



ENVIRONMENTAL PROTECTION

DEPARTMENT

ANNUAL REPORT

2012



ENVIRONMENTAL PROTECTION DEPARTMENT

Executive Summary

The Environmental Protection Department (EPD) is a regulatory government agency with responsibilities in the areas of ambient air quality, building development control, derelict buildings and vehicles, hazardous materials management, indoor air quality, marine pollution control, noise pollution control, solid waste management and water quality management.

The Department has a total of fifty-one (51) posts. In 2012, the vacant posts of Environmental Protection Officer assigned to the Water Quality Management Section, Environmental Protection Officer assigned to the Solid Waste and Hazardous Materials Management Section and Marine Pollution Officer in the Marine Pollution Control Section were filled. There was one resignation in 2012 from the post of Senior Environmental Protection Officer.

1.1 AIR AND NOISE POLLUTION CONTROL

The Air and Noise Pollution Control Section regulates air and noise pollution and some of its responsibilities include the investigation of complaints, monitoring air quality and the assessment of commercial buildings.

1.1.1 AIR POLLUTION

1.1.1.1 Response to Complaints

The Department received thirty-five (35) air quality complaints in 2012 which was a decrease from the 2011 total of forty-seven (47). The air quality complaints received by the Department were classified as industrial emissions, manufacturing emissions, nuisance emissions, vehicle maintenance facility emissions, and indoor air quality. The complaints that were investigated in 2012 are summarized in Table 1.

Table 1: The air quality complaints received and investigated by the Department in 2012.

COMPLAINT CLASSIFICATION	COMPLAINTS RECEIVED IN 2012	COMPLAINTS INVESTIGATED IN 2012
Industrial Emissions	3	2
Manufacturing Emissions	3	0
Nuisance Emissions	11	15
Vehicle Maintenance Facility Emissions	9	11
Indoor Air Quality	9	24
Total	35	52

1.1.1.2 Building Assessments

The Air and Noise Pollution Control Section conducted one (1) building assessment in 2012. Building assessments are conducted in conjunction with the Building Development Control Section of buildings before occupation by government departments when requested by the Ministry of Housing and Lands.

1.1.2 NOISE POLLUTION

The Department received twelve (12) complaints related to noise pollution in 2012, which represented an increase over the two (2) complaints received in 2011. The number of noise pollution investigations conducted was six (6).

1.1.3 OTHER ACTIVITIES OF THE AIR AND NOISE POLLUTION SECTION

The other activities of the Air and Noise Pollution Control Section were the following projects.

i. Characterization of Ambient Air Quality in Bridgetown

The objective of this project was the determination of the concentration of selected air pollutants in Bridgetown and its environs using passive air samplers. Passive air sampling commenced in 2012 and continued throughout the year.

ii. Noise Assessment of Bridgetown

The objective of the project was the identification of noise sources within a specified area of Bridgetown. Monitoring commenced at selected locations but was suspended due to malfunctioning equipment.

1.2 BUILDING DEVELOPMENT CONTROL

The mandate of the Building Development Control Section is the enforcement of the Health Services Act, Cap 44 and Regulations related to building development control, the Groundwater Protection Zoning Policy and some aspects of the Marine Pollution Control Act, 1998.

The number of building development application received in 2012 was one thousand nine hundred and sixty-two (1962) and one thousand seven hundred and thirty-three (1733) applications were processed.

1.2.1 OTHER ACTIVITIES OF THE BUILDING DEVELOPMENT CONTROL SECTION

The following activities were also conducted by the Building Development Control Section.

i. **Septic Tank and Filter Bed Inspections**

Inspections of twenty-six (26) septic tanks and one (1) filter bed were conducted to ensure these waste disposal systems were constructed correctly. It was found that only four (4) septic tanks were constructed incorrectly and revisits were conducted to ensure the necessary alterations were made.

ii. **Development of a Standard Operating Procedure**

In 2012, the preparation of a standard operating procedure, by a consultant, for the processing of building development applications commenced. The sections of the standard operating procedure reviewed by officers of the Department included natural and mechanical ventilation and commercial kitchen ventilation.

iii. **Development of a Database**

The development of a database for the management of building development applications was commissioned in November 2011. The operational issues identified during the implementation of the database were addressed by the developers, the Data Processing Department. The input of selected information was conducted by interns from the Samuel Jackman Prescod Polytechnic for applications in 2011 and some of the applications processed in 2010.

1.3 DERELICT BUILDINGS AND VEHICLES

The mandate of the Derelict Buildings and Vehicles Section is the enforcement of the provisions of the Health Services Act, Cap 44 and the Health Services (Disposal and Collection of Refuse) Regulations, 1975 related to derelict buildings and vehicles respectively.

1.3.1 DERELICT BUILDINGS

The total number of derelict buildings demolished in 2012 was one hundred and twelve (112), which was a small increase when compared to the 2011 total of one hundred and seven (107). Fifty-four per cent (54%) of the derelict buildings demolished in 2012 were located in the parish of St. Michael.

1.3.2 DERELICT VEHICLES

One thousand one hundred and eighty-nine (1189) derelict vehicles were removed in 2012 which was less than the 2011 total of one thousand four hundred and six (1406).

1.4 ENVIRONMENTAL IMPACT ASSESSMENTS

The Department is one of the government agencies represented on the Environmental Impact Assessment Review Panel which reviews and makes recommendations regarding development applications that are required to conduct environmental impact assessments. The Panel is chaired by the Chief Town Planner and reviews terms of reference and the technical reports generated from the process.

In 2012 the Department received twenty-two documents related to the environmental impact assessments procedure.

1.5 MARINE POLLUTION CONTROL

The mandate of the Marine Pollution Control Section is to enforce the Marine Pollution Control Act, Cap 392A which seeks to control the pollution of the marine environment from all sources including land-based sources.

1.5.1 AUDITS

The responsibilities of the Marine Pollution Control Section include the characterization of sources of marine pollution by conducting audits which, depending on the nature of the operation being audited, may include contributions from other sections of the Department.

A total of five (5) audits were conducted in 2012, the types of operations audited were beverage manufacturing, beverage distribution and paint manufacturing.

One (1) compliance audit was conducted on a rum distillery in 2012.

The audit reports prepared in 2012 were reports for the audits conducted that year in addition to reports for four (4) audits conducted before 2012.

1.5.2 RESPONSE TO COMPLAINTS

Sixteen (16) marine pollution complaints were received and investigated in 2012 which were classified as fish kill, oil pollution, sediment, wastewater discharge and other. The total number of marine pollution complaints decreased when compared to the 2011 total which was twenty-seven (27). Forty-four per cent (44%) of the complaints received in 2012 were classified as wastewater discharges.

1.5.3 OTHER ACTIVITIES OF THE MARINE POLLUTION CONTROL SECTION

The following activities were conducted by the Marine Pollution Control Section.

- i. **Oil Spill Contingency Planning**
 - a. Completion of environmental sensitivity maps by Regional Marine Pollution Emergency, Information and Training Centre – Caribe.
 - b. The decision was made by the National Oil Spill Response Committee to prepare area-specific response plans for areas with significant use, transfer or storage of hydrocarbons.
 - c. The Department and ESSO Standard Oil S.A. Ltd. Barbados co-sponsored a workshop September 10 – 11, 2012 on Response Safety Best Practices.

ii. **Pesticide and Benthic Organisms/Storm Water Assessment Project**

The terms of reference for the Pesticide and Benthic Organisms /Storm Water Assessment project was completed.

iii. **Marine Litter**

The annual clean up of Morgan Lewis Beach, St. Andrew was conducted on September 15, 2012.

1.6 MULTILATERAL ENVIRONMENTAL AGREEMENTS

1.6.1 STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS

The Stockholm Convention on Persistent Organic Pollutants is a global treaty to protect human health and the environment from persistent organic pollutants (POPs). There are twenty-two (22) chemicals listed as POPs in the Convention which are categorized as pesticides, industrial chemicals, and by-products. Barbados acceded to the Stockholm Convention on June 07, 2004.

1.6.1.1 Global Monitoring Plan

In 2012, the Department continued its participation in the Global Atmospheric Passive Sampling (GAPS) Network. The GAPS Network is a global survey that monitors the presence of POPs and other priority pollutants in the air and reports its results to the Global Monitoring Plan of the Stockholm Convention.

The Department has the responsibility of retrieving and deploying passive samplers at the monitoring site at Ragged Point, St. Philip quarterly. The passive samplers are shipped to Environment Canada for analysis after retrieval.

The Department also endorsed a regional proposal to the Global Environment Facility for the continuation of the Global Monitoring Plan under the Stockholm Convention in Latin America and the Caribbean Region.

1.6.1.2 Caribbean Hub – Capacity Building Related to Multilateral Environmental Agreements in African, Caribbean and Pacific Countries Project

The Department was successful in accessing an internship facility through the Caribbean Hub – Capacity Building Related to Multilateral Environmental Agreements (MEAs) in Africa, the Caribbean and Pacific Countries Project, which was managed by the CARICOM Secretariat. The internship facility provided funds for the payment of two interns who commenced work on October 22, 2012, to update the pesticide, polychlorinated biphenyls and dioxins and furans inventories. The interns were scheduled to complete the update of the inventories by January 11, 2013.

1.6.2 STRATEGIC APPROACH TO INTERNATIONAL CHEMICALS MANAGEMENT

The Strategic Approach to International Chemicals Management (SAICM) is a policy framework to foster the sound management of chemicals. The objective of SAICM is the sound management of chemicals throughout their life cycle so that by 2020, chemicals are produced and used in ways that minimize significant adverse impacts on human health and the environment. The Department is the focal point for the SAICM.

1.6.2.1 National Implementation Strategy for the Globally Harmonized System of Classification and Labelling of Chemicals

The project National Implementation Strategy for the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), funded by SAICM, has the objective of capacity building to facilitate the development of a strategy for the implementation of GHS.

The project activities conducted in 2012 were:

- i. The review by the coordinating committee of a report of the analysis of interviews with stakeholders in selected sectors and an assessment of the legal framework to determine any changes which may be necessary for the implementation of the GHS.

- ii. The acceptance by the Department of a gap analysis prepared by a consultant, which compared the existing situation with the requirements for the implementation of the GHS.
- iii. The review of the final draft of the National Implementation Strategy by the Department and the coordinating committee.
- iv. The National GHS Workshop was held November 12 – 13, 2012, which among other things, allowed stakeholders to review the draft National Implementation Strategy. The Workshop report was accepted by the Department.
- v. The preparation of an advertisement regarding the GHS commenced.
- vi. The sponsorship of a poster competition organized by the National Advisory Committee on Occupational Health.

1.7 SOLID WASTE AND HAZARDOUS SUBSTANCES

The responsibilities of the Solid Waste and Hazardous Materials Section include the investigation of complaints, regulation of the disposal of solid and hazardous wastes and regulation of the importation of hazardous materials.

1.7.1 RESPONSE TO COMPLAINTS

The Solid Waste and Hazardous Substances Section received a total of thirteen (13) complaints in 2012, which were all classified as miscellaneous. Examples of the complaints received were the accidental release of a substance which was suspected to be calcium carbide and the environmental impacts of a recycling operation.

1.7.2 SOLID WASTE

1.7.2.1 Solid Waste Disposal Site Monitoring

The Department conducts routine inspections of the Mangrove Pond Landfill and the Bulky Waste Disposal Facility, which are government-operated sites for the disposal of solid waste. Routine inspections are also conducted at Edgumbe and Parson's quarries which are utilized for the disposal of construction and demolition waste.

The Bulky Waste Disposal Facility and Parson's quarry were closed on June 3, 2012, and June 8, 2012, respectively. Also, a new cell at the Mangrove Pond Landfill was officially opened July 8, 2012.

Monthly inspections of the solid waste and construction and demolition waste disposal sites were conducted in 2012. In June 2012, the use of an inspection form was implemented to facilitate the standardization of regulatory inspections.

Data on the quantity of waste disposed at these facilities was not available at the time of preparation of this report.

1.7.3 HAZARDOUS SUBSTANCES

1.7.3.1 Hazardous Waste Disposal Site Monitoring

Monthly inspections of the Asbestos Disposal Site and Blood and Grease Disposal Site, which are operated by the Sanitation Service Authority, were conducted in 2012.

1.7.3.2 Hazardous and Special Waste Disposal

In 2012, the Department received thirty-four (34) requests for the disposal of hazardous and/or special waste and one hundred and eleven (111) requests for permission to dispose of hazardous and/or special waste.

1.7.3.3 Used Oil Management

The Department had no information on the reuse of used automotive oil in 2012 since the company that utilized used automotive oil for fuel ceased operations in 2011.

1.7.3.4 Import of Radioactive Materials

The Department received a total of thirty-four (34) applications for the importation of radioactive materials of which thirty (30) applications were for medical purposes and four (4) were for industrial purposes.

1.8 WATER QUALITY MANAGEMENT

The responsibilities of the Water Quality Management Section include monitoring groundwater, nearshore marine water from selected south and west coast beaches

and wastewater treatment plants. However, the wastewater treatment plant monitoring was not conducted during the year under review.

1.8.1 GROUNDWATER MONITORING

The Department conducts a groundwater monitoring programme, jointly with the Barbados Water Authority with a monthly sampling frequency. The potable groundwater sources monitored were nineteen (19) supply wells and two (2) springs and the agricultural sources monitored were eight (8) supply wells and five (5) springs.

The results for the chloride, Nitrate-N, total dissolved solids, faecal coliform and sulphate parameters were compared to the World Health Organization (WHO) Drinking Water Guidelines. A comparison of the results for the selected parameters in 2012 and for the five years 2008 – 2012 was conducted.

1.8.1.1 Drinking-Water Supply

Monitoring was conducted in the Belle, Hampton, and West Coast catchments at eight (8), three (3) and eight (8) supply wells respectively and two springs. The WHO guideline values for Nitrate-N and sulphates of 10 mg/l and 500 mg/l were not exceeded at the potable supply sources in 2012 and the five year review period. The WHO guideline value of 250 mg/l for chloride was not exceeded in 2012 but there were instances when it was exceeded during the previous five year review period at two (2) supply wells in the West Coast Catchment. The WHO guideline value of 0 CFU/100 ml was exceeded at all of the potable supply wells in 2012 and there were instances of exceedance at all of these sources except three (3) supply wells in the West Coast catchment during the five year review period. The total dissolved solids concentration met the WHO guideline excellent taste threshold range of less than 300 mg/l at five (5) supply wells in the Belle Catchment in 2012 and all other sources met the good taste threshold of 300 – 600 mg/l. During the five year review period, only three (3) supply wells in the Belle catchment met the excellent threshold each year and there were instances where the total dissolved solids were within the fair taste threshold of 600 – 900 mg/l at three (3) supply wells in the West Coast catchment.

1.8.1.2 Agricultural Supply

Groundwater monitoring of agricultural supply sources was conducted in the Belle and Hampton catchments at two (2) and (6) supply sources respectively and five (5) springs. The WHO guideline values for chlorides and sulphates were not exceeded in 2012 and also during the five year review period. The WHO guideline value for Nitrate-N was exceeded in 2012 at one (1) supply well in the Hampton Catchment and one (1) spring and during the five year review period at two (2) supply wells in the Hampton catchment and two (2) springs. The faecal coliform WHO guideline value was exceeded at all agricultural sources in 2012 and there were instances of exceedance at all supply sources during the five year review period. The total dissolved solids excellent taste threshold was met by one (1) supply well in the Hampton catchment in 2012 and each year during the review period and the good taste threshold was exceeded by one (1) supply well in the Belle catchment in 2012 and during the five year review period. All other agricultural supply sources were within the good taste threshold range.

1.8.2 RECREATIONAL WATER QUALITY

The nearshore water quality monitoring programme involved the weekly sampling of eighteen (18) West and South Coast beaches. The results of sample analysis were compared with the draft Marine Pollution Control Discharge standards to verify the quality of the water was suitable for recreational use.

In 2012, the enterococci standard that no sample shall exceed 104 colonies/100ml was breached at six (6) South Coast and six (6) West Coast beaches during the year. The enterococci standard requiring the geometric mean of at least five (5) samples should be less than 35 colonies/100ml was exceeded at only one sampling site, Amaryllis in February.

It should be noted that sampling was suspended in December. There were instances where either no samples were taken or insufficient samples were taken to allow comparison with the draft Marine Pollution Control Discharge standards, which occurred each month of the year except October. The beaches where this occurred during the year are listed below.

- January – Accra, Dover, Graveyard, Silver Sands, Welches

- February – Accra, Brownes, Dover, Graveyard, Miami, Pebbles, Silver Sands, Welches, Holetown
- March – Accra, Amaryllis, Brownes, Dover, Graveyard, Miami, Pebbles, Silver Sands, Welches, Worthing, Batts Rock, Heywoods, Holetown, Paradise
- April – Accra, Dover, Graveyard, Silver Sands, Welches
- May – Accra, Dover, Graveyard, Silver Sands, Welches, Batts Rock, Coach House, Holetown
- June – Accra, Amaryllis, Dover, Graveyard, Silver Sands, Welches, Brandons
- July – Accra, Brownes, Graveyard, Pebbles, Silver Sands, Batts Rock, Coach House, Heywoods, Holetown, Mullins, Paradise
- August – Accra, Amaryllis, Brownes, Dover, Graveyard, Miami, Pebbles, Silver Sands, Welches, Worthing, Batts Rock, Brandons, Brighton, Coach House, Heywoods, Holetown, Mullins, Paradise
- September – Graveyard, Mullins
- November – Graveyard, Silver Sands, Mullins

1.9 PUBLIC EDUCATION AND AWARENESS

The public education and awareness activities conducted in 2012 included the following:

- i. The printing and distribution of the March and September issues of the Envirofocus newsletter.
- ii. The hosting of four (4) interns from the Barbados Community College Environmental Science programme and the Samuel Jackman Prescod Polytechnic Business Studies programme.
- iii. The printing and distribution of “Marine Monster of Morgan Island Colouring and Activity Book” to Class 1 primary school students.
- iv. Dissemination of environmental tips via the radio and an online newspaper.
- v. The hosting of a seminar on best practices for vehicle maintenance facility operators on June 19, 2012.
- vi. Hosting an exhibition in Jubilee Gardens on June 21, 2012.

- vii. Conducting a hike with students of the Department's adopted school Garrison Secondary on June 25, 2012.

1.10 TRAINING, CONFERENCES, WORKSHOPS AND SEMINARS

1.10.1 TRAINING

The local and overseas training courses completed by officers of the Department are listed below.

Local Training

- i. Introduction to Microsoft Access
- ii. Stress Management
- iii. Occupational Health and Safety Workshop
- iv. Hazwoper Training Programme on Hazardous Waste Operations and Emergency Response
- v. Risk Assessment and Personal Protective Equipment Training
- vi. OPCW Assistance and Capacity Building Training Workshop
- vii. Performance Budgeting

Overseas Training

- i. International Postgraduate Course on Environmental Management for Developing and Emerging Countries
- ii. Organisation for the Prohibition of Chemical Weapons Basic Course
- iii. Organisation for the Prohibition of Chemical Weapons Associate Programme
- iv. Air Quality Collaboration Study Tour of the United States Environmental Protection Agency Region 4 Pesticides and Toxics Management Division

1.10.2 CONFERENCES, WORKSHOPS AND SEMINARS

The conferences, workshops and seminars attended by officers of the Department in 2012 are listed below.

Local Conferences, Workshops and Seminars

- i. Workshop to Review the Draft White Paper on Tourism Development in Barbados
- ii. UNESCO World Heritage Training Workshop; World Heritage in Context and Outstanding Universal Value

- iii. Information Communication Technology Workshop
- iv. 3rd Biennial International Conference on Higher Education

Overseas Conferences, Workshops and Seminars

- i. Global Environment Facility Caribbean Regional Fund for Wastewater Management (CReW) Project Inception Workshop
- ii. Project Planning Session on Regional Land and Water Resources Management Initiatives (GEF-IWCAM Successor Project)
- iii. Regional Workshop on Regulatory Infrastructure for the Control of Radioactive Sources
- iv. Fourth Session of the Intergovernmental Negotiating Committee to Prepare a Global Legally Binding Instrument on Mercury
- v. Third Session of the International Conference on Chemicals Management
- vi. Eighth Meeting of the Open-Ended Working Group of the Basel Convention on the Control of Transboundary Wastes and Their Disposal
- vii. Fourteenth Annual Meeting of the National Authorities of the Chemical Weapons Convention

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2 Department Overview

The mandate of the Environmental Protection Department is the preservation of environmental quality, prevention of environmental pollution, environmental monitoring, pollution control, and consequently protection of human health. To achieve this, the Department implements programmes to monitor and control conditions likely to affect the quality of land, air and water and the general well-being of inhabitants of Barbados.

The Department's regulatory functions are in the areas of ambient air quality, building development control, derelict buildings and vehicles, hazardous materials management, indoor air quality, 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. The basis of these activities are the Marine Pollution Control Act CAP 392A and the Health Services Act CAP 44.

There are fifty-one (51) posts in the Department of which thirty-two (32) are established and nineteen (19) are temporary. The Department is comprised of management and administrative sections in addition to the following seven technical sections:

- Air & Noise Pollution Control
- Building Development Control
- Derelict Buildings & Vehicles
- Environmental Technical Officers
- Marine Pollution Control
- Solid Waste & Hazardous Materials Management
- Water Quality Management

In 2012, there were three new members of staff. The vacancies filled were the posts of Environmental Protection Officer assigned to the Water Quality Management Section, Environmental Protection Officer assigned to the Solid Waste and

Hazardous Materials Management Section and Marine Pollution Officer in the Marine Pollution Control Section.

There was one resignation in 2012 from the post of Senior Environmental Protection Officer assigned to the Solid Waste and Hazardous Materials Management Section.

3 Air and Noise Pollution Control

The mandate of the Air and Noise Pollution Control Section is to regulate air and noise pollution in Barbados. The Air and Noise Pollution Control Section:

- i. Investigates ambient air, indoor air and noise pollution complaints;
- ii. Researches air and noise pollution issues; and
- iii. Conducts assessments of commercial buildings.

The four posts in the Air and Noise Pollution Control Section are:

- 1 Senior Environmental Technician and;
- 3 Environmental Technicians.

3.1 AIR POLLUTION

3.1.1 RESPONSE TO COMPLAINTS

The air quality complaints received by the Department are classified as industrial stack emissions, manufacturing emissions, nuisance emissions, vehicular maintenance facility emissions and indoor air quality. The definitions of the classifications are given in Table 2.

Table 2: Definitions of the categories of air quality complaints.

CLASSIFICATION	DEFINITION
Industrial Stack Emissions	Emissions from industrial sources that negatively affect ambient air quality.
Manufacturing Emissions	Emissions from manufacturing sources that negatively affect the ambient air quality e.g. furniture manufacturing.
Nuisance Emissions	Emissions from miscellaneous sources that negatively impact the ambient air quality in its environs e.g. open burning of materials and fugitive emissions.
Vehicular Maintenance Facility Emissions	Emissions from vehicle maintenance facilities and any location where vehicle or auto-body

CLASSIFICATION	DEFINITION
	repair is conducted that result in the emission of toxic sprays, odours and dust that negatively impact the ambient air quality.
Indoor Air Quality	Relates to complaints of adverse health impacts of employees in the work environment.

The air quality complaints received by the Department in 2012 are shown in Figure 1.

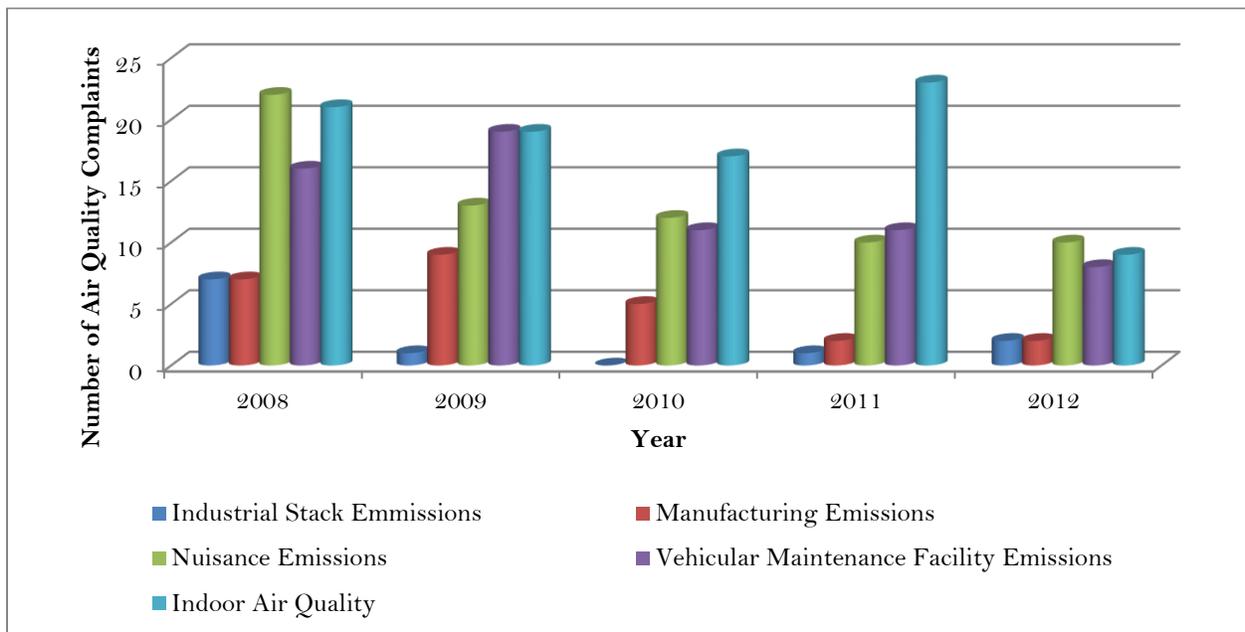


Figure 1: The air quality complaints received in 2012.

The total number of air quality complaints received in 2012 was thirty-five (35) of which three (3) were industrial emissions, three (3) were manufacturing emissions, eleven (11) were nuisance emissions, nine (9) were vehicle maintenance facility emissions and nine (9) were indoor air quality.

Over the five years the number of air quality complaints received decreased, the least number was received in 2012. The categories with the highest number of

complaints received each year were manufacturing and vehicle maintenance facility emissions and indoor air quality.

The new and recurring air quality complaints received are shown in Figure 2. Eighty-three per cent (83%) of the complaints were new complaints. The greatest numbers of new complaints recorded were in the categories of nuisances, vehicular maintenance facility emissions and indoor air quality which represented thirty-one per cent (31%), twenty-four per cent (24%) and twenty-eight per cent (28%) respectively of the new complaints.

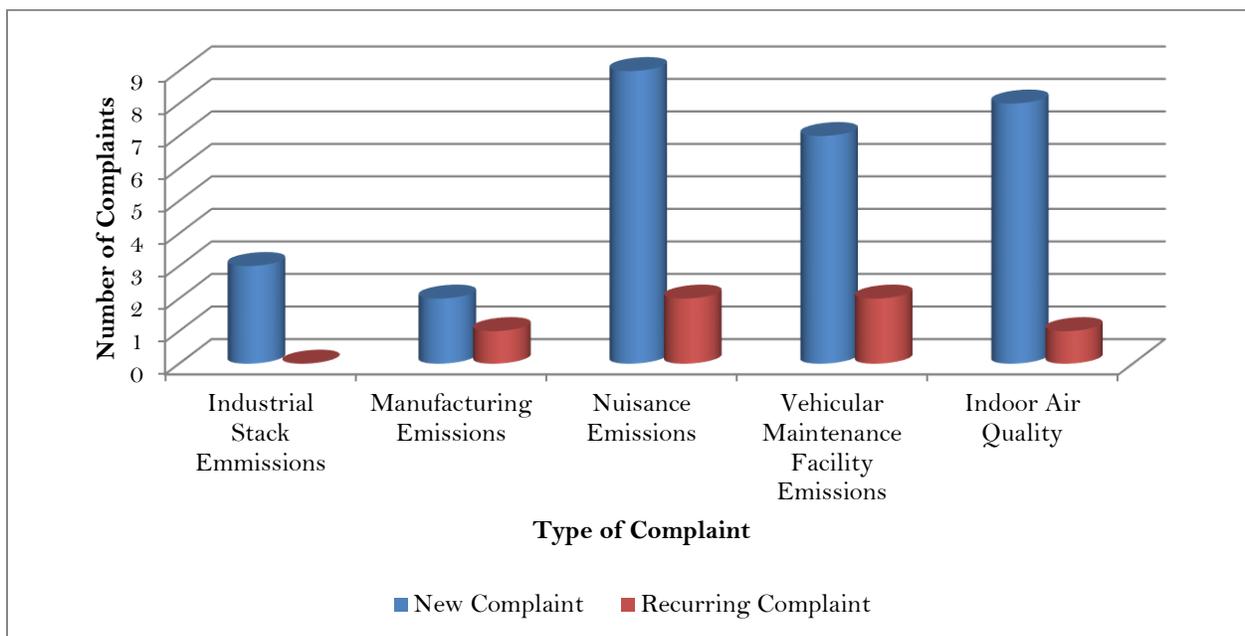


Figure 2: The new and recurring air quality complaints received in 2012.

The air quality investigations conducted in 2012 are shown in Figure 3. Fifty-two (52) air quality investigations were conducted, the nuisance and vehicular maintenance facility emissions and indoor air quality accounted for ninety-six per cent (96%) of the investigations conducted. The number of nuisance and vehicular maintenance facility emissions and indoor air quality investigations conducted were fifteen (15), eleven (11), and twenty-four (24) respectively.

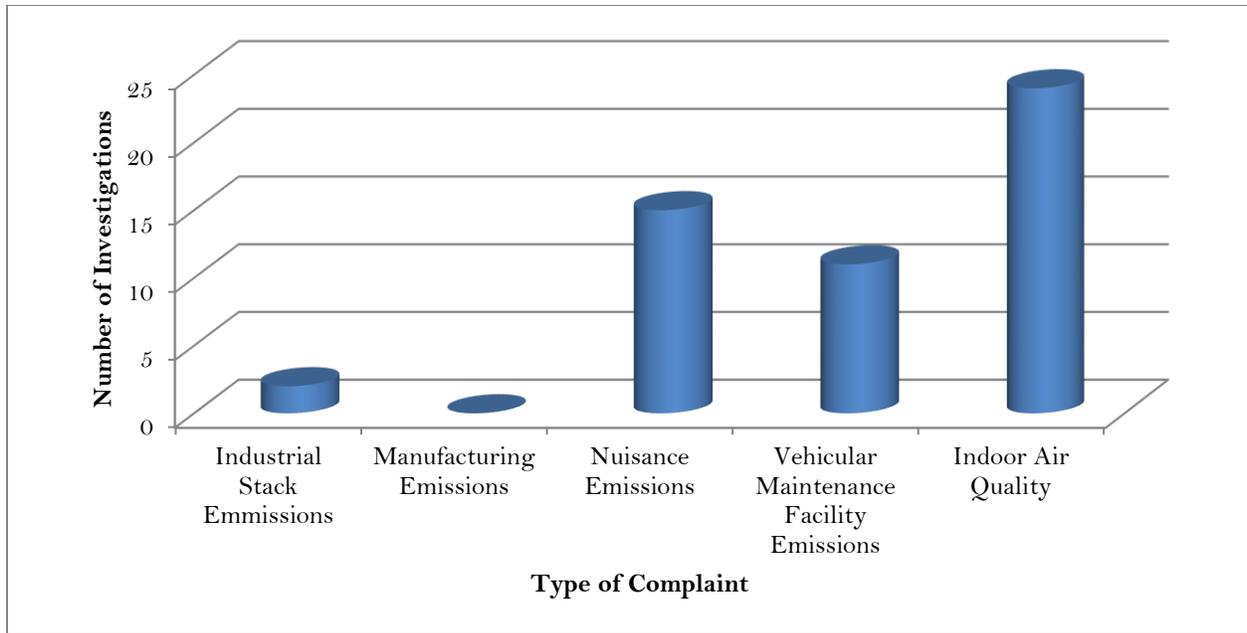


Figure 3: The air quality investigations conducted in 2012.

3.1.2 BUILDING ASSESSMENTS

The Air and Noise Pollution Control Section, in conjunction with the Building Development Control Section, inspect buildings, primarily at the request of the Ministry of Housing and Lands before occupation by government departments. The assessment is conducted by a walk through inspection and a review of the building and ventilation system to evaluate its suitability for the intended purpose. A report of the assessment is subsequently forwarded to the entity that made the request.

In 2012, one (1) building assessment was conducted on the Gildan building, Warrens Industrial Estate, St. Michael for occupation by the Financial Services Commission.

3.2 NOISE POLLUTION

3.2.1 RESPONSE TO COMPLAINTS

The number of noise complaints received by the Department during the five years 2008 – 2012 is shown in Figure 4.

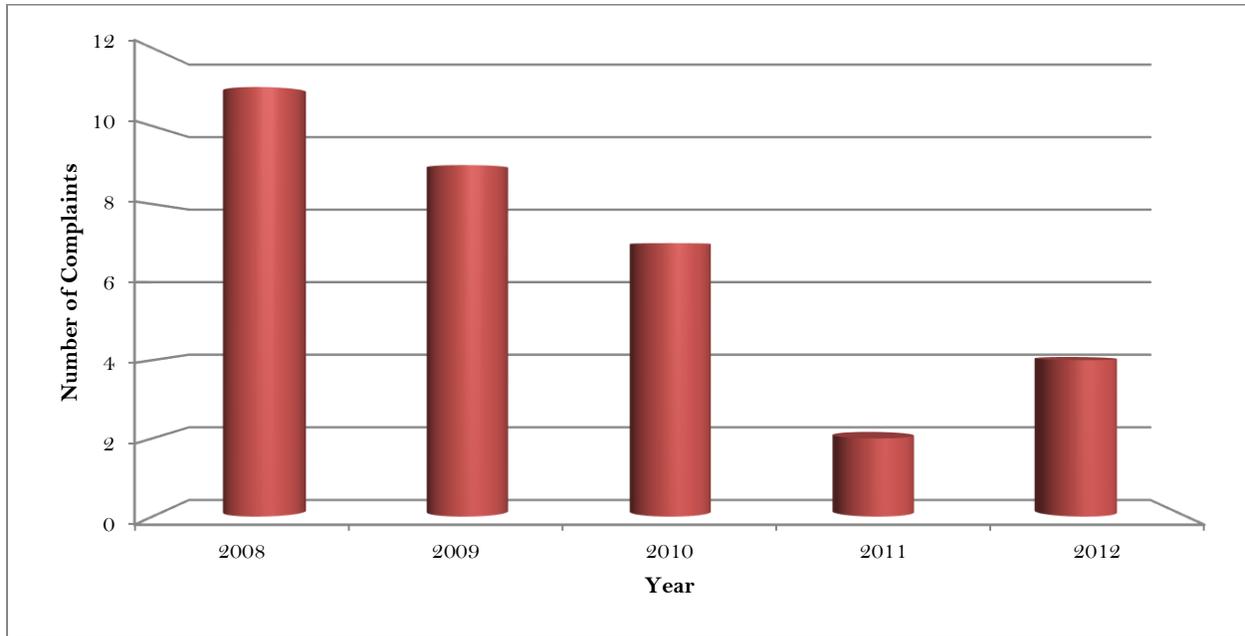


Figure 4: The noise complaints received during the period 2008 – 2012.

The trend during the first four years of the review period was a decrease in the number of noise complaints received from eleven (11) in 2008 to two (2) in 2011. The number of noise complaints received in 2012 increased from two (2) to four (4). The noise complaints received in 2012 were all new complaints. Six (6) noise investigations were conducted in 2012.

3.3 OTHER ACTIVITIES

The Air and Noise Pollution Control Section also conducted the following activities in 2012.

i. **Characterization of Ambient Air Quality in Bridgetown**

The project sought to characterize ambient air quality in Bridgetown and its environs utilizing passive air samplers. The objectives of the project included

the determination of the concentration of the criteria pollutants sulphur dioxide, nitrogen dioxide and ozone as well as volatile organic compounds including benzene, toluene, ethylbenzene and xylenes. Passive samplers were mounted at various locations in Bridgetown and control sites throughout the year.

ii. **Noise Assessment of Bridgetown**

The project sought to determine background sound levels within a specified area of Bridgetown. The objectives included the identification of sources contributing to measured sound levels. Monitoring was conducted at selected locations. The monitoring programme was suspended due to the malfunctioning of the noise meter, which was sent to the manufacturer for repairs.

4 Building Development Control

The objective of the Department's building development control programme is to verify that all building occupants enjoy a comfortable environment that satisfies national environmental health laws. This is achieved by enforcing the Health Services Act, Cap 44 and Regulations relating to building development control. The Groundwater Protection Zoning Policy and the Marine Pollution Control Act, CAP 392A are additional regulatory instruments used in the review.

The fourteen technical posts in the Building Development Control Section are:

- 1 Chief Building Development Officer
- 2 Senior Building Development Officers
- 8 Building Development Officers
- 2 Building Inspectors
- 1 Draughtsman/Technician

The administrative posts assigned to the Building Development Control Section are:

- 1 Clerk/Typist; and
- 1 Clerical Officer.

4.1 PROCESSING OF APPLICATIONS

The Building Development Control Section received a total of one thousand nine hundred and sixty-two (1962) applications in 2012. The total number of applications processed was one thousand seven hundred and thirty-three (1733). It should be noted that the applications processed in 2012 were applications received in 2012, 2011 and previous years.

4.2 OTHER ACTIVITIES

In addition to the processing building development applications, the Building Development Control Section also conducted the following activities.

i. **Septic Tank and Filter Bed Inspections**

Twenty-six (26) septic tanks and one (1) filter bed inspections were conducted to ensure these waste disposal systems were constructed correctly. Twenty-

two (22) septic tanks and one (1) filter bed were found to be satisfactory on the first visit. Revisits were made to ensure the necessary alterations were made to the four (4) septic tanks that were incorrectly constructed.

ii. **Development of a Standard Operating Procedure**

A Consultant was hired to prepare a Standard Operating Procedure for the processing of building development applications. The objective of developing a standard operating procedure included streamlining the review and approval of building applications and implementing standards for the assessment of certain aspects of applications such as mechanical ventilation. The sections of the Standard Operating Procedure prepared in 2012 which were reviewed by officers of the Building Development Section and other sections within the Department included natural, mechanical, and commercial kitchen ventilation and requirements for vehicle maintenance facilities.

iii. **Development of a Database**

In November 2011, the development of a database for the management of building development applications commenced. The database, which is intended to improve the efficiency of tracking applications and improve the management of information from the Building Development Section, was developed by the Data Processing Department. The issues with the operation of the database which were discovered during its use were addressed by the Data Processing Department. Selected information from all of building development applications processed in 2011 and a portion of the applications processed in 2010 were entered in the database by interns from the Samuel Jackman Prescod Polytechnic.

5 Derelict Buildings and Vehicles

The Derelict Buildings and Vehicles Section enforces the provisions of the Health Services Act, Cap 44 and the Health Services (Disposal and Collection of Refuse) Regulations, 1975 related to derelict buildings and vehicles respectively. These instruments are the basis for the procedures used. Notices are served on the owners of derelict buildings and vehicles. When all aspects of that process are completed and the nuisance remains, the derelict structure or derelict vehicles are removed and disposed of in the interest of public health. The cost incurred by the Department for the derelict programme may be recovered from the owner as a debt to the Crown.

The posts in the Derelict Buildings and Vehicles Section are:

- 1 Senior Environmental Inspector and;
- 3 Environmental Inspectors.

5.1 DERELICT BUILDINGS

The total number of derelict buildings demolished in 2012 was one hundred and twelve (112); their spatial distribution is shown in Figure 5.

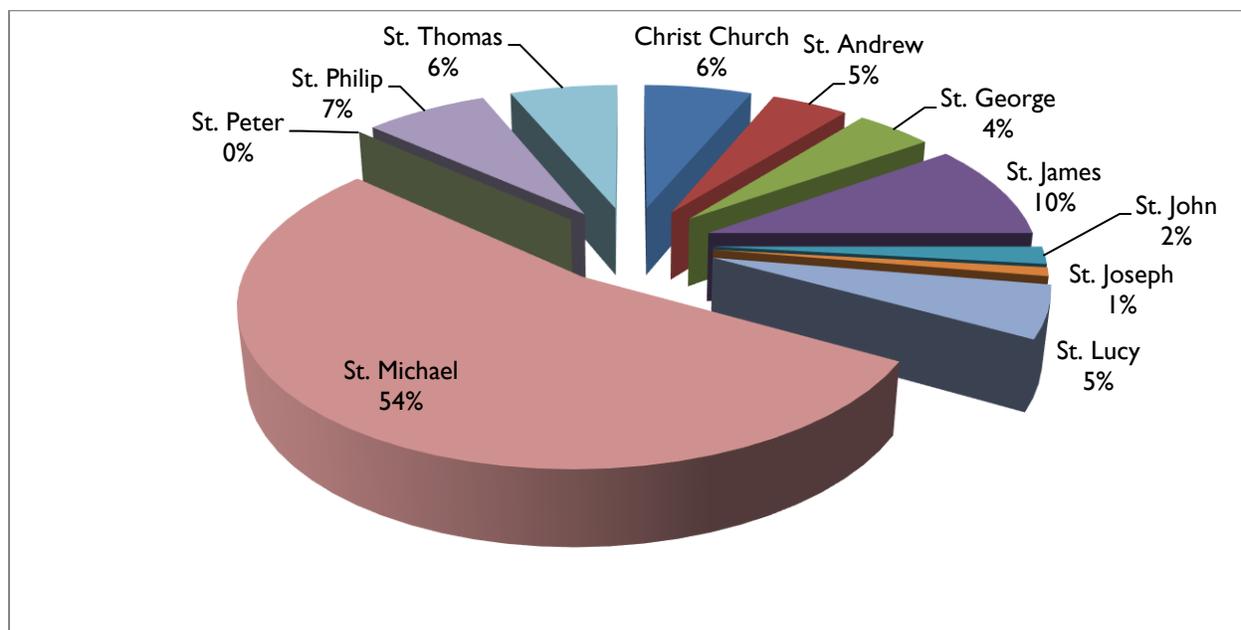


Figure 5: The spatial distribution of derelict buildings demolished in 2012.

Fifty-four per cent (54%) of the derelict buildings demolished were in the parish of St. Michael. There were no derelict buildings demolished in St. Peter in 2012. The remaining forty-six (46%) of the derelict buildings were distributed among nine parishes and the total number was within the range one (1) to eleven (11).

The total number of derelict buildings demolished each year during the period 2008 – 2012 is shown in Figure 6.

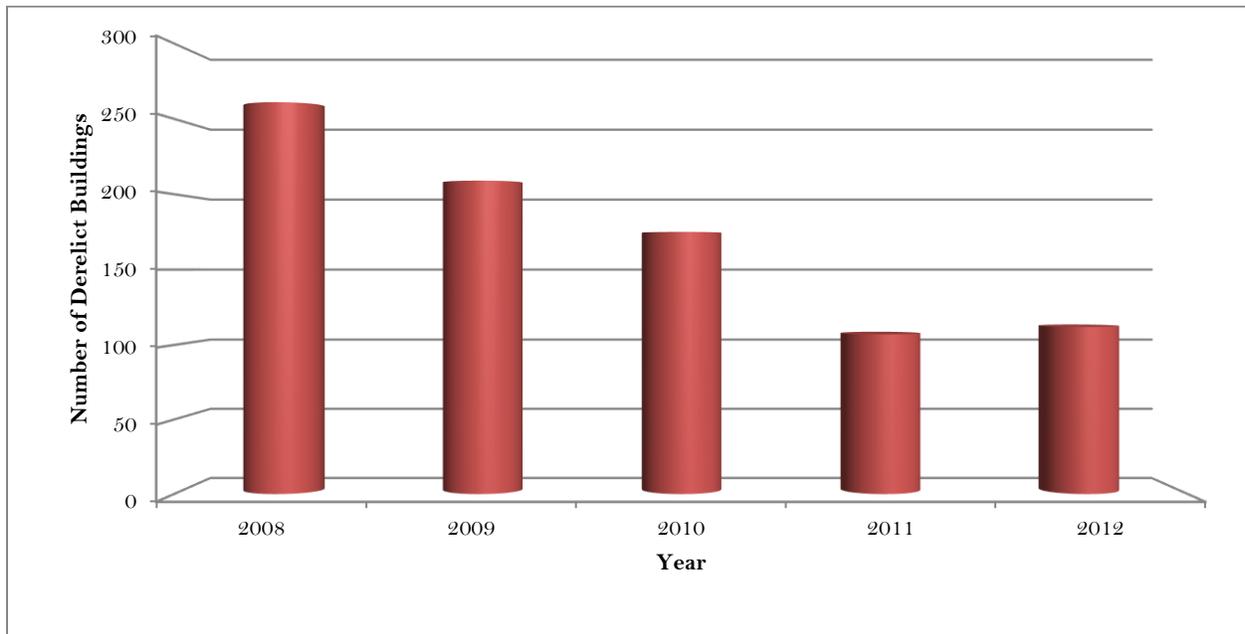


Figure 6: The derelict buildings demolished during the period 2008 – 2012.

The number of derelict buildings demolished decreased during the review period from two hundred and sixty-one (261) in 2008 to one hundred and twelve (112) in 2012. The least number of derelict buildings was recorded in 2011 which was one hundred and seven (107).

5.2 DERELICT VEHICLES

In 2012, one thousand one hundred and eighty-nine (1189) derelict vehicles were removed and disposed of. The spatial distribution of these derelict vehicles is shown in Figure 7.

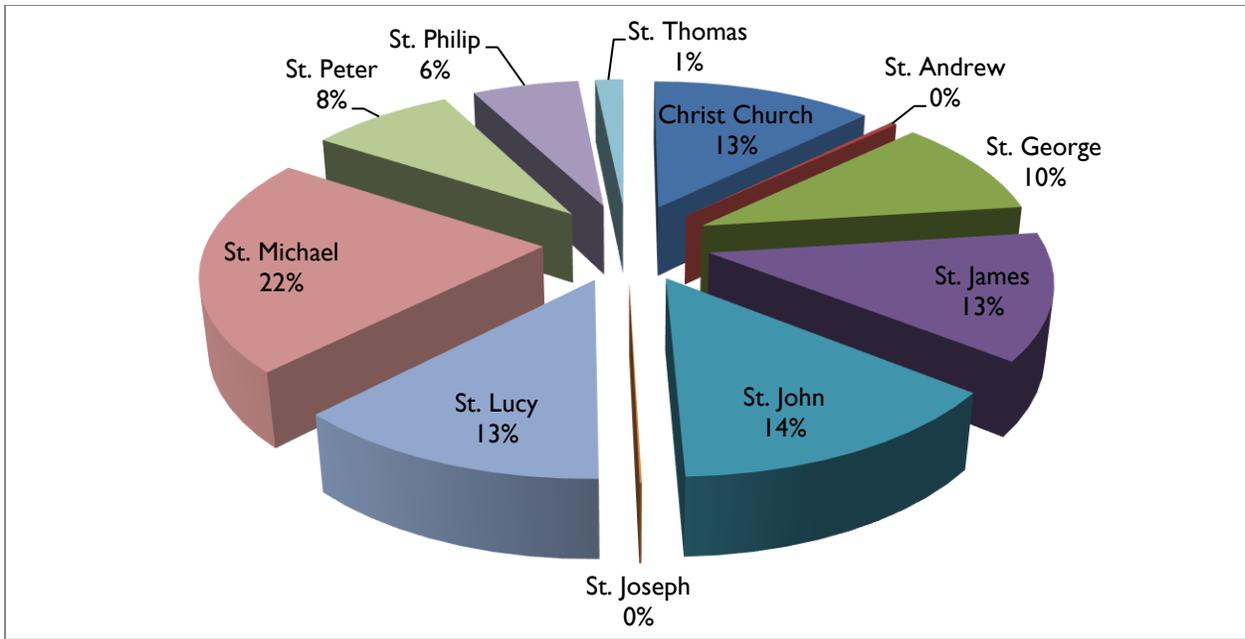


Figure 7: The spatial distribution of derelict vehicles removed and disposed of in 2012.

Seventy-four per cent (74%) of the derelict vehicles were removed from the five parishes of St. Michael, St. John, St. Lucy, St. James and Christ Church. The remaining forty per cent (40%) of the derelict vehicles were distributed among six parishes and were within the range of one (1) to one hundred and nineteen (119).

The total number of derelict vehicle removed and disposed of each year during the period 2008 – 2012 is shown in Figure 8.

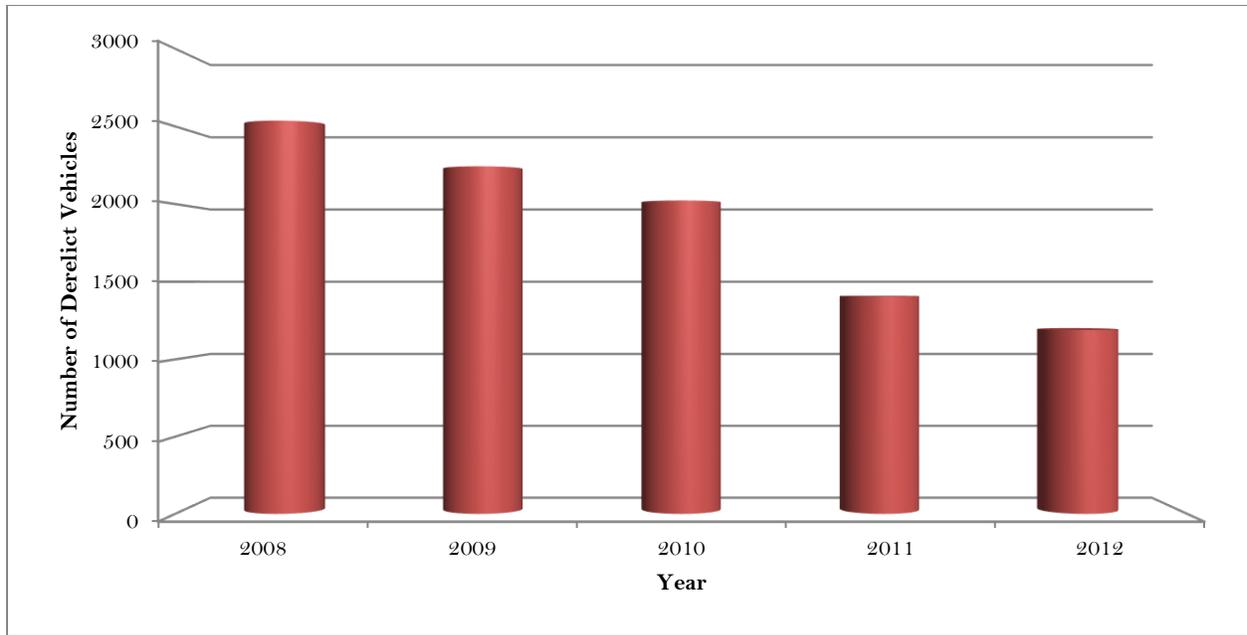


Figure 8: The derelict vehicles removed and disposed of during the period 2008 – 2012.

The total number of derelict vehicles removed and disposed of decreased each year during the review period from two thousand, five hundred and thirty-seven (2537) in 2008 to one thousand, one hundred and eighty-nine (1189) in 2012.

6 Environmental Impact Assessments

The Environmental Protection Department is one of the government agencies represented on the Environmental Impact Assessment Review Panel. The Panel is chaired by the Chief Town Planner, Town and Country Development Planning Office, and reviews and makes a recommendation regarding developments that require an environmental impact assessment.

The Chief Town Planner has the authority to require that an environmental impact assessment (EIA) be conducted for certain developments. The Physical Development Plan lists certain types of developments that require an EIA, but this list is not exhaustive. As a member of the Review Panel, the Department reviews documents and submits comments to the Town and Country Development Planning Office regarding the proposed development. The types of documents that are reviewed are:

- Terms of reference
- Environmental scoping studies
- Environmental impact assessments

In 2102, the Department received twenty-two (22) documents related to environmental impact assessments for proposed developments.

7 Marine Pollution Control

The objective of the Marine Pollution Control Section is to prevent, reduce, and control pollution of the marine environment of Barbados from whatever source. The Marine Pollution Control Section:

- i. Implements the provisions of the Marine Pollution Control Act, CAP 392A;
- ii. Investigates complaints of marine pollution; and
- iii. Develops programmes, projects, and policies to control marine pollution.

The four posts in the Marine Pollution Control Section are:

- 1 Senior Marine Pollution Officer;
- 2 Marine Pollution Officers; and
- 1 Marine Pollution Inspector.

7.1 AUDITS

The Marine Pollution Control Act, CAP 392A mandates the Department to characterize sources of marine pollution which is achieved by conducting audits. Audits are managed by the Marine Pollution Control Section, but depending on the nature of the operation, other Sections may be involved in conducting and reporting the findings of the audit. The information collected from the audits may also be used to inform policy development.

In 2012, environmental audits were conducted of the operations of two (2) beverage manufacturer, one (1) beverage distributor and two (2) paint manufacturers. Details of the establishments audited are given in Table 3.

Table 3: A summary of the environmental audits conducted in 2012.

COMPANY NAME	INDUSTRY	DATE OF AUDIT	SECTIONS ASSISTING WITH AUDIT
Barbados Bottling Company	Beverage Manufacturing	March 14, 2012	<ul style="list-style-type: none">• Air and Noise Pollution Control• Water Quality Management

COMPANY NAME	INDUSTRY	DATE OF AUDIT	SECTIONS ASSISTING WITH AUDIT
B&B Distribution	Beverage Distribution	February 02, 2012	
Pine Hill Dairy	Beverage Manufacturing	March 01, 2012	<ul style="list-style-type: none"> • Air and Noise Pollution Control • Water Quality Management
Berger Paints Limited	Paint Manufacturing	October 11, 2012	
Harris Paints	Paint Manufacturing	October 26, 2012	<ul style="list-style-type: none"> • Air and Noise Pollution Control

One (1) compliance audit was conducted on the Foursquare Rum Distillery and Heritage Park on December 6, 2012, in collaboration with the Air and Noise Pollution Control Section.

In addition to the reports for environmental and compliance audits conducted in 2012 on Foursquare Rum Distillery and Heritage Park, reports were prepared on Barbados National Terminal Company Limited, Funeral Homes and a compliance audit prepared on the Barbados Light and Power Ltd.

7.2 RESPONSE TO COMPLAINTS

The marine pollution complaints received by the Department are classified as fish kill, oil pollution, sediment, wastewater discharge and Other. The definitions of the classifications are given in Table 4.

Table 4: The definitions of the categories of marine pollution complaints.

CLASSIFICATION	DEFINITION
Fish Kill	The localized die-off of fish populations in the marine environment.
Oil Pollution	Direct releases of oil and/or hydrocarbons to the marine environment or releases which may reach and negatively impact the marine environment.

CLASSIFICATION	DEFINITION
Sediment	Direct releases of sediment to the marine environment or releases which may reach and negatively impact the marine environment.
Wastewater Discharge	The discharge of wastewater from various sources directly to the marine environment or discharges which may reach and negatively impact the marine environment.
Other	Direct releases from sources other than those listed above and releases from these sources which negatively impact the marine environment.

A total of sixteen (16) marine pollution complaints were received and investigated in 2012. The classification of these complaints is shown in Figure 9. The three categories of complaints received and investigated in 2012 were oil pollution, wastewater discharge and other which were twenty-five per cent (25%), forty-four per cent (44%) and thirty-one per cent (31%) respectively.

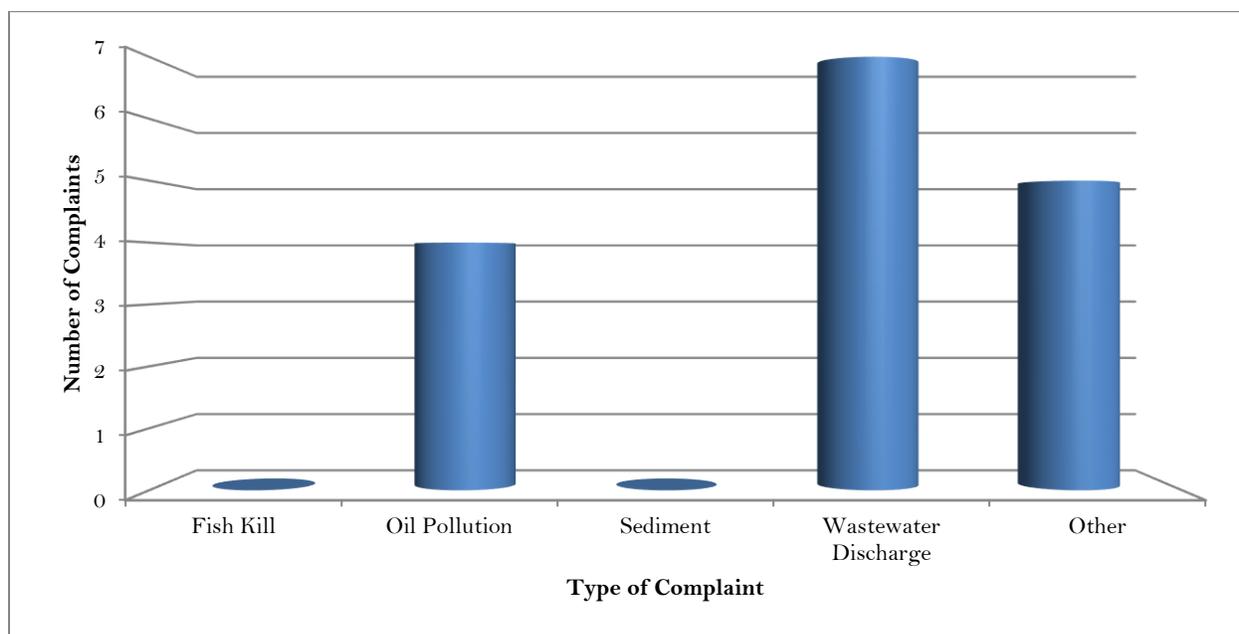


Figure 9: The marine pollution complaints received and investigated in 2012.

Figure 10 shows the marine pollution complaints received and investigated during the period 2008 – 2012.

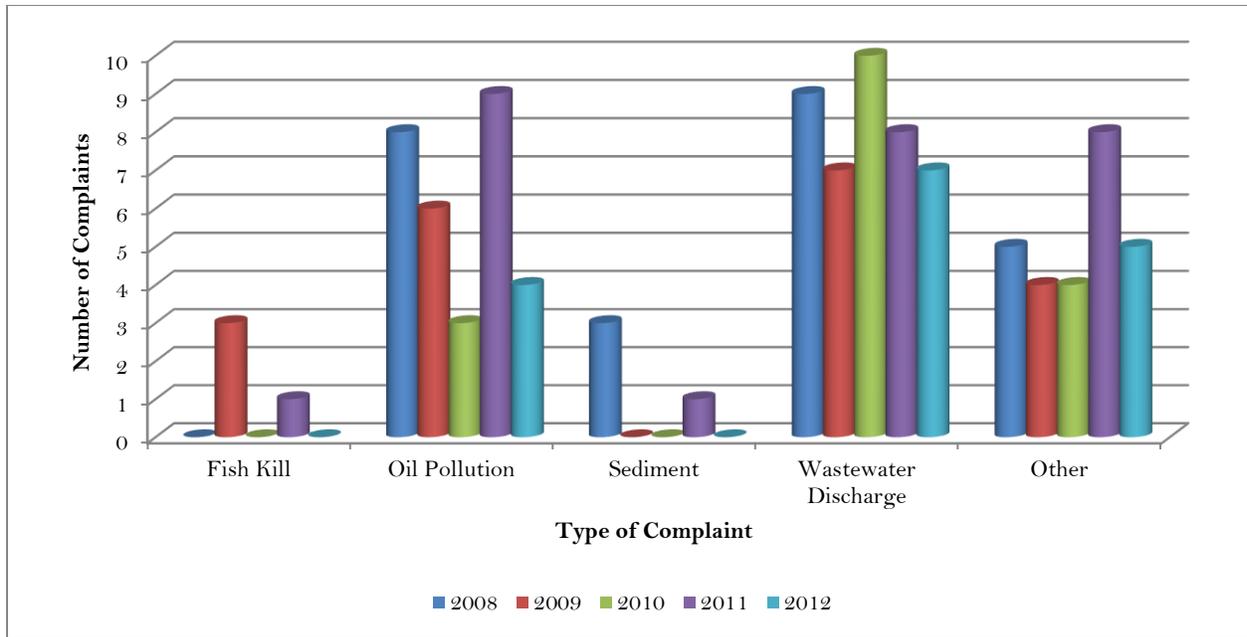


Figure 10: The marine pollution complaints received and investigated during the period 2008 – 2012.

The marine pollution complaints generally decreased over the five years. The total number of complaints received and investigated was twenty-five (25), twenty (20), seventeen (17), twenty-seven (27) and sixteen (16) in 2008, 2009, 2010, 2011 and 2012 respectively.

The majority of the marine pollution complaints were classified as oil pollution, wastewater discharge and other each year during the review period. There were three years during the review period when there were no fish kills and sediment complaints.

7.3 OTHER ACTIVITIES

The other activities of the Marine Pollution Control Section in 2012 included the following.

- i. **Oil Spill Contingency Planning**
 - a. The environmental sensitivity index maps, produced by Regional Activity/Regional Marine Pollution Emergency, Information and Training Centre on the Caribbean (RAC-REMPEITC-Caribe) were received and reviewed.

b. The National Oil Spill Response Committee decided to mandate the preparation of area-specific response plans, by Marine Oil Spill Action Plan members, for areas where significant use, transfer or storage of hydrocarbons occurs.

c. A two-day workshop, September 10 – 11, 2012, on Response Safety Best Practices was facilitated by the Department, with co-sponsorship provided by ESSO Standard Oil S.A. Ltd., Barbados. The target group for the workshop was first responders to an oil spill on a beach. The objectives of the workshop included equipping agency staff with the knowledge and skills necessary to respond to an oil spill and carry out post-spill cleanup and rehabilitations activities safely and efficiently. The workshop participants included Sanitation Service Authority, National Conservation Commission, Ministry of Public Works and Coastal Zone Management Unit.

ii. **Pesticide and Benthic Organisms /Storm Water Assessment Project**

The terms of reference for Pesticide and Benthic Organisms /Storm Water Assessment project was completed.

iii. **Marine Litter**

The annual cleanup of Morgan Lewis Beach, St. Andrew was conducted on September 15, 2012.

8 Multilateral Environmental Agreements

8.1 **STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS**

The Stockholm Convention on Persistent Organic Pollutants was adopted on May 22, 2001, in Stockholm, Sweden and entered into force on May 17, 2004. The Stockholm Convention is a global treaty to protect human health and the environment from persistent organic pollutants (POPs), which are a group of chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health and/or on the environment.

The possible health effects of exposure to POPs include birth defects, dysfunctional immune and reproductive systems, and damages to the central and peripheral nervous system.

There are twenty-two (22) chemicals listed as POPs which are categorized as pesticides, industrial chemicals, and by-products.

POPs were recognized as a global problem which requires global cooperation since POPs can be transported over long distances. The Stockholm Convention requires parties to the Convention to take measures to eliminate or reduce the release of POPs into the environment. Barbados acceded to the Stockholm Convention on June 07, 2004.

8.1.1 **GLOBAL MONITORING PLAN**

The objective of the Global Monitoring Plan for POPs is to evaluate the effectiveness of the Stockholm Convention, which is achieved by the collection of comparable monitoring data on POPs for all regions to identify changes in concentration and the regional and global environmental transport of POPs. The core media for monitoring POPs under the Global Monitoring Plan are air, human milk and human blood.

The Global Atmospheric Passive Sampling (GAPS) Network is a global research survey that monitors the presence of POPs and other priority pollutants in the air. The GAPS Network allows the comparison of monitoring data from sites around the world and facilitates the identification of seasonal and long term trends. The results of the GAPS Network are reported to the Global Monitoring Plan of the Stockholm Convention.

The Department continued to participate in the GAPS Network in 2012. The monitoring site is located at Ragged Point St. Philip and the Department was responsible for the deployment and retrieval of the passive samplers quarterly. Samplers were shipped to Environment Canada for analysis.

The Department also endorsed a regional project proposal to the Global Environment Facility for continuing the regional support for the Global Monitoring Plan under the Stockholm Convention in Latin America and the Caribbean Region. The project is designed to assist countries in Latin America and the Caribbean Region to fulfil their obligations under the Stockholm Convention.

8.1.2 CARIBBEAN HUB – CAPACITY BUILDING RELATED TO MULTILATERAL ENVIRONMENTAL AGREEMENTS IN AFRICAN, CARIBBEAN AND PACIFIC COUNTRIES PROJECT

The Caribbean Hub – Capacity Building Related to Multilateral Environmental Agreements (MEAs) in Africa, Caribbean and Pacific Countries Project provided an internship facility to participating countries. The internship facility was managed by the CARICOM Secretariat and provided funds for the payment of interns for three months, to conduct activities that support the implementation of MEAs at a regional and national level.

The Department submitted an expression of interest to access the internship facility to update the POPs pesticides, polychlorinated biphenyls and dioxins and furans inventories and where necessary include POPs listed under the Convention after the inventories were completed in 2004. The expression of interest was accepted by the CARICOM Secretariat and two interns were selected to carry out the update of the POPs inventories.

The interns commenced work on October 22, 2012, and were scheduled to complete the update of the inventories by January 11, 2013.

8.2 STRATEGIC APPROACH TO INTERNATIONAL CHEMICALS MANAGEMENT

The Strategic Approach to International Chemicals Management (SAICM) is a policy framework to foster the sound management of chemicals adopted by the International Conference on Chemical Management on February 6, 2006, in Dubai, United Arab Emirates. The overall objective of SAICM is the sound management of chemicals throughout their life cycle so that by 2020, chemicals are produced and used in ways that minimize significant adverse impacts on human health and the environment, as agreed at the 2002 Johannesburg World Summit on Sustainable Development.

The Overarching Policy Strategy for SAICM provides, among other things, the objectives of SAICM which are grouped under the themes of risk reduction; knowledge and information; governance; capacity building and technical cooperation; and illegal international traffic.

The Department is the focal point for the SAICM.

8.2.1 NATIONAL IMPLEMENTATION STRATEGY FOR THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

The objective of the project to develop a National Implementation Strategy for the GHS is to build capacity to facilitate a coordinated national strategy for implementing GHS, which supports the implementation of SAICM. The National GHS Implementation Strategy is intended to outline the goals, activities and recommended implementation mechanisms for the actions needed to achieve effective implementation of the GHS in the four sectors that would be affected by the GHS.

The project activities were:

1. Project coordination;
2. Preparation of a draft National GHS Implementation Strategy;
3. Provision of training on the GHS;
4. Supporting activities such as awareness-raising and training for civil society and industry;
5. Organization of a national GHS Workshop and;
6. Regional and international outreach and communication.

The following activities were conducted under the project in 2012.

- i. The coordinating committee reviewed and commented on the following reports.
 - A report of the analysis of interviews with stakeholders in the agriculture, industry, transport and consumer sectors which was intended to obtain information on the understanding of GHS hazard communication elements.
 - An assessment of the legal framework in Barbados to identify possible changes to implement the GHS.
- ii. A gap analysis, which was prepared by a consultant, was completed and accepted by the Department. The purpose of the gap analysis was to compare the existing situation, depicted in the situation analysis against what should be in place to implement the GHS.
- iii. The final draft of the National Implementation Strategy was reviewed by the Department and the coordinating committee before the National GHS Workshop.
- iv. The National GHS Workshop was held November 12 – 13, 2012. The purpose of the Workshop was to allow stakeholders to review the draft National Implementation Strategy, prioritize strategies, finalise action plans and discuss any other issues related to the implementation of the GHS in Barbados.
- v. The report on the National GHS Workshop was submitted by the consultant and accepted by the Department.
- vi. The Department commenced the preparation of an advertisement regarding the GHS to be aired on television.
- vii. The Department sponsored a poster competition organized by the National Advisory Committee on Occupational Health.

9 Solid Waste and Hazardous Substances

The Solid Waste and Hazardous Substances Section regulates government-operated solid waste disposal facilities and hazardous substances. The activities of the Solid Waste and Hazardous Substances Section include:

- i. Regulating government-operated solid waste disposal sites;
- ii. Regulating the disposal of special waste;
- iii. Providing advice on the disposal of hazardous substances;
- iv. Regulating the importation of radioactive materials and;
- v. Developing policies for the management of hazardous substances.

The posts in the Solid Waste and Hazardous Substances Section are:

- 1 Senior Environmental Protection Officer and;
- 1 Environmental Protection Officer.

In March 2012, an officer was temporarily appointed to the post of Environmental Protection Officer.

9.1 RESPONSE TO COMPLAINTS

The complaints received by the Solid Waste and Hazardous Substances Section are classified as illegal dumping or miscellaneous. Thirteen (13) complaints were received in 2012 which were all classified as miscellaneous. Examples of the complaints received were the release of a substance suspected to be calcium carbide and environmental impacts of a recycling operation.

9.2 SOLID WASTE

9.2.1 DISPOSAL SITE MONITORING

The Department monitors the operations of the following solid waste disposal sites operated by the Sanitation Service Authority:

- i. Mangrove Pond Landfill, St Thomas and;
- ii. Bulky Waste Disposal Facility, St. Thomas.

A new cell at the Mangrove Pond Landfill, Cell 4, was officially opened on July 8, 2012.

The Sanitation Service Authority also operates two sites for the disposal of construction and demolition waste. These sites are located at the following privately-owned quarries:

- i. Edgecumbe quarry, Bentley Tenantry, St. Philip and;
- ii. Parsons' quarry, Foster Hall, St. George.

The Parsons' quarry and Bulky Waste Disposal Facility were closed June 8, 2012, and June 3, 2012, respectively. These sites had been in operation since May 29, 2006, in the case of Parsons' quarry and August 2, 1996, in the case of the Bulky Waste Disposal Facility.

Monthly inspections of the four (4) solid waste disposal sites were conducted by the Department in 2012. The use of an inspection form, which seeks to standardize the criteria used to assess disposal sites, was implemented in June. The main findings of the inspections are summarized in Table 5.

Table 5: Summary of the findings of waste disposal sites inspections.

DISPOSAL SITE	OBSERVATIONS
Mangrove Pond Landfill	<ul style="list-style-type: none"> • The placement of select waste in Cell 4 commenced in January and the cell was fully operational in December. • Equipment failure limited the operations at the site in October. • The leachate collection facility was not operational in October. • The disposal of liquid waste was restricted in December due to saturated conditions.
Bulky Waste Disposal Facility	<ul style="list-style-type: none"> • Equipment failure resulted in delays in compaction and levelling of waste. • Metal scavenging was occurring on the site. • There were instances of illegal dumping along the western and eastern perimeters of the site.
Edgecumbe quarry	<ul style="list-style-type: none"> • There were instances of illegal dumping along the

DISPOSAL SITE	OBSERVATIONS
	western perimeter of the site.
	<ul style="list-style-type: none"> • There was no dedicated equipment on site; therefore levelling waste did not always take place promptly. • The site was approaching its maximum capacity.
Parsons' quarry	<ul style="list-style-type: none"> • There was no dedicated equipment on site; therefore levelling waste did not always take place promptly.

At the time of preparation of this report, no data was available on the quantity of waste disposed at the solid waste disposal sites operated by Sanitation Service Authority.

9.3 HAZARDOUS SUBSTANCES

9.3.1 DISPOSAL SITE MONITORING

The Department monitors the operations of the following waste disposal sites operated by the Sanitation Service Authority:

- i. Asbestos Disposal Site, St. Philip and;
- ii. Blood and Grease Disposal Site, St. Peter.

Monthly inspections of the two (2) waste disposal sites were conducted by the Department in 2012. The use of an inspection form was also implemented for the routine inspection. The main findings of the inspections are summarized in Table 6.

Table 6: Summary of the main findings of waste disposal sites inspections.

DISPOSAL SITE	OBSERVATIONS
Asbestos Disposal Site	<ul style="list-style-type: none"> • There was no dedicated equipment on site; therefore covering waste did not always take place on time. • The site was approaching its maximum capacity.
Blood and Grease Disposal Site	<ul style="list-style-type: none"> • The site was not adequately secured. • The site was saturated in January. • Equipment failure resulted in delays covering waste and excavating cells. • The site access road was in poor condition.

At the time of preparation of this report, no data was available on the quantity of waste disposed at the solid waste disposal sites operated by Sanitation Service Authority.

9.3.2 HAZARDOUS AND SPECIAL WASTE DISPOSAL

The Department received thirty-four (34) requests for advice for the disposal of hazardous and/or special waste. Thirty-three (33) of the requests received were from commercial establishments and one (1) request was made by a householder.

One hundred and eleven (111) requests for permission for the disposal of hazardous and/or special waste were received from commercial establishments in 2012.

9.3.3 USED OIL MANAGEMENT

There was no information on the reuse of used automotive oil in 2012. The lone company that utilized used automotive oil as fuel ceased operations in 2011.

9.3.4 IMPORT OF RADIOACTIVE MATERIALS

In 2012, the Department received thirty-four (34) applications for the importation of radioactive materials. Thirty (30) of the applications received were for the importation of radioactive substances for medical purposes and the remaining four (4) applications were for industrial purposes.

The two (2) importers of radioactive substances for medical purposes were the Queen Elizabeth Hospital and Nuclear Medicine. The radioactive substances imported included sodium iodide, molybdenum, cobalt-60, and technetium.

The radioactive materials importation application form was modified and the use of the new form implemented in March 2012.

10 Water Quality Management

The Water Quality Management Section has the mandate of monitoring the quality of Barbados’ drinking water supply and nearshore marine water for recreational use. The primary responsibilities of the Water Quality Management Section are to monitor:

- i. The quality of groundwater from potable and agricultural supply wells;
- ii. Discharges from wastewater treatment facilities;
- iii. The quality of nearshore marine water from several, south and west coast beaches; and
- iv. Research activities that may negatively impact groundwater resources.

The Water Quality Management Section is staffed by:

- 1 Senior Environmental Protection Officer and;
- 2 Environmental Protection Officers.

10.1 GROUNDWATER MONITORING

The Department conducts a joint groundwater monitoring programme with the Barbados Water Authority. Sampling was conducted at nineteen (19) supply wells and two (2) springs utilized for potable water, eight (8) supply wells used for agricultural purposes and five (5) springs. The frequency of sampling was monthly.

The groundwater monitoring results were compared to the World Health Organization (WHO) Drinking Water Guidelines to ensure the quality of the water is in compliance with drinking water standards. Table 7 provides the standard, sources and implications of five pollutants which are considered indicators of pollution and are discussed in the report.

Table 7: The possible sources, implications, and WHO drinking water guideline value for selected pollutants.

Parameter	Standard	Sources	Implications
Chlorides	250 mg/l	In excessive amounts, it can be an indicator of	High concentrations may give water an objectionable taste

Parameter	Standard	Sources	Implications
		saline intrusion or pollution from industrial waste or sewage.	and can be corrosive to metal distribution pipes resulting in the release of heavy metal ions into the water.
Faecal Coliform	0 CFU/100 ml	Indicator of faecal contamination from warm-blooded animals.	Gastrointestinal illness and other waterborne diseases.
Nitrate expressed as Nitrogen (Nitrate-N)	10 mg/l	Indicator of pollution from agriculture, and domestic and industrial wastewater	May cause methemoglobinemia particularly in infants less than six months of age.
Sulphates	500 mg/l	General indicator of pollution.	High concentrations may cause transitory diarrhoea.
Total Dissolved Solids	Taste Thresholds <300mg/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.

10.1.1 DRINKING-WATER SUPPLY

The drinking water supply wells and springs monitored in 2012 and the catchments in which they are located are shown in Table 8.

Table 8: Drinking water supply wells and springs monitored in 2012.

CATCHMENT	DRINKING-WATER SUPPLY SOURCES	
Belle	Applewhaites	New Market
	Applewhaites Well Field	Sweet Vale #1
	Belle	Sweet Vale #2
	Constant	Waterford
Hampton	Bowmanston	Hampton
	Carrington	
West Coast	Alleynedale	Molyneux
	Ashton Hall	Trents
	Carlton	Villa Marie
	Haymans	The Whim
Springs	Benn	Codrington College

10.1.1.1 Chlorides

Figure 11 illustrates the average chloride concentration at the drinking water supply wells, which were all below the standard of 250 mg/l. The greatest concentrations were at supply wells located in the West Coast catchment and Hampton supply well.

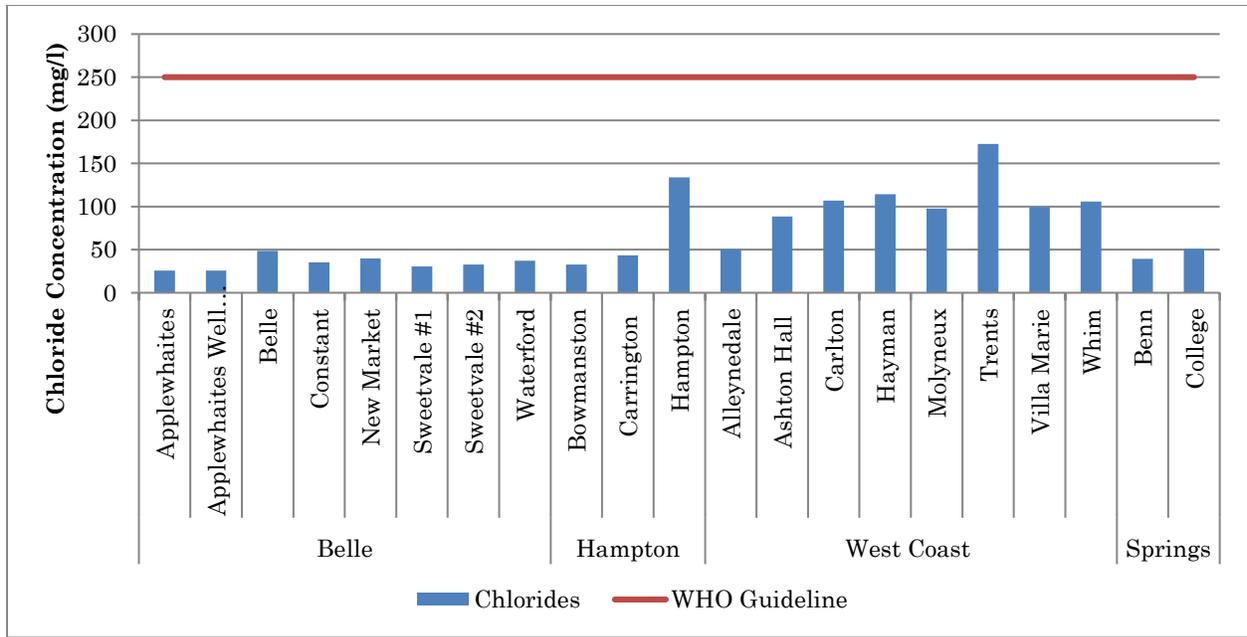


Figure 11: The average chloride concentration at drinking water supply wells and springs in 2012.

The average chloride concentration over the five years of 2008 to 2012 at drinking supply wells is shown in Figure 12.

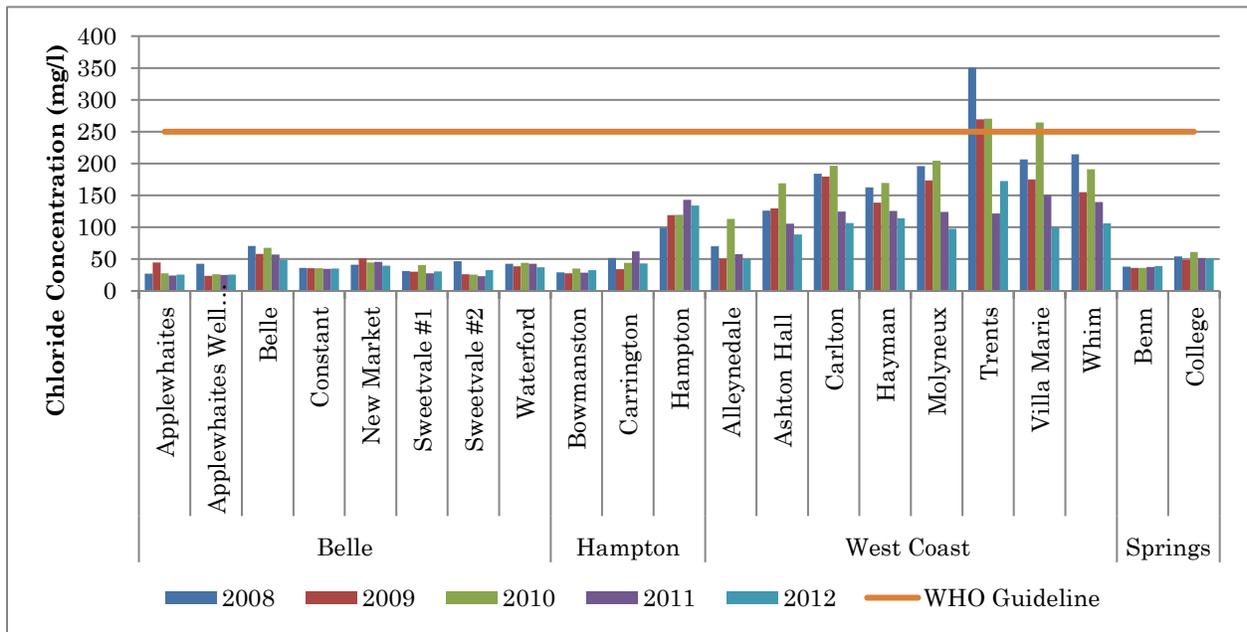


Figure 12: The average chloride concentration at drinking water supply wells and springs during the period 2008 – 2012.

The supply wells in the West Coast catchment and Hampton supply well had the highest concentrations during the review period and the standard was exceeded at Trents in 2008, 2009, and 2010 and Villa Marie in 2010.

10.1.1.2 Nitrate expressed as Nitrogen (Nitrate-N)

The average Nitrate-N concentration at drinking water supply sources is shown in Figure 13.

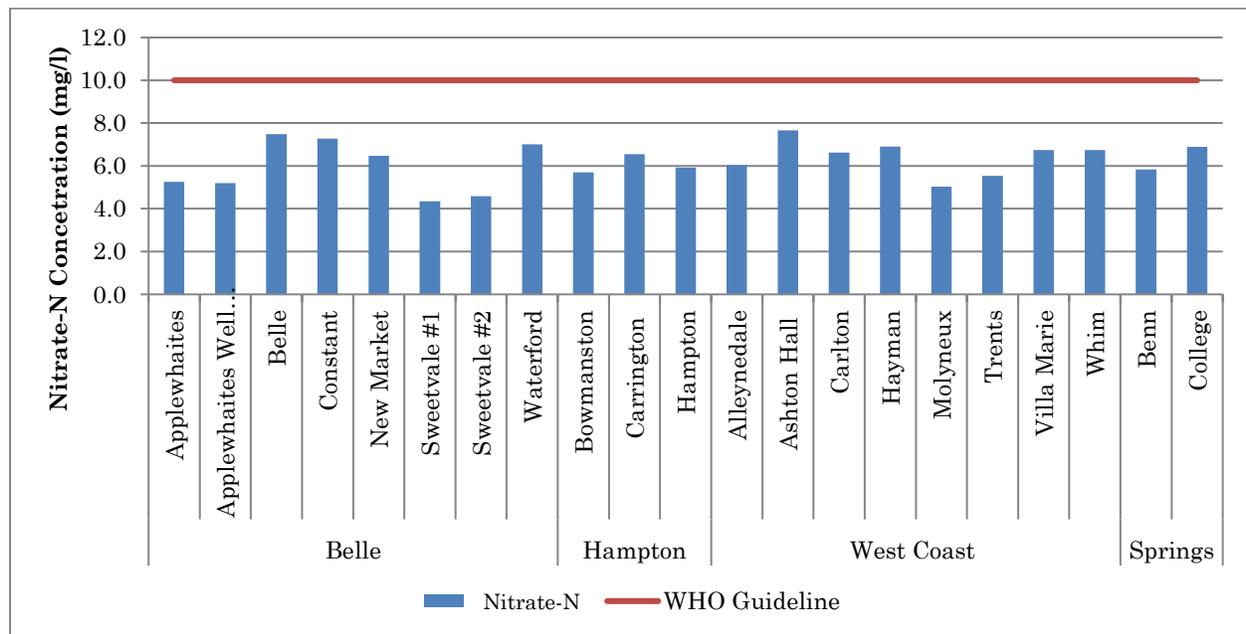


Figure 13: The average Nitrate-N concentration at drinking water supply wells and springs in 2012.

The average Nitrate-N concentration did not exceed the standard of 10 mg/l during 2012. The values were within the range of 5 – 8 mg/l at all supply sources.

The average Nitrate-N concentration is shown on Figure 14 for drinking water supply sources during the period 2008 – 2012.

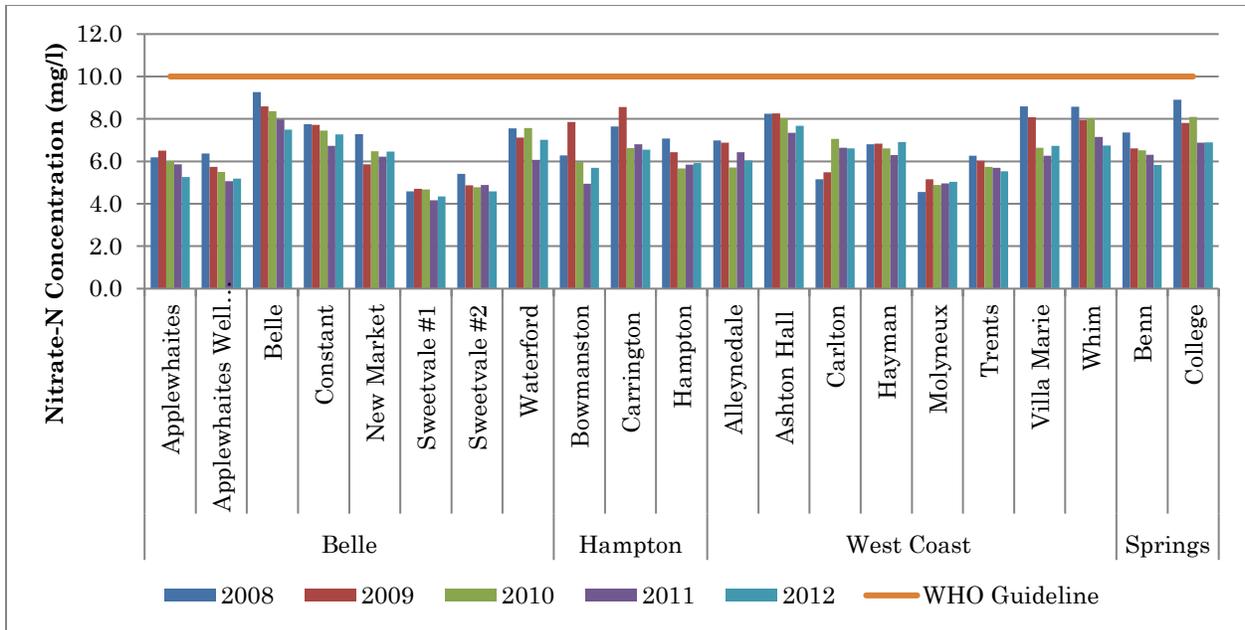


Figure 14: The average Nitrate-N concentration at drinking water supply wells and springs during the period 2008 – 2012.

During the review period, the average Nitrate-N concentration was below the standard at all drinking water sources.

10.1.1.3 Total Dissolved Solids

The average total dissolved solids concentration is shown in Figure 15: The average total dissolved solids concentration at drinking water supply wells and springs in 2012. Figure 15 for drinking water supply sources in 2012.

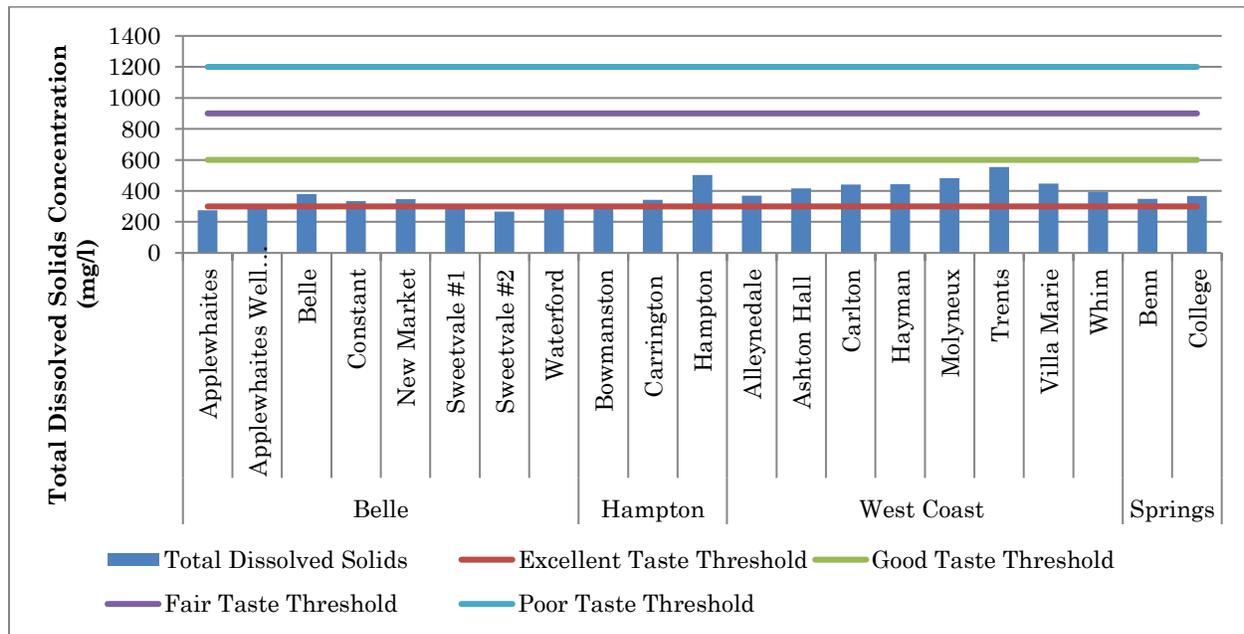


Figure 15: The average total dissolved solids concentration at drinking water supply wells and springs in 2012.

The five supply wells that met the excellent taste threshold for total dissolved solids were Applehaites, Applehaites Well Field, Sweetvale #1, Sweetvale #2, and Waterford in the Belle catchment. The average total dissolved solids for all other drinking water supply sources were within the range of 300 – 600 mg/l of the good taste threshold. The highest values were recorded at Hampton and Trents supply wells and were 503 mg/l and 554 mg/l respectively.

The average total dissolved solids concentration for the period 2008 – 2012 is shown in Figure 16.

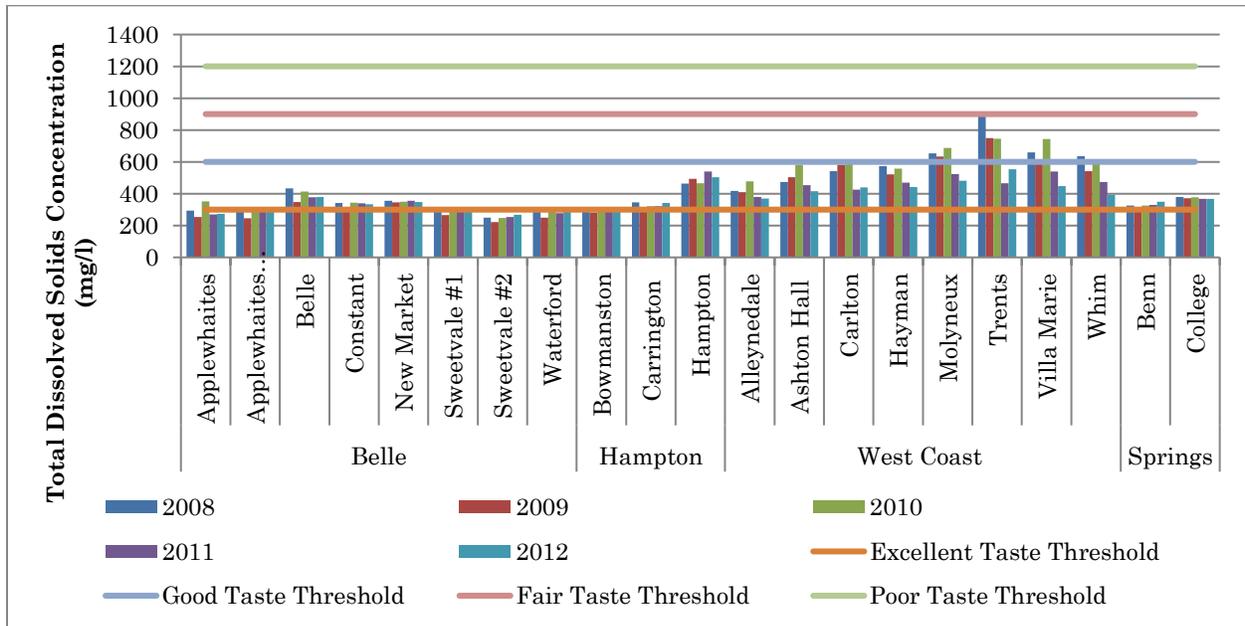


Figure 16: The average total dissolved solids concentration at drinking water supply wells and springs during the period 2008 – 2012.

The supply wells where the average total dissolved concentration did not exceed the excellent taste threshold of 300 mg/l during the five years were Applewaites Well Field, Sweetvale #2, and Waterford. The average total dissolved solids were higher at Hampton supply well and the well in the West Coast catchment. The good taste threshold of 600 mg/l was exceeded by Molyneux, Trents, Villa Marie, and Whim in the West Coast catchment. All other drinking water supply sources were within the range 300 – 600 mg/l for a good taste threshold during the five years.

10.1.1.4 Faecal Coliform

The average faecal coliform counts for the drinking water supply sources are shown in Figure 17.

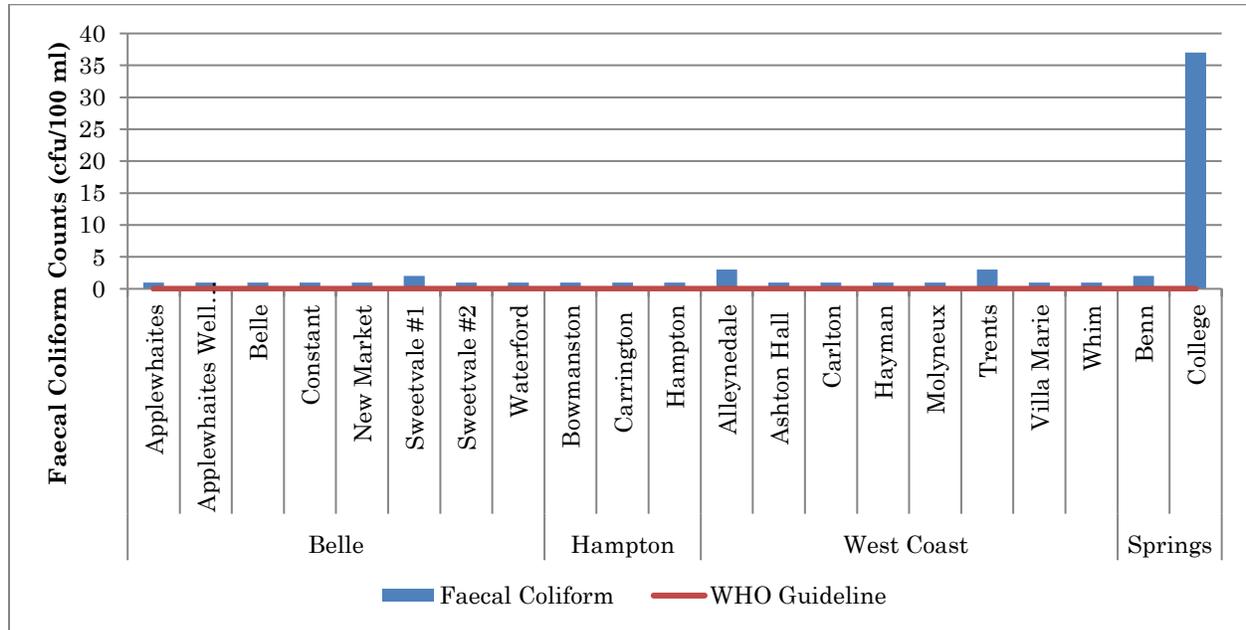


Figure 17: The average faecal coliform counts at drinking water supply wells and springs in 2012.

The WHO drinking water guideline value of 0 cfu/100ml was exceeded at all sources in 2012. The average faecal coliform counts were within the range of 1 – 3 cfu/100ml for all sources except College spring where the average was 37 cfu/100ml.

It should be noted that the sampling location at the following sources is before the chlorination point; therefore the results of faecal coliform analysis cannot be used to assess the effectiveness of chlorination.

- Belle Catchment – Applewaites, Applewaites Well Field, Sweetvale #1
- West Coast Catchment – Molyneux P.S, Villa Marie
- Springs – College Spring

The average faecal coliform counts at the drinking water supply sources during the five year review period are shown in Figure 18.

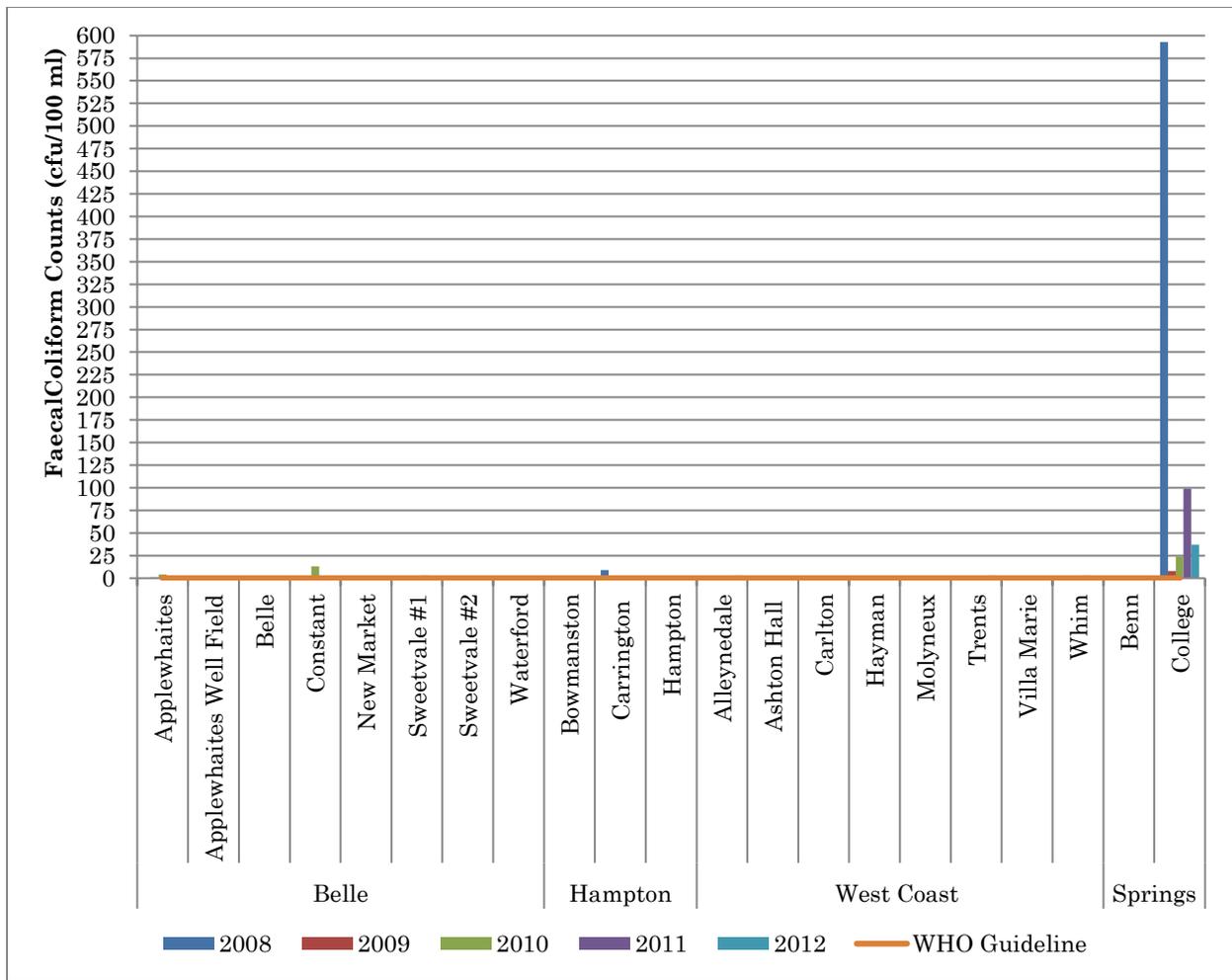


Figure 18: The average faecal coliform counts at drinking water supply wells and springs during the period 2008 – 2012.

During the five year review period, there were instances where the average faecal coliform count exceeded the WHO drinking water guideline value of 0 CFU/100ml at all of the drinking water supply sources. The standard was exceeded in 2012 only at Carlton, Hayman and Villa Marie supply wells in the West Coast catchment. The average faecal coliform counts were within the range of 0 – 5 CFU/100ml at all sources except Constant in the Belle catchment and Carrington in the Hampton catchment where values of 13 CFU/100 ml and 9 CFU/100ml respectively were recorded and College spring where the maximum and minimum values were 8 CFU/100ml and 593 CFU/100ml respectively.

10.1.1.5 Sulphates

The average sulphate concentration at drinking water supply wells is shown in Figure 19. The average sulphate concentration at all drinking water supply sources complied with the WHO guideline value of 500 mg/l in 2012, and was also below 70 mg/l.

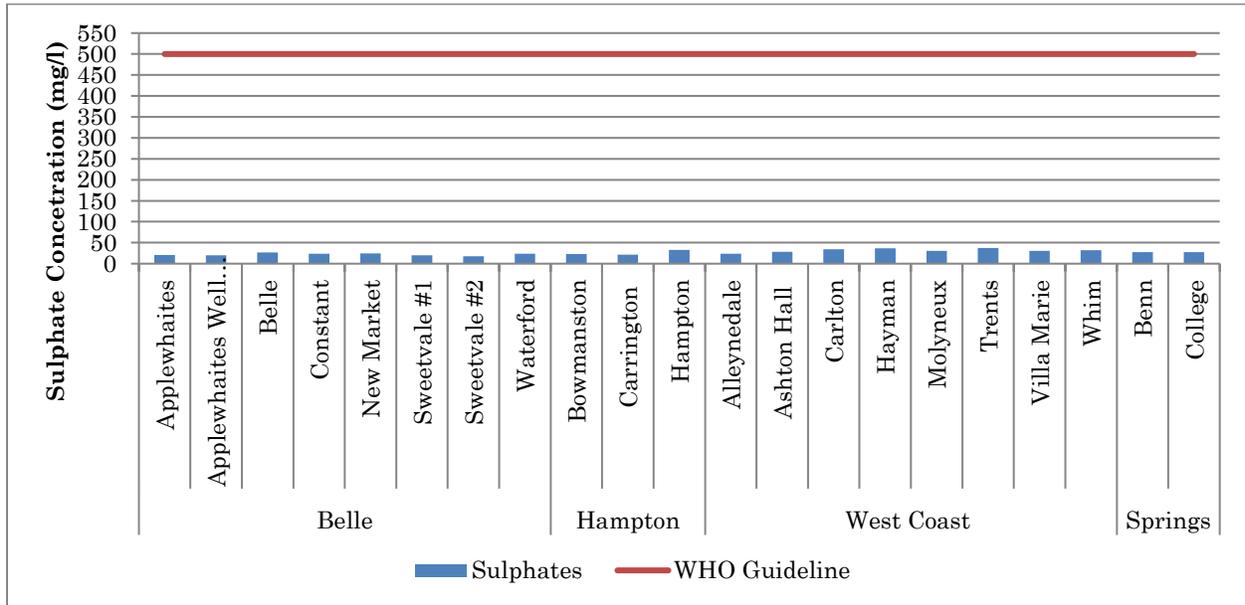


Figure 19: The average sulphate concentration at drinking water supply wells and springs in 2012.

The average sulphate concentration for the period 2008 – 2012 is shown in Figure 20 for the drinking water supply sources.

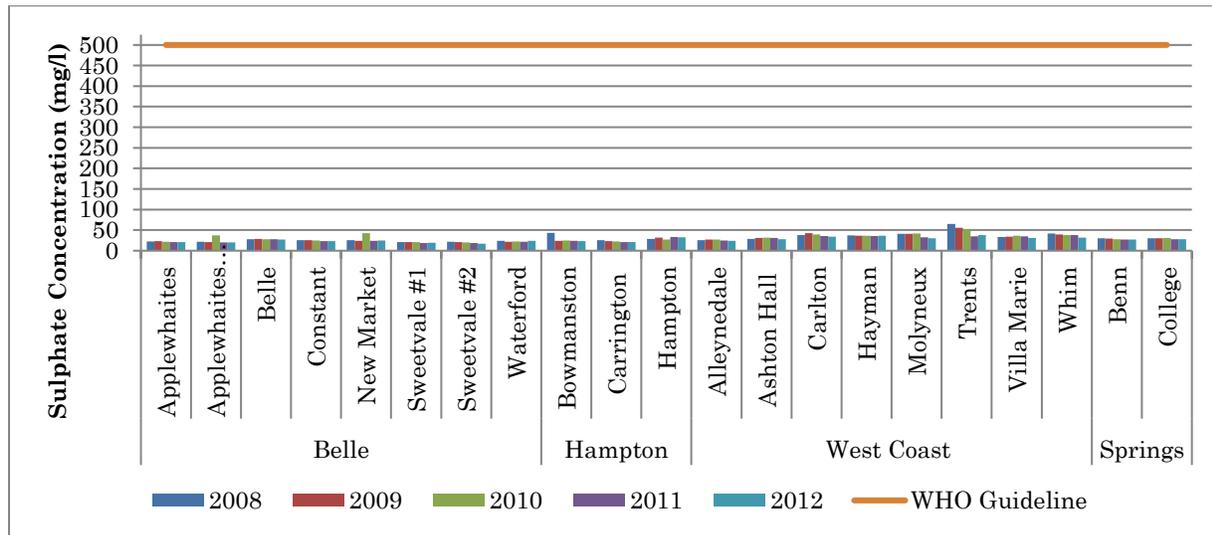


Figure 20: The average sulphate concentration at drinking water supply wells and springs during the period 2008 – 2012.

The WHO guideline value was met at all supply sources each year during the review period. There were very small variations in the average sulphate concentration at the supply sources during the five years.

10.1.2 AGRICULTURAL SUPPLY

The agricultural supply wells and springs monitored in 2012 and the catchments in which they are located are shown in Table 9: The agricultural supply wells and springs monitored in 2012. Table 9.

Table 9: The agricultural supply wells and springs monitored in 2012.

CATCHMENT	AGRICULTURAL SUPPLY SOURCES	
Belle	Engine Field	King's Road
	Brighton	Marchfield
Hampton	Edgecumbe	National Hatcheries
	Kendal	Pool Plantation

CATCHMENT	AGRICULTURAL SUPPLY SOURCES	
Springs	Bath	Pot House
	Fortesque	Three Houses
	Porey	

The results of the monitoring of agricultural wells and springs were also compared to the WHO drinking water guidelines even though they are not utilized as sources of drinking water. The comparison of the results to the standards facilitates the determination of any trends which may negatively impact on the groundwater resources.

It should also be noted that the springs are utilized for domestic purposes by some groups in the population.

10.1.2.1 Chlorides

The average chloride concentration at agricultural supply wells and springs monitored in 2012 is shown in Figure 21.

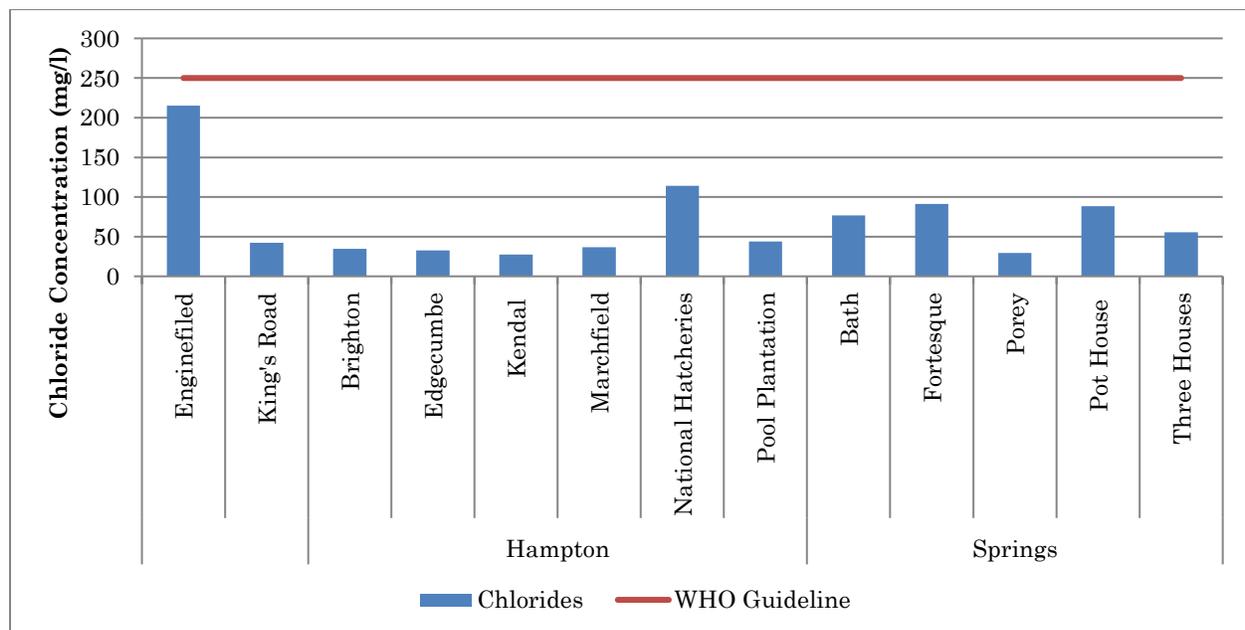


Figure 21: The average chloride concentration at agricultural supply wells and springs in 2012.

The average chloride concentration did not exceed the WHO drinking water guideline value of 250 gm/l at any of the non-potable sources in 2012. Engine field in the Belle catchment had the highest average which was 215 mg/l. The average chloride concentration exceeded 100 mg/l at only one other source which was Natural Hatcheries in the Hampton Catchment.

Figure 22 shows the average chloride concentration during the period 2008 – 2012 for the agricultural supply wells and springs.

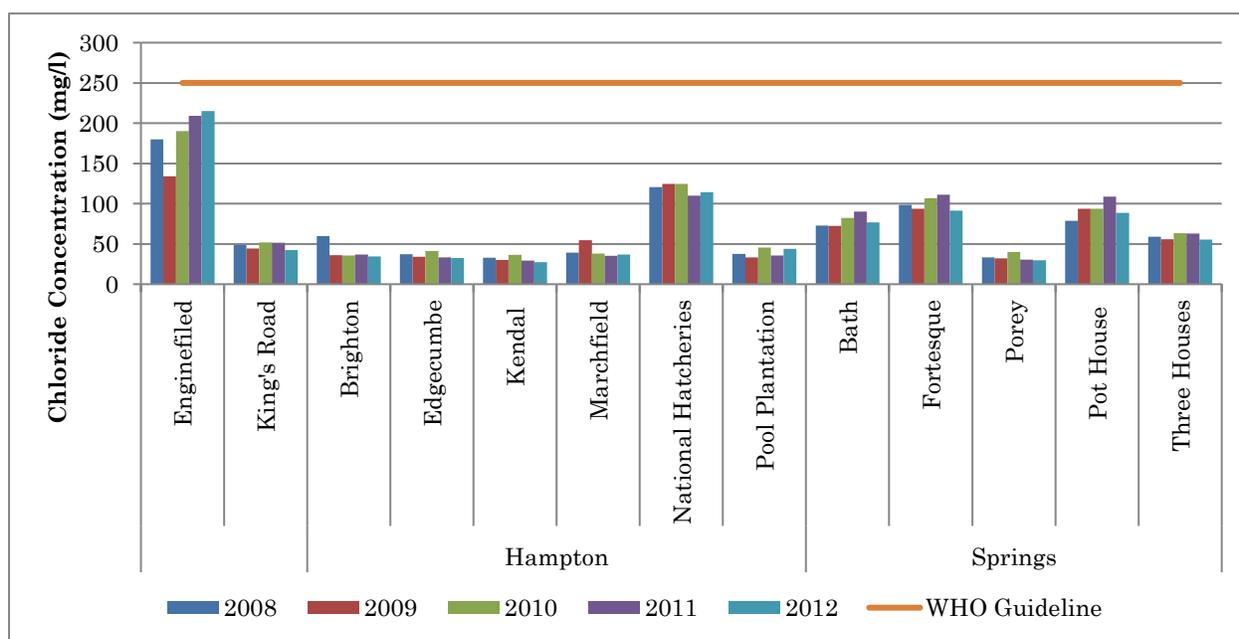


Figure 22: The average chloride concentration at agricultural supply wells and springs during the period 2008 – 2012.

The average chloride concentration did not exceed the WHO guideline value for chlorides during the five year review period. The highest values were recorded each year at Enginefield supply well in the Belle Catchment and National Hatcheries in the Hampton catchment.

10.1.2.2 Nitrate expressed as Nitrogen (Nitrate-N)

The average Nitrate-N concentration at agricultural supply wells and springs is shown in Figure 23.

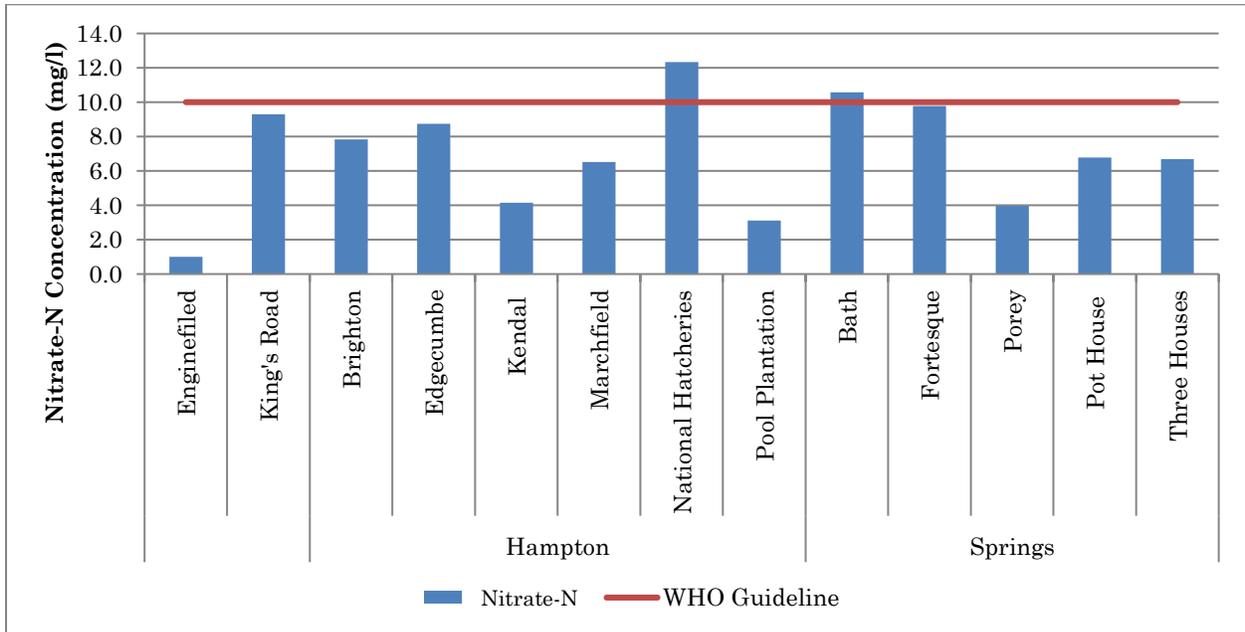


Figure 23: The average Nitrate-N concentration at agricultural supply wells and springs in 2012.

The average Nitrate-N concentration exceeded the WHO drinking water guideline at National Hatcheries supply well in the Hampton catchment and Bath spring in 2012. The average value exceeded 8 mg/l at King's Road in the Belle Catchment, Edgecumbe in the Hampton catchment and Fortesque spring.

The average Nitrate-N concentration at the non-potable supply sources during the five year period 2008 – 2012 is shown in Figure 24.

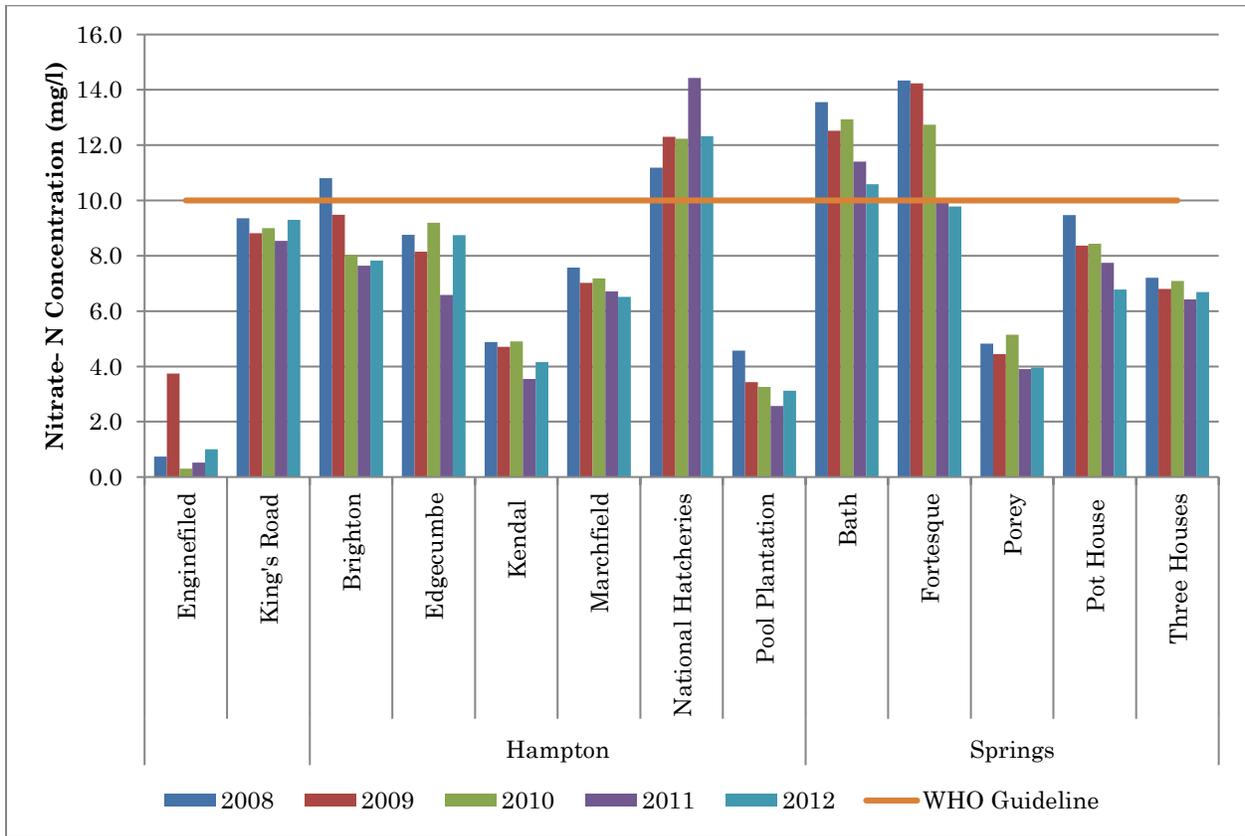


Figure 24: The average Nitrate-N concentration at agricultural supply wells and springs during the period 2008 – 2012.

The average Nitrate-N concentration exceeded the WHO drinking water guideline value every year during the review period at National Hatcheries in the Hampton catchment and Bath spring. The average Nitrate-N value exceeded the WHO guideline value in 2008 and 2008 – 2010 at Brighton in the Hampton catchment and Fortesque spring respectively. Enginefield in the Belle catchment recorded the lowest average values during the review period.

10.1.2.3 Total Dissolved Solids

The average total dissolved solids concentration for the agricultural supply wells and springs is shown in Figure 25.

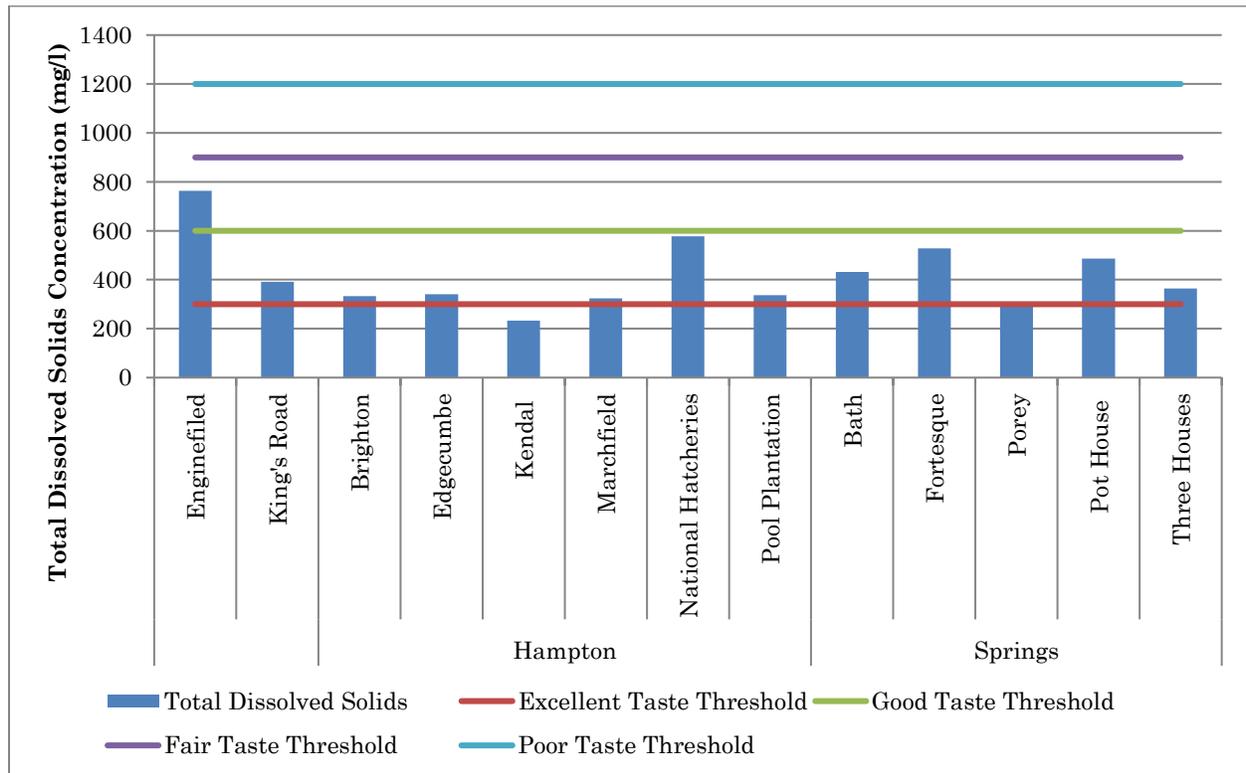


Figure 25: The average total dissolved solids concentration at agricultural supply wells and springs in 2012.

Kendal supply well in the Hampton catchment was the only non-potable supply source which had average total dissolved solids below the excellent taste threshold in 2012. The average total dissolved solids of the other non-potable supply sources were below the good taste threshold except Enginefield in the Belle catchment which was within the fair taste threshold range.

The average total dissolved solids concentration during the period 2008 – 2012 for the agricultural supply wells and springs is shown in Figure 26.

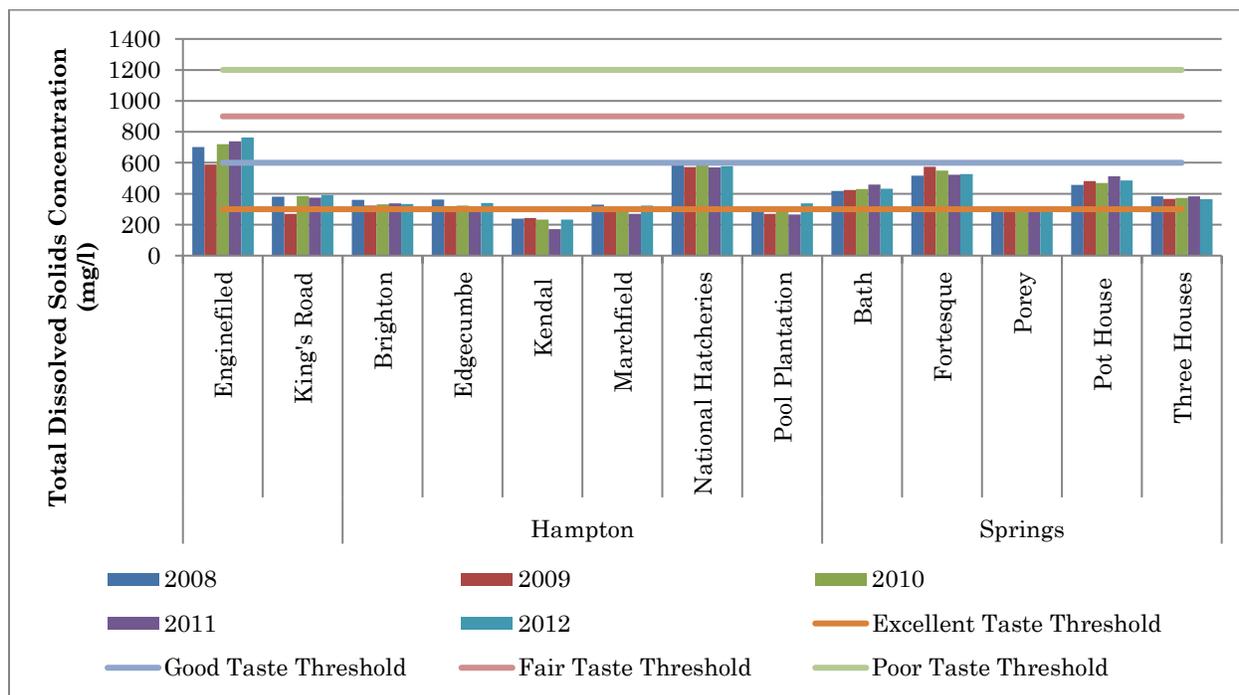


Figure 26: The average total dissolved solids concentration at agricultural supply wells and springs during the period 2008 – 2012.

Kendal supply well in the Hampton catchment was the only non-potable supply source which had average total dissolved solids below the excellent taste threshold each year during the review period. King’s Road in the Belle catchment, Marchfield and Pool Plantation in the Hampton catchment and Porey spring had average total dissolved solids concentration below the excellent taste threshold during the review period in 2009, 2009 and 2011, 2009 and 2011, and 2008 – 2011 respectively. The average total dissolved solids were below the good taste threshold for the remaining years of the review period. Enginefield supply well in the Belle catchment was the only non-potable supply source where the average total dissolved solids exceeded the good taste threshold, which occurred in 2008 and 2010 – 2012.

10.1.2.4 Faecal Coliform

The average faecal coliform counts for the agricultural supply wells and springs are shown in Figure 27.

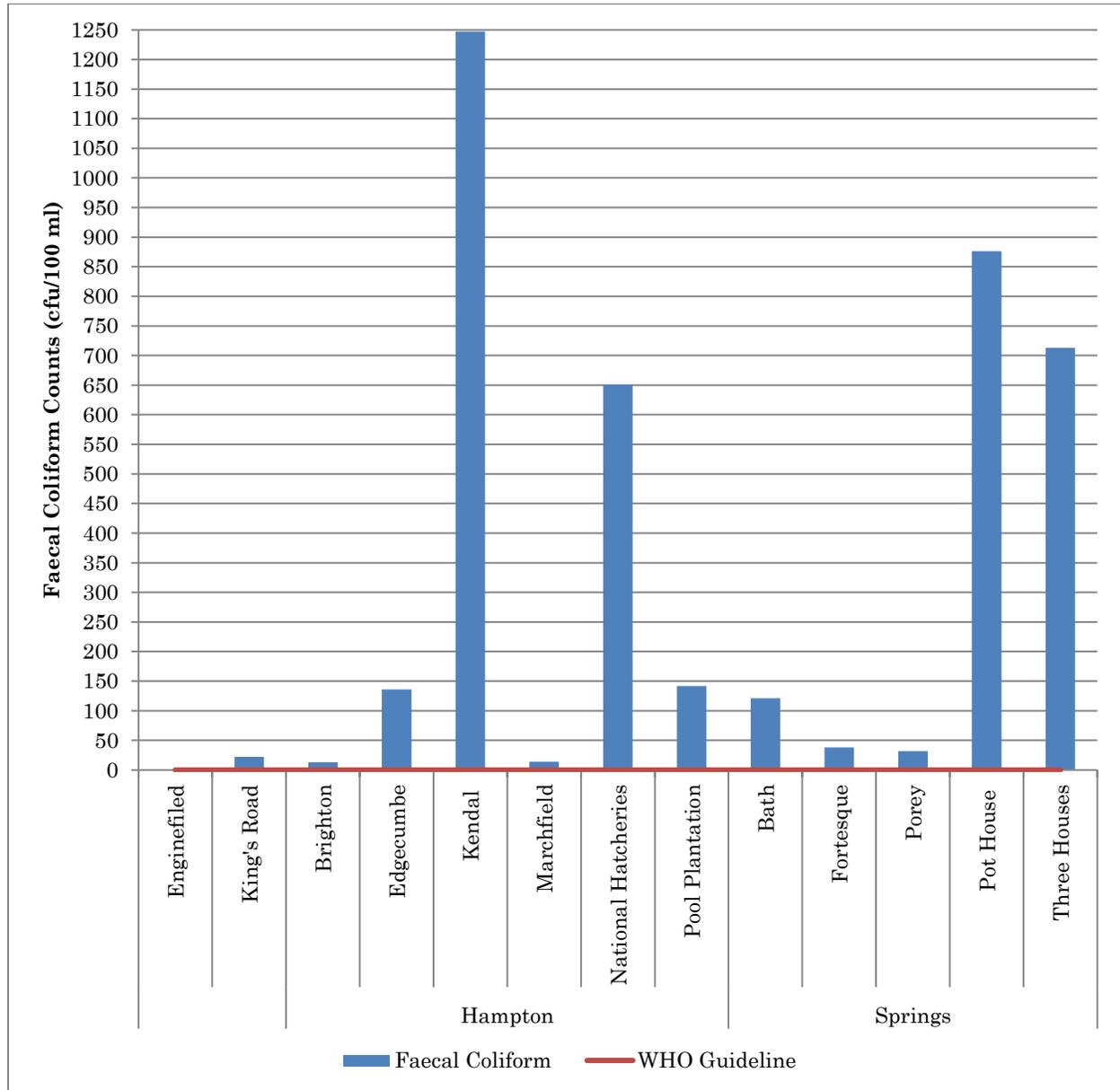


Figure 27: The average faecal coliform counts at agricultural supply wells and springs in 2012.

The average faecal coliform counts exceeded zero at all non-potable supply sources except Enginefield. The average faecal coliform counts at the other supply sources were within the range of 13 CFU/100ml at Brighton in the Hampton catchment and

1247 CFU/100ml at Kendal. It should however be noted that since the water from these sources is not used for potable purposes, it is not chlorinated.

The average faecal coliform counts for the agricultural supply wells and springs are shown in Figure 28.

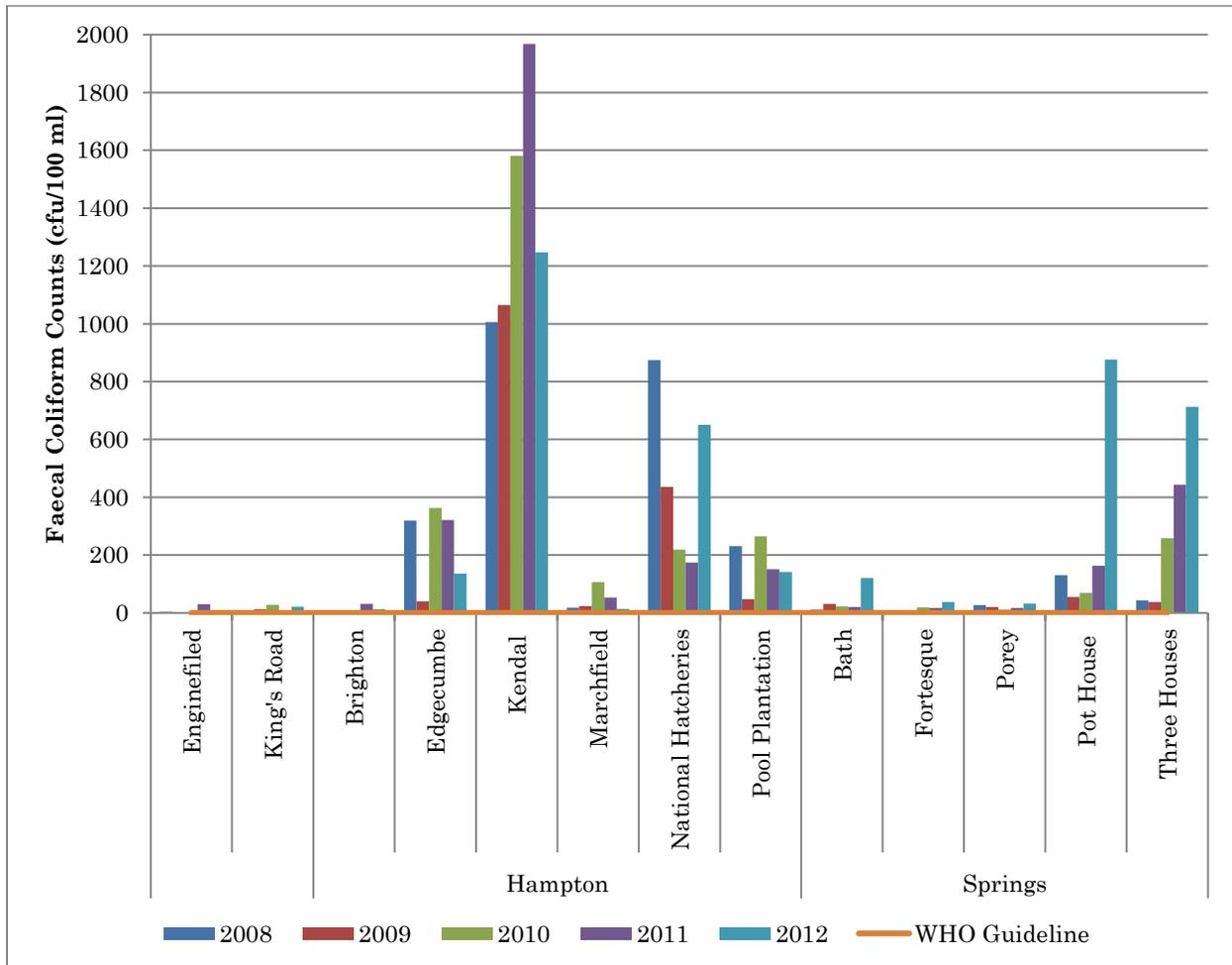


Figure 28: The average faecal coliform counts at agricultural supply wells and springs during the period 2008 – 2012.

The highest faecal coliform counts were recorded at Kendal supply well in the Hampton catchment each year during the review period; these values were in the range 1006 – 1968 CFU/100ml.

10.1.2.5 Sulphates

The average sulphate concentration for the agricultural supply wells and springs in 2012 is shown in Figure 29.

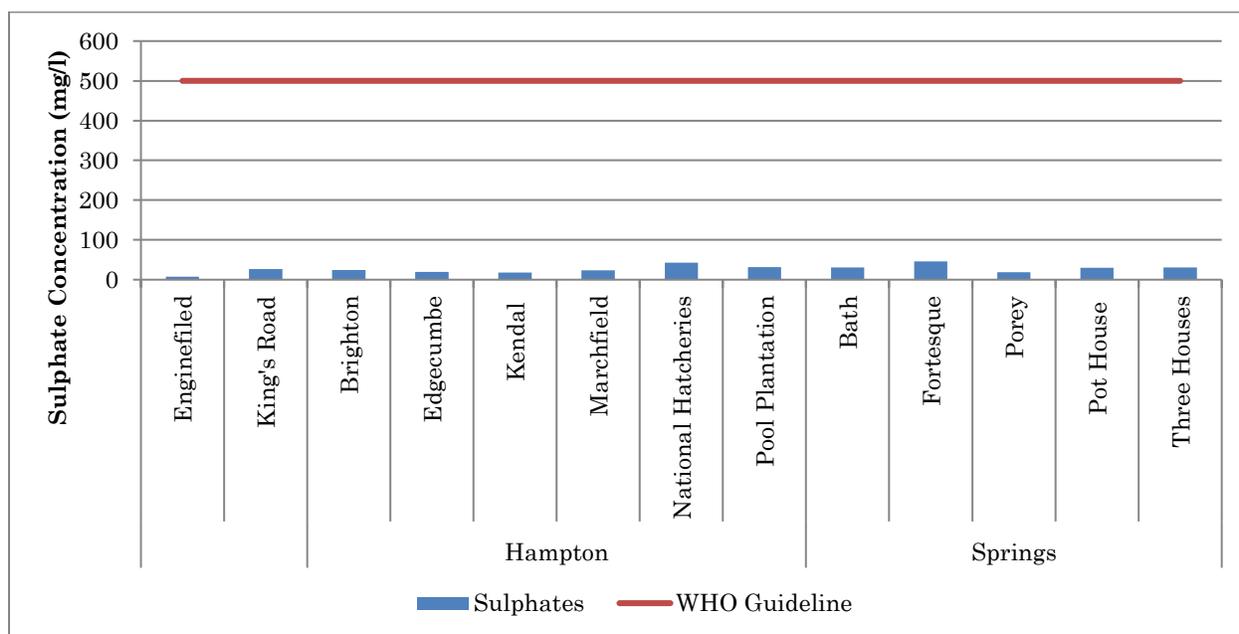


Figure 29: The average sulphate concentration at agricultural supply wells and springs in 2012.

The average sulphate concentration was below the WHO drinking water guideline value and was within the range 8 – 53 mg/l at the non-potable supply sources.

The average sulphate concentration at the agricultural supply sources was below the WHO guideline value in 2012 and within the range 17 – 38 mg/l.

The average sulphate concentration for the agricultural wells and springs during the period 2008 – 2012 is shown in Figure 30.

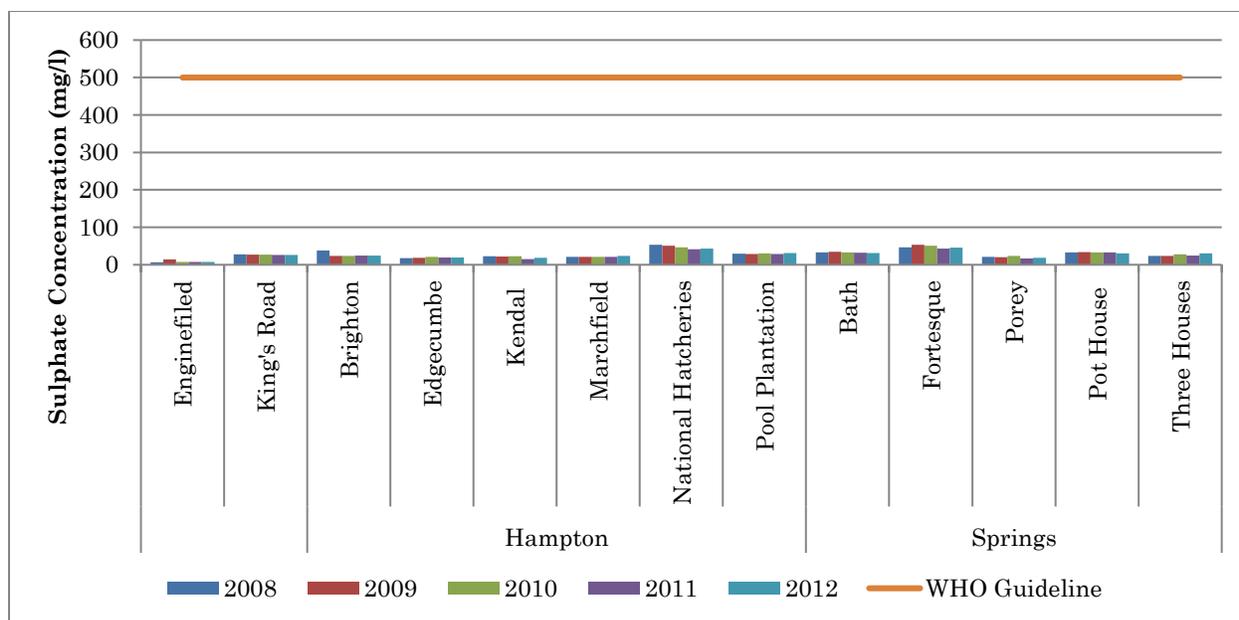


Figure 30: The average sulphate concentration at agricultural supply wells and springs during the period 2008 – 2012.

The average sulphate concentration at the non-potable wells and springs remained below the WHO guideline value of 500 mg/l during the five years. The results were within the 17 – 65 mg/l range.

10.2 RECREATIONAL WATER QUALITY

The Department conducted a weekly nearshore water quality monitoring programme at eighteen (18) south and west coast beaches. The results were compared to the draft Marine Pollution Control Discharge standards to ensure the quality of the water is suitable for recreational use. The ten (10) south coast and eight (8) west coast beaches monitored are shown in Table 10 and the standards are shown in Table 11.

Table 10: The south and west coast beaches monitored in 2012.

SOUTH COAST BEACHES	WEST COAST BEACHES
Accra	Batts Rock
Amaryllis	Brandons
Brownes	Brighton
Dover	Coach House

SOUTH COAST BEACHES	WEST COAST BEACHES
Graveyard	Heywoods
Miami	Holetown
Pebbles	Mullins
Silver Sands	Paradise
Welches	
Worthing	

Table 11: The draft Marine Pollution Control Discharge standards.

PARAMETER	RATIONALE	STANDARD
Enterococci	Public health indicator of sewage pollution in seawater. This is generally the preferred indicator of health risk.	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	Public health indicator of sewage pollution in fresh water, but historically used in seawater.	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.

It should be noted that the monitoring programme was suspended in December.

10.2.1 SOUTH COAST BEACHES

The compliance of the south coast beaches with the draft Marine Pollution Control Discharge standard is shown in Table 12.

Table 12: The compliance of the south coast beaches monitored in 2012 with the draft Marine Pollution Control Discharge standards.

KEY

IS – Insufficient samples taken

NS – No sample taken

PASS – The results complied with the relevant standard

FAIL – The results did not comply with the relevant standard

BEACH NAME	SITE	STANDARD	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	
Accra	2	FC 1	IS	IS	NS	NS	IS	IS	PASS	IS	PASS	PASS	PASS		
		FC 2	IS	IS	NS	NS	IS	IS	PASS	IS	PASS	PASS	PASS		
		ENT 1	IS	IS	NS	NS	IS	IS	PASS	IS	PASS	PASS	PASS		
		ENT 2	IS	IS	NS	NS	IS	IS	FAIL	IS	PASS	PASS	PASS		
	3	FC 1	IS		NS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		FC 2	IS		NS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 1	IS		NS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 2	IS		NS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
Amaryllis	1	FC 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
		FC 2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
		ENT 1	PASS	FAIL	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 2	PASS	FAIL	PASS	PASS	PASS	PASS	PASS	FAIL	IS	PASS	FAIL	PASS	
	2	FC 1	PASS	PASS	IS	PASS	PASS	PASS	IS	PASS	IS	PASS	PASS	PASS	
		FC 2	PASS	PASS	IS	PASS	PASS	PASS	IS	PASS	IS	PASS	PASS	PASS	
		ENT 1	PASS	PASS	IS	PASS	PASS	IS	PASS	IS	PASS	PASS	PASS		

BEACH NAME	SITE	STANDARD	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	
		ENT 2	PASS	PASS	IS	PASS	PASS	IS	FAIL	IS	PASS	PASS	PASS		
Browne s	1	FC 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
		FC 2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
		ENT 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	PASS	PASS	FAIL	PASS	PASS	PASS	IS	PASS	PASS	PASS	
	2	FC 1	PASS	PASS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		FC 2	PASS	PASS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 1	PASS	PASS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	IS	PASS	PASS	PASS	PASS	FAIL	IS	PASS	PASS	PASS	
	3	FC 1	PASS	IS	IS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		FC 2	PASS	IS	IS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 1	PASS	IS	IS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 2	PASS	IS	IS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	FAIL	
Dover	2	FC 1	IS	IS	NS	IS	IS	IS	PASS	IS	PASS	PASS	PASS		
		FC 2	IS	IS	NS	IS	IS	IS	PASS	IS	PASS	PASS	PASS		
		ENT 1	IS	IS	NS	IS	IS	IS	PASS	IS	PASS	PASS	PASS		
		ENT 2	IS	IS	NS	IS	IS	IS	PASS	IS	PASS	PASS	PASS		
	3	FC 1	PASS	IS	IS	IS	IS	IS	IS	PASS	IS	PASS	PASS	PASS	
		FC 2	PASS	IS	IS	IS	IS	IS	IS	PASS	IS	PASS	PASS	PASS	
		ENT 1	PASS	IS	IS	IS	IS	IS	IS	PASS	IS	PASS	PASS	PASS	
		ENT 2	PASS	IS	IS	IS	IS	IS	IS	PASS	IS	PASS	PASS	PASS	
Graveyard	2	FC 1	NS	NS	NS	NS	IS	NS	IS	IS	IS	PASS	IS		
		FC 2	NS	NS	NS	NS	IS	NS	IS	IS	IS	PASS	IS		
		ENT 1	NS	NS	NS	NS	IS	NS	IS	IS	IS	PASS	IS		

BEACH NAME	SITE	STANDARD	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	
	3	ENT 2	NS	NS	NS	NS	IS	NS	IS	IS	IS	PASS	IS		
		FC 1	NS	NS	NS	IS	IS	IS	PASS	IS	IS	PASS	PASS		
		FC 2	NS	NS	NS	IS	IS	IS	PASS	IS	IS	PASS	PASS		
		ENT 1	NS	NS	NS	IS	IS	IS	PASS	IS	IS	PASS	PASS		
		ENT 2	NS	NS	NS	IS	IS	IS	PASS	IS	IS	PASS	PASS		
Miami	1	FC 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
		FC 2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
		ENT 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	PASS	PASS	FAIL	PASS	PASS	PASS	IS	PASS	PASS	PASS	
	2	FC 1	PASS	IS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		FC 2	PASS	IS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 1	PASS	IS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
ENT 2	PASS	IS	IS	PASS	PASS	PASS	PASS	FAIL	IS	PASS	FAIL	PASS			
Peebles	1	FC 1	PASS	IS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS		
		FC 2	PASS	IS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS		
		ENT 1	PASS	IS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS		
		ENT 2	PASS	IS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS		
	2	FC 1	PASS	IS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		FC 2	PASS	IS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 1	PASS	IS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 2	FAIL	IS	IS	FAIL	PASS	PASS	PASS	PASS	IS	PASS	FAIL	FAIL	
	3	FC 1	PASS	IS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
FC 2		PASS	IS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
ENT 1		PASS	IS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		

BEACH NAME	SITE	STANDARD	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	
		ENT 2	PASS	IS	IS	PASS	PASS	PASS	FAIL	IS	PASS	PASS	PASS		
Silver Sands	1	FC 1	NS	NS	NS	IS	IS	IS	IS	IS	PASS	PASS	IS		
		FC 2	NS	NS	NS	IS	IS	IS	IS	IS	PASS	PASS	IS		
		ENT 1	NS	NS	NS	IS	IS	IS	IS	IS	PASS	PASS	IS		
		ENT 2	NS	NS	NS	IS	IS	IS	IS	IS	PASS	PASS	IS		
	2	FC 1	NS	NS	NS	IS	IS	PASS	IS	IS	PASS	PASS	IS		
		FC 2	NS	NS	NS	IS	IS	PASS	IS	IS	PASS	PASS	IS		
		ENT 1	NS	NS	NS	IS	IS	PASS	IS	IS	PASS	PASS	IS		
		ENT 2	NS	NS	NS	IS	IS	PASS	IS	IS	PASS	PASS	IS		
Welches	1	FC 1	IS	IS	NS	IS	IS	IS	PASS	IS	PASS	PASS	PASS		
		FC 2	IS	IS	NS	IS	IS	IS	PASS	IS	PASS	PASS	PASS		
		ENT 1	IS	IS	NS	IS	IS	IS	PASS	IS	PASS	PASS	PASS		
		ENT 2	IS	IS	NS	IS	IS	IS	FAIL	IS	PASS	PASS	PASS		
Worthin g	1	FC 1	PASS	PASS	IS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
		FC 2	PASS	PASS	IS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
		ENT 1	PASS	PASS	IS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
		ENT 2	PASS	PASS	IS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS		
	2	FC 1	PASS	PASS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		FC 2	PASS	PASS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 1	PASS	PASS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	IS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	

In 2012, the enterococci standards were not met at all of the sampling sites at the beaches monitored. The enterococci standard requiring the geometric mean of at least five (5) samples should be less than 35 colonies/100ml was exceeded at one sampling site at Amaryllis in February. The enterococci standard requiring that no sample exceed 104 colonies/100ml was exceeded at sample sites at the following six (6) beaches during the year and occurred mainly during the rainy season;

- i. Accra – July
- ii. Amaryllis – February, July and October
- iii. Brownes – May and November
- iv. Peebles – January, April, July, October and November
- v. Miami – May, July and October
- vi. Welches – July

It should be noted that with the exception of the month of October, there were monitoring sites where either no samples were taken or insufficient samples were taken to allow comparison with the standards. The beaches where this occurred during the year are listed below.

- January – Accra, Dover, Graveyard, Silver Sands, Welches
- February – Accra, Brownes, Dover, Graveyard, Miami, Peebles, Silver Sands, Welches
- March – Accra, Amaryllis, Brownes, Dover, Graveyard, Miami, Peebles, Silver Sands, Welches, Worthing
- April – Accra, Dover, Graveyard, Silver Sands, Welches
- May – Accra, Dover, Graveyard, Silver Sands, Welches
- June – Accra, Amaryllis, Dover, Graveyard, Silver Sands, Welches
- July – Accra, Brownes, Graveyard, Peebles, Silver Sands
- August – Accra, Amaryllis, Brownes, Dover, Graveyard, Miami, Peebles, Silver Sands, Welches, Worthing
- September – Graveyard
- November – Graveyard, Silver Sands

10.2.2 WEST COAST BEACHES

The compliance of the south coast beaches with the draft Marine Pollution Control Discharge standard is shown in Table 13.

Table 13: The compliance of the west coast beaches monitored in 2012 with the draft Marine Pollution Control Discharge standards.

KEY

IS – Insufficient samples taken

NS – No sample taken

PASS – The results complied with the relevant standard

FAIL – The results did not comply with the relevant standard

BEACH NAME	SITE	STANDARD	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Batts Rock	1	FC 1	PASS	PASS	IS	PASS	IS	PASS	IS	IS	PASS	PASS	PASS	
		FC 2	PASS	PASS	IS	PASS	IS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 1	PASS	PASS	IS	PASS	IS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	IS	PASS	IS	PASS	IS	IS	FAIL	PASS	PASS	
Brandons	1	FC 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		FC 2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 1	PASS	PASS	PASS	PASS	PASS	IS	PASS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	PASS	PASS	FAIL	IS	PASS	IS	PASS	PASS	PASS	
Brighton	1	FC 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		FC 2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	PASS	PASS	PASS	
Coach House	1	FC 1	PASS	PASS	PASS	PASS	IS	PASS	IS	IS	PASS	PASS	PASS	
		FC 2	PASS	PASS	PASS	PASS	IS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 1	PASS	PASS	PASS	PASS	IS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	PASS	PASS	IS	IS	PASS	IS	IS	PASS	PASS	PASS
Heywoods	2	FC 1	PASS	PASS	IS	PASS	PA	PASS	IS	IS	PASS	PASS	PASS	

BEACH NAME	SITE	STANDARD	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	
							SS								
		FC 2	PASS	PASS	IS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS		
		ENT 1	PASS	PASS	IS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS		
		ENT 2	PASS	PASS	IS	PASS	PA SS	PASS	IS	IS	PASS	FAIL	PASS		
	3	FC 1	PASS	PASS	PASS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS		
		FC 2	PASS	PASS	PASS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS		
		ENT 1	PASS	PASS	PASS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS		
		ENT 2	PASS	PASS	PASS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS		
	Holetown	1	FC 1	PASS	PASS	PASS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS	
			FC 2	PASS	PASS	PASS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS	
			ENT 1	PASS	PASS	PASS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS	
			ENT 2	PASS	PASS	PASS	PASS	PA SS	FAIL	IS	IS	PASS	PASS	PASS	
2		FC 1	PASS	PASS	IS	PASS	IS	PASS	IS	IS	PASS	PASS	PASS		
		FC 2	PASS	PASS	IS	PASS	IS	PASS	IS	IS	PASS	PASS	PASS		
		ENT 1	PASS	PASS	IS	PASS	PA SS	PASS	IS	IS	PASS	PASS	PASS		

BEACH NAME	SITE	STANDARD	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	
		ENT 2	PASS	PASS	IS	PASS	FAIL	PASS	IS	IS	PASS	PASS	PASS		
	3	FC 1	PASS	IS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS		
		FC 2	PASS	IS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS		
		ENT 1	PASS	IS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS		
		ENT 2	PASS	IS	IS	FAIL	PASS	PASS	IS	IS	FAIL	PASS	PASS		
Mullins	1	FC 1	PASS	PASS	PASS	PASS	PASS	PASS	IS	IS	PASS	IS	IS		
		FC 2	PASS	PASS	PASS	PASS	PASS	PASS	IS	IS	PASS	IS	IS		
		ENT 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	IS	PASS	IS	IS	
		ENT 2	PASS	PASS	PASS	PASS	PASS	PASS	FAIL	IS	IS	FAIL	IS	IS	
	2	FC 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		FC 2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 1	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	PASS	PASS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
Paradise	1	FC 1	PASS	PASS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS		

BEACH NAME	SITE	STANDARD	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
		FC 2	PASS	PASS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 1	PASS	PASS	IS	PASS	PASS	PASS	IS	IS	PASS	PASS	PASS	
		ENT 2	PASS	PASS	IS	PASS	FAIL	PASS	IS	IS	PASS	FAIL	PASS	

The enterococci standard requiring no sample to exceed more than 104 colonies/100ml was the only standard which was not met at all of the West Coast beaches monitored in 2012. This enterococci standard was exceeded at sample sites at the following beaches;

- i. Holetown – April, May, June and September
- ii. Brandons – May
- iii. Paradise – May, October
- iv. Mullins – June and September
- v. Batts Rock – September
- vi. Heywoods – October

There were instances during the year when no samples were taken or insufficient samples were taken to allow comparison with the draft Marine Pollution Control standards. The beaches where this occurred are listed below.

- February – Holetown
- March – Batts Rock, Heywoods, Holetown, Paradise
- May – Batts Rock, Coach House, Holetown
- June – Brandons
- July – Batts Rock, Coach House, Heywoods, Holetown, Mullins and Paradise
- August – Batts Rock, Brandons, Brighton, Coach House, Heywoods, Holetown, Mullins and Paradise
- October – Mullins
- November – Mullins

11 Public Education and Awareness

The public education initiatives conducted in 2012 are summarized below.

- i. The March and September issues of Envirofocus newsletter were professionally printed and distributed.
- ii. The Department hosted the following interns:
 - Two (2) interns from the Samuel Jackman Prescod Polytechnic Business Studies programme during the period May 21 – June 29, 2012.
 - Two (2) interns from the Barbados Community College Environmental Science programme for the period June 5 – August 3, 2012.
- iii. Four thousand (4000) copies of “Marine Monster of Morgan Island Colouring and Activity Book” were printed. The activity book is intended to educate children of primary school age on matters related to marine litter and the protection of the marine environment from land based sources of pollution. The activity books were distributed to Class 1 students of primary schools.
- iv. Environmental tips were aired on the radio stations LOVE 104.1 FM and HOTT 95.3 FM in August and September 2012.

During Environment month the following public education and awareness initiatives were conducted.

- i. The Department’s jingle was aired during the Evening News on weekdays in June.
- ii. Environmental tips were aired on the radio station VOB 92.9 FM.
- iii. Online tips were published in the online newspaper Barbados Today along with the Department’s jingle.
- iv. The Department hosted a seminar on best practices for vehicle maintenance facility operators on June 19, 2012. Booklets entitled “Best Management Practices for Vehicle Maintenance Facilities” were printed and booklets distributed to participants before the seminar.
- v. An Open Day was hosted on June 21, 2012, in Jubilee Gardens, Bridgetown. In addition to providing information about the Department, free blood pressures checks were administered by the Diabetes Association, breast screening was conducted by the Barbados Cancer Society, and free HIV testing was available.

- vi. The Department conducted a hike with students from its adopted school, Garrison Secondary on June 25, 2012. The hike started at Cove Bay and passed through Pico Tenerife and Little Bay in St. Lucy. The hike, which was attended by eighteen (18) students and three (3) teachers, introduced the students to aspects of environmental protection with a focus on marine and groundwater pollution.

In addition to the activities listed above, the Department also made presentations of various topics which included the following.

- i. The requirements of the Department for nursing homes at a seminar hosted by the Ministry of Health on Alternative Care of the Elderly.
- ii. Applications of Environmental Chemistry in Pollution Control made to CAPE students from various secondary schools.
- iii. Safety, Health and Environmental Concerns at a workshop hosted by National Union of Public Workers (ancillary staff at primary and secondary schools).

12 Training, Conferences, Workshops and Seminars

12.1 TRAINING

The local and overseas training completed by officers of the Department in 2012 is summarized in Table 14 and Table 15 respectively.

Table 14: Summary of local training completed by officers of the Department in 2012.

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE	OFFICER(S) IN ATTENDANCE
Introduction to Microsoft Access	In-Service Training provided basic training in the use of Microsoft Access.	January 16-24, 2012	Mrs Gail Hinds – Environmental Protection Officer
		November 5 -13, 2012	Mr Roger Butcher – Clerical Officer Ms Rachel Waterman – Computer Operator
Stress Management	In-Service Training this was designed to equip participants with the knowledge and skills to cope with stressful situations.	February 23 – 24, 2012	Mrs Gail Hinds – Environmental Protection Officer Ms Tonia Williams – Marine Pollution Officer
Occupational Health and Safety Workshop	In-Service Training to sensitize public sector employees about the Safety and Health at Work Act Cap 356.	February 23 – 24, 2012	Mrs Gail Hinds – Environmental Protection Officer Ms Natalee Aymes – Marine Pollution Officer Mr Glen Clarke – Building Development Officer
Hazwoper Training Programme on Hazardous Waste Operations and	The course objectives included instructing participants on the importance of	May 7 – 11, 2012	Ms Tonya Armstrong – Senior Environmental Protection Officer

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE	OFFICER(S) IN ATTENDANCE
Emergency Response	<p>hazardous waste operations, containment, and response activities. The course covered the broad issues related to hazard recognition at worksites and is intended for workers involved in the hazardous waste cleanup operations, emergency response operations and storage, disposal or treatment of hazardous substances or uncontrolled hazardous waste sites. Facilitated by Barbados Port Inc.</p>		<p>Mr Nicholas Jordan – Environmental Protection Officer</p>
Risk Assessment and Personal Protective Equipment Training	<p>The objectives of the course were to train officers in the application of risk assessment and the correct selection and use of personal protective equipment.</p>	June 7, 2012	<p>Mr Justin Yearwood – Environmental Technician</p> <p>Ms Lianda Chapman – Environmental Technician</p> <p>Ms Carol Ann Browne – Building Development Officer</p> <p>Mr Erich Harper – Building Development Inspector</p> <p>Ms Shakira Chase – Environmental Inspector</p> <p>Mr Hayden Clarke – Building Development Inspector</p> <p>Mr Earle Ward – Environmental Inspector</p> <p>Mr Daniel Forde – Environmental Inspector</p> <p>Mr Philip Pile – Environmental Technical</p>

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE	OFFICER(S) IN ATTENDANCE
			<p>Officer</p> <p>Mrs Allison Reeves</p> <p>Ms Natalee Aymes – Marine Pollution Officer</p> <p>Mr Carlon Worrell – Marine Pollution Officer</p> <p>Ms Tonya Armstrong – Senior Environmental Protection Officer</p> <p>Mr Nicholas Jordan – Environmental Protection Officer</p> <p>Mr Patrick Fergusson – Environmental Protection Officer</p> <p>Mrs Gail Hinds- Environmental Protection Officer</p>
Organization for the Prohibition of Chemical Weapons Assistance and Capacity Building Training Workshop	<p>The objective of the training course was to training for the regional chemical weapons emergency response team and included sessions on chemical warfare agents, basic principles of protection against chemicals and an exercise.</p>	July 16 – 20, 2012	<p>Ms Tonya Armstrong – Senior Environmental Protection Officer</p> <p>Mr Nicholas Jordan – Environmental Protection Officer</p>
Performance Budgeting	<p>The course, which was facilitated by The Productivity Council, was intended to demonstrate the importance of effective and efficient spending which generates results and macroeconomic development. The target groups for the</p>	September 26 – 27, 2012	Mr Philip Pile – Environmental Technical Officer
		October 3 – 4, 2012	Ms Lisa Senhouse – Environmental Technical Officer
		October 24 – 25, 2012	Ms Ingrid Lavine – Senior Environmental Technical Officer

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE	OFFICER(S) IN ATTENDANCE
	course were officers with responsibility for preparing budgets and officers with responsibility for technical programmes which impact on the overall budget.		

Table 15: Summary of overseas training completed by officers of the Department in 2012.

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE & LOCATION	OFFICER(S) IN ATTENDANCE
International Postgraduate Course on Environmental Management for Developing and Emerging Countries	The objectives of the course were to impart to participants the skills and knowledge to develop interdisciplinary strategies for sustainable development and to take appropriate measures for environmental protection that takes ecological, socio-economic, and cultural aspects into account.	January 16 – July 13, 2012 Technische Univeristat Dresden, Germany	Ms Ingrid Lavine – Senior Environmental Technical Officer
Organisation for the Prohibition of Chemical Weapons Basic Course	The objectives of the course were to assist States with complying with obligations under the Convention by enhancing the knowledge and skills of the personnel of National Authorities.	August 7 – 10, 2012 The Hague, The Netherlands	Mr Sylvan Catwell – Chief Building Development Officer
Organisation for the Prohibition of Chemical Weapons Associate Programme	The objectives of the programme include facilitating the national implementation of the Convention and to enhance the national capacity of Member States to provide training.	August 2 – October 6, 2012 The Netherlands and Europe	Ms Tonya Armstrong Senior Environmental Protection Officer

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE & LOCATION	OFFICER(S) IN ATTENDANCE
Air Quality Collaboration Study Tour the United States Environmental Protection Agency Region 4 Pesticides and Toxics Management Division	The main objective of the study tour was to facilitate the exchange of practical information regarding the regulation and monitoring of ambient air quality and noise and also included site visits.	November 5 – 9, 2012 Atlanta, Georgia, United States of America	Mr Anthony Headley – Deputy Director Ms Shaina Goodridge – Senior Environmental Technician Mr Justin Yearwood – Environmental Technician

12.2 CONFERENCES, WORKSHOPS AND SEMINARS

The local conferences, workshops and seminars and the overseas conferences, workshops and seminars attended by officers of the Department are given in Table 16 and Table 17 respectively.

Table 16: The local conferences, workshops, and seminars attended by officers of the Department in 2012.

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE	OFFICER(S) IN ATTENDANCE
Workshop to Review the Draft White Paper on Tourism Development in Barbados	The workshop objective was to facilitate stakeholder feedback on the Draft White Paper on Tourism Development in Barbados.	January 18, 2012	Ms Lisa Senhouse – Environmental Technical Officer
UNESCO World Heritage Training Workshop; World Heritage in Context and Outstanding Universal Value	The objectives included a review of World Heritage in a contextual framework, outstanding universal value and the Operational Guidelines for Implementation of the World Heritage Convention.	February 15 – 16, 2012	Mr Stephen Forde – Building Development Officer Mr Glen Clarke – Building Development Officer
Information Communication Technology Workshop	The objective was to provide stakeholders with information on the technology solutions available through LIME.	October 9, 2012	Mr Philip Pile – Environmental Technical Officer

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE	OFFICER(S) IN ATTENDANCE
3rd Biennial International Conference on Higher Education	The objectives were to bring together keynote speakers, researchers, and academics to explore and share solutions underpinning excellence in higher education.	October 21 – 24, 2012	Mr Sylvan Catwell Chief Building Development Officer

Table 17: The overseas conferences, workshops, and seminars attended by officers of the Department in 2012.

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE & LOCATION	OFFICER(S) IN ATTENDANCE
Global Environment Facility Caribbean Regional Fund for Wastewater Management (CReW) Project Inception Workshop	The workshop sought to facilitate discussion about the project components and solicit feedback from stakeholders on the proposed annual work plan.	February 6 – 8, 2012 Kingston, Jamaica	Mr Anthony Headley – Deputy Director
Project Planning Session on Regional Land and Water Resources Management Initiatives (GEF-IWCAM Successor Project)	The meeting was a planning session on the coordination of land and water resources management initiatives in the Caribbean.	May 21 – 25, 2012 St. Kitts and Nevis	Mr Anthony Headley – Deputy Director
Regional Workshop on Regulatory Infrastructure for the Control of Radioactive Sources	The objective was to prepare an action plan for developing radiation protection capabilities on the participating states and present the relevant international safety standards and security documents.	June 11 – 15, 2012 Kingston, Jamaica	Mr Jeffrey Headley – Director
Fourth Session of the Intergovernmental Negotiating	The objectives of the meeting included negotiating a global legally binding	June 27 – July 2, 2012 Punta del Este, Uruguay	Mr Jeffrey Headley – Director

NAME OF COURSE/ACTIVITY	DESCRIPTION	DATE & LOCATION	OFFICER(S) IN ATTENDANCE
Committee to Prepare a Global Legally Binding Instrument on Mercury	agreement on mercury and facilitating the transfer of the information regarding transitional arrangements pending the phase-out of mercury-added products and manufacturing processes.		
Third Session of the International Conference on Chemicals Management	The objectives included evaluation of the implementation of Strategic Approach to International Chemicals Management (SAICM) and the evaluation of progress with emerging policy issues and the financing of SAICM.	September 17 – 21, 2012 Nairobi, Kenya	Mr Jeffrey Headley – Director
Eighth Meeting of the Open-Ended Working Group of the Basel Convention on the Control of Transboundary Wastes and Their Disposal	The objectives of the meeting included a discussion of strategic and technical and scientific issues related to the work programme of the Open-Ended Working Group.	September 25 – 28, 2012 Geneva, Switzerland	Mr Anthony Headley – Deputy Director
Fourteenth Annual Meeting of the National Authorities of the Chemical Weapons Convention	The objectives included facilitating cooperation among National Authorities to further the implementation of the Convention and highlight issues with selected areas to enhance capacity to comply with the obligations of the Convention.	November 22 – 25, 2012 The Hague, The Netherlands	Mr Anthony Headley – Deputy Director