

## 4.1 Monitoring of the Aquatic Environment by Environmental Protection- an overview

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### Executive summary

- Extensive monitoring of the Island's aquatic environment according to strict protocols
- Independent auditing of protocols and results
- Comprehensive database maintained of all fresh and marine water quality records

#### 1. Introduction

Environmental Protection measures the quality and quantity of the Island's aquatic environment and maintains a central comprehensive public access database.

#### 2. History of monitoring

Prior to December 2003, Water Resources operated and staffed its own laboratory at Bellozanne.

As part of the 'Machinery of Government' changes, the Water Resources Bellozanne

Laboratory closed on 31 December 2003. All of the analysis functions performed by the Bellozanne Laboratory were transferred to the States Official Analyst at Pier Road. This included a budget transfer of £58,496.

The budget transfer has since funded some of the analysis requirement of Environmental Protection as detailed with a Service Level Agreement (SLA- see Appendix 2).

*The analyses covered by the SLA include:*

- *Pollution incidents.*
- *Routine monitoring of surface waters and outfalls.*
- *Routine monitoring of groundwater.*
- *Crabbe.*
- *Bathing waters.*
- *Discharge permits*
- *Macroinvertebrate monitoring.*

Under the SLA all samples are to be analysed in accordance with standard quality control, quality assurance and standard operating procedures. Details of which are available on request for viewing by officers of Environmental Protection.

All samples will be analysed within a reasonable timescale so that any delay does not result in the degradation of the sample or hinder the investigation of a pollution incident. The timescale will vary depending on the nature of the sample and the specific analyte.

### **3. Monitoring undertaken**

Article 7 of The Water Pollution (Jersey) Law 2000 states the requirement to monitor controlled waters.

A monitoring timetable is prepared annually (see Appendix 1). Monitoring is undertaken by the Environmental Protection Technician who is also responsible for data checking and data entry.

Types of monitoring currently undertaken include:

- i. Bathing water quality
- ii. Beach outfalls
- iii. Surface water quality
- iv. Surface flow monitoring
- v. Groundwater quality
- vi. Groundwater quantity
- vii. Macro invertebrate
- viii. Diffuse Pollution Pilot Project
- ix. Heavy metal monitoring
- x. SSIs
- xi. Crabbe
- xii. Monitoring with respect to pollution incidents
- xiii. Regulatory samples for discharge permits

(see separate sections for details of each monitoring programme)

### **4. Monitoring of pollution incidents**

The need to collect samples and the quantity will depend on the severity of the incident. For pollution to a stream, reservoir or pond, officers will collect samples from at least 3 points: The area of pollution, upstream of the pollution to show the background quality and downstream to demonstrate the extent and impact of the incident.

The samples are labelled using the standard procedure for labelling exhibits. A Chain of Custody form will also be completed for the samples (Appendix 3). This contains details of the sample, analysis required, pollution report number if known at the time and an order number for samples outside of those covered by the SLA. The order number can be telephoned in later if necessary.

### **5. Storage of data**

#### **Water Quality Database**

A database to store all water quality parameters was developed by the Centre for Research into Environment and Health, Aberystwyth University in 2004. This currently stores all water quality data collected in the island (circa 310,000 records).

# MONITORING TIMETABLE 2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Mon		1 DPPP +	1 DPPP +								1 DPPP +
Tues		2 Dip	2 Dip			1 Bathing					2 Dip
Wed		3 Dip	3 Dip			2 Bathing			1 Bathing		3 Dip
Thurs		4 Dip	4	1		3 DPPP	1 Dip		2 DPPP		4 Dip
Fri	1 Public Holiday	5	5	2 Public Holiday		4	2 Dip		3 Dip	1 O Dip	5
Sat	2	6	6	3	1	5	3		4	2	6
Sun	3	7	7	4	2	6	4	1	5	3	7
Mon	4	8 DPPP +	8 DPPP	5 Public Holiday	3 Public Holiday	7 Bathing	5 Bathing	2 Bathing	6 Bathing	4 M DPPP +	8 B
Tues	5 DPPP	9	9	6 DPPP +	4 DPPP +	8 Bathing	6 Bathing	3 Bathing	7 Bathing	5 A	9 O
Wed	6	10	10	7 Dip	5 Dip	9 DPPP +	7 DPPP +	4 DPPP +	8 DPPP +	6 C	10 R DPPP
Thurs	7	11	11	8 Dip	6 Dip	10 Dip	8	5 Dip	9 Dip	7 R	11 E
Fri	8	12	12	9	7 Dip	11 Dip	9	6 Dip	10	8 O	12
Sat	9	13	13	10	8	12	10	7	11	9	13
Sun	10	14	14	11	9	13	11	8	12	10	14
Mon	11 SSI	15 DPPP	15 DPPP	12 SSI	10 B DPPP	14 Bathing	12 Bathing	9 Bathing	13 Bathing	11 SSI	15 H
Tues	12 SSI	16	16 Crabbe	13 SSI	11 O	15 Bathing	13 Bathing	10 Bathing	14 Bathing	12 SSI	16 O
Wed	13 DPPP	17	17	14 DPPP	12 R Outfalls	16 DPPP	14 SSI	11 DPPP	15 DPPP	13 DPPP	17 L DPPP
Thurs	14 Dip	18	18	15	13 E	17 Crabbe	15 DPPP	12 Dip	16 Crabbe	14	18 E
Fri	15 Dip	19	19	16	14	18	16	13	17	15	19 S
Sat	16	20	20	17	15	19	17	14	18	16	20
Sun	17	21	21	18	16	20	18	15	19	17	21
Mon	18 DPPP	22 DPPP	22 DPPP	19 M DPPP	17 H Bathing	21 Bathing	19 Bathing	16 Bathing	20 Bathing	18 Outfalls	22 Outfalls
Tues	19	23 Outfalls	23	20 A	18 O Bathing	22 Bathing	20 Bathing	17 Bathing	21 Bathing	19 DPPP	23 DPPP
Wed	20	24	24	21 C	19 L DPPP	23 Outfalls	21 Outfalls	18 DPPP	22 Outfalls	20	24
Thurs	21	25	25	22 R	20 E	24 DPPP	22 DPPP	19	23 DPPP	21	25
Fri	22	26	26	23 O	21 S	25	23	20	24	22	26
Sat	23	27	27	24	22	26	24	21	25	23	27
Sun	24	28	28	25	23	27	25	22	26	24	28
Mon	25 Outfalls		29 Outfalls	26 M Outfalls	24 Bathing	28 Bathing	26 Bathing	23 Bathing	27 M Bathing	25 DPPP	29 DPPP
Tues	26 DPPP		30 DPPP	27 A DPPP	25 Bathing	29 Bathing	27 Bathing	24 Bathing	28 A Bathing	26	30
Wed	27		31	28 C	26 DPPP	30 DPPP	28 SSI	25 Outfalls	29 C DPPP	27	
Thurs	28			29 R	27		29 DPPP	26 DPPP	30 R	28	
Fri	29			30 O	28			27		29	
Sat	30				29		31	28		30	
Sun	31				30			29		31	
Mon					31 Public Holiday			30 Public Holiday			
Tues								31 Bathing			

***Service Level Agreement between the States of Jersey Official Analyst  
and Environmental Protection, Planning and Environment Department***

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- 8. Macroinvertebrate monitoring.**

## **1. Introduction**

*The States of Jersey Official Analyst (the Analyst) will offer analytical services to Environmental Protection in respect of samples arising from:*

- *Pollution incidents.*
- *Routine monitoring of surface waters and outfalls.*
- *Routine monitoring of groundwater.*
- *Crabbe.*
- *Bathing waters.*
- *Discharge permits*
- *Macroinvertebrate monitoring.*

All samples will be analysed in accordance with standard quality control, quality assurance and standard operating procedures. Details of which will be available on request for viewing by officers of Environmental Protection.

All samples will be analysed within a reasonable timescale so that any delay does not result in the degradation of the sample or hinder the investigation of a pollution incident. The timescale will vary depending on the nature of the sample and the specific analyte.

The cost of providing this service is deemed to be covered by the transfer of budget and one post from the Environment and Public Services Committee as agreed on 6 November 2003.

Any work extra to that stipulated in this Service Level Agreement is deemed not to be covered by the budget transfer, and will be arranged by prior agreement.

*This Service Level Agreement (the Agreement) will be effective from 1 January 2010 and will expire on 31 December 2011.*

*Sections of the Agreement including sample numbers and suites of determinands may be amended from time to time, subject to mutual agreement.*

## 2. Pollution Incidents

Environmental Protection investigates approximately 120 pollution incidents a year.

Under normal working conditions and subject to the agreed provisions, the Analyst will, where appropriate, provide analysis of samples arising from pollution incidents on the same working day as sample delivery, using approved methods. In all other instances, analysis will be performed as soon as reasonably practicable thereafter.

Analysis out of hours will be provided where appropriate, when possible and when necessary.

For aquatic hydrocarbon determination, the Analyst will provide a sufficient supply of, clean sampling containers.

The samples provided by Environmental Protection will be:

1. supplied with the correct paperwork,
2. of the correct volume,
3. labelled accordingly,
4. in an appropriate container, and
5. brought to the laboratory after prior notification where possible.

Where analysis of the samples provided is not possible, repeat sampling and analysis will be undertaken by mutual agreement.

Any samples that are deemed unsuitable will be re-sampled by Environmental Protection.

The analytical results will be delivered to the appropriate member of Environmental Protection by email, in a format specified by Environmental Protection in order to optimise data transfer and storage, within one working day of the completion of the analysis, with a written report forwarded to Environmental Protection within ten working days. This report may be in the form of a witness statement with interpretation of the results when requested.

All analysis of pollution incident samples will be covered by the transfer of the budget except the following:

Hydrocarbons in water and soil

Detergents

Metals other than copper, zinc, lead, manganese, iron, sodium, potassium, calcium and magnesium

Other complex or non-routine analyses by agreement.

To ensure quality control, standards will be analysed and reported alongside the samples where appropriate.

The chromatogram for hydrocarbon determination will be provided with the analysis result.

### 3. Surface waters and outfalls

Environmental Protection takes approximately 300 surface water and outfall samples each year. Other samples may be required dependant on investigations being undertaken by Environmental Protection. These will be notified by Environmental Protection and agreed with the Analyst prior to sampling.

Under normal working conditions and subject to the agreed provisions, the Analyst will provide an analytical programme for Environmental Protection according to the timetable provided and using approved methods for the following determinands:

Surface Water and outfall analysis
COD mg/l
SUSPENDED SOLIDS mg/l
AMMONIA mg/l (NH <sub>4</sub> )
CHLORIDE mg/l (Cl)
NITRITE mg/l (NO <sub>2</sub> )
NITRATE mg/l (NO <sub>3</sub> )
PHOSPHATE mg/l (P) (and SRP, Particulate P and Total P for the Diffuse Pollution Pilot Project (DPPP))
SULPHATE mg/l (SO <sub>4</sub> )
SODIUM mg/l (Na)
POTASSIUM mg/l (K)
MAGNESIUM mg/l (Mg)
CALCIUM mg/l (Ca)
MICROBIOLOGY TC (cfu/100ml)
FC (cfu/100ml)
FS (cfu/100ml)

Environmental Protection will provide all samples and results of field temperature, conductivity, pH and dissolved oxygen tests unless the equipment fails. In the case of failure of field equipment, the Analyst will undertake the analysis of these determinands, apart from dissolved oxygen. In cases where high suspended solid loading prohibits the filtration of samples in the field, this will be undertaken by the Analyst.

The samples provided by Environmental Protection will be:

1. supplied with the correct paperwork,
2. of the correct volume,
3. labelled accordingly, and
4. in an appropriate container.

Where analysis of the samples provided is not possible, repeat sampling and analysis will be undertaken by mutual agreement.

Any samples that are deemed unsuitable will be re-sampled by Environmental Protection.

The analytical results will be delivered to the appropriate member of Environmental Protection by email in a format specified by Environmental Protection in order to optimise data transfer and storage, within one working day of the completion of the analysis, with a written report forwarded to Environmental Protection within ten working days.

To ensure quality control, standards will be analysed and reported alongside the samples where appropriate.

Any anomalous results will be reported to Environmental Protection as soon as is reasonably practicable. Any changes in analysis will be requested in writing.



#### 4. Groundwater

Environmental Protection takes approximately 120 groundwater samples per year.

Under normal working conditions and subject to the agreed provisions, the Analyst will provide an analytical programme for Environmental Protection according to the timetable provided and using approved methods for the following determinands:

<b>Borehole analysis</b>
CHLORIDE mg/l (Cl)
NITRATE mg/l (NO <sub>3</sub> )
PHOSPHATE mg/l (P)
SULPHATE mg/l (SO <sub>4</sub> )
SODIUM mg/l (Na)
POTASSIUM mg/l (K)
MAGNESIUM mg/l (Mg)
CALCIUM mg/l (Ca)
MANGANESE µg/l (Mn)
IRON µg/l (Fe)
MICROBIOLOGY TC (cfu/100ml)
FC (cfu/100ml)
FS (cfu/100ml)

Environmental Protection will provide all samples and results of field temperature, alkalinity, conductivity and pH tests unless the equipment fails. In the case of failure of field equipment, the Analyst will undertake the analysis of these determinands.

The samples provided by Environmental Protection will be:

1. supplied with the correct paperwork,
2. of the correct volume,
3. labelled accordingly, and
4. in an appropriate container.

Where analysis of the samples provided is not possible, repeat sampling and analysis will be undertaken by mutual agreement.

Any samples that are deemed unsuitable will be re-sampled by Environmental Protection.

The analytical results will be delivered to the appropriate member of Environmental Protection by email, in a format specified by Environmental Protection in order to optimise data transfer and storage, within one working day of the completion of the analysis, with a written report forwarded to Environmental Protection within ten working days.

To ensure quality control, standards will be analysed and reported alongside the samples where appropriate.

Any anomalous results will be reported to Environmental Protection as soon as is reasonably practicable.

Any changes in analysis will be requested in writing.

## 5. Crabbe

Samples from Crabbe monitoring boreholes (4 sites in March, 2 sites in June, September, December) will be brought to the laboratory quarterly by Environmental Protection, according to the timetable provided. The total number of samples per year will be 10.

These will be analysed for the following determinands according to approved methods.

<b>Crabbe Boreholes</b>
SUSPENDED SOLIDS mg/l
COD mg/l
AMMONIA mg/l (NH <sub>4</sub> )
ARSENIC µg/l (As)
LEAD(µg/l (Pb)

Environmental Protection will provide all samples and results of field temperature, conductivity and pH tests unless the equipment fails. In the case of failure of field equipment, the Analyst will undertake the analysis of these determinands.

This analytical programme is under review and any further requirements for sampling and analysis will be subject to mutual consultation.

The samples provided by Environmental Protection will be:

1. supplied with the correct paperwork,
2. of the correct volume,
3. labelled accordingly and
4. in an appropriate container.

Where analysis of the samples provided is not possible, repeat sampling and analysis will be undertaken by mutual agreement.

Any samples that are deemed unsuitable will be re-sampled by Environmental Protection.

The analytical results will be delivered to the appropriate member of Environmental Protection by email, in a format specified by Environmental Protection in order to optimise data transfer and storage, within one working day of the completion of the analysis, with a written report forwarded to Environmental Protection within ten working days.

To ensure quality control, standards will be analysed and reported alongside the samples where appropriate.

Any anomalous results will be reported to Environmental Protection as soon as is reasonably practicable.

Any changes in analysis will be requested in writing.

## 6. Bathing Waters

Environmental Protection will sample 16 bathing water sites plus two duplicate samples each week, for a 20 week period each year producing approximately 360 samples.

Under normal working conditions, and subject to the agreed provisions, the Analyst will provide an analytical programme for Environmental Protection according to the timetable provided and using the methods supplied by Environmental Protection for the following determinands:

<b>Bathing Water Analysis</b>
<b>Microbiology</b>
Coliform bacteria (cfu/100ml)
<i>Escherichia coli</i> (cfu/100ml)
Enterococci (cfu/100ml)

The samples provided by Environmental Protection will be:

1. supplied with the correct paperwork,
2. of the correct volume,
3. labelled accordingly, and
4. in an appropriate container.

Where analysis of the samples provided is not possible repeat sampling and analysis will be undertaken by mutual agreement.

Any samples that are deemed unsuitable will be re-sampled by Environmental Protection.

The Analyst will provide a temperature gauge to Environmental Protection. Temperature data will be downloaded by the Analyst and forwarded to the appropriate member of Environmental Protection by fax. Any variations beyond the specified range will be reported to Environmental Protection.

The analytical and quality control results will be delivered to the appropriate member of Environmental Protection by email, in a format specified by Environmental Protection in order to optimise data transfer and storage, as soon as practicable and in any instance before close of business on each Friday, followed by a written report forwarded to Environmental Protection.

Any erroneous results or results that fail the EU Directive Imperative standards will be reported to Environmental Protection immediately.

Any action to be taken due to the results of the analysis is the responsibility of Environmental Protection.

To ensure quality control, an external quality assurance scheme will be used and an annual audit carried out by an appropriate external consultant.

Any changes in analysis will be requested in writing.

## 7. Discharge Permits

Under normal working conditions and subject to the agreed provisions, the Analyst will provide a fortnightly analytical programme for Environmental Protection for samples from the Bellozanne Sewage Treatment Works and weekly analytical programme for the Bonne Nuit Package Sewage Treatment Plant using approved methods for the following determinands.

<b>Sewage Treatment Works</b>
SUSPENDED SOLIDS / mg/l
COD mg/l
BOD mg/l
TOTAL NITROGEN mg/l
NITRATE mg/l
NITRITE mg/l
KJELDAHL NITROGEN mg/l

<b>Bonne Nuit Package Sewage Treatment Plant</b>
SUSPENDED SOLIDS / mg/l
COD mg/l
BOD mg/l

Environmental Protection will take samples from the regulatory point at the Bellozanne Sewage Treatment Works and Transport and Technical Services Department's Operations Directorate will provide the Bonne Nuit Package Sewage Treatment Plant samples.

Other samples may be required dependant on investigations being undertaken by Environmental Protection. These will be notified and agreed with the Analyst prior to sampling and may include sampling for bacterial loading (Coliform bacteria (cfu/100ml) *Escherichia coli* (cfu/100ml), Enterococci (cfu/100ml)).

The samples provided by Environmental Protection will be:

1. supplied with the correct paperwork,
2. of the correct volume,
3. labelled accordingly and
4. in an appropriate container.

Where analysis of the samples provided is not possible repeat sampling and analysis will be undertaken by mutual agreement. Any samples that are deemed unsuitable will be re-sampled by Environmental Protection.

The analytical results will be delivered to the appropriate member of Environmental Protection by email, in a format specified by Environmental Protection in order to optimise data transfer and storage, within one working day of the completion of the analysis, with a written report forwarded to Environmental Protection within ten working days.

To ensure quality control, standards will be analysed and reported alongside the samples where appropriate.

Any anomalous results will be reported to Environmental Protection as soon as is reasonably practicable. Any changes in analysis will be requested in writing.

## **8. Macroinvertebrate monitoring**

Under normal working conditions, and subject to the agreed provisions, the Analyst will provide an analytical programme for Environmental Protection according to the timetable provided, and using approved methods for calcium mg/l (Ca).

The samples provided by Environmental Protection will be:

1. supplied with the correct paperwork,
2. of the correct volume,
3. labelled accordingly and
4. in an appropriate container.

There will be approximately 40 samples per year. This will depend on the quinquennial and future sampling programme.

Where analysis of the samples provided is not possible repeat sampling and analysis will be undertaken by mutual agreement.

Any samples that are deemed unsuitable will be re-sampled by Environmental Protection.

The analytical results will be delivered to the appropriate member of Environmental Protection by email, in a format specified by Environmental Protection in order to optimise data transfer and storage, within one working day of the completion of the analysis, with a written report forwarded to Environmental Protection within ten working days.

To ensure quality control, standards will be analysed and reported alongside the samples where appropriate.

Any anomalous results will be reported to Environmental Protection as soon as is reasonably practicable.

Any changes in analysis will be requested in writing.

All non-routine sampling will be agreed in advance by mutual consent between Environmental Protection and the States of Jersey Official Analyst

**Declaration**

*We, the undersigned, agree to abide by the conditions of this Service Level Agreement for the time that it is in force and agree that it may be re-negotiated at any time.*

***On behalf of the States of Jersey Official Analyst***

..... Date .....

**Name** .....

**Position**.....


***On behalf of Environmental Protection, Planning and Environment Department***

..... Date .....

**Name** .....

**Position**.....

Appendix 3 Chain of Custody Form

	<b>Environmental Protection</b> <b>Transport Report and Chain of Custody Record</b>		<b>Pollution Report Number</b>  <b>Order Number</b>	
<b>Matrix (Enter in Column A)</b> 1. Surface Water 2. Ground Water 3. Sea Water 4. Leachate 5. Effluent 6. Soil 7. Other (specify in column A)	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <b>Samples delivered to States of Jersey Official Analyst by:</b>           Name: _____ Signature _____           Time _____ Date _____       </div> <div style="border: 1px solid black; padding: 5px;"> <b>Samples received at States of Jersey Official Analyst by:</b>           Name: _____ Signature _____           Time _____ Date _____       </div>			
<b>Type of Sample (Enter in Column B)</b> 1. SSI Monitoring 2. Macro Monitoring 3. Outfall Monitoring 4. Bathing Water Monitoring 5. Pollution Incident 6. Other Regulatory 7. Groundwater Monitoring 8. Crabbe Monitoring 9. Other (Specify in column B)				
<b>About the Samples</b>				
<b>Sample Reference</b>	<b>A (Matrix)</b>	<b>B (Sample Type)</b>	<b>*Analysis to be performed</b>	<b>Lab Reference &amp; Notes</b>

\*See over for standard analysis suites

COC1

August 2007

**Standard analysis suites**

**Suite 1 (outfalls & WRS ssi)**

Cod / mg/l  
Suspended solids / Mg/l  
Ammonia / mg/l (NH<sub>4</sub>)  
Chloride / mg/l (Cl)  
Nitrite / mg/l (NO<sub>2</sub>)  
Nitrate / mg/l (NO<sub>3</sub>)  
Phosphate / mg/l (P)  
Sulphate / mg/l (SO<sub>4</sub>)  
Sodium mg/l (Na)  
Potassium mg/l (K)  
Magnesium mg/l (Mg)  
Calcium mg/l (Ca)  
Total coliforms / cfu/100ml  
Faecal coliforms / cfu/100ml  
Faecal streptococci / cfu/100ml

**Suite 4 Bathing Water**

Total coliforms / cfu/100ml  
Faecal coliforms / cfu/100ml  
Faecal streptococci / cfu/100ml

**Suite 2 (Borehole Monitoring)**

Chloride / Mg/l (Cl)  
Nitrate / mg/l (NO<sub>3</sub>)  
Phosphate / mg/l (P)  
Sulphate / mg/l (SO<sub>4</sub>)  
Sodium mg/l (Na)  
Potassium mg/l (K)  
Magnesium mg/l (Mg)  
Calcium mg/l (Ca)  
Manganese µg/l (Mn)  
Iron µg/l (Fe)  
Total coliforms / cfu/100ml  
Faecal coliforms / cfu/100ml  
Faecal streptococci / cfu/100ml

**Suite 5 Drinking Water**

Total Petroleum Hydrocarbons with a detection limit of  $\leq 10\mu\text{g/l}$

**Suite 3 (Crabbe)**

Suspended solids mg/l  
COD mg/l  
Ammonia / mg/l (NH<sub>4</sub>)  
Arsenic µg/l (As)  
Lead µg/l (Pb)

**Suite 6 Surface Water for the Abstraction of Drinking Water**

Total Petroleum Hydrocarbons with a detection limit of  $\leq 0.2\text{mg/l}$