



ENVIRONMENTAL
PROTECTION
DEPARTMENT
ANNUAL REPORT

2016



ENVIRONMENTAL PROTECTION DEPARTMENT

EXECUTIVE SUMMARY

The Environmental Protection Department in 2016 continued to carry out activities which would lead to a healthy environment for all Barbadians and visitors. Work was carried out most notably in areas such as Ambient Air Quality, Building Development, Water Quality, Marine Pollution and Chemicals Management at both the domestic and regional level.

Twenty-eight complaints related to ambient air quality were received in 2016. The majority of complaints were from vehicle maintenance (61%) facilities followed by nuisance (25 %) and manufacturing (14 %). One hundred and nine (109) site visits were carried out concerning the investigation of ambient air quality complaints.

Six noise complaints were received in 2016 and seven site visits relating to noise complaints were undertaken in the same period.

The Department received one thousand seven hundred and fifty-seven (1,757) building applications during 2016. One thousand five hundred and nine applications (1,509) were brought forward from 2015. One thousand four hundred and sixty-two (1,462) applications were processed with the majority (86.5 %) approved and 8.7 % approved with conditions. The majority of applications approved were residential applications followed by commercial applications.

Twenty-eight (28) septic tanks and one (1) filter bed were inspected during 2016. Sixty-eight per cent (68 %) of inspections were deemed satisfactory and the remaining unsatisfactory.

Twelve (12) development-related documents such environmental impact assessment were received in 2016. Nine documents were reviewed during the same and comments prepared and submitted.

Twenty-three complaints were received which pertained to marine pollution.

Also, regulatory inspections reports for Trowel Plastics and HIPAC Ltd were completed while five others were still being prepared.

Concerning the National Oil Spill Contingency Plan, the oil spill response equipment inventory and the directory of the members of the National Oil Spill Response Committee

were updated. Also related to the management of oil pollution, the first draft of the media protocol was completed. The draft guidelines for Petroleum Soil Treatment areas were submitted for internal review.

Twenty-seven samples were collected from equipment which was inventoried as possibly containing polychlorinated biphenyls (PCBs). The results of the analysis indicated that the concentration of the PCBs in the oils were less than 40 parts per million (ppm). Equipment which has oil with a concentration of PCBs over 40 ppm were earmarked for disposal. This activity was undertaken as part of the Global Environment Facility (GEF) funded regional projects 5558: Development of a Sustainable Mechanism for Persistent Organic Pollutants and 5407: Disposal of Obsolete Pesticides including POPs, Promotion of Alternatives and Strengthening Pesticides Management in the Caribbean.

The GEF funded regional project 4881: Continuing Regional Support for the Persistent Organic Pollutants (POPs) Global Monitoring Plan under the Stockholm Convention in Latin America and Caribbean Region commenced in 2016 with the signing of the Memorandum of Understanding between the Basel Convention Coordinating Centre and the Stockholm Regional Centre for Latin America and the Caribbean (BCCC-SCRC) – Technological Laboratory of Uruguay (LATU) and the Environmental Protection Department.

In 2016, there were thirty-seven (37) requests for disposal advice with requests from commercial entities making up the majority (91.9 %) of requests.

Regarding applications for the importation of pesticides into Barbados, the EPD reviewed twenty-three such applications in 2016. Most of the pesticides reviewed were insecticides.

In relation to the removal and disposal of asbestos, fifty-five (55) requests for permission to remove asbestos-containing materials were processed, approved and monitored by the officers of the Department.

Several public education and awareness initiatives were carried out in 2016. These included the Building Development Workshop, 50th Anniversary of Independence Edition of the EnviroFocus Newsletter, the Photo-Essay Competition and the Asbestos Workshop among others.

With respect to the Groundwater Monitoring Programme, one thousand eight hundred and ninety-nine samples were collected and analysed. The majority (87.5 %) of the west coast public supply wells exceeded the guideline value of 250 mg/L for chlorides. No public supply sources exceeded the sulphates guideline value of 500mg/L. All the west coast public supply wells exceeded the guideline value for Total Dissolved Solids of 600 mg/L. It should be noted that these values were the highest in the five years 2012-2016. Only one public supply source (Benn Spring) had a faecal coliform count which exceeded the standard of 10 mg/L.

For the nearshore monitoring, one hundred and thirty-one nutrient (131) samples were taken. All the samples exceeded the guideline value of 0.015 mg/L for total phosphorus with the lowest recorded value being < 0.05 mg/L. All samples were within the acceptable range for ph of 7.0-8.7 All samples exceeded the guideline value of 1.5 NTU with the lowest value being <2.

Widescreen sampling took place on March 15, 2016 (Dry season) and October 18, 2016 (wet season).

Data Verification was undertaken for 2015 groundwater data and 2010, 2011 and 2015 nearshore monitoring data.

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1 DEPARTMENTAL OVERVIEW

The Environmental Protection Department was established in 1971 and its mission 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 is responsible for the management of air, noise, water and marine pollution. This is achieved through the implementation of monitoring programmes in these areas and other management strategies such as policy development and enforcement.

Solid waste management is another component under the Department's purview. This involves the removal of derelict buildings and vehicles, the inspection of disposal sites and recycling facilities and investigation of complaints relating to the mismanagement of solid waste.

The life cycle approach is utilized by the Department as a tool for the management of hazardous materials. The life cycle approach encompasses dealing with the importation, use, handling and disposal of these substances. The implementation of Multilateral Environmental Agreements which includes the Stockholm and Basel Conventions is also an important aspect of the activities of the EPD.

Another aspect of the EPD's mandate is the role it plays in the development and the implementation in emergency response and planning. Public education and awareness activities are also carried out to support all the aforementioned activities of the Department as a means to strengthen the impact of those activities.

Table 1 shows the structure of the EPD and the various positions therein.

Table 1: Structure of the Environmental Protection Department

Section	No. of Posts	Used Post
1. Management	2	2
2. Administration	14	11
3. Air & Noise Pollution Control	4	3
4. Building Development Control	14	13
5. Environmental Planning, Education and Research	3	3
6. Marine Pollution Control	4	2
7. Management of Solid Waste & Hazardous Materials	5	4
8. Water Quality Management	4	4
Total	50	

2 AIR AND NOISE POLLUTION

The Air and Noise Pollution Control (ANPC) Section is responsible for the management of air quality, most significantly ambient (outdoor) air pollution and noise pollution in Barbados. This is achieved by carrying out the following functions:

- Monitoring and regulating ambient air quality and environmental noise;
- Investigating complaints related to ambient air pollution and environmental noise;
- Researching ambient air quality and environmental noise issues; and
- Developing and implementing policies and programmes to control ambient air quality.

The ANPC Section consists of one Senior Environmental Technician and three Environmental Technicians (ETs). However, during 2016, one ET position was vacant.

2.1 AMBIENT AIR QUALITY

The ANPCS carried out several activities related to ambient air quality during 2016. These included the investigation of complaints, development of policies and the conducting of ambient air quality assessments.

2.1.1 AMBIENT AIR QUALITY COMPLAINTS

In 2016, the ANPC Section received twenty-eight (28) complaints related to ambient air quality. Complaints are categorized as follows:

- Vehicles Maintenance Facilities (VMFs) – pollutant releases from facilities which carry out auto-body repair and maintenance
- Manufacturing –furniture, block making, food factory
- Industrial Stacks – releases from stacks
- Nuisance – construction, odours etc.

Figure 1 below shows that the majority (61 %) was from VMFs and that there were no complaints were from the source category of industrial stacks.

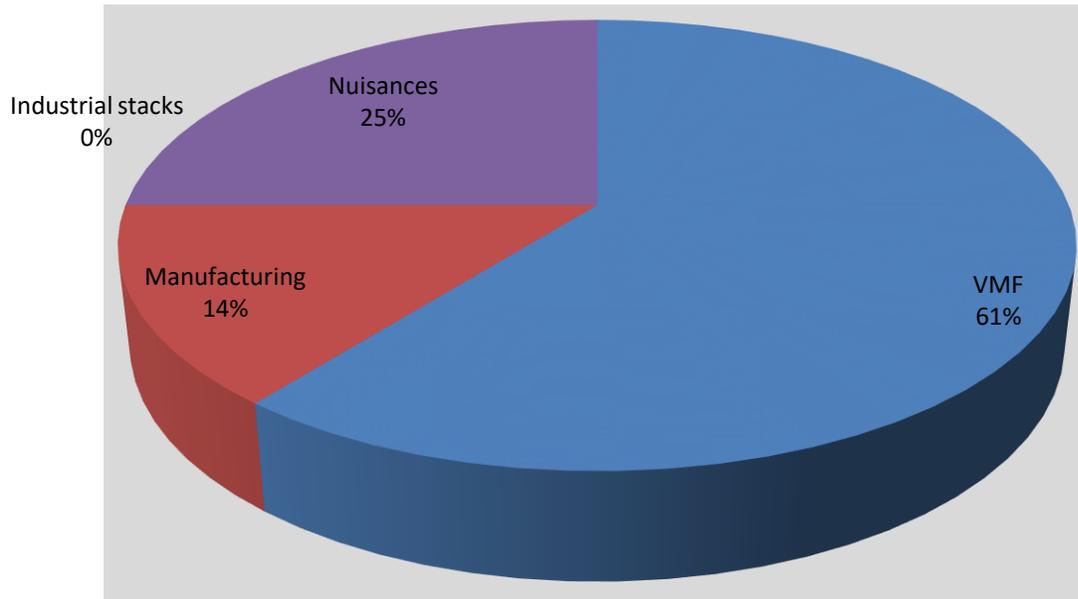


Figure 1: Distribution of complaints by category

Eighty-two per cent (82 %) of complaints were classified as new while the remaining was considered as recurring (complaints that were made previously and had been lodged again). Most of the new complaints were related to vehicle maintenance facilities (Figure 2). However, the recurring complaints, seven in total were spread over the different categories.

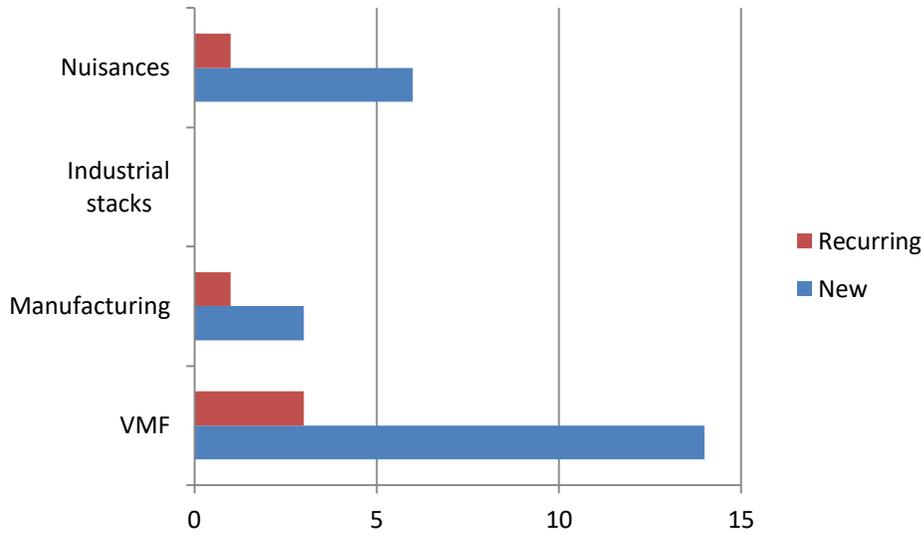


Figure 2: New and Recurring Ambient Air Quality Complaints during 2016

One hundred and nine (109) site visits were undertaken with respect to ambient air quality complaints with the majority (71.6 %) dealing with VMFs.

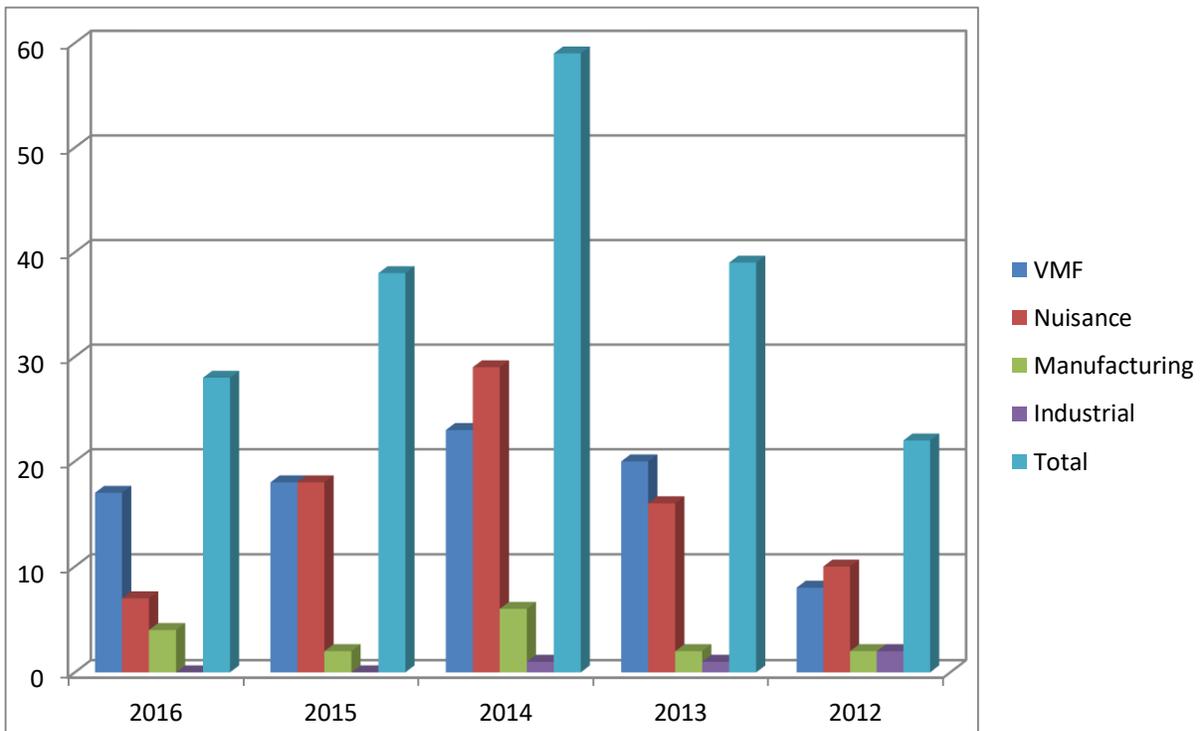


Figure 3: Total complaints in categories for the period 2012 to 2016

After the high in 2014, there has been a decline in the number of complaints in total and across categories from 2015 to 2016. VMFs remain the leading cause for complaints followed by nuisance complaints. Complaints related to industrial stacks over the period have not contributed significantly to the number of complaints lodged.

2.2 AMBIENT AIR QUALITY ASSESSMENTS

The ANPC has undertaken several assessments of the ambient air quality in Barbados using passive samplers. The assessments were as follows:

- Bridgetown
- Speightstown & Oistins (August 2013 – July 2014)
- Holetown & Two Rural Areas (February 2015 to January 2016)

The pollutants measured included sulphur dioxide, nitrogen dioxide (NO₂), ozone and volatile organic compounds.

2.2.1 OISTINS AND SPEIGHTSTOWN

Seven sampling locations were used for one (1) year with a total of 12 samples per parameter were tested at each location (Table 2). A single duplicate tube was also used at various locations during the year. Ragged Point was used as a background site. Table 2 shows the locations for sampling in Oistins and Speightstown.

Table 2: District and the Sampling Locations

District	Sampling Locations
Oistins	Thornbury Hill, Oistins, Christ Church
	Oistins Police Station, Oistins, Christ Church
	Cane Vale Seventh Day Adventist Church, Cane Vale, Ch. Ch.
Speightstown	First Caribbean Commercial Bank
	Speightstown Police Station
	Sand Street

Table 3 below shows the highest and lowest average concentration of the pollutants of concern. The highest average concentration (HAC) of sulphur dioxide was measured at a private residence located at Thornbury Hill. The HAC for NO₂ was measured at the First Caribbean Bank in Speightstown and the highest ozone concentration was detected at Oistins Police Station. On average the concentrations of nitrogen dioxide and ozone were higher in Speightstown than in Oistins.

Table 3: Summary of the Average Concentrations on the selected pollutants measured in the study

Pollutant	Average Concentration/ppb	Highest Concentration/ppb	Average Concentration/ppb	Lowest Concentration/ppb	Average Concentration/ppb
Sulphur Dioxide (SO₂)	0.5	4.85		Below limit	detectable
Nitrogen Dioxide (NO₂)	3.22 (Speightstown) 2.08 (Oistins)	4.72		Below limit	detectable
Ozone (O₃)	30.64 (Speightstown) 27.88 (Oistins)	37.48		19.98	

The study concluded that further assessment should be conducted using continuous sampling, which would allow comparison to the WHO standards for the primary and secondary pollutants.

2.2.2 HOLETOWN AND TWO RURAL AREAS

The ambient air quality assessment of Holetown and Two Rural Areas consisted of seven sampling locations which were as follows:

- five locations in Holetown,
- one at Farley Hill and
- one at Gun Hill.

There were seven sample locations in Holetown, St. James and one each at Farley Hill, St. Peter and Gun Hill, St. George. The project commenced in February 2015 and ended in January 2016. Report preparation also commenced in 2016.

2.3 NOISE POLLUTION

The ANPC carried out activities involved mainly the investigation of complaints in 2016. The noise monitoring projects scheduled for 2016 to 2017 did not commence as planned due to equipment and scheduling issues.

2.3.1 COMPLAINTS

There were six (6) noise complaints lodged in 2016 with four (4) of these being new and the remaining were recurring. Seven (7) investigations were also carried out in this period. Figure 4 below shows that there has been in a decline in noise complaints over the past three years.

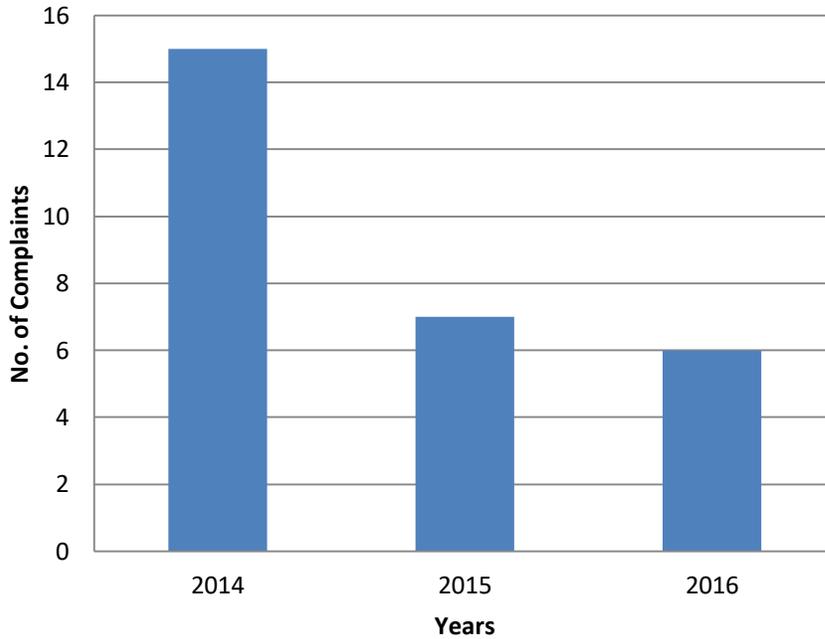


Figure 4: Total number of noise complaints over the last three years

2.4 LOOKING FORWARD

In 2017, the ANPC will contribute to the preparation of the departmental enforcement policy will be prepared along with the revisions to the ANPC standard operating procedures. Also, the compilation report which is a comparison of the results of the three ambient air quality assessment will be drafted during 2017.

3 BUILDING DEVELOPMENT CONTROL

Building Development Control Section (BDCS) of the Environmental Protection Department carries out the following activities:

- Reviews all applications for residential, commercial and industrial developments;
- Evaluates primary wastewater treatment systems;
- Offers technical advice to the Chief Town Planner through the Director on applications submitted to the department;
- Provides technical advice concerning the investigation of building-related complaints.
- Educate the public about varying aspects of building development

The legislative basis for the BDCS is the Health Services Act CAP. 44 and the Health Services (Building) Regulations 1969. However, in addition to the foregoing, several other Health Services Regulations are used in the processing of the diverse applications submitted. Most notable are the Health Services (Private Hospitals & Nursing Homes) Regulations 2005, the Health Services (Restaurants) Regulations 1969, the Health Services (Nuisances) Regulations 1969) and the Health Services (Disposal of Offences Matter) Regulations 1969. Other legal and policy instruments used include the Marine Pollution Control Act and the Groundwater Protection Zone Policy.

The Building Development Control Section consists of the Chief Buildings Development Officer, two (2) Senior Buildings Development Officer, eight (8) Buildings Development Officers, two (2) Building Development Inspectors, one (1) Environmental Inspector and one (1) Draughtsman Technician. The administrative staff attached to the BDCS was one (1) clerk-typist, one (1) stenographer typist and one (1) clerical officer.

3.1 PROCESSING APPLICATIONS

Building applications are either received from the Town and Country Planning Office (TCDPO) or applicants may apply directly to the EPD. The BDCS received one thousand seven hundred fifty-seven (1,757) applications during 2016. One thousand five hundred

and nine¹ (1,509) applications were brought over from 2015. Figure 5 shows that the total number of files has been consistent over the last three years.

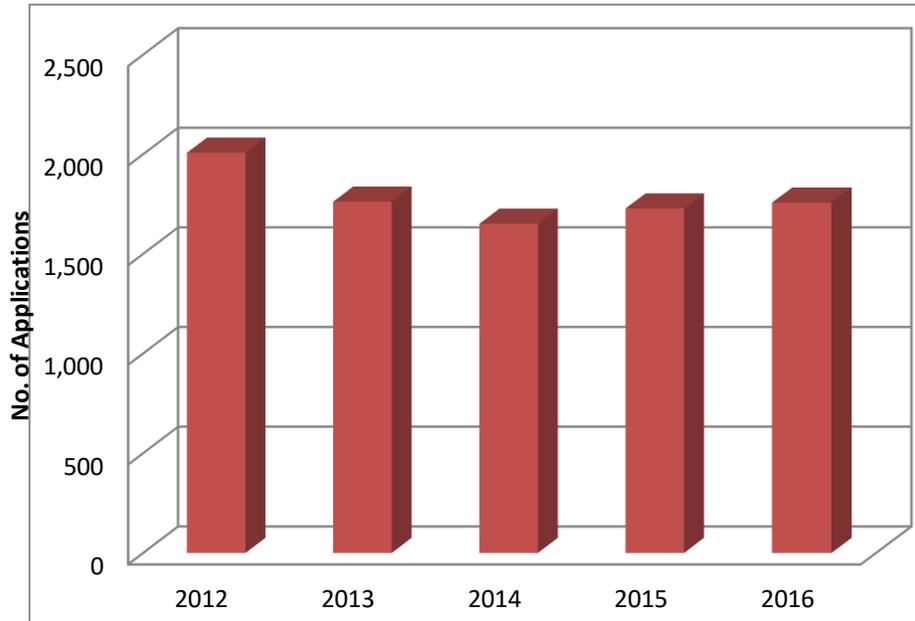


Figure 5: Total number of applications by year from 2012-2016

Majority of complaints received were residential applications followed by commercial as seen in Figure 6 below.

¹ Due to the crash of the server previously the database which stores the building development information has not been fully updated. Therefore there may be some error with the number stated.

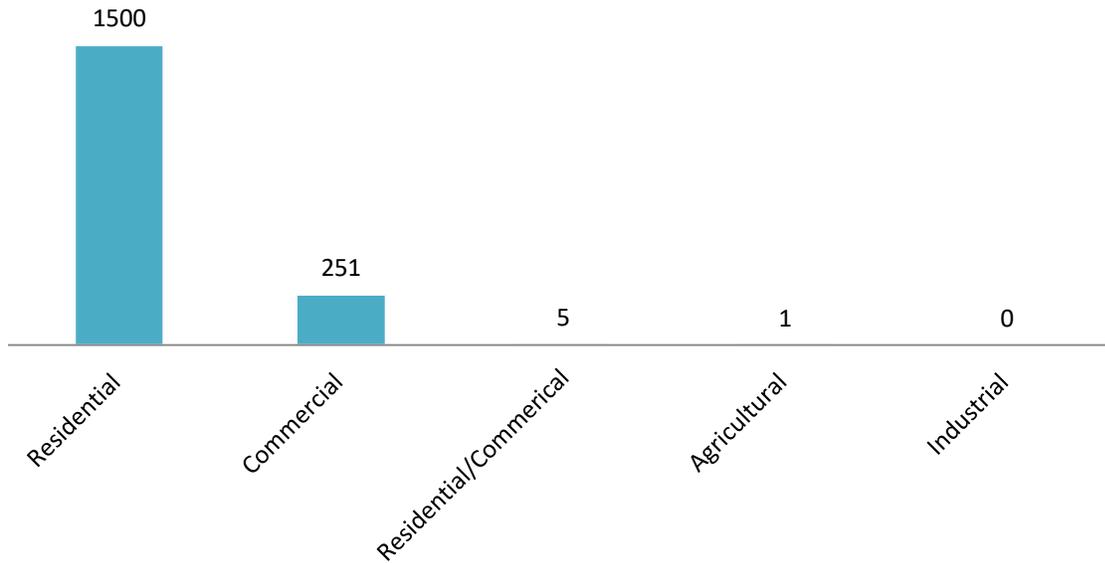


Figure 6: Types of application received by the Department 2016

Applications, when processed, may be approved, approved with conditions, refused, withdrawn or acknowledged. Acknowledged applications are those which do not fall under the purview of the Health Services (Building) Regulations. One thousand four hundred and sixty-two (1462) applications were processed and the majority of which were either approved or approved with conditions (Table 4). As with the amount received residential applications had the largest number of approvals.

Table 4: Types of applications processed by type of decision

Decision/ Classification	Approved	Approval with conditions	Refused	Acknowledged	Withdrawn	Total
Residential	1207	81	31	3	5	1327
Commercial	53	43	8	6	14	124
Residential/ Commercial	5	3	1	-	-	9
Agriculture	-	-	1	-	-	1
Industrial	-	-	1	-	-	1
Total	1265	127	42	9	19	1462

The majority (86.5 %) of applications were approved followed by 8.7% which were approved with conditions while 2.8 % were refused. The majority of applications approved were residential applications followed by commercial and residential/commercial.

There were several challenges faced in the processing applications which included:

- Staff shortage
- Database with errors
- Discrepancies in zoning (files having different zones across departments i.e. EPD and Town and Country Development Planning Office)
- Long delays in getting reports from the Ministry of Agriculture on building applications proposed for the Scotland District.
- These challenges will be dealt with as much as possible in the coming year.

3.2 INSPECTIONS

3.2.1 SEPTIC TANKS AND FILTER BEDS

The BDCS conducts inspections of septic tanks and filters beds as part of the conditions of approval to ensure that these devices are constructed adequately. Twenty-eight (28) septic tanks and one filter bed were inspected by the BDCS during 2016. Majority of septic tanks were considered to be satisfactory (68 %) and the remaining to be unsatisfactory (32 %).

3.2.2 COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL BUILDINGS

There were no inspections of commercial, industrial and institutional buildings in 2016.

3.3 CONSULTATION FILES

The Chief Town Planner, TCDPO is required under the Town and Country Planning Act CAP. 240 to consult with varying agencies, on development applications which may impact on health, environment, agriculture and traffic, before making a decision. As such these applications are forwarded to the EPD for review and comment. Comments on other files may be required from other government departments.

In 2016, twenty-five (25) consultation files were received by the Department. Twenty-five consultation files were also commented and return to the respective owners.

3.4 LOOKING FORWARD

The Building Development Section will develop a type of application-specific booklet and conduct a stakeholder sensitization workshop. It will also embark on the development of guidelines for the construction of rainwater storage tanks.

4 ENVIRONMENTAL IMPACT ASSESSMENTS

The Environmental Protection Department is part of the Environmental Impact Assessment Review Panel and therefore reviews the environmental impact assessments (EIAs) and other development-related documents submitted to the TCDPO as part of the development process. EIAs and other development-related documents such as terms of reference are reviewed by the Environmental Planning, Education and Research Section of the EPD as well as the ANPC, BDCS, Marine Pollution Control Section and Water Quality Section as required.

The Environmental Planning, Education and Research section consists of the Senior Environmental Technical Officer, the Environmental Technical Officer and the Technical Officer.

4.1 REVIEW OF DEVELOPMENT RELATED DOCUMENTS

Table 5: Types of documents received in 2016

Types of document	No. of documents
Environmental Impact Assessment	3
Terms of Reference	3
Monitoring Reports	1
EIA Addendum	4
Environmental Scoping Studies	1
Total	12

There were a total of twelve (12) documents received by the Department in 2016 (Table 5). The Department reviewed and commented on nine (9) documents. The EPD was also represented on a committee which reviewed an EIA for offshore petroleum exploration. Some of the documents reviewed involved wind energy, sand quarry and waste to energy developments.

4.2 LOOKING FORWARD

Activities in this area will continue specifically the reviewing of development-related documents.

5 MARINE POLLUTION CONTROL

The Marine Pollution Control Section (MPCS) deals with environmental issues which may have an impact on the marine environment. These include pollution from land-based sources e.g. gas stations, marine litter and wastewater discharges. The Marine Pollution Control Act CAP. 392A is the legislation used by the MPCS to undertake its duties.

The Marine Pollution Control Section consists of a Senior Marine Pollution Officer, two Marine Pollution Officers (MPOs) and one of the Marine Pollution Officer/Marine Pollution Inspector (MPI). One of the MPO posts and the MPO/MPI position were vacant in 2016

5.1 COMPLAINTS

The MPCS received and investigated twenty-three (23) complaints in 2016. The MPCS investigates complaints in which the activities involved may negatively impact the marine environment.

The majority of complaints related to wastewater discharges followed by oil pollution with the remaining complaints falling into the other category (Figure 7). Complaints in the other category consisted of hydrocarbon and sewage odours and the illegal disposal of molasses.

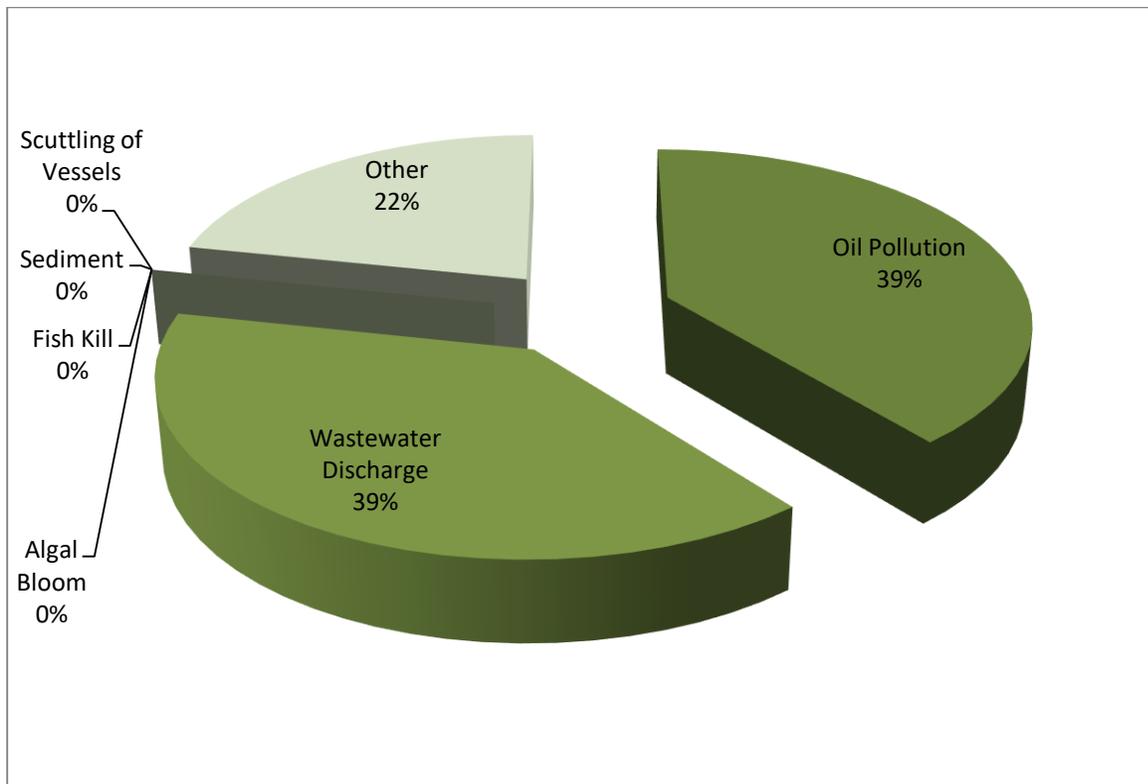


Figure 7: Distribution of complaints across the various categories

5.2 REGULATORY AND COMPLIANCE INSPECTIONS

Regulatory inspections are used by the MPCCS to identify existing and potential sources of pollution, to characterize the pollution and determine the impacts on human health and the environment. Compliance inspections are follow-up activities after the initial regulatory inspection has been undertaken. It is used to determine whether all the recommendations which were communicated to the facility inspected had been carried out.

The MPCCS continued the preparation of regulatory and compliance reports which lost due to a malfunction of the server. The documents were worked on during 2016 include the following:

- Supercentre Meat Facility
- BBC
- B&B Distribution

- Trowel Plastics
- HIPAC Ltd.

The documents will be finalized in the upcoming years.

5.3 OIL POLLUTION

The Environmental Protection Department carries out several activities related to the management of oil pollution besides the investigation of complaints. These include the implementation of the National Oil Spill Contingency Plan (NOSCP) and the development of guidelines aimed at reducing the impact of oil pollution of the environment.

5.3.1 NATIONAL OIL SPILL CONTINGENCY PLAN

In 2016, activities were carried out to update the National Oil Spill Contingency Plan (NOSCP). These included the following:

- Update of the oil spill response equipment inventory (Appendix C) and Directory of the members of the National Oil Spill Response Committee (Appendix A);
- Development of the oil spill directory (Appendix D);
- The first draft of the media protocol was completed, comments prepared and it is being reviewed by the sub-committee.

5.3.2 GUIDELINES FOR PETROLEUM SOIL TREATMENT AREAS

The document draft guidelines for Petroleum Soil Treatment Areas was submitted for internal review and comment. The draft guidelines lay out the requirements of the EPD and the structural basis for the treatment of contaminated soil.

5.4 LOOKING FORWARD

Investigation of marine-related complaints and activities associated with the NOSCP will be undertaken in 2016.

6 MULTILATERAL ENVIRONMENTAL AGREEMENTS

The Environmental Protection Department is responsible for the implementation of several multilateral environmental agreements (MEAs) and other international policies. These activities are carried out the by the Environmental Planning, Education and Research Section, the Marine Pollution Control Section and the Solid Waste and Hazardous Materials Management Section.

The MEAs that are currently dealt with by the Department in 2016 were as follows:

- Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention) including the Oil Spill and Land-Based Sources of Marine Pollution Protocols,
- Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal,
- The Stockholm Convention on Persistent Organic Pollutants (POPs) and
- Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons/Chemicals Weapons Convention (CWC).

The Department also carried out activities related to the implementation of the Globally Harmonized System of Classification and Labelling of Chemicals and the Strategic Approach to International Chemical Management.

The Environmental Protection Department compiled information for State of the Convention Area report (SOCAR) questionnaires. The goal of the SOCAR is to provide information about the state of coastal and marine ecosystems within the Wide Caribbean Region in relation to its present state, the various factors which may impact these systems and the strategies being used to manage the environment.

6.1 BASEL CONVENTION

Barbados is party to the Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal. The Environmental Protection Department is responsible for the implementation of the Convention. As such the Department prepared

the Annual Report for 2015 and this report has been sent to the Permanent Secretary Ministry of Environment and Drainage for approval.

To increase the knowledge of the varying aspects of the Convention in relation to the management of hazardous materials several webinars were attended (Table 17, Appendix).

6.2 STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS

Barbados became a party to the Convention on Persistent Organic Pollutants on June 2005. The Environmental Protection Department is responsible for the implementation of the Convention. In 2016, the Department undertook activities outlined below which were aimed at fulfilling the obligation of the Convention.

6.2.1 GLOBAL ATMOSPHERIC PASSIVE SAMPLING

The Global Atmospheric Passive Sampling (GAPS) Network carries out measurements of POPs and priority chemicals in the atmosphere. Passive air samplers are deployed in many countries around the world. The data is used to establish temporal trends and to determine if the measures used to reduce the level of pollutants in the atmosphere are being effective.

Quarterly, the filters are retrieved, replaced with new ones and sent to Environment Canada for analysis.

6.2.2 DEVELOPMENT AND IMPLEMENTATION OF A SUSTAINABLE MECHANISM FOR PERSISTENT ORGANIC POLLUTANTS

The regional Global Environment Facility (GEF) funded project 5558 'Development and Implementation of a Sustainable Management Mechanism for Persistent Organic Pollutants (POPs) in the Caribbean received GEF CEO Endorsement on May 27, 2015, and commenced on December 1, 2015.

Representatives from the Basel Convention Regional Centre for the Caribbean visited Barbados on August 22 to 16, 2016 and undertook the following:

- Surveyed equipment that was identified in the inventories conducted by the EPD in 2004 and 2013 as possibly containing polychlorinated biphenyls (PCBs).

- Sampled fluids in the equipment to determine whether PCBs were present.

These activities were carried out with assistance from the EPD. The following facilities were visited:

- Barbados Agricultural Management Company – Portvale Sugar Factory, Bulkeley Factory and Carrington Sugar Factory
- Barbados Defence Force – St. Ann’s Fort
- Barbados Water Authority – Bowmanston Pumping Station

Twenty-seven samples were collected and shipped to the laboratory Aevitas Inc. in Canada for analysis. The results of the testing indicated that the oils in all the equipment sampled were below 40 parts per million (ppm) concentration benchmark for disposal.

6.2.3 Continuing Regional Support for the POPs Global Monitoring Plan under the Stockholm Convention in the Latin American and Caribbean Region

The GEF funded project 4881 “Supporting the Implementation of the Global Monitoring Plan of POPs in Latin America and Caribbean States” commenced in 2016 and will be completed by June 2019. The objectives of the project are to:

- strengthen the monitoring capacity at a national level
- contribute to the generation of data for the global monitoring plan
- support the building of regional analytical capacities
- generate POPs data in the relevant matrices for the Global Monitoring Plan for POPs
- enable Latin and Caribbean countries to contribute to the global report to be submitted to the Conference of the Parties of the Stockholm Convention.

The project involves the sampling of air using passive samplers and the surveying of human mothers’ milk for the presence of persistent organic pollutants.

During 2016, the Memorandum of Understanding between the Basel Convention Coordinating Centre and the Stockholm Regional Centre for Latin America and the

Caribbean (BCCC-SCRC) - Technological Laboratory of Uruguay (LATU) and the Environmental Protection Department was signed. The EPD was designated as the agency in Barbados responsible for collecting the air and human milk samples while the University of the West Indies Cave Hill Campus will be responsible for the analysis of samples.

The air sampling aspect of the project commenced on December 30, 2016, with the mounting of 11 passive samplers at the Caribbean Institute for Meteorology and Hydrology, Husbands, St. James.

With regards to the survey of human mothers' milk conditional approval was given by the University of West Indies/Ministry of Health Research Ethics Committee to undertake the study.

6.2.4 CHEMICAL WEAPONS CONVENTION

Barbados is Member State of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons (Chemical Weapons). The EPD is responsible for the implementation of the Convention in Barbados.

In 2016, the Department would have participated in several activities in relation to the Convention (Table 17, Appendix) which included the 18th National Authorities which was held on November 23 to 25, 2016.

The EPD also commenced development of the annual report 2016 and Barbados' Operational Information was also prepared.

6.2.5 IMPLEMENTATION OF ACTIVITIES RELATED TO THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS)

In 2016, the implementation of the activities identified as a means of utilizing the unspent funds under the project "Strengthening Capacities for Strategic Approach to Chemicals Management (SAICM) Implementation and Supporting the GHS Capacity Building in Barbados" continued. These activities were the development of a public awareness campaign and a guidance document to inform the development of GHS legislation.

Public Awareness Campaign

The public awareness project continued in 2016 with the development of the various components of the plan. The GHS jingle, radio ads, TV Scripts, magnet artwork and press release and posters were developed by Merville Lynch Productions during this time and were vetted by the Department.

The project is expected to be completed during the first quarter of 2017.

Legislative Review

The gap analysis for the legislative framework for the GHS was prepared by the consultants Moseley and Company. The analysis was reviewed and commented on the Department. A focus group was held to facilitate the preparation of guidance for the development of GHS legislation. The guidance document will be finalized in 2017.

Public Education

A meeting was held with a representative from the Caribbean Examinations Council concerning the incorporation of GHS into the syllabus for Caribbean Secondary Education Certificate (CSEC®) and the Caribbean Certificate of Secondary Level Competence (CCSLC®).

6.3 LOOKING FORWARD

The GEF funded projects 5558 & 4881 will continue during 2017. With respect to 4881, sampling of air and human mothers' milk will be conducted. In relation to 5558, inventories of POPs will be carried out. Concerning SAICM and specifically the GHS there will be the preparation of a cabinet paper to support the development of legislation for the GHS. Additionally, the public awareness campaign for the GHS will also be undertaken.

7 SOLID WASTE AND HAZARDOUS MATERIALS

The Solid Waste and Hazardous Materials Section (SWHMS) is responsible for the management of hazardous materials and the regulation of solid waste disposal.

The SWHMS comprises of the Senior Environmental Technical Officer, one Environmental Protection Officer and Derelict Buildings and Vehicles Section (DBV). The Environmental Protection Officer post was vacant in 2016. The DBV comprises a Senior Environmental Inspector (SEI) and three Environmental Inspectors (EIs). In 2016, the DBV was subsumed under the SWHMS.

7.1 INSPECTION OF LANDFILL AND DISPOSAL SITES

The SWHMS undertake monthly inspections of the waste disposal facilities in Barbados. The sites are accessed using a landfill inspection form which looks at areas such as recording keeping, waste management e.g. spreading and compaction and environmental management e.g. controlling illegal dumping.

Site visits took place monthly from January to April 2016 and the findings were compiled in a monthly report. Sites visited included:

- Mangrove Pond Landfill
- Lonesome Hill, St. Peter
- Rock Hall. St. Philip
- Bulky waste Facility, Bagatelle, St. Thomas
- Edgecumbe, St. Philip
- Parsons (Foster Lodge). St. George

Limited human resources and the amalgamation of the Derelict Section and the SWHMS resulted in no inspections after April 2016.

7.2 INSPECTION OF RECYCLING FACILITIES

The SWHMS conducts site visits to recycling facilities quarterly. One such site visit was undertaken on January 13, 2016, to nine facilities. These facilities were as follows:

- Solid Waste Solutions and Services (used vegetable oil)
- Caribbean E-waste Management (electrical and electronic waste equipment)
- Paradise Green Energy
- B's Recycling
- Amelot Oil
- Scrap man Recycling
- RPI
- Verdue Oils
- Ace Recycling

No other site visits were carried out during the year mainly due to limited human resources.

7.3 COMPLAINTS

There was only one complaint in 2016 which was addressed. This complaint involved illegal dumping and was forwarded to the Environmental Health Department of the Ministry of Health.

7.4 ADVICE ON THE DISPOSAL OF HAZARDOUS WASTES

During 2016, there were thirty-seven (37) requests for disposal advice. Commercial requests made up the majority (91.9%) of those submitted with the remaining classified as residential. Materials to be disposed of including but not limited to cleaning solutions, fluorescent bulbs and food products.

7.5 MANAGEMENT OF RADIOACTIVE MATERIALS

The SWHM Section processes the application for the importation of radioactive materials into Barbados. There were forty (40) applications for the importation of radioactive materials in 2016. The majority of these applications were from the Queen Elizabeth Hospital and the Nuclear Medicine Barbados.

7.6 REVIEW OF PESTICIDE APPLICATIONS

In 2016, twenty-three (23) applications were reviewed and all were recommended for approval. The majority of applications were for insecticides.

The draft of the standard operating procedure for the review of pesticide applications was completed.

7.7 IDENTIFICATION AND REMOVAL OF DERELICT BUILDINGS & VEHICLES

In 2016, there were twenty-three (23) buildings identified as derelict and notices were served on 23 of these buildings. No derelict buildings were removed in 2016 due to delays in the procurement system.

The derelict vehicle aspect of the programme has been suspended due to the absence of a designated facility for disposal of these items.

7.8 ENVIRONMENTAL SOUND DISPOSAL OF ASBESTOS

During 2016, fifty-five (55) requests for permission to remove asbestos-containing materials were processed, approved and monitored by officers of the Department.

7.9 LOOKING FORWARD

Activities in 2017 include the continued regulation of the importation of radioactive materials and pesticides and activities associated with membership to the IAEA.

8 PUBLIC EDUCATION AND AWARENESS

To raise awareness and educate the selected groups and the general public about environmental issues the EPD has developed several activities. The EPD also seeks to make persons more aware of the roles and responsibilities of the Department.

8.1 BUILDING DEVELOPMENT WORKSHOP

A workshop was held on March 16, 2016, for architects, engineers and draftsman technician at. The objective of the seminar was to engage and educate stakeholders of the EPD on the regulatory requirements for the submission of applications for building development. The workshop also included many exhibits related to building development.

8.2 ENVIROFOCUS NEWSLETTER

In 2016, Barbados celebrated its 50th Anniversary of Independence and the EPD marked its 45th year of existence. As such, the EPD within its newsletter looked at its origins, accomplishments and the people who have contributed to the development of EPD this far.

8.3 PHOTO-ESSAY COMPETITION

The Environmental Protection Department hosted a photo-essay competition entitled, “Snap It Photo-essay Competition” for students from 8 t 18 years old. Students were asked to submit a series of five images along with a 50-word summary on one for the following topics:

- Why is the environment important to us?
- How can we play our part in protecting the environment?
- What has Barbados done, or is doing to protect the environment?

There were twenty-six (26) participants in the competition which were mostly from primary schools.

8.4 MARINE LITTER CLEAN-UP

On September 17, 2016, International Coastal Clean-up Day, the annual beach clean-up was carried out. Sixty-five (65) volunteers participated in the event. Five thousand six hundred and twenty-one (5,621) pieces of litter were collected which weighed eight hundred and nineteen (819) pounds (lbs). Plastic accounted for a significant amount of the materials found during the cleanup Table 6 below.

Table 6: Top Ten Marine Debris Items²

Rank	Debris Item	Quantity of Debris Items	Percentage of Total Debris Items
1	Plastic Pieces	1293	23%
2	Bottle Caps (Plastic)	855	15%
3	Beverage Bottles (Plastic)	794	14%
4	Other Plastic/Foam Packaging	595	11%
5	Rope (1 yd/m=1 piece)	394	7%
6	Foam Pieces	287	5%
7	Other Plastic Bottles	219	4%
8	Fishing Net & Pieces	210	4%
9	Other Plastic Bags	138	2%
10	Take Out/Away Containers (plastic)	129	2%

² Excerpt from the Marine Litter Report

8.5 ENVIRONMENTAL TIPS AND THE EPD JINGLE

Environmental Tips were broadcast on-air on the following radio stations:

- Q100 and 94.7 during June and July,
- StarCom radio stations 94.7 FM and 95.3 FM in August and,
- Power Broadcasting 103.3 FM and 101.1fm in September 2016.

The tips are short messages which are aimed at increasing public awareness about the environment and EPD.

The EPD Jingle was aired Caribbean Broadcasting Corporation Channel 8 during the Evening News in June and July 2016.

8.6 VEHICLE MAINTENANCE FACILITY VIDEO

A video was developed with the assistance of the Government Information Service to inform the public about the negative health and environmental impacts of VMFs as well as the correct procedure for the establishment and environmentally sound operation of VMFs.

The video centred around a scenario where one person was planning to start a VMF at home while the other person explained in layman's terms why there were certain procedures to follow when setting up or operating a VMF. The video also raised awareness of the availability of the Best Management Practices booklet.

8.7 PROPERTY MANAGERS' GUIDEBOOK FOR MANAGING INDOOR AIR QUALITY

The purpose of this booklet is to educate and provide guidance for those individuals responsible for building maintenance. The topics focus on monitoring the indoor environmental quality up to and including the maintenance of the Ventilation and Air Conditioning Systems.

8.8 INTERNSHIP PROGRAMME

In 2016, four persons participated in the internship programme. This comprised of an intern each from the Private Secretary's Diploma and Law and Literature programmes

for the period June 6 to July 15, 2016. Additionally, from June 13, 2016, to August 12, 2016, the Environmental Protection Department hosted two (2) interns from the Barbados Community College Environmental Science Programme.

8.9 ASBESTOS WORKSHOP

The Department held a workshop for asbestos removal contractors on February 17 & 18, 2016. Seventy (70) persons participated in the event. The objectives of the event were to train contractors in the proper methods to employ in removing asbestos and to certify persons such that the number of persons may be increased.

8.10 OTHER ACTIVITIES

On May 25, 2016, a presentation about the environment was made to the cub scouts of the St. Giles Primary School.

The Department took in the career showcase held by the Barbados Youth Service on May 12, 2016.

8.11 LOOKING FORWARD

In 2017, activities under Public Education and Awareness include the internship programme and preparation and dissemination of inspection sheets.

9 WATER QUALITY

The Water Quality Section is responsible for the implementation of the routine monitoring programmes for groundwater and nearshore water quality. It also researches potential sources of water pollution.

The Water Quality Section is manned by a Senior Environmental Protection Officer, two Environmental Protection Officers and one Environmental Inspector.

9.1 GROUNDWATER MONITORING PROGRAMME

The Environmental Protection Department in collaboration with the Barbados Water Authority conducts sampling of public groundwater supplies. Table 7 shows the frequency of sampling for the Groundwater Monitoring Programme.

Table 7: The Sampling Schedule for each catchment and springs

Area	Frequency/monthly
Belle Catchment	1 st Tuesday
Hampton Catchment	2 nd Tuesday
West Coast Catchment	3 rd Tuesday
Springs	4 th Tuesday

In 2016, two hundred and ninety-two (292) samples were collected from thirty-four sources (wells and springs). Seventeen (18) sources were public supply wells, ten (10) agricultural sources and (6) six springs. One hundred and fifty-seven samples were collected by the Environmental Protection Department. Eighty-nine (89) samples were taken from the Belle Catchment, ninety-one (91) from Hampton, seventy (70) from the west coast and the remaining 42 samples from springs.

The samples were analyzed for twenty (21) water quality parameters which are compared to the relevant World Health Organization (WHO) Guidelines for Drinking-water Quality. These parameters include microbiological organisms such as faecal coliform and Physico-chemical parameters e.g. pH and turbidity.

9.1.1 CHLORIDES

Seven (7) out of the eight (8) west coast public supply wells exceeded the WHO Guideline Value for chloride concentration in potable water (Figure 8). The highest average chloride concentration was for Trent’s P.S. which was 567.50 mg/L. All other catchments were below the guideline value of 250 mg/L.

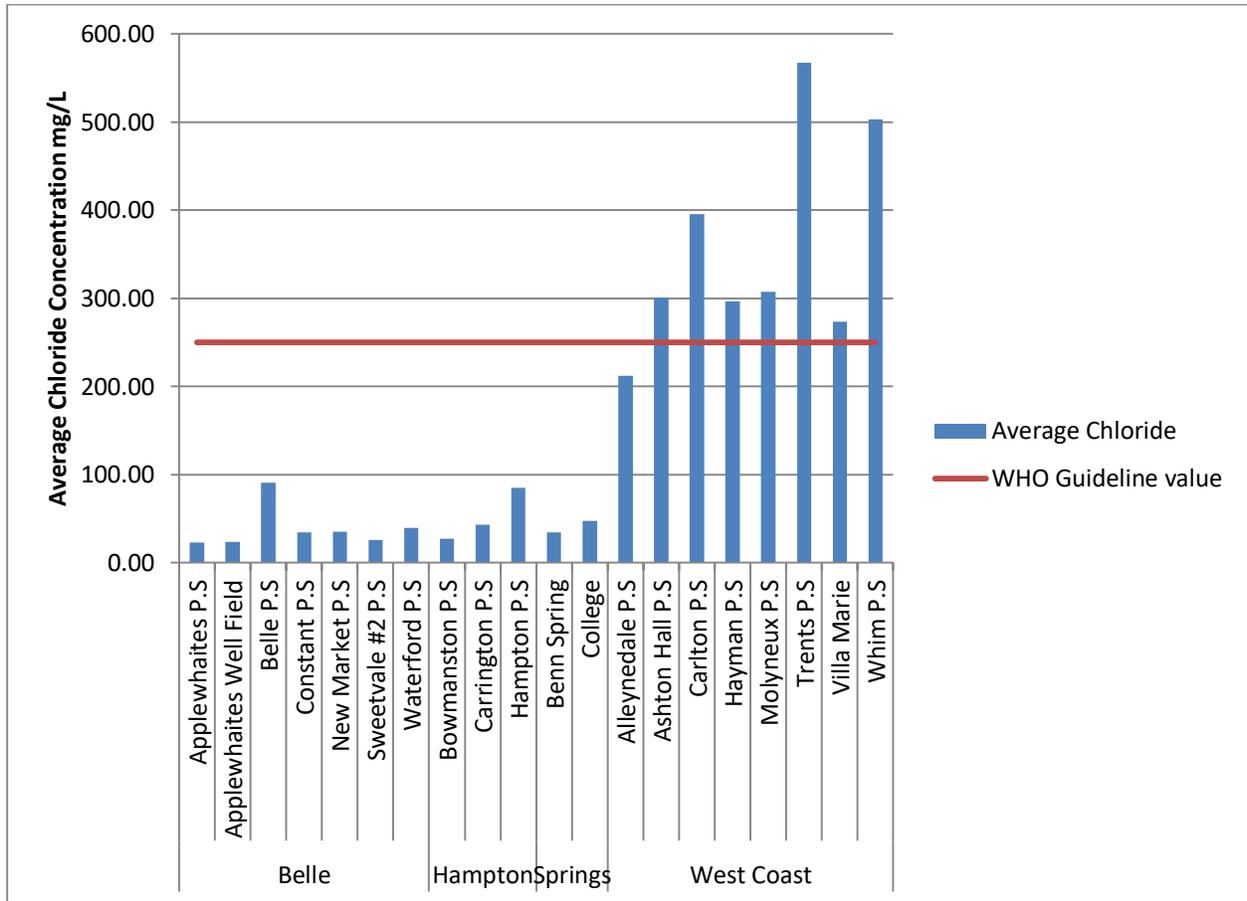


Figure 8: Average Chloride concentration for public supply wells in 2016

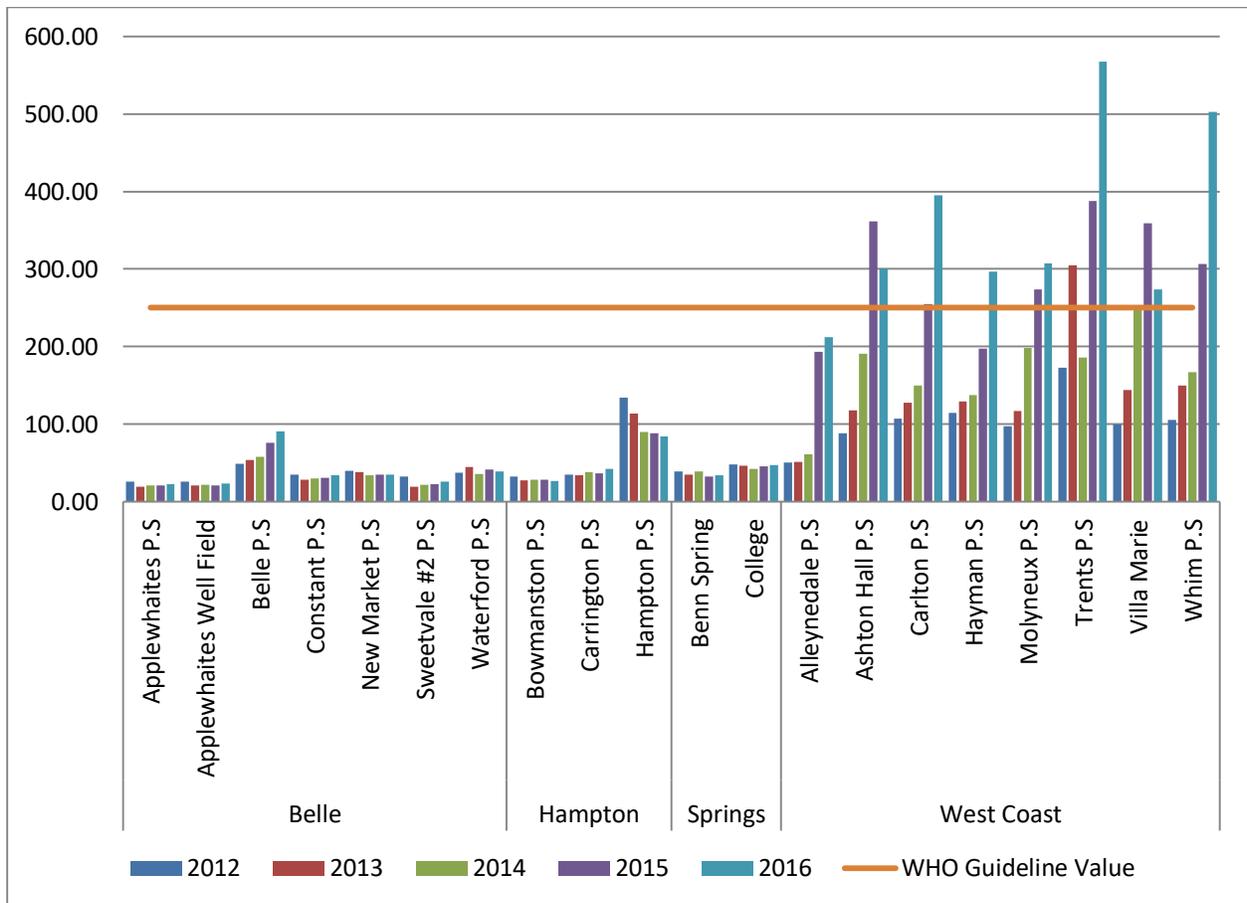


Figure 9: Average chloride concentration for supply sources over the period 2012 – 2016

Figure 9 shows that the average concentration for chlorides in groundwater for the wells situated on the west coast has been generally increasing especially Trent P.S and Whim P.S for the five years. The west coast wells generally for the past two years have exceeded or approached the guideline value of 250 mg/L. The concentration of chlorides for the Belle P.S appears to be increasing slightly.

9.1.2 NITRATES EXPRESSED AS NITROGEN (NITRATE-N)

All supply wells have not exceeded the World Health Organization Guidelines value of 10 mg/L (Figure 10). The highest value was for Belle. P.S of 9.4 mg/L and the lowest was the Molyneaux P.S. 4.7 mg/L.

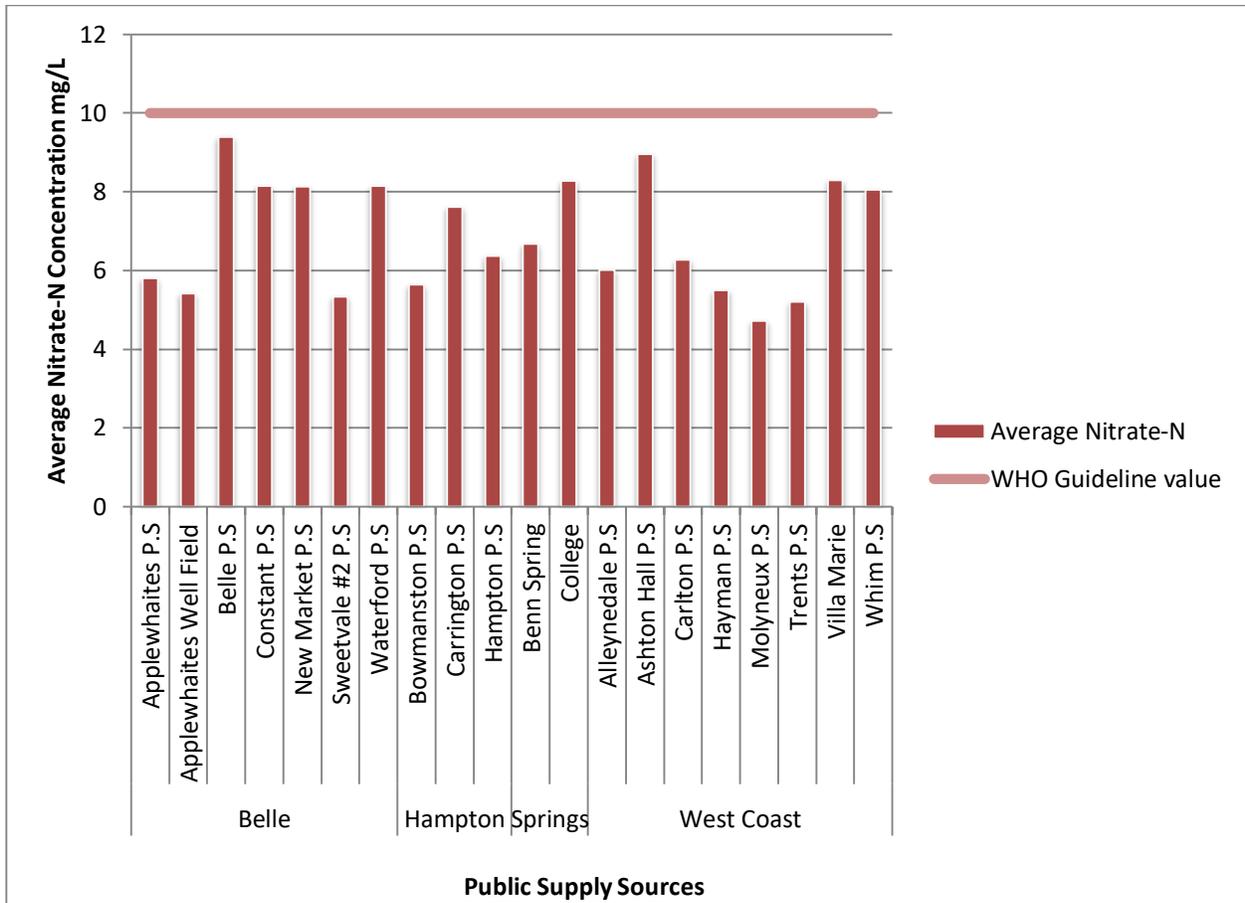


Figure 10: Average Nitrate-N concentrations in public supply sources 2016

Over the five years, 2012 to 2016 there seems to be a general increase in the concentration of Nitrate-N in the public supply sources. This trend is seen in Belle P.S., Ashton Hall P.S and the Whim P.S among others.

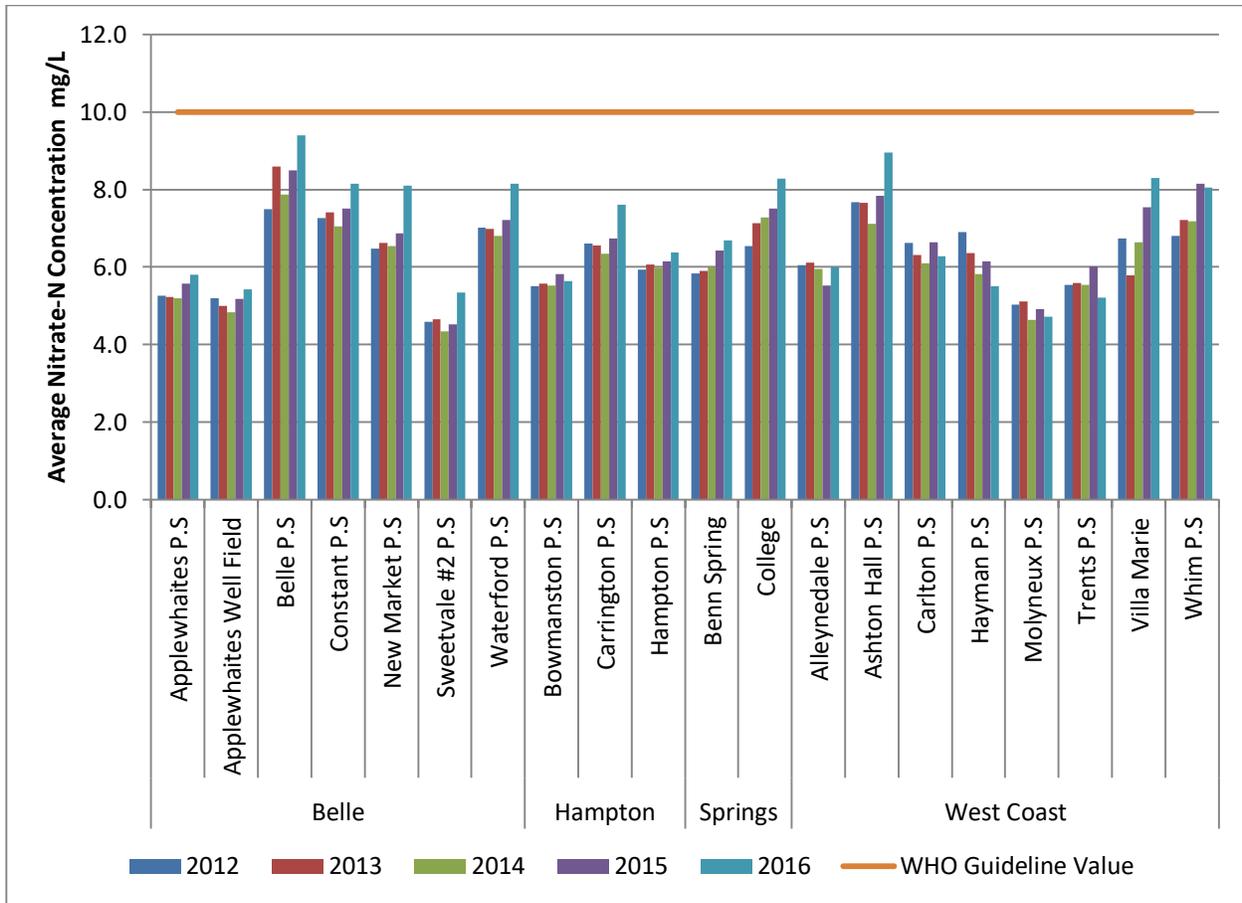


Figure 11; Average concentration of Nitrate-N in public supply sources for 2012 to 2016

9.1.3 SULPHATES

All public supply sources were within the WHO Guideline value for sulphates of 500 mg/L (Figure 12). The highest concentration was measured at Trent's P.S. of 99.5 mg/L and the lowest was 21.28 mg/L for the Applewhaites Well Field.

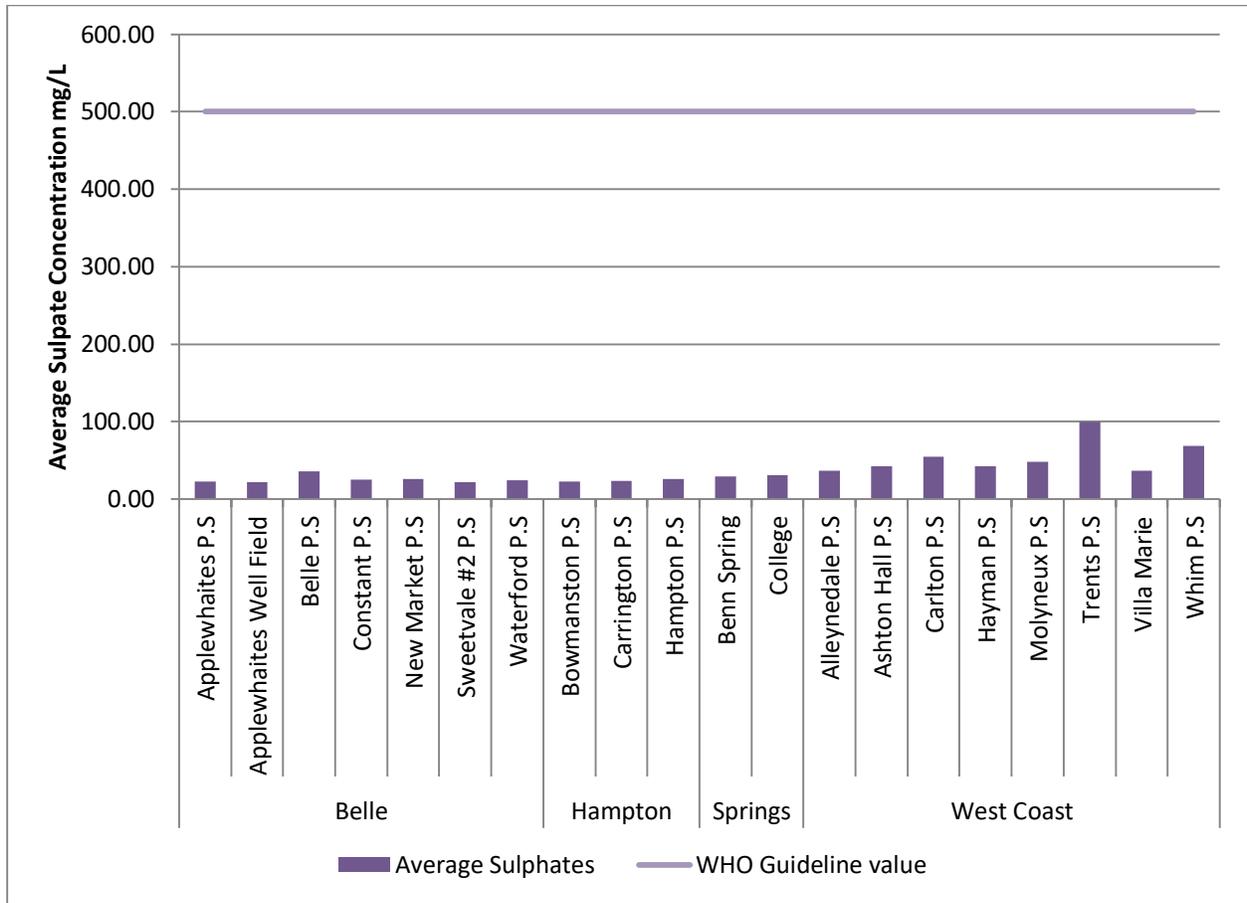


Figure 12: Average sulphates concentration for the public supply sources in 2016

For the period 2012 to 2016, the concentration of sulphates has increased significantly for Trent's and Whim P.S. (Figure 13). Bowmanston P.S. on the other hand among others has been somewhat consistent in the values measured.

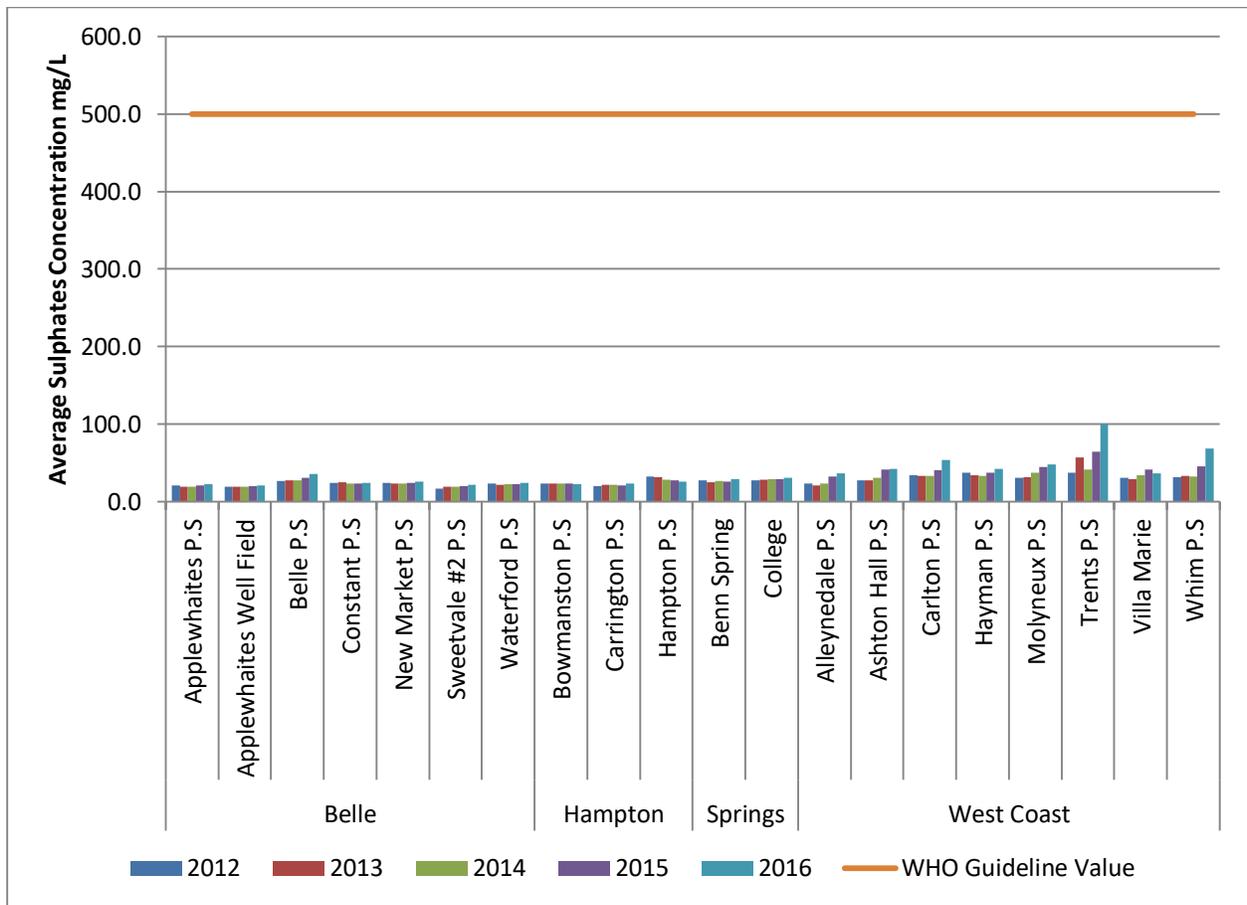


Figure 13: Average sulphates concentration in the public supply sources from 2012 to 2016

9.1.4 TOTAL DISSOLVED SOLIDS

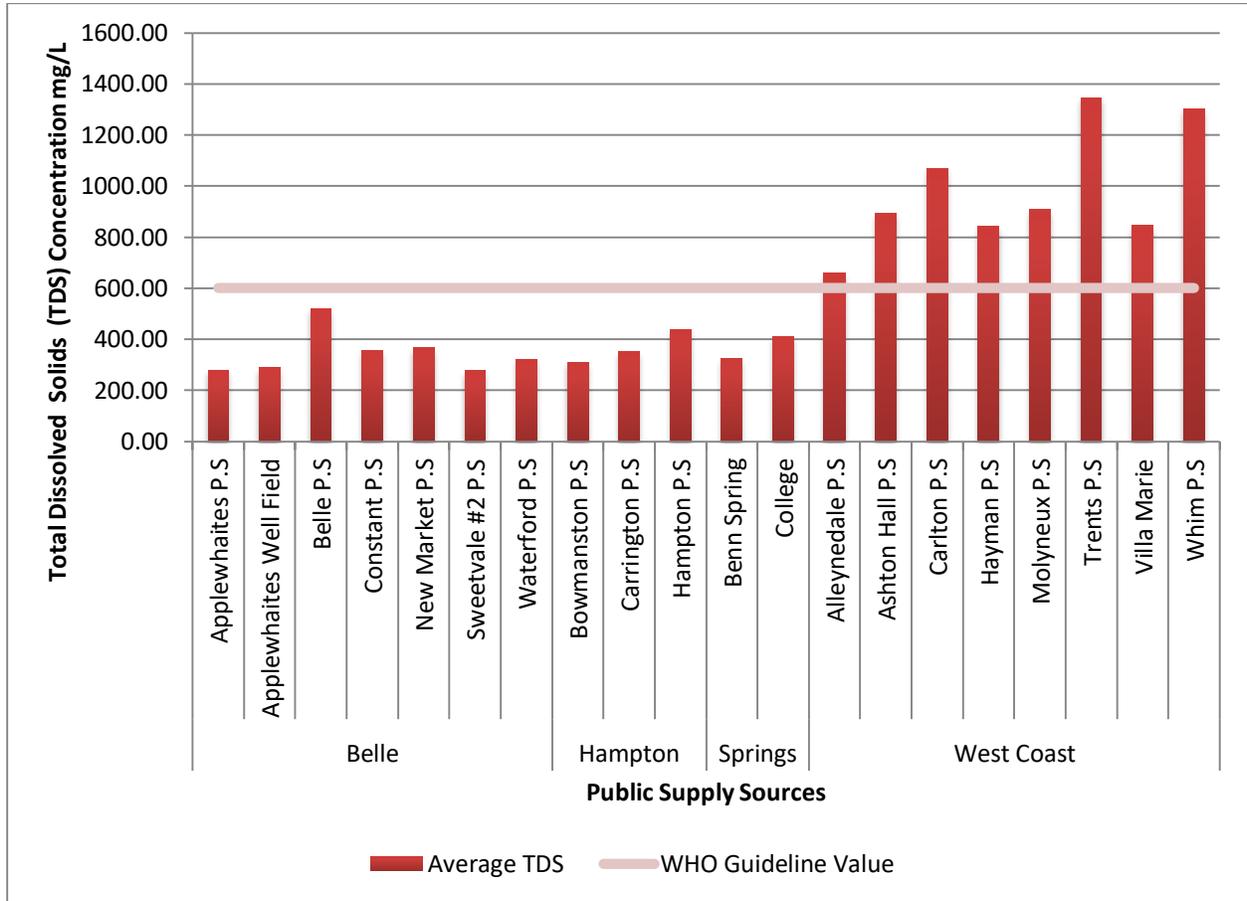


Figure 14: Average concentration of total dissolved solids (TDS) in public supply sources in 2016

In 2016, the highest average concentration of total dissolved solids (TDS) was observed in the west coasts public supply wells (Figure 14). The highest value was recorded for Trent’s P.S of 1,347.50 mg/L.

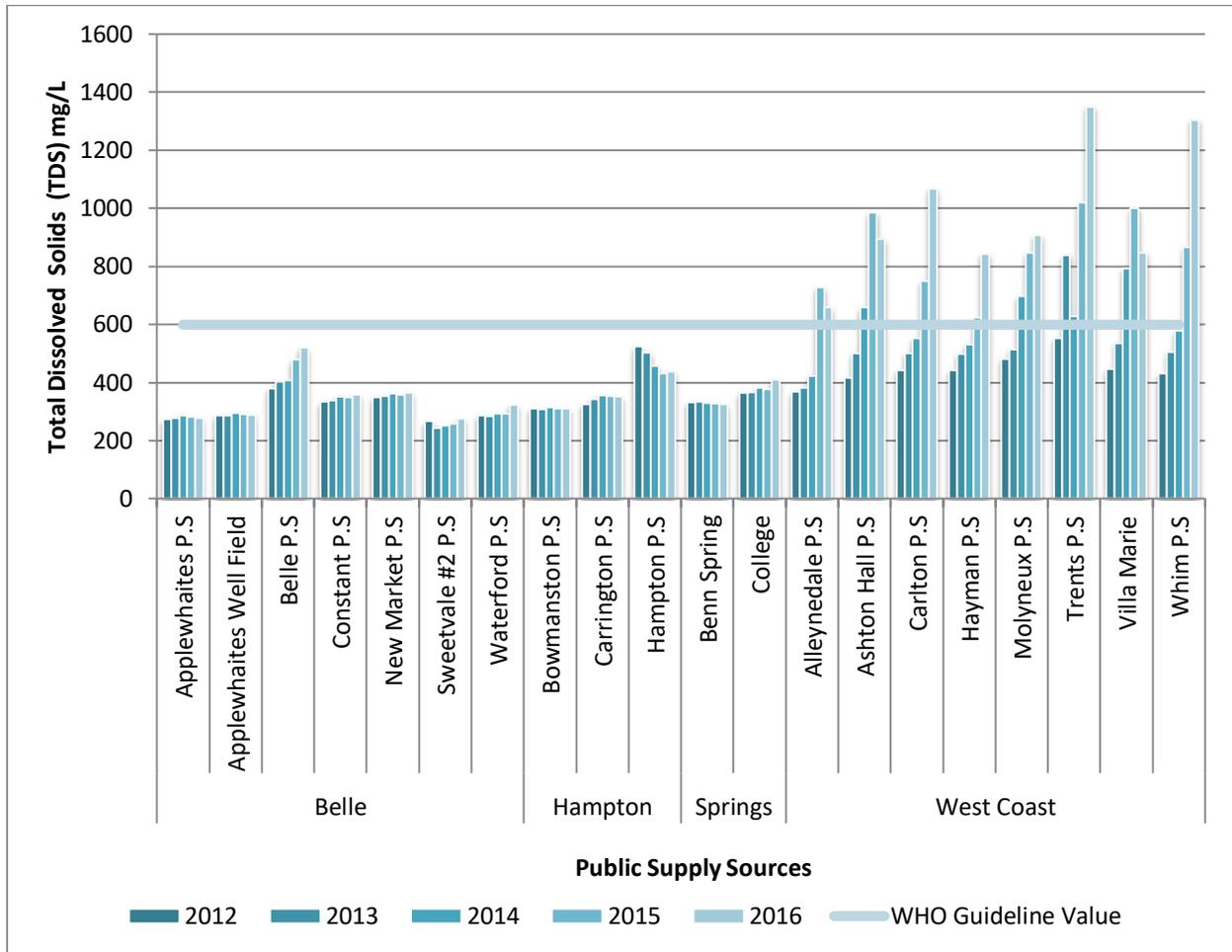


Figure 15: Average concentration of Total Dissolved Solids for 2012 to 2016

Over the five years, 2012 to 2016, the average concentration of total dissolved solids has been increasing (Figure 15). This especially observed for the west coast wells with the total dissolved solids approaching and exceeding the guideline value. For Carlton P.S, Trent’s P.S and the Whim P.S, the increase from 2015 to 2016 appears to be significant.

9.1.5 FAECAL COLIFORM

Most of the public supply sources on average did not exceed the guideline value of 0 CFU/100 ml (Figure 16). Benn Springs exceeded the guideline value with 1 CFU/100 ml.

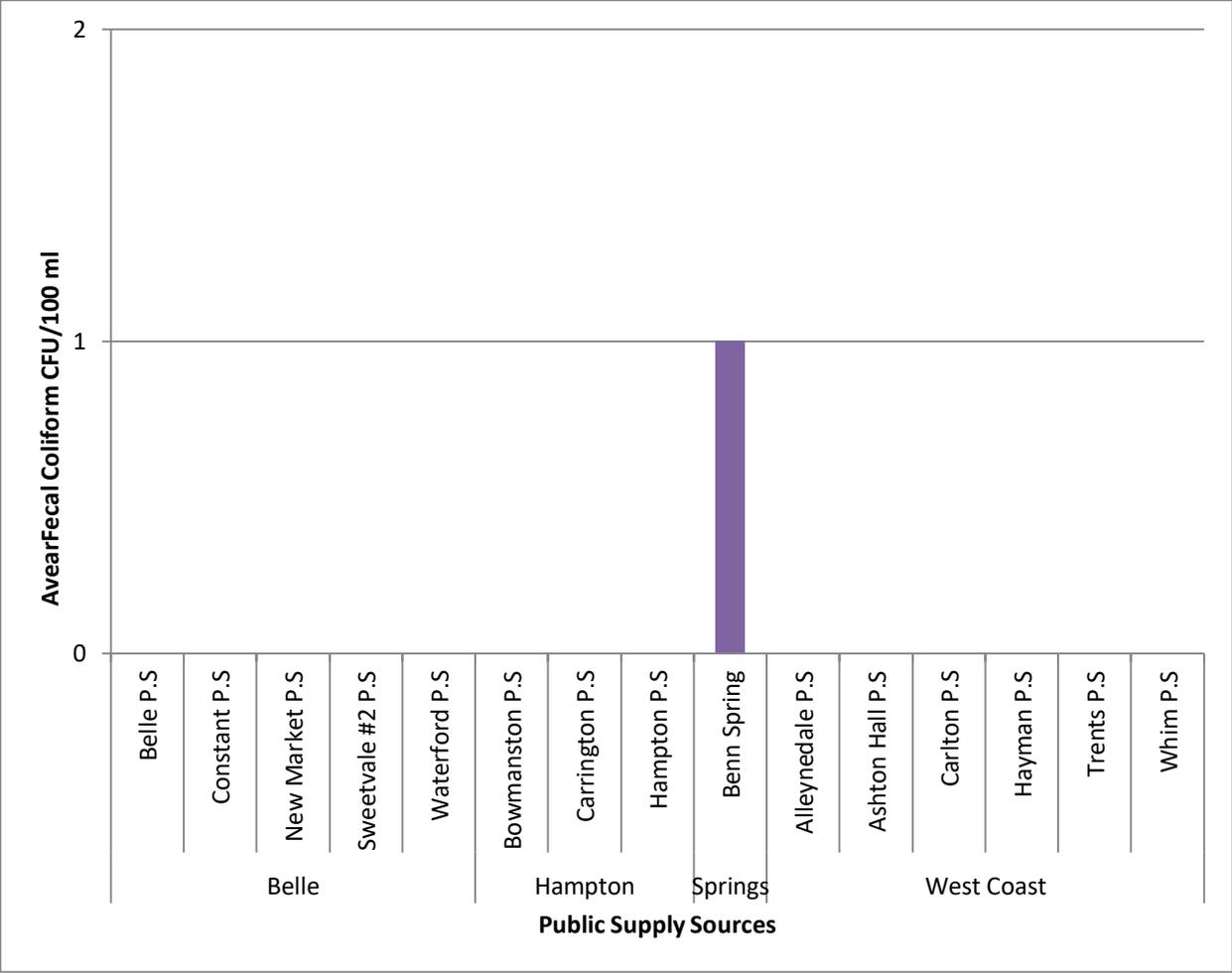


Figure 16: Average faecal coliform counts (CFU/100ml) in 2016

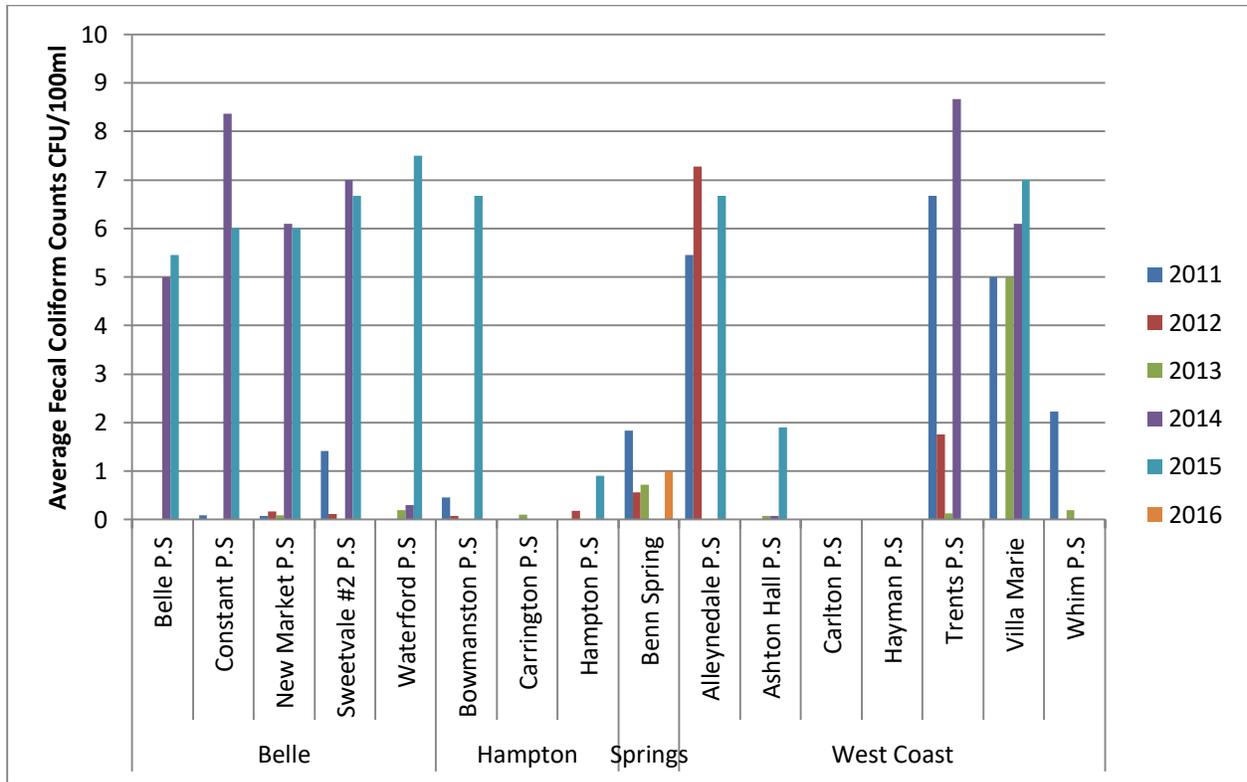


Figure 17: Fecal Coliform Counts for Public Supply Sources 2011 to 2016

Figure 17 shows that there has been a decrease in the average amount of coliform units over the past year. The values for 2014 and 2015 were generally significantly higher than the other years under review.

9.2 MONITORING OF NATURAL SPRINGS

Figure 18 shows that the average concentrations of chlorides for all springs were well below the guideline value of 250 mg/L in 2016.

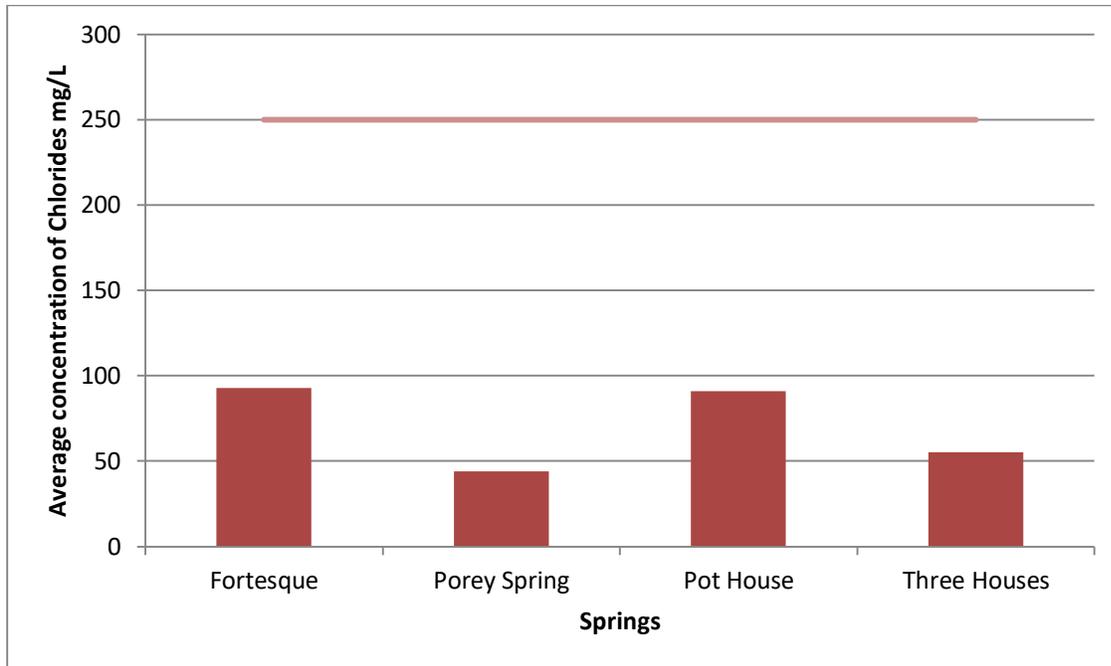


Figure 18: Average concentration of Chlorides for springs in 2016

For spring at Fortesque in 2016, the average concentration of Nitrate-N exceeded the guideline value of 10 mg/L (Figure 19). The other wells were below this guideline value.

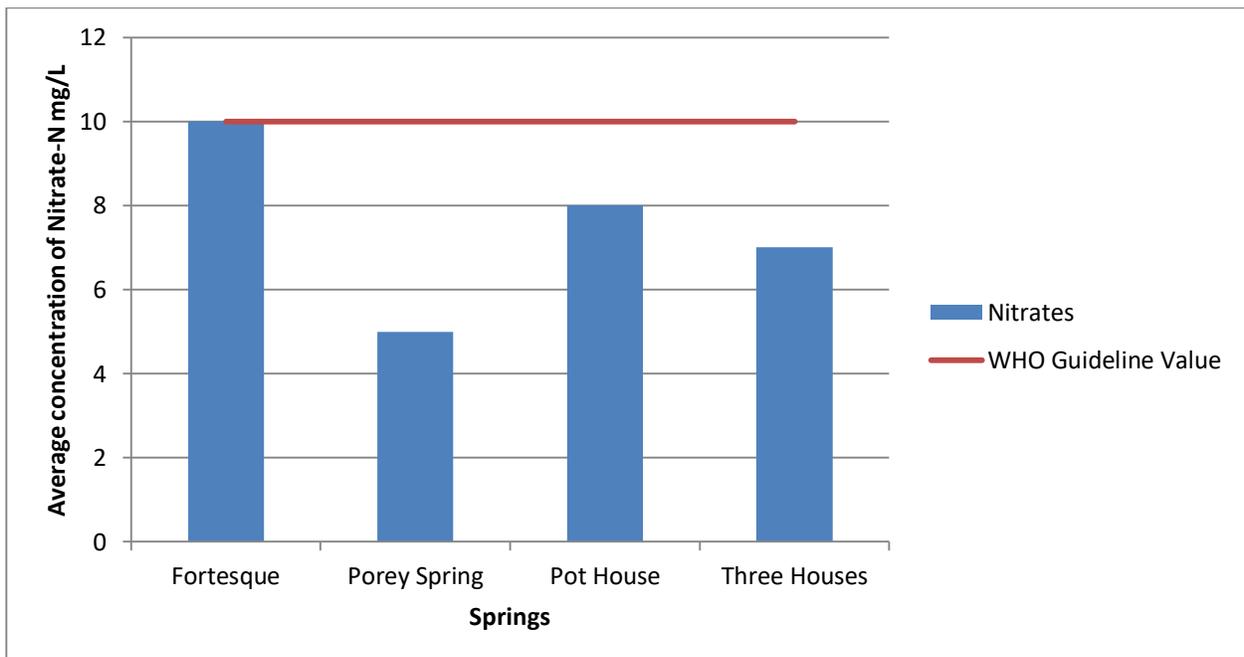


Figure 19: Average concentration of Nitrate-N in springs in 2016

Figure 20 below shows that the average counts for faecal coliform at the springs Fortesque, Porey Spring, Pot House and Three House are above the standard of 0 CFU/100 ml. These sources are not chlorinated before the sample being taken. Hence the high values.

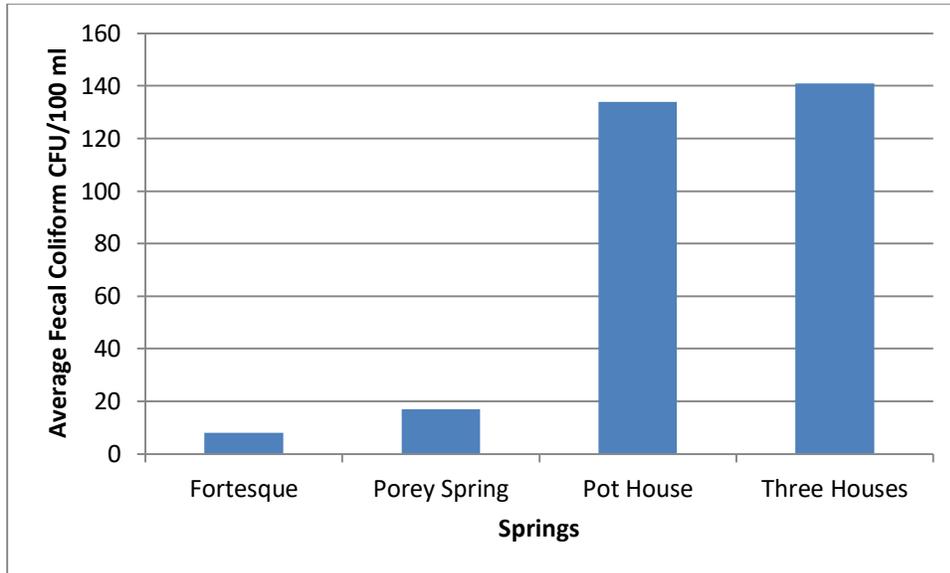


Figure 20: Average Fecal Coliform for Non-potable Springs

9.3 NEAR SHORE WATER QUALITY MONITORING

Samples are collected from eighteen popular bathing water beaches (Table 8). In 2016, were collected as part of the Near Shore Water Quality Monitoring Programme.

Table 8: List of Beaches sampled by catchment

West Coast	South Coast
Brandons	Brownes
Brighton	Pebbles
Paradise	Amaryllis
Batts Rock	Accra
Coach House	Worthing
Holetown	Dover

Mullins	Graveyard
	Welches
	Miami
	Silver Sands

9.3.1 MICROBIOLOGICAL ANALYSIS

In 2016, one thousand eight hundred and ninety-nine (1,899) samples were collected for microbiological analysis. Eight hundred and twenty-eight samples were from the west coast and one thousand and seventy-one samples were from the south coast. The results of the analysis were compared to the standards listed in Table 9 below.

Table 9: Marine Quality Parameters and Proposed Ambient Standards

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

No sites exceeded the standards for geometric mean for both faecal coliform and enterococci. Please note that there were fourteen (14) instances of TNTC for faecal coliform and five (5) for enterococci. There were no sites in which the faecal coliform count was greater than 400 colonies per 100 ml.

9.3.2 PHYSICO-CHEMICAL AND NUTRIENT ANALYSIS

In 2016, one hundred and thirty-one Physico-chemical and nutrient samples were collected and analysed by the Government Analytical Services. Table 10 shows the parameters which were tested and the standard values.

Table 10: Parameters and the standard values

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

Table 11 below shows the average, maximum and minimum values for the Physico-chemical and nutrient parameters.

Table 11: Statistical parameters of the various Physico-chemical and nutrient parameters

	Total Phosphorus/ mg/L	TSS/ mg/L	pH	Turbidity/ NTU	Total Nitrogen/ mg L
No. of samples	130 ³	131	131	131	125 ⁴
Average	0.07	12.25	8.04	2.17	0.30
Max	1.03	156	8.38	4.6	0.9

³ One sample was inadvertently disposed of.

⁴ Four of the samples were not measured because there was a problem with the instrument and two samples were inadvertently disposed of

Minimum	0.02	0.28	7.21	2 ⁵	0.01
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Concerning total phosphorus, all of the results exceeded the guideline value of 0.015 mg/L. It should be noted that several values were noted as < 0.05 mg/L and as such is above the guideline value for this parameter. The maximum value was noted for Heywoods Site 2 on November 14, 2016.

Less than half (48.9 %) of samples exceeded the guideline value for total suspended solids (TSS). The maximum value was 156 mg/L and was recorded for Miami Beach Site 1 on March 23, 2016. None of the samples was above or below the range indicated for pH.

As it relates to turbidity, it was observed that the lowest value recorded was < 2. This value is above the guideline value of 1.5 NTU. The maximum value was recorded for Hometown Beach Site 2 on February 15, 2016.

Ninety-two per cent (92 %) of samples exceeded the guideline value for total nitrogen in 2016. The maximum of 0.9 mg/L was Graveyard Beach on November 9, 2016. The average value of exceeded the guideline value.

9.4 WIDESCREEEN SAMPLING

The Environmental Protection Department as part of the water quality monitoring programme carries out a widescreen assessment of the drinking water sources in Barbados. The assessment is conducted on a biannual basis, with one being in the dry season and the other in the wet season. The Belle and Hampton public supply wells are sampled during each widescreen assessments. The other wells, on the other hand, are sampled such that after both assessments within the year each one is sampled at least once. Samples are shipped to Advanced Environmental Laboratories, Inc. in Florida for analysis.

The widescreen assessment involves the analysis for various substances include metals e.g. zinc and mercury, POPs e.g. polychlorinated biphenyls (PCBs) and endrin, volatile

⁵ This value should be noted as < 2 because this is the notation used by the laboratory.

compounds such as chloroform and benzene. Wet Chemistry is also part of the analysis with parameters such as pH, turbidity and chlorides are tested for.

9.4.1 WIDESCREEEN SAMPLING 2015

Widescreen sampling took place on March 17, 2015, and October 27, 2015. Samples were taken from six water supply sources which were Belle Public Supply P.S, Hampton P.S, and Applewhaites Well Field W.F, Sweetvale #2 P.S, Benn Spring and the Whim P.S.

Analysis of the samples taken during widescreen sampling during 2015 showed that the presence of arsenic, lead, selenium and uranium were not detected.

The Whim P.S, the concentration of total dissolved solids (TDS) was 800 mg/L in March 2015 and 990 mg/L in October 2015. These results both exceed the WHO guideline value of <600 mg/L.

9.4.2 WIDESCREEEN SAMPLING 2016

Samples were collected from the Belle P.S, Hampton P.S., Newmarket P.S., Carrington P.S., Alleynedale P.S. and Ashton Hall P.S. sites on March 15, 2016. The second assessment was undertaken on 18 October 2016 with samples taken from the Belle P.S, Hampton P.S, Constant P.S, Molyneaux P.S, Ashton Hall P.S and Porey Spring.

9.4.3 DATA VERIFICATION AND DATABASE MANAGEMENT

The WQS undertook the verification of the data entered into the database for the Groundwater and Nearshore monitoring programmes. Table 12 shows that four years of sampling was completed with three for the nearshore programme and the remaining for Ground Water Monitoring Programme (GWMP). A total of seven hundred and seventy-nine errors were found.

Table 12: Programmes verified and the errors identified

Programme	Verification Period	No. of errors
NMP	2010	261
	2011	347
	2015	96
GWMP	2015	75

9.5 LOOKING FORWARD

In 2017, the Groundwater Monitoring Programme will continue with routine monitoring and bi-annual widescreen sampling and analysis of potable and non-potable sources. Also, the standard operating procedure (SOP) for this programme will be updated. Additionally, the Marine Water Quality Monitoring Programme will continue in 2017 with the collection and analysis of nearshore marine water samples. Also, the verification of 2016 monitoring data will be undertaken and the updating of the SOP for Marine Water Quality Monitoring Programme will also take place.

10 TRAINING, CONFERENCES, SEMINARS AND WORKSHOPS

10.1 TRAINING

The Department undertook training a number of areas to increase the human resource capacity. Training took place both locally (Appendix, Table 13) inclusive of online and overseas (Appendix, Table 15).

Local & Online Training

Twelve persons were signed up for a 20-hour online training programme in Quality Trainer by Minitab. By the end of 2016, three persons had completed the training programme, with the others scheduled to be completed in 2017.

Courses administered by the Training Administration Division were also attended. These include Microsoft Excel, Microsoft Access and Microsoft Word among others.

Overseas Training

In 2016, overseas training consisted of five courses, two of which pertained to oil spill contingency planning. Three others dealt with solid waste management, Global Fuel Economy and the Chemical Weapons Convention.

10.2 CONFERENCES, SEMINARS AND WORKSHOPS

The conferences, seminars and workshops attended by the Department were related to climate change, persistent organic pollutants, chemical weapons and the International Atomic Energy Agency (Appendix, Table 16 & Table 17).

Appendix

Table 13: Local Training

Name of Course/ Activity	Location/ Date	Description	Officers (s) in Attendance/Participating
Introduction to Microsoft Access	Jan. 25 to Feb. 2	The course involves basic elements of Microsoft Access such as creating tables and queries	P. Fergusson – Environmental Protection Officer (ag.)
Advanced IT- MS Word	Feb. 24 to Mar. 8, 2016	The course consisted of topics such as using art, graph and equation functions of Microsoft Word	D. Baker – Clerical Officer L. Harewood – Receptionist/Typist
MS Intermediate Excel	Mar. 9 to 17		<ul style="list-style-type: none"> ▪ R. Howell – Computer Operator ▪ A. Boxill – Secretary (ag.) ▪ S. Goodridge – Senior Environmental Technician (ag.)
Introductory training in MicroVol 1100			<ul style="list-style-type: none"> ▪ Lavine – Deputy Director (ag.) ▪ S. Goodridge – Senior Environmental Technician (ag.) ▪ J. Yearwood – Environmental Technician ▪ L. Chapman – Environmental Technician
Stress Management Workshop	Solidarity House/Apr. 20		L. Chapman – Environmental Technician
Water Resource Management and Flood Resilience, Climate Change Adaptation Technical Workshop	Ministry of Environment/Apr. 12		<ul style="list-style-type: none"> ▪ T. Williams – Marine Pollution Officer ▪ Eversley – Senior Marine Pollution Officer (ag.) ▪ G. Hinds – Environmental Protection Officer

Fire Warden Training	EPD/May 27		<ul style="list-style-type: none"> ▪ P. Pile – Environmental Technical Officer ▪ S. Goodridge – Senior Environmental Technician (ag.) ▪ K. Barrow – Chief Buildings Development Officer (ag.) ▪ G. Clarke – Buildings Development Officer ▪ N. Cummins – Environmental Inspector
Performance Review and Development System Training for Managers/Supervisors	TAD/Sept. 19 to 23		C. Worrell – Senior Environmental Protection Officer
Disaster Risk Management	Savannah Hotel/ Sept. 19 to 23	Topics included an introduction to disaster/climate risk management, impact on built defences, adaptive capacity and risk classification and policy response.	A. Reeves – Technical Officer
Spanish as a Foreign Language for Public Officers	SJPP/Sept. 5 to January 26, 2017		P. Pile – Environmental Technical Officer
YSI Meter training	EPD/ Feb 25	Instruction on the use of the YSI meter	<ul style="list-style-type: none"> ▪ C. Worrell – Senior Environmental Protection Officer ▪ T. Williams – Marine Pollution Officer ▪ G. Hinds – Environmental Protection Officer

			<ul style="list-style-type: none"> ▪ P. Fergusson - Environmental Protection Officer (ag.)
Training Needs Assessment Training	Training Administration Division and EPD/ Dec 7-8	Determine what is and how to conduct a training need assessment	<ul style="list-style-type: none"> ▪ Eversley - Senior Marine Pollution Officer (ag.) ▪ Worrell - Senior Environmental Protection Officer ▪ Lavine - Deputy Director (ag.) ▪ S. Goodridge - Senior Environmental Technician (ag.) ▪ Clarke - Senior Buildings Development Officer ▪ M. Small - Senior Buildings Development Officer (ag.) ▪ K. Barrow - Chief Buildings Development Officer (ag.) ▪ T. Armstrong - Senior Environmental Protection ▪ L. Senhouse - Senior Environmental Technical Officer (ag.)

Table 14: Local seminars and workshops

Name of Event	Location/Date	Description	Officers in Attendance
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Caribbean Aerosol Network	EPD/January 16, 2016	The purpose of this teleconference was to learn about the ongoing activities related to air quality and aerosols in the participating countries. Short presentations were given by each agency to establish what measurements already existed, determine where measurements are needed and to identify ongoing or planned activities/projects in the region.	S. Goodridge – Senior Environmental Technical Officer (ag.)
Contingency Planning Summit, Overseas Security Advisory Council	Savannah Hotel/April 15	Disaster Management strategies	A. Reeves – Technical Officer
Safe Homes, Safe Environments in the Care of the Elderly	Pan-American Health Organization, Road/Nov. 16 Dayrells	Presented on “The guidelines on making an application to the EPD for nursing homes/senior citizens home	C. Clarke – Senior Building Development Officer C. Layne – Building Development Inspector (ag.) A. Deane – Buildings Development Officer

Training of Trainers Workshop – Climate Change, Stormwater Management	UWI Solution Centre / Nov. 24	Adaptation Measures to Counter the Effect of Climate Change (AMCECC) project	C. Worrell – Senior Environmental Protection Officer A. Eversley – Senior Marine Pollution Officer (ag.)
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Table 15: Online Training in 2016

Name of Event	Dates	Description	Officers Participating
<p>Quality Trainer - Minitab</p>	<p>various dates</p>	<p>To familiarize persons with statistics and Minitab Software.</p>	<p>J. Yearwood – Environmental Technician (Completed) C. Browne – Buildings Development Officer G. Hinds – Environmental Protection Officer C. Worrell – Senior Environmental Protection Officer A. Reeves – Technical Officer (Completed) S. Goodridge – Senior Environmental Technician (ag.) C. Layne – Building Development Inspector C. Griffith – Environmental Inspector T. Williams – Marine Pollution Officer R. Howell – Computer Operator P. Pile – Environmental Technical Officer (Completed)</p>

Name of Event	Dates	Description	Officers Participating
E-waste Challenge Massive Open Online Course (MOOC) live event: Sustainable Management of Waste Electrical and Electronic Equipment in Latin America	May 26	The objective was to present case studies and the experience gained in a multi-stakeholder project on sustainable management of e-waste in Latin America, involving the following countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela	T. Armstrong – Senior Environmental Protection Officer
E-waste Challenge MOOC live event: Climate impacts of E-waste	June 02	The objective was to present a life cycle impact assessment study of the e-waste sector in Mexico, where the impacts on climate change of various e-waste management options were compared.	T. Armstrong – Senior Environmental Protection Officer

Name of Event	Dates	Description	Officers Participating
Review of Annex IV and related aspects of Annex IX (B1110) to the (Basel) Convention, as well as on the review of Annexes I and III to the Convention	Sept. 15, 2016	<p>Webinar related to the concept paper prepared by Canada on the review of Annex IV to the Convention and related aspects of Annex IX to the Convention, as well as on the review of Annexes I and III to the Convention.</p> <p>The presentation was made by Jacinthe Seguin – Environment Canada</p>	T. Armstrong – Senior Environmental Protection Officer
Online Course on Solid Waste Management(UNESCO-IHE)	Sept. 1, 2016, to Jan. 6, 2017	<p>The course includes the following topics:</p> <ul style="list-style-type: none"> • Introduction to Solid Waste Management; • Waste Collection & Transport; • Treatment/disposal Technologies; • Financial, Social and Institutional aspects. 	T. Armstrong – Senior Environmental Protection Officer

Name of Event	Dates	Description	Officers Participating
Diploma in Acoustics and Noise Control	Sept. 2016 to Dec. 2017	Course Content includes: <ol style="list-style-type: none"> 1. General Principles of Acoustics Module, 2. Laboratory and Experiments Module, 3. Project and 4. Two other option modules. 	L. Chapman – Environmental Technician
Training on the IOMC Toolbox	Guy Perrin Room, Labour Department, June 21	To raise awareness about the IOMC Toolbox and its role and benefits in chemicals management	A. Headley – Director (ag.) L. Senhouse – Senior Environmental Technical Officer (ag.) P. Pile – Environmental Technical Officer

Table 16: Overseas training

Name of Event	Location/Date	Description	Officers in Attendance
Urban Solid Waste Management	Singapore/ Feb. 22 to 26	An overview of the tools and conceptualized frameworks of urban solid waste management.	T. Armstrong – Senior Environmental Protection Officer
Global Fuel Economy Initiative Training and Networking Event	Paris, France /June 9-10	The event dealt with issues such as fuel economy labelling, fiscal measures, and how to overcome policy and implementation challenges.	S. Goodridge- Senior Environmental Technician (ag.)
Shoreline Spill Response and Shoreline Clean-up Assessment Technique	Fort Lauderdale, Miami, USA/ June 28 – 30	The course identified the types of information needed by shoreline response decision-maker to response priorities, treatment objectives, selects appropriate tactics and establishes clean-up endpoints.	A. Eversley - Senior Marine Pollution Officer (ag.)

<p>Basic course for Personnel of National Authorities involved in the National Implementation of the Chemical Weapons Convention</p>	<p>Hague, Netherlands/July 18-23</p>	<p>It provided personnel of National Authorities with a basic introduction to the Convention, the OPCW and the roles and responsibilities of both the OPCW and the National Authority in implementing the CWC</p>	
<p>International Maritime Organization (IMO) Regional Workshop on Oil Spill Contingency Planning' in Nassau, The Bahamas</p>	<p>Nassau, Bahamas/Dec. 13-16</p>	<p>The objective of the workshop was to provide training on oil spill preparedness and contingency planning, as well as developing a hands-on working knowledge of the use, and advantages of the ARPEL Manual and Readiness Evaluation Tool for Oil Spills (RETOS™) in analyzing and identifying gaps in national oil spill preparedness and response programs throughout the Wider Caribbean Region (WCR)</p>	<p>A. Eversley – Senior Marine Pollution Officer (ag.)</p>

Table 17: Overseas conferences, seminars and workshops

Name of Event	Location/Date	Description	Officers in Attendance
Regional Project Initiation Meeting for the project entitled Development and Implementation of a Sustainable Management Mechanism for Persistent Organic Pollutants in the Caribbean	Trinidad and Tobago/April 13 - 15, 2016		L. Senhouse - Senior Environmental Technical Officer (ag.)
Organization for the Prohibition of Chemical Weapons seminar on Chemical Safety & Security	Sao Paulo, Brazil/ April 17 - 22	The overall goal was to familiarise States Parties with the new approaches that can be adopted in relation to chemical safety and security management, with a particular focus on assisting small and medium-sized enterprises.	T- Armstrong - Senior Environmental Protection Officer

Interregional Meeting on Aligning the Technical Cooperation Programme with the Development Goals of Small Island Developing States which the IAEA is Organizing	Vienna, Austria/ 27-30 June	Discussions on the potential of nuclear applications to the developmental context of SIDS.	I. Lavine – Deputy Director (ag.)
Regional Project Inception Workshop- Update of National Implementation Plans, POPs Inventories and Related Capacity Development for Eight Countries in the Caribbean	Port of Spain, Trinidad and Tobago/Nov. 8 -10	Objectives were to: <ul style="list-style-type: none"> ▪ Provide an update on the status of implementation if existing NIP action plans ▪ Present the implementation plan for updating the NIPS, POPS inventories and Capacity Development ▪ Train the regional team on the assessment of ‘new’ POPs 	L. Senhouse – Senior Environmental Technical Officer (ag.)

<p>OPCW 18th Annual Meeting of National Authorities</p>	<p>The Hague, the Netherlands/Nov. 23-25</p>	<p>Objectives were :</p> <ul style="list-style-type: none"> ▪ To provide an occasion for National Authorities (NAs) to highlight and work through relevant issues in order to enhance their capacity to comply with the obligation under the Convention ▪ To promote cooperation among National Authorities to further the implementation of the Convention on the Regional Level. ▪ To promote cooperation between States Parties and the Secretariat to enhance the implementation of the Convention. 	<p>A. Headley – Director (ag.)</p>
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<p>Global Environment Facility 2016 Expanded Constituency Workshop</p>	<p>Hotel Radisson, Wrightson Rd, Port of Spain, Trinidad and Tobago</p> <p>March 1-4</p>	<p>To clarify concerns regarding access to funding and programming and enhance the capacity to maximize the use of the available opportunities under the GEF to support national development concerns.</p>	<p>P. Pile – Environmental Technical Officer</p>
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