



ENVIRONMENTAL PROTECTION DEPARTMENT ANNUAL REPORT 2015



ENVIRONMENTAL PROTECTION DEPARTMENT

Executive Summary

The mission of the Environmental Protection Department (EPD) is to preserve and improve Barbados's quality of life and its natural and built environment, through the promotion of sustainable practices, education, partnerships, and the enforcement of legislation. During 2015, the EPD undertook several activities to fulfil this mission. The following is a summary of the activities undertaken.

- The Department received 48 complaints related to ambient air quality and eight complaints about noise. Approximately, 54% of the complaints received in 2015 were investigated. With regards to ambient air quality complaints, the majority of complaints pertained to nuisance emissions and vehicle maintenance facilities (VMFs). The Department also conducted air quality assessments of Holetown and rural areas and prepared reports of assessments conducted in the Oistins, Speightstown and Bridgetown areas. Concerning the management of noise pollution, the planned assessments of the Speightstown and Oistins areas were postponed due to challenges with the monitoring equipment.
- The EPD received 1,728 building development applications in 2015. The majority of the applications pertained to residential developments. Approximately, 43% of the applications received in 2015 were processed along with applications received before 2015. In addition to reviewing applications, the Department began development of a booklet to help applicants to understand and comply with the requirements for the application process.
- In 2015, 125 derelict buildings were identified and notices served to the 110 owners or agents of those structures. However, the Department did not coordinate the removal of any derelict structures due to the delay in procuring the services of contractors to remove the structures. No derelict vehicles were removed in 2015 due to the absence of a suitable disposal location. Despite the challenges faced with the removal of derelict buildings and vehicles, the Department was able to approve and supervise the removal and disposal of asbestos and fibreglass containing materials for 68 applicants.
- Eighteen development-related documents, namely: terms of references, environmental impact assessments, environmental scoping studies and social impact assessments were received in 2015. Fourteen of these documents were reviewed and comments provided to the Chief Town Planner by the end of 2015. The Department also began researching and developing guidelines for renewable energy developments in Barbados such as wind and solar farms.
- Concerning the management of marine pollution, the EPD received and investigated 17 complaints; the majority of these complaints were related to wastewater discharges. The Department also reported to the Inter-American Development Bank on the water quality

of south coast beaches; worked to recover and edit regulatory inspection reports that were lost when the Department's file servers experienced a catastrophic failure; coordinated the annual clean-up of the Morgan Lewis Beach on September 19 and undertook activities to update appendices of 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 under the objectives of the Basel Convention in 2013 and 2014. Similarly, the EPD reported on the activities undertaken in 2014 regarding the Chemicals Weapons Convention. The Department also undertook preparatory work for a project to build local laboratory capacity to analyse samples of various media for persistent organic pollutants (POPs), and continued efforts to support the implementation of the GHS in Barbados and to strengthen the management of wastewater in Barbados.
- The EPD conducted routine inspections of the waste disposal sites operated by the Sanitation Service Authority; processed 29 applications for the importation of radioactive materials and vetted 38 applications for the importation of pesticides.
- Under the Nearshore Monitoring Program, samples of marine water were collected from 18 South and West Coast Beaches. All of the beaches conformed to the standards for faecal coliform and enterococci under the proposed Marine Pollution Control (Discharge) Regulations. With respect to 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 20 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:
 - six of the eight public supply wells in the West Coast Catchment registered average chloride concentrations that exceeded the recommended WHO drinking water 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 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;

- ✎ ten public supply wells recorded average concentrations of Faecal Coliforms that were above the WHO guideline value of 0 CFU/l.

The outlook for 2016 is that the Department will face several challenges stemming primarily from a shortage of human and financial resources and inadequate legislative instruments. However, the year 2016 will also present the Department with an opportunity to explore creative ways to deliver exceptional service and concomitantly, achieve its mission.

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1 Introduction

The mission of the Environmental Protection Department is to preserve and improve Barbados' quality of life and its natural and built environment, through the promotion of sustainable practices, education, partnerships and enforcement of legislation.

The Department carries out regulatory functions in the areas of ambient air quality, building development control, management of derelict buildings and vehicles, hazardous materials management, management of multi-lateral environmental agreements, marine pollution control, noise pollution control, solid waste management and water quality management.

The Department comprises eight sections including administration and seven technical sections. The activities were executed in the context of reduced funding and limited human resources.

2 Air and Noise Pollution Control

The Air and Noise Pollution Control Section (ANPCS) deals with issues related to ambient air and noise pollution. The section conducts technical research into air quality issues, conducts environmental noise assessment and investigates complaints related to outdoor air pollution and environmental noise pollution.

Three people staff the section: one senior officer and two environmental technicians. A third environmental technician post was vacant during 2015.

2.1 Activities of the Section

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 the quality of life. Pursuant to this goal, the ANPCS undertook the following activities in 2015.

- Investigated air and noise pollution complaints.
- Monitoring ambient air quality across the island.
- Conducted noise assessments.

2.1.1 Complaints and Investigations

Complaints received by the ANPCS were classified as relating to 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
Industrial Stacks	Emissions from industrial sources that negatively affect the ambient air quality in its vicinity.
Manufacturing Operations	Emissions from manufacturing sources that negatively affect the ambient air quality in its vicinity e.g. furniture manufacturing, wrought ironworks.
Nuisance	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.
Vehicle Maintenance Facilities	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.
Noise	Instances of unwanted sound.

In 2015, the ANPCS received 45 complaints – 38 about ambient air quality and seven concerning noise pollution. Complaints about vehicle maintenance facilities and nuisance emissions accounted for 80% of the ambient air quality complaints received.

The complaints received by the ANPCS were further divided into new and continuing complaints. The ANPCS classifies new complaints as those lodged with the section for the first time. Continuing complaints are 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, 7% of the complaints received were continuing complaints. Figure 1 provides a breakdown of types of new and continuing complaints received.

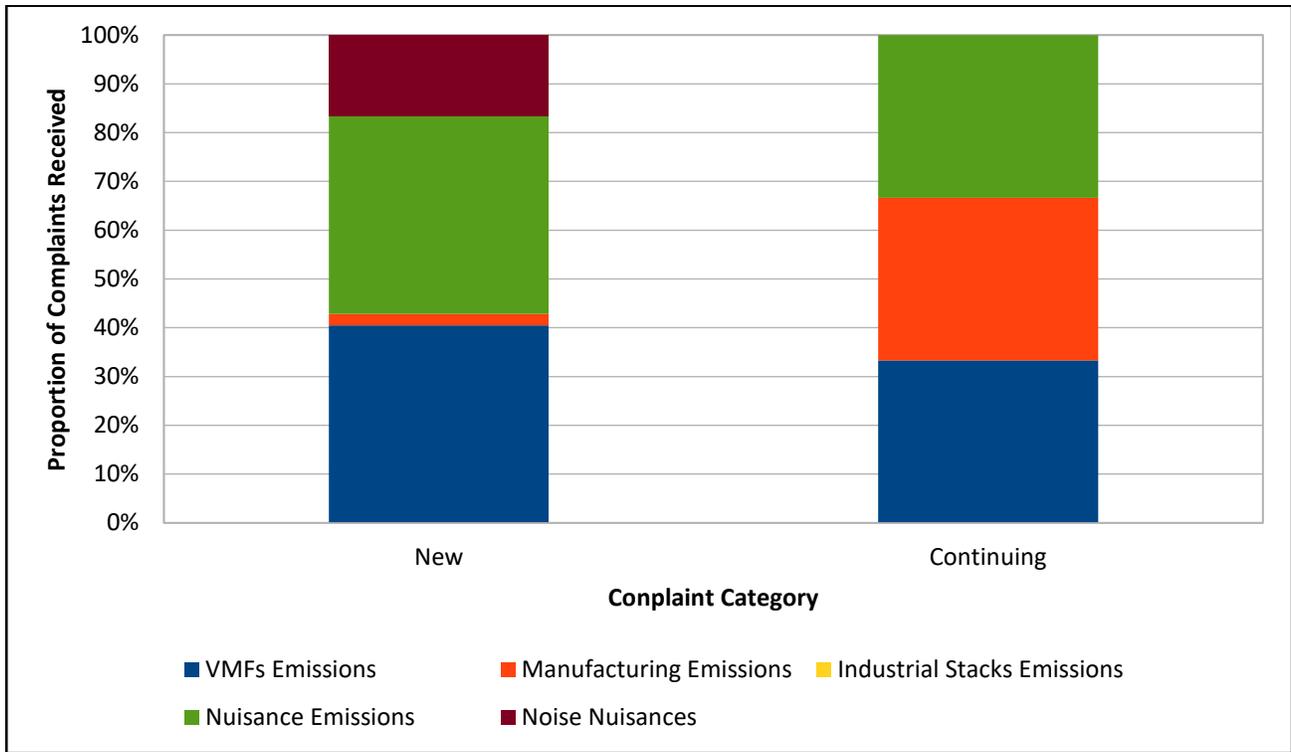


Figure 1: Proportion of Air Quality Complaints Received in 2015

Over the past five years, there has been an overall increase in the total number of air quality complaints received by the ANPCS (see Figure 2) even though the ANPCS officially stopped addressing indoor air quality (IAQ) complaints in August 2013 and began diverting these complaints to the Labour Department. Diversion of complaints to the Labour Department was in response to the proclamation of the Safety and Health at Work Act, which conferred responsibility for IAQ to the Labour Department.

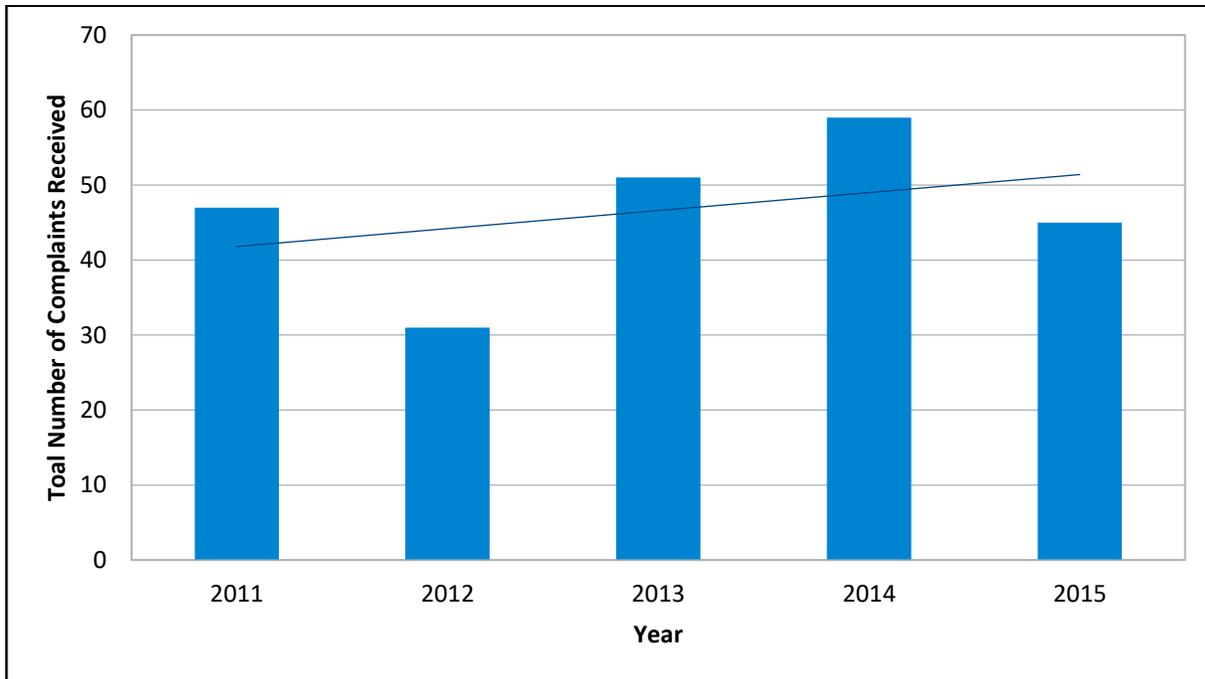


Figure 2: Total Number of Air Quality Complaints Received over the Period 2011-2015

With respect to investigations, the section conducted 140 site visits, prepared 126 reports and issued 245 pieces of correspondence as part of the process of investigating complaints in 2015. Approximately, 54% of the complaints investigated were received in 2015; the remainder were lodged with the Department in previous years. The majority of complaints investigated pertained VMFs and nuisance ambient air emissions (see Figure 3).

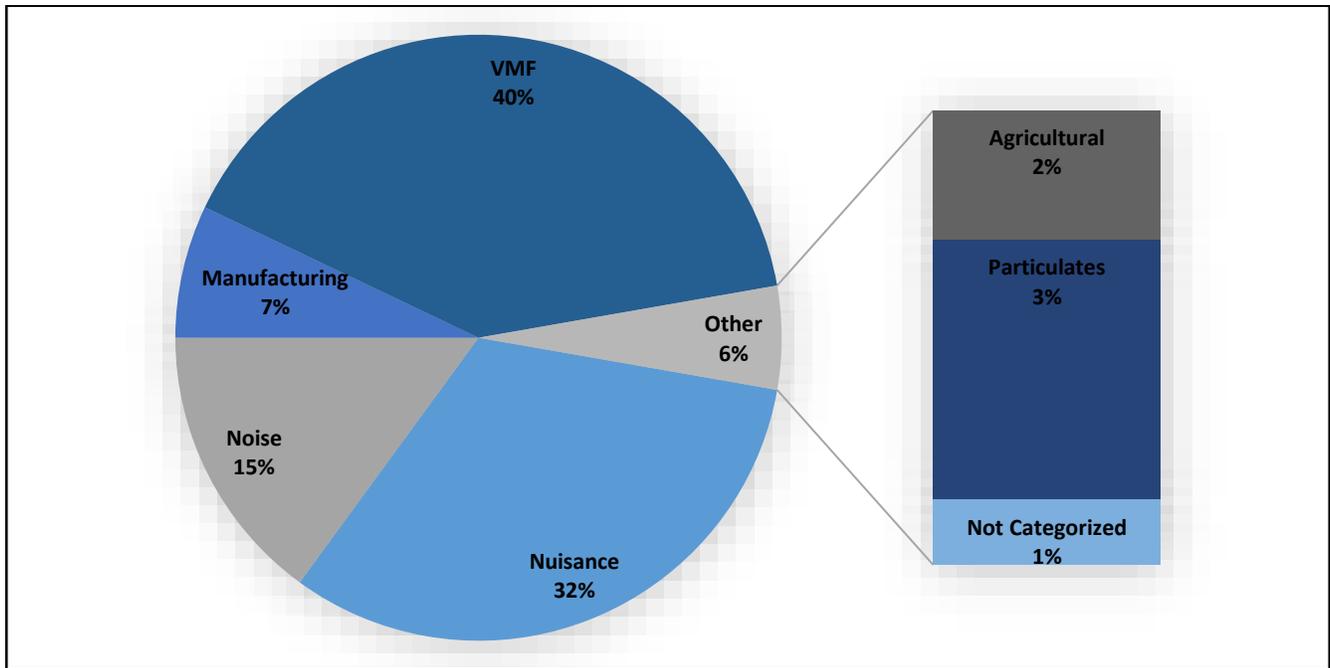


Figure 3: Proportion of Investigations Undertaken by Type

The primary issue observed with respect to investigating complaints about nuisances and VMFs was the absence of suitable legislation to effectively address these areas.

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.

Over the years, the EPD has received several complaints regarding ambient air quality; 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, the development of appropriate policies and regulations for the management of ambient air quality is difficult. To address this issue, the Department continued work to assess the ambient air quality across the island. The assessments involved the determination of the ambient air concentration of selected pollutants using passive samplers. The selected locations and details on the status of the assessments are presented below:

- **Bridgetown Ambient Air Quality Passive Monitoring Study.** The project commenced in June 2012 and was completed in May 2013. The Bridgetown area was selected because it is a major economic centre and approximately 7,000 people reside there. The project concluded, *inter alia*, that the data collected could be used to establish baseline levels for nitrogen dioxide, sulphur dioxide, ozone and range of volatile organic compounds

within the Bridgetown area. The final project report was submitted to Cabinet and was noted in its meeting held on August 20, 2015.

- **Oistins and Speightstown.** The collection of samples for the ambient air quality assessment of Oistins and Speightstown began in June 2013 and concluded in 2014. Subsequently, efforts commenced to compile and finalize the report on the assessment. Those efforts continued in 2015.
- **Holetown and Rural Areas.** The ambient air quality assessment of Holetown and rural Areas commenced on January 2015. Passive samplers were deployed in Holetown, St. James, Farley Hill, St. Peter and Gun Hill, St. George. The study is expected to last for 12 months concluding in 2016.

2.1.3 Noise Assessments

The planned noise assessments of the Speightstown and Oistins areas were not undertaken in 2015. The purpose of the assessments was to gather baseline sound levels in areas likely to generate various levels of sound and where exposure to that sound may be high. There was a protracted delay in facilitating the payment to have the sound level meter shipped to the manufacture and factory calibrated. Factory calibration improves the accuracy and reliability of data generated by the meter.

2.1.4 Other Activities

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

- Reviewed and commented on the technical standard, “Guidelines for Good Indoor Air Quality – Code of Practice”. The objective of the standard is to provide general guidance on improving indoor air quality. It also provides information on the potential health effects of indoor contaminants, and an action plan to achieve good indoor air quality.
- Coordinated the calibration of one of the Department's sound level meters to ensure accurate and reliable results.
- Participated in the review of environmental impact assessments submitted by the Town and Country Planning Development Office.
- Submitted a revised Ambient Air Quality Policy Paper to the Ministry of Environment and Drainage.

3 Building Development Control

The objective of the Building Development Control Section (BDCS) is to ensure that all residential, commercial and industrial development in Barbados complies with local and international standards that promote improved health conditions. This is achieved by enforcing the Health Services Act, Cap 44 and regulations relating to building development control, the Groundwater Protection Policy, and the environment-related policies and guidelines sanctioned by the Cabinet of Barbados.

The BDCS comprises posts for 15 technical officers with support from three administrative staff.

3.1 Activities of the Section

The main activities of the Building Development Control Section for 2015 were as follows:

- Vetting applications for residential, commercial and industrial developments.
- Inspecting commercial, industrial and institutional buildings for compliance with conditions of approval.
- Revising its Building Development Booklet.

3.1.1 Processing of Building Development Applications

During the year, the BDCS received 1,728 applications for building development. Figure 4 summarizes the number of applications received based on the intended purpose of the development. Applications for residential developments accounted for the majority (~87%) of applications received by the BDCS in 2015.

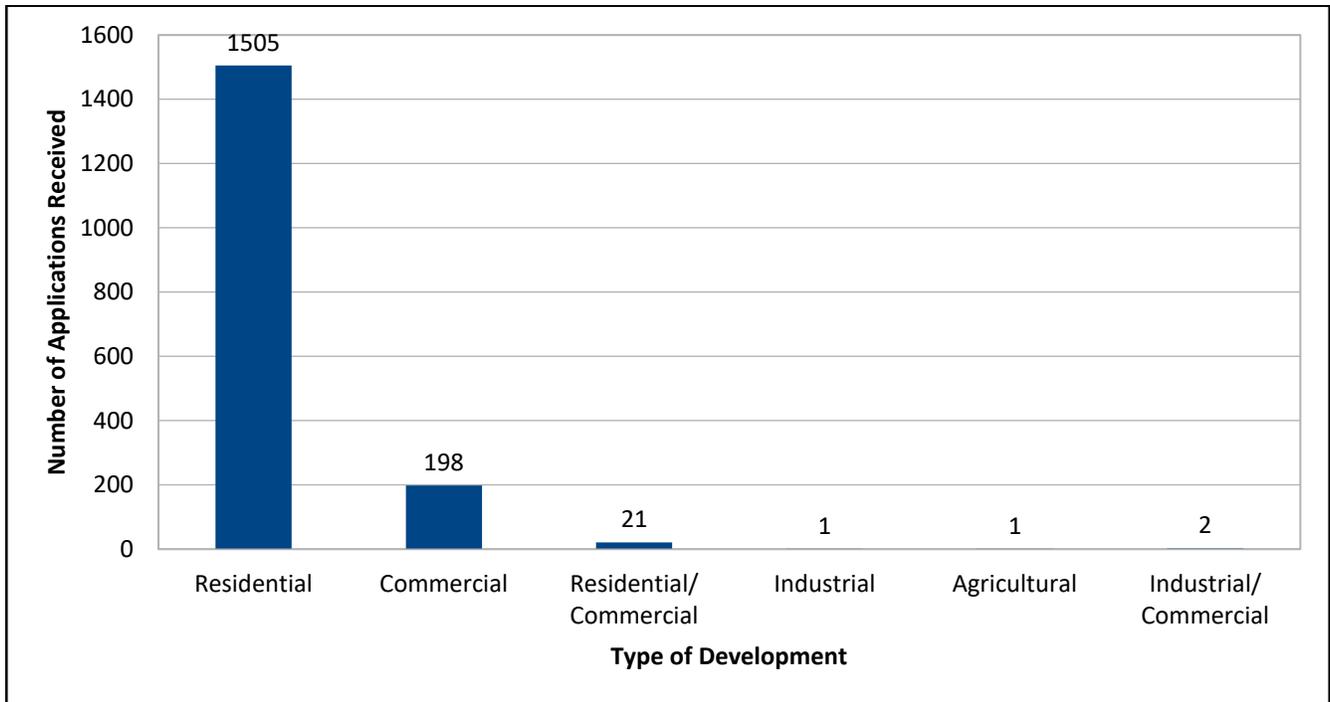


Figure 4: Applications Received in 2015

The section processed approximately 43% of the 1,728 applications received in 2015 along with 982 applications that were received before 2015. The table below summarizes the types of applications that section vetted and the decisions taken.

Table 2: Decisions Taken on Applications Processed in 2015

Classification	Approved	Refused	Approved with conditions	Withdrawn	Acknowledged	Total
<i>Residential</i>	1324	103	95	10	7	1539
<i>Commercial</i>	41	34	60	15	14	164
<i>Residential/Commercial</i>	7	5	7	0	1	20
<i>Industrial</i>	1	0	2	0	0	3
<i>Agricultural</i>	0	0	0	0	0	0
<i>Industrial/Commercial</i>	0	0	0	0	0	0
Total	1373	142	164	25	22	1726

By December 31st, 2015, 1,509 applications were waiting to be processed. The number of applications awaiting a decision is of concern because this number, when combined with applications that the Department will receive in 2016, will place a strain on the limited human resources of the section. The factors that contributed to a large number of pending applications were as follows:

- The late receipt of reports on Zone 1 applications from the Barbados Water Authority continued to cause long delays in processing those applications. During 2015, 18 Zone 1 applications were received; of which six were processed and a decision taken. At the end of 2015, 118 Zone 1 applications were awaiting a decision.
- The absence of reports from the Ministry of Agriculture on the suitability of sites in the Scotland District for development continued to hamper the processing of applications in that area. However, the section began to develop measures to address this issue, which should significantly reduce the time taken to process such applications.
- The BDCS was not operating with its full complement of staff as a result of posts becoming vacant due to retirement and transfers to other departments. This hampered the ability of the section to process commercial applications. This situation was further compounded when officers went on leave and there were no replacements.
- The EPD's file server crashed during the middle of 2013 and was re-established in 2015. Due to the absence of the electronic database, it was difficult to manually ascertain the number of files received, processed and pending for the period.

3.1.2 Compliance with Conditions of Approval

The BDCS conducts inspections to ensure that construction of buildings conform to the conditions attached when the application was approved. These inspections generally take place before the building becomes occupied.

In 2015, the section conducted inspections of the Caribbean Disaster Emergency Management Agency (CDEMA), Lower Estate, St. Michael; the Barbados Water Authority Building, Pine Industrial Park, St. Michael; and Sandals Resort, St. Lawrence, Christ Church.

A lack of staff hampered the ability of the section to verify compliance with conditions of approval for other commercial, industrial and institutional development.

3.1.3 Building Development Booklet

To increase public awareness on the requirements for the building development applications, the section began the revision of its building development booklet. It is anticipated that easy access to the information in the booklet by applicants and their agents should reduce the number of applications for which the section needs to request additional information. The revised booklet is expected to be completed and made available to the public in 2016.

3.1.4 Other Activities

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

- Conducted inspections of septic tanks and filter beds to ensure that the construction and installation of these disposal systems complied with prevailing standards. However, receiving notification from contractors to inspect these devices before commissioning was a major challenge. 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 form to the EPD. Consequently, the department is not in a position to verify that those developments requiring septic tanks and filter beds have the systems built to specification.
- Liaised with other government agencies such as the Child Care Board and Ministry of Health regarding building development and environmental issues.

4 Management of Derelict Buildings and 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 Activities of the Section

In 2015, the DBVS undertook the following:

- Identification and removal of derelict buildings.
- Identification and removal of derelict vehicles.
- 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 may provide a home for rodents and vermin and a shelter for illegal activities while causing discomfort to the public.

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 2015, one hundred and twenty-five (125) structures were identified as derelict. The owners of 15 of the structures ameliorated the conditions of their buildings and notices were served to the owners or agents of the remaining structures to renovate or remove their structure(s). However, the section did not facilitate the removal of any derelict buildings

during 2015. This was due to protracted delays in the process of procuring the services of contractors to remove the structures.

The section also experienced challenges in identifying the owners of identified derelict buildings as a result of challenges being experienced by the Land Tax Department.

Although no derelict buildings were removed during the year, the section recovered \$10,545.00 for structures removed before 2015.

4.1.2 Removal of Derelict Vehicles

No derelict vehicles were disposed of in 2015. A derelict vehicle is considered an abandoned automobile, truck or other vehicular parts which may provide harbourage for rodents and other vermin. This in turn can negatively impact human health and quality of life.

The closure of the Bagatelle Bulky Waste Disposal Site removed the only legally operated disposal site for metal waste. 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

Asbestos is the name given to naturally occurring fibrous silicate minerals. The types of asbestos include chrysotile (white asbestos), amosite (brown asbestos) and crocidolite (blue asbestos).

Exposure to asbestos fibres poses a health hazard and must be prevented by dust control and the use of devices to guard against inhalation of the fibres. To this end, the Government of Barbados has in place guidelines for contractors, workers and other persons engaged in the removal and disposal of asbestos.

Similarly, fibreglass can harm human health and the environment.

During 2015, the DBVS received 68 requests for permission to remove asbestos-containing materials and fibreglass and approvals were granted to remove and dispose of the asbestos and fibreglass containing materials at the disposal facility at Rock Hall, St. Philip. Officers of the derelict section supervised the removal and disposal process.

4.1.4 Other Activities

In addition to the activities outlined above, the section began preparations to host a workshop for contractors. The purpose of the workshop is to educate contractors about the protocol for the environmentally sound removal and disposal of asbestos in Barbados.

5 Development Related Documents

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. EIAs are carried out under the aegis of the Town and Country Planning Development Office (TCPDO), as part of the process of evaluating development applications and determining whether approval, with or without conditions, should be granted for proposed projects.

The EPD is a member of the EIA Review panel under the auspices of the TCPDO and advises the Chief Town Planner on matters pertaining to environmental management. The Environmental Technical Officers (ETOs) review environmental impact assessment and other development-related documents such as Terms of Reference and Environmental Scoping Studies and provides comments to the Chief Town Planner. Apart from the aforementioned functions, the section also plays a role in public education and the overall administration of the Department.

The ETOs consists of a Senior Environmental Technical Officer, one Environmental Technical Officer and one Technical Officer.

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 Review of Development Related Documents

During the year, the ETOs received 18 development-related documents (DRDs) and reviewed and provided comments on 14 of these documents. The remainder of the DRDs received were not processed by the end of 2015. A breakdown of the documents processed is presented below.

Type of DRD	Number Processed
Terms of Reference	6
Environmental Scoping Studies	1
Environmental Impact Assessments	6
Other	0
Social Impact Assessments	1
<i>Total</i>	<i>14</i>

Additionally, the officers of the section periodically attended meetings of the EIA panel.

5.1.2 Other Activities

In addition to the activities outlined above, the section began researching and developing guidelines for renewable energy developments in Barbados such as wind and solar farms. The

guidelines will inform the selection of sites and best practices for construction, operation and decommissioning of such developments.

6 Marine Pollution Control

The Marine Pollution Control Section (MPCS) is responsible for implementing 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 three officers – a Senior Marine Pollution Officer and two Marine Pollution Officers. There is also a vacant Marine Pollution Inspector/Marine Pollution Officer Post.

6.1 Activities of the Section

For the year 2015, the MPCS:

- Prepared a monitoring report for the Inter-American Development Bank (IADB);
- Reported on regulatory and compliance inspections;
- Worked on developing appendices to the National Oil Spill Contingency Plan;
- Collected data on marine litter; and
- Investigated marine pollution complaints.

6.1.1 Reporting to the IADB

The Barbados South Coast Sewerage Treatment Plant was constructed in recognition of the need to preserve and, where applicable, improve the groundwater and marine water quality of the South Coast. The plant was completed under the Government of Barbados' South Coast Sewerage Project with financial support and technical assistance from the IADB.

Per section 6.09 of the IADB Loan Agreement No. 709/OC-BA/710/OC-BA: Environmental Monitoring Programme, the Government of Barbados is required to submit an Environment Monitoring Report of marine water quality on the South Coast to IADB annually. These yearly submissions were mandatory up to 2014 when the Government's obligations officially ended. Assessment of the marine water quality was carried out at Brownes, Pebbles, Accra, Welches, Dover, Amaryllis, Worthing and Graveyard beaches.

In 2015, the Department prepared a report entitled, "Report on the Water Quality Monitoring Programme of the South Coast Beaches for the Period 2014". The report concluded that there was no indication of a decline in near-shore marine water quality since the commissioning of the South Coast Sewage Treatment Plant. The report found that:

- the concentrations of Faecal Coliform did not exceed the relevant standard during the

review period for any of the beaches.

- A minority of the beaches violated the standard for Enterococci periodically during the review period.
- Although the concentrations of Total Nitrogen, Total Phosphorous and Turbidity were low, the concentrations at all beaches generally exceeded the guidelines values outlined in the proposed List of Prohibited Concentrations: Ambient Standards. The report suggested that more sensitive testing methods or equipment may be necessary to better assess these parameters as the current instrument detection limits often exceed the standard.
- pH values were generally over 8 and within an acceptable range based on the proposed List of Prohibited Concentrations: Ambient Standards (7.0 – 8.7).
- Calmer beaches exhibited lower concentrations of Total Suspended Solids (TSS) than those with rougher seas. The beaches with rougher seas occasionally violated the standard for TSS.

The monitoring report was submitted to the Cabinet to note its contents and for onward submission to the IADB.

6.1.2 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 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.

No regulatory or compliance inspections were performed in 2015. However, the officers of the MPCS worked to recover and edit regulatory inspection reports that were lost when the Department's file servers experienced a catastrophic failure. These reports pertained to the inspections of the Barbados Light and Power Company Limited, HIPAC Limited, Trowel Plastics Limited, Barbados Bottling Company, Berger Paints, Harris Paints, Pine Hill Dairy and Chickmont Foods Limited. Additionally, efforts continued to compile the report on the regulatory inspection of the Super Centre Meat Facility.

With respect to compliance inspections, the MPCS worked to recover and revise the compliance report on the West Indies Rum Distillery.

As of December 31, 2015, work was still going to finalize all of the aforementioned reports.

6.1.3 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 minimise 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 2015, there were no meetings of the National Oil Spill Response Committee (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.

Despite the NOSRC not meeting, its sub-committee on Communication, Health and Safety and Equipment and the MPCCS undertook activities to:

- prepare drafts of a protocol for volunteers, a memorandum of understanding for oil companies and a hire agreement for procuring equipment in the event of a spill (Appendix H);
- update Appendix A (directory of the members of the National Oil Spill Response Committee); and
- create Appendix D (database of trained oil spill response personnel, including national, regional and international personnel) and Appendix F (Pre-agreed response strategies).

With respect to Appendix D, the efforts focused on identifying the trained response personnel in Barbados.

Updating of the appendices, particularly Appendix A, was hampered by the slow response of stakeholders to provide the requested information. By the end of 2015, the update process was ongoing.

6.1.4 National 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. Moreover, the programme contributes to a cleaner, safe and more aesthetically pleasing beaches.

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.

The clean-up took place on September 19th, 2015 under the guidance of the Environmental Protection Department and with the assistance of 80 volunteers. Litter was removed from a one-kilometre stretch of the beach and the types and quantities of litter collected were recorded. Approximately 2,600 pieces of litter were collected, which weighed a total of 567 pounds. Plastic bottle caps, plastic beverage bottles, plastic bags and foam, glass and plastic pieces were the main items collected. These are items that can be easily dropped by beachgoers or washed onto the beach from watercourses during heavy rainfall.

Since its inception, the Morgan Lewis Beach clean-up under the National Marine Litter Monitoring Programme generated significant data on littering habits and their impacts on the beach. Moving forward, the EPD intends to seek to transfer responsibility for the Morgan Lewis clean-up to the St. Andrew community. This will allow the Department to focus on expanding the Marine Litter Monitoring Programme to other coastal communities across the island.

During 2015, the Department also printed 1,000 copies of its Marine Litter Activity Book, at a cost of 5,604.75 Barbadian Dollars, and delivered a presentation on marine litter to students of the Sharon Primary School. Printing of the activity book and the presentation at the primary school were geared toward raising awareness about marine litter among young people.

6.1.5 Complaints

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 and Other.

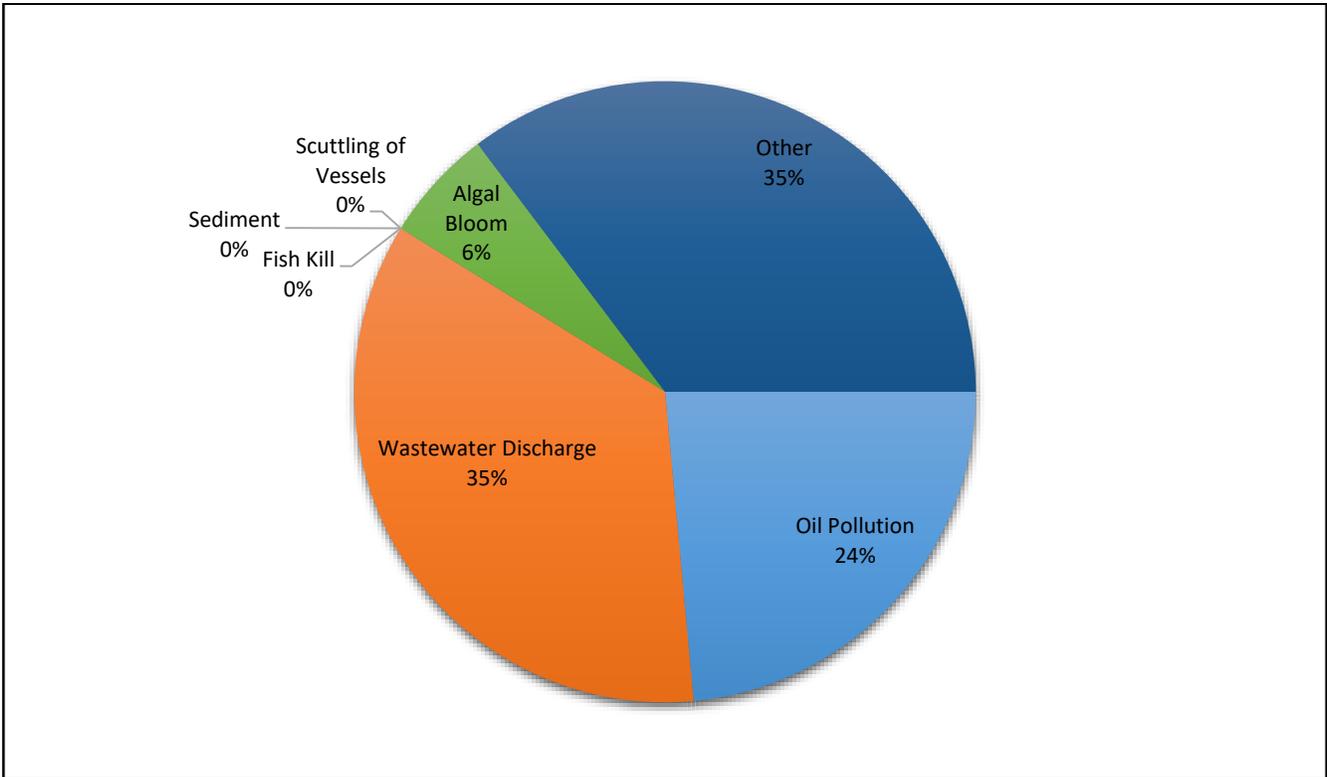


Figure 5: Type of Complaints Received by the Marine Pollution Control Section in 2015

In 2015, the MPCS received and investigated 17 complaints about marine pollution. The majority of these complaints were related to Wastewater Discharges and complaints classified at “Other” (see Figure 5). The “Other” complaints included a spill of molasses from a vessel at the Bridgetown Port, molasses disposal, storage of glycerine and inappropriate disposal of empty glycerine containers.

Between 2013 and 2015, there was an overall decline in the number of complaints received by the Departments: 21, 11 and 17 complaints were received in 2013, 2014 and 2015 respectively. Similarly, there were decreases in the proportions of complaints about Oil Pollution, Wastewater Discharge, Algal Bloom and Other complaints (see Figure 6). Over the period, there were no complaints lodged with the Department regarding Fish Kills or the Scuttling of Vessels.

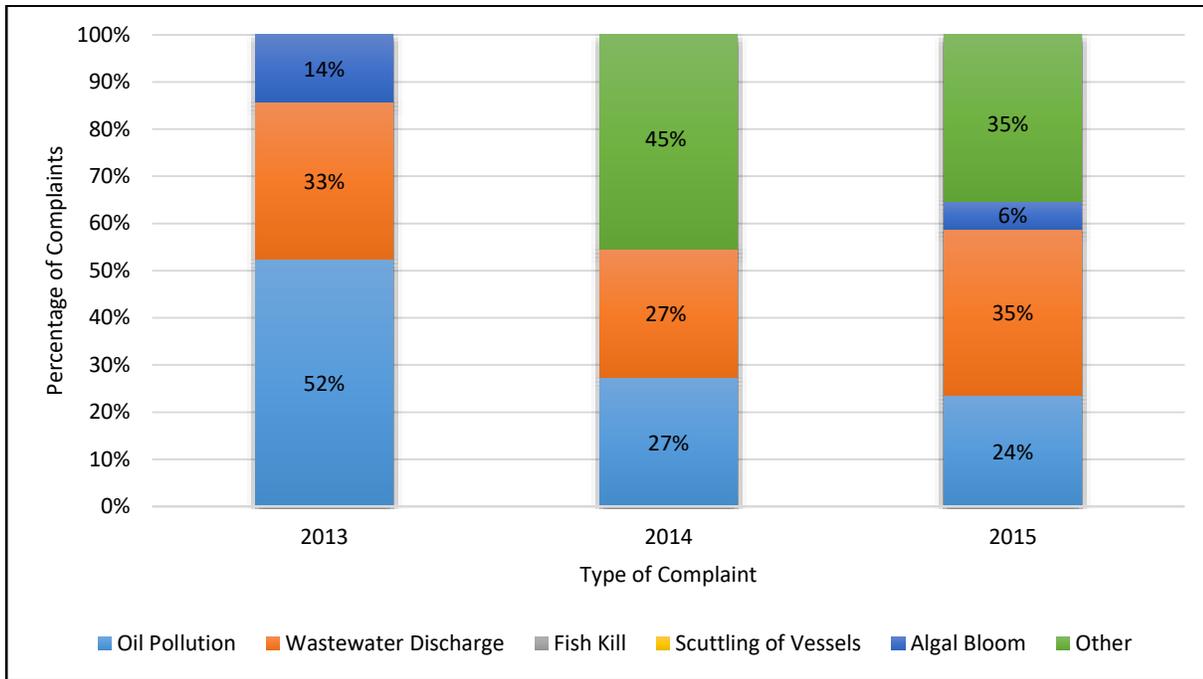


Figure 6: Proportion of Marine Pollution Complaints Received Between 2013 and 2015

Although the number of complaints has decreased over the past five years, the ability of the Environmental Protection Department 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.

6.1.6 Other Activities

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

- Prepared guidelines for funeral homes and printers to improve the environmental performances of their operations. Development of the guidelines was informed by the findings of regulatory inspections, which found deficiencies in existing practices.
- Monitored the process of decommissioning fuel tanks at SOL Worthing, SOL Charles Rowe Bridge, SOL Bank Hall and the ESSO Service Station in Payne Bay to ensure compliance with prevailing environmental policies and regulations and that appropriate remediation measures were implemented.
- Reviewed a proposed study of marine plastic debris and microplastics. Resolution 1/6 of the United Nations Environment Assembly requested the Executive Director of United Nations Environment Programme (UNEP) to support countries to develop and

implement national or regional action plans to reduce marine litter; and in consultation with other relevant stakeholders, undertake a study on marine plastic debris and microplastics, building on existing work and taking into account the most up-to-date studies and data. The review concluded that the study would be an asset to Barbados and could support Barbados' National Marine Litter Monitoring Programme. The report further recommended that Barbados fully support the study when it commences in 2016.

- Reviewed and provided comments on the ISO 130009 Beach Management Standard. The ISO standard includes provisions for standardization of signage, beach facility infrastructure, the publication of water quality data and water sports management, among others. EPD's review of the standard focused on the provisions of the standards that would likely affect the mandate of the Department.
- Updated its complaints database.
- Completed a questionnaire regarding the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention). Completion of the questionnaire was in fulfilment of Barbados' obligations under Article 4 of the Convention. Article 4 requires Parties to cooperate, assist each other and endeavour to harmonize their policies. The questionnaire collected information on the measures taken by Barbados to implement relevant provisions of the Convention and its Protocols and on the effectiveness of such measures in meeting the objectives of the Convention and its Protocols.
- Reviewed applications for the construction of a breakwater and stormwater drainage related to the Sandals Dover Wood development. The review of the proposal was geared toward mitigating adverse environmental impacts to the environment.
- Submitted a country profile for 2015 to RAC/REMPEITC. RAC/REMPEITC is an acronym for the Regional Marine Pollution Emergency Information and Training Center for the Wider Caribbean, which is also the Regional Activity Center for the Protocol Concerning the Cooperation in Combating Oil Spills in the Wider Caribbean Region. The information provided will be used by RAC/REMPEITC to determine, among other things, Barbados' specific training needs and regional training needs and fulfils the exchange of information requirements of the Cartagena Convention and International Convention on Oil Pollution Prevention, Response and Cooperation, 1990.

7 Multilateral Environmental Agreements

The coordination of the activities aimed at implementing the multilateral environmental agreements (MEAs) is executed by the Environmental Planning, Education, and Research Section; 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:

- 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);
- Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons/Chemicals Weapons Convention (CWC); and
- 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 responsibility 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 2015

The activities undertaken by the Department for the year 2015 were as follows. The Department:

- Monitored the transboundary movement of hazardous waste per the Basel Convention.
- Took steps to implement obligations under the Stockholm Convention.
- Took steps to implement obligations under the Chemicals Weapons Convention.
- Participated in the Caribbean Regional Fund for Wastewater Management (CreW) project.

- Continued efforts to support the implementation of the Globally Harmonized Systems of Classification and Labelling of Chemicals (GHS).in Barbados.

7.1.1 Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is the most 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 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.

There were no shipments of hazardous material from Barbados in 2015. However, the Department undertook activities to ensure that the shipments about the Food and Agriculture Organization of the United Nations' (FAO) Obsolete Pesticides Project will be done under the provisions of the Basel Convention. This project will strive to collect obsolete pesticides throughout the region including Barbados and ship it to the United Kingdom for environmentally sound disposal.

During 2015, the Department also submitted the Basel Convention Annual Report for the calendar years 2013 and 2014 to the Secretariat of the Conventions once approval had been received from the Ministry of Environment and Drainage.

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.

Substances controlled by the Stockholm Convention are identified in the table below.

Category	Controlled Substance
Pesticides	chlordecone, alpha hexachlorocyclohexane, beta hexachlorocyclohexane, lindane, pentachlorobenzene
Industrial chemicals	hexabromobiphenyl, hexabromodiphenyl ether and heptabromodiphenyl ether, pentachlorobenzene, perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride, tetrabromodiphenyl ether and pentabromodiphenyl ether;
By-products	alpha hexachlorocyclohexane, beta hexachlorocyclohexane and pentachlorobenzene
Newly Added	alpha hexachlorocyclohexane, beta hexachlorocyclohexane, chlordecone, Hexabromobiphenyl, hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octabromodiphenyl ether), lindane, Pentachlorobenzene, Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride, Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether)

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). A questionnaire was developed and submitted to the engineering department at the GAIA to collect information regarding the incinerator. Additionally, arrangements were made with the Faculty of Science and Technology (FST) of the University of the West Indies Cave Hill Campus to analyse samples from the incinerator. By December 31st, 2015, representatives from the GAIA had not submitted the completed questionnaire to the Department; this delayed the implementation of the project significantly.

The EPD also undertook preparatory work for a project to build local laboratory capacity to analyse samples of various media for POPs. This is the second phase of the research conducted in 2010, which involved the collection and analysis of samples of air and human milk. The Department, among other things:

- Facilitated the participation of Dr Emma Smith from the Faculty of Science and Technology, UWI in the inception workshop held from December 1-4, 2015 in Montevideo, Uruguay;

- Drafted correspondence to Ministry of Health and Caribbean Institute of Meteorology and Hydrology to provide them with the results of the first GMP project and to inform them of the second phase; and
- Reviewed and commented on a model contract between the Government of Barbados and the project coordinators.

Monitoring under the Global Atmospheric Passive Sampling (GAPS) 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 Persistent Organic Pollutants and other chemicals in the air. The data obtained to allow for comparison of sites around the world.

7.1.3 Chemical Weapons Convention

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 States Parties. 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 2015, the EPD facilitated training for five officers from the Barbados Fire Service. The training was aimed at the creation and development of response capabilities against the use of chemical weapons including incidents with toxic industrial chemicals as well as improving local chemical emergency response.

The Department also completed the Organisation for the Prohibition of Chemical Weapons' Annual report for 2014 per Article X of the Chemicals Weapons Convention.

7.1.4 Crew Project

The Caribbean Regional Fund for Wastewater Management (CReW) is a four-year project which seeks to provide a mechanism through which key stakeholders can build capacity within the wastewater sector. The CReW seeks to assist countries with the establishment or expansion of wastewater management programmes in three main ways:

- The provision of a sustainable financing mechanism
- Supporting reforms in policy and legislation
- Fostering knowledge exchange and dialogue among key stakeholders

Thirteen countries including Barbados are participating in this project with pilot studies being established in Guyana, Trinidad and Tobago, Belize and Jamaica. For the remaining nine

countries, the CReW is supporting other projects and activities.

The national project being undertaken by Barbados comprises three components. These are:

- Component 1: Development of legislative guidance document to assist the office of the Chief Parliamentary Counsel in the preparation of regulations for wastewater management;
- Component 2: Development of a licensing and permitting systems for wastewater operators, managers and service providers; and
- Component 3: Development of a Guidance Manual for Regulatory Inspections of Wastewater Treatment Systems.

The Department procured the services of Environmental Advisors Inc (EAI) to carry out the works. In 2015, the consultant continued their efforts regarding the aforementioned project components. A stakeholder meeting was held on May 6, 2015, at the headquarters of the Barbados Water Authority in Green Hill, St. Michael. The purpose of the meeting was to discuss the development of a proposed licensing and permitting system for wastewater treatment systems on the island. Another stakeholder meeting was held on December 10 and 11, 2015 at the EPD. This meeting allowed the consultant to garner comments on the draft manual for inspections of wastewater treatment plants and to provide training in the use of the manual.

By the end of 2015, efforts to finalize the deliverables for the various project components were still ongoing and completion is expected in 2016.

7.1.5 Implementation of the GHS

The Strategic Approach to International Chemicals Management (SAICM) is a policy framework for international action on chemical hazards. Barbados, through the Environmental Protection Department, has implemented or has been involved in projects under the Strategic Approach. Some of the initiatives undertaken were as follows:

- The Environmental Protection Department, under the auspices of the Ministry of Environment and Drainage, hosted the SAICM Caribbean Workshop in Barbados in March of 2009. One of the outputs from the workshop was the Latin America and the Caribbean Regional Action Plan for the implementation of SAICM.
- Updating of the national profile on chemicals management, developing a capacity assessment and setting priorities for strengthening the mechanisms for chemicals management in Barbados.
- Undertaking a project entitled, “Strengthening Capacities for SAICM Implementation and Supporting GHS Capacity Building in Barbados”, which was funded by the SAICM QuickStart Programme. This project sought to, *inter alia*, develop a coordinated national GHS implementation strategy.

During 2015, efforts continued to utilize the unspent funds for the project entitled, "Strengthening Capacities for Strategic for Strategic Approach to Chemicals Management (SAICM) Implementation and Supporting the GHS Capacity Building in Barbados". The Department contracted consultants to develop a public awareness campaign for the GHS and to develop a guidance document to inform the development of GHS legislation in Barbados. Furthermore, the EPD, through consultation with the Faculty of Science and Technology (FST) at the UWI, succeeded in having the GHS incorporated into the FST's safety seminars.

Also in 2015, the EPD obtained permission from the Ministry of Education, Science, Technology and Innovation to deliver presentations regarding the GHS to selected primary and secondary schools. The Department developed appropriate presentations for the target audiences; however, due to limited human resources, the presentations were not delivered in 2015.

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 2015, 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 2015, the SWHMS:

- conducted monthly inspections of Government operated landfills and disposal sites;
- conducted quarterly inspections of known waste brokers;
- offered advice on appropriate disposal of hazardous and special wastes;
- addressed requests for disposal of solid and hazardous materials;
- vetted applications for the importation of radioactive materials; and
- reviewed pesticide applications.

8.1.1 Inspection of Landfills and Disposal Sites

To ensure that the operations of the government-operated sites comply with environmental best management practices, the Environmental Protection Department regulates the disposal of waste at many disposal sites operated by the Sanitation Service Authority (SSA). These disposal sites were:

- Mangrove Pond Landfill, 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 Edgecumbe Quarry. This location was for the disposal of construction and demolition waste and vegetative matter.

The section conducted inspections of the government-operated disposal sites during seven

months of 2015. Some of the observations made during the inspections included compromised perimeter fencing, personnel not wearing personal protective equipment, illegal dumping around the disposal sites and deteriorated access roads. Reports on the observations were prepared for each site visit and any concerns observed were brought to the attention of the SSA. No inspections were conducted in April, May, July, August and September due to a lack of personnel.

8.1.2 Inspection of waste brokers

The section conducted quarterly inspections of known waste brokers. The brokers were:

- Solid Waste Solutions & Services
- Caribbean e-Waste Management
- Paradise Green Energy
- Recycling Preparation Inc.
- B's Recycling
- Amelot Oil
- Scrap Man Recycling
- Verde Oil
- Ace Recycling

The inspections revealed, among other things, that:

- chemicals were not stored appropriately and could potentially contaminate the soil and groundwater; and
- the conditions at some sites could pose a hazard to human health by creating breeding grounds for vermin and mosquitoes.

The Department attempted to organize a meeting with the Chief Medical Officer under the auspices of the Ministry of Environment and Drainage to regulate the operations at these facilities. However, the meeting could not be convened.

Due to the lack of relevant environmental legislation, the EPD is unable to regulate these operations effectively. Therefore, a conversation with the Chief Medical Officer is critical to resolving the issues at these locations through enforcement of the Health Services (Nuisance) Regulations.

In the interim, the Department continued to bring issues identified at these sites to the attention of the Ministry of Health and to provide guidance to operators to improve their environmental practices.

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 a signatory.

During 2015, the SWHMS received 47 requests for disposal advice and the section addressed 38 of those requests. Requests for assistance in these areas were primarily from commercial entities. The remaining nine requests for disposal advice were not addressed because the Department requested additional information, which was not provided.

Also in 2015, the section observed an increase in the number of inquiries pertaining to the disposal of electronic and bulky waste. With the closure of the Bulky Waste Facility at Bagatelle in St. Thomas, there are no suitable sites to appropriately dispose of these types of waste. Consequently, there is a need for a policy to address the disposal of this type of waste to reduce the potential for illegal dumping.

8.1.4 Disposal Requests

A disposal request is submitted to seek permission to dispose of a hazardous substance at one of the approved disposal sites in Barbados. The Department received and addressed 16 disposal requests. The requests were commercial entities and pertained primarily to the disposal of paint and oily water.

8.1.5 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, the importer must obtain approval from the EPD.

In 2015, the Department received and endorsed 29 applications to import radioactive materials. Twenty-eight of these applications were for use as radio-pharmaceuticals and one was for the importation of radioactive material for industrial purposes.

8.1.6 Review of Pesticide Applications

In 2015, the section received and vetted 41 applications for the importation of pesticides into Barbados. The section vetted the applications to determine the potential environmental impacts of the proposed pesticides. Subsequently, recommendations were made to the Chair of the Pesticide Control Board regarding whether to allow the importation of the pesticide.

8.1.7 Other Activities

In addition to the aforementioned activities, the SWHMS:

- Revised a Cabinet Paper regarding Barbados becoming Party to the Minamata Convention. The Paper was revised to include additional information.
- Reviewed the Basel Convention and identified Barbados' national obligations.
- Reviewed and provided comments to the SSA regarding proposed rules/regulations for the entrance of wastes into the Mangrove Pond Landfill.
- Provided comments on a draft concept paper to develop a Caribbean regional organic waste management sub-sector. The concept paper is to provide background information to support the planning and staging of a proposed regional meeting on organic waste-to-energy as a main feature of the Caribbean Community Energy Week 2015. The comments included a recommendation that Barbados' participation would be beneficial to gain knowledge and guidance regarding access funding and waste-to-energy technologies.
- Supervised the destruction and disposal of 17 gaming machines.

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 (i.e. the well-head);
2. the quality of nearshore marine water at several beaches to assess whether the microbial and nutrient quality of the marine environment is suitable for recreational purposes; and
3. discharges from wastewater treatment facilities.

Three officers staff this section: one Senior Environmental Protection Officer and two Environmental Protection Officers. During 2015, the Senior for the section demitted the post.

9.1 Activities of Section

Activities regarding water quality management for the year 2015 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 twenty (20) wells and two (2) springs across the island. The EPD collected approximately half of the samples and the Barbados Water Authority collected the remaining samples. These sampling locations are presented in Table 3.

Table 3: Sampling Locations for Public Supply Wells

Belle Catchment	Hampton Catchment	West Coast Catchment	Springs
Applewhaites	Bowmanston	Alleynedale	Benn Spring
Applewhaites Well Field	Carrington	Ashton Hall	Codrington College
Belle	Hampton	Carlton	
Desalination Plant		Haymans	
Constant		Molyneaux	
New Market		Trents	
Sweet Vale #1		Villa Marie	
Sweet Vale # 2		The Whim	
Waterford			

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 sixty-nine samples were collected in 2015. 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 below (Table 4).

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 4: 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 ¹ /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. All the public supply wells in Belle and Hampton Catchments and the two springs that are used for public supply recorded average chloride concentration that was markedly below recommended WHO drinking water value of 250 mg/l. However, six of the eight public supply wells in the West Coast Catchment registered average chloride concentrations that exceed the standard (see Figure 7).

The Trents pumping station recorded the highest average chloride concentration of 387.9 mg/l.

¹ CFU – Colony Forming Units

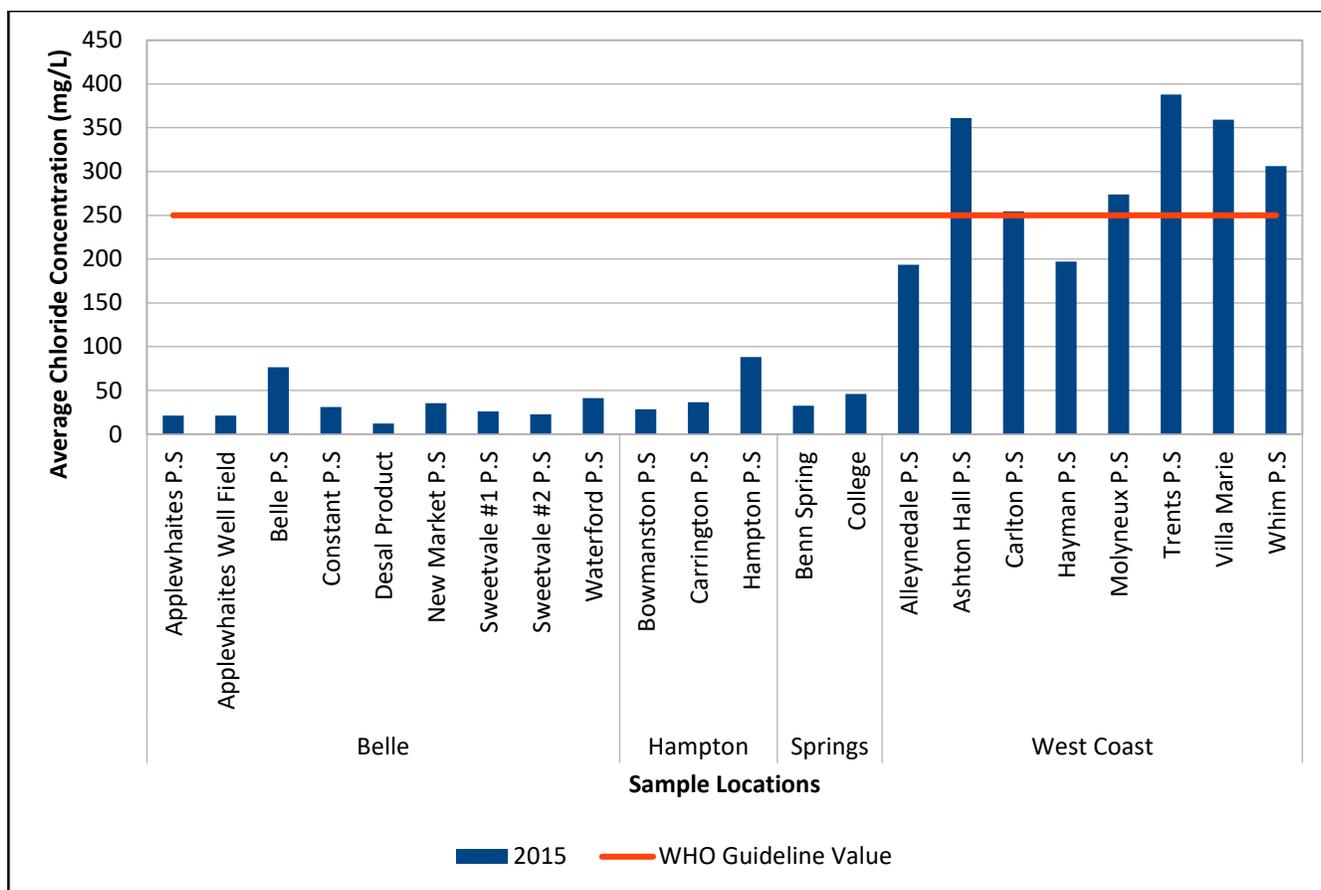


Figure 7: Average chloride concentration for public supply sources for 2015

From Figure 8, it is evident that over the period 2011 to 2015 most of the supply wells had similar annual average chloride concentrations. Only the public supply sources in the West Coast Catchment registered average chloride concentrations in 2015 that were significantly greater than their respective average concentrations over the period 2011 to 2014.

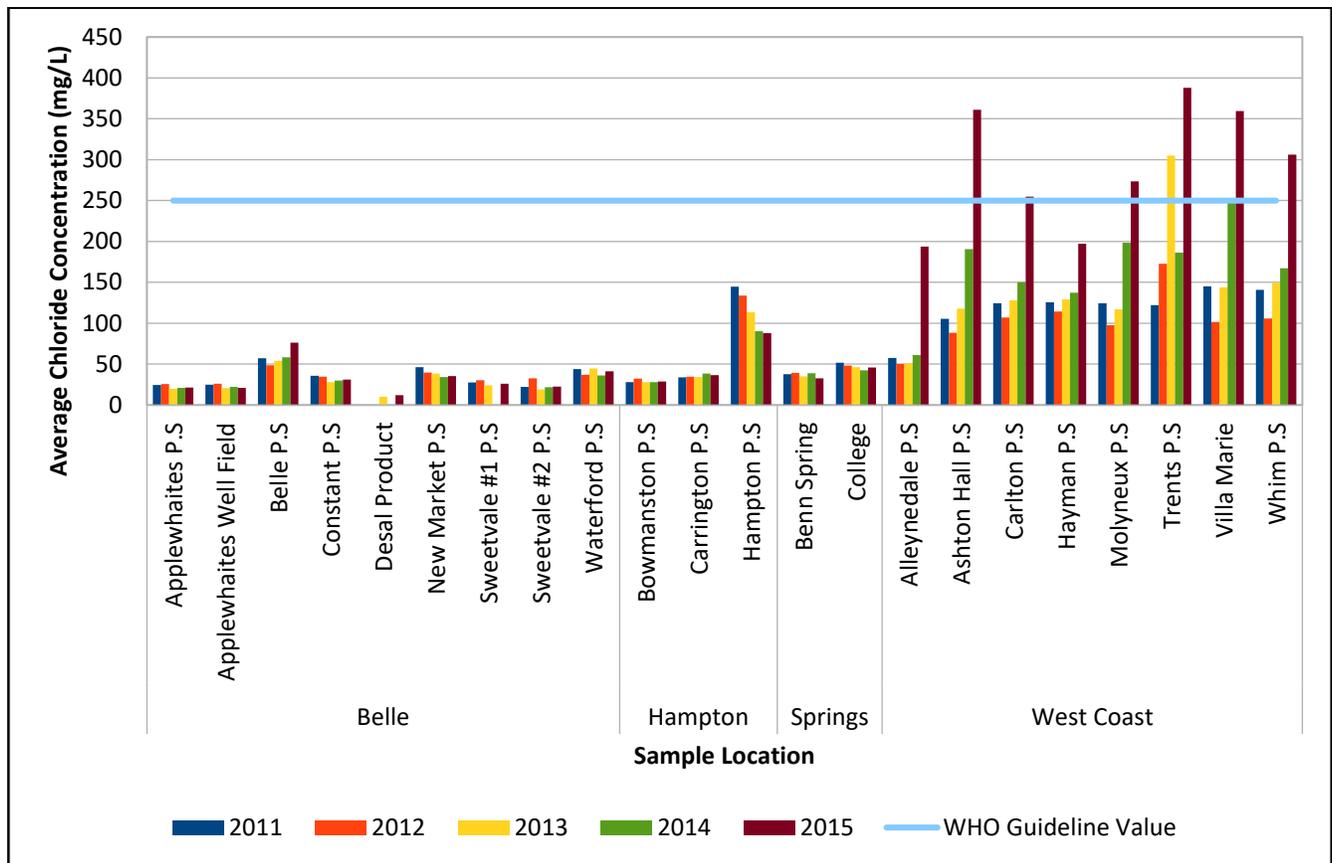


Figure 8: Average chloride concentrations for public supply sources over the period 2011– 2015

9.1.1.1.2 Nitrates expressed as Nitrogen (Nitrate-N)

In 2015, all of the public supply sources recorded average Nitrate-N concentrations that were less than the WHO guideline value of 10 mg/l. However, seven of the supply wells registered average Nitrate-N concentration above 7 mg/l (Figure 9).

The Belle P.S recorded the highest average Nitrate-N concentration of 8.49 mg/l. Other wells, which registered elevated average Nitrate-N concentrations, were Ashton Hall, with a value of 7.83 mg/l; Constant P.S, with 7.51 mg/l; Waterford P.S, with 7.21 mg/l; the Whim, with 8.15 mg/l; Villa Marie, with 7.53 mg/l; and the spring at Codrington College with 7.51 mg/l.

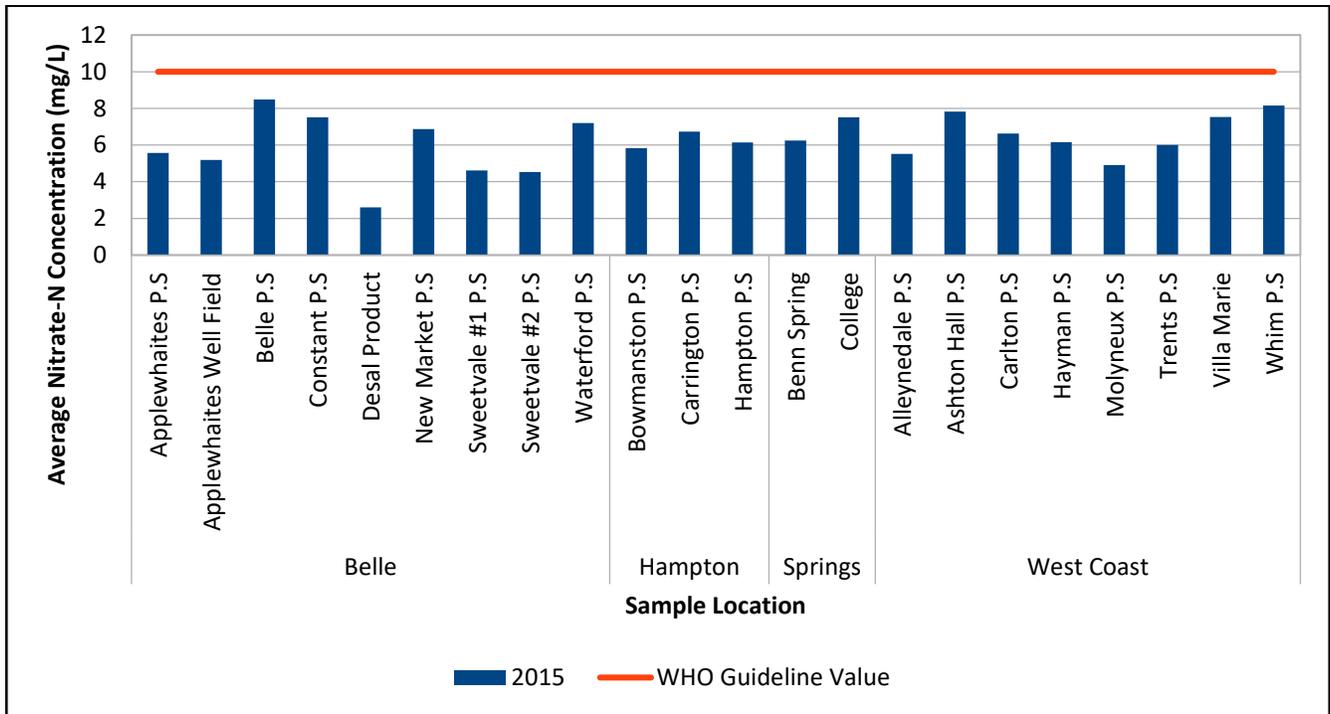


Figure 9: Average Nitrate-N concentrations for public supply sources for 2015

For most of the public supply sample locations, the average Nitrate-N concentration observed in 2015 were similar to those observed over the period 2011 to 2014 (Figure 10). There were noticeable increases in the average Nitrate-N concentrations at Villa Marie, Whim P.S, and Trents P.S over the five years. This may be indicative that the groundwater was more impacted by the disposal practices of liquid waste and agricultural activity in the vicinity. However, the sustained elevated Nitrate-N concentrations at the Belle P.S, Constant P.S and Ashton Hall P.S are an indication that measures need to be taken to prevent levels reaching or exceeding the WHO guideline value.

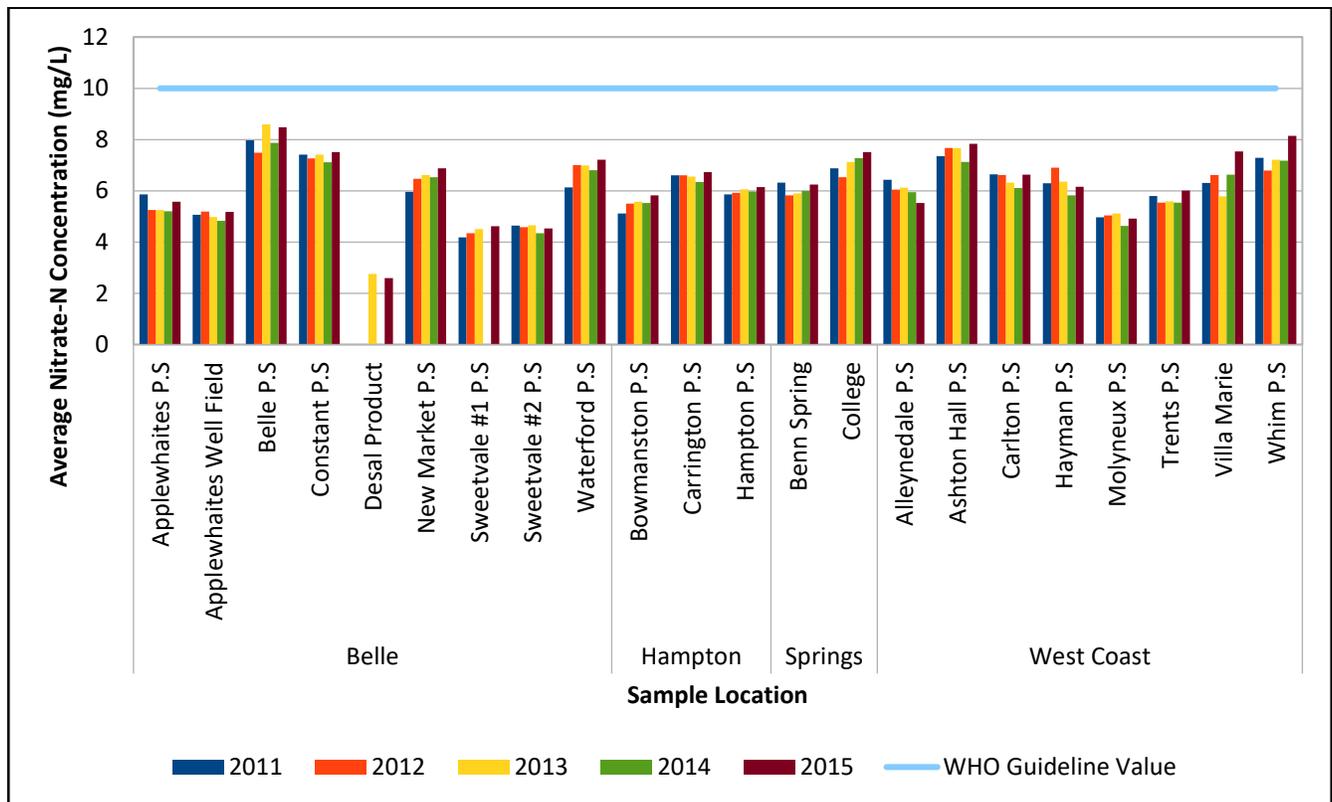


Figure 10: Average Nitrate-N concentrations for public supply sources over the period 2011 to 2015

9.1.1.1.3 Sulphates

For 2015, Trents P.S recorded the highest average concentration of sulphates, 64.79 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 2011-2014 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 (TDS)

The majority of the public supply sources recorded average concentrations of total dissolved solids that were below 900 mg/l (Figure 11). Six sample locations, Applewhaites P.S, Applewhaites Well Field, the Desalination Plant, Sweetvale #1, Sweetvale #2 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.

Eight 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”.

Five 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”.

Three locations (Villa Marie, Trents P.S and Ashton Hall) 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.

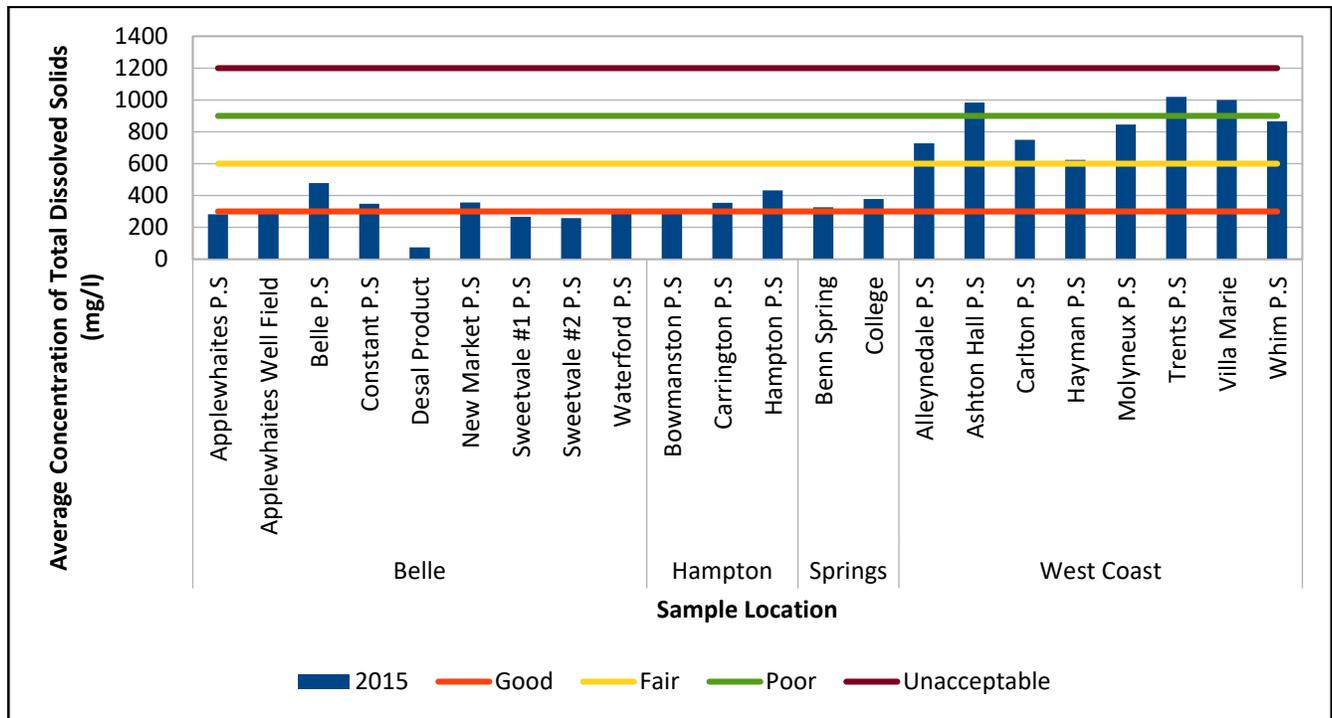


Figure 11: Average Concentration of TDS for public supply sources in 2015

Over the period 2011 to 2014, the average concentrations of TDS were greatest in the West Coast Catchment and least in the Belle Catchment; this pattern was also observed in 2015 (Figure 12).

Except for public supply sources in the West Coast Catchment and the Hampton pumping station, the average TDS concentrations observed in 2015 were comparable with those recorded from 2011 to 2014. The public supply sources in the West Coast Catchment recorded average concentrations of TDS that were significantly greater than those recorded in proceeding years.

In contrast, the average concentrations of TDS for the Hampton pumping station declined over the 5 years.

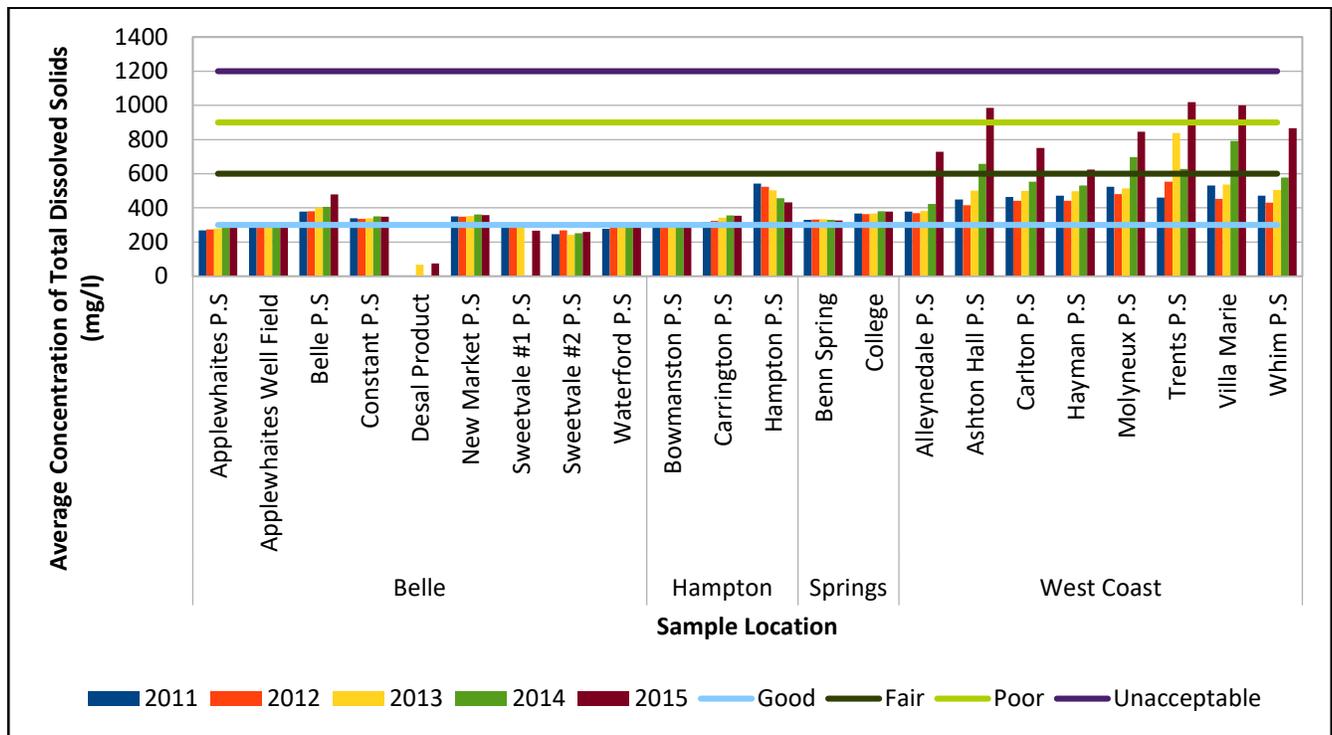


Figure 12: Average TDS concentrations for supply sources over the period 2011 - 2015

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 13 depicts the average concentration of faecal coliforms recorded at chlorinated sampling sites in 2015. As is evident from the figure, a number of the public supply sources observed average concentrations of faecal coliform above the WHO drinking water guideline. This might have been the result of ineffective chlorination. Discussions should be held with the Barbados Water Authority (BWA) to address this issue.

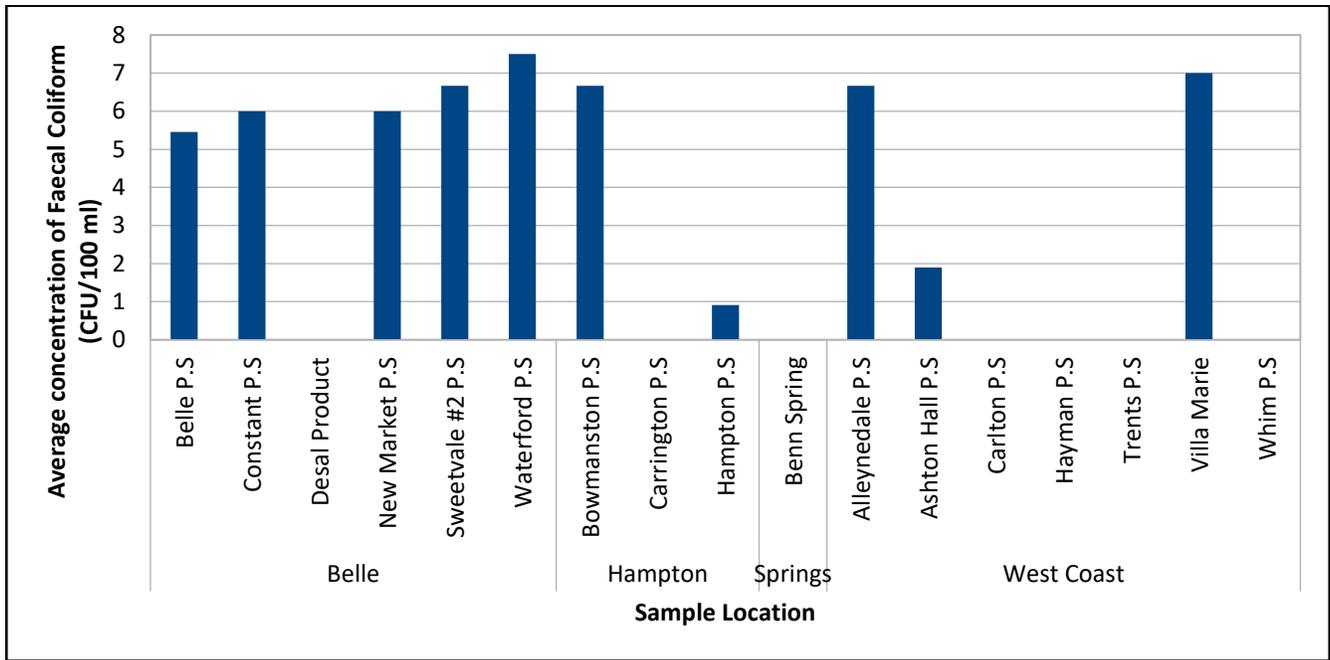


Figure 13: Average concentrations of faecal coliform for chlorinated supply sources in 2015

With respect to the product from the Desalination Plant, the Department obtained very few sample results for this location and the concentration of faecal coliform was not reported. The Department should request that the BWA submit analytical results from this location more frequently and that faecal coliform be included in the results.

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 five additional springs. These springs are located at Bath, 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 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 2015 because the path to the site was blocked and the site had been overrun by bush. The site should be cleared so that sampling can resume.

9.1.1.2.1 Chlorides

Figure 14 depicts the average chloride concentrations for four of the five non-public supply springs. All of the recorded average chloride concentration was below the WHO drinking water guideline for chloride of 250 mg/l. Pot House each recorded the highest average chloride

concentration of 86.7 mg/l whereas Three Houses recorded the lowest value of 50.7 mg/l.

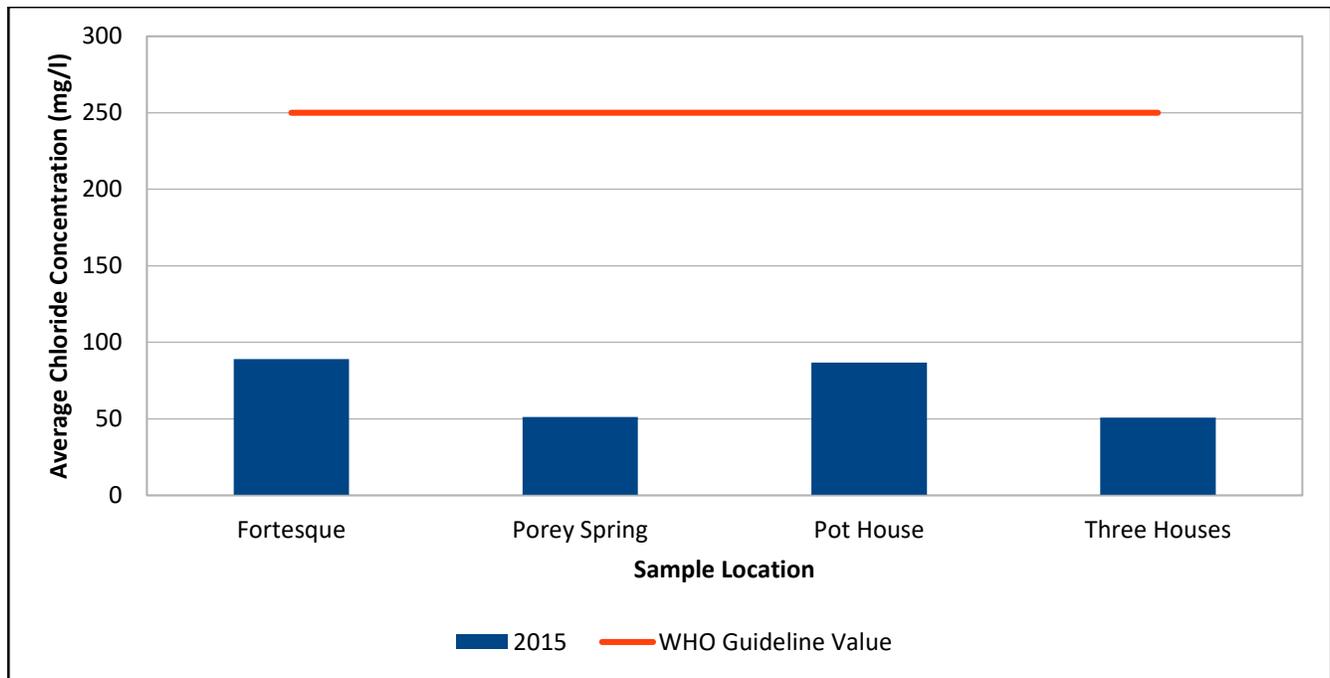


Figure 14: Average chloride concentration for 2015 for non-public supply springs

9.1.1.2.2 Nitrates 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 15). The spring at Fortesque recorded an average Nitrate-N concentration of 9.86 mg/l. The use of water from this location was of particular concern since the average Nitrate-N concentrations were very close 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 4.10 mg/l.

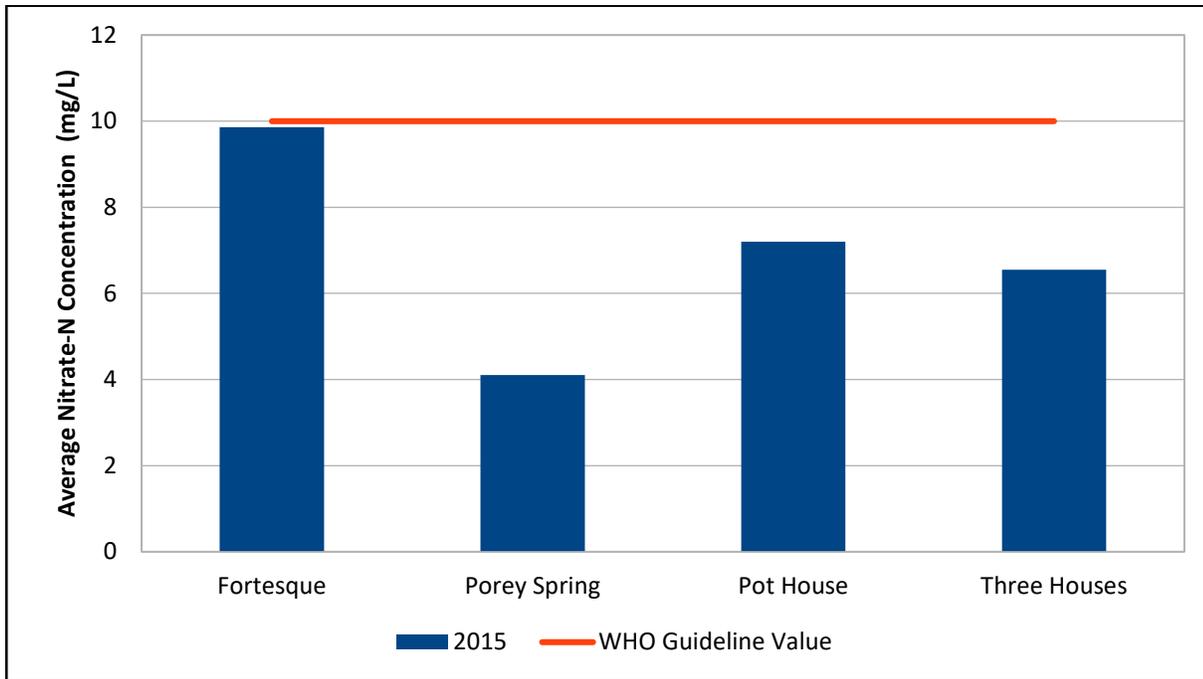


Figure 15: Average Nitrate-N concentration for non-public supply spring in 2015

9.1.1.2.3 Faecal Coliform

The waters from these five 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 16).

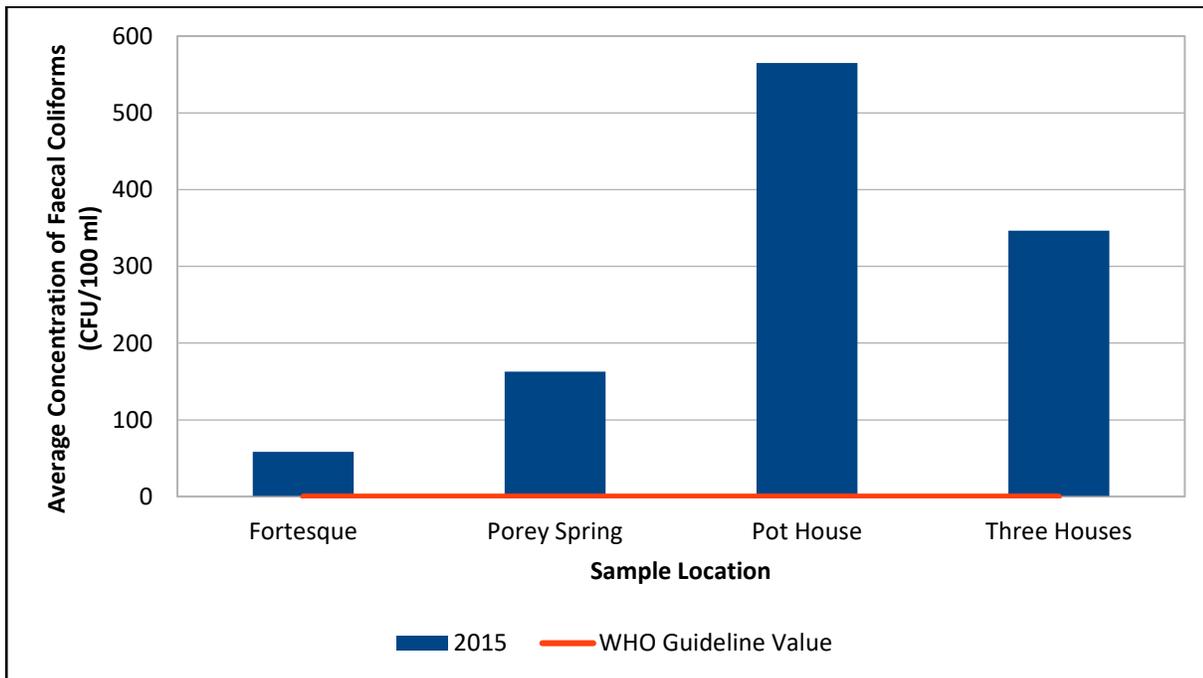


Figure 16: Average faecal coliform concentrations for non-public supply springs in 2015

The spring at Pot House recorded the highest average faecal coliform concentration of 565 CFU/100 ml. Fortesque recorded the lowest average concentration of faecal coliform, 58.5 CFU/100 ml.

High concentrations of faecal coliform in water from these locations indicated the possible presence of pathogens that may induce gastrointestinal illness in persons that ingest 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 program 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 5.

Table 5: 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, Physico-chemical and nutrients parameters. The public health laboratory at the 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 seven hundred and eighty-two samples were collected and analysed for microbial parameters. The microbial parameters analysed were Faecal Coliforms and Faecal Streptococci (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 6 below.

Table 6: Marine Quality Parameters and Proposed Standards

Parameter	Standard
Enterococci	The geometric mean of a minimum of 5 samples should not exceed 35 colonies/100ml in any 30-day period.
Faecal Coliform	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 2015, all of the bathing water sites from which adequate samples were collected conformed to the standards for enterococci and faecal coliform. However, there were 161 instances out of a total of 352 when an insufficient number of samples (less than 5) were collected. Consequently, those results could not be compared to the standards.

9.1.2.2 Physicochemical and Nutrient Analysis

A total of 95 samples were collected from the west and south coast beaches following the schedule developed by the EPD. The 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 7: 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. The only pH observed average levels for both South and West Coast beaches that conformed to the standard.

Coast	Parameter	Average Value
South	pH	8.1
	Total Phosphorus	0.1 mg/l
	Turbidity	3.0 NTU
	Total Suspended Solids	14.9 mg/l
	Total Nitrogen	0.4 mg/l
West	pH	8.1
	Total Phosphorus	0.1 mg/l
	Turbidity	2.5 NTU
	Total Suspended Solids	12.8 mg/l
	Total Nitrogen	0.4 mg/l

9.1.3 Wide-screen Analysis

This programme involves the collection of water samples from potable wells for analysis of a suite of parameters which are not normally assessed in the routine groundwater monitoring programme. Parameters such as heavy metals, pesticides, asbestos and persistent organic pollutants are analysed under this programme. This monitoring allows the Department to identify potential threats to groundwater that would not be detected from the routine monitoring activity.

A widescreen sampling of groundwater was conducted on March 17, 2015, and October 27, 2015. The corresponding report will be completed in 2016.

9.1.4 Wastewater Plant Monitoring

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

10 Public Education and 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 of the Department

For the year 2015, the EPD:

- produced its biannual newsletter.
- hosted interns through its summer internships programme.
- Raised awareness about the Department and environmental issues.

10.1.1 Biannual Newsletter

The Department distributed, via email, the 15th edition of its newsletter during the first quarter of 2015. This issue raised public awareness about, *inter alia*, the Department's nearshore monitoring programme and efforts of stakeholders to improve the management of chemicals in Barbados.

A draft of issue #16 of the newsletter was prepared but not published. The draft newsletter was sent to the MED for approval and to date, no directive has been received from the MED to distribute the newsletter. The newsletter contained articles about, the student internship programme for 2015, the hazards of engine exhaust from diesel vehicles and a workshop held jointly by the EPD and Labour Department to raise awareness about the GHS and how it can help businesses comply with their obligations under the Safety and Health and Work Act.

In light of the lengthy delays in getting approval for the Ministry, and the reduced level of activities undertaken by the Department due to the economic situation, the decision was taken to only produce the newsletter once during a financial year. Additionally, it was decided to only distribute the newsletter electronically as a cost-saving measure.

10.1.2 Summer Internship Programme

Each year the Environmental Protection Department 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.

The EPD hosted six (6) interns during the period May 11 to August 28, 2015. The interns surveyed the awareness levels of persons about the Globally Harmonized System of Classification of Labelling (GHS). The interns also performed data entry, participated in site visits and routine sampling and conducted research into environmental issues.

10.1.3 Environmental Awareness

The Department undertook several activities during 2015 to raise awareness about its roles and responsibilities and other matters about 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 19, 2015, International Coastal Clean-up Day (see Section 6.1.4 for further information).
- The Department aired environmental tips on Starcom Network (92.9 FM & 95.3 FM) from August 3 to 20, 2015, Caribbean Broadcasting Corporation (Q 100.7 FM & 94.7 FM) from July 6 to 31 and Power Broadcasting from June 8 to 30, 2015. The EPD's jingle was also televised during the CBC Evening News during July.
- The EPD reprinted 1,000 copies of the publication entitled, "Marine Monster of Morgan Island Colouring and Activity Book" for distribution to the public.
- The EPD and the Government Information Service with assistance from the Ministry of Health and the Labour Department developed a public educational video on Asbestos Removal which was aired on CBC TV on March 12, 2015.
- The Department participated in the Enviro-Waste Expo on March 6, 2015.
- During the year, the Department delivered several presentations to various institutions.
- The Department hosted a seminar, in association with the Labour Department, for 24 representatives from the retail and industrial sector on March 19, 2015. The purpose of the seminar was to raise awareness about GHS, chemical management obligations under the SHAW Act and the role the GHS can play in achieving those objectives.

11 Conferences, Seminars, Workshops and 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 2015 (Tables 10, 11, 12 and 13).

11.1 Training

11.1.1 Local Training

Table 8: Summary of Local Training Activities for 2015

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
Registry Procedures	The Solution Centre, University of the West Indies, Cave Hill Campus, Cave Hill, St. Michael. January 19 -23, 2015	To explain the basic principles and practices of Registry Procedures and enable participants to perform routine registry functions.	D. Baker – Clerical Officer
Training in First Aid, Adult CPR and AED	Conference room, Environmental Protection Department. March 13, 19 & 20, 2015 April 23, 24 & 30, 2015	To equip staff with the skills to address minor injuries and medical emergencies.	A. Belgrave -Stenographer/Typist A. Boxill – Secretary A. Eversley – Senior Marine Pollution Officer A. Headley – Director A. Reeves – Technical Office C. Browne – Building Development Officer C. Clarke – Senior Building Development Officer C. Crichlow – Clerical Officer C. Layne – Building Development Officer C. Taylor – Building Development Officer C. Worrell – Marine Pollution Officer D. Barker – Clerical Officer D. Forde – Environmental Inspector D. King – Driver Messenger G. Clarke – Building Development Officer G. Drakes – Draughtsman Technician G. Hinds – Environmental Protection Officer

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
			J. Yearwood – Environmental Technician K. Barrow – Chief Building Development Officer L. Chapman – Environmental Technician L. Harewood – Receptionist L. Senhouse – Senior Environmental Technical Officer M. Small – Senior Building Development Officer N. Cummins – Environmental Inspector I P. Agard – Clerical Officer P. Fergusson – Environmental Protection Officer S. Chase – Building Development Officer S. Forde – Building Development Officer T. Armstrong – Senior Environmental Protection Officer T. King – Senior Environmental Inspector Y. Howell – Maid
Time Management	Warrens Tower II, Warrens, St. Michael. March 23, 2015	To expose participants to current methods and strategies for managing their time, to improve individual and organisational productivity	G. Hinds – Environmental Protection Officer T. Williams – Marine Pollution Officer J. Yearwood – Environmental Technician
Secretarial Development	Warrens Tower II, Warrens, St. Michael. June 3 – 5, 2015	To help secretarial staff improve their skills, attitudes, knowledge and ultimately to improve their productivity and performance	A. Belgrave -Stenographer/Typist

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
Training in OpenOffice - Base	4 th -Floor Baobab Towers, Warrens, St. Michael	Review of the information technology training manuals to ensure that the training manuals are user friendly	G. Drakes – Draughtsman Technician C. Griffith – Environmental Protection Officer J. Yearwood – Environmental Technician
Introduction to Public Service Management	Warrens Towers II, Warrens, St. Michael. September 28 – October 9, 2015	To provide the participants with an opportunity to develop their supervisory performance, so that they become more effective in this role. It also seeks to prepare them to undertake greater responsibility.	S. Goodridge – Senior Environmental Technician
EIA Workshop	Accra Beach Hotel October 5 – 7, 2015	To provide participants with a better understanding of the process of review EIA for the oil and gas sector.	A. Headley – Director L. Senhouse – Senior Environmental Technical Officer P. Pile – Environmental Technical Officer
Effective Presentation Skills	Warrens Towers II, Warrens, St. Michael November 16 – 20, 2015	To give delegates the confidence and skills required to deliver effective presentations	L. Chapman – Environmental Technician
Workshops for 360° Appraisal System	Warrens Towers II, Warrens, St. Michael November 16 – 18, 2016	To recommend strategies to strengthen the capacity of the TAD to administer and deliver quality training and professional development services for the public service of Barbados; and To improve PAD's effectiveness and efficiency in identifying, developing and delivering quality-assured professional strategic human resources management services for the public service of Barbados	A. Headley – Director (ag)
LIDAR Training	Warrens Towers II, Warrens, St. Michael December 2, 2015	To demonstrate the capabilities of the LIDAR (a remote sensing technology) server software in	C. Worrell – Marine Pollution Officer A. Eversley – Senior Marine

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
		querying, analysing and exporting LIDAR data.	Pollution Officer

11.1.2 Overseas Training

Table 9: Summary of Overseas Training Activities for 2015

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
Oil Spill Preparedness and Response Training and Capacity Building Activities	Fort Lauderdale, Florida, USA. April 20 – 24,2015	To familiarise participants with: <ul style="list-style-type: none"> oil spill response concepts and strategies and the practical realities of response management and operations. a wide variety of response equipment necessary to assess spills, selecting appropriate response strategies, methodologies and equipment safe deployment of equipment. 	T. Williams – Marine Pollution Officer
Regional Water and Education Workshop	Knutsford Court Hotel, Jamaica April 20 – 24, 2015	To introduce participants to the General Guide for Water and Education to use in their public education programmes to promote the appreciation of knowledge about and respect for water.	I. Lavine – Deputy Director (ag)
Oil Pollution Preparedness, Response and Co-operation Exercise of the Martinique Prefecture	Martinique October 6 – 8,2015	To meet Oil Pollution Preparedness Response and Cooperation (OPRC) goals	A. Eversley – Senior Marine Pollution Officer (ag)
Training Workshop on Measurement of Gas Concentration for Monitoring Air Quality and Climate Change	Mexico's National Centre, Queretaro, Mexico. September 8 – 10, 2015	To increase knowledge of the measurement of gas concentration for monitoring air quality and climate change.	L. Chapman – Environmental Technician

11.2 Conferences, Seminars and Workshops

11.2.1 Local

Table 10: Summary of Local Seminars, Conferences and Workshop in which the Department Participated

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
Validation of the draft Climate Change Smart Comprehensive Disaster Management Country Work Programme Document developed by Barbados.	Baobab Towers, Warrens, St. Michael. February 24 – 26, 2015	To orient participants to Results-Based Management and Monitoring and Evaluation Frameworks among other things.	I. Lavine – Deputy Director (ag)
Seminar on Understanding Barbados' Foreign Policy	Lloyd Erskine Sandiford Centre, Two Mile Hill, St. Michael. February 25, 2015		I. Lavine – Deputy Director (ag)
Workshops on Public Sector Performance Budgeting	Baobab Tower, Warrens, St. Michael. May 13 – 14, 2015 May 20 – 21, 2015 May 27 – 28, 2015 June 10 – 11, 2015	To raise awareness amongst participants about the tenants and benefits of performance budget.	D. Gittens – Senior Environmental Protection Officer T. Armstrong – Senior Environmental Protection Officer A. Reeves – Technical Officer A. Eversley – Senior Marine Pollution Officer S. Goodridge – Senior Environmental Technician C. Clarke – Senior Building Development Officer T. King – Senior Environmental Inspector
Bridgetown 360: Participatory Workshop – Local Economic Development in Bridgetown	IDB Barbados Country Office, Welches, Maxwell Main Road, Christ Church. May 12 – 15, 2015	To discuss the challenges and opportunities for economic development observed in two specific areas of the city of Bridgetown and to think of plausible solutions.	I. Lavine – Deputy Director (ag)

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
The BREA Consumer Guide Solar PV Training Workshop for the Financial and Government Sector	Training room, Barbados Coalition of Service Industries Inc. June 10, 2015	To inform participants, <i>inter alia</i> , about the use and application of solar PV systems within businesses and homes.	K. Barrow – Chief Building Development Officer (ag)
Occupational Safety and Health Week 2015	Accra Beach Hotel and Spa, Christ Church July 7, 2015	EPD officer delivered presentations to raise awareness about the GHS and the safe management of obsolete chemicals.	T. Armstrong – Senior Environmental Protection Officer P. Pile – Environmental Technical Officer
Mapping Your Coastal Tourism	Caribsave Caribbean Regional Headquarters, Dayrell's Road, St. Michael. August 13, 2015	To bring stakeholders together to identify key actors and conduct mapping activities.	A. Eversley – Senior Marine Pollution Officer (ag)
Lecture regarding Preparation for Retirement	Warrens Office Complex, Warrens, St. Michael September 16, 2015	To prepare participants for retirement.	K. Barrow – Chief Building Development Officer (ag) M. Small – Senior Building Development Officer (ag)
Tools for Mobilising Renewable Energy in the Caribbean	Caribbean Development Bank, Wildey, St. Michael. November 5, 2015	To empower the private sector and energy consumers in the Caribbean to make informed decisions on renewable energy investments and to provide input to policy-making to create an enabling environment to accelerate such investment.	A. Reeves – Technical Officer
Capacity Building Workshop on Solid Waste Management	Accra Beach Hotel and Spa, Barbados. December 8 – 10, 2015	To share the outcome and outputs of the project to develop a route optimization study for solid waste collection in Barbados with local and regional stakeholders.	I. Lavine – Deputy Director (ag) T. Armstrong – Senior Environmental Protection Officer

11.2.2 Overseas

Table 11: Summary of Overseas Seminars, Conferences and Workshop in which the Department Participated

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
Global Environment Facility Expanded Constituents Workshop.	Freeport, Bahamas May 4 – 7, 2015	To keep the GEF national focal points, convention focal points and other key stakeholders abreast of GEF strategies, policies and procedures and to encourage coordination.	L. Senhouse – Senior Environmental Technical Officer (ag)
Subregional Workshop for Caribbean Countries on Civil Liability for Nuclear Damage	Panama City, Panama June 23 – 25, 2015	<p>To provide information on the existing international nuclear liability regime, in particular, the instruments adopted under the auspices of the International Atomic Energy Agency, including the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage and the Convention on Supplementary Compensation for Nuclear Damage.</p> <p>To advise on the development of national implementing legislation to reflect the principles and norms of the international nuclear liability regime.</p>	I. Lavine – Deputy Director (ag)
4 th Global Environment Fund Caribbean Regional Fund for Waste Management (GEF CreW) Project Steering Committee Meeting	Antigua, Guatemala July 7 -9, 2015	To review activities for the past year and those planned up to the end of the project, which was extended until January 2017. The meeting also examined the challenges and lessons learnt throughout the project and considered a draft proposal for a follow-on to the project.	I. Lavine – Deputy Director (ag)

Name of Course/Activity	Location and Date/Period	Objective(s)	Officer(s) in Attendance
GEF CReW Resource Evaluation Workshop	Miami, Florida August 23 – 24, 2015	To discuss and disseminate the results of two resource valuation studies, which were conducted in Panama and Trinidad and Tobago.	A. Reeves – Technical Officer
17 th Annual Meeting of National Authorities	, The Hague, The Netherlands November 25-30, 2015	To Promote cooperation among National Authorities to further the implementation of the Convention at the regional level To promote cooperation between the States, Parties and the secretariat to enhance the implementation of the Convention.	A. Headley – Director (ag)

12 Outlook for 2016

It is anticipated that the Department will face several challenges in 2016. Government's policy to suspend the provision of additional staff to fill vacant posts or to provide substitutes will 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.

Additionally, challenges are anticipated in two main areas. These areas are the protracted delays in receiving the necessary approvals and feedback from the Ministry of Environment and Drainage and absence of adequate legislation. There is a need for the Department to champion the development of 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.

However, the year 2016 will also present the Department with an opportunity to explore creative ways to:

- deliver exceptional service; and
- achieve its mission of promoting sustainable practices through control, regulation and enforcement and in so doing enable future generations to inherit an environment, which is healthy, productive and enjoyable.