Caribbean Blue Flag Campaign Report

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CONTENTS

List Of Tables

EXECUTIVE SUMMARY

INTRODUCTION

The Foundation for Environmental Education (FEE) is a non-profit, non-governmental organisation. FEE runs five environmental programmes which includes the Blue Flag Campaign.

The Blue Flag is a voluntary certification scheme started in Europe in 1987. The Blue Flag is an eco-label for beaches and marinas that seeks to reward local government and its partners for providing a safe and clean environment.

The Blue Flag is a self-regulation scheme with objectives that include the promotion of the sustainable use of coastal resources, awareness of the need for integrated management in the coastal zone and the incorporation of environmental issues in the decision making process for local authorities and their partners.

The Blue Flag International Jury awards Blue Flags annually to the beaches and marinas that satisfy the criteria of the scheme in the areas of water quality standards, safety standards, environmental education and environmental management. The Blue Flag may be removed during the year in which it was awarded if the conditions on the beach or marina deteriorate so that the criteria for the scheme are no longer satisfied. The Blue Flag criteria are reviewed every five years as the scheme seeks to progressively set higher goals for its participants.

THE CARIBBEAN BLUE FLAG CAMPAIGN

The Foundation for Environmental Education (FEE), United Nations Environment Programme (UNEP) and the World Tourism Organisation(WTO) initiated the implementation of Blue Flag in the Caribbean. The Caribbean Blue Flag Consortium was established in 2001, which consists of the Caribbean Tourism Consortium (CTO), the Caribbean Conservation Association (CCA) and the Caribbean Alliance for Sustainable Tourism (CAST).

The Caribbean will be eligible for the award of Blue Flags from November 2004. The Caribbean Blue Flag Campaign is currently being implemented in Barbados, Dominican Republic, Jamaica, Puerto Rico, Venezuela and the Bahamas.

Caribbean Blue Flag In Barbados

Barbados submitted a feasibility study for seven beaches in which were, Casuarina Beach, Dover Beach, Accra Beach, Coconut Court/Amaryllis, Browns Beach, Heywoods Beach and Worthing Beach. This feasibility study was approved by the FEE International Jury.

CARIBBEAN BLUE FLAG CRITERIA

The Caribbean Blue Flag criteria has been adapted to reflect the environmental and social conditions in the Caribbean.

There are 24 Caribbean Blue Flag criteria in the categories of water quality, environmental education and information, environmental management and safety and services. The criteria may be imperative or guideline. All of the imperative criteria and a minimum number of the guideline criteria must be met for the award of a Blue Flag.

Water Quality Criteria

The water quality criteria require that Blue Flag beaches have at least two sample sites. Chemical, qualitative and biological sampling should be carried out every 14 days during the dry season and every 7 days during the wet season. The biological water quality standards are shown in the table below.

PARAMETER	STANDARD
Faecal Coliform	< 100/100 ml in minimum of 75% of samples taken over a period of a year < 400/100 ml in minimum 95% of samples taken over a period of a year
Faecal Streptococci	< 40/100 ml in minimum 75% of samples taken over a period of a year

Table 1: Caribbean Blue Flag criteria for biological water quality parameters. (Taken from Caribbean Blue Flag Beach Criteria And Guidance Notes.)

The Blue Flag beaches should have no direct discharge of industrial effluent, sewage effluent or storm water to the beach and the health of the coral reefs in the vicinity of the beach should be monitored using the Reef Check programme.

The Blue Flag biological water quality criteria must be satisfied for at least one year preceding the season the Blue Flag will be awarded.

Environmental Education And Information Criteria

The requirements of the environmental education and information criteria include the completion of a minimum of five environmental education activities in the year the Blue Flag is awarded and the placement of a Blue Flag information board on the Blue Flag beach. The display on the Blue Flag information board should include standardised information about the Blue Flag Campaign, rules governing the use of the beach, a map of the beach, the location of the lifeguard, life saving equipment and water sampling points; and information about any sensitive environmental resources. **The recreational water quality information should be prominently displayed on the Blue Flag information board. This is an imperative criterion.**

Environmental Management Criteria

The requirements of the environmental management criteria include the establishment of a beach management committee that consist of all relevant stakeholders, the placement of waste disposal and recycling bins and the prohibition of driving, camping and dumping on the beach.

Safety And Services

The safety and services criteria requirements include the provision an adequate number of lifeguards and life saving equipment, safe and easy access to the beach, bath and toilet facilities and the zoning of the beach to prevent conflict between different beach users.

WATER QUALITY MONITORING IN BARBADOS

The Environmental Engineering Division monitors the water quality of ten beaches in Barbados. The Blue Flag pilot beaches that are included in the Division's monitoring programme are Accra Beach, Brownes Beach, Heywoods Beach, Dover Beach and Worthing Beach.

The Division's water quality monitoring programme has established three sample sites on each on the beaches monitored and sampling is done weekly. **The location of the sample sites were selected to reflect the worst case scenario for the water quality and hence are located opposite discharges such as storm water.**

Data Analysis Methodology

The laboratory results may indicate that the number of bacteria in a sample were too numerous to count due to low dilution of the original sample. The too numerous to count values may be ignored or the maximum value substituted. The data in this paper will be analysed using both methods i.e. the maximum value substituted for the too numerous to count values and the too numerous to count values ignored.

The water quality monitoring programme was suspended in June 2003 because the laboratory exhausted its supply of consumables needed to conduct the tests.

The Division uses the United States Environmental Protection Agency (USEPA) recreational water quality standards, which are shown in the table below.

Parameter	Standard
Faecal Coliform	Geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period, nor should more than 10% of the samples exceed 400 counts/100ml.
Faecal Streptococci	Geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period nor should any of the samples exceed 104 counts/100ml.

Table 2: United States Environmental Protection Agency recreational water quality standards.

WATER QUALITY DATA ANALYSIS USING UNITED STATES ENVIRONMENTAL PROTECTION AGENCY RECREATIONAL WATER QUALITY STANDARDS

The water quality data was analysed using two methods:

1. **The maximum value was substituted for too numerous to count values.**
2. **Too numerous to count values were ignored.**

Data Analysis With Maximum Value Substituted For Too Numerous To Count Values

The table below shows the compliance of the Blue Flag Pilot beaches to USEPA recreational water quality standards over the period of the year **2002 when the maximum value is substituted for the too numerous to count values.**

2002	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC	✓	✓	✓	✓	×
%FC < 400/100 ml	×	✓	×	✓	×
FS	×	×	×	✓	×
FS < 104/100 ml	×	×	×	×	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100 ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100 ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 3: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

Accra Beach met one of the USEPA standards which was faecal coliform geometric mean less than 200 counts /100 ml during any 30 day period.

Browns Beach met two standards which were faecal coliform geometric mean less than 200 counts /100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Dover Beach met one of the standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period.

Heywoods Beach met three of the standards which were faecal coliform geometric mean less than 200 counts /100 ml during any 30 day period, faecal coliform less than 400 counts/100 ml

in no more than 10% of the samples and faecal streptococci less 35 counts/100 ml during any 30 day period.

Worthing Beach met none of the USEPA recreational water quality standards in 2002.

The table below shows the compliance of the Blue Flag Pilot beaches to USEPA recreational water quality standards over the period of the year **2003 when the maximum value is substituted for the too numerous to count values.**

2003	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC	×	✓	✓	×	×
%FC < 400/100 ml	×	✓	✓	✓	×
FS	×	×	×	✓	×
FS < 104/100 ml	×	×	×	✓	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 4: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003.

Accra Beach met none of the USEPA recreational water quality standards.

Browns Beach met two standards which were faecal coliform geometric mean less than 200counts /100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Dover Beach met two of the standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Heywoods Beach met three of the standards which were faecal coliform less than 400 counts/100 ml in no more than 10% of the samples, faecal streptococci less 35 counts/100 ml during any 30 day period and faecal streptococci not exceeding 104 counts/100 ml.

Worthing Beach met none of the USEPA recreational water quality standards in 2003.

Data Analysis With Too Numerous To Count Values Ignored

The table below shows the compliance of the Blue Flag pilot beaches with the USEPA recreational water quality standards over the period of the year **2002 where the too numerous to count values were ignored.**

2002	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC	✓	✓	✓	✓	×
%FC < 400/100 ml	×	✓	×	✓	×
FS	×	×	×	✓	×
FS < 104/100 ml	×	×	×	×	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100 ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100 ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 5: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

The results for the beaches over the period of 2002 remained the same when the too numerous to count values were ignored. Over this period, none the beaches met all of the USEPA standards.

Accra Beach met one of the standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period.

Brownes Beach met two standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Dover Beach met one of the standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period.

Heywoods Beach met three of the standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period, faecal coliform less than 400 counts/100 ml in no more than 10% of the samples and faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period.

Worthing Beach met none of the USEPA recreational water quality standards.

The table below shows the compliance of the Blue Flag pilot beaches with the USEPA recreational water standards over the period of the year **2003 where the too numerous to count values were ignored.**

2003	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC	✓	✓	✓	×	×
%FC < 400/100 ml	×	✓	✓	✓	×
FS	×	×	×	✓	×
FS < 104/100 ml	×	×	×	✓	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 6: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003.

There was a change in the results at Accra Beach over the period 2003 when the too numerous to count values were ignored. However, over this period, none the beaches met all of the USEPA standards.

Accra Beach met one of the USEPA standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period. This standard was not met when the maximum value was substituted for too numerous to count values.

Browns Beach met two standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Dover Beach met two standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Heywoods Beach met three of the USEPA standards which were faecal coliform less than 400 counts/100 ml in no more than 10% of the samples, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period and faecal streptococci not exceed 104 counts/100 ml in any sample.

Worthing Beach met none of the USEPA recreational water quality standards.

WATER QUALITY ANALYSIS USING CARIBBEAN BLUE FLAG WATER QUALITY CRITERIA

The water quality data was analysed using two methods:
1. **The maximum value was substituted for too numerous to count values.**
2. **Too numerous to count values were ignored.**

Data Analysis With Maximum Value Substituted For Too Numerous To Count Values

The table below shows the compliance of the Blue Flag pilot beaches with the Caribbean Blue Flag water quality criteria over the period of the year **2002 where the maximum value was substituted for the too numerous to count values.**

2002	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC < 100/100 ml	✓	✓	✓	✓	×
FC < 400/100 ml	×	✓	✓	✓	×
FS < 40/100 ml	✓	✓	✓	✓	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 7: The compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2002.

Accra beach did not meet the Caribbean Blue Flag criterion for faecal coliforms less than 400/100ml in 95% of samples.

Browns, Dover and Heywoods beaches met all of the Caribbean Blue Flag water quality criteria in 2002.

Worthing Beach did not meet the Blue Flag criteria for faecal coliforms less than 100/100ml in 75% of samples and faecal coliforms less than 400/100ml in 95% of samples.

The table below shows the compliance of the Blue Flag pilot beaches with the Caribbean Blue Flag water quality criteria over the period of the year **2003 where the maximum value was substituted for the too numerous to count values.**

2003	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC < 100/100 ml	×	✓	✓	✓	×
FC < 400/100 ml	×	✓	✓	✓	×
FS < 40/100 ml	×	×	×	✓	×

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 8: The compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2003.

Accra beach did not meet any of the Caribbean Blue Flag water quality criteria.

Brownes beach did not meet the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples.

Dover beach did not meet the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples.

In 2003 Heywoods beaches met all of the Caribbean Blue Flag water quality criteria.

Worthing Beach did not meet any of the Caribbean Blue Flag water quality criteria.

Data Analysis With Too Numerous To Count Values Ignored

The table below shows the compliance of the Blue Flag pilot beaches with the Caribbean Blue Flag water quality criteria over the period of the year **2002 where the too numerous to count values were ignored.**

2002	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC < 100/100 ml	✓	✓	✓	✓	✓
FC < 400/100 ml	✓	✓	✓	✓	×
FS < 40/100 ml	✓	✓	✓	✓	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 9: The compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2002.

Accra, Brownes, Dover and Heywoods beaches met all of the Caribbean Blue Flag water quality criteria in 2002.

Worthing Beach did not meet the Blue Flag criterion for faecal coliforms less than 400/100ml in 95% of samples.

These result were different from those obtained when the maximum value was substituted for the too numerous to count values. Accra beach did not meet the criteria faecal coliforms less than 400/100ml in 95% of samples and Worthing beach did not meet the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples when the maximum value was substituted for the too numerous to count values.

The table below shows the compliance of the Blue Flag pilot beaches with the Caribbean Blue Flag water quality criteria over the period of the year 2003 **where the too numerous to count values were ignored.**

2003	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC < 100/100 ml	✓	✓	✓	✓	✓
FC < 400/100 ml	×	✓	✓	✓	×
FS < 40/100 ml	✓	×	×	✓	×

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 10: The compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2003.

Accra beach did not meet the criterion faecal coliforms less than 400/100ml in 95% of samples. This result was different since the criteria faecal coliforms less than 100/100ml in 75% of samples and faecal streptococci less than 40/100 ml in a minimum of 75% of samples were met when the too numerous to count values were ignored.

Brownes beach did not meet the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples. This result was identical to that obtained when the maximum value was substituted for the too numerous to count values.

Dover beach did not meet the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples. This result was identical to that obtained when the maximum value was substituted for the too numerous to count values.

Heywoods beach met all of the Caribbean Blue Flag water quality criteria. This result was identical to that obtained when the maximum value was substituted for the too numerous to count values.

Worthing Beach did not meet the Caribbean Blue Flag criteria for faecal coliforms less than 400/100ml in 95% of samples and faecal streptococci less than 40/100 ml in a minimum of 75% of the samples. This result was different since the criterion faecal coliforms less than 100/100ml in 75% of samples was met when the too numerous to count values were ignored.

DISCUSSION

In 2002, the months with the highest failure rate of the Blue Flag Water quality criteria were May, July, October and November when the maximum value was substituted for the too numerous to count values. When the too numerous to count values were ignored the months with the highest frequency of failure were May and November.

In 2003, the months with the highest failure rate of the Blue Flag water quality criteria were January, February, March, April, May and June when the maximum value was substituted for the too numerous to count values. When the too numerous to count values were ignored the months with the highest frequency of failure were January, March and June. It should be reiterated that sampling in 2003 was conducted for the months of January to July. Hence these failure rates are representative of this period which is the dry season only which is generally expected to have lower failure rates than the rainy season.

The beaches with the highest frequency of failure were Accra and Worthing beaches in 2002 and 2003.

DISCLOSURE OF WATER QUALITY INFORMATION

The disclosure of water quality information is an imperative Caribbean Blue Flag educational and information criterion. The criterion requires that water quality information be prominently displayed on the Blue Flag information board.

The Cabinet of Barbados made a decision not to publish water quality information as a result of an incident in 1996 when water quality information obtained from the Chief Medical Officer's annual report was used to inaccurately portray the water quality of beaches in Barbados.

The display of water quality information on the Blue Flag information board is an imperative criterion. The Blue Flag will not be awarded if this criterion is not satisfied even if all other criteria are met. Hence, there needs to be change in Government's policy if Barbados' Blue Flag pilot beaches are to comply with this criterion.

Advantages Of Participating In The Caribbean Blue Flag Campaign

- The attainment of an internationally recognised, exclusive eco-label associated with high environmental standards.
- The provision of beach users with water quality information in order to make an informed decision on whether to bathe at a particular beach.
- The fulfilment of the Caribbean Blue Flag criteria would result in the improvement in conditions at the Blue Flag beaches through education, environmental management and planning services.

Disadvantages Of Participating In The Caribbean Blue Flag Campaign

- The water quality information may be used to inaccurately represent the water quality at a particular beach.

- The publishing of water quality information may lead to beach discrimination if the water quality at a particular does not consistently meet the standards.

RECOMMENDATIONS

1. Barbados should participate in the Caribbean Blue Flag Campaign.

2. Barbados' pilot beaches should apply for the Blue Flag for a "season" which runs from December to June in the first instance.

CONCLUSION

1. Blue Flag is an exclusive eco-label associated with high environmental standards.

2. An imperative criterion for the award of a Blue Flag is the display of water quality information on the Blue Flag information board.

3. A Blue Flag will not be awarded if water quality information is not displayed on the Blue Flag information board even if all other criteria are met.

4. The current Government policy prohibits the disclosure of water quality information.

5. There needs to be a change in Government policy on the disclosure of water quality information if Barbados is to fully participate in the Caribbean Blue Flag Campaign.

INTRODUCTION

The Foundation For Environmental Education And The Blue Flag Campaign

The Foundation for Environmental Education (FEE) is a non-profit, non-governmental organisation with members in over 30 countries. FEE promotes education about the environment and sustainable development. The five programmes run by FEE are Blue Flag Campaign, Eco-Schools, Young Reporters for the Environment (YRE), Learning about Forests (LEAF) and Green Key.

The Blue Flag is a voluntary certification scheme started in Europe in 1987. The Blue Flag is an eco-label for beaches and marinas that seeks to reward local government and its partners for providing a safe and clean environment, which has proven to be an effective environmental management tool. In 1996, FEE, the United Nations Environment Programme (UNEP) and the World Tourism Organisation (WTO) collaborated to investigate the expansion of the Blue Flag scheme outside of Europe. The investigation led to the conclusion that the Blue Flag scheme could be expanded outside of Europe if the local environmental, social and economic conditions were taken into account.

The Blue Flag Campaign endeavours to improve understanding of the local coastal environment and promote the incorporation of environmental issues in the decision making processes of local authorities and their partners. The Blue Flag Campaign is a self-regulation scheme with long-term objectives that include:

1. the promotion of the sustainable use of coastal resources,
2. awareness of the need for integrated management of the coastal zone,
3. awareness of the importance of the coastal environment to its users and
4. sound national policies on water quality.

FEE owns and operates the Blue Flag Campaign with national non-governmental organisations (NGOs) as members running its programmes at the national level.

The Blue Flag International Jury awards Blue Flags annually to beaches and marinas that satisfy the criteria of the scheme in the areas of water quality standards, safety standards, environmental education and environmental management. The Blue Flag may be removed during the year in which it was awarded if the conditions on the beach or marina deteriorate so that the criteria of the scheme are no longer satisfied. The criteria for the award of the Blue Flag is reviewed every five years as the scheme seeks to progressively set higher goals for its participants as knowledge and standards are improved.

The Blue Flag Campaign In The Caribbean

The implementation of Blue Flag in the Caribbean was initiated by the Foundation For Environmental Education (FEE), United Nations Environment Programme (UNEP) and the World Tourism Organisation (WTO) in 1999. Feasibility studies for seven Caribbean countries verified the eligibility and interest for a Blue Flag Campaign in the region.

The Caribbean Blue Flag Consortium was established in May 2001, which consists of the Caribbean Tourism Organization (CTO), the Caribbean Conservation Association (CCA) and the Caribbean Alliance For Sustainable Tourism (CAST). It was established to continue the implementation of Blue Flag in the Caribbean.

In October 2002, the Caribbean Conservation Association on behalf of the Caribbean Blue Flag Consortium was accepted as a member of FEE. The Caribbean will be eligible for the award of Blue Flags from November 2004.

Feasibility studies for selected beaches and marinas must be approved by the FEE International Jury as a condition for starting the Blue Flag pilot phase. Beaches and marinas must bring conditions up to the standard required for the award of a Blue Flag during the pilot phase.

The Caribbean Blue Flag Campaign is currently being implemented in Barbados, Dominican Republic, Jamaica, Puerto Rico, Venezuela and the Bahamas.

BACKGROUND: CARIBBEAN BLUE FLAG CAMPAIGN IN BARBADOS

The Ministry of Tourism And International Transport established a Committee in 2001 to determine whether Barbados should accept the invitation of the Caribbean Blue Flag Consortium to participate in the Caribbean Blue Flag Campaign pilot project. The decision was taken that Barbados should participate in the Caribbean Blue Flag Campaign.

The National Coordinator for the Blue Flag Campaign in Barbados is the Barbados Hotel and Tourism Association. The Committee for the pilot beaches comprises representatives from the Environmental Engineering Division, Coastal Zone Management Unit, National Conservation Commission, Ministry of Environment, Ministry of Tourism, NGO's, environmental NGOs (ENGO's), Barbados Hotel And Tourism Association, Barbados Tourism Association and Tourism Development Corporation.

Barbados submitted a feasibility study for seven beaches in August 2003, which was approved by the FEE International Jury. The beaches selected were Casuarina Beach, Dover Beach, Accra Beach, Coconut Court/Amaryllis, Browns Beach, Heywoods and Worthing Beach.

CARIBBEAN BLUE FLAG CRITERIA

The Caribbean Blue Flag criteria for beaches have been adapted to reflect the environmental and social conditions in the Caribbean and will be finalised by the end of December 2003.

A Blue Flag beach is defined as a national officially designated bathing area with at least one sampling point for water quality analyses. The beach must have the necessary facilities and comply with the standards outlined in the Caribbean Blue Flag Criteria.

The Caribbean Blue Flag Campaign has 24 criteria in the categories of water quality, environmental education and information, environmental management and safety and services. The criteria are either imperative or guideline. All imperative criteria and a maximum number of guideline criteria must be fulfilled for the award of a Blue Flag.

The requirements of the criteria include and life saving and safety equipment, the establishment of a beach management committee to set up environmental management systems and conduct regular environmental audits of the beach facilities and a Blue Flag information board that displays the rules governing the beach, a map of the beach showing all facilities and water quality information for the beach.

An imperative environmental education and information criterion requires that clear and up to date information on the water quality of the beach must be prominently displayed on the Blue Flag information board within three weeks after the sampling has been carried out.

The Environmental Engineering Division through the Ministry of Housing Lands And Environment is responsible for water quality monitoring, control and information and therefore will examine the water quality criteria with respect to the Caribbean Blue Flag Campaign.

Water Quality Criteria

The Caribbean Blue Flag Campaign water quality criteria are all imperative criteria hence they must be fulfilled for its award.

1. The requirements and standards of Class I waters as defined by the Protocol Concerning Pollution from Land–Based Sources and Activities (LBS Protocol) must be fulfilled. Water containing coral reefs and water used for recreation are considered Class I Waters under the LBS Protocol definition.

   The beach must have at least two sample points representative of the stretch of beach. The sampling points should be placed where the concentration of bathers is the highest and where there are potential pollution sources such as streams and rivers. At least one sampling point should coincide with a sampling point of the water quality sampling programme of the regulatory body.

   The biological water quality parameters are faecal coliform and faecal streptococci bacteria. The sampling and analysis for faecal coliform bacteria is imperative while the sampling and analysis for faecal streptococci is optional. Biological sampling should be done every 14 days during the dry season and every 7 days during the wet season. The standards for the biological water quality parameters are shown in the table below.

PARAMETER	STANDARD
Faecal Coliform	< 100/100 ml in minimum of 75% of samples taken over a period of a year < 400/100 ml in minimum 95% of samples taken over a period of a year
Faecal Streptococci	< 40/100 ml in minimum 75% of samples taken over a period of a year

Table 11: Caribbean Blue Flag criteria for biological water quality parameters. (Taken from Caribbean Blue Flag Beach Criteria And Guidance Notes.)

The chemical and qualitative parameters are pH, oil and grease, transparency/turbidity and floatables. Chemical and qualitative sampling should be taken every 14 days during the dry season and every 7 days during the wet season. The standards for the chemical and qualitative water quality parameters are shown in the table below.

PARAMETER	STANDARD
pH	6.5 – 8.5 in 95% of samples taken over a period of a year
Oil And Grease	Absence of sheen or odour in 95% of samples taken over a period of a year
Transparency/Turbidity	Secchi disk reading to the bottom up to the swimming boundary or to a depth of 3 metres if the depth of the swim are exceed 3 metres in 95% of samples taken over a period of a year
Floatables	Absence in 95% of samples taken over a period of a year

Table 12: Caribbean Blue Flag criteria for chemical and qualitative water quality parameters (Taken from Caribbean Blue Flag Beach Criteria And Guidance Notes.)

2. There should be no direct discharge of industrial, sewage effluent or storm water to the beach.

3. The health of the coral reefs located in the vicinity of the beach should be monitored using the Reef Check monitoring programme.

The Blue Flag will not be awarded to a pilot beach if the biological water quality parameters are not satisfied for at least one year preceding the season the Blue Flag will be awarded. The Blue Flag cannot be flown for the rest of a current season and the following season if the biological water quality standards are not satisfied.

Environmental Education And Information Criteria

4. The Blue Flag information board should display standardized information about the Blue Flag Campaign and rules governing beach use and conduct.

5. A map of the beach showing the extent of the Blue Flag beach, areas of the beach with designated uses, the location of lifeguards, life saving equipment, water sampling points, sanitary facilities any natural sensitive areas.

6. **The bathing water quality information should be prominently displayed on the Blue Flag information board.**

7. There should be information about any sensitive environmental resources on or near the beach to educate beach users

8. There should be a minimum of five environmental education activities in the year the Blue Flag is awarded.

9. Sustainable transportation such as public and collective transport and bicycles should be encouraged.

Environmental Management Criteria

10. A beach management committee must be established that consists of all of the relevant stakeholders. The committee should institute environmental management systems, conduct regular audits of the beach facility and ensure compliance with environmental management criteria.

11. Waste disposal and recycling bins should be placed along the beach.

12. The entire length of the beach should be kept clean.

13. There should be no unauthorised driving, camping or dumping on the beach.

14. There should be sanitary toilet and shower facilities at the beach with controlled sewage disposal.

15. Environmental management at the beach should be planned taking into consideration any sensitive environmental species and/or habitats and should be enforced.

16. The operation of the beach should comply with all relevant regulations regarding.

17. The building and equipment at the beach must be properly maintained.

18. No pets should be allowed on the beach with the exception of dogs for blind people.

Safety And Services

19. There must be an adequate number of trained lifeguards and lifesaving and first aid equipment available at the beach. The lifeguards should be certified from the national accreditation institution a flag system used to demarcate zones on the beach and to warn of the condition of the sea.

20. The beach should be clearly zoned to prevent conflict between different users of the beach such as water sports and swimmers.

21. There should be an internationally recognised warning system in place for environmental pollution safety risks.

22. The beach and toilet facilities should have access for the disabled.

23. The access to the beach should be safe and easy.

WATER QUALITY MONITORING IN BARBADOS

The Environmental Engineering Division monitors the water quality at ten beaches in Barbados. The beaches selected for the pilot phase of the Caribbean Blue Flag Campaign that are routinely monitored by the Environmental Engineering Division are Accra Beach, Brownes Beach, Heywoods Beach, Dover Beach and Worthing Beach.

Sampling Methodology

The Division has been conducting weekly marine water quality monitoring since 2002 at ten of the most highly used beaches on the West and South Coasts. The parameters tested are faecal coliforms, faecal streptococci and enterococci. Analysis of the water samples is conducted at the Sir Winston Scott Polyclinic.

The Division has established three sample sites on each beach. **These samples sites were selected to reflect the worst case scenario for the near shore water quality and hence are located opposite discharges such as storm water drains and wastewater from hotels to assess their effects on the nearshore water quality.** The table below shows the location of historical sample sites at proposed Blue Flag Pilot beaches.

BEACHES	STATION 1	2	3
ACCRA	Storm water drain (Near Bikini Beach Bar)	Opposite storm water drain	Opposite Almond tree and Manchioneil tree between two Mile trees
BROWNES	Facing sea, jetty on right	Opposite storm water drain (Harbour Lights)	Opposite storm water drain (Beckles Road)
DOVER	Opposite Divi Sand Hurst	Opposite Southern Palms Bar	Opposite biggest tree on old Dover Convention Centre Property
HEYWOODS	Facing sea, entrance to Port St. Charles' lagoon on right	Stone with red marking (Opposite centre of Port St. Charles' estate)	Opposite Dive Shop (Almond Beach Village)
WORTHING	Sandy Beach Hotel	Opposite sluice gate (Graeme Hall Swamp)	Basin (Opposite Yellow Bird Hotel, Sluice Gate on left)

Table 13: Location of sample sites on the Blue Flag Pilot beaches.

Water samples are taken from three sample sites at each beach in 1m depths and 18 inches from the surface. Two samples are taken per site. Additional qualitative information collected at the time of sampling is beach debris, cloud cover, state of the sea, wind direction, wind speed, height

of tide, hours of sunshine, daily rainfall, water temperature, salinity, pH, turbidity and transparency. Water quality sampling is sensitive to factors such as the time of sampling in relation to rainfall events, weather conditions and concentration of bathers. Hence, these qualitative parameters are used to assess the importance of environmental factors and their influence on indicator organism densities in the near shore.

Faecal coliform and faecal streptococci bacteria are thermotolerant bacteria and may grow in soils in tropical climates such as Barbados. The presence of faecal coliform and faecal streptococci bacteria is generally higher in the rainy season than in the dry season as a result of increased surface run off entering the recreational bathing region.

Data Analysis Methodology

The seawater samples are analysed at the Sir Winston Scott Polyclinic and the sample results reported as number of counts of bacteria tested for per 100 ml.

The laboratory results may indicate that the number of bacteria were too numerous to count due to low dilution of original sample. The too numerous to count values may be treated two different ways in the analysis of the sample results. They may be ignored or the maximum value substituted. The data was analysed using both methods of analysis.

In 2003, sampling was conducted only until July because the laboratory exhausted its supply of consumables needed to conduct the tests.

United States Environmental Protection Agency Recreational Water Quality Standards

The Division uses the United States Environmental Protection Agency (USEPA) standards for recreational waters. The USEPA standards are shown in the table below.

Parameter	Standard
Faecal Coliform	Geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period, nor should more than 10% of the samples exceed 400 counts/100ml.
Faecal Streptococci	Geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period nor should any of the samples exceed 104 counts/100ml.

Table 14: USEPA recreational water quality standards.

WATER QUALITY DATA ANALYSIS USING UNITED STATES ENVIRONMENTAL PROTECTION AGENCY RECREATIONAL WATER QUALITY STANDARDS

The water quality data was analysed using two methods:

1. **The maximum value was substituted for too numerous to count values.**
2. **Too numerous to count values were ignored.**

Data Analysis With Maximum Value Substituted For Too Numerous To Count Values

The table below shows the compliance of the Blue Flag pilot beaches with the USEPA recreational water standards over the period of the year **2002 where the maximum value was substituted for the too numerous to count values.**

2002	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC	✓	✓	✓	✓	×
%FC < 400/100 ml	×	✓	×	✓	×
FS	×	×	×	✓	×
FS < 104/100 ml	×	×	×	×	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100 ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100 ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 15: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

Over the period 2002, none the beaches met all of the USEPA standards.

Accra Beach met one of the USEPA standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period.

Browns Beach met two standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Dover Beach met one of the standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period.
Heywoods Beach met three of the USEPA standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period, faecal coliform less than 400 counts/100 ml in no more than 10% of the samples and faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period.

Worthing Beach met none of the USEPA standards.

The tables below show the monthly compliance of the Blue Flag pilot beaches with the USEPA recreational water quality standards in **2002 where the maximum value was substituted for the too numerous to count values**.

2002 MONTH	ACCRA				BROWNES			
	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml	FC	%FC< 400/100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	✓	✓	✓	✓	×	✓
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	✓	✓	✓	✓	✓	✓	✓	✓
APRIL	✓	✓	✓	×	✓	✓	×	×
MAY	✓	×	✓	✓	✓	✓	✓	✓
JUNE	✓	✓	✓	✓	✓	✓	✓	✓
JULY	✓	✓	✓	✓	✓	✓	✓	×
AUGUST	✓	✓	✓	✓	✓	✓	✓	✓
SEPTEMBER	✓	✓	✓	✓	✓	✓	✓	✓
OCTOBER	✓	×	✓	×	✓	✓	✓	✓
NOVEMBER	✓	×	×	×	✓	✓	✓	✓
DECEMBER	✓	✓	✓	✓	✓	✓	✓	✓

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.
% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.
FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.
FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.
✓ - Meets standard. × - Does not meet standard.

Table 16: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

2002 MONTH	DOVER				HEYWOODS			
	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	✓	✓	✓	✓	✓	✓
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	✓	✓	✓	✓	✓	✓	✓	✓
APRIL	✓	✓	✓	✓	✓	✓	✓	✓
MAY	✓	✓	✓	✓	✓	✓	✓	✓
JUNE	✓	✓	✓	✓	✓	✓	✓	✓
JULY	✓	×	✓	✓	✓	✓	✓	✓
AUGUST	✓	✓	✓	✓	✓	✓	✓	✓
SEPTEMBER	✓	×	×	×	✓	✓	✓	✓
OCTOBER	✓	✓	✓	×	✓	✓	✓	×
NOVEMBER	✓	✓	✓	✓	✓	✓	✓	✓
DECEMBER	✓	✓	✓	✓	✓	✓	✓	✓

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 17: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

2002 MONTH	WORTHING			
	FC	%FC< 400/100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	✓	✓
FEBRUARY	✓	✓	✓	✓
MARCH	✓	✓	✓	✓
APRIL	✓	✓	✓	✓
MAY	✓	×	✓	✓
JUNE	✓	✓	✓	✓
JULY	✓	✓	✓	✓
AUGUST	✓	×	✓	×
SEPTEMBER	✓	✓	×	×
OCTOBER	✓	×	✓	×
NOVEMBER	×	×	✓	×
DECEMBER	✓	×	✓	✓

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 18: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

The standard faecal coliform geometric mean less than 200 counts / 100 ml during any 30 day period was not met in the month of November.

The standard faecal coliform less than 400 counts/100 ml in no more than 10% of the samples was not met in the months of May, July, August, September, October, November and December.

The standard faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period was not met in January, April, September and November.

The standard faecal streptococci should not exceed 104 counts/ 100 ml in any sample was not met in April, July, August, September, October and November. This was the only standard that was not met by all of the beaches.
Accra beach met the USEPA standard of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period each month of the year. It did not meet the standards faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in May, October and November, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in November and faecal streptococci should not exceed 104 counts/100 ml in any sample in April, October and November.

Brownes beach met the USEPA standards of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples each month of 2002. It did not meet the standards of faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in January and April and faecal streptococci should not exceed 104 counts/100 ml in any sample in April and July.

Dover beach met the USEPA standard of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period each month of 2002. It did not meet the standards faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in July and September, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in September and faecal streptococci should not exceed 104 counts/100 ml in any sample in September and October.

Heywoods beach met the USEPA standards of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period, faecal coliform less than 400 counts/100 ml in no more than 10% of the samples and faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period each month of the year 2002. It did not meet the standard of faecal streptococci should not exceed 104 counts/100 ml any sample in October.

Worthing beach did not meet the standards faecal coliform geometric mean less than 200 counts / 100 ml during any 30 day period in November; faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in May, August, October, November and December, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in September and faecal streptococci should not exceed 104 counts/ 100 ml in any sample in August, September, October and November.

The table below shows the compliance of the Blue Flag pilot beaches with the USEPA recreational water standards over the period of the year **2003 where the maximum value was substituted for the too numerous too count values**.

2003	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC	×	✓	✓	×	×
%FC < 400/100 ml	×	✓	✓	✓	×
FS	×	×	×	✓	×
FS < 104/100 ml	×	×	×	✓	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 19: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003.

Over the period 2003, none the beaches met all of the USEPA recreational water quality standards.

Accra Beach met none of the USEPA recreational water quality standards.

Browns Beach met two standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Dover Beach met two standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Heywoods Beach met three of the USEPA standards which were faecal coliform less than 400 counts/100 ml in no more than 10% of the samples, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period and faecal streptococci not exceed 104 counts/100 ml in any samples.

Worthing Beach met none of the USEPA recreational water quality standards.

The tables below show the monthly compliance of the Blue Flag pilot beaches with the USEPA recreational water quality standards in **2003 where the maximum value was substituted for the too numerous to count values**.

2003 MONTH	ACCRA				BROWNES			
	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml
JANUARY	✓	×	✓	×	✓	✓	✓	×
FEBRUARY	✓	×	✓	✓	✓	✓	✓	×
MARCH	×	×	×	×	✓	✓	×	×
APRIL	✓	×	✓	×	✓	✓	×	×
MAY	✓	×	✓	✓	✓	✓	✓	×
JUNE	×	×	×	×	✓	✓	×	×
JULY	–	–	–	–	–	–	–	–

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 20: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003.

2003 MONTH	DOVER				HEYWOODS			
	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	×	✓	✓	✓	✓	✓
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	✓	✓	✓	✓	✓	✓	✓	✓
APRIL	✓	✓	✓	×	×	✓	✓	✓
MAY	✓	✓	×	✓	✓	✓	✓	✓
JUNE	✓	✓	×	×	✓	✓	✓	✓
JULY	✓	✓	✓	✓	–	–	–	–

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 21: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003.

2003 MONTH	WORTHING			
	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml
JANUARY	✓	×	✓	×
FEBRUARY	×	×	×	×
MARCH	×	×	×	×
APRIL	✓	×	✓	×
MAY	✓	×	✓	✓
JUNE	✓	×	×	×
JULY	✓	✓	×	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 22: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003

The standard faecal coliform geometric mean less than 200 counts / 100 ml during any 30 day period was not met in the months of February, March, April and June.

The standard faecal coliform less than 400 counts/100 ml in no more than 10% of the samples was not met in the months of January, February, March, April, May and June.

The standard faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period was not met in January, February, March, April, May, June and July.

The standard faecal streptococci should not exceed 104 counts/ 100 ml in any sample was not met in January, February, March, April, May, June and July.

Accra Beach did not meet the USEPA standards of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period in March and June, faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in January, February, March, April, May and June, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in March and June and faecal streptococci should not exceed 104 counts/100 ml in any sample in January, March, April and June.

Brownes beach met the USEPA standards of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples during the year 2003. It did not meet the standards of faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in March, April and June and faecal streptococci should not exceed 104 counts/100 ml in January, February, March, April, May and June.

Dover beach met the USEPA standards of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples during 2003. It did not meet the standard faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in January, May and June and faecal streptococci should not exceed 104 counts/100 ml in any sample in April and June.

Heywoods beach met the USEPA standards of faecal coliform less than 400 counts/100 ml in no more than 10% of the samples, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period and faecal streptococci should not exceed 104 counts/100 ml in any sample during the year 2003. It did not meet the standard of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period in April.

Worthing beach did not meet the USEPA standards of faecal coliform geometric mean less than 200 counts/100ml during any 30 day period in February and March, faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in January, February, March, April, May and June, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in February, March, June and July and faecal streptococci should not exceed 104 counts/ 100 ml in any sample in January, February, March, April, June and July.

Data Analysis With Too Numerous To Count Values Ignored

The table below shows the compliance of the Blue Flag pilot beaches with the USEPA recreational water standards over the period of the year **2002 where the too numerous to count values were ignored.**

2002	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC	✓	✓	✓	✓	×
%FC < 400/100 ml	×	✓	×	✓	×
FS	×	×	×	✓	×
FS < 104/100 ml	×	×	×	×	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100 ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100 ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 23: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

The results for the beaches over the period of 2002 remained the same when the too numerous to count values were ignored. Over this period, none the beaches met all of the USEPA standards.

Accra Beach met one of the USEPA standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period.

Brownes Beach met two standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Dover Beach met one of the standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period.

Heywoods Beach met three of the USEPA standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period, faecal coliform less than 400 counts/100 ml in no more than 10% of the samples and faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period.

Worthing Beach met none of the USEPA standards.

The tables below show the monthly compliance of the Blue Flag pilot beaches with the USEPA recreational water quality standards in **2002 where the too numerous to count values were ignored.**

2002 MONTH	ACCRA				BROWNES			
	FC	%FC< 400/100ml	FS	FS < 104/ 100ml	FC	%FC< 400/100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	✓	✓	✓	✓	×	✓
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	✓	✓	✓	✓	✓	✓	✓	✓
APRIL	✓	✓	✓	×	✓	✓	×	×
MAY	✓	×	✓	✓	✓	✓	✓	✓
JUNE	✓	✓	✓	✓	✓	✓	✓	✓
JULY	✓	✓	✓	✓	✓	✓	✓	×
AUGUST	✓	✓	✓	✓	✓	✓	✓	✓
SEPTEMBER	✓	✓	✓	✓	✓	✓	✓	✓
OCTOBER	✓	✓	✓	✓	✓	✓	✓	✓
NOVEMBER	✓	×	×	×	✓	✓	✓	✓
DECEMBER	✓	✓	✓	✓	✓	✓	✓	✓

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 24: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

2002 MONTH	DOVER				HEYWOODS			
	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	✓	✓	✓	✓	✓	✓
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	✓	✓	✓	✓	✓	✓	✓	✓
APRIL	✓	✓	✓	✓	✓	✓	✓	✓
MAY	✓	✓	✓	✓	✓	✓	✓	✓
JUNE	✓	✓	✓	✓	✓	✓	✓	✓
JULY	✓	×	✓	✓	✓	✓	✓	✓
AUGUST	✓	✓	✓	✓	✓	✓	✓	✓
SEPTEMBER	✓	✓	×	×	✓	✓	✓	✓
OCTOBER	✓	✓	✓	×	✓	✓	✓	×
NOVEMBER	✓	✓	✓	✓	✓	✓	✓	✓
DECEMBER	✓	✓	✓	✓	✓	✓	✓	✓

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 25: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

2002 MONTH	WORTHING			
	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	✓	✓
FEBRUARY	✓	✓	✓	✓
MARCH	✓	✓	✓	✓
APRIL	✓	✓	✓	✓
MAY	✓	×	✓	✓
JUNE	✓	✓	✓	✓
JULY	✓	✓	✓	✓
AUGUST	✓	×	✓	×
SEPTEMBER	✓	✓	×	×
OCTOBER	✓	✓	✓	✓
NOVEMBER	×	×	✓	×
DECEMBER	✓	✓	✓	✓

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 26: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2002.

The standard faecal coliform geometric mean less than 200 counts / 100 ml during any 30 day period was not met in the month of November.

The standard faecal coliform less than 400 counts/100 ml in no more than 10% of the samples was not met in the months of May, July, August and November.

The standard faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period was not met in January, April, September and November.

The standard faecal streptococci should not exceed 104 counts/ 100 ml in any sample was not met in April, July, August, September, October and November.

Accra beach met the USEPA standard of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period each month of the year. It did not meet the standards faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in May and November, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in November and faecal streptococci should not exceed 104 counts/100 ml in any sample in April and November. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the standards faecal coliform less than 400 counts/100 ml in no more than 10% of the samples and faecal streptococci should not exceed 104 counts/100 ml in any sample were met in October.

Brownes beach met the USEPA standards of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples each month of 2002. It did not meet the standards of faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in January and April and faecal streptococci should not exceed 104 counts/100 ml in any sample in April and July. These results were identical to those obtained when the maximum value was substituted for the too numerous to count values.

Dover beach met the USEPA standard of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period each month of 2002. It did not meet the standards faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in July, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in September and faecal streptococci should not exceed 104 counts/100 ml in any sample in September and October. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the standard faecal coliform less than 400 counts/100 ml in no more than 10% of the samples was met in September.

Heywoods beach met the USEPA standards of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples each month of year 2002. It did not meet the standard of faecal streptococci should not exceed 104 counts/100 ml in any sample in October. These results were identical to those obtained when the maximum value was substituted for the too numerous to count values.

Worthing beach did not meet the standards faecal coliform geometric mean less than 200 counts / 100 ml during any 30 day period in November; faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in May, August and November, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in September and faecal streptococci should not exceed 104 counts/ 100 ml in any sample in August, September and November. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the standards faecal coliform less than 400 counts/100 ml in no more than 10% of the samples was met in October and December and faecal streptococci should not exceed 104 counts/ 100 ml in any sample was met in October.

The table below shows the compliance of the Blue Flag pilot beaches with the USEPA recreational water standards over the period of the year **2003 where the too numerous to count values were ignored.**

2003	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC	✓	✓	✓	×	×
%FC < 400/100 ml	×	✓	✓	✓	×
FS	×	×	×	✓	×
FS < 104/100 ml	×	×	×	✓	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 27: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003.

There was a change in the results over the period 2003 when the too numerous to count values were ignored. However, over this period, none the beaches met all of the USEPA standards.

Accra Beach met one of the USEPA standards which was faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period. This standard was not met when the maximum value was substituted for too numerous to count values.

Browns Beach met two standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Dover Beach met two standards which were faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples.

Heywoods Beach met three of the USEPA standards which were faecal coliform less than 400 counts/100 ml in no more than 10% of the samples, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period and faecal streptococci not exceed 104 counts/100 ml in any sample.

Worthing Beach met none of the USEPA standards.

The tables below show the monthly compliance of the Blue Flag pilot beaches with the USEPA recreational water quality standards in **2003 where the too numerous too count values were ignored**.

2003 MONTH	ACCRA				BROWNES			
	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	✓	×	✓	✓	✓	×
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	✓	✓	×	×	✓	✓	✓	✓
APRIL	✓	✓	✓	×	✓	✓	×	×
MAY	✓	×	✓	✓	✓	✓	✓	×
JUNE	✓	×	×	×	✓	✓	×	×
JULY	–	–	–	–	–	–	–	–

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 28: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003.

2003 MONTH	DOVER				HEYWOODS			
	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml	FC	%FC <400/ 100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	×	✓	✓	✓	✓	✓
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	✓	✓	✓	✓	✓	✓	✓	✓
APRIL	✓	✓	✓	×	×	✓	✓	✓
MAY	✓	✓	×	✓	✓	✓	✓	✓
JUNE	✓	✓	×	×	✓	✓	✓	✓
JULY	✓	✓	✓	✓	–	–	–	–

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 29: The monthly compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003.

2003 MONTH	WORTHING			
	FC	%FC< 400/100ml	FS	FS < 104/ 100ml
JANUARY	✓	✓	✓	×
FEBRUARY	✓	×	×	×
MARCH	×	×	×	×
APRIL	✓	✓	✓	×
MAY	✓	✓	✓	✓
JUNE	✓	✓	×	×
JULY	✓	✓	×	×

Key

FC – Faecal coliform geometric mean of a minimum of five samples should not exceed 200 counts/100ml during any 30 day period.

% FC < 400/100ml – Faecal coliform should not exceed 400 counts/100ml in no more than 10% of samples.

FS – Faecal streptococci geometric mean of a minimum of five samples should not exceed 35 counts/100ml during any 30 day period.

FS < 104 – Faecal streptococci should not exceed 104 counts/100ml in any of samples.

✓ - Meets standard. × - Does not meet standard.

Table 30: The compliance of the Caribbean Blue Flag Campaign pilot beaches with USEPA recreational water quality criteria in 2003

The standard faecal coliform geometric mean less than 200 counts / 100 ml during any 30 day period was not met in the months of March and April.

The standard faecal coliform less than 400 counts/100 ml in no more than 10% of the samples was not met in the months of February, March, May and June.

The standard faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period was not met in January, February, March, April, May, June and July.

The standard faecal streptococci should not exceed 104 counts/ 100 ml in any sample was not met in January, February, March, April, May, June and July.

Accra beach met the USEPA standard of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period. It did not meet the standards faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in May and June, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 days in March and June and faecal streptococci should not exceed 104 counts/100 ml in any sample in January, March, April and June. These results were different to those obtained when the maximum value was substituted

for the too numerous to count value. When the too numerous to count values were ignored the standards faecal coliform geometric mean less than 200 counts/ 100 ml during any 30 day period was met in March and June and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples was met in January, February, March and April.

Brownes beach met the USEPA standards of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples during the year 2003. It did not meet the standards of faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in April and June and faecal streptococci should not exceed 104 counts/100 ml in any sample in January, April, May and June. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the standards faecal streptococci geometric mean less than 35 counts/ 100 ml during any 30 day period was met in March and faecal streptococci should not exceed 104 counts/ 100 ml in any sample in February and March.

Dover beach met the USEPA standards of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples and during 2003. It did not meet the standard faecal streptococci geometric mean less than 35 counts/100 ml during nay 30 day period in January, May and June and faecal streptococci should not exceed 104 counts/100 ml in any sample in April and June. These results were identical to those obtained when the maximum value was substituted for the too numerous to count values.

Heywoods beach met the USEPA standards of faecal coliform less than 400 counts/100 ml in no more than 10% of the samples, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period and faecal streptococci should not exceed 104 counts/100 ml in any sample during the year 2003. It did not meet the standard of faecal coliform geometric mean less than 200 counts/100 ml during any 30 day period in April. These results were identical to those obtained when the maximum value was substituted for the too numerous to count values.

Worthing beach did not meet the USEPA standards of faecal coliform geometric mean less than 200 counts/100ml during any 30 day period in March, faecal coliform less than 400 counts/100 ml in no more than 10% of the samples in February and March, faecal streptococci geometric mean less than 35 counts/100 ml during any 30 day period in February, March, June and July and faecal streptococci should not exceed 104 counts/ 100 ml in any sample in January, February, March, April, June and July. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the standards faecal coliform geometric mean less than 200 counts/100ml during any 30 day period was met in February and faecal coliform less than 400 counts/100 ml in no more than 10% of the samples was met in January, April May and June.

WATER QUALITY DATA ANALYSIS USING CARIBBEAN BLUE FLAG WATER QUALITY CRITERIA

The water quality data was analysed using two methods:

3. **The maximum value was substituted for too numerous to count values.**
4. **Too numerous to count values were ignored.**

Data Analysis With Maximum Value Substituted For Too Numerous To Count Values

The table below shows the compliance of the Blue Flag pilot beaches with the Caribbean Blue Flag water quality criteria over the period of the year **2002 where the maximum value was substituted for the too numerous to count values.**

2002	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC < 100/100 ml	✓	✓	✓	✓	×
FC < 400/100 ml	×	✓	✓	✓	×
FS < 40/100 ml	✓	✓	✓	✓	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 31: The compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2002.

In 2002, Brownes, Dover and Heywoods beaches met the Caribbean Blue Flag water quality criteria.

Accra beach did not meet the Caribbean Blue Flag criterion for faecal coliforms less than 400/100ml in 95% of samples.

Worthing Beach did not meet the Blue Flag criteria for faecal coliforms less than 100/100ml in 75% of samples and faecal coliforms less than 400/100ml in 95% of samples.

An examination of the monthly results at the beaches in **2002** is summarised in the table below **where the maximum value was substituted for the too numerous to count values.**

2002 MONTH	ACCRA			BROWNES			DOVER		
	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40
JANUARY	✓	✓	✓	✓	✓	×	×	✓	✓
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	✓	✓	×	✓	✓	✓	✓	✓	✓
APRIL	✓	✓	×	×	✓	×	✓	✓	✓
MAY	×	×	✓	×	✓	✓	✓	✓	×
JUNE	✓	✓	✓	✓	✓	✓	✓	✓	✓
JULY	×	✓	✓	×	✓	×	✓	×	✓
AUGUST	✓	✓	✓	✓	✓	✓	✓	✓	✓
SEPTEMBER	✓	✓	✓	✓	✓	✓	✓	×	×
OCTOBER	×	×	✓	✓	✓	✓	✓	✓	×
NOVEMBER	×	×	×	✓	✓	✓	✓	✓	×
DECEMBER	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 32: An analysis of the monthly compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2002.

2002 MONTH	HEYWOODS			WORTHING		
	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40
JANUARY	✓	✓	✓	✓	✓	✓
FEBRUARY	✓	✓	✓	×	✓	✓
MARCH	✓	✓	✓	✓	✓	×
APRIL	✓	✓	✓	✓	✓	✓
MAY	✓	✓	✓	×	×	✓
JUNE	✓	✓	✓	×	✓	✓
JULY	✓	✓	✓	✓	✓	✓
AUGUST	✓	✓	✓	✓	×	×
SEPTEMBER	✓	✓	✓	✓	✓	×
OCTOBER	✓	✓	✓	×	×	×
NOVEMBER	✓	✓	✓	×	×	×
DECEMBER	✓	✓	✓	×	×	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 33: An analysis of the monthly compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2002.

The Caribbean Blue Flag criterion faecal coliform less than 100/100 ml in a minimum of 75% of samples was not met in the months of January, February, April, May, June, July, October, November and December. The failure of the criterion occurred most frequently in the months of May, October and November.

The Caribbean Blue Flag criterion faecal coliform less than 400/100 ml in a minimum of 95% of samples was not met in the months of May, July, August, September, October, November and December. The failure of the criterion occurred most frequently in the months of May, October and November.

The Caribbean Blue Flag faecal streptococci criterion was not met in the months of January, March, April, May, July, August, September, October and November. The failure of the beaches occurred most frequently in the months of September and November.

Accra Beach failed the criteria of faecal coliform less than 100/100 ml in a minimum of 75% of samples in May, July, October and November, faecal coliform less than 400/100 ml in a minimum of 95% of samples in May, October and November and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in March, April and November.

Brownes Beach failed the criteria faecal coliform less than 100/100 ml in a minimum of 75% of samples in April, May and July, and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January, April and July.

Dover Beach failed the criteria faecal coliform less than 100/100 ml in a minimum of 75% of samples in January, faecal coliform less than 400/100 ml in a minimum of 95% of samples in July and September and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in May, September, October and November.

Heywoods Beach passed all of the Caribbean Blue Flag criteria each month of 2002.

Worthing Beach failed the criteria faecal coliform less than 100/100 ml in a minimum of 75% of samples in February, May, June, October, November and December, faecal coliform less than 400/100 ml in a minimum of 95% of samples in May, August, October, November and December and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in March, August, September, October and November.

The table below shows the compliance of the Blue Flag pilot beaches with the Caribbean Blue Flag water quality criteria over the period of the year **2003 where the maximum value was substituted for the too numerous to count values.**

2003	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC < 100/100 ml	×	✓	✓	✓	×
FC < 400/100 ml	×	✓	✓	✓	×
FS < 40/100 ml	×	×	×	✓	×

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 34: The compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2003.

In 2003 Heywoods beaches met the Caribbean Blue Flag water quality criteria.

Accra beach did not meet any of the Caribbean Blue Flag water quality criteria.

Brownes beach did not meet the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples.

Dover beach did not meet the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples.

Worthing Beach did not meet any of the Caribbean Blue Flag water quality criteria.

An examination of the monthly results at the beaches in **2003** is summarised in the table below **where the maximum value was substituted for the too numerous to count values.**

2003 MONTH	ACCRA			BROWNES			DOVER		
	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40
JANUARY	×	×	×	✓	✓	×	✓	✓	×
FEBRUARY	×	×	✓	✓	✓	✓	✓	✓	✓
MARCH	×	×	×	✓	✓	×	✓	✓	×
APRIL	×	×	×	✓	✓	×	✓	✓	✓
MAY	✓	×	✓	✓	✓	✓	✓	✓	×
JUNE	×	×	×	✓	✓	×	✓	✓	×
JULY	-	-	-	-	-	-	✓	✓	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 35: An analysis of the monthly compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2003.

2003 MONTH	HEYWOODS			WORTHING		
	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40
JANUARY	✓	✓	✓	×	×	×
FEBRUARY	✓	✓	✓	×	×	✓
MARCH	✓	✓	✓	×	×	×
APRIL	✓	✓	✓	✓	×	×
MAY	✓	✓	✓	✓	×	✓
JUNE	✓	✓	✓	✓	×	×
JULY	-	-	-	✓	✓	×

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 36: An analysis of the monthly compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2003.

The Caribbean Blue Flag criterion faecal coliform less than 100/100 ml in a minimum of 75% of samples was not met in the months of January, February, March, April and June. The failure of the criterion occurred most frequently in the months of January, February and March.

The Caribbean Blue Flag criterion faecal coliform less than 400/100 ml in a minimum of 95% of samples was not met in the months of January, February, March, April, May and June.

The Caribbean Blue Flag faecal streptococci criterion was not met in the months of January, March, April, May, June and July. The failure of the beaches occurred most frequently in the months of January, March and June.

Accra Beach failed the criteria of faecal coliform less than 100/100 ml in a minimum of than 75% of samples in January, February, March April and June, faecal coliform less than 400/100 ml in a minimum of 95% of samples in January, February, March April, May and June and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January, March, April and June.

Brownes Beach failed the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January, March, April and June.

Dover Beach failed the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January, March, May and June.

Heywoods Beach passed all of the Caribbean Blue Flag criteria each month of 2002.

Worthing Beach failed the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples in January, February and March, faecal coliform less than 400/100 ml in a minimum of 95% of samples in January, February, March, April, May and June and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January, March, April, June and July.

Data Analysis With Too Numerous To Count Values Ignored

The table below shows the compliance of the Blue Flag pilot beaches with the Caribbean Blue Flag water quality criteria over the period of the year **2002 where the too numerous to count values were ignored.**

2002	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC < 100/100 ml	✓	✓	✓	✓	✓
FC < 400/100 ml	✓	✓	✓	✓	×
FS < 40/100 ml	✓	✓	✓	✓	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 37: The compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2002.

Accra, Brownes, Dover and Heywoods beaches met the Caribbean Blue Flag water quality criteria.
Worthing Beach did not meet the Blue Flag criterion for faecal coliforms less than 400/100ml in 95% of samples.

There was a difference in the results when the too numerous to count values were ignored. Accra beach did not meet the criteria faecal coliforms less than 400/100ml in 95% of samples and Worthing beach did not meet the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples when the maximum value was substituted for the too numerous to count values.

An examination of the monthly results at the beaches in **2002** is summarised in the table below **where too numerous to count values were ignored.**

2002 MONTH	ACCRA			BROWNES			DOVER		
	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40
JANUARY	✓	✓	✓	✓	✓	×	×	✓	✓
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	✓	✓	×	✓	✓	✓	✓	✓	✓
APRIL	✓	✓	×	×	✓	×	✓	✓	✓
MAY	×	×	✓	×	✓	✓	✓	✓	×
JUNE	✓	✓	✓	✓	✓	✓	✓	✓	✓
JULY	✓	✓	✓	✓	✓	✓	✓	×	✓
AUGUST	✓	✓	✓	✓	✓	✓	✓	✓	✓
SEPTEMBER	✓	✓	✓	✓	✓	✓	✓	✓	×
OCTOBER	✓	✓	✓	✓	✓	✓	✓	✓	×
NOVEMBER	×	×	×	✓	✓	✓	✓	✓	×
DECEMBER	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria.

Table 38: An analysis of the monthly compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2002.

2002 MONTH	HEYWOODS			WORTHING		
	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40
JANUARY	✓	✓	✓	✓	✓	✓
FEBRUARY	✓	✓	✓	×	✓	✓
MARCH	✓	✓	✓	✓	✓	×
APRIL	✓	✓	✓	✓	✓	✓
MAY	✓	✓	✓	×	×	✓
JUNE	✓	✓	✓	×	✓	✓
JULY	✓	✓	✓	✓	✓	✓
AUGUST	✓	✓	✓	✓	×	×
SEPTEMBER	✓	✓	✓	✓	✓	×
OCTOBER	✓	✓	✓	✓	✓	✓
NOVEMBER	✓	✓	✓	×	×	×
DECEMBER	✓	✓	✓	✓	✓	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria.

Table 39: An analysis of the monthly compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2002.

The Caribbean Blue Flag criterion faecal coliform less than 100/100 ml in a minimum of 75% of samples was not met in the months of January, February, April, May, June, and November. The failure of the criterion occurred most frequently in the months of May and November.

The Caribbean Blue Flag criterion faecal coliform less than 400/100 ml in a minimum of 95% of samples was not met in the months of May, July and November. The failure of the criterion occurred most frequently in the months of May and November.

The Caribbean Blue Flag faecal streptococci criterion was not met in the months of January, March, April, May, August, September, October and November. The failure of the beaches occurred most frequently in the month of November.

Accra Beach failed the criteria of faecal coliform less than 100/100 ml in a minimum of than 75% of samples in May and November, faecal coliform less than 400/100 ml in a minimum of 95% of samples in May and November and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in March, April and November. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples was met in July and October and faecal coliform less than 400/100 ml in a minimum of 95% of samples was met in October.

Brownes Beach failed the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples in April and May, and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January and April. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples and faecal streptococci less than 40/100 ml in a minimum of 75% of samples were met in July.

Dover Beach failed the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples in January, faecal coliform less than 400/100 ml in a minimum of 95% of samples in July and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in May, September, October and November. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the criterion faecal coliform less than 400/100 ml in a minimum of than 95% of samples was met in September.

Heywoods Beach passed all of the Caribbean Blue Flag criteria each month of 2002. These results were identical to those obtained when the maximum value was substituted for the too numerous to count values.

Worthing Beach failed the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples in February, May, June and November faecal coliform less than 400/100 ml in a minimum of 95% of samples in May, August and November and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in March, August, September and November. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples was met in October and December, faecal coliform less than 400/100 ml in a minimum of 95% of samples was met in October and December and faecal streptococci less than 40/100 ml in a minimum of 75% of samples was met in October.

The table below shows the compliance of the Blue Flag pilot beaches with the Caribbean Blue Flag water quality criteria over the period of the year 2003 **where the too numerous to count values were ignored.**

2003	ACCRA	BROWNES	DOVER	HEYWOODS	WORTHING
FC < 100/100 ml	✓	✓	✓	✓	✓
FC < 400/100 ml	×	✓	✓	✓	×
FS < 40/100 ml	✓	×	×	✓	×

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 40: The compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2003.

Accra beach did not meet the criterion faecal coliforms less than 400/100ml in 95% of samples. This result was different since the criteria faecal coliforms less than 100/100ml in 75% of samples and faecal streptococci less than 40/100 ml in a minimum of 75% of samples were met when the too numerous to count values were ignored.

Brownes beach did not meet the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples. This result was identical to that obtained when the maximum value was substituted for the too numerous to count values.

Dover beach did not meet the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples. This result was identical to that obtained when the maximum value was substituted for the too numerous to count values.

Heywoods beach met all of the Caribbean Blue Flag water quality criteria. This result was identical to that obtained when the maximum value was substituted for the too numerous to count values.

Worthing Beach did not meet the Blue Flag criteria for faecal coliforms less than 400/100ml in 95% of samples and faecal streptococci less than 40/100 ml in a minimum of 75% of the samples. This result was different since the criterion faecal coliforms less than 100/100ml in 75% of samples was met when the too numerous to count values were ignored.

An examination of the monthly results at the beaches in **2003** is summarised in the table below **where too numerous to count values were ignored.**

2003 MONTH	ACCRA			BROWNES			DOVER		
	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40
JANUARY	✓	✓	×	✓	✓	×	✓	✓	×
FEBRUARY	✓	✓	✓	✓	✓	✓	✓	✓	✓
MARCH	×	✓	×	✓	✓	×	✓	✓	×
APRIL	✓	✓	×	✓	✓	×	✓	✓	✓
MAY	✓	×	✓	✓	✓	✓	✓	✓	×
JUNE	×	×	×	✓	✓	×	✓	✓	×
JULY	-	-	-	-	-	-	✓	✓	✓

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 41: An analysis of the monthly compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2003.

2003 MONTH	HEYWOODS			WORTHING		
	FC <100	FC <400	FS <40	FC <100	FC <400	FS <40
JANUARY	✓	✓	✓	✓	✓	×
FEBRUARY	✓	✓	✓	×	×	✓
MARCH	✓	✓	✓	×	×	×
APRIL	✓	✓	✓	✓	✓	×
MAY	✓	✓	✓	✓	✓	✓
JUNE	✓	✓	✓	✓	✓	×
JULY	-	-	-	✓	✓	×

Key

FC – Faecal coliform bacteria. **FS –** Faecal streptococci bacteria.

✓ - Meets criteria. × - Does not meet criteria

Table 42: An analysis of the monthly compliance of Barbados' Blue Flag pilot beaches with Caribbean Blue Flag criteria in 2003.

The Caribbean Blue Flag criterion faecal coliform less than 100/100 ml in a minimum of 75% of samples was not met in the months of February, March and June. The failure of the criterion occurred most frequently in the month of March.

The Caribbean Blue Flag criterion faecal coliform less than 400/100 ml in a minimum of 95% of samples was not met in the months of February, March, May and June.

The Caribbean Blue Flag faecal streptococci criterion was not met in the months of January, March, April, May, June and July. The failure of the beaches occurred most frequently in the months of January, March and June.

Accra Beach failed the criteria of faecal coliform less than 100/100 ml in a minimum of than 75% of samples in March and June, faecal coliform less than 400/100 ml in a minimum of 95% of samples in May and June and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January, March, April and June. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples was met in January, February and April and faecal coliform less than 400/100 ml in a minimum of 95% of samples was met in January, February, March and April.

Brownes Beach failed the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January, March, April and June. These results were identical to those obtained when the maximum value was substituted for the too numerous to count values.

Dover Beach failed the criterion faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January, March, May and June. These results were identical to those obtained when the maximum value was substituted for the too numerous to count values.

Heywoods Beach passed all of the Caribbean Blue Flag criteria each month of 2002. These results were identical to those obtained when the maximum value was substituted for the too numerous to count values.

Worthing Beach failed the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples in February and March, faecal coliform less than 400/100 ml in a minimum of 95% of samples in February and March and faecal streptococci less than 40/100 ml in a minimum of 75% of samples in January, March, April, June and July. These results were different to those obtained when the maximum value was substituted for the too numerous to count value. When the too numerous to count values were ignored the criteria faecal coliform less than 100/100 ml in a minimum of than 75% of samples was met in January and faecal coliform less than 400/100 ml in a minimum of 95% of samples was met in January, April, May and June.

DISCUSSION

When the maximum value was substituted for the too numerous to count values the months with the highest frequency of failure of the Blue Flag faecal coliform criteria were May, July October and November in 2002 and January, February, March, April, May and June in 2003 (each of these months had two failures for the year). The months with the highest frequency of failure of the Blue Flag faecal streptococci criterion were November in 2002 and January, March and June in 2003.

When the too numerous to count values were ignored the months with the highest frequency of failure of the Blue Flag faecal coliform criteria were May and November in 2002 and March in 2003. The months with the highest frequency of failure of the Blue Flag faecal streptococci criterion were November in 2002 and January, March and June in 2003.

It should be reiterated that there was no data for the months of July to December for the beaches (with the exceptions of Dover and Worthing Beaches which were sampled in July). Hence the frequency of failure of the Blue Flag water quality criteria in 2003 represents the frequency of failure in the dry season only which is generally expected to be lower than the rainy season.

Accra Beach and Worthing Beach had the highest frequency of failure of the Caribbean Blue Flag Campaign water quality criteria in 2002 and 2003. This could be due to the location of the sample sites. At Accra Beach sample site 2 coincides with a storm water outlet to the sea. At Worthing Beach sample site 2 coincides with the sluice gate for Graeme Hall Swamp. These sources of water would have an adverse impact on the seawater quality and would be sensitive to increased rainfall. It should be noted that the failure of Accra Beach and Worthing Beach to meet the Caribbean Blue Flag criteria was due to the failure at these sample sites to meet these criteria.

It should be noted that in 2003, there was a greater rate of failure of the Blue Flag faecal coliform and faecal streptococci criteria when compared to 2002.

The water quality sampling methodology was designed to reflect the worst-case scenario for water quality. The locations of the sample points (as shown in Table 3) are frequently opposite storm drains and hence sample results would be sensitive to rainfall events. The sampling methodology has been revised for 2004, so that fewer locations on a given beach are sampled and the locations of the sample points repositioned. The sample sites that traditionally have poor water quality results have been removed.

The South Coast Sewage Project commenced collection of sewage in July 2003. There are expected to be improvements in the water quality of South Coast beaches as a result of this project. However, sampling was only conducted from January to July 2003 and hence does not record any improvements in water quality resulting from this project.

DISCLOSURE OF WATER QUALITY INFORMATION

The Caribbean Blue Flag Campaign imperative educational and information criteria require that water quality information for the beach should be prominently displayed on the Blue Flag information board. The Blue Flag will not be awarded if this criteria is not satisfied.

The water quality information should be displayed within three weeks after sampling has been carried out hence the information would be representative of the water quality at the time of sampling not the present status of the water quality.

The Cabinet of Barbados made a decision not to disclose water quality information as a result of an incident in 1996 where water quality information obtained from the Chief Medical Officer's annual report was used to give an inappropriate and inaccurate portrayal of the water quality of Barbados' beaches.

The display of water quality information on the Blue Flag information board is an imperative criterion for the award of a Blue Flag. The Blue Flag will not be awarded if this criterion is not satisfied even if all other criteria are satisfied. Hence a change in government policy on the disclosure of water quality information is mandatory if Barbados's Blue Flag pilot beaches are to comply with this criterion.

Advantages Of Participating In The Caribbean Blue Flag Campaign

1. The Blue Flag is an internationally recognised exclusive eco-label associated with beaches and marinas. The Blue Flag is a symbol of high environmental standards because of the criteria that must be satisfied for the award of the Blue Flag.

2. Publishing water quality information would provide the beach user with the option of making an informed decision on whether to bath at a particular beach.

3. The fulfilment of the criteria Blue Flag criteria would bring a number of improvements through education, environmental management and planning and services. The Caribbean Blue Flag criteria are divided into four areas and are summarized below.
   a. Water Quality
      The water quality must meet the Caribbean Blue Flag water quality criteria.

   b. Environmental Education And Information Criteria
      - The beach must have a Blue Flag information board that posts standard information such as a map of the beach and water quality information.
      - Sensitive environmental resources in the vicinity of the beach must be identified and beach users educated about them.
      - A minimum of five environmental education activities must be completed through out the year.

   c. Environmental Management Criteria
      - Blue Flag beaches must be managed by a beach management committee that ensures that the operation of the beach complies with relevant regulations and protection of sensitive species and habitats.
      - The beach must be kept clean and adequate waste disposal bins should be provided.
      - Adequate sanitary facilities should be provided.

- Driving, camping and dumping on the beach should be prohibited.
- The buildings and equipment on the beach must be properly maintained

d. Safety And Services Criteria
   - Adequate lifeguards and safety and first aid equipment on the beach.
   - If the beach has a number of uses e.g. bathing and water sports, it should be zoned.
   - There must be an internationally recognized warning system for environmental pollution risks must be in place.
   - Access to the beach should be safe and easy and there should be access for disabled persons to the beach and toilet facilities.
   - An adequate supply of potable water must be provided.

Disadvantages Of Participating In The Caribbean Blue Flag Campaign

1. The water quality information may be used to give an inaccurate representation of the beaches as occurred in the past.

2. The disclosure of water quality information may lead to beach discrimination if a beach consistently fails to meet water quality standards. However, it should be noted that there has been no reported serious health problems associated with bathing waters in Barbados.

RECOMMENDATIONS

1. Barbados should participate in the pilot phase of the Caribbean Blue Flag Campaign. In order to meet the Caribbean Blue Flag Campaign criteria, the pilot beaches would be required to improve and maintain the safety services and facilities and environmental management and planning at the beaches; meet the water quality criteria in addition to providing a minimum of five public education programmes throughout a year.

2. Water quality information should be disclosed to give the beach user the option of making an informed decision about entering the water at a beach.

3. The Blue Flag does not have to be awarded for an entire year; it may be awarded for a season as in Europe. The Division would recommend that Barbados select the period from December to June (dry season) in the first instance.

4. The stretch of beach designated for the Caribbean Blue Flag Campaign should be restricted to those areas of the beach that satisfy the criteria.

CONCLUSION

1. The Blue Flag is an exclusive eco-label awarded to beaches and marinas that meet the Blue Flag Campaign criteria.

2. The Blue Flag is an international symbol of high environmental standards as well as good sanitary and safety facilities at beaches and marinas.

3. Barbados submitted a feasibility study for seven pilot beaches, which was approved by the FEE International Jury.

4. An imperative criterion for the award of a Blue Flag is the disclosure of water quality information.

5. The present policy of the Government of Barbados prohibits the disclosure of water quality information.

6. The beaches will not be awarded Blue Flags if water quality information for the beach is not displayed on the Blue Flag information board even if all other criteria are satisfied.

7. It is mandatory that Government's policy on the disclosure of water quality information change if Barbados is to be eligible for the award of Blue Flags.

8. The Environmental Engineering Division water sampling methodology was designed to reflect the worst-case scenario for the near shore water quality.

9. The Division's sampling programme has been revised in 2004 resulting in the repositioning of sample sites.

10. Sampling was conducted from January to June; hence any improvements in water quality due to the commencement of operation of the South Coast Sewage Project were not recorded.

APPENDIX 1

WATER QUALITY DATA FOR THE PILOT BLUE FLAG BEACHES FOR 2002 TO USEPA STANDARDS – MAXIMUM VALUE SUBSTITUTED FOR TOO NUMEROUS TO COUNT VALUES

ACCRA BEACH

Accra Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	78	78	78
Overall Geometric mean	3	5	2
January - June Geometric Mean	4	3	2
July - December Geometric Mean	3	7	2
Overall Maximum	368	240	20
Overall Median	185	121	11
Overall Average	31	17	3
Geometric Mean January	2	8	1
Geometric Mean February	1	2	1
Geometric Mean March	1	2	2
Geometric Mean April	1	2	1
Geometric Mean May	117	10	8
Geometric Mean June	13	3	1
Geometric Mean July	2	2	2
Geometric Mean August	1	9	2
Geometric Mean September	2	7	3
Geometric Mean October	12	18	3
Geometric Mean November	2	24	4
Geometric Mean December	1	2	1

Table A1: Accra Beach analysis 2002 - Site 1.

Accra Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	80	80	80
Overall Geometric mean	6	5	3
January - June Geometric Mean	6	2	2
July - December Geometric Mean	6	8	3
Overall Maximum	849	468	178
Overall Median	425	4	90
Overall Average	79	30	12
Geometric Mean January	2	4	3
Geometric Mean February	1	1	1
Geometric Mean March	1	5	1
Geometric Mean April	2	2	1
Geometric Mean May	109	3	6
Geometric Mean June	29	2	1
Geometric Mean July	10	2	1
Geometric Mean August	4	8	5
Geometric Mean September	4	8	4
Geometric Mean October	6	13	4
Geometric Mean November	36	40	11
Geometric Mean December	3	6	2

Table A2: Accra Beach analysis 2002 - Site 2.

Accra Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of Samples	80	80	80
Overall Geometric Mean	10	7	3
January - June Geometric Mean	8	7	2
July - December Geometric Mean	11	8	4
Overall Maximum	748	166	110
Overall Median	375	84	56
Overall Average	77	20	9
Geometric Mean January	9	27	8
Geometric Mean February	3	3	1
Geometric Mean March	1	30	3
Geometric Mean April	10	21	2
Geometric Mean May	24	4	3
Geometric Mean June	19	2	1
Geometric Mean July	17	2	2
Geometric Mean August	8	5	5
Geometric Mean September	2	8	3
Geometric Mean October	15	12	6
Geometric Mean November	160	35	10
Geometric Mean December	3	13	3

Table A3: Accra Beach analysis 2002 - Site 3.

BROWNES BEACH

Brownes Beach Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	78	78	78
Overall Geometric mean	2	4	2
January - June Geometric Mean	2	2	1
July - December Geometric Mean	2	5	2
Overall Maximum	70	80	69
Overall Median	36	41	35
Overall Average	5	9	4
Geometric Mean January	1	7	1
Geometric Mean February	2	3	1
Geometric Mean March	6	1	1
Geometric Mean April	2	3	2
Geometric Mean May	1	2	2
Geometric Mean June	2	2	1
Geometric Mean July	1	2	1
Geometric Mean August	2	5	2
Geometric Mean September	4	5	4
Geometric Mean October	1	3	2
Geometric Mean November	5	12	7
Geometric Mean December	1	13	1

Table A4: Brownes Beach analysis 2002 - Site 1.

Brownes Beach Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	78	78	78
Overall Geometric mean	2	4	2
January - June Geometric Mean	2	3	2
July - December Geometric Mean	2	5	2
Overall Maximum	75	47	19
Overall Median	38	24	10
Overall Average	4	7	3
Geometric Mean January	2	1	1
Geometric Mean February	1	2	1
Geometric Mean March	3	2	1
Geometric Mean April	3	7	2
Geometric Mean May	2	3	3
Geometric Mean June	1	3	1
Geometric Mean July	2	2	1
Geometric Mean August	2	5	1
Geometric Mean September	2	5	4
Geometric Mean October	2	7	2
Geometric Mean November	4	11	4
Geometric Mean December	1	5	1

Table A5: Brownes Beach analysis 2002 - Site 2.

Brownes Beach Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	76	78	78
Overall Geometric mean	3	10	4
January - June Geometric Mean	5	13	4
July - December Geometric Mean	3	8	5
Overall Maximum	151	290	237
Overall Median	76	146	119
Overall Average	19	32	18
Geometric Mean January	1	37	3
Geometric Mean February	2	5	2
Geometric Mean March	1	1	1
Geometric Mean April	30	79	5
Geometric Mean May	10	14	6
Geometric Mean June	3	13	7
Geometric Mean July	15	18	17
Geometric Mean August	2	4	2
Geometric Mean September	1	11	11
Geometric Mean October	2	5	2
Geometric Mean November	2	9	8
Geometric Mean December	4	8	3

Table A6: Brownes Beach analysis 2002 - Site 3.

DOVER BEACH

Dover Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	70	70	70
Overall Geometric mean	2	7	2
Overall Maximum	21	164	22
Overall Median	11	83	12
Overall Average	3	22	3
Geometric Mean January	6	4	1
Geometric Mean February	1	2	1
Geometric Mean March	7	3	3
Geometric Mean April	1	2	1
Geometric Mean May	1	1	1
Geometric Mean June	6	1	1
Geometric Mean July	3	2	2
Geometric Mean August	4	23	4
Geometric Mean September	1	44	3
Geometric Mean October	1	21	2
Geometric Mean November	1	12	3
Geometric Mean December	2	4	1

Table A7: Dover Beach analysis 2002 - Site 1.

Dover Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	70	70	70
Overall Geometric mean	4	7	2
Overall Maximum	504	138	53
Overall Median	253	70	27
Overall Average	35	20	6
Geometric Mean January	11	4	1
Geometric Mean February	4	1	2
Geometric Mean March	1	1	1
Geometric Mean April	2	3	1
Geometric Mean May	5	2	3
Geometric Mean June	5	2	3
Geometric Mean July	35	3	2
Geometric Mean August	7	14	4
Geometric Mean September	6	54	9
Geometric Mean October	2	23	3
Geometric Mean November	2	10	2
Geometric Mean December	2	6	1

Table A8: Dover Beach analysis 2002 - Site 2.

Dover Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	76	75	76
Overall Geometric mean	4	5	2
Overall Maximum	640	92	26
Overall Median	321	47	14
Overall Average	26	11	4
Geometric Mean January	14	2	4
Geometric Mean February	2	3	2
Geometric Mean March	1	2	1
Geometric Mean April	1	2	1
Geometric Mean May	4	10	3
Geometric Mean June	4	4	1
Geometric Mean July	14	3	4
Geometric Mean August	10	8	3
Geometric Mean September	2	6	3
Geometric Mean October	6	8	2
Geometric Mean November	2	13	3
Geometric Mean December	2	4	1

Table A9: Dover Beach analysis 2002 - Site 3.

HEYWOODS BEACH

Heywoods Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	72	70	72
Overall Geometric mean	1	3	1
Overall Maximum	75	86	8
Overall Median	38	44	5
Overall Average	4	11	2
Geometric Mean January	1	17	3
Geometric Mean February	2	1	2
Geometric Mean March	1	1	1
Geometric Mean April	1	1	1
Geometric Mean May	1	4	1
Geometric Mean June	1	4	1
Geometric Mean July	3	2	1
Geometric Mean August	1	6	1
Geometric Mean September	2	9	3
Geometric Mean October	1	2	1
Geometric Mean November	1	9	1
Geometric Mean December	3	7	1

Table A10: Heywoods Beach analysis 2002 - Site 1.

Heywoods Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	72	70	70
Overall Geometric mean	1	3	1
Overall Maximum	144	77	16
Overall Median	73	39	9
Overall Average	4	8	2
Geometric Mean January	1	16	1
Geometric Mean February	2	2	1
Geometric Mean March	1	1	1
Geometric Mean April	1	1	1
Geometric Mean May	1	2	2
Geometric Mean June	1	5	1
Geometric Mean July	2	2	1
Geometric Mean August	1	2	1
Geometric Mean September	2	2	1
Geometric Mean October	1	3	2
Geometric Mean November	1	18	3
Geometric Mean December	1	10	1

Table A11: Heywoods Beach analysis 2002 - Site 2.

Heywoods Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	72	70	70
Overall Geometric mean	3	6	3
Overall Maximum	57	108	82
Overall Median	29	55	42
Overall Average	9	18	9
Geometric Mean January	1	11	2
Geometric Mean February	1	1	2
Geometric Mean March	1	3	1
Geometric Mean April	8	2	6
Geometric Mean May	1	4	2
Geometric Mean June	1	3	1
Geometric Mean July	3	2	2
Geometric Mean August	2	14	6
Geometric Mean September	6	17	4
Geometric Mean October	2	8	5
Geometric Mean November	5	33	10
Geometric Mean December	5	33	6

Table A12: Heywoods Beach analysis 2002 - Site 3.

WORTHING BEACH

Worthing Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	90	80	90
Overall Geometric mean	2	3	2
Overall Maximum	42	153	20
Overall Median	22	77	11
Overall Average	4	10	2
Geometric Mean January	3	2	2
Geometric Mean February	2	1	1
Geometric Mean March	1	2	2
Geometric Mean April	1	1	1
Geometric Mean May	2	1	1
Geometric Mean June	5	1	1
Geometric Mean July	1	1	1
Geometric Mean August	2	17	3
Geometric Mean September	2	8	2
Geometric Mean October	1	8	2
Geometric Mean November	1	6	3
Geometric Mean December	1	3	2

Table A13: Worthing Beach analysis 2002 - Site 1.

Worthing Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	88	78	88
Overall Geometric mean	4	3	2
Overall Maximum	208	94	29
Overall Median	105	48	15
Overall Average	18	7	4
Geometric Mean January	10	2	2
Geometric Mean February	6	2	1
Geometric Mean March	1	5	1
Geometric Mean April	6	1	7
Geometric Mean May	3	3	1
Geometric Mean June	6	2	1
Geometric Mean July	2	1	1
Geometric Mean August	1	4	1
Geometric Mean September	4	7	3
Geometric Mean October	2	5	1
Geometric Mean November	5	12	6
Geometric Mean December	2	4	2

Table A14: Worthing Beach analysis 2002 - Site 2.

Worthing Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	87	78	88
Overall Geometric mean	33	14	8
Overall Maximum	426	248	200
Overall Median	214	125	101
Overall Average	116	39	25
Geometric Mean January	30	12	5
Geometric Mean February	26	6	6
Geometric Mean March	32	30	30
Geometric Mean April	47	11	7
Geometric Mean May	98	5	9
Geometric Mean June	7	5	4
Geometric Mean July	25	10	8
Geometric Mean August	18	24	14
Geometric Mean September	6	41	12
Geometric Mean October	49	15	10
Geometric Mean November	380	33	8
Geometric Mean December	187	18	8

Table A15: Worthing Beach analysis 2002 - Site 3.

APPENDIX 2

WATER QUALITY DATA FOR THE PILOT BLUE FLAG BEACHES FOR 2002 TO USEPA STANDARDS – TOO NUMEROUS TO COUNT VALUES IGNORED

ACCRA BEACH

Accra Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	74	77	76
Overall Geometric mean	2	5	2
January - June Geometric Mean	4	3	2
July - December Geometric Mean	2	6	2
Overall Maximum	368	240	20
Overall Median	185	121	11
Overall Average	13	14	3
Geometric Mean January	2	8	1
Geometric Mean February	1	2	1
Geometric Mean March	1	2	2
Geometric Mean April	1	2	1
Geometric Mean May	117	10	8
Geometric Mean June	13	3	1
Geometric Mean July	2	2	2
Geometric Mean August	1	9	2
Geometric Mean September	2	7	3
Geometric Mean October	1	13	2
Geometric Mean November	2	24	4
Geometric Mean December	1	2	1

Table A16: Accra Beach analysis 2002 - Site 1.

Accra Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	75	78	78
Overall Geometric mean	5	4	2
January - June Geometric Mean	4	2	2
July - December Geometric Mean	5	7	3
Overall Maximum	849	468	178
Overall Median	425	4	90
Overall Average	27	19	8
Geometric Mean January	2	4	3
Geometric Mean February	1	1	1
Geometric Mean March	1	5	1
Geometric Mean April	2	2	1
Geometric Mean May	39	3	6
Geometric Mean June	29	2	1
Geometric Mean July	10	2	1
Geometric Mean August	4	8	5
Geometric Mean September	4	8	4
Geometric Mean October	2	5	1
Geometric Mean November	19	40	11
Geometric Mean December	3	6	2

Table A17: Accra Beach analysis 2002 - Site 2.

Accra Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of Samples	76	78	78
Overall Geometric Mean	8	7	3
January - June Geometric Mean	8	7	2
July - December Geometric Mean	8	7	3
Overall Maximum	748	166	110
Overall Median	375	84	56
Overall Average	42	17	7
Geometric Mean January	9	27	8
Geometric Mean February	3	3	1
Geometric Mean March	1	30	3
Geometric Mean April	10	21	2
Geometric Mean May	24	4	3
Geometric Mean June	19	2	1
Geometric Mean July	17	2	2
Geometric Mean August	8	5	5
Geometric Mean September	2	8	3
Geometric Mean October	6	6	3
Geometric Mean November	74	35	10
Geometric Mean December	3	13	3

Table A18: Accra Beach analysis 2002 - Site 3.

BROWNES BEACH

Brownes Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	78	78	78
Overall Geometric mean	2	4	2
January - June Geometric Mean	2	2	1
July - December Geometric Mean	2	5	2
Overall Maximum	70	80	69
Overall Median	36	41	35
Overall Average	5	9	4
Geometric Mean January	1	7	1
Geometric Mean February	2	3	1
Geometric Mean March	6	1	1
Geometric Mean April	2	3	2
Geometric Mean May	1	2	2
Geometric Mean June	2	2	1
Geometric Mean July	1	2	1
Geometric Mean August	2	5	2
Geometric Mean September	4	5	4
Geometric Mean October	1	3	2
Geometric Mean November	5	12	7
Geometric Mean December	1	13	1

Table A19: Brownes Beach analysis 2002 - Site 1.

Brownes Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	78	78	78
Overall Geometric mean	2	4	2
January - June Geometric Mean	2	3	2
July - December Geometric Mean	2	5	2
Overall Maximum	75	47	19
Overall Median	38	24	10
Overall Average	4	7	3
Geometric Mean January	2	1	1
Geometric Mean February	1	2	1
Geometric Mean March	3	2	1
Geometric Mean April	3	7	2
Geometric Mean May	2	3	3
Geometric Mean June	1	3	1
Geometric Mean July	2	2	1
Geometric Mean August	2	5	1
Geometric Mean September	2	5	4
Geometric Mean October	2	7	2
Geometric Mean November	4	11	4
Geometric Mean December	1	5	1

Table A20: Brownes Beach analysis 2002 - Site 2.

Brownes Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	73	76	78
Overall Geometric mean	3	9	4
January - June Geometric Mean	5	13	4
July - December Geometric Mean	2	7	5
Overall Maximum	151	290	237
Overall Median	76	146	119
Overall Average	14	25	18
Geometric Mean January	1	37	3
Geometric Mean February	2	5	2
Geometric Mean March	1	1	1
Geometric Mean April	30	79	5
Geometric Mean May	10	14	6
Geometric Mean June	3	13	7
Geometric Mean July	5	9	17
Geometric Mean August	2	4	2
Geometric Mean September	1	11	11
Geometric Mean October	2	5	2
Geometric Mean November	2	9	8
Geometric Mean December	4	8	3

Table A21: Brownes Beach analysis 2002 - Site 3.

DOVER BEACH

Dover Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	70	68	70
Overall Geometric mean	2	6	2
Overall Maximum	21	164	22
Overall Median	11	83	12
Overall Average	3	18	3
Geometric Mean January	6	4	1
Geometric Mean February	1	2	1
Geometric Mean March	7	3	3
Geometric Mean April	1	2	1
Geometric Mean May	1	1	1
Geometric Mean June	6	1	1
Geometric Mean July	3	2	2
Geometric Mean August	4	23	4
Geometric Mean September	1	28	3
Geometric Mean October	1	21	2
Geometric Mean November	1	12	3
Geometric Mean December	2	4	1

Table A22: Dover Beach analysis 2002 - Site 1.

Dover Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	68	68	70
Overall Geometric mean	4	6	2
Overall Maximum	504	138	53
Overall Median	253	70	27
Overall Average	21	16	6
Geometric Mean January	11	4	1
Geometric Mean February	4	1	2
Geometric Mean March	1	1	1
Geometric Mean April	2	3	1
Geometric Mean May	5	2	3
Geometric Mean June	5	2	3
Geometric Mean July	35	3	2
Geometric Mean August	7	14	4
Geometric Mean September	1	39	9
Geometric Mean October	2	23	3
Geometric Mean November	2	10	2
Geometric Mean December	2	6	1

Table A23: Dover Beach analysis 2002 - Site 2.

Dover Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	76	75	76
Overall Geometric mean	4	5	2
Overall Maximum	640	92	26
Overall Median	321	47	14
Overall Average	26	11	4
Geometric Mean January	14	2	4
Geometric Mean February	2	3	2
Geometric Mean March	1	2	1
Geometric Mean April	1	2	1
Geometric Mean May	4	10	3
Geometric Mean June	4	4	1
Geometric Mean July	14	3	4
Geometric Mean August	10	8	3
Geometric Mean September	2	6	3
Geometric Mean October	6	8	2
Geometric Mean November	2	13	3
Geometric Mean December	2	4	1

Table A24: Dover Beach analysis 2002 - Site 3.

HEYWOODS BEACH

Heywoods Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	72	70	72
Overall Geometric mean	1	3	1
Overall Maximum	75	86	8
Overall Median	38	44	5
Overall Average	4	11	2
Geometric Mean January	1	17	3
Geometric Mean February	2	1	2
Geometric Mean March	1	1	1
Geometric Mean April	1	1	1
Geometric Mean May	1	4	1
Geometric Mean June	1	4	1
Geometric Mean July	3	2	1
Geometric Mean August	1	6	1
Geometric Mean September	2	9	3
Geometric Mean October	1	2	1
Geometric Mean November	1	9	1
Geometric Mean December	3	7	1

Table A25: Heywoods Beach analysis 2002 - Site 1.

Heywoods Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	72	70	70
Overall Geometric mean	1	3	1
Overall Maximum	144	77	16
Overall Median	73	39	9
Overall Average	4	8	2
Geometric Mean January	1	16	1
Geometric Mean February	2	2	1
Geometric Mean March	1	1	1
Geometric Mean April	1	1	1
Geometric Mean May	1	2	2
Geometric Mean June	1	5	1
Geometric Mean July	2	2	1
Geometric Mean August	1	2	1
Geometric Mean September	2	2	1
Geometric Mean October	1	3	2
Geometric Mean November	1	18	3
Geometric Mean December	1	10	1

Table A26: Heywoods Beach analysis 2002 - Site 2.

Heywoods Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	70	70	70
Overall Geometric mean	3	6	3
Overall Maximum	57	108	82
Overall Median	29	55	42
Overall Average	8	18	9
Geometric Mean January	1	11	2
Geometric Mean February	1	1	2
Geometric Mean March	1	3	1
Geometric Mean April	8	2	6
Geometric Mean May	1	4	2
Geometric Mean June	1	3	1
Geometric Mean July	3	2	2
Geometric Mean August	2	14	6
Geometric Mean September	3	17	4
Geometric Mean October	2	8	5
Geometric Mean November	5	33	10
Geometric Mean December	5	33	6

Table A27: Heywoods Beach analysis 2002 - Site 3.

WORTHING BEACH

Worthing Analysis 2002 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	90	80	90
Overall Geometric mean	2	3	2
Overall Maximum	42	153	20
Overall Median	22	77	11
Overall Average	4	10	2
Geometric Mean January	3	2	2
Geometric Mean February	2	1	1
Geometric Mean March	1	2	2
Geometric Mean April	1	1	1
Geometric Mean May	2	1	1
Geometric Mean June	5	1	1
Geometric Mean July	1	1	1
Geometric Mean August	2	17	3
Geometric Mean September	2	8	2
Geometric Mean October	1	8	2
Geometric Mean November	1	6	3
Geometric Mean December	1	3	2

Table A28: Worthing Beach analysis 2002 - Site 1.

Worthing Analysis 2002 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	86	78	88
Overall Geometric mean	3	3	2
Overall Maximum	208	94	29
Overall Median	105	48	15
Overall Average	13	7	4
Geometric Mean January	10	2	2
Geometric Mean February	6	2	1
Geometric Mean March	1	5	1
Geometric Mean April	6	1	7
Geometric Mean May	3	3	1
Geometric Mean June	6	2	1
Geometric Mean July	2	1	1
Geometric Mean August	1	4	1
Geometric Mean September	1	7	3
Geometric Mean October	2	5	1
Geometric Mean November	5	12	6
Geometric Mean December	2	4	2

Table A29: Worthing Beach Analysis 2002 - Site 2.

Worthing Analysis 2002 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	77	76	84
Overall Geometric mean	24	13	7
Overall Maximum	426	248	200
Overall Median	214	125	101
Overall Average	76	34	17
Geometric Mean January	30	12	5
Geometric Mean February	26	6	6
Geometric Mean March	32	30	30
Geometric Mean April	47	11	7
Geometric Mean May	98	5	9
Geometric Mean June	7	5	4
Geometric Mean July	25	10	8
Geometric Mean August	18	24	14
Geometric Mean September	6	41	12
Geometric Mean October	12	7	1
Geometric Mean November	302	33	8
Geometric Mean December	82	18	8

Table A30: Worthing Beach Analysis 2002 - Site 3.

APPENDIX 3

WATER QUALITY DATA FOR THE PILOT BLUE FLAG BEACHES FOR 2003 TO USEPA STANDARDS – MAXIMUM VALUE SUBSTITUTED FOR TOO NUMEROUS TO COUNT VALUES

ACCRA BEACH

Accra Analysis 2003 -Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	25	26	30
Overall Geometric Mean	5	12	5
January - June Geometric Mean	5	12	5
Overall Maximum	150	86	188
Overall Median	4	20	3
Overall Average	18	24	20
Geometric Mean January	3	23	5
Geometric Mean February	3	6	2
Geometric Mean March	13	34	10
Geometric Mean April	20	24	3
Geometric Mean May	2	2	3
Geometric Mean June	11	45	25

Table A31: Accra Beach analysis 2003 -Site 1.

Accra Analysis 2003 -Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	20	36	34
Overall Geometric Mean	17	10	9
January - June Geometric Mean	17	10	9
Overall Maximum	396	116	101
Overall Median	19	12	6
Overall Average	81	18	21
Geometric Mean January	1	4	2
Geometric Mean February	19	8	6
Geometric Mean March	142	37	25
Geometric Mean April	14	8	11
Geometric Mean May	13	3	4
Geometric Mean June	19	23	23

Table A32: Accra Beach analysis 2003 -Site 2.

Accra Analysis 2003 -Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	28	40	42
Overall Geometric Mean	15	19	11
January - June Geometric Mean	15	19	11
Overall Maximum	489	712	186
Overall Median	7	19	11
Overall Average	79	71	24
Geometric Mean January	4	19	7
Geometric Mean February	30	6	6
Geometric Mean March	8	12	10
Geometric Mean April	3	25	18
Geometric Mean May	20	11	7
Geometric Mean June	199	92	89

Table A33: Accra Beach analysis 2003 -Site 3.

BROWNES BEACH

Brownes Analysis 2003 -Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of Samples	22	38	32
Overall Geometric Mean	3	8	5
January - June Geometric Mean	3	8	5
Overall Maximum	21	199	88
Overall Median	3	8	5
Overall Average	6	18	10
Geometric Mean January	2	13	20
Geometric Mean February	9	12	2
Geometric Mean March	5	7	3
Geometric Mean April	2	9	5
Geometric Mean May	6	5	4
Geometric Mean June	2	7	7

Table A34: Brownes Beach analysis 2003 -Site 1.

Brownes Analysis 2003 -Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of Samples	23	42	40
Overall Geometric Mean	4	9	5
January - June Geometric Mean	4	9	5
Overall Maximum	58	135	87
Overall Median	3	10	4
Overall Average	9	21	14
Geometric Mean January	0	6	1
Geometric Mean February	3	5	2
Geometric Mean March	9	8	2
Geometric Mean April	1	12	12
Geometric Mean May	2	4	4
Geometric Mean June	7	29	16

Table A35: Brownes Beach analysis 2003 -Site 2.

Brownes Analysis 2003 -Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of Samples	27	37	41
Overall Geometric Mean	7	26	10
January - June Geometric Mean	7	26	10
Overall Maximum	44	392	176
Overall Median	5	23	8
Overall Average	12	67	28
Geometric Mean January	36	19	3
Geometric Mean February	6	6	3
Geometric Mean March	5	28	9
Geometric Mean April	5	49	23
Geometric Mean May	7	18	5
Geometric Mean June	10	88	37

Table A36: Brownes Beach analysis 2003 -Site 3.

DOVER BEACH

Dover Analysis 2003 -Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	22	32	29
Overall Geometric Mean	3	14	6
January - June Geometric Mean	3	16	6
July - December Geometric Mean	3	7	6
Overall Maximum	13	130	39
Overall Median	7	66	20
Overall Average	5	27	10
Geometric Mean January	13	20	11
Geometric Mean February	1	5	1
Geometric Mean March	6	14	2
Geometric Mean April	2	16	7
Geometric Mean May	1	39	16
Geometric Mean June	5	28	5
Geometric Mean July	3	7	6

Table A37: Dover Beach analysis 2003 -Site 1.

Dover Analysis 2003 -Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	24	31	32
Overall Geometric Mean	4	15	4
January - June Geometric Mean	3	17	3
July - December Geometric Mean	12	8	8
Overall Maximum	15	320	136
Overall Median	8	161	69
Overall Average	5	36	10
Geometric Mean January	6	59	3
Geometric Mean February	2	11	1
Geometric Mean March	2	25	2
Geometric Mean April	3	21	17
Geometric Mean May	3	3	2
Geometric Mean June	3	16	6
Geometric Mean July	12	8	8

Table A38: Dover Beach analysis 2003 -Site 1.

Dover Analysis 2003 -Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	32	45	45
Overall Geometric Mean	6	13	5
January - June Geometric Mean	6	13	5
July - December Geometric Mean	6	8	6
Overall Maximum	80	189	67
Overall Median	41	95	34
Overall Average	16	30	12
Geometric Mean January	80	6	5
Geometric Mean February	1	2	1
Geometric Mean March	4	13	4
Geometric Mean April	8	16	8
Geometric Mean May	5	9	4
Geometric Mean June	10	66	13
Geometric Mean July	6	8	6

Table A39: Dover Beach analysis 2003 -Site 3.

HEYWOODS BEACH

Heywoods Analysis 2003 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	13	23	20
Overall Geometric Mean	3	4	3
January - June Geometric Mean	3	4	3
Overall Maximum	332	19	20
Overall Median	1	5	2
Overall Average	28	6	5
Geometric Mean January	7	4	1
Geometric Mean February	2	2	1
Geometric Mean March	1	8	3
Geometric Mean April	332	4	3
Geometric Mean May	1	9	4
Geometric Mean June	2	2	2

Table A40: Heywoods Beach analysis 2003 - Site 1.

Heywoods Analysis 2003 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	19	28	32
Overall Geometric Mean	3	5	4
January - June Geometric Mean	3	5	4
Overall Maximum	61	88	50
Overall Median	1	6	3
Overall Average	9	11	9
Geometric Mean January	25	13	5
Geometric Mean February	1	12	5
Geometric Mean March	1	4	3
Geometric Mean April	0	4	4
Geometric Mean May	3	2	2
Geometric Mean June	1	3	8

Table A41: Heywoods Beach analysis 2003 - Site 2.

Heywoods Analysis 2003 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	22	37	39
Overall Geometric Mean	4	7	5
January - June Geometric Mean	4	7	5
Overall Maximum	62	95	126
Overall Median	4	8	5
Overall Average	8	12	12
Geometric Mean January	5	8	3
Geometric Mean February	8	4	3
Geometric Mean March	8	8	4
Geometric Mean April	1	18	18
Geometric Mean May	3	8	18
Geometric Mean June	3	5	4

Table A42: Heywoods Beach analysis 2003 - Site 3.

WORTHING BEACH

Worthing Analysis 2003 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci.**
Total Number of samples	19	37	27
Overall Geometric Mean	2	5	3
January - June Geometric Mean	2	4	2
July - December Geometric Mean	19	20	20
Overall Maximum	16	48	30
Overall Median	9	25	16
Overall Average	3	11	7
Geometric Mean January	1	8	0!
Geometric Mean February	2	5	1
Geometric Mean March	2	2	2
Geometric Mean April	1	9	3
Geometric Mean May	2	2	1
Geometric Mean June	6	5	6
Geometric Mean July	2	19	20

Table A43: Worthing Beach analysis 2003 - Site 1.

Worthing Analysis 2003 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	36	40	42
Overall Geometric Mean	5	11	5
January - June Geometric Mean	5	13	6
July - December Geometric Mean	2	4	4
Overall Maximum	121	462	120
Overall Median	61	232	61
Overall Average	14	42	15
Geometric Mean January	3	8	18
Geometric Mean February	4	48	4
Geometric Mean March	5	8	5
Geometric Mean April	10	16	4
Geometric Mean May	2	3	1
Geometric Mean June	9	28	17
Geometric Mean July	30	2	4

Table A44: Worthing Beach analysis 2003 - Site 3.

Worthing Analysis 2003 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	51	47	51
Overall Geometric Mean	188	50	41
January - June Geometric Mean	219	46	36
July - December Geometric Mean	136	156	156
Overall Maximum	5500	300	260
Overall Median	2752	151	131
Overall Average	2145	94	82
Geometric Mean January	122	32	51
Geometric Mean February	767	23	17
Geometric Mean March	5141	190	85
Geometric Mean April	47	35	35
Geometric Mean May	63	17	14
Geometric Mean June	84	83	77
Geometric Mean July	31	136	156

Table A45: Worthing Beach analysis 2003 - Site 3.

APPENDIX 4

WATER QUALITY DATA FOR THE PILOT BLUE FLAG BEACHES FOR 2003 TO USEPA STANDARDS – TOO NUMEROUS TO COUNT VALUES IGNORED

ACCRA BEACH

Accra Analysis 2003 -Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	25	26	30
Overall Geometric Mean	5	12	5
January - June Geometric Mean	5	12	5
Overall Maximum	150	86	188
Overall Median	4	20	3
Overall Average	18	24	20
Geometric Mean January	3	23	5
Geometric Mean February	3	6	2
Geometric Mean March	13	34	10
Geometric Mean April	7	24	3
Geometric Mean May	2	2	3
Geometric Mean June	11	45	25

Table A46: Accra Beach analysis 2003 -Site 1.

Accra Analysis 2003 -Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	20	36	34
Overall Geometric Mean	17	10	9
January - June Geometric Mean	17	10	9
Overall Maximum	396	116	101
Overall Median	19	12	6
Overall Average	81	18	21
Geometric Mean January	1	4	2
Geometric Mean February	19	8	6
Geometric Mean March	142	37	25
Geometric Mean April	14	8	11
Geometric Mean May	13	3	4
Geometric Mean June	19	23	23

Table A47: Accra Beach analysis 2003 -Site 2.

Accra Analysis 2003 -Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	28	40	42
Overall Geometric Mean	15	19	11
January - June Geometric Mean	15	19	11
Overall Maximum	489	712	186
Overall Median	490	713	187
Overall Average	79	71	24
Geometric Mean January	4	19	7
Geometric Mean February	30	6	6
Geometric Mean March	8	12	10
Geometric Mean April	3	25	18
Geometric Mean May	20	11	7
Geometric Mean June	199	92	89

Table A48: Accra Beach analysis 2003 -Site 3.

BROWNES BEACH

Brownes Analysis 2003 -Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of Samples	22	38	32
Overall Geometric Mean	3	8	5
January - June Geometric Mean	3	8	5
Overall Maximum	21	199	88
Overall Median	11	100	45
Overall Average	6	18	10
Geometric Mean January	2	13	20
Geometric Mean February	9	12	2
Geometric Mean March	5	7	3
Geometric Mean April	2	9	5
Geometric Mean May	6	5	4
Geometric Mean June	2	7	7

Table A49: Brownes Beach analysis 2003 -Site 1.

Brownes Analysis 2003 -Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of Samples	23	42	40
Overall Geometric Mean	4	9	5
January - June Geometric Mean	4	9	5
Overall Maximum	58	135	87
Overall Median	30	68	44
Overall Average	9	21	14
Geometric Mean January	0	6	1
Geometric Mean February	3	5	2
Geometric Mean March	9	8	2
Geometric Mean April	1	12	12
Geometric Mean May	2	4	4
Geometric Mean June	7	29	16

Table A50: Brownes Beach analysis 2003 -Site 2.

Brownes Analysis 2003 -Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of Samples	27	37	41
Overall Geometric Mean	7	26	10
January - June Geometric Mean	7	26	10
Overall Maximum	44	392	176
Overall Median	23	197	89
Overall Average	12	67	28
Geometric Mean January	36	19	3
Geometric Mean February	6	6	3
Geometric Mean March	5	28	9
Geometric Mean April	5	49	23
Geometric Mean May	7	18	5
Geometric Mean June	10	88	37

Table A51: Brownes Beach analysis 2003 -Site 3.

DOVER BEACH

Dover Analysis 2003 -Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	20	32	29
Overall Geometric Mean	3	14	6
January - June Geometric Mean	3	16	6
July - December Geometric Mean	3	7	6
Overall Maximum	13	130	39
Overall Median	7	66	20
Overall Average	4	27	10
Geometric Mean January	0	20	11
Geometric Mean February	1	5	1
Geometric Mean March	6	14	2
Geometric Mean April	2	16	7
Geometric Mean May	1	39	16
Geometric Mean June	5	28	5
Geometric Mean July	3	7	6

Table A52: Dover Beach analysis 2003 -Site 1.

Dover Analysis 2003 -Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	22	31	32
Overall Geometric Mean	3	15	4
January - June Geometric Mean	2	17	3
July - December Geometric Mean	12	8	8
Overall Maximum	15	320	136
Overall Median	8	161	69
Overall Average	4	36	10
Geometric Mean January	1	59	3
Geometric Mean February	2	11	1
Geometric Mean March	2	25	2
Geometric Mean April	3	21	17
Geometric Mean May	3	3	2
Geometric Mean June	3	16	6
Geometric Mean July	12	8	8

Table A53: Dover Beach analysis 2003 -Site 2.

Dover Analysis 2003 -Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	30	45	45
Overall Geometric Mean	5	13	5
January - June Geometric Mean	5	13	5
July - December Geometric Mean	6	8	6
Overall Maximum	80	189	67
Overall Median	41	95	34
Overall Average	12	30	12
Geometric Mean January	0	6	5
Geometric Mean February	1	2	1
Geometric Mean March	4	13	4
Geometric Mean April	8	16	8
Geometric Mean May	5	9	4
Geometric Mean June	10	66	13
Geometric Mean July	6	8	6

Table A54: Dover Beach analysis 2003 -Site 3.

HEYWOODS BEACH

Heywoods Analysis 2003 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	13	23	20
Overall Geometric Mean	3	4	3
January - June Geometric Mean	3	4	3
Overall Maximum	332	19	20
Overall Median	167	10	11
Overall Average	28	6	5
Geometric Mean January	7	4	1
Geometric Mean February	2	2	1
Geometric Mean March	1	8	3
Geometric Mean April	332	4	3
Geometric Mean May	1	9	4
Geometric Mean June	2	2	2

Table A55: Heywoods Beach analysis 2003 - Site 1.

Heywoods Analysis 2003 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	19	28	32
Overall Geometric Mean	3	5	4
January - June Geometric Mean	3	5	4
Overall Maximum	61	88	50
Overall Median	31	45	26
Overall Average	9	11	9
Geometric Mean January	25	13	5
Geometric Mean February	1	12	5
Geometric Mean March	1	4	3
Geometric Mean April	0	4	4
Geometric Mean May	3	2	2
Geometric Mean June	1	3	8

Table A56: Heywoods Beach analysis 2003 - Site 2.

Heywoods Analysis 2003 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	22	37	39
Overall Geometric Mean	4	7	5
January - June Geometric Mean	4	7	5
Overall Maximum	62	95	126
Overall Median	32	48	64
Overall Average	8	12	12
Geometric Mean January	5	8	3
Geometric Mean February	8	4	3
Geometric Mean March	8	8	4
Geometric Mean April	1	18	18
Geometric Mean May	3	8	18
Geometric Mean June	3	5	4

Table A57: Heywoods Beach analysis 2003 - Site 3.

WORTHING BEACH

Worthing Analysis 2003 - Site 1			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	19	37	27
Overall Geometric Mean	2	5	3
January - June Geometric Mean	2	4	2
July - December Geometric Mean	19	20	20
Overall Maximum	16	48	30
Overall Median	9	25	16
Overall Average	3	11	7
Geometric Mean January	1	8	0
Geometric Mean February	2	5	1
Geometric Mean March	2	2	2
Geometric Mean April	1	9	3
Geometric Mean May	2	2	1
Geometric Mean June	6	5	6
Geometric Mean July	2	19	20

Table A58: Worthing Beach analysis 2003 - Site 1.

Worthing Analysis 2003 - Site 2			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	36	40	42
Overall Geometric Mean	5	11	5
January - June Geometric Mean	5	13	6
July - December Geometric Mean	2	4	4
Overall Maximum	121	462	120
Overall Median	61	232	61
Overall Average	14	42	15
Geometric Mean January	3	8	18
Geometric Mean February	4	48	4
Geometric Mean March	5	8	5
Geometric Mean April	10	16	4
Geometric Mean May	2	3	1
Geometric Mean June	9	28	17
Geometric Mean July	30	2	4

Table A59: Worthing Beach analysis 2003 - Site 2.

Worthing Analysis 2003 - Site 3			
Parameters	**Faecal Coliform**	**Faecal Streptococci**	**Enterococci**
Total Number of samples	34	43	46
Overall Geometric Mean	35	42	33
January - June Geometric Mean	35	38	29
July - December Geometric Mean	136	156	156
Overall Maximum	5500	300	260
Overall Median	2752	151	131
Overall Average	468	74	63
Geometric Mean January	18	32	22
Geometric Mean February	107	23	17
Geometric Mean March	4595	158	71
Geometric Mean April	14	35	35
Geometric Mean May	11	17	14
Geometric Mean June	21	54	51
Geometric Mean July	31	136	156

Table A60: Worthing Beach analysis 2003 - Site 3.

APPENDIX 5

WATER QUALITY DATA FOR THE PILOT BLUE FLAG BEACHES FOR 2002 TO PROPOSED BLUE FLAG STANDARDS – MAXIMUM VALUE IS SUBSTITUTED FOR TOO NUMEROUS TO COUNT VALUES

ACCRA BEACH

Accra Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	74	77	76
Overall Percentage	92%	100%	94%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	50%	100%	100%
Percentage Value June	100%	100%	83%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	60%	100%	80%
Percentage Value November	100%	100%	67%
Percentage Value December	100%	100%	100%

Table A61: Accra Beach analysis 2002 – Site 1.

Accra Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	75	78	78
Overall Percentage	90%	91%	95%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	33%	50%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	80%	80%	80%
Percentage Value November	67%	67%	67%
Percentage Value December	100%	100%	100%

Table A62: Accra Beach analysis 2002 – Site 2.

Accra Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	76	78	78
Overall Percentage	85%	93%	90%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	50%
Percentage Value April	83%	100%	67%
Percentage Value May	67%	67%	100%
Percentage Value June	83%	100%	100%
Percentage Value July	80%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	80%	80%	80%
Percentage Value November	33%	67%	67%
Percentage Value December	100%	100%	83%

Table A63: Accra Beach analysis 2002 – Site 3.

BROWNES BEACH

Brownes Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	78	78	78
Overall Percentage	100%	100%	94%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	83%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	75%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	83%
Percentage Value December	100%	100%	83%

Table A64: Brownes Beach analysis 2002 – Site 1.

Brownes Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	78	78	78
Overall Percentage	100%	100%	99%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	88%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A65: Brownes Beach analysis 2002 – Site 2.

Brownes Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	73	76	78
Overall Percentage	91%	100%	81%
Percentage Value January	100%	100%	50%
Percentage Value February	100%	100%	88%
Percentage Value March	100%	100%	100%
Percentage Value April	67%	100%	0%
Percentage Value May	67%	100%	83%
Percentage Value June	100%	100%	100%
Percentage Value July	70%	100%	60%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	75%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A66: Brownes Beach analysis – Site 3.

DOVER BEACH

Dover Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	70	68	70
Overall Percentage	100%	100%	87%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	75%
Percentage Value September	100%	100%	63%
Percentage Value October	100%	100%	80%
Percentage Value November	100%	100%	67%
Percentage Value December	100%	100%	100%

Table A67: Dover Beach analysis 2002 – Site 1.

Dover Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Coliform < 400/100ml**
Total Number of samples	70	70	70
Overall Percentage	94%	96%	86%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	75%	88%	100%
Percentage Value August	100%	100%	88%
Percentage Value September	75%	75%	25%
Percentage Value October	100%	100%	70%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A68: Dover Beach analysis 2002 – Site 2.

Dover Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Coliform < 400/100ml**
Total Number of samples	76	76	75
Overall Percentage	93%	97%	92%
Percentage Value January	50%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	67%
Percentage Value June	100%	100%	83%
Percentage Value July	75%	75%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	75%
Percentage Value October	90%	100%	100%
Percentage Value November	100%	100%	83%
Percentage Value December	100%	100%	100%

Table A69: Dover Beach analysis 2002 – Site 3.

HEYWOODS BEACH

Heywoods Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Coliform < 400/100ml**
Total Number of samples	72	72	70
Overall Percentage	100%	100%	100%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A70: Heywoods Beach analysis 2002 – Site 1.

Heywoods Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Coliform < 400/100ml**
Total Number of samples	72	72	70
Overall Percentage	99%	100%	100%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	88%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A71: Heywoods Beach analysis 2002 – Site 2.

Heywoods Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Coliform < 400/100ml**
Total Number of samples	72	72	70
Overall Percentage	100%	100%	100%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A72: Heywoods Beach analysis 2002 – Site 3.

WORTHING BEACH

Worthing Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Coliform < 400/100ml**
Total Number of samples	90	90	80
Overall Percentage	100%	100%	95%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	63%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	90%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A73: Worthing Beach analysis 2002 – Site 1.

Worthing Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Coliform < 400/100ml**
Total Number of samples	88	88	78
Overall Percentage	94%	100%	97%
Percentage Value January	100%	100%	100%
Percentage Value February	75%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	83%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	75%	100%	88%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	83%
Percentage Value December	100%	100%	100%

Table A74: Worthing Beach analysis 2002 - Site 2.

Worthing Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Coliform < 400/100ml**
Total Number of samples	88	88	78
Overall Percentage	69%	83%	76%
Percentage Value January	86%	100%	100%
Percentage Value February	63%	100%	100%
Percentage Value March	100%	100%	50%
Percentage Value April	83%	100%	83%
Percentage Value May	33%	67%	100%
Percentage Value June	67%	100%	100%
Percentage Value July	100%	100%	80%
Percentage Value August	75%	75%	50%
Percentage Value September	88%	100%	50%
Percentage Value October	60%	60%	60%
Percentage Value November	0%	17%	50%
Percentage Value December	50%	50%	100%

Table A75: Worthing Beach analysis 2002 – Site 3.

APPENDIX 6

WATER QUALITY DATA FOR THE PILOT BLUE FLAG BEACHES FOR 2002 TO PROPOSED BLUE FLAG STANDARDS –TOO NUMEROUS TO COUNT VALUES IGNORED

ACCRA BEACH

Accra Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	74	77	76
Overall Percentage	97%	100%	95%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	50%	100%	100%
Percentage Value June	100%	100%	83%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	89%
Percentage Value November	100%	100%	67%
Percentage Value December	100%	100%	100%

Table A76: Accra Beach analysis 2002 - Site 1.

Accra Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	75	78	78
Overall Percentage	96%	97%	97%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	50%	75%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	100%
Percentage Value November	67%	80%	67%
Percentage Value December	100%	100%	100%

Table A77: Accra Beach analysis 2002 - Site 2.

Accra Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	76	78	78
Overall Percentage	89%	97%	92%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	50%
Percentage Value April	83%	100%	67%
Percentage Value May	67%	67%	100%
Percentage Value June	83%	100%	100%
Percentage Value July	80%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	100%
Percentage Value November	33%	100%	67%
Percentage Value December	100%	100%	83%

Table A78: Accra Beach analysis 2002 - Site 3.

BROWNES BEACH

Brownes Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	78	78	78
Overall Percentage	100%	100%	94%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	83%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	75%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	83%
Percentage Value December	100%	100%	83%

Table A79: Brownes Beach analysis 2002 - Site 1.

Brownes Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	78	78	78
Overall Percentage	100%	100%	99%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	88%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A80: Brownes Beach analysis 2002 - Site 2.

Brownes Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	73	76	78
Overall Percentage	95%	100%	83%
Percentage Value January	100%	100%	50%
Percentage Value February	100%	100%	88%
Percentage Value March	100%	100%	100%
Percentage Value April	67%	100%	0%
Percentage Value May	67%	100%	83%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	75%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	75%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A81: Brownes Beach analysis 2002 - Site 3.

DOVER BEACH

Dover Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	70	68	70
Overall Percentage	100%	100%	90%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	75%
Percentage Value September	100%	100%	83%
Percentage Value October	100%	100%	80%
Percentage Value November	100%	100%	67%
Percentage Value December	100%	100%	100%

Table A82: Dover Beach analysis 2002 - Site 1.

Dover Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	70	70	70
Overall Percentage	97%	99%	88%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	75%	88%	100%
Percentage Value August	100%	100%	88%
Percentage Value September	100%	100%	33%
Percentage Value October	100%	100%	70%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A83: Dover Beach analysis 2002 - Site 2.

Dover Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	76	76	75
Overall Percentage	93%	97%	92%
Percentage Value January	50%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	67%
Percentage Value June	100%	100%	83%
Percentage Value July	75%	75%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	75%
Percentage Value October	90%	100%	100%
Percentage Value November	100%	100%	83%
Percentage Value December	100%	100%	100%

Table A84: Dover Beach analysis 2002 - Site 3.

HEYWOODS BEACH

Heywoods Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	72	72	70
Overall Percentage	100%	100%	100%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A85: Heywoods Beach analysis 2002 - Site 1.

Heywoods Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	72	72	70
Overall Percentage	99%	100%	100%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	88%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A86: Heywoods Beach analysis 2002 - Site 2.

Heywoods Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	72	72	70
Overall Percentage	100%	100%	100%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A87: Heywoods Beach analysis 2002 - Site 3.

WORTHING BEACH

Worthing Analysis 2002 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	90	90	80
Overall Percentage	100%	100%	95%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	63%
Percentage Value September	100%	100%	100%
Percentage Value October	100%	100%	90%
Percentage Value November	100%	100%	100%
Percentage Value December	100%	100%	100%

Table A88: Worthing Beach analysis 2002 - Site 1.

Worthing Analysis 2002 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	88	88	78
Overall Percentage	97%	100%	97%
Percentage Value January	100%	100%	100%
Percentage Value February	75%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	83%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%
Percentage Value August	100%	100%	100%
Percentage Value September	100%	100%	88%
Percentage Value October	100%	100%	100%
Percentage Value November	100%	100%	83%
Percentage Value December	100%	100%	100%

Table A89: Worthing Beach analysis 2002 - Site 2.

Worthing Analysis 2002 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	88	88	78
Overall Percentage	78%	94%	78%
Percentage Value January	86%	100%	100%
Percentage Value February	63%	100%	100%
Percentage Value March	100%	100%	50%
Percentage Value April	83%	100%	83%
Percentage Value May	33%	67%	100%
Percentage Value June	67%	100%	100%
Percentage Value July	100%	100%	80%
Percentage Value August	75%	75%	50%
Percentage Value September	88%	100%	50%
Percentage Value October	100%	100%	75%
Percentage Value November	0%	50%	50%
Percentage Value December	100%	100%	100%

Table A90: Worthing Beach analysis 2002 - Site 3.

APPENDIX 7

WATER QUALITY DATA FOR THE PILOT BLUE FLAG BEACHES FOR 2003 TO PROPOSED BLUE FLAG STANDARDS - MAXIMUM VALUE SUBSTITUTED FOR TOO NUMEROUS TO COUNT VALUES

ACCRA BEACH

Accra Analysis 2003 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	40	40	39
Overall Percentage	93%	100%	100%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	75%	100%	100%
Percentage Value April	88%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A91: Accra Beach analysis 2003 – Site 1.

Accra Analysis 2003 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	36	36	37
Overall Percentage	78%	100%	95%
Percentage Value January	100%	100%	100%
Percentage Value February	75%	100%	100%
Percentage Value March	33%	100%	67%
Percentage Value April	75%	100%	100%
Percentage Value May	75%	100%	100%
Percentage Value June	100%	100%	100%

Table A92: Accra Beach analysis – Site 2.

Accra Analysis 2003 -Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	48	48	48
Overall Percentage	65%	69%	75%
Percentage Value January	67%	67%	67%
Percentage Value February	63%	75%	100%
Percentage Value March	75%	75%	88%
Percentage Value April	60%	60%	70%
Percentage Value May	75%	88%	100%
Percentage Value June	50%	50%	25%

Table A93: Accra Beach analysis 2003 – Site 3.

BROWNES BEACH

Brownes Analysis 2003 -Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	48	48	48
Overall Percentage	100%	100%	94%
Percentage Value January	100%	100%	67%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	88%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A94: Brownes Beach analysis 2003 –Site 1.

Brownes Analysis 2003 -Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	48	48	48
Overall Percentage	100%	100%	88%
Percentage Value January	100%	100%	67%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	90%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	63%

Table A95: Brownes Beach analysis 2003 – Site 2.

Brownes Analysis 2003 -Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	46	46	48
Overall Percentage	100%	100%	52%
Percentage Value January	100%	100%	67%
Percentage Value February	100%	100%	88%
Percentage Value March	100%	100%	38%
Percentage Value April	100%	100%	40%
Percentage Value May	100%	100%	75%
Percentage Value June	100%	100%	13%

Table A96: Brownes Beach analysis 2003 – Site 3.

DOVER BEACH

Dover Analysis 2003 -Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	22	22	32
Overall Percentage	100%	100%	83%
Percentage Value January	100%	100%	83%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	83%
Percentage Value April	100%	100%	80%
Percentage Value May	100%	100%	50%
Percentage Value June	100%	100%	67%
Percentage Value July	100%	100%	100%

Table A97: Dover Beach analysis 2003 – Site 1.

Dover Analysis 2003 -Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	24	24	31
Overall Percentage	100%	100%	72%
Percentage Value January	100%	100%	0%
Percentage Value February	100%	100%	83%
Percentage Value March	100%	100%	67%
Percentage Value April	100%	100%	80%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	67%
Percentage Value July	100%	100%	100%

Table A98: Dover Beach analysis 2003 – Site 2.

Dover Analysis 2003 -Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	32	32	45
Overall Percentage	100%	100%	83%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	88%
Percentage Value April	100%	100%	90%
Percentage Value May	100%	100%	88%
Percentage Value June	100%	100%	25%
Percentage Value July	100%	100%	100%

Table A99: Dover Beach analysis 2003 – Site 3.

HEYWOODS

Heywoods Analysis 2003 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	42	42	42
Overall Percentage	98%	100%	100%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	75%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A100: Heywoods Beach analysis 2003 – Site 1.

Heywoods Analysis 2003 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	42	42	42
Overall Percentage	100%	100%	95%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	75%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A101: Heywoods Beach analysis 2003 – Site 2.

Heywoods Analysis 2003 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	42	42	42
Overall Percentage	100%	100%	98%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	90%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A102: Heywoods Beach analysis 2003 – Site 3.

WORTHING BEACH

Worthing Analysis 2003 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	19	19	37
Overall Percentage	100%	100%	98%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	90%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%

Table A103: Worthing Beach analysis 2003 – Site 1.

Worthing Analysis 2003 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	36	36	40
Overall Percentage	98%	100%	85%
Percentage Value January	100%	100%	83%
Percentage Value February	100%	100%	75%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	80%
Percentage Value May	100%	100%	100%
Percentage Value June	88%	100%	63%
Percentage Value July	100%	100%	100%

Table A104: Worthing Beach analysis 2003 – Site 2.

Worthing Analysis 2003 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	51	51	47
Overall Percentage	56%	60%	46%
Percentage Value January	67%	67%	33%
Percentage Value February	13%	38%	75%
Percentage Value March	0%	0%	13%
Percentage Value April	80%	80%	70%
Percentage Value May	75%	75%	75%
Percentage Value June	75%	75%	25%
Percentage Value July	100%	100%	0%

Table A105: Worthing Beach analysis 2003 – Site 3.

APPENDIX 8

WATER QUALITY DATA FOR THE PILOT BLUE FLAG BEACHES FOR 2003 TO PROPOSED BLUE FLAG STANDARDS - TOO NUMEROUS TO COUNT VALUES IGNORED

ACCRA BEACH

Accra Analysis 2003 -Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total number of samples	48	48	48
Overall Percentage	95%	100%	85%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	75%	100%	67%
Percentage Value April	100%	100%	75%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	60%

Table A106: Accra Beach analysis 2003 -Site 1.

Accra Analysis 2003 -Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total number of samples	48	48	48
Overall Percentage	88%	100%	95%
Percentage Value January	100%	100%	100%
Percentage Value February	75%	100%	100%
Percentage Value March	50%	100%	67%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A107: Accra Beach analysis 2003 -Site 2.

Accra Analysis 2003 -Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total number of samples	48	48	48
Overall Percentage	86%	92%	78%
Percentage Value January	100%	100%	67%
Percentage Value February	83%	100%	100%
Percentage Value March	100%	100%	88%
Percentage Value April	100%	100%	70%
Percentage Value May	75%	88%	100%
Percentage Value June	67%	67%	33%

Table A108: Accra Beach analysis 2003 -Site 3.

BROWNES BEACH

Brownes Analysis 2003 -Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	48	48	48
Overall Percentage	100%	100%	94%
Percentage Value January	100%	100%	67%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	88%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A109: Browes Beach analysis 2003 -Site 1.

Brownes Analysis 2003 -Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	48	48	48
Overall Percentage	100%	100%	88%
Percentage Value January	100%	100%	67%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	90%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	63%

Table A110: Browes Beach analysis 2003 -Site 2.

Brownes Analysis 2003 -Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	46	46	48
Overall Percentage	100%	100%	61%
Percentage Value January	100%	100%	67%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	50%
Percentage Value April	100%	100%	67%
Percentage Value May	100%	100%	75%
Percentage Value June	100%	100%	13%

Table A111: Browes Beach analysis 2003 -Site 3.

DOVER BEACH

Dover Analysis 2003 -Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	22	22	32
Overall Percentage	100%	100%	83%
Percentage Value January	100%	100%	83%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	83%
Percentage Value April	100%	100%	80%
Percentage Value May	100%	100%	50%
Percentage Value June	100%	100%	67%
Percentage Value July	100%	100%	100%

Table A112: Dover Beach analysis 2003 -Site 1.

Dover Analysis 2003 -Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	24	24	31
Overall Percentage	100%	100%	72%
Percentage Value January	100%	100%	0%
Percentage Value February	100%	100%	83%
Percentage Value March	100%	100%	67%
Percentage Value April	100%	100%	80%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	67%
Percentage Value July	100%	100%	100%

Table A113: Dover Beach analysis 2003 -Site 2.

Dover Analysis 2003 -Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	32	32	45
Overall Percentage	100%	100%	83%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	88%
Percentage Value April	100%	100%	90%
Percentage Value May	100%	100%	88%
Percentage Value June	100%	100%	25%
Percentage Value July	100%	100%	100%

Table A114: Dover Beach analysis 2003 -Site 3.

HEYWOODS BEACH

Heywoods Analysis 2003 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	42	42	42
Overall Percentage	98%	100%	100%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	75%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A115: Heywoods Beach analysis 2003 - Site 1.

Heywoods Analysis 2003 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	42	42	42
Overall Percentage	100%	100%	95%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	75%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A116: Heywoods Beach Analysis 2003 - Site 2.

Heywoods Analysis 2003 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	42	42	42
Overall Percentage	100%	100%	98%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	90%
Percentage Value April	100%	100%	100%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%

Table A117: Heywoods Beach analysis 2003 - Site 3.

WORTHING BEACH

Worthing Analysis 2003 - Site 1			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	19	19	37
Overall Percentage	100%	100%	98%
Percentage Value January	100%	100%	100%
Percentage Value February	100%	100%	100%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	90%
Percentage Value May	100%	100%	100%
Percentage Value June	100%	100%	100%
Percentage Value July	100%	100%	100%

Table A118: Worthing Beach analysis 2003 - Site 1.

Worthing Analysis 2003 - Site 2			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	36	36	40
Overall Percentage	98%	100%	85%
Percentage Value January	100%	100%	83%
Percentage Value February	100%	100%	75%
Percentage Value March	100%	100%	100%
Percentage Value April	100%	100%	80%
Percentage Value May	100%	100%	100%
Percentage Value June	88%	100%	63%
Percentage Value July	100%	100%	100%

Table A119: Worthing Beach analysis – Site 2.

Worthing Analysis 2003 - Site 3			
Parameters	**% Faecal Coliform < 100/100ml**	**% Faecal Coliform < 400/100ml**	**% Faecal Streptococci < 40/100ml**
Total Number of samples	51	51	47
Overall Percentage	83%	89%	50%
Percentage Value January	100%	100%	33%
Percentage Value February	25%	75%	75%
Percentage Value March	0%	0%	17%
Percentage Value April	100%	100%	70%
Percentage Value May	100%	100%	75%
Percentage Value June	100%	100%	33%
Percentage Value July	100%	100%	0%

Table A120: Worthing Beach analysis 2003 - Site 3.