



ENVIRONMENTAL PROTECTION DEPARTMENT ANNUAL REPORT

2013



ENVIRONMENTAL PROTECTION DEPARTMENT

Director's Review

During 2013, the Environmental Protection Department (EPD) ushered in a new chapter in its life with the retirement of long-standing Director, Mr Jeffrey Headley, and EPD stalwart, Mr Sylvan Catwell.

This new chapter saw the new management continue the Department on its path to becoming the lead regulatory and enforcement agency for environmental management in Barbados. However, there were some challenges. One challenge was the absence of an adequate legislative framework necessary to address various aspects of effective environmental management such as the removal of derelict buildings and vehicles, ambient air quality and wastewater reuse. This in turn affected the Department's ability to effectively respond to these issues. The inability of the Department to respond adequately to issues was further exacerbated by the austerity measures implemented by the Government to deal with the global financial crisis.

However, the Department endeavoured to achieve its vision by:

- renewing its zeal to tackle the issues confronting our environment;
- fostering new partnerships and strengthening existing ones;
- conducting sound environmental research for decision making; and
- engaging stakeholders on critical issues.

The Department will persist in its efforts to build on these key elements to ensure that Barbados' environment remains healthy, productive and enjoyable.

Anthony Headley
Director (ag)

Executive Summary

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 the enforcement of legislation. The Department consists of eight sections – seven technical sections supported by an administrative section – that carry out its functions. The following is a summary of the Department's activities for 2013.

The Air and Noise Pollution Control Section (ANPCS) received 51 air quality complaints and six noise complaints. The majority of the air quality complaints pertained to vehicle maintenance facilities (VMFs) and nuisance emissions. Only a small number of indoor air quality complaints were received as the ANPCS officially stopped addressing indoor air quality complaints and diverted such complaints to the Labour Department.

In addition to its routine monitoring activities, the ANPCS participated in three building assessments; revised the indoor air quality policy; undertook a project to increase its knowledge of ambient air pollution caused vehicle maintenance facilities; and conducted studies of noise levels and ambient air quality in Bridgetown area.

During 2013, the Building Development Control Section (BDCS) processed and decided on 1,414 applications for building development. The majority of the applications were for residential developments. However, 1,531 applications were not processed. A contributory factor to this occurrence was the absence of two Building Development Officers. The section also processed 84 consultation files regarding areas such as wastewater treatment plants and refurbishment of petrol stations.

Some of the other activities undertaken by the BDCS were as follows. The section:

- continued to work on its standard operating procedures, focusing on areas such as kitchen ventilation systems and laboratories;
- entered into discussions with the Ministry of Health regarding the inadequacy of existing regulations regarding the licensing of residential care homes other nursing and senior citizen homes; and
- began the revision of the building development booklet which serves to raise public awareness about the requirement for building development applications.

In 2013, the Derelict Buildings and Vehicles section observed a 68% decrease in the number of derelict vehicles removed relative to 2012. This decrease was primarily the result of the closure of the solid waste disposal facility at Bagatelle, St. Thomas. Similarly, the section also observed a decrease of 66% in the number of derelict buildings demolished in 2013 in comparison to the number demolished in 2012. This occurrence was influenced by:

- the inability of the section to ascertain the names and addresses of owners of derelict buildings due to the relocation of the Land Valuation Department; and
- the non-issuance of contracts for building demolition by the Ministry of Environment.

The section recovered costs as a debt due to the Crown of \$ 5,497.00 from the owners of derelict building. Moreover, the section approved and supervised the disposal of 66 requests for the disposal of asbestos-containing materials and fibreglass.

Concerning multilateral environmental agreements (MEAs), the Department began work to establish a bilateral agreement between the United States of America and the Government of Barbados. The agreement will seek to provide a more cost-effective alternative for the disposal of hazardous wastes from Barbados under the provisions of the Basel Convention. Additionally, the Department submitted a report to secretariat of the Basel Convention. The report précised Barbados' shipments of hazardous waste for environmentally sound disposal abroad for the year 2012.

The Department concluded a two-year project, with assistance from the United Nations Institute for Training and Research (UNITAR), to develop a National Implementation Strategy for the Implementation of the Globally Harmonized System of Classification and Labelling of Chemical (GHS). A cabinet paper (CP) was prepared and sent to the MED for onward submission to the Cabinet. The Department also hosted a workshop which raised awareness about the GHS, its methodology for hazard classification and its communication tools.

In 2013, the Department began talks with the Department of Commerce and Customs and Excise Department regarding the placing of Polychlorinated Biphenyls (PCBs) on the import and export licensing system. PCBs are a category of Persistent Organic Pollutants (POPs), which are highly hazardous organic chemicals. The main outcomes of the talks were that a cabinet paper should be developed that only addresses mixtures and formulations containing PCBs and that a notification procedure is developed to address equipment containing PCBs. The Department of Commerce will prepare the Cabinet Paper and the EPD will work with the Customs and Excise Department to establish a notification procedure.

Concerning POPs, the Department also explored options for analysing POPs locally. After discussions with the Forensic Science Centre, Government Analytical Services and the Faculty of Science and Technology (FST) of the UWI, the FST was identified as the most suitable entity to perform the analyses. Consequently, the Department is working to develop a Memorandum of Agreement with the FST.

Other activities undertaken by the Department regarding MEAs included:

- Finalizing a report on Barbados' activities associated with Chemicals Weapons Convention for the year 2012 and submitting the said report to the secretariat of the Organization for the Prohibition of Chemical Weapons.

- Submitting a proposal to the SAICM QuickStart Programme Trust Fund to seek funding for a project to develop a management strategy for the sound governance of cadmium, mercury and lead in Barbados.
- Facilitating the signing of an agreement for a project to strengthen local capacity as well as policy, legal and institutional frameworks for wastewater management.

The Marine Pollution Control Section conducted regulatory inspections of HIPAC Limited, Peronne Manufacturing Company Limited and Chickmont Foods Limited and began preparation of the associated reports. The section also conducted compliance inspections of the Rum Refinery of Mount Gay in St. Lucy and West Indies Rum Distillery. Furthermore, the section received and investigated 21 complaints about marine pollution and reviewed and provided comments on a draft response action plan for oil spills in the Oistins Bay area.

On September 21st, 2013 the MPCS hosted its annual beach clean-up at the Morgan Lewis Beach in St. Andrew with the assistance of 175 volunteers. The clean-up recovered 681 pounds of litter.

During the year under review, the Solid Waste and Hazardous Material Section (SWHMS) conducted monthly inspections of the government-operated disposal sites. Any concerns observed were brought to the attention of the Sanitation Service Authority for its necessary action. The section processed 25 requests for disposal advice and 102 requests for the disposal of paint and oil-water. Request for assistance in these areas were primarily from commercial entities.

The section also, *inter alia*, investigated ten complaints, processed 27 applications for the importation of radioactive substances and reviewed 32 applications for the importation of pesticides into Barbados.

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:

1. all of the supply wells, except Trents pumping stations, recorded average chloride concentrations that were below the recommended WHO drinking water guideline value of 250 mg/l;
2. all of the wells had average Nitrate-N concentrations that were less than the WHO guideline of 10 mg/l (however, five wells had concentrations above 7 mg/l);
3. all of the supply sources recorded an average concentration of sulphates that were below the WHO guideline of 500 mg/l;
4. the majority of water for the various supply sources had tastes that would be classified by the WHO drinking water guidelines as "Good" since the average concentrations of the total dissolved solids (TDS) ranged from 300 – 600 mg/l;

5. all of the public supply wells and public supply springs recorded average concentrations of Faecal Coliforms that were above the WHO guideline value of 0 CFU/l.

The wastewater programme was suspended indefinitely due to budgetary constraints and logistical issues.

Regarding recreational (beach) water quality monitoring, samples were taken from 18 beaches; eight on the west coast and ten on the south coast, and analysed to determine the concentration of Faecal Coliforms and Enterococci present. The results of the analyses were compared to the proposed List of Prohibited Concentrations under the Marine Pollution Control Act. All of the beaches on the south and west coast complied with the standard for Faecal Coliform. However, three locations – Amaryllis Site 2, Brownes Beach Site 1 and Pebbles Beach Site 2 – exceeded the standard for Enterococci during some months of the year.

When compared to the Ambient Water Quality Standards under the Marine Pollution Control Act, the results of the 132 marine water samples that were tested for nutrients samples revealed that:

- all the samples failed to comply with the standards for total phosphorous and turbidity;
- approximately 91% of the samples failed to comply with the standard for total nitrogen; and
- the only nutrient parameter that was satisfactory across all beaches was pH.

In 2013, the EPD continued to increase public awareness about its activities and environmental issues in various ways. These ways included:

- organizing a trip on the Atlantic Submarine for the students of the Gradyon Sealy Secondary School to foster an appreciation for the marine environment in the youth;
- hosting two final year students from the Environmental Science Programme at the Barbados Community College;
- airing tips on the radio and television that the public could use to help protect the environment.

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.

The outlook for 2014 is that the Department will face many challenges stemming primarily from a shortage of human and financial resources. However, the year 2014 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 has regulatory functions in the areas of ambient air quality, building development control, 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. These functions include environmental policy development in addition to routine activities such as processing building development applications, water quality monitoring and response to complaints of environmental pollution.

The Department comprises management and administrative sections in addition to seven technical sections. As shown in Table 1 there are 54 posts in the Department of which 48 are established and 6 are temporary. Two of the posts – Marine Pollution Inspector and Environmental Inspector – are frozen.

Table 1: Posts within the Environmental Protection Department

Section		No. of Posts
1.	Management	2
2.	Administration	14
3.	Air & Noise Pollution Control	4
4.	Building Development Control	15
5.	Removal of Derelict Buildings & Vehicles	6
6.	Management of Multi-lateral Environmental Agreements	3
7.	Marine Pollution Control	5
8.	Management of Solid Waste & Hazardous Materials	2
9.	Water Quality Management	3
Total		54

2 Air and Noise Pollution Control

The Air and Noise Pollution Control Section (ANPCS) deals with issues related to ambient air, indoor air and noise pollution. The section conducts technical research into air and noise quality issues; carries out air quality assessments of office buildings; and conducts environmental noise assessments. Additionally, the section investigates complaints related to outdoor air pollution, the indoor environment in office buildings and environmental noise pollution.

Four persons staff the section: one senior officer and three environmental technicians. However, from May 2013, only three persons staffed the section as one of the technicians was appointed to act as an environmental technical officer.

2.1 Planned Activities for 2013

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 work programme for 2013 included the following.

- To circulate the Ambient Air Quality Policy Paper to stakeholders and utilize the comments to revise the Policy Paper.
- Collate data and produce a report on the ambient air quality assessment of Bridgetown using passive samplers.
- Conduct ambient air quality assessment of Oistins and Speightstown using passive samplers.
- Review data and generate a report on the noise assessment of selected Bridgetown communities and selected developments.
- Investigate ambient air, indoor air and noise complaints.

2.1.1 Revision of the Ambient Air Quality Policy Paper

The Ambient Air Quality Policy Paper provides an overview of the potential air pollutants, existing issues concerning ambient air quality and suggests a management framework to address ambient air pollution. Implementation of the provisions of the policy paper would enable the Department to effectively regulate or restrict the location of incompatible activities. This could have a positive effect on the health of Barbadians and should also aid to decrease the burden on the National Insurance Scheme.

To finalise the paper, the EPD recommended in 2010 that the Ministry of Environment and Drainage (MED) organize a meeting to capture the opinions and views of those agencies identified in the proposed framework. No response was received from the Ministry.

In June 2013, the EPD received stakeholder comments from the MED regarding the policy paper. These comments were provided by the Town and Country Development Planning Office, Royal Barbados Police Force, Ministry of Health and Ministry of Public Works during the period September 2010 to February 2011. The Department incorporated the comments and submitted the revised paper to the MED.

2.1.2 Ambient air quality assessment of Bridgetown

The section continued the process of characterising the ambient air quality in Bridgetown and its environs utilizing passive monitors. The objectives of the assessment included the determination of the concentration of the criteria pollutants as well as volatile organic compounds. Criteria pollutants such as sulphur dioxide, nitrogen dioxide, and ozone are used to describe the quality of ambient air.

Deployment of the passive monitors concluded in June 2013. All of the passive samplers were shipped overseas for analysis. Subsequently, the results were analysed and a report is being prepared. Based on the findings of the study, the Department would be in a position to recommend appropriate policy initiatives and control measures to decision-makers.

2.1.3 Ambient air quality assessments of Oistins and Speightstown

The Department began its preparations to conduct ambient air quality assessments of the Oistins and Speightstown areas using passive monitors. Similar to the Bridgetown assessment, the purpose of these activities will be to characterize the air quality in these areas and facilitate the development of control measures.

The Department identified several sampling locations for the Oistins and Speightstown areas and sent letters to the property owners requesting permission to place samplers at the identified locations. As a result of the loss of documentation or failure to notify the customs brokers in the United Kingdom (UK), the samplers were retained at Gatwick Airport for an extended period before clearance by UK customs brokers. This resulted in additional storage fees being incurred; thereby increasing the cost of the project.

2.1.4 Bridgetown Noise Characterization Study

This study aimed to determine the sound levels within Bridgetown and identify sources contributing to the measured sound levels.

The sound level meter was deployed on the roofs of selected buildings. At each site, twenty-four-hour readings were taken for three weekdays and a Sunday within the same week. Monitoring on a Sunday was done to gauge the sound levels when there should be little human activity. In addition to the sound level reading collected at each visit to a site, data on the general activities being conducted in the vicinity were also collected. Traffic count data was requested from the Ministry of Transport and Works to complement the noise data collected.

At the end of 2013, the ANPCS were in the process of analysing the data and preparing the final report which would include recommendations on the next steps that should be taken.

2.1.5 Receipt and Response to Complaints

2.1.5.1 Air Quality

Complaints received by the ANPCS were classified as relating to emissions from industrial stacks, manufacturing operations, nuisance and vehicular maintenance facilities. The section also received complaints related to the working environment – occupational matters (IAQ). Table 2 presents the definitions of these classifications.

Table 2: Classification of air quality 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 iron works
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
Occupational (IAQ)	Relates to complaints of the physical discomfort of employees in the work environment, mostly related to ventilation systems

In 2013, the ANPCS received 51 complaints about air quality. These comprised 12 IAQ complaints and 39 ambient air quality complaints. Complaints about vehicle maintenance facilities and nuisance emissions accounted for the majority of ambient air quality complaints as shown in Figure 1.

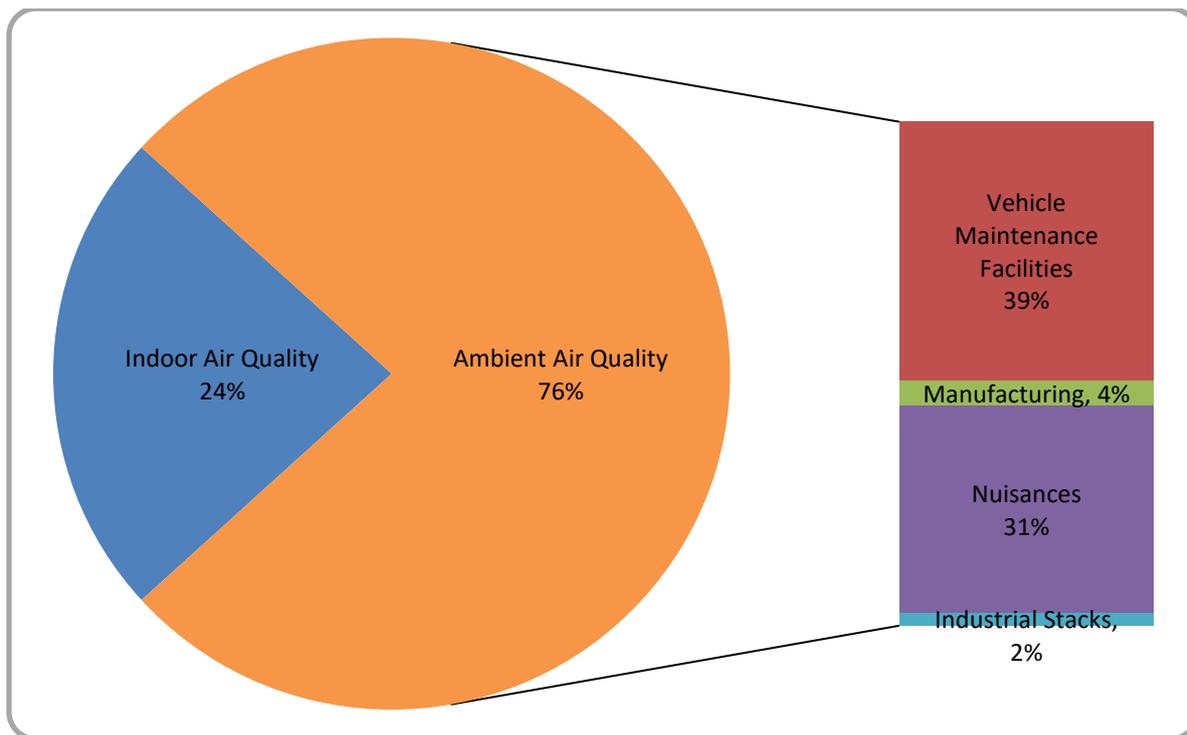


Figure 1: Proportion of Air Quality Complaints Received in 2013

Concerning IAQ complaints, the ANPCS officially stopped addressing IAQ complaints in August 2013 and started to divert 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. Consequently, the complaints recorded were received before August.

The complaints received by the ANPCS were further divided into new and recurring complaints. The ANPCS classifies new complaints as those lodged with the section for the first time. Recurring 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, 4% of the complaints received were recurring complaints.

Generally, over the past five years, there has been a decrease in the total number of air quality complaints received by the ANPCS (see Figure 2). Despite this decrease, the relative proportions of VMF complaints showed an overall increase from 31% in 2009 to 39% in 2013. Similarly, there was a general increase in the number of nuisance complaints received by the Department.

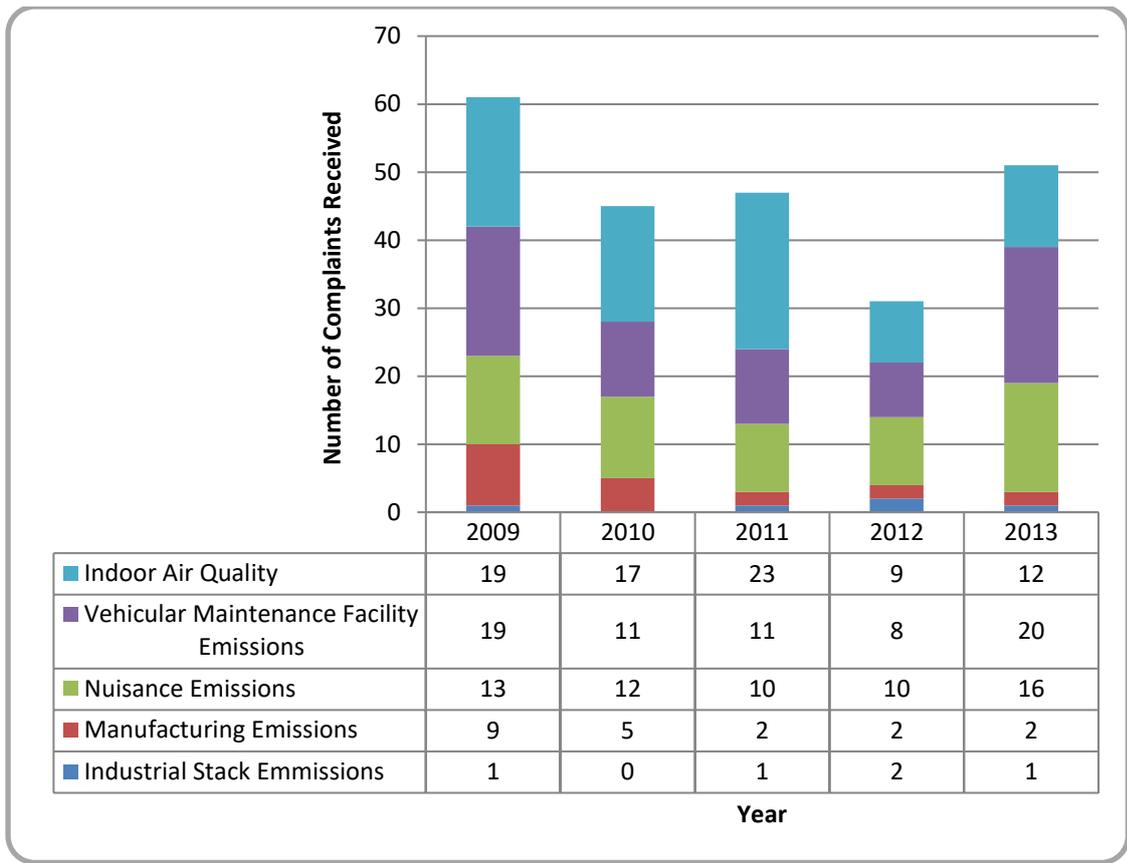


Figure 2: Total Number of Air Quality Complaints Received over the Period 2009-2013

Officers of the section investigated 80 complaints during the year. These comprised 27 recurring complaints and 53 new complaints. Figure 3 shows the category of air quality complaints investigated. From the figure, it is evident that the majority of investigated complaints about ambient air quality were nuisance complaints and the majority of these were recurring complaints. The section also investigated twenty-one (21) IAQ complaints from January to August 2013.

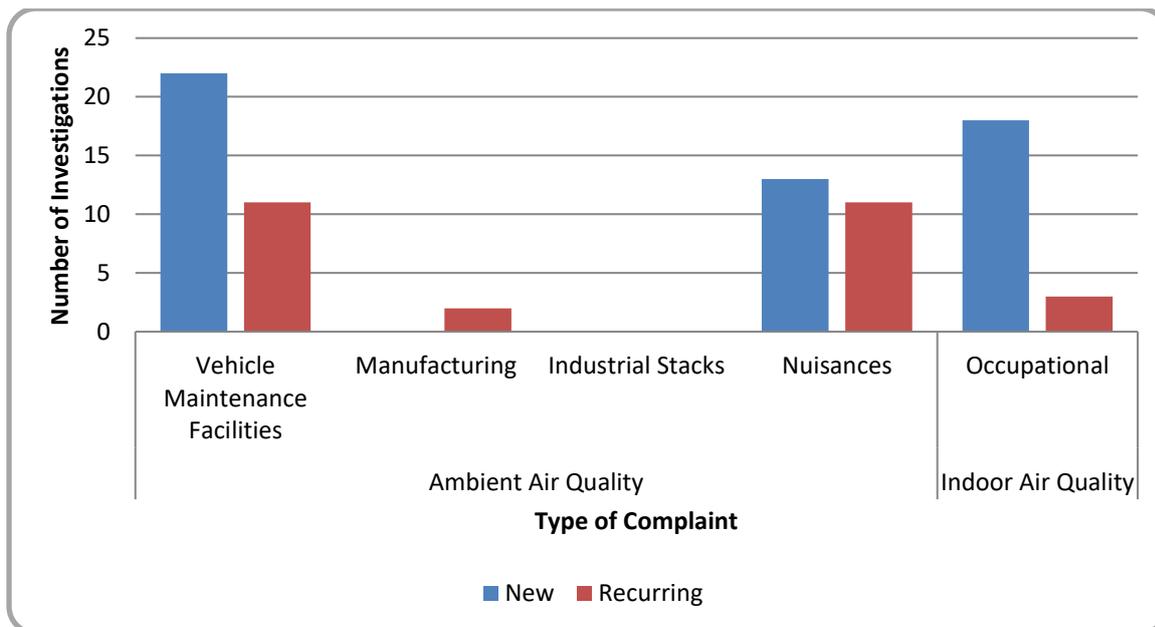


Figure 3: Number of Air Quality Complaints Investigated in 2013 Categorized by the Type of Complaint

The high proportion of recurring complaints about nuisances is indicative of the absence of suitable legislation to conclusively address these issues.

2.1.5.2 Noise Pollution

The ANPCS received six new complaints about environmental noise pollution in 2013; there were no recurring complaints. Additionally, the section investigated eight complaints related to noise pollution. Half of these investigations pertained to new complaints and the remainder were recurring complaints.

2.1.6 Building Assessments

When requested by the Ministry of Housing and Lands, the section conducts building assessments in conjunction with the Building Development Section. Officers of the ANPCS visually inspect the ventilation systems of the building to determine the type and condition of the ductwork being utilized, the presence of fresh air intake, the cleanliness and condition of the air handling room and air-handling units, and to identify conditions that could affect the quality of the indoor air. A report on the assessment is subsequently submitted to the agency that had requested the assessment.

Three building assessments were performed in 2013 and these were:

- an assessment of the Ombudsman’s Office at Trident House in St. Michael;
- commercial office space at the Goddard Enterprises Limited Building at Haggatt Hall in St. Michael; and
- an application for the construction of a woodwork shop in St. Philip.

2.1.7 Indoor Air Quality Policy Paper

In 2007, the EPD prepared and submitted to the MED a draft policy paper on indoor air quality management in Barbados. The policy paper proposed to centralize the governance of indoor air quality (IAQ) issues to streamline regulation of IAQ and remove duplication of services. Additionally, the EPD requested that the MED convene a high-level meeting with relevant stakeholders to discuss the salient points of the policy paper. To date, the meeting has not been held and the process appears to have stalled. Consequently, the issues about the management of indoor air quality in Barbados have not been addressed.

To restart the process, during 2013 the ANPCS undertook a review of the draft policy paper. Although the review of the policy paper was not included in the section's work programme, it was identified as a priority. Consequently, the paper was updated to reflect changes that occurred since the paper was first developed and to resolve any unclear areas and points that required modification. The revised policy paper was submitted to the MED in October 2013 for review along with another request for the MED to convene a high-level meeting to discuss the issues highlighted in the paper.

2.1.8 Vehicle Maintenance Facilities

Increased knowledge of ambient air pollution caused by various industries will improve regulation of these industries. This would ultimately assist with ensuring that the environment is of the best quality for Barbadians. Due to the number of complaints received related to vehicle maintenance facilities (VMFs), the ANPCS undertook a review of the regulatory instruments used to manage emissions from these operations.

The first stage of this activity was to collect information. A survey for the suppliers of VMFs was developed and administered to two suppliers to pilot test the design of and response to the survey. The importers targeted for the pilot test of the survey advised the Department that they are unable to provide the information. As a result, the section is exploring other options to obtain the required information.

Once a suitable method can be identified to obtain the required information, the next phase will be to use the information gathered to guide the development of a draft regulatory framework for VMFs.

3 Building Development Control

The objective of the Environmental Protection Department's building development programme is to ensure that all residential, commercial and industrial in Barbados comply with local and international standards that promote health and safety. This is achieved by enforcing the Health Services Act, Cap 44 and regulations relating to building development control, the Groundwater Protection Zoning Policy, the Marine Pollution Control Act and the policies and guidelines sanctioned by the Cabinet of Barbados.

The Building Development Control Section (BDCS) comprises fifteen (15) technical officers with support from three administrative staff. Table 3 provides a summary of the various posts and number of officers in those posts. However, during the year under review, there were only six Building Development Officers in the section due to transfers to other government departments before 2013. This reduction in the number of officers negatively impacted the activities of the section.

Table 3: Posts in the Building Development Section

Post	Quantity
Chief Building Development Officer	1
Senior Building Development Officer	2
Building Development Officer	8
Building Development Inspector	2
Draughtsman Technician	1
Clerk/Typist	2
Clerical Officer	1
Environmental Inspector	1

3.1 Planned Activities for 2013

The planned activities for the Building Development Control Section were as follows:

- Vet applications for residential, commercial and industrial developments.
- Inspect commercial and industrial buildings for compliance with conditions of approval.
- Provide technical advice to Town and Country Development Planning Office (TCDPO), other regulatory agencies and the Ministry of Health's Nursing Homes Advisory and Inspection Committee on EPD requirements for development applications.
- Investigation of building-related complaints.
- Continue development of the technical Standard Operation Procedure Manual to standardise procedures within the Building Development Control Section.

3.1.1 Processing of Building Development Applications

At the start of 2013, a total of 1,183 applications were brought forward from previous years. During the year, the BDCS received 1,762 applications for building development, which added to this number. Application for residential developments accounted for the majority (85%) of application received by the BDCS in 2013. Table 4 summarizes the number of applications received in 2013 based on the intended purpose of the development.

Table 4: Types of Building Development Applications Received in 2013

Type of application	Number of applications received
Agricultural	1
Commercial	248
Commercial/Industrial	1
Commercial/Residential	11
Industrial	3
Residential	1,498
	1,762

By the end of 2013, 42 % of the 1, 762 applications received in 2013 and 58% of the applications from previous years received decisions and the remainder were awaiting a decision. Figure 4 shows the decisions made on the applications processed by the BDCS in 2013.

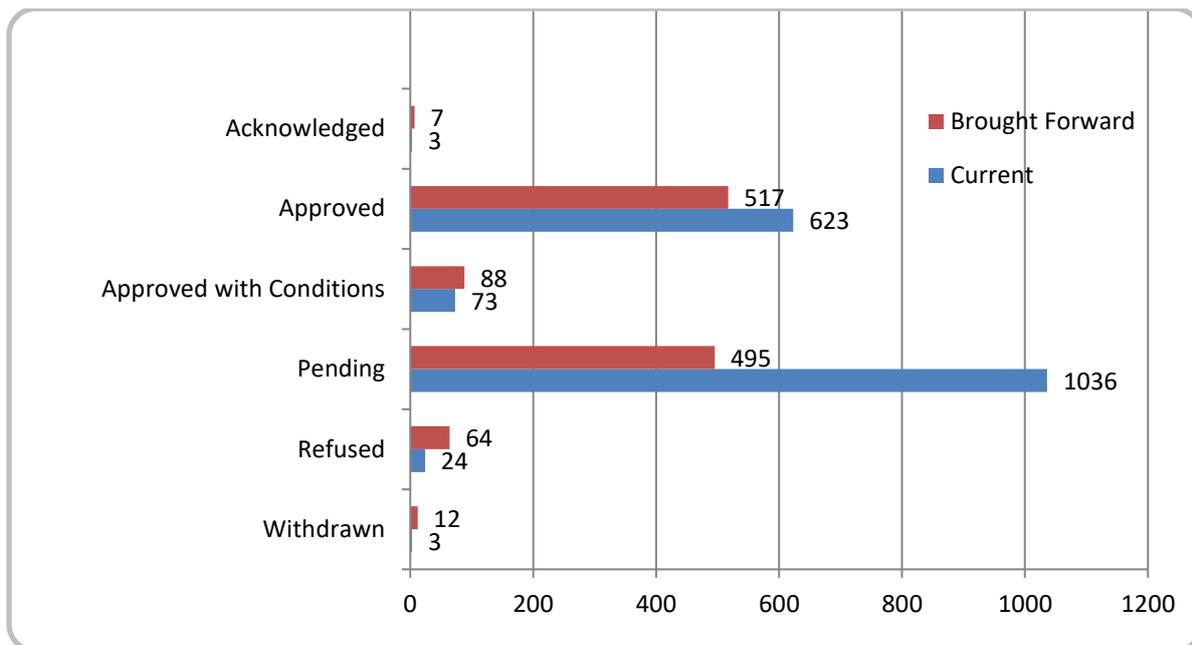


Figure 4: Decision Made on Applications Received in 2013

Moreover, at the end of the period under review, the BDCS observed a 7% decline in the number of applications received since 2009. The Barbados Economic and Social Report 2012 indicated that there was a slight decline in the construction sector in that year as a result of a moderately unstable global economy. The factor(s) contributing to this decline may have continued into 2013 resulting in the reduction in applications received.

During the year, the section also received and processed 84 consultation files on issues ranging from smoking in public places, wastewater treatment plants, erection of pig pens and chicken farms in residential amenities, assessment of underground tunnels for a major tourist attraction and refurbishment of two petrol stations. Consultation files are those files, other than building applications, received from the Chief Town Planner and other ministries or departments soliciting the technical input of the BDCS.

Additionally, officers of the section performed several compliance inspections to determine whether facilities conformed to the approved plans or met the conditions of approval.

3.1.2 Nursing and Senior Citizen Homes

Under regulation 5 paragraph 2 of the Health Services (Private Hospitals, Nursing Homes, Senior Citizens' Homes and Maternity Homes) Regulations 2005, the BDCS continued to vet applications for the establishment of these institutions. A total of eight applications for senior citizens' homes and one private hospital were received during the period. Of these, two senior citizens' homes were approved with conditions while the remaining applications were undergoing further consultation and awaiting additional information.

After consultation with the Town and Country Development Planning Office and the Ministry of Health, the section discontinued the pre-inspection visits of buildings intended for a change of use to senior citizens' homes. These visits were conducted to expedite these applications. However, this procedure posed some problems to the Town and Country Development Planning Office.

3.1.3 Investigation of Complaints

The section received no complaint in 2013 and consequently, no investigations were conducted.

3.1.4 Standard Operating Procedure

In 2003, the BDCS continued to work on its standard operating procedures (SOP) to streamline and improve the operations of the section. This year, the section focused on areas such as kitchen ventilation systems, swimming pools, incinerators, laboratories, agriculture, and institutions. Site visits were made to various workshops work out a teething issue with the new SOP.

Additionally, a new application form for kitchen ventilation systems was designed by the section. The objective of the form is to ensure that applicants submit all of the information necessary to assess commercial kitchen applications. The form would help to ensure consistency in the information being requested by the Department from applicants and or agents. A similar form is also being developed for swimming pools.

3.2 Other Activities

In addition to the aforementioned activities, the BDCS also undertook the following activities.

- The section entered into discussions with the Ministry of Health regarding the inadequacy of existing regulations regarding the licensing of residential care homes other nursing and senior citizen homes. Examples of the residential care home in question include half-way houses and care homes for battered females. In the absence of appropriate legislation, there are implications for the vetting and approval of such building development applications. There is an ongoing dialogue on these matters.
- To improve public awareness on the requirements for the building development applications, the section began the revision of its building development booklet. The information in the booklet should reduce the number of application for which the section needs to request additional information. In 2013, decisions could not be made on 14% of the applications received in that year because the section was awaiting additional information from the applicants. The revised booklet is expected to be completed and made available to the public in 2014.

4 Removal of Derelict Building and Vehicles

The Derelict Buildings and Vehicles Section 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.

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 if they are, a notice is served on 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.

In addition to dealing with derelict buildings and vehicles, this section also regulates the disposal of asbestos and fibreglass.

4.1 Planned Activities from 2013

The planned activities for this section were to:

- Continue the removal of derelict vehicles
- Continue to demolish derelict buildings
- Improve cost recovery and monitoring system.
- Prepare standard operating procedures for the section.
- Develop a risk assessment form for contractors.
- Facilitate the environmentally sound disposal of asbestos.

4.1.1 Removal of Derelict Vehicles

A derelict vehicle is an abandoned automobile, truck or other vehicular parts which may provide harbourage for rodents and other vermin. During 2013, the derelicts

section facilitated the removal of 386 derelict vehicles at a cost of approximately \$ 56,595.00. In comparison to 2012, the number of derelict vehicles removed in 2013 decreased by approximately 68%. Several reasons contributed to the reduction in the number of derelict vehicles removed. Some of these factors are as follows.

- There was a reduction in the allocation of funds in the Department’s budget for this activity.
- 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 concerning the disposal of derelict vehicles. Consequently, the removal of derelict vehicles was suspended.

The total number of derelict vehicles removed during the five years 2009 to 2013 is shown in Figure 5. From the figure, it can be seen that there has been a steady decrease in the number of derelict vehicles removed annually over the period with the largest number of vehicles being removed in 2009.

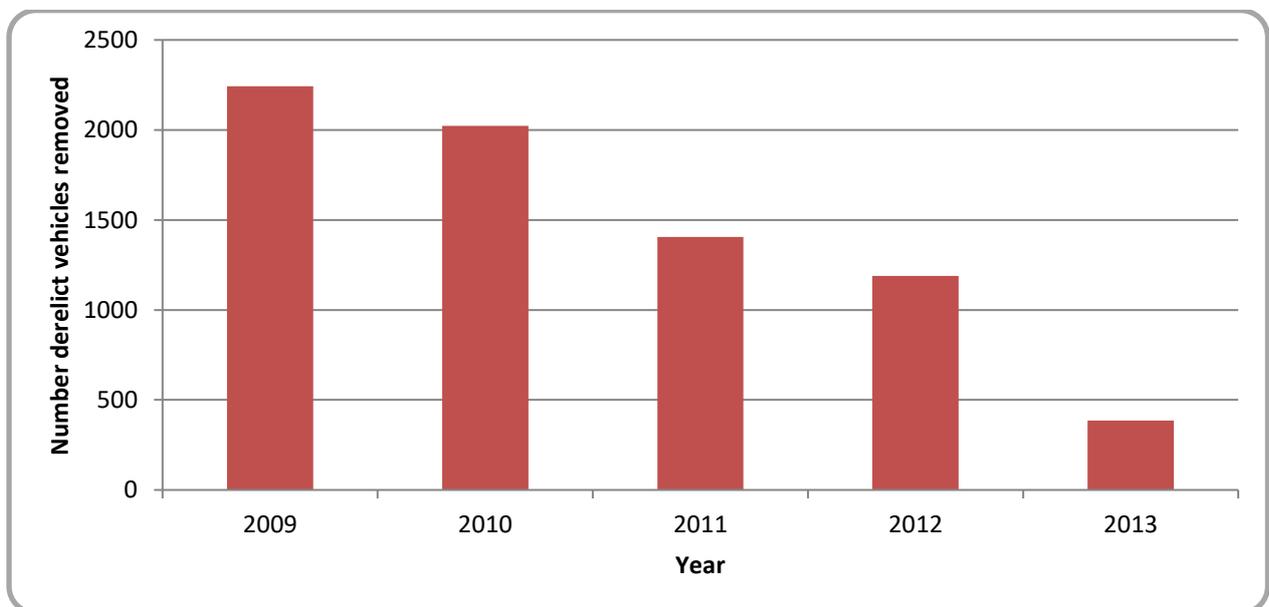


Figure 5: Number of derelict vehicles removed annually during the period 2009 – 2013

The removal of less derelict vehicles allows these automobiles to remain in the environment where they can contribute to an increase in the population of disease vectors such as rodents and mosquitoes. This in turn can negatively impact human health and quality of life.

4.1.2 Demolition 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.

Thirty-eight derelict buildings were demolished in 2013 at a cost of \$ 165,839.63. The majority of derelict buildings (66%) were removed from St. Michael and Christ Church. No buildings were removed from the parishes of St. Andrew, St. Joseph or St. Thomas.

Since 2009 there has been a continual decrease in the number of derelict buildings requiring demolition annually (see Figure 6). However, there was a noticeable decrease (66%) in the number of derelict buildings demolished in 2013 relative to the number demolished in 2012. The followed factors contributed to this marked decline.

- Relocation of the Land Valuation Department prevented the section from ascertaining the names and addresses of owners of derelict buildings.
- There was a reduction in the allocation of funds in the Department’s budget for this activity.
- During the year the MED cancelled the LPOs that had been an issue and requested that the contracts for the building demolitions be retendered. Subsequently, no new contracts were issued.

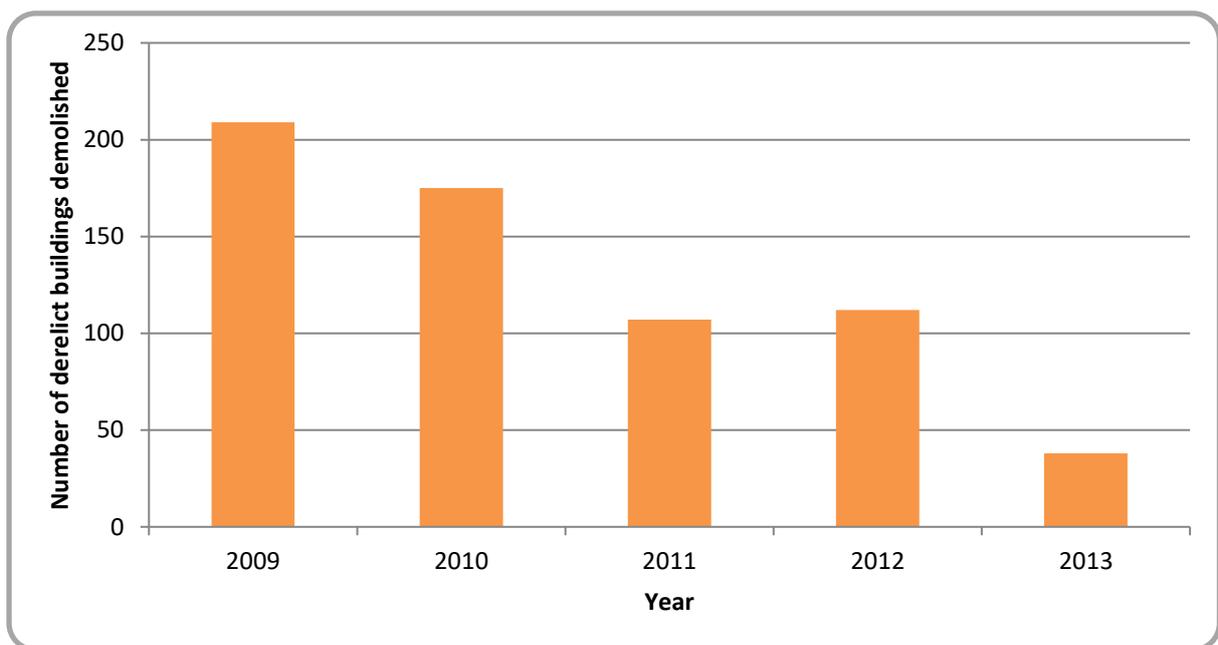


Figure 6: Number of derelict buildings demolished annually during the period 2009 – 2013

4.1.3 Cost Recovery

When owners of derelict buildings do not comply with a notice to remediate the state of the building 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. In 2013 the Department recovered costs in the amount of \$ 5,497.00.

Currently, the process of recording monies received is a paper-based system, which makes timely reporting difficult. The proposed solution was to develop a database for the derelict programme which includes features to facilitate improved procedures for the recovery of cost for the removal or demolition of derelict buildings and vehicles respectively. A form was designed to facilitate the input of field data into the database. The Department is still in the process of identifying and procuring a contractor to develop the database.

4.1.4 Finalization of Standard Operating Procedures

The section completed its first draft of the standard operating procedures, which aim to improve the functioning of the section.

4.1.5 Development of a Risk Assessment Form for Contractors

Paragraph 6 of the Safety and Health at Work Act 2005 requires, inter alia, that employers "...ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees." In response to this obligation, the derelicts section developed and implemented a risk assessment form. The form seeks to aid contractors, procured by the section to remove derelict buildings, to systematically identify potential hazards and take appropriate action to mitigate those hazards. In doing so, the contractors would promote the health, safety and welfare of persons at work and prevent the release of certain emissions into the environment.

4.1.6 Environmental Sound Disposal of Asbestos

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.

During 2013, the derelicts section received numerous requests for permission to remove asbestos-containing materials and fibreglass. Approvals were granted to 66 applicants remove and dispose of the material at the asbestos disposal facility at Rock Hall, St. Philip. Officers of the derelict section supervised the removal and disposal process.

5 Multilateral Environmental Agreement and Environmental Impact Assessments

The Environmental Protection Department bears responsibility for coordinating initiatives to implement obligations under certain conventions to which Barbados is a Party.

Responsibility for these conventions is shared between the Solid and Hazardous Materials Section and Environmental Technical Officers.

The Environmental Technical Officers also coordinate projects funded by the QuickStart Programme Trust Fund of the Strategic Approach to International Chemicals Management (SAICM). Additionally, the section coordinates the review of Environmental Impacts Assessments for proposed developments, plays a role in public education and the overall administration of the Department.

A Senior Environmental Technical Officer and two Environmental Technical Officers staff the section.

5.1 Multilateral Environmental Agreements

Multilateral Environmental Agreements (MEAs) are legally binding agreements between two or more countries, which relate to environmental issues. The Department is currently responsible for the implementation of several multilateral environmental agreements (MEAs). These are:

- The Stockholm Convention on Persistent Organic Pollutants (POPs)
- Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal
- Chemicals Weapons Convention (CWC)
- Cartagena Convention specifically its Oil Spill and Land-Based Sources of Marine Pollution Protocols

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 reporting obligations for the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the London Convention).

5.1.1 Planned Activities for 2013

The activities planned by the Department for the year 2011 were as follows:

- Monitor and regulate the transboundary movement of hazardous waste under the Basel Convention protocols.
- Develop a National Implementation Strategy for the Implementation of the Globally Harmonized Systems of Classification and Labelling of Chemicals (GHS).
- Implement obligations under the Stockholm Convention.
- Report to the Organization for the Prohibition of Chemical Weapons on the activities undertaken with respect to the Chemicals Weapons Convention.
- Participate in the CReW project.
- Participate in meeting or conference relating to the various conventions.

5.1.1.1 Transboundary movement of hazardous waste

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 was a Party from 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.

During 2013, the Department worked on establishing a bilateral agreement between the United States of the America and the Government of Barbados. This agreement will seek to provide a more cost-effective alternative for the disposal of hazardous wastes from Barbados as opposed to the existing practice of shipping such waste to Canada for disposal. The Department prepared a draft document to guide and justify the establishment of the agreement. The document was submitted to the MED and the Department is awaiting a directive from the ministry.

Additionally, the EPD participated in a workshop on the Environmentally Sound Management of Waste Electrical and Electronic Equipment. The workshop, which was held in Trinidad and Tobago; July 9 -11, aimed was to identify and chart the way forward for the Caribbean for the management of electrical and electronic waste. Participation in the workshop:

- provided an opportunity to understand the various challenges faced by small island states during the implementation of the provisions of the Basel Convention;
- identified the needs for the successful implementation and realisation of obligations under the Convention; and
- facilitated an opportunity to foster relations with stakeholders from across the region.

In 2013, the Department also finalized the annual report for the Basel Convention for the year 2012. The report summarized Barbados' activities related to shipments of hazardous waste for environmentally sound disposal overseas during that year.

5.1.1.2 Development of a national implementation strategy for the GHS

The Department concluded a two-year project, with assistance from the United Nations Institute for Training and Research (UNITAR), to develop a National Implementation Strategy for the Implementation of the GHS.

The GHS is a system for standardizing and harmonizing the classification and labelling of chemicals. It is a logical and comprehensive approach to:

- defining health, physical and environmental hazards of chemicals;
- creating classification processes that use available data on chemicals for comparison with the defined hazard criteria; and
- communicating hazard information, as well as protective measures, on labels and Safety Data Sheets (SDS).

A cabinet paper (CP) was prepared and sent to the MED for onward submission to the Cabinet. The CP invited the Cabinet to note and approve the report on the strategy that was developed through stakeholder consultation and to agree, *inter alia*, to allow the EPD to disseminate the report. The Department is awaiting Cabinet's decision on the matter.

Furthermore, from March 5th to 7th, the Department hosted a workshop to raise awareness about the GHS, its methodology for hazard classification and its communication tools. The cadre of trained professionals will contribute to the implementation of the GHS in Barbados. These persons will form nuclei from which information about the GHS can be distributed throughout their various workplaces. Additionally, these persons can form a resource pool which the EPD can draw upon to facilitate the training of a wider cross-section of sectors across Barbados.

5.1.2 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:

- *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; and
- *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).

Under Article 7 of the Convention, Parties must develop and endeavour to implement a plan for the implementation of its obligations under this Convention. Such a plan was developed and approved by Cabinet in 2007.

In 2013, the ETO section held talks with the Department of Commerce to develop a Cabinet Paper seeking approval to place Polychlorinated Biphenyls (PCBs) on the import and export licensing system. PCBs are a category of Persistent Organic Pollutants, commonly known as POPs, which are highly hazardous organic chemicals. Placing PCBs on the import and export licensing system was an activity identified in Barbados' National Implementation Plan for the Management of Persistent Organic Pollutants. The talks revealed that input from the Customs and Excise Department was necessary for clarification of tariff headings and procedure for addressing equipment containing PCBs. Subsequently, a meeting was convened with the Department of Commerce and the Customs and Excise Department. The main conclusion of the meeting was that the CP, which the Department of Commerce will prepare, should only address mixtures and formulations containing PCBs. The EPD should contact the Customs and Excise Department directly to formalize a procedure to address equipment containing PCBs. The Department is awaiting a draft of the CP from the commerce department. Correspondence was sent to the Customs and Excise Department to arrange a meeting to discuss equipment containing PCBs. The correspondence was accompanied by a draft notification procedure for PCB containing equipment. The Department is awaiting a reply from the Customs and Excise Department to meet and discuss the issue.

During the year, the ETO section explored options for conducting analyses for Persistent Organic Pollutants locally. A meeting was held with the Forensic Science Centre and Government Analytical Services to determine if these organisations could test for POPs. One of the main conclusion of the meeting was the EPD should investigate whether the UWI can conduct the analyses. Subsequently, a meeting was held with the Faculty of Science and Technology (FST) of the UWI to determine if that entity was could test for POPs. The FST indicated that they were able to test for POPs. The Department is now working to enter into a partnership with the FST to have them conduct analyses for POPs and other analytes.

Monitoring under the Global Atmospheric Passive Sampling (GAPS) continued with sample replacement and retrieval conducted quarterly. The samples are 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 which are obtained allow for comparison of sites around the world.

5.1.3 Chemicals 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 concerning persons within their jurisdiction. Via a Cabinet decision in 2009, the Department was charged with administering Barbados' obligations under this Convention.

With the input of stakeholders, the Department completed a report on Barbados' activities associated with this Convention for the year 2012. The report was forwarded to Ministry of Foreign Affairs and Foreign Trade for onward submission to the OPCW Secretariat.

5.1.4 Strategic Approach to International Chemicals Management

The Strategic Approach to International Chemicals Management (SAICM) is a policy framework for international action on chemical hazards. In 2013, the ETO section finalized and submitted a project proposal to the SAICM QuickStart Programme Trust Fund (QSPTF) to solicit funding. The purpose of the proposal was to solicit funding for a project entitled, "Building Capacities for Strengthening the Management of Heavy Metals in Barbados". The overall objective of the project is to develop a management strategy for the sound governance of cadmium, mercury and lead. The management strategy will help to minimize any adverse effects on human health and the environment due to the use and disposal of heavy metals or their derivatives. The proposed activities would also contribute to the overall objective of SAICM—to achieve the sound management of chemicals throughout their life-cycle so that, by 2020, chemicals are used and produced in ways that lead to the

minimization of significant adverse effects on human health and the environment. At the end of 2013, the Department was awaiting a decision from the SAICM QSPTF about whether the project had been approved for funding.

5.1.5 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 will be participating in this project with pilot studies being established in Guyana, Trinidad and Tobago, Belize and Jamaica. For the remaining nine countries, the CReW will be supporting other projects and activities; so while Barbados is not involved in the pilot studies, it will still benefit from the overall initiative.

During 2013, the Department finalized and facilitated the signing of an agreement for a project. The objectives of the project are to:

- Strengthen the policy and institutional framework for wastewater management in Barbados.
- Enhance the management of capacity of wastewater management agencies, utilities and service providers.
- Increase awareness of wastewater management issues and the GEF CReW project in Barbados.
- Support ongoing efforts by the Government of Barbados in its implementation of the LBS Protocol.

Activities to be carried out under the project include:

- Preparation/development of a template for parliamentary counsel to prepare wastewater regulations to be subsumed under the draft Environmental Management Act.
- Development of a guide for wastewater permitting and licensing system.
- Development of regulator inspection guidance manual for wastewater treatment plants by type and size.
- Convening of National Training Workshop for Operators and Regulators of Wastewater facilities.
- Development of a national communication strategy for wastewater issues and management.

- Development and dissemination of communication products, press releases, and articles relating to wastewater management in Barbados among key selected target groups.

The EPD initiated the process of developing Terms of Reference to procure contractors to conduct the aforementioned activities.

5.2 Environmental Impact Assessments

Environmental Impact Assessments (EIAs) and Environmental Scoping Studies (ESS) are intended to identify potential positive and negative impacts of development beforehand so that measures can be put in place to eliminate, where possible, or otherwise reduce and manage the negative impacts. If the impacts cannot be suitably mitigated, the EIA may be the basis of a decision not to approve a proposed project.

Under the National Physical Development Plan 2003, EIAs and Scoping Studies are required for the following classes of development:

- Chemical or petroleum manufacturing plants, other than plants for the manufacturing of pharmaceutical drugs;
- Refineries;
- Desalination plants;
- Electricity generating plants;
- Cement plants or other plants for the burning of lime or bricks;
- Any industry where the processes are potentially obnoxious or dangerous to health or amenity because of excessive smell, fumes, smoke, dust, grist, ash, noise or vibration;
- Waste management facilities other than facilities for the initial sorting or processing of source-separated dry recyclables;
- Waste disposal sites;
- Golf courses;
- Development within a Natural Heritage Conservation Area;
- Development within a National Park Forest Area;
- Development within an Agricultural area;
- Mining operations including quarries and sand mines;
- Applications for initial construction of, or expansions of major transportation infrastructure including highways, airports, seaports, wharves, marinas or jetties;
- Sewage treatment facilities;
- Crematoriums and funeral parlours; and

- Amusement parks.

EIAs may also be requested if it is the opinion of the Chief Town Planner that a proposed development may have significant adverse environmental impacts.

The Environment Protection Department sits on the EIA review panel and advises the Chief Town Planner on matters about environmental management. The EPD is generally involved with reviewing Terms of Reference and EIA reports

5.2.1 Planned Activities for 2013

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

5.2.2 Review of EIAs and ESSs

In 2013, the Department reviewed and provided comments to the Chief Town Planner on eleven environmental impact assessments. Five of the EIAs pertained to commercial developments, two to sub-divisions of land, two to agricultural developments, another to industrial development and one dealt with the relocation of a sewage outfall.

5.2.3 Attendance at Conference and Meetings

The attendance of officers of the Environmental Protection Department to meetings and conference about Conventions is detailed in Section 10.

6 Marine Pollution Control

The Marine Pollution Control Section (MPCS) has responsibility for this function. The MPCS comprises four officers - a Senior Marine Pollution Officer and three Marine Pollution Officers. The section seeks to prevent, reduce and control pollution of the marine environment of Barbados from whatever source. This is achieved by enforcing the Marine Pollution Control Act 1998 (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.

During 2013, one of the Marine Pollution Officers resigned and another was granted training leave to pursue a postgraduate degree in England. As a result, the section was not staffed by its full complement in 2013.

6.1 Planned Activities

For the year 2013, the MPCS planned to:

- Conduct regulatory inspections of HIPAC Limited, Peronne Manufacturing Company Limited and Chickmont Foods Limited and where practicable, collect environmental samples (water, air and soil) to identify and quantify sources of marine pollution.
- Conduct compliance inspections of industries that have already been inspected to determine if these industries have implemented recommended environmental controls.
- Collect scientifically sound data on marine litter for use in decision making
- Develop appendices to the National Oil Spill Contingency Plan
- Investigate marine pollution complaints.

6.1.1 Regulatory Inspections

Regulatory inspections seek to characterize the 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 recommends appropriate mitigation measures.

During 2013, the MPCS conducted regulatory inspections of the operations at Trowel Plastics Limited, HIPAC Limited and Super Centre Meat Facility (formerly Peronne Manufacturing Company Limited). Reports on the inspections are being prepared and should be finalized in 2014. Additionally, the section also worked on finalizing inspection reports for B&B Distribution, Barbados Bottling Company, Pine Hill Dairy, Funeral Homes, Berger Paints Barbados Limited and Harris Paints. These inspections were conducted in 2012.

In 2012, the section conducted a regulatory inspection of the Foursquare Rum Distillery. The regulatory inspection report for Foursquare Rum Distillery was completed in 2013 and the recommendations on mitigation measures were forwarded to that organization for action.

6.1.2 Compliance Inspections

The MPCS conducts compliance inspections at least six months after the recommendations from a regulatory inspection are submitted to an establishment. A compliance inspection is done to determine the extent to which the entity implemented the Department's recommendations.

During 2013, the section conducted compliance inspections of the Rum Refinery of Mount Gay in St. Lucy and the West Indies Rum Distillery. The report on the compliance inspection for West Indies Rum Refinery was completed whereas the report for the Rum Refinery at Mount Gay is being compiled.

During the year, the section also finalized a compliance report for the Barbados Light and Power Company Limited.

6.1.3 Marine Litter Programme

The Marine Litter Programme aims to gain data that could be used to increase public awareness of the issue associated with marine litter and aid the Department to develop long-term solutions. 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. Litter is removed from a one-kilometre stretch of the beach and the types and quantities of litter collected recorded. The clean-up took place on September 21st, 2013 under the guidance of the Environmental Protection Department and with the assistance of 175 volunteers.

The 2013 beach clean-up of Morgan Lewis beach succeeded in collecting 681 pounds of litter. The majority of the litter collected were classified as originating from the shoreline and recreational activities and ocean and waterway activities. Shoreline and recreational activities originate from sources such as beach users, picnickers, beach sports, festival effects, gullies and storm drains. Ocean and waterway activities stem from fishing, boating, offshore oil and gas rigs and ships. Additionally, the clean-up revealed that plastic pieces continue to be a great contributor to the litter found on the beach.

The marine litter programme also benefitted from litter collected by Caribbean Youth Environment Network (CYEN). The data received from CYEN was collected from six beaches on September 21, 2013. These beaches were Chandler's Bay, Long Beach, Maxwell, Browne's Beach, Brighton, Batts Rock and Six Men's. This data supported the conclusion from the Morgan Lewis clean-up that plastics are a great concern to the environment of Barbados. Everything from plastic beverage bottles, plastic bags,

plastic utensils, plastic food containers and food wrappers and the Styrofoam forms of some of these items were found on the beaches.

During 2013, the MPCS concluded the distribution of its activity booklet on marine litter to primary schools in Barbados which began in 2012. The purpose of the booklet was to raise the awareness of individuals at an early age to what they can do to protect our environment. Subsequently, a questionnaire was developed and distributed to the primary schools which received booklets obtain feedback regarding the impact of the activity booklet on the students who received copies. However, the response to the questionnaire was very low; less than 6% of the school responded.

6.1.4 Oil Spill Contingency Plan

The Oil Spill Contingency 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; coordinates 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 2013, the Barbados National Terminal Company Limited (BNTCL) developed a draft response action plan for oil spills in the Oistins Bay area where its marine operations are based. This draft plan was submitted to the EPD for review. The MPCS reviewed the response plan for Oistins Bay and furnished the BNTCL with comments. Currently, the Department is awaiting a revised version of the response plan.

Additionally, during 2013, the MPCS updated the directory for the members of the National Oil Spill Response Committee and the database of available oil spill equipment.

6.1.5 Investigation of Complaints

In 2013, the MPCS received and investigated 21 complaints about marine pollution. The majority of these complaints were related to oil pollution (see Figure 7).

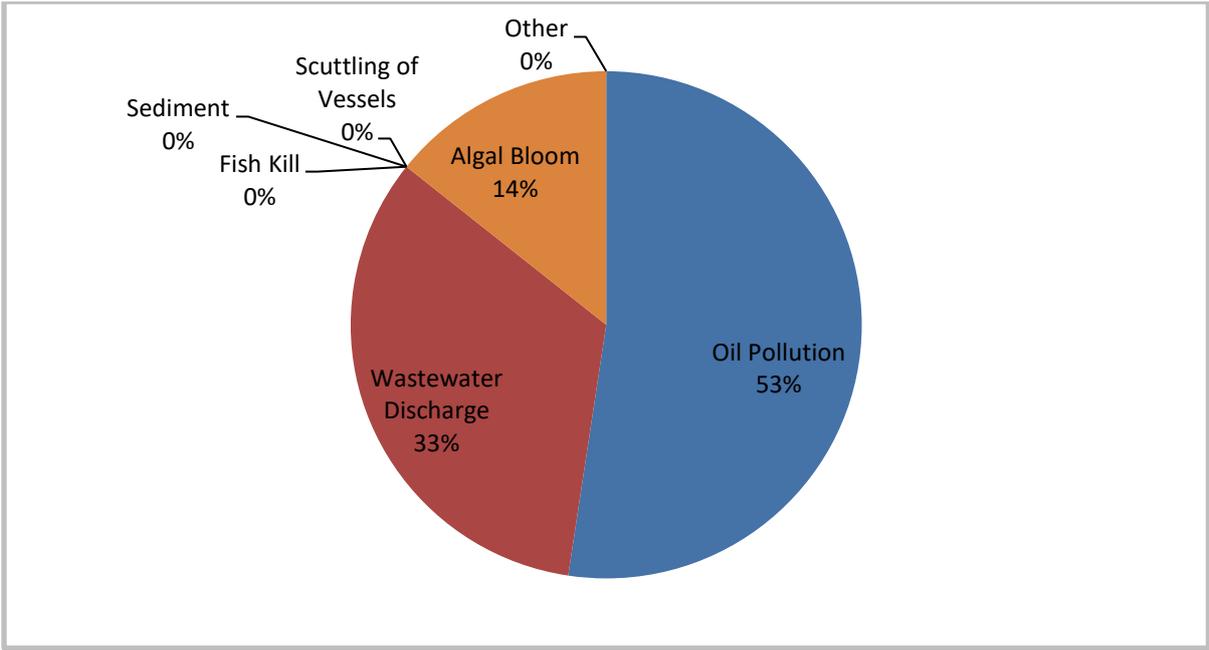


Figure 7: Type of Complaints Received by the Marine Pollution Control Section in 2013

The number of marine pollution complaints received by the Department has shown an overall increase between 2009 and 2013 even though there was a decline in the number of complaints received by the Department since 2011. A summary of the number of complaints received and investigated since 2009 is depicted in Figure 8.

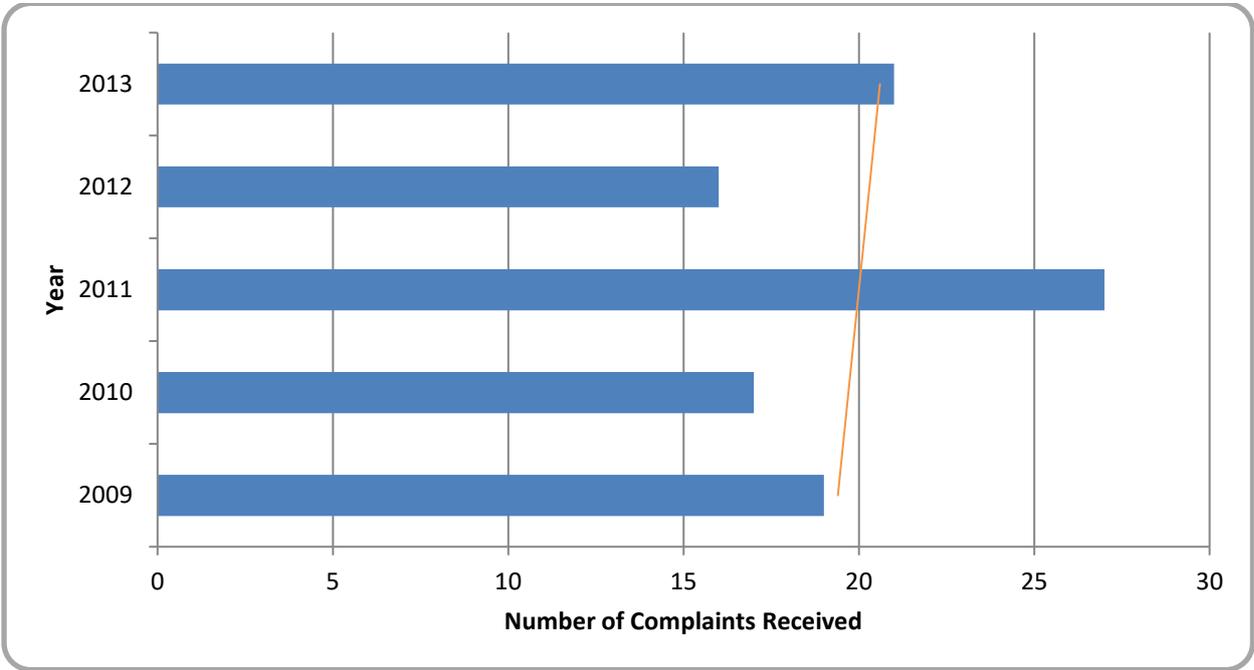


Figure 8: The Number of Marine Pollution Complaints Received during the Period 2009 – 2013

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 section reviewed the annual groundwater monitoring reports received from the BNTCL. Under the Town and Country Planning Department Planning Act Cap 240 BNTCL was granted permission to develop new petroleum storage and distribution facilities at Fairy Valley and Oistins. Under this approval, certain conditions had to be met, including the development of an Environmental Management Plan (EMP). One of the major components of this EMP was a groundwater monitoring system to examine areas along the fuel transfer pipeline from Grantley Adams International Airport to Oistins and from Holborn, Spring Garden to the Barbados Light and Power Company Limited, Spring Garden. The review revealed that levels of the parameter analysed were satisfactory when compared to the draft Marine Pollution Control (Discharge) standards.
- The section reviewed data on effluent and marine quality from the South Coast and Bridgetown wastewater treatment plants for the period 2007 – 2009. The EPD requires both entities to submit monitoring results monthly to assess the potential marine water quality impacts of septage reception and treatment at these facilities. The review process identified several concern and gaps in the data received by the EPD that will need to be addressed.
- Beautification of the Careenage area and the enhancement of the river flow to open ocean continued in 2013. The MPCS made routine visits to the construction site to monitor the effect of the work on the environment.
- During 2013, the MPCS developed the work plan, budget and monitoring and evaluation plan for component 3 of the Water Resources Management and Flood Resilience Climate Change Adaptation Programme. Component 3 aims to characterize stormwater discharges to the marine environment and quantify the levels selected pesticides and pharmaceuticals in the coastal ground and marine water, sediment and benthic organisms.
- The section reviewed two proposals for dewatering projects. Dewatering is the process of removing water from the foundations or wells of properties that are located on or near the shoreline. The MPCS monitored these projects and made recommendations for environmental issues to the companies.

7 Management of Solid Waste and Hazardous Materials

The Solid Waste and Hazardous Materials Section (SWHMS) comprises two officers, a Senior Environmental Protection Officer and an Environmental Protection Officer, who are 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; developing policies for the management of hazardous substances; and regulating the shipment of hazardous substances under Basel Convention protocols and reporting this activity to the Basel Secretariat.

During the second quarter of the year, the Environmental Protection Officer resigned and as a result, only the senior environmental Protection Officer staffed the section for the remainder of the year.

7.1 Planned Activities for 2013

For the year 2013, the SHMCS planned to:

- Continue routine monitoring and regulation of government-operated solid waste disposal facilities;
- Investigate complaints related to solid waste disposal and regulate the disposal of hazardous waste;
- Review request to import radioactive materials;
- Review applications for the importation of pesticides; and
- Inspect recycling preparation companies to ensure their operations do not negatively impact the environment and human health.

7.1.1 Monitoring and Regulation of Solid Waste Disposal Facilities

The Environmental Protection Department regulates the disposal of waste at several disposal sites operated by the Sanitation Service Authority (SSA). These disposal sites are:

- Mangrove Pond Landfill, St. Thomas;
- Asbestos Disposal Site, Rock Hall, St. Philip; and
- Blood and Grease Disposal Site, Lonesome Hill, St. Peter

The section conducted monthly inspections of the government-operated disposal sites. The landfill inspection forms that were developed in 2012 continued to be used to improve the inspection process. Reports on the observation were prepared for

each site visit and any concerns observed were brought to the attention of the Sanitation Service Authority.

In addition to the disposal locations listed above, the section monitored and regulated the activities at two other locations – Edgecumbe Quarry and Foster Lodge Quarry. These locations are used for the disposal of construction and demolition waste and vegetative matter.

7.1.2 Investigation of Complaints and Requests for Disposal Advice

Processing disposal requests and providing advice on the proper disposal of special and hazardous waste was a major part of the sections workload during 2013. 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. A disposal request is submitted to seek permission to dispose of a hazardous substance at one of the approved disposal sites in Barbados.

During 2013, the SWHMS received and processed 25 requests for disposal advice and 102 requests for the disposal of paint and oily water. Requests for assistance in these areas were primarily from commercial entities.

The section also investigated ten complaints. Four of these complaints pertained to the incidence of illegal dumping. The others complaints involved issues ranging from alleged spraying of chemicals at residences and disposal of used engine oil from a VMF to odours emanating from Mangrove Pond Landfill.

7.1.3 Importation of Radioactive Materials

The process of reviewing and approving applications for the importation of radioactive substances continued during the year. The Department received 27 applications. Twenty-six of these applications were for use as radiopharmaceuticals and one was for the importation of radioactive material for industrial purposes.

7.1.4 Importation of Pesticides

In 2013 the section received 32 applications for the importation of pesticides into Barbados. The section vets the applications to determine the potential environmental impacts of the proposed pesticides. Subsequently, recommendations are made to the Chair of the Pesticide Control Board regarding whether to allow the importation of the pesticide.

7.1.5 Other Activities

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

- The section made quarterly site visits to known recycling preparation entities operating in Barbados and prepared reports of the observation. Environmental issues identified the visits were brought to the attention of the organization whose operation was contravening existing environmental regulation and practices to take the necessary remediation measures.
- The section represented the Department at various meetings or events about the management of chemicals and other environmental issues including:
 - a meeting of the Pesticide Control Board held to introduce a new system for the review of pesticide applications;
 - the emergency responses to the fire at B's Recycling, Reece Road, Cane Garden St. Thomas on March 25th, 2013 and the incident at the Barbados Water Authority Bridgetown Sewage Treatment Plant on December 17th, 2013; and
 - a workshop on the Department at the Globally Harmonised System of the Classification and Labelling of Chemicals which was held at Lloyd Erskine Sandiford Centre on March 5th to 7th, 2013.
- Draft Standard Operating Procedures for review of pesticide applications were developed and are currently being finalized. The procedure will serve to streamline the review process and improve the functioning of the section.
- The section started the development of inspection form for the Sustainable Barbados Resource Centre (SBRC). This form will help to improve the ability of the Department to monitor and regulate the operation at the SBRC as well as improve the environmental performance of its operations.
- The section completed a review of the liquid waste disposed at the Mangrove Pond Landfill and prepared a report on the existing situation. Moreover, a database was developed for the monitoring of liquid waste disposals. The purpose of this review was to determine the ability of the landfill to accept liquid from cruise ship for disposal. The study revealed that there are deficiencies in the administrative framework for the disposal of liquid waste at the landfill. Consequently, there is a need to review this framework.
- A handbook entitled, "Guidelines for Recycling Entities" was developed and is currently being finalized.
- The section developed a draft sensitization plan for the Chemical Weapons Convention and attendant presentation. The sensitization plan will raise

awareness about the CWC and the work of the OPCW to capitalize on the benefits afforded to States Parties to this convention.

8 Water Quality Management

The responsibilities of the Water Quality section are to monitor the:

1. quality of the ground/potable water at the source (i.e. the well-head);
2. quality of nearshore marine water at several beaches to assess whether the microbial quality of the marine environment is suitable for recreational purposes;
3. discharges from wastewater treatment facilities; and
4. impact of waste disposal on groundwater quality.

Three officers staff this section: one Senior Environmental Protection Officer and two Environmental Protection Officers.

8.1 Planned Activities

Activities regarding water quality management for the year 2013 were as follows:

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

8.1.1 Groundwater Monitoring

8.1.1.1 *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. Roughly, half of the samples are collected by the Environmental Protection Department; the other samples are collected by the Barbados Water Authority. These sampling locations are presented in Table 5.

No samples were collected from Codrington pumping station in 2013 because the well was offline.

It should be noted that the Desalination Plant is not included in the monitoring regime for the Environmental Protection Department and consideration should be given to its inclusion.

Table 5: 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	
Codrington		Haymans	
Constant		Hope	
New Market		Molyneaux	
Sweet Vale #1		Trents	
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. 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). 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. Five parameters that have implications for the health and aesthetic quality of potable water were selected for discussion. These parameters, the associated WHO guideline values, possible sources and their implications are listed in the table below (Table 6).

Table 6: Selected Water Quality Parameters and their Associated Sources and Health Implications

	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.

¹ CFU – Colony Forming Units

8.1.1.1.1 Chlorides

Except for the well at Trents, St. James; all of the supply wells recorded average chloride concentration that were below recommended WHO drinking water value of 250 mg/L (Figure 9). Average chloride concentrations were observed to be lowest in the Belle catchment and highest in the West Coast catchment.

The Trents pumping station recorded an average chloride concentration of 305 mg/L.

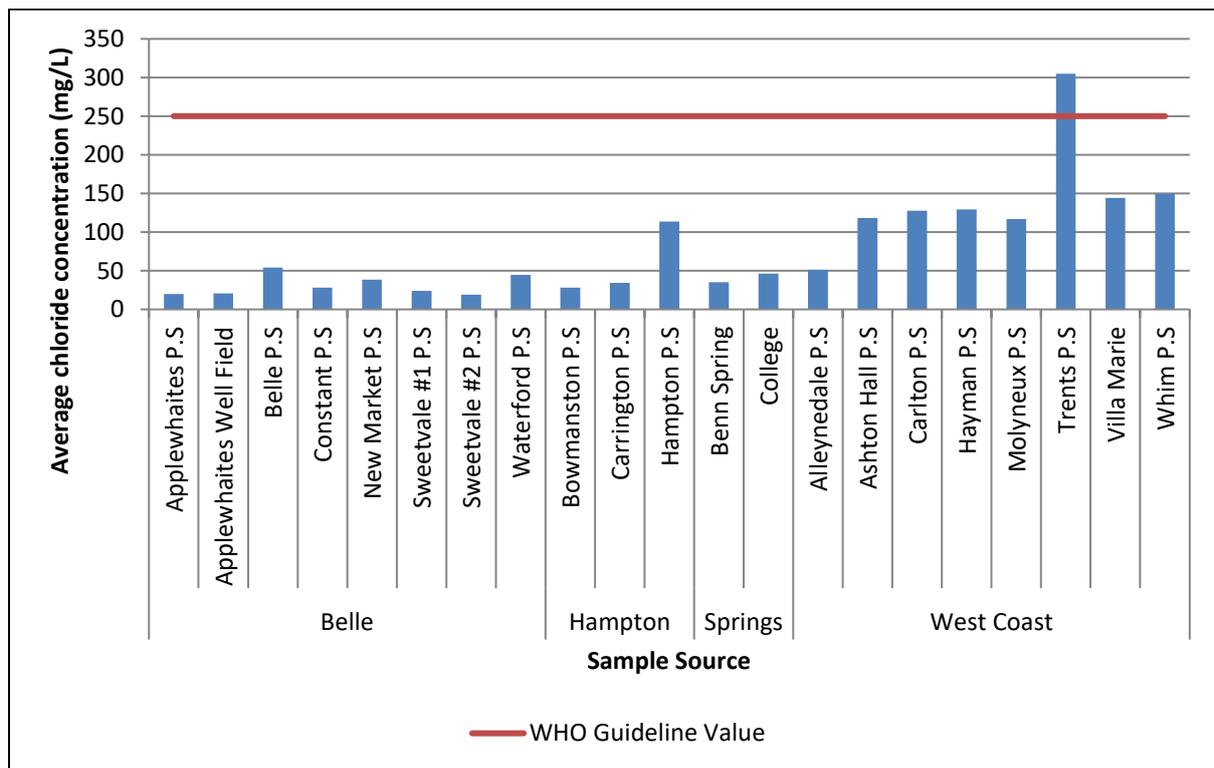


Figure 9: Average chloride concentration for supply sources for 2013

Over the period 2009 to 2013, it was observed that most of the supply wells had similar average chloride concentrations (see Figure 10). Only the Trents pumping stations registered average concentrations in 2013 that was markedly above their respective average concentrations over the period 2009-2012.

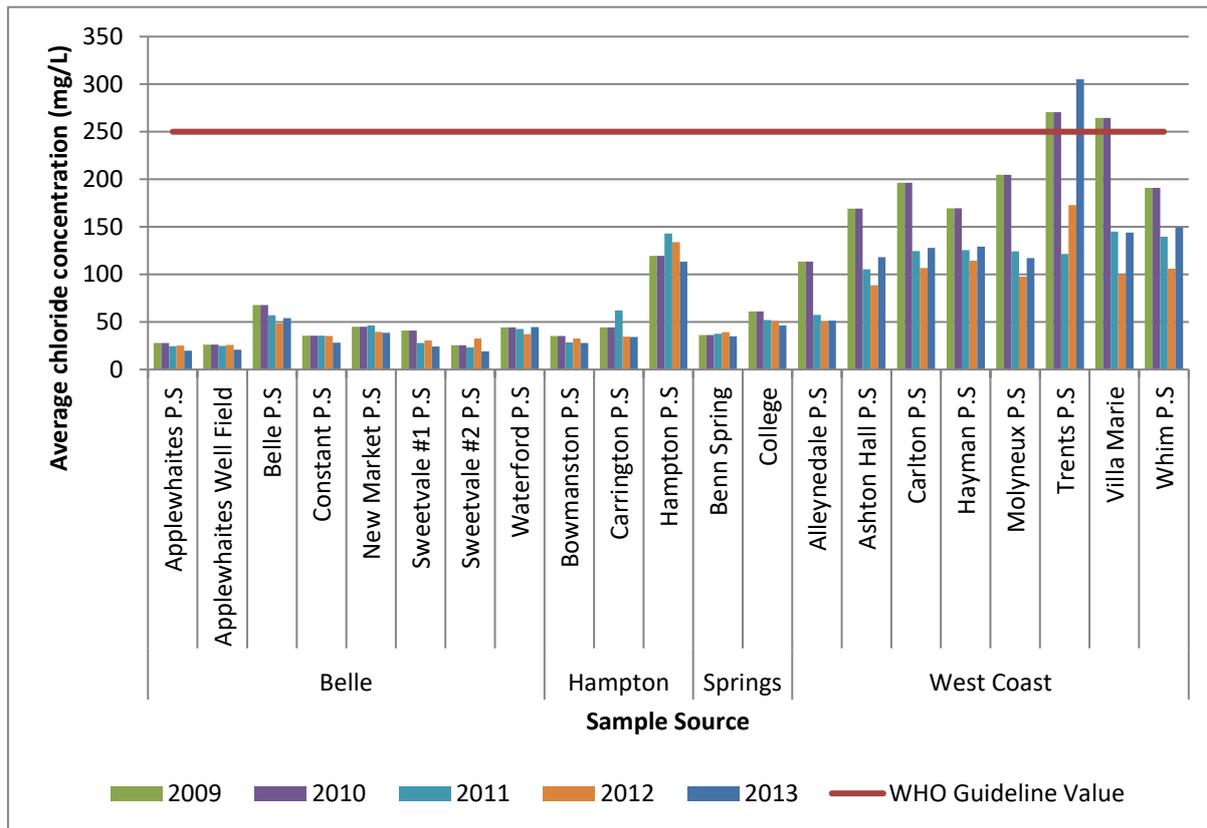


Figure 10: Average chloride concentration for supply sources over the period 2009 – 2013

8.1.1.1.2 Nitrate expressed as Nitrogen (Nitrate-N)

In 2013, all of the public supply sources recorded average Nitrate-N concentrations that were less than the WHO guideline value of 10 mg/l. However, 60% of the supply wells registered average Nitrate-N concentration above 6 mg/l (Figure 11).

The Belle P.S recorded an average Nitrate-N concentration of 8.59 mg/l and a maximum concentration of 9.01 mg/l. The average Nitrate-N concentration registered by this well was the highest of all the supply wells and springs. Other wells, which registered elevated average Nitrate-N concentrations, were Ashton Hall, which recorded a value of 7.66 mg/l; Constant P.S, which recorded a value of 7.42 mg/l; the Whim, which recorded a value of 7.22 mg/l; and the spring at Codrington College which recorded a value of 7.13 mg/l.

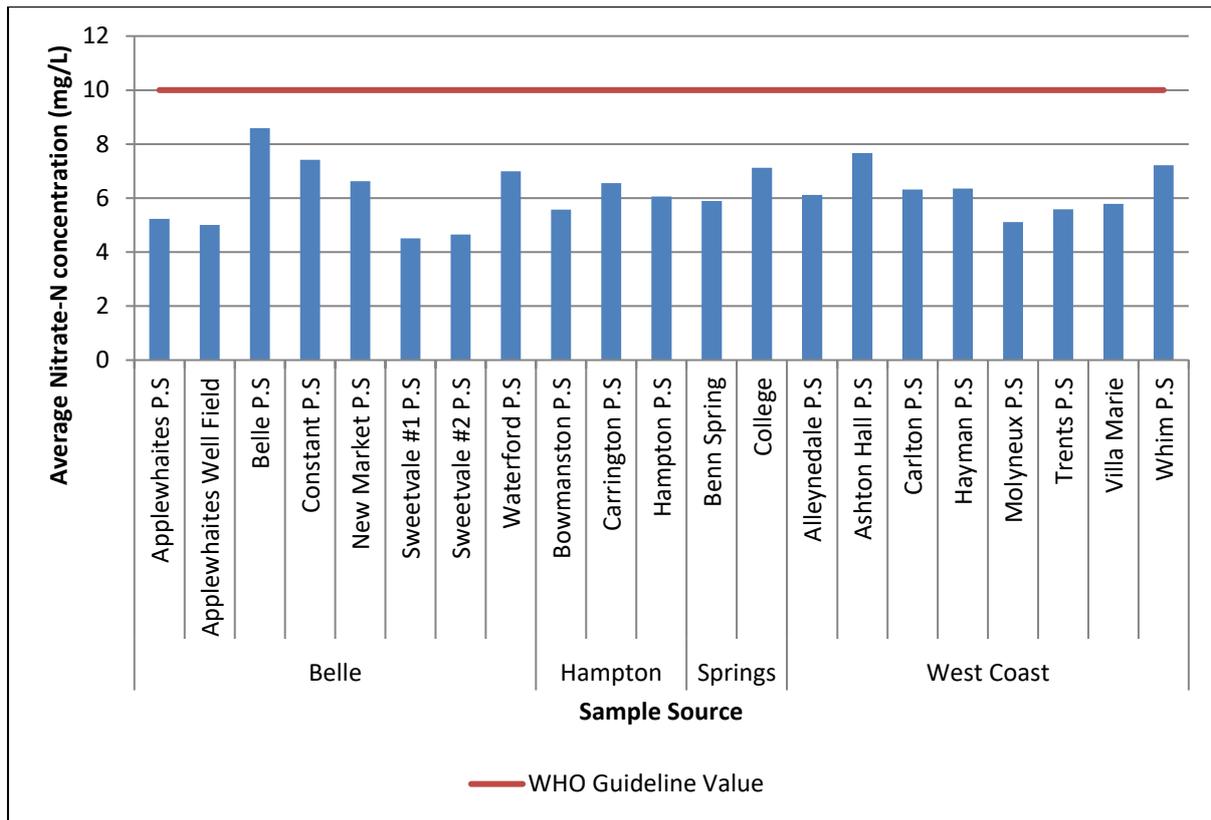


Figure 11: Average Nitrate-N concentrations for supply sources for 2013

For most of the public supply sample locations, the average Nitrate-N concentration observed in 2013 were similar to those observed over the period 2009 to 2012 (Figure 12). There were noticeable declines in the average Nitrate-N concentrations at Villa Marie, Whim P.S, Applewhaites P.S and Applewhaites Well Field over the five years. This may be indicative that the groundwater was less 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.

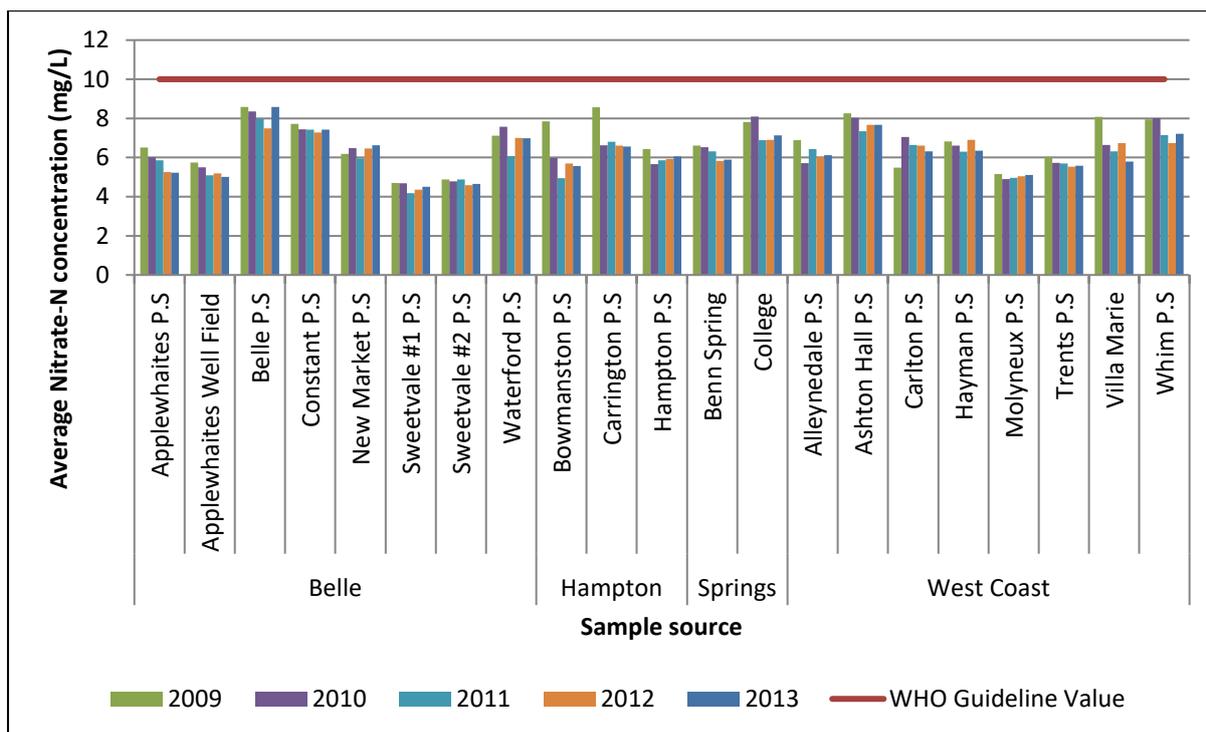


Figure 12: Average Nitrate-N concentrations for supply sources over the period 2009 to 2013

8.1.1.1.3 Sulphates

During 2013, the highest recorded average concentration of sulphates, 56.78 mg/l, was recorded at the Trents P.S. This value was markedly less than the WHO guideline of 500 mg/l (Figure 13).

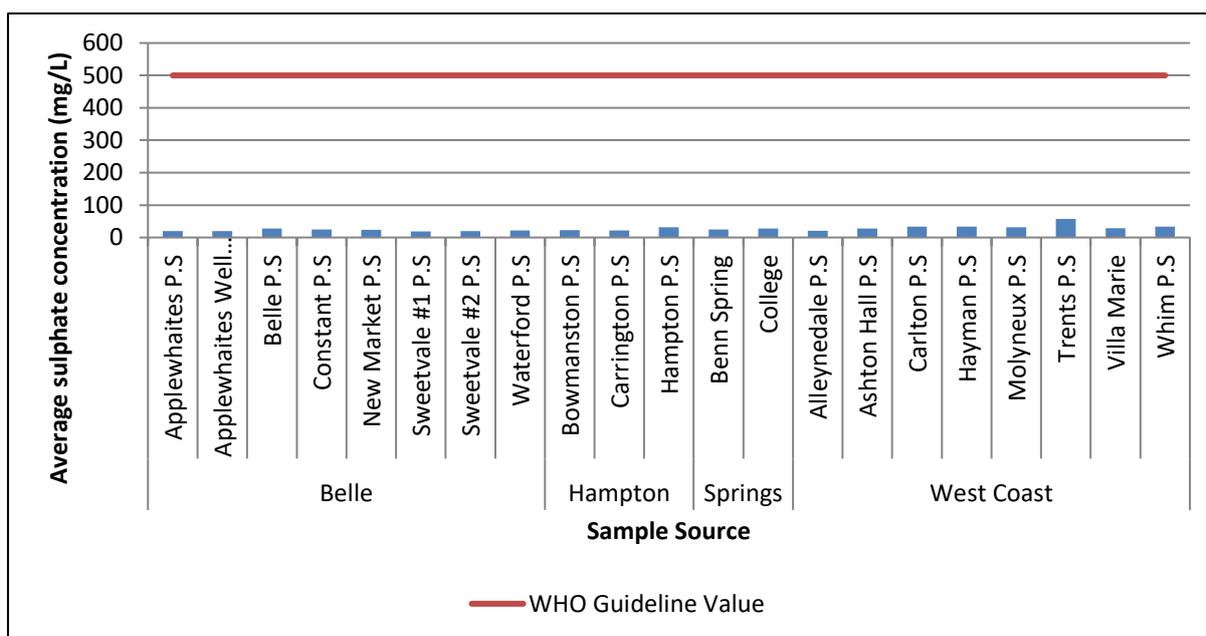


Figure 13: Average Sulphate Concentrations for Supply Sources in 2013

Similarly, all of the average concentrations for sulphate over the period 2009-2013 were also markedly less the WHO guideline value. This illustrates that the supply sources in Barbados are not being overly impacted by sulphates (see Figure 14).

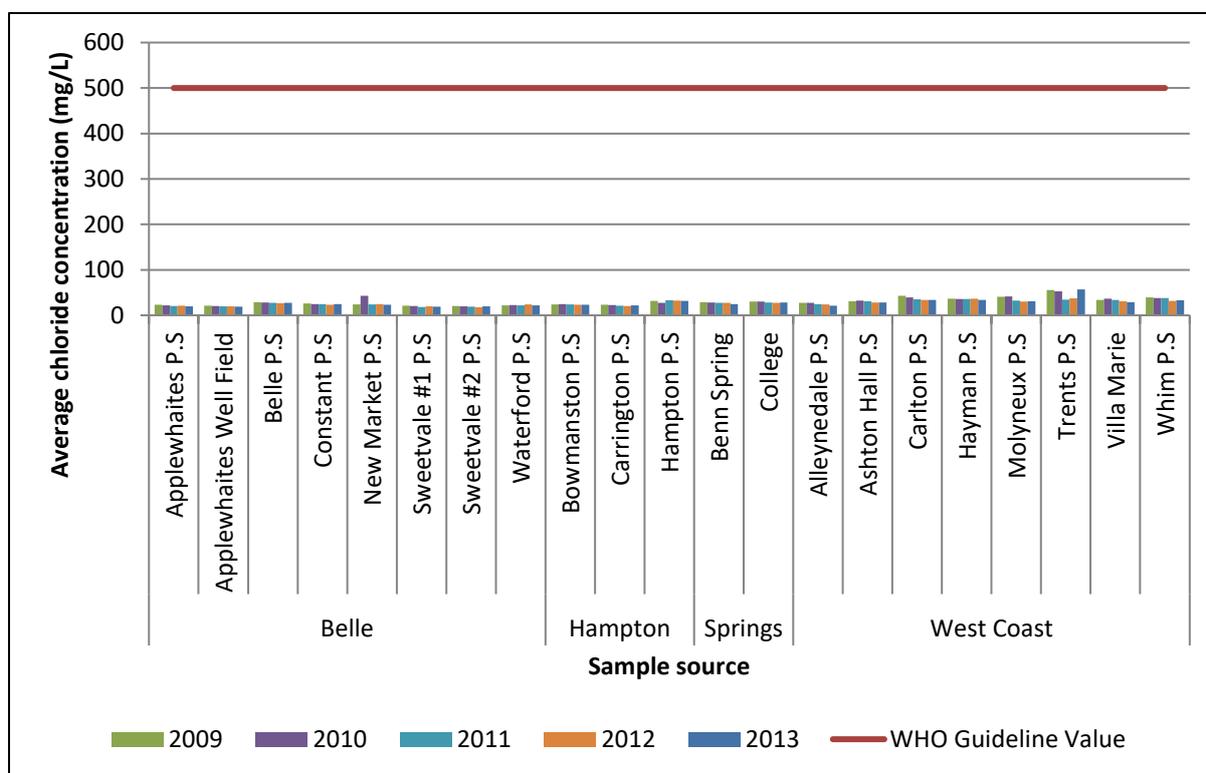


Figure 14: Average sulphate concentrations for supply sources over the period 2009-2013

8.1.1.1.4 Total Dissolved Solids (TDS)

Except for Trent P.S, in 2013 most of the supply sources registered average concentrations of total dissolved solids between 300 and 600 mg/l (Figure 15). Under the WHO drinking water guidelines, water from these locations would have taste classified as “Good”.

Four locations, Applewhaites P.S, Applewhaites Well Field, Sweetvale #2 P.S, Waterford P.S. recorded average concentration of TDS that were less than 300 mg/l. Drinking water from these locations would be classified as “Excellent” according to the WHO drinking water guidelines.

The pumping station at Trents registered an average concentration of TDS of 837.78 mg/l. Consequently, drinking water from this location would be classified as “Fair”.

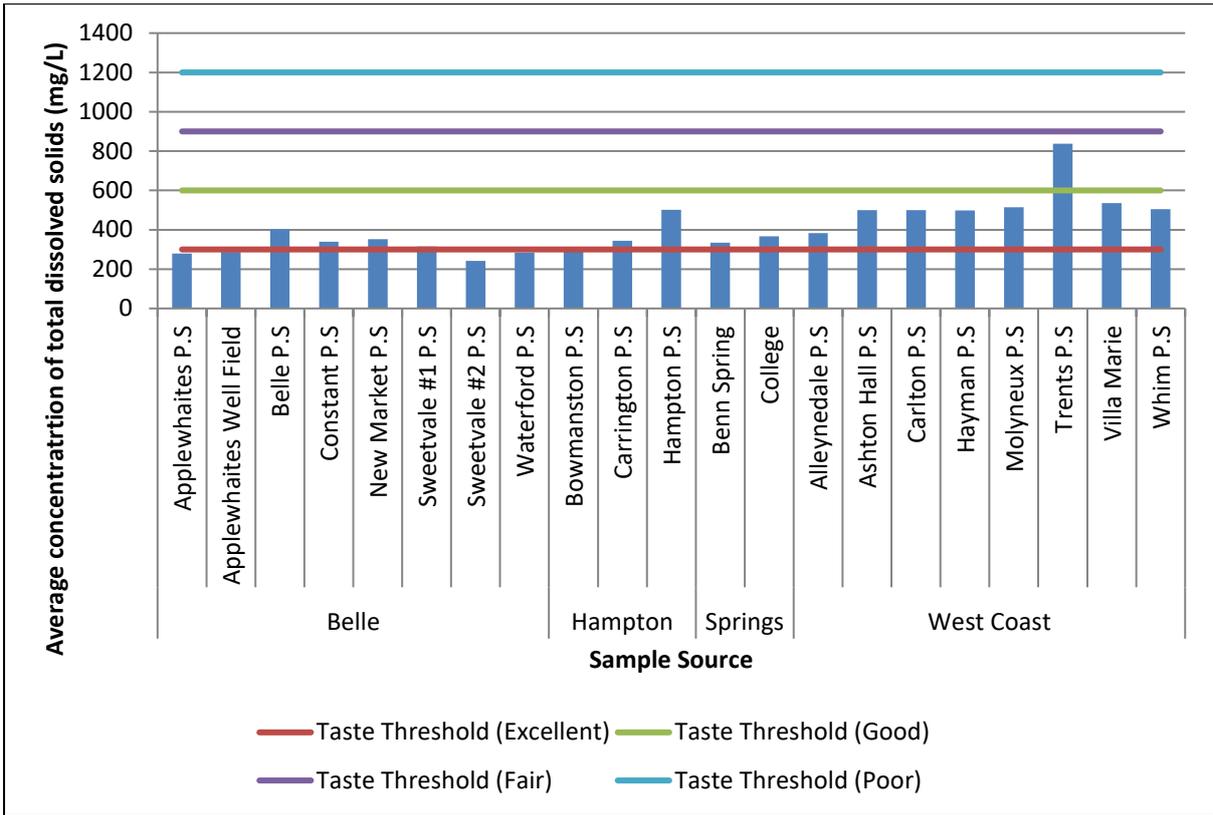


Figure 15: Average concentration of TDS for supply sources for 2013

From Figure 16, it was observed that over the period 2009-2012, the average concentrations of TDS were greatest in the West Coast catchment and least in the Belle catchment. This pattern was also observed in 2013.

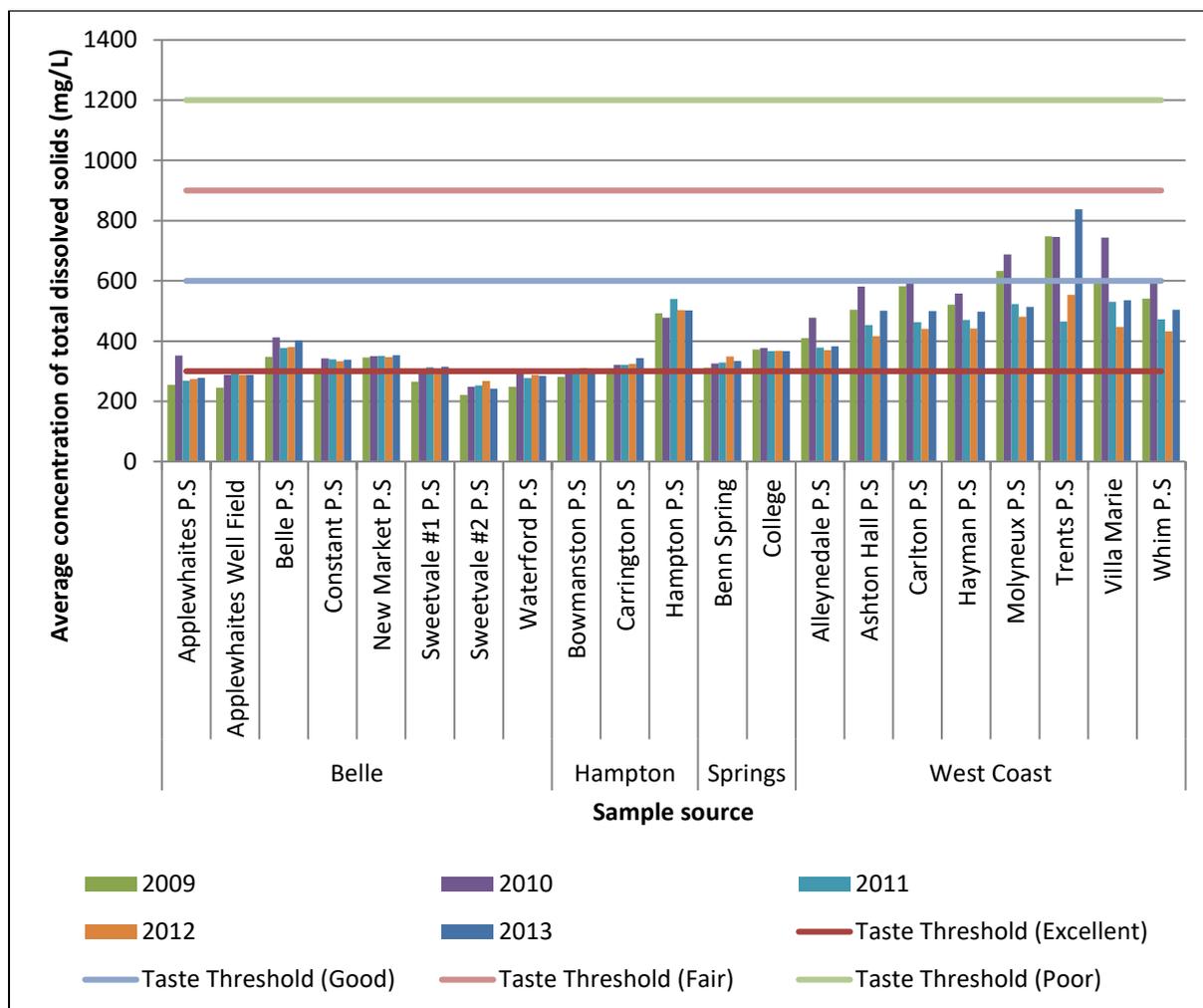


Figure 16: Average TDS concentrations for supply sources over the period 2009 – 2013

8.1.1.1.5 Faecal Coliform

The WHO drinking water guideline for Faecal Coliforms is zero Colony Forming Units/100 ml. Faecal Coliforms are 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.

Figure 17 depicts the average concentration of faecal coliforms recorded for each of the supply sources in 2013. All of the public supply sources in the figure 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 to address this issue.

Applewaithe P.S, Applewaites Well Field, Constant P.S, New Market P.S, Sweetvale #1 P.S, Sweetvale #2 P.S, Bowmanston P.S, Benn Spring, College Spring, Molyneux

P.S and the Whim P.S also recorded concentrations of faecal coliform above the WHO drinking water guideline. These occurrences may have occurred because samples from these locations are taken before chlorination occurs.

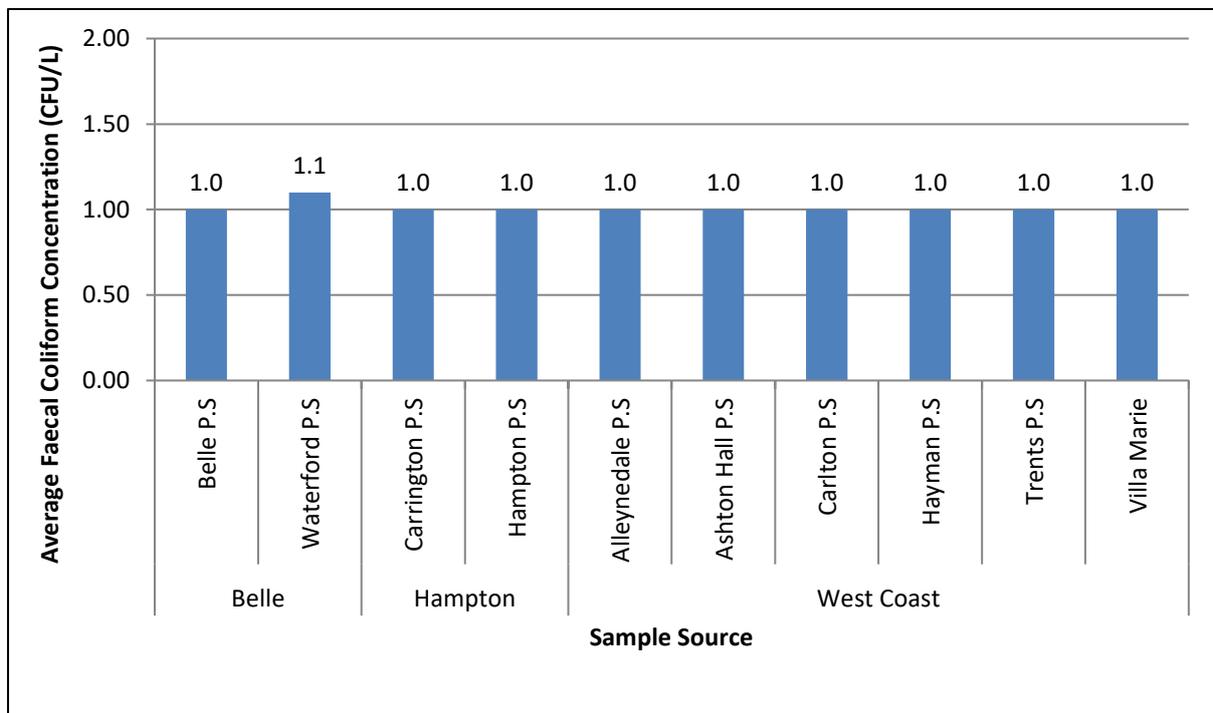


Figure 17: Average concentrations of faecal coliform for chlorinated supply sources in 2013

8.1.1.2 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.

8.1.1.2.1 Chlorides

Each of the five springs recorded average chloride concentrations that were below the WHO drinking water guideline for chloride of 250 mg/l. Fortesque and Pot House each recorded the highest average chloride concentration of 92.22 mg/l and 82.44 mg/l respectively whereas Porey Spring recorded the lowest value of 24.27 mg/l (Figure 18).

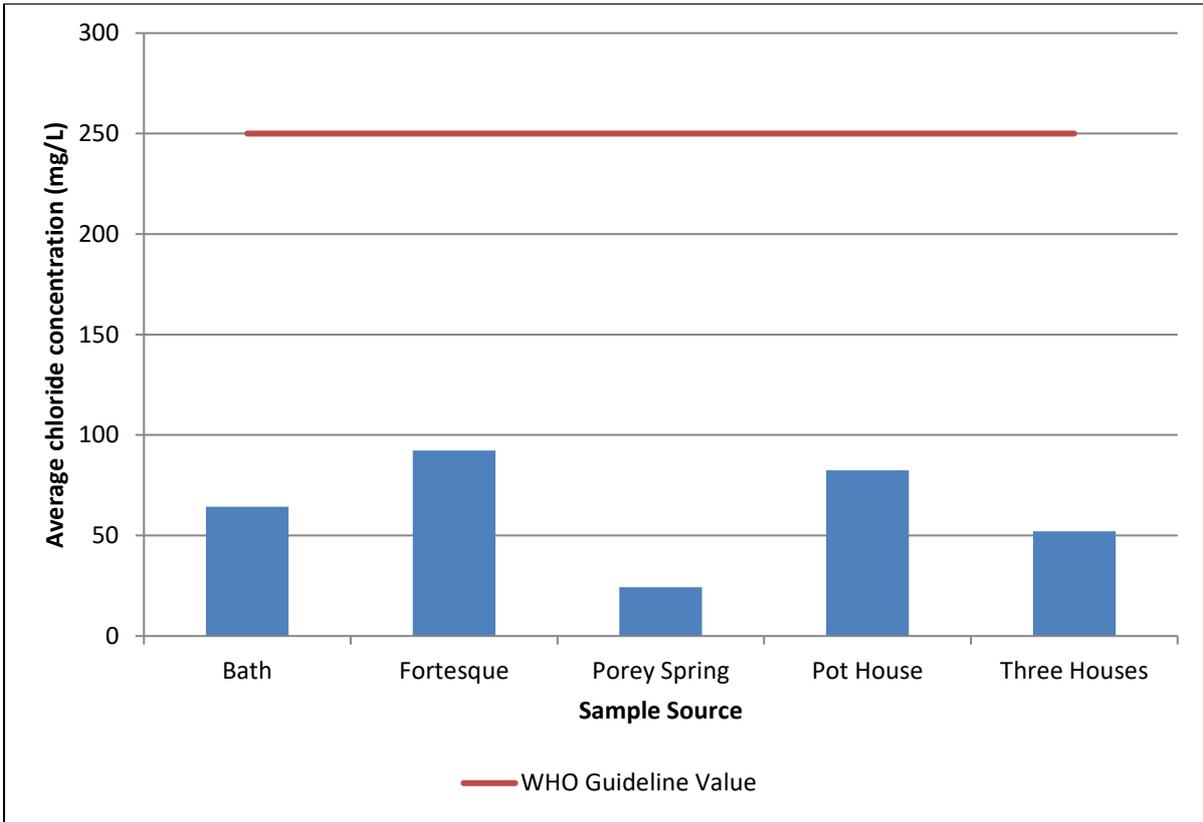


Figure 18: Average chloride concentration for 2013 for non-public supply springs

8.1.1.2.2 Nitrate expressed as Nitrogen (Nitrate-N)

The natural spring located at Bath, St. Joseph appeared to have been impacted by disposal practices and agricultural activities than the other springs. The Bath spring recorded an average Nitrate-N concentration of 12.1 mg/l. The spring at Fortesque recorded an average Nitrate-N concentration of 9.48 mg/l. The use of water from these two locations is of particular concern since the average Nitrate-N concentrations exceeded or was 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 4.64 mg/l (Figure 19).

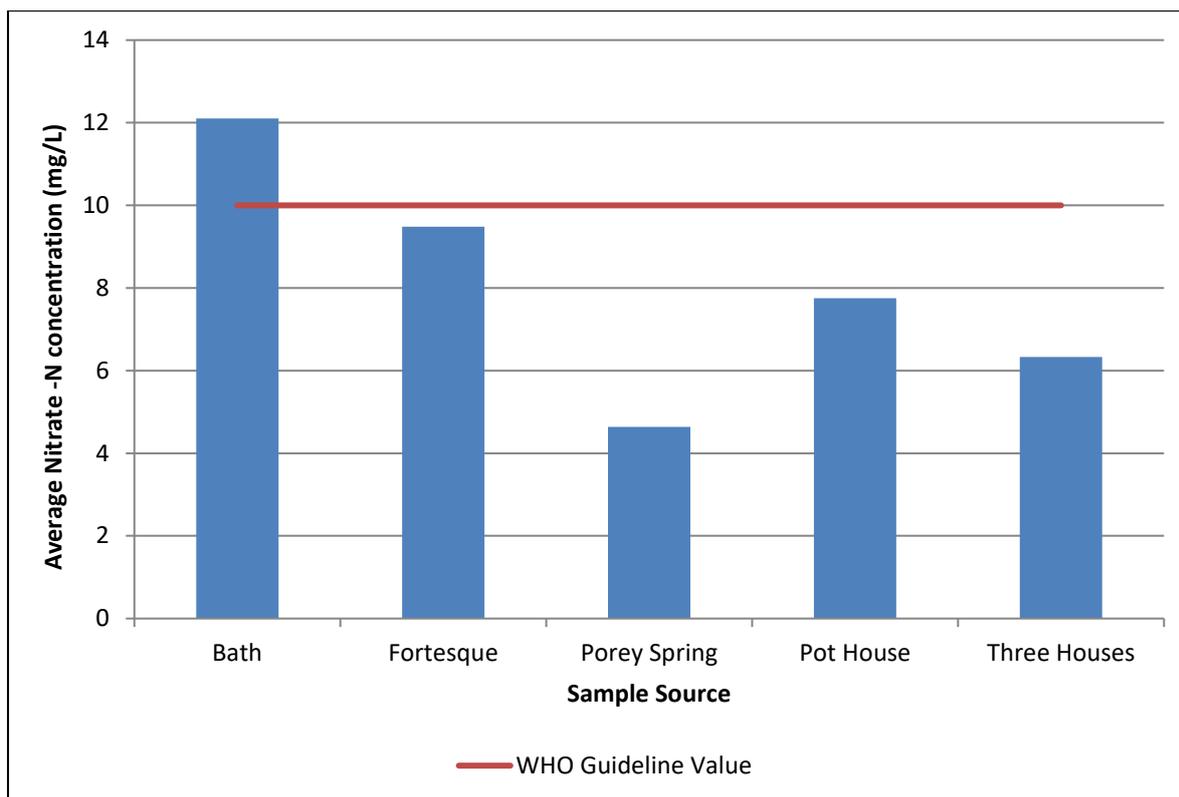


Figure 19: Average Nitrate-N concentration for non-public supply spring in 2013

8.1.1.2.3 Faecal Coliform

The waters from these five (5) 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 (Figure 20).

The spring at Three Houses recorded the highest average faecal coliform concentration of 1,517 CFU/100 ml. High concentrations of Faecal Coliform in water from these locations indicate the possible presence of pathogens that may induce gastrointestinal illness in persons that ingest the water. Porey Spring each had the lowest value of 21 CFU/100 ml.

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.

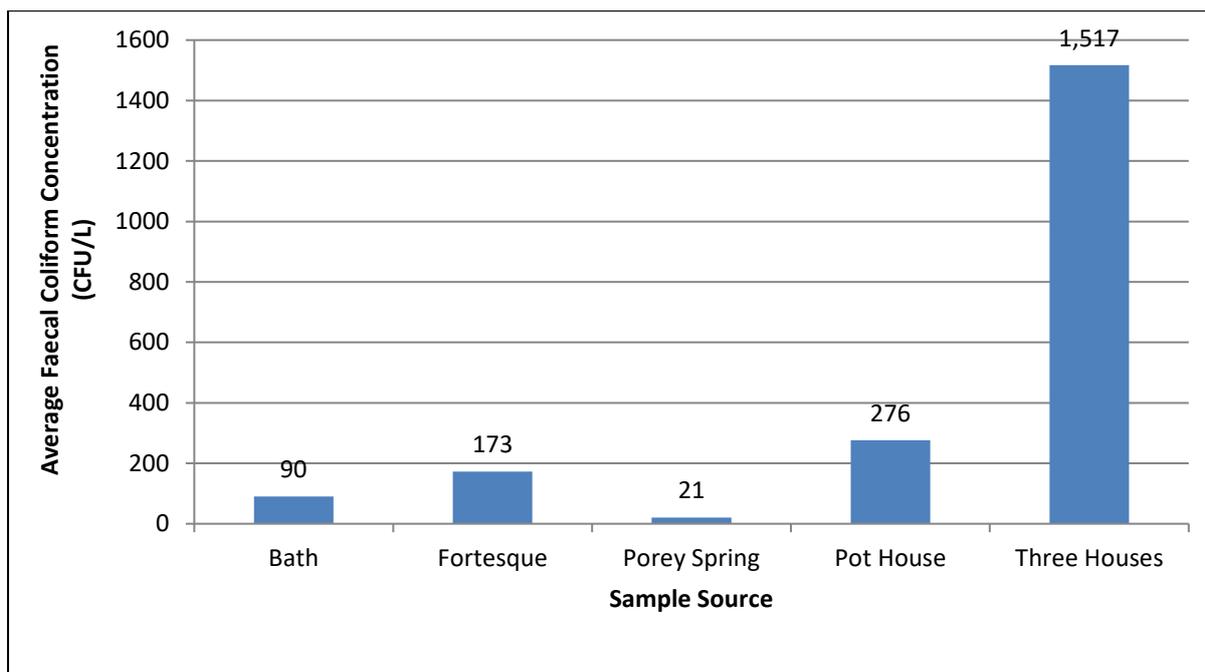


Figure 20: Average faecal coliform concentrations for non-public supply springs in 2013

8.1.2 Wastewater Plant Monitoring

This programme was suspended due to budgetary restraints and logistical difficulties. A date for resumption of activities had not yet been determined.

8.1.3 Recreational Water Monitoring

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 for 18 popular West and South coast bathing sites. These sites are listed below in Table 7.

Table 7: Beaches sampled under the Nearshore Recreational Monitoring Programme

West Coast		South Coast	
<i>Beach</i>	<i>Site</i>	<i>Beach</i>	<i>Site</i>
Brandons	1	Brownes Beach	3
Brighton	1	Pebbles	3
Paradise	1	Amaryllis	2
Batts Rock	1	Accra	2
Coach House	1	Worthing	2
Holetown	3	Dover	2
Mullins	2	Graveyard	2
Heywoods	2	Welches	1
		Miami	2
		Silver Sands	2

Samples were analysed for two types of parameters – microbes and nutrients. The laboratory of 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.

8.1.3.1 Microbial Analysis

Microbial analysis was conducted on each site once per week. 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, 1998-40. These standards are presented in Table 8 below.

Table 8: 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. AND No sample should exceed 104 colonies/100ml
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 2013, all of the beaches monitored complied with the standard for faecal coliforms.

Three beaches exceeded the standard for Enterococci. Amaryllis site 2 and Brownes Beach site 1 in November and Pebbles site 2 in August exceeded the standard and are displayed as peaks on the graphs in Figure 2. The geometric means for these failures were 43 CFU/100 ml for Amaryllis, 118 CFU/100 ml for Brownes Beach Site 1 and 69 CFU/100 ml for Pebbles site 2.

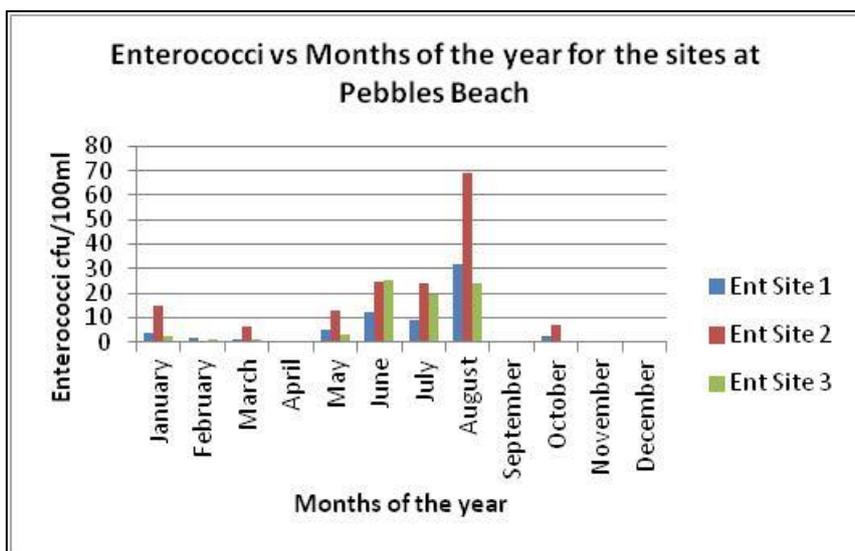
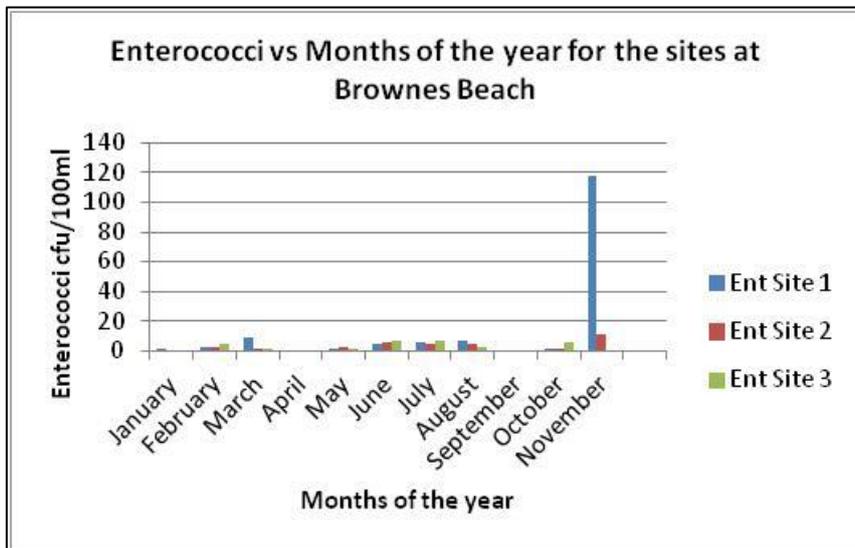
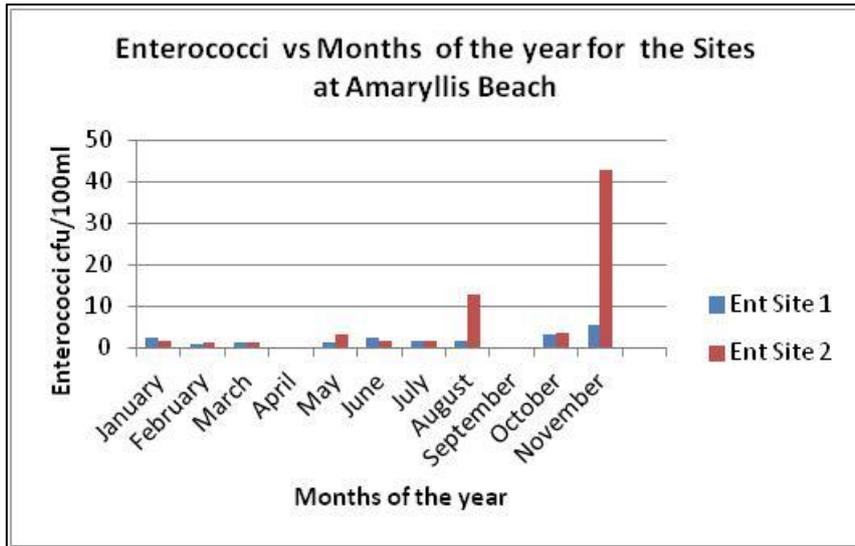


Figure 21: Monthly Geometric means of Enterococci for Amaryllis, Pebbles and Brownes Beach for 2013

A review of the field sheets for Amaryllis and Pebbles did not yield any possible explanations for the geometric means being as high as they were for these two beaches. However, for site 1 at Brownes beach, the field sheet indicated that there were two instances in November where the berm was breached at the time of sample collection and stormwater was running directly into the sea. The direct discharge of stormwater into the marine environment may have been the reason for the elevated mean concentrations for Enterococci.

8.1.3.2 Nutrients

Nutrient samples were collected from each beach under the schedule developed the EPD. The nutrients tested for were pH, total nitrogen (TN), total phosphorus (TP) and total suspended solids (TSS).

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 (WHO, 2009).

The parameters TN and TP can indicate if nutrient loading is occurring in the marine environment. Increased nutrient concentration in nearshore waters can be caused by discharges from point sources into the nearshore (State of Nova Scotia, 2009). 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 total suspended solids can affect the aesthetics of the nearshore with the water appearing “muddy” and result in reduced water clarity. This can therefore decrease the light penetration to benthic organisms for example corals. Settling solids can also smother reefs (EPD, 2004). Some potential sources of solids in the marine environment are stormwater runoff from drains and construction in the nearshore environment.

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, 1998-40. Table 11 below lists the standards.

Table 9: The standards for the nutrients analysed in the 2013 sampling program

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

All the nutrient samples collected in 2013 recorded concentrations of total phosphorous and turbidity that exceeded the respective standard and only 12 of 132

samples were in compliance for Total Nitrogen. The only nutrient parameter that was satisfactory across all beaches was pH.

Total Nitrogen results ranged from 0.01 to 1.50 mg/L. The maximum Total Nitrogen concentration was seen at Paradise Beach on July 1st, 2013. Only 12 of the 132 nutrient samples taken had total nitrogen concentrations that were in compliance with the standard of 0.1 mg/L.

Total Phosphorus concentrations ranged from 0.05 to 0.5 mg/L for nutrient samples collected in 2013. The maximum total phosphorous concentration of 0.5 mg/L was obtained at Brownes Beach Site 1 on July 10th, 2013. All 132 of the nutrient samples collected had total phosphorus concentrations that exceeded the standard of 0.015 mg/L.

pH readings for nutrient samples collected in 2013 ranged from 7.8 to 8.40. All the pH readings for all the beaches were well within the range of the standard of 7.0 - 8.7.

Total Suspended Solids (TSS) concentration ranged from 0.15 to 34 mg/L for samples collected in 2013. The maximum concentration of TSS was obtained for Accra Site 2 on the 4th December 2013. Twenty-eight (28) sites exceeded the TSS standard of 5 mg/L.

The turbidity concentration for all 132 samples exceeded the standard of 1.5 NTU. Turbidity concentrations ranged from 2 NTU at to 7 NTU. The maximum turbidity concentration occurred at Heywoods site 2 on January 7th, 2013.

The results indicated that the marine environment is being negatively impacted by the activities of land-based sources.

8.1.3.3 Challenges

It should be noted that some of the beaches could not be sampled frequently due to the unsafe conditions of the ocean at the time of sample collection. Graveyard beach was only sampled for 5 months of the year. Silver Sands site 1 was sampled 7 months of the year while site 2 was only sampled during 3 months.

Due to construction associated with the Coastal Zone Management Unites Coastal Infrastructure Project, the sites at Holetown were inaccessible for most of the year. Consequently, all of the sites at Holetown were only sampled 4 months during the year.

9 Public Education and Awareness

The goal of the Public Education and Awareness Programme is to help increase the levels of environmental awareness and environmental stewardship among Barbadians.

9.1 Planned Activities

For the year 2013, the Environmental Protection Department (EPD) planned to:

- Produce and distribute its biannual newsletter;
- Continue the adopt-a-school programme with the Garrison Secondary School;
- Host at least one intern from the Environmental Science Programme at the Barbados Community College; and
- Raise awareness about the Department via print and electronic media.

9.1.1 Biannual Newsletter

The Department published the 12th edition of its newsletter during the second quarter of 2013. This issue raised public awareness about the Chemicals, Weapons Convention, GHS and CReW project. Moreover, this issue also announced the retirement, Mr Jeffrey Headley, from the civil service and as Director of the Environmental Protection Department.

A draft of the September issue 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 print the newsletter. The newsletter contained articles about; *inter alia*, the student internship programme for 2013, the logo competition held to raise awareness about the GHS and a study on septic tank and filter beds.

9.1.2 “Adopt-a-School” Programme

The staff of the Environmental Protection Department accompanied students from the Graydon Sealy Secondary School on a trip on the Atlantic Submarine. The tour sought to foster an appreciation for the marine environment in the youth and sensitize them to the impacts of their activities on that environment.

9.1.3 Internship Programme

The purpose of the internship is to provide meaningful work experience for young persons who have an interest in environmental science. Additionally, the internship provides an opportunity for the students to put into practice some of the principles they had learned. In 2013, the EPD hosted two final year students from the Environmental Science Programme at the Barbados Community College. During their stint with the Department, the intern accompanied officers on their daily duties

and was exposed to the various functions of the Department. Additionally, the interns completed a precursor study on open burning in Barbados.

Additionally, the Department hosted students from the Samuel Jackman Prescod Polytechnic. These students assisted with the administrative functions of the Department.

9.1.4 Raise Awareness about the Department

As part of the activities for Environment Month, the Department aired advertisements on the radio and television. The advertisements served to raise awareness about the EPD as well as provide tips the public could use to help protect the environment.

10 Conference, 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 2013 (Tables 10, 11, 12 and 13).

10.1 Training

10.1.1 Local Training

Table 10: Summary of Local Training Activities

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
Introduction to Microsoft Access	January 7 th to 15 th , 2013 Data Processing Department 4 th Floor Baobab Tower Building, Warrens, St. Michael	This course sought to provide participants with a basic knowledge of and skills in Microsoft Access.	N. Jordan – Environmental Protection Officer
Professional Skill	February 18 th to 22 nd , 2013 Conference room, Environmental Protection Department	Training of eight members of staff in creating and making presentations and report writing	N. Jordan – Environmental Protection Officer G. Hinds – Environmental Protection Officer N. Aymes – Marine Pollution Officer Tonia Williams – Marine Pollution Officer K. Barrow – Senior Building Development Officer

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
			<p>S. Catwell – Chief Building Development Officer</p> <p>C. Clarke – Senior Building Development Officer</p> <p>P. Fergusson – Environmental Protection Officer</p>

<p>Environmental Assessment</p>	<p>Impact</p>	<p>February 25th to March 1st, 2013 Conference room, Environmental Protection Department</p>	<p>Training of ten members of staff in Environmental Impact Assessment. It covered all of the steps required for conducting an EIA and focused attention on scoping a project and preparing terms of reference and reviewing an EIA report.</p>	<p>N. Jordan – Environmental Protection Officer G. Hinds – Environmental Protection Officer P. Pile – Environmental Technical Officer Tonia Williams – Marine Pollution Officer P. Fergusson – Environmental Protection Officer L. Chapman – Environmental Technician L. Senhouse – Environmental Technical Officer G. Clarke – Building Development Officer A. Deane – Building Development Officer C. Taylor – Building Development Officer</p>
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<p>Geographic Information Systems (GIS)</p>	<p>Information</p> <p>March 4th to 15th, 2013</p> <p>The University of the West Indies, Cave Hill, St. Michael</p>	<p>To provide participants with a basic knowledge of and skills in GIS</p>	<p>N. Jordan – Environmental Protection Officer</p> <p>T. Armstrong – Senior Environmental Protection Officer</p> <p>N. Aymes – Marine Pollution Officer</p> <p>Tonia Williams – Marine Pollution Officer</p> <p>C. Worrell – Marine Pollution Officer</p> <p>L. Chapman – Environmental Technician</p> <p>D. Roach – Senior Environmental Protection Officer</p> <p>H. Clarke – Building Development Officer</p> <p>J. Yearwood – Environmental Technician</p> <p>C. Taylor – Building Development Officer</p>
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Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
Water and Wastewater Management	March 8 th to April 16 th , 2013 The University of the West Indies, Cave Hill, St. Michael	The course aimed to introduce students to the water cycle upstream and downstream of the user covering water supply and wastewater management and their associated techniques and technologies.	G. Hinds – Environmental Protection Officer
PRDS Training for Managers and Supervisors	February 18 th to 22 nd , 2013 Garfield Sobers Sports Complex, Willey, St. Michael	To familiarize managers and supervisor of their roles under PRDS	L. Burnett – Administrative Officer II
Driver/Messenger Development Course	March 5 th , 8 th and 13 th , 2013 Gymnasium Limited, Willey, St. Michael	The objective of the course was to equip Drivers/Messengers with essential skills and knowledge to improve their productivity and performance.	D. King – Driver/Messenger
Public Service Communication	February 25 th to May 6 th , 2013 The University of the West Indies, Cave Hill, St. Michael		L. Burnett – Administrative Officer II

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
Public Sector Performance Budgeting	October 2 nd to 3 rd , 2013 Productivity Council 3 rd Floor Baobab Tower Building, Warrens, St. Michael	The seminar sought to promote increased usage of Performance budgeting in the public sector to foster efficient and effective spending which generates results and macroeconomic development.	A. Headley - Acting Director
Registry Procedures	November 4 th to 7 th , 2013 Solutions Centre, University of West Indies, Cave Hill Campus, St. Michael	To improve the efficiency and effectiveness of Registries within respective Ministries and Departments.	D. Barker – Clerical Officer

10.1.2 Overseas Training

Table 11: Summary of Overseas Training Activities

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
GEF CReW Regional Facilitator Training	May 19 th to 24 th , 2013 Kingston, Jamaica	The training aimed to strengthen leadership and capacity to: enhance skills for conflict resolution improve skills in participatory engagement in the broadest possible context facilitate bi-lateral learning, learning across countries and organisations	A. Headley – Director (ag) D. Roach – Senior Environmental Protection Officer
Oil Spill Preparedness and Response Plan	November 4 th to 8 th , 2013 Fort Lauderdale, Florida	The course provided individuals at various levels of responsibility with an understanding of spill response concepts and strategies, practical realities of response management and operations, and familiarization with a wide variety of response equipment. Participants were trained to assess a spill and select appropriate response strategies, methods, and equipment. They were also trained to safely deploy, operate, supervise and maintain a wide variety of response equipment.	A. Eversley – Senior Marine Pollution Officer (ag)

10.2 Conference, Seminars and Workshops

10.2.1 Local

Table 12: Summary of Participation in Local Seminars, Conferences and Workshop

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
Greenhouse Gas Inventory Workshop and Stakeholder Consultation	January 22 nd to 23 rd , 2013 Savannah Beach Hotel	As a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), the MED executed a project to prepare the Second National Communication Report on Barbados' activities related to climate change. The purpose of this workshop was to solicit information from stakeholders to prepare the aforementioned report.	S. Goodridge – Senior Environmental Technician (ag)
How to Comply With the Safety and Health at Work Act and Fast Track Your Business to New Wealth on the Horizon	April 25 th , 2013 Garfield Sobers Sports Complex, Wildey, St. Michael	An officer from the Department made presentations to the participants at the workshop on chemicals and safety. Additionally, participants were made aware of the GHS.	T. Armstrong – Senior Environmental Protection Officer P. Pile – Environmental Technical Officer

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
Environmental Medicine as a Tool for the Prevention of Occupational Diseases	April 26 th , 2013 Lloyd Erskine Sandiford Centre Two Mile Hill, St. Michael	A half-day seminar to commemorate ILO World Day of Safety and Health at Work.	L. Chapman – Environmental Technician
Water Management, Health and Climate Adaptation in Barbados	May 9 th , 2013 University of the West Indies – Cave Hill Campus Shell Suite/3W's Pavilion St. Michael		A. Headley – Director (ag) D. Roach – Senior Environmental Protection Officer
Multi-Hazard Disaster Symposium 2013	May 31 st , 2013 Barbados Hilton Hotel Needhams Point St. Michael	The symposium formed part of the Government of Barbados' initiative to reduce the vulnerability of the tourism sector to both man-made and natural hazards and to ensure that a safe and secure environment is provided for visitors and locals alike.	L. Burnett – Administrative Officer

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
Occupational Safety and Health Week 2013	July 1 st to 4 th , 2013 Accra Beach Hotel and Spa Rockley, Christ Church	A series of seminar geared towards raising awareness about safety and health at work.	N. Cummins – Environmental Protection Department C. Crichlow – Clerical Officer

10.2.2 Overseas

Table 13: Summary of Participation in Overseas Seminars, Conferences and Workshop

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
Workshop to Enhance the Implementation of the Stockholm Convention in the Caribbean	February 18- 22, 2013 Trinidad and Tobago	Hosted by the Basel Convention Regional Centre for the Caribbean to help regional countries to fulfil their obligations under the Stockholm Convention.	<ul style="list-style-type: none"> I. Lavine – Senior Environmental Technical Officer
One Health Meeting	February 28 – March 1, 2013, Trinidad and Tobago	Represented the Ministry of Environment at the One Health Meeting held by PAHO/WHO.	<ul style="list-style-type: none"> I. Lavine – Senior Environmental Technical Officer
27 th Session of United Nations Environment Programme Governing Council Global Ministerial Environment Forum	18 – 22 February 2013 Nairobi, Kenya	The twenty-seventh session of the Governing Council/Global Ministerial Environment Forum of the United Nations Environment Programme (UNEP), under section II of Governing Council decision 26/17 of 24 February 2011.	<ul style="list-style-type: none"> A. Headley – Deputy Director
Extraordinary meetings of the conference of parties to the Basel, Rotterdam and Stockholm Convention	April 28 – May 10, 2013	Participated in ordinary and extraordinary meetings of the conferences of the parties to the Basel, Rotterdam and Stockholm Conventions in Geneva, Switzerland.	<ul style="list-style-type: none"> I. Lavine – Senior Environmental Technical Officer
Basel Regional Centre Caribbean Workshop on the Environmentally Sound Management of Waste Electrical and Electronic Equipment	July 9 – 11, 2013 Trinidad and Tobago	The purpose of this workshop was to raise awareness about the environmentally sound management of waste electrical and electronic equipment (WEEE). Participants from across the Caribbean and Latin America came together to identify the issues and challenges associated with this type of waste.	<ul style="list-style-type: none"> T. Armstrong – Senior Environmental Protection Officer

Name of Course/ Activity	Location/ Date	Description	Officers (s) In Attendance
International Conference on Marine Data and Information Systems	September 23 rd to 25 th , 2013 Lucca, Italy	Presentation of the Caribbean Marine Atlas.	<ul style="list-style-type: none"> • A. Eversley - Senior Marine Pollution Officer

11 Outlook for 2014

It is anticipated that the Department will face several challenges in 2014. Many of its programmes may need to be scaled down, reformulated, and or postponed in light of the shortage of human resources arising from the resignations of staff during 2013. This shortage will be compounded by the implementation of the Government's policy to suspend the provision of additional staff to fill vacant posts or to provide substitutes where needed. These factors will affect in particular the activities of the Building Development Control Section, Hazardous Material and Solid Waste Section and the Marine Pollution Control Section.

However, the year 2014 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.

Establishing strategic partnerships and training of staff will need to be part and parcel of any approach employed by the Department. Strategic partnerships will serve to efficiently and effectively utilize limited financial and human resources to achieve the goals of the parties involved. Moreover, an aggressive training regime for all staff would develop the relevant competencies necessary to implement the Department's various programmes. This should include the training of officers in areas related to other sections in the Department to which they are not currently assigned. It is hoped that this would aid in the facilitation of lateral movement at the EPD to allow for more effective use of the limited human resources.

One other area where the EPD will also need to focus its attention is its legislative authority to enforce certain statutes. These statutes pertain to the removal of derelict building and vehicles and building development control. Additionally, 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.

12 References

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