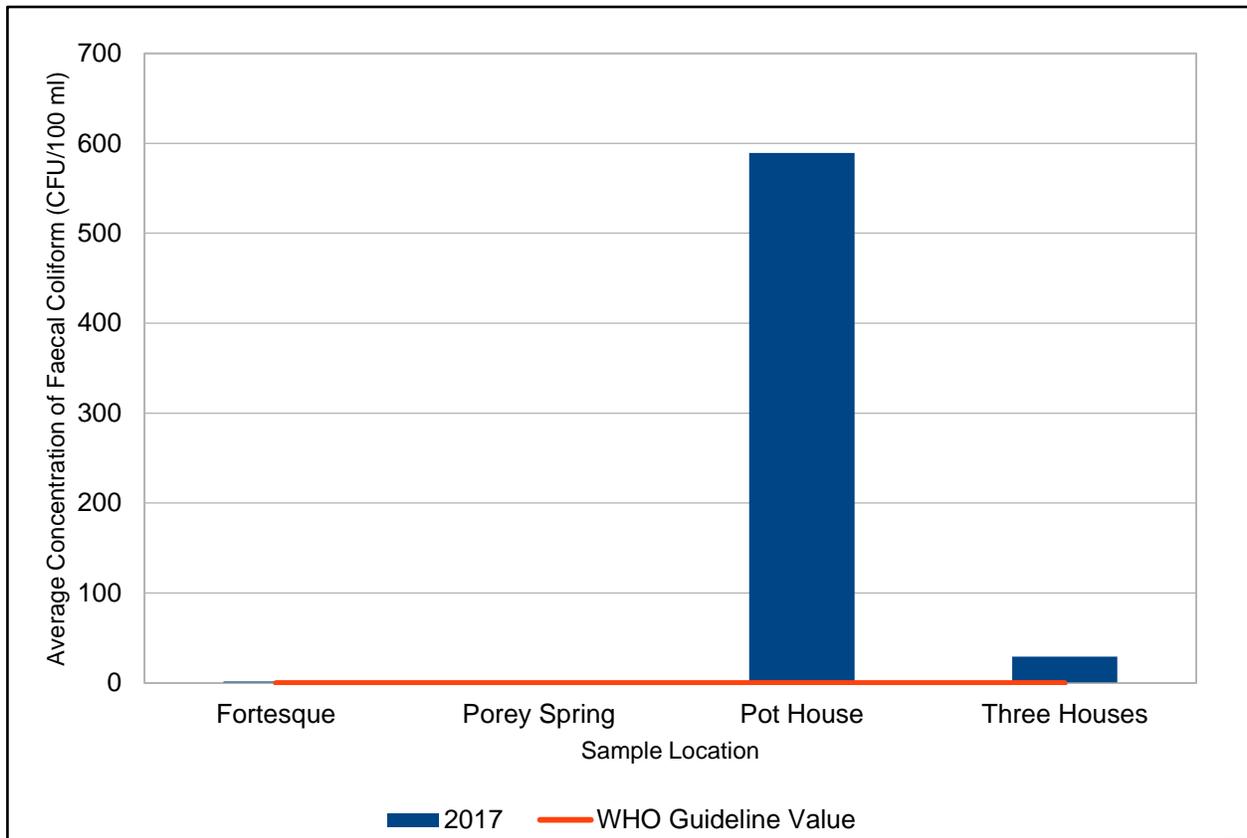
### 9.1.1.2.2 Nitrate expressed as Nitrogen (Nitrate-N)

The natural spring located at Fortesque in St. Philip appeared to have been more impacted by sewage disposal practices and agricultural activities than the other springs (see Figure 13). The spring at Fortesque recorded an average Nitrate-N concentration 10.4 mg/l. The use of water from this location was of particular concern since the average Nitrate-N concentration was above to the WHO drinking water guideline for Nitrate-N of 10 mg/l. In contrast, Porey Spring showed the lowest average Nitrate-N concentration of 4.40 mg/l.



### 9.1.1.2.3 Faecal Coliform

The waters from the springs are not chlorinated. Consequently, all of the springs recorded an average concentration of Faecal Coliform above the WHO drinking water guideline value of zero CFU/100 ml (see Figure 14).



The spring at Pot House recorded the highest average faecal coliform concentration of 589 CFU/100 ml. Fortesque and Porey Spring recorded the lowest average concentrations of faecal coliform, 2 CFU/100 ml.

High concentrations of faecal coliform in water from this location indicated the possible presence of pathogens that may induce gastrointestinal illness in persons who ingested the water. To minimize the risk to the public from using water from springs, educational programmes need to be developed, which highlight the dangers associated with the use of untreated spring water for potable or domestic purposes.

### 9.1.2 Nearshore Water Quality

The Nearshore Recreational Water Monitoring Program has been in existence since 1993. The goal of this programme is to ensure that bathing beaches are safe for swimming and indicates the effect of land-based activities on water quality in the marine environment. Marine water samples are collected weekly from 18 popular West and South coast bathing sites. These sites are listed below in Table 6.

Table 6: Beaches sampled under the Nearshore Recreational Water Monitoring Programme

West Coast	South Coast
Brandons	Brownes Beach
Brighton	Pebbles
Paradise	Amaryllis

Batts Rock	Accra
Coach House	Worthing
Holetown	Dover
Mullins	Graveyard
Heywoods	Welches
	Miami
	Silver Sands

Samples were analysed for microbial, physicochemical and nutrients parameters. The public health laboratory at Sir Winston Scott Polyclinic conducted the microbial analysis of samples while the Government Analytical Services (GAS) analysed the samples for the inorganic or nutrient parameters.

#### ***9.1.2.1 Microbial Analysis***

One thousand six hundred and forty-five samples were collected and analysed for microbial parameters. The microbial parameters analysed were Faecal Coliforms and Enterococci. Faecal Coliforms and Enterococci are used as indicator organisms to show the presence of faecal contamination of water sources. Their presence may indicate the potential for pathogenic organisms to be present in a water body.

The results of the microbial analysis were compared to the standards for Faecal Coliform and Enterococci that are outlined in the proposed List of Prohibited Concentrations under the Marine Pollution Control Act, CAP 392A. These standards are presented in Table 7 below.

Table 7: Marine Quality Parameters and Proposed Standards

Parameter	Standard
<b>Enterococci</b>	The geometric mean of a minimum of 5 samples should not exceed 35 colonies/100ml in any 30-day period.
<b>Faecal Coliform</b>	The geometric mean of a minimum of 5 samples should not exceed 200 colonies/ 100ml in any 30-day period. AND No more than 10% of samples exceed 400 colonies/100ml

In 2017, all of the bathing water sites from which an adequate number of samples were collected, except for Site #2 at Holetown, conformed to the standards for enterococci and faecal coliform. Site #2 at Holetown failed to comply with the standard for faecal coliform in July when more than 10% of the samples exceeded 400 CFU/100 ml. This site is the outlet of the Holetown Lagoon (Holetown Hole) and a discharge point of the gully that is impacted by upstream activity. However, the berm was not reported as being breached when the samples were collected. Consequently, there was no identifiable explanation for the elevated levels of faecal coliform.

There were 141 instances out of a total of 352 sampling event when an insufficient number of samples (less than 5) were collected. Consequently, those results could not be compared to the standards. It should be noted that in November the public health laboratory relocated from Jemmott's Lane to Martindales Road. The relocation prevented sampling from the occurring, which contributed to the instances of insufficient samples.

#### **9.1.2.2 Physicochemical and Nutrient Analysis**

Collected samples were tested for the physicochemical parameters: pH, total suspended solids (TSS); and nutrients: total nitrogen (TN) and total phosphorous (TP).

pH has a direct impact on the recreational uses of water at very low or very high values. Under these circumstances, pH may have adverse effects on the skin and eyes. The parameters TN and TP can indicate if nutrient loading is occurring in the marine environment. Increased nutrient concentrations in nearshore waters can be caused by discharges from point sources into the nearshore. They can also occur as a result of stormwater runoff after heavy rainfalls. Nutrient loading can indirectly affect recreational water use if algal blooms occur. Algal blooms can also have an impact on marine life by decreasing the dissolved oxygen in the water.

High concentrations of TSS can affect the aesthetics of the nearshore by reducing the clarity of the water. Furthermore, TSS can decrease the light penetration to benthic organisms for example corals and settling solids can also smother reefs. Some potential sources of solids in the marine environment are stormwater runoff from drains and dewatering activity from construction in the nearshore and coastal zone management area.

The nutrient results obtained were compared to the Ambient Water Quality Standards which are listed in the List of Prohibited Concentrations under the Marine Pollution Control Act, CAP 392A.

It should be noted that these standards based on optimum levels for marine ecosystem health. Table 7 below lists the standards.

Table 8: The standards for the nutrients analysed

Parameter	Ambient Water Quality Standard
Total Nitrogen	0.1 mg/L
Total Phosphorous	0.015 mg/L
pH	7.0 – 8.7
Total Suspended Solids (TSS)	5 mg/L
Turbidity	1.5 NTU

From the table below, it was observed that the average concentrations for most of the parameters exceeded their respective standard. The results indicated that the marine environment was being negatively impacted by the activities of land-based sources. Only average levels for pH and Total Suspended Solids for both the South and West Coast beaches conformed to the standard.

Table 9: Summary of nutrient data

Coast	Parameter	Unit	Average Value
South	pH	-	7.9
	Total Phosphorus	mg/l	0.1
	Turbidity	NTU	2.1
	Total Suspended Solids	mg/l	2.9
	Total Nitrogen	mg/l	0.3
West	pH	-	7.6
	Total Phosphorus	mg/l	0.1
	Turbidity	NTU	2.3
	Total Suspended Solids	mg/l	2.3
	Total Nitrogen	mg/l	0.3

### 9.1.3 Widescreen Programme

This programme is conducted twice a year and assesses a wide range of chemicals to identify potential threats to the groundwater that would not be detected from the routine monitoring activity. Samples are collected once in the dry season and again in the wet season. During each sampling session, samples are collected from six groundwater wells. The public supply wells, Belle and Hampton, are sampled during each widescreen sampling session as they are significant sources of potable water, while the remaining four wells can be selected from the remaining 17 public supply wells and springs that are sampled under the Ground Water Monitoring Programme (GWMP).

In 2017, samples were collected from the Belle P.S, Sweetvale #2 P.S, Hampton P.S, College Spring, Carlton P.S and the Whim P.S on May 23<sup>rd</sup> and October 24<sup>th</sup>, 2017. The collected samples were

shipped to an accredited laboratory in Florida for analysis. Parameters such as heavy metals, pesticides, asbestos and persistent organic pollutants were analysed under this programme. The World Health Organization (WHO) potable water quality guidelines were used as the standards for microbial and chemical contaminants.

At the end of the year, the report on the 2017 Widescreen Programme was being prepared. The report will present the findings of the two sampling events for that year as well as an assessment of the state of the groundwater.

#### **9.1.4 Monitoring of Wastewater Plants**

This programme was suspended due to human resource constraints and logistical challenges with the laboratory. A date for resumption of activities had not yet been determined.

### **9.2 Other Activities**

In addition to undertaking the above programmes, the section also:

- continued with a review of the groundwater monitoring programme to identify and address any existing deficiencies in the programme;
- began a review of the nearshore monitoring programme to identify and address any existing deficiencies in the programme; and
- conducted additional sampling in light of the challenges with sewage on the South Coast.

## **10 Public Education & Awareness Programme**

The Public Education and Awareness Programme aims to:

- increase the levels of awareness about environmental issues facing Barbados and the impacts of those issues;
- raise awareness about the roles and responsibilities of the EPD; and
- promote environmental stewardship among Barbadians.

### **10.1 Activities for 2017**

For the year 2017, the EPD:

- Conducted its annual internship programme;
- Prepared and disseminate its annual newsletter;
- Conducted an environmental awareness activity as part of the Adopt-a-school programme;
- Raised awareness about the Department and environmental issues.

#### **10.1.1 Internship Programme**

Each year the EPD strives to provide a meaningful work experience for young people who have an interest in environmental monitoring and control. This is achieved through the Department's annual internship programme, which caters to:

- final year students in the Environmental Science Programme at the Barbados Community College; and
- students from secondary and other tertiary institutions.

There were no interns from the Environmental Science Programme of the Barbados Community College in 2017. However, the EPD did host two interns from January to March; an intern from the Samuel Jackman Prescod Polytechnic from May 31<sup>st</sup> to July 14<sup>th</sup>; and an intern referred by the Barbados Association of Guidance Counsellors from July 17<sup>th</sup> to August 25<sup>th</sup>. The interns performed data entry, participated in site visits and routine sampling and or researched environmental issues.

Additionally, the Department participated in the Lodge School's annual Job Shadow Day. The activity aimed to empower students with first-hand knowledge to make informed choices about their intended careers before embarking on tertiary education. Two students from the school shadowed the Water Quality Team.

### **10.1.2 Annual Newsletter**

An issue of the Department newsletters was not published in 2017. The officer responsible for compilation of the newsletter was assigned other duties, which took priority.

### **10.1.3 Adopt-a-School Programme**

An objective of the Adopt-a-School Programme is to increase awareness of the students about the environment. To this end, officers from the EPD coordinated a hike of the Turner's Hall Woods, St. Andrew, for students of the Graydon Sealy Secondary School. The tour highlighted the ecosystem services provided by forests and helped the students to connect with nature in keeping with the 2017 theme for World Environment Day, which was "connecting people to nature". The hike was led by a representative from the National Botanical Gardens.

### **10.1.4 Environmental Awareness**

The EPD undertook several activities during 2017 to raise awareness about its roles and responsibilities and other matters pertaining to environmental management. Some of the activities that were undertaken are outlined below:

- The Department organized the annual clean-up of Morgan Lewis Beach on September 16, 2017, International Coastal Clean-up Day (see Section **Error! Bookmark not defined.** for further information).
- From June until November 2017, the Department aired information about the GHS on CBC TV8; the radio stations of CBC (98.1 FM, Q 100.7 FM & 94.7 FM), Starcom Network (VOB 92.9FM and HOTT 95.3FM) and Habmar Investment Inc (Slam 101.1 FM and Y 103.3 FM); and placed advertisements in Barbados Today, the Nation newspaper and the Barbados Advocate (see Section **Error! Bookmark not defined.** for additional information).
- The EPD, with the assistance of the Government Information Service, developed and aired a video on best management practices for vehicles maintenance facilities.

- The EPD revised and published updated versions of its brochures, which explain the functions of the Department.
- During the year, officers of the Department delivered presentations on the GHS, the Bridgetown Noise and Ambient Air Quality projects, environmental noise and the Basel Convention to various stakeholders.
- Officers of the Department participated in a panel discussion entitled, “Man Talk: Should the church be exempt from noise regulations?”

### **10.1.5 Other Activities**

In addition to the aforementioned, the EPD also coordinated and hosted the award ceremony for the photo-essay competition, which was held in 2016. The purpose of the photo-essay competition was to raise awareness among young people about the importance of the environment to Barbadians. The winners, and schools in which they were enrolled, were presented with prizes. Moreover, a Cabinet Paper and Evaluation Report regarding the contest were prepared and submitted to the Ministry of Environment and Drainage. The Evaluation Report outlined, *inter alia*, the number and age ranges of the students who participated in the contest, whether the project met its objectives and recommendations for consideration should a similar contest be undertaken in the future.

Also in 2017, the Department:

- renewed its Domain Name Registration licence for epd.gov.bb;
- began the process of identifying suppliers and obtaining quotations for the procurement of EPD branded items such as pens, pencils, water bottles and bags; and
- started discussions with the Data Processing Department to host its existing website or to develop a new website for the EPD.

## **11 Conferences, Seminars, Workshops & Training**

The Department participated in several training courses as well as seminars, conferences and workshops to increase the technical competence of the staff, and to articulate Barbados’ position on critical environmental matters. Additionally, training and retraining are essential to the efficient operations of the Department, and indeed any organisation. It is necessary to support the technical and administrative activities as well as promote the personal development of staff. The following is a summary of training activities undertaken in 2017 (Tables 10, 11, 12 and 13).

## 11.1 Training

### 11.1.1 Local Training

Table 10: Summary of Local Training Activities for 2017

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
UNESCO-IHE online course on Biological Wastewater Treatment: Principles, Modelling and Design.	<p><i>Location:</i> Online</p> <p><i>Period:</i> September 4, 2017, to February 16, 2018.</p>	To familiarize participants with the latest approaches to the design, operation, modelling and simulation of wastewater treatment processes such as activated sludge, biological nitrogen or phosphorus removal, secondary settling tanks and membrane bioreactors.	A. Reeves – Technical Officer P. Pile – Environmental Technical Officer
Spanish as a Foreign Language	<p><i>Location:</i> Samuel Jackman Prescod Institute of Technology</p> <p><i>Period:</i> September 4 to December 17, 2017</p>	To aid participants to acquire communicative competence that allows for the understanding of everyday conversation as well as everyday media subjects in Spanish.	I. Lavine – Deputy Director P. Pile – Environmental Technical Officer
Court Prosecutors' Course	<p><i>Location:</i> Regional Police Training Center</p> <p><i>Period:</i> August 7 to September 1, 2017</p>	<p>To enlighten candidates about the fundamental principles of prosecution.</p> <p>To sensitive candidates about the operations of the courts and procedural matters.</p> <p>To educate participants about the legal interpretations of statutes and laws.</p> <p>To make participants proficient in presenting case files.</p> <p>To prepare participants to functions as effective prosecutors.</p>	S. McAllister – Senior Environmental Technician

<b>Name of Course/Activity</b>	<b>Location and Date/Period</b>	<b>Objective(s)</b>	<b>Officer(s) in Attendance</b>
Seminar on Understanding Misconduct for Public Officers	<i>Location:</i> The Lloyd Erskine Sandiford Centre  <i>Period:</i> September 13, 2017	To provide public officers with the opportunity to discuss the different categories of misconduct in the public service and understand how each category is to be investigated	I. Lavine – Deputy Director C. Worrell – Senior Environmental Protection Officer C. Clarke – Senior Building Development Officer
Public Service Document Preparation	<i>Location:</i> Training Administration Division  <i>Period:</i> June 19 – 23, 2017	To equip participants with the knowledge and skills to produce public services documents.	A. Boxill – Secretary L. Harewood – Receptionist/Typist
Caribbean Development Bank – Public Policy and Management and Project Cycle Management Training	<i>Location:</i> Caribbean Development Bank  <i>Period:</i> various between October 9 and November 14, 2017.		A. Headley – Director I. Lavine – Deputy Director J. Yearwood – Environmental Technician T. Armstrong – Senior Environmental Technical Officer G. Hinds – Environmental Protection Officer P. Fergusson – Environmental Protection Officer A. Eversley – Senior Marine Pollution Officer T. Williams – Marine Pollution Officer S. McAllister – Senior Environmental Technician C. Worrell – Senior Environmental Protection Officer

### 11.1.2 Overseas Training

Table 11: Summary of Overseas Training Activities for 2017

<b>Name of Course/Activity</b>	<b>Location and Date/Period</b>	<b>Objective(s)</b>	<b>Officer(s) in Attendance</b>
Diploma in Acoustics and Noise Control	<i>Location:</i> Online and Trinity College, Dublin, the Republic of Ireland  <i>Period:</i> January 9 – 13, 2017	To attend the mandatory laboratory sessions as part of the requirement for the diploma.	L. Chapman – Environmental Technician
Basic Course for Personnel of National Authorities Involved in the National Implementation of	<i>Location:</i> The Hague, the Netherlands  <i>Period:</i> April 3 – 7, 2017	To ensure that States Parties can implement and realize their obligations under Article VII of	T. King – Senior Environmental Inspector

the Chemicals Weapons Convention		the Chemicals Weapon Convention.	
State of the Convention Area Report (SOCAR) Data Workshop	<i>Location:</i> Cayenna, French Guiana <i>Period:</i> March 13, 2017	To keep track of advances in policies, programmed and projects for the management of pollution within the region, identify development opportunities to strengthen sustainable development efforts and to protect the interest of the Government concerning policy changes within the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region.	A. Headley – Director
The third meeting of the Contracting Parties (COP) to the Protocol Concerning Pollution from Land-Based Sources and the Activities (LBS Protocol) in the Wider Caribbean Region	<i>Location:</i> Cayenna, French Guiana <i>Period:</i> March 14, 2017		
17 <sup>th</sup> Intergovernmental Meeting of the Action Plan for the Caribbean Environment Programme and the 14 <sup>th</sup> Meeting of the Contracting Parties to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region.	<i>Location:</i> Cayenna, French Guiana <i>Period:</i> March 15 – 17, 2017		
GEF Expanded Constituency Workshop	<i>Location:</i> Grenada <i>Period:</i> May 16 – 20, 2017	To learn about the new features, policies and procedures of the Global Environment Facility.	P. Pile – Environmental Technical Officer

## 11.2 Conferences, Seminars, Workshops and Meetings

### 11.2.1 Local

Table 12: Summary of Local Seminars, Conferences and Workshop in which the Department Participated during 2017

Name of Seminar/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
Regional Workshop for Senior Maritime Administrators	<i>Location:</i> Barbados <i>Period:</i> February 7 to 8, 2017	To, <i>inter alia</i> : <ul style="list-style-type: none"> <li>▪ update the knowledge of maritime administrators on the latest regulatory and other developments at IMO to increase awareness of the</li> </ul>	A. Eversley – Senior Marine Pollution Officer

Name of Seminar/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
		<p>information available on the IMO website; and</p> <ul style="list-style-type: none"> <li>▪ increase awareness of the opportunities for technical cooperation and mutual assistance in beneficiary countries.</li> </ul>	
<p>Geotechnical Survey Investigations Study Training Workshop</p> <p>Service Excellence – The New Normal</p>	<p><i>Location:</i> Warrens Tower II</p> <p><i>Period:</i> March 20 – 22, 2017</p> <p><i>Location:</i> Lloyd Erskine Sandiford Centre</p> <p><i>Period:</i> April 26, 2017</p>	<p>To establish a basis for evaluating and enhancing resilience to coastal hazards in Barbados.</p>	<p>A. Eversley – Senior Marine Pollution Officer</p> <p>A. Reeves – Technical Officer</p> <p>C. Layne – Building Development Inspector</p> <p>R. Best - Typist</p>
<p>Research Drones: Development of an Unmanned Aerial System Policy (UAS) and Operations Protocol for the UWI</p>	<p><i>Location:</i> CERMES Conference Room</p> <p><i>Period:</i> May 9, 2017</p>	<p>To, among other things:</p> <ul style="list-style-type: none"> <li>▪ raise the awareness of stakeholders about, the development of a UWI UAS policy, protocol and methodology for using drone technology; and</li> <li>▪ sensitize the public to the application of drones for research by the project objectives, lessons learned and recommendation for the practice and policy.</li> </ul>	<p>A. Reeves – Technical Officer</p>
<p>Meeting with BTI on Feasibility Study</p>	<p><i>Location:</i> BTI, Old Town Hall Building, Cheapside</p> <p><i>Period:</i> June 9, 2017</p>	<p>To engage the expertise of the EPD regarding a feasibility study to establish a Convention Centre and Theme Park in the Needham’s Point Peninsular.</p>	<p>A. Headley – Director</p> <p>L. Senhouse – Senior Environmental Technical Officer</p> <p>K. Barrow – Chief Building Development Officer</p>
<p>Water Supply Network Upgrade Project – Barbados Project Launch Workshop</p>	<p><i>Location:</i> Conference Room, CDB, Wildey, St, Michael</p>	<p>To officially launch the project and raise the awareness of stakeholders about the project.</p>	<p>C. Worrell – Senior Environmental Technical Officer</p>

<b>Name of Seminar/Activity</b>	<b>Location and Date/Period</b>	<b>Objective(s)</b>	<b>Officer(s) in Attendance</b>
	<i>Period: June 19, 2017</i>		
Transport Sector Study and Preparation of a Transport Sector Policy, Strategy and Operational Guidelines for CDB	<i>Location: Building B, CDB Period: July 17 and 18, 2017</i>	To consult with stakeholders in the road, air and maritime transport and gather data about the full range of transport issue to ensure that the Bank's policies remain effectively aligned with its development thrust.	A. Reeves – Technical Officer
Invitation to GIS Workshop	<i>Location: Training Room, Media Resource Department, Ministry of Education, Science, Technology and Innovation. Period: November 22 &amp; 23, 2017</i>	To introduce participants to the Geographical Information System (GIS) and School Mapping Model, and to engage the relevant stakeholders in the meaning discussion.	C. Layne – Building Development Inspector
Workshop on “The role of research partnerships in promoting sustainable development” and seminar “Lessons from the Field: Exploring Culturally Relevant Solution to Increasing Environmental Challenges for Climate Change and Biodiversity Loss”	<i>Location: Period: September 18, 2017</i>		I. Lavine – Deputy Director
Workshop on Integrated Surveillance for Antimicrobial Resistance (AMR).	<i>Location: Period: November 2 &amp; 3, 2017</i>	To improve the understanding of Integrated AMR Surveillance through the illustration of existing monitoring programs and international regulations.  To reach consensus on a pilot project to implement an Integrated AMR Surveillance System in the country.	A. Headley – Director C. Worrell – Senior Environmental Protection Officer
Regional Non-Reimbursable Technical Cooperation	<i>Location: EPD</i>	To improve knowledge about the level of governability for Disaster Risk	A. Headley – Director I. Lavine – Deputy Director

<b>Name of Seminar/Activity</b>	<b>Location and Date/Period</b>	<b>Objective(s)</b>	<b>Officer(s) in Attendance</b>
	<i>Period:</i> November 15, 2017	Management in Latin American and Caribbean countries through the Index of Governance and Public Policy in Disaster Risk Management.	
Workshop on National Legislation for the Implementation of the internal CBRN Legal Instrument	<i>Location:</i> Bridgetown <i>Period:</i> November 2 & 3, 2017	To identify the gaps in Barbados' legal framework for the control of dangerous, biological materials, chemicals and nuclear materials which could pose a proliferation risk.	I. Lavine – Deputy Director T. Armstrong – Senior Environmental Protection Officer

## 11.2.2 Overseas

Table 13: Summary of Overseas Seminars, Conferences and Workshop in which the Department Participated

<b>Name of Course/Activity</b>	<b>Location and Date/Period</b>	<b>Objective(s)</b>	<b>Officer(s) in Attendance</b>
Regional Training Course on National Register for Radiation Source Including Regulatory Authority Information System RAIS 3.4 Web.	<i>Location:</i> Trinidad and Tobago <i>Period:</i> January 23 – 27, 2017	To train participants on the use of RAIS 3.4 Web to establish a national register of radiation sources and to manage the regulatory authority activities, and on the customization of the system with due account of the national legal and regulatory infrastructure.	T. Armstrong – Senior Environmental Technical Officer
Certificate of Participation for International Atomic Energy Agency (IAEA) Regional Workshop: School on Drafting/Reviewing Legislation – Radiation Safety Stream (PLA 9082)	<i>Location:</i> Vienna, Austria <i>Period:</i> January 16 – 27, 2017	To introduce the IAEA Safety Standard Standards, and facilitate the drafting of new Acts and Regulations for Radiation safety and protection.	A. Headley – Director
5 <sup>th</sup> Annual Steering Committee Meeting of the Basel Convention Regional Centre for the Caribbean and the 2 <sup>nd</sup> Annual Meeting of the Regional Project Steering	<i>Location:</i> Belize City, Belize <i>Period:</i> May 24 – 25, 2017	The objectives of the Steering Committee Meeting were to: <ul style="list-style-type: none"> <li>▪ review and endorse the proceedings of the 4<sup>th</sup></li> </ul>	L. Senhouse – Senior Environmental Technical Officer

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
Committee of the GEF #5558 Project		Steering Committee Meeting; <ul style="list-style-type: none"> <li>▪ review the status of ongoing projecting being executed by the BCRC-Caribbean;</li> <li>▪ plan the work programme and activities of the Centre for the next three years;</li> <li>▪ review and revise the Centre’s 2016- 2019 Business Plan; and</li> <li>▪ plan for an update to the needs assessment conducted for member countries in 2012</li> </ul>	
Regional Nuclear Safeguards Workshop for Caribbean States	<i>Location:</i> Miami, Florida <i>Period:</i> August 21 – 25, 2017	To acquire a better understanding of the national obligation regarding safeguards, safety and security, current tools used under the safeguard agreement, potential resources available to facilitate the implementation of national obligations and to determine whether the Government of Barbados should accede to the proposed modified small quantities protocols or additional protocols to the comprehensive safeguard agreement.	A. Headley – Director
Caribbean Sub-Regional Preparatory Meeting of the 2017 Meeting of the Conference of Parties to the Minamata Convention on Mercury	<i>Location:</i> Trinidad and Tobago <i>Period:</i> September 11- 15, 2017	To provide participants with an overview of the Convention, priority issues for the Caribbean Region as well as Convention related activities in the Caribbean such as the regional projects to conduct the Minamata Initial Assessments.	I. Lavine – Deputy Director

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
		To provide an opportunity for the Caribbean sub-region to be informed of matters to be discussed, decisions to be endorsed and Caribbean positions to be discussed before and at the Conference of Parties to the Minamata Convention of Mercury.	
IMO Sub-regional Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention Workshop on Oil Spill Response Equipment, Simulation Exercises and Coordination with Neighbouring Countries	<i>Location:</i> Cartagena, Colombia <i>Period:</i> October 2 – 5, 2017	To provide a greater understanding of the assessment, identification and acquisition of oil spill response equipment; and developing and implementing national and regional oil spill simulation programmes.	A. Eversley – Senior Marine Pollution Officer
GEF IWeco Regional Capacity Building Communication Workshop in St. Lucia	<i>Location:</i> St. Lucia <i>Period:</i> October 30 – November 3, 2017	To, <i>inter alia</i> , provide participants with the tools to enable them to fosters relationships between country focal points and the project’s partnership group.	I. Lavine – Deputy Director
GEF 5558 Regional Persistent Organic Pollutants (POPs) Inventories Workshop	<i>Location:</i> Marriott Resort and Royal Beach Casino, St. Kitts and Nevis <i>Period:</i> November 16- 17, 2017	The workshop: <ul style="list-style-type: none"> <li>▪ validated and endorsed the POPs inventories;</li> <li>▪ rolled out the next phase of the NIP update which includes the national priority assessment;</li> <li>▪ set objectives and reviewed/developed actions plans to manage POPs; and</li> <li>▪ updated participating countries on the status of the GED 5558 project.</li> </ul>	A. Headley – Director L. Senhouse – Senior Environmental Technical Officer
3 <sup>rd</sup> Session of the Environment Assembly of the United Nations Environment Programme	<i>Location:</i> Nairobi, Republic of Kenya	To deliver several tangible commitments to end the pollution of air, land, waterways, and oceans, and	A. Headley – Director

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
	<i>Period:</i> November 27 – December 6, 2017	to safely manage chemicals and waste.	
19 <sup>th</sup> Annual Meeting of National Authorities Chemicals Weapons Convention, Organization for the Prohibition of Chemical Weapons	<i>Location:</i> The Hague, The Netherlands  <i>Period:</i> November 22 – 24, 2017	<ul style="list-style-type: none"> <li>▪ To provide an occasion for National Authorities to highlight and work through relevant issues to enhance their capacity to comply with their obligations under the Convention.</li> <li>▪ To promote cooperation among National Authorities to further the implementation of the Convention at the regional level; and</li> <li>▪ To promote cooperation between the States Parties and the Secretariat to enhance the implementation of the Convention.</li> </ul>	A. Headley – Director

## 12 Outlook for 2018

In 2018, it is anticipated that the interview process will commence to permanently fill the vacant posts within the Department. This process will ensure that staff can secure their tenure. However, the possibility exists that some institutional learning may be lost if the staff members are unsuccessful.

Additionally, Government's policy to suspend the provision of additional staff to fill vacant posts or to provide substitutes will continue to impact negatively on some of the Department's functions, particularly those under the purview of the Building Development Control Section and Hazardous Material and Solid Waste Section. The absence of adequate legislation to address, *inter alia*, ambient air quality concerns, wastewater treatment, disposal and reuse; hazard communication and the disposal of solid waste such as waste electronic and electrical equipment will be a challenge to the Department's effectiveness in regulating environmental issues.

Nonetheless, the Department will continue to strive to minimize the negative impacts of development on the environment through the promotion of sustainable practices and enforcement of prevailing environmental standards and regulations.