4.5 Surface water monitoring by Environmental Protection

Executive Summary

- Data collected from surface water monitoring is used to assess water quality in Jersey's streams.
- The monitoring of surface waters is essential to assess whether Jersey is meeting its aims of achieving "good status" under the Water Framework Directive (WFD) for these water bodies.
- Surface water monitoring is an essential tool in assessing the impact of water pollution.

1. Overview of monitoring programme

Monitoring of surface water quality began in 1995 at nine sites across Jersey, which were considered to be sites of potential ecological significance. In 2000, three sites were included to encompass the remaining catchments within this monitoring programme.

The surface water monitoring programme aims to:

- Create a database of background levels of a number of parameters in the Island's surface waters.
- Use the background data to analyse long-term trends and impacts from diffuse pollution and pollution incidents.
- To assess the background water quality entering the marine environment through outfalls.
- Provide baseline quality data in order to characterise the status of the Islands surface water resource at catchment scale.
- Use the data to assess surface water suitability as a habitat for aquatic life and the formulation of water quality objectives.
- Determine whether water quality objectives are met under the WFD in order to achieve a good surface water chemical status.

2. Legislation

- Water Pollution (Jersey) Law, Article 7 requires the Minister to monitor controlled waters which includes surface waters.

- Article 16(7) of the Water Framework Directive (Directive 2000/60/EC) required the establishment of environmental quality standards applicable to water. The environmental water quality standards for priority substances and certain other pollutants must be respected in order to achieve a good surface water chemical status. Although Jersey is not obliged to comply with the provisions of the Water Framework Directive, the States of Jersey have an undertaking to achieve EU Standards where possible.

3. Potential pollution sources and pathways

When measuring the quality of surface waters consideration should be given to the potential pollutants entering the streams by assessing the adjacent land use, potential pathways for pollutants entering the stream and their impact on water quality.

Potential pollution sources include: Discharges from the sewerage network, industry and agriculture following prolonged rainfall events, diffuse pollution, contaminated groundwater, leaking/ineffective septic tanks, soakaways and tight tanks, slurry application to land and livestock faeces from animals grazing in fields.

Pollution pathways include: run-off from land entering surface water streams, point source discharges and groundwater base flow.

4. Monitoring

Quarterly monitoring of the twelve SSI sites is conducted over a two day period. Field data, such as, pH, conductivity, dissolved oxygen and temperature are measured using field meters and test kits. Samples are collected at each site and these are subsequently analysed by the Official Analyst to the States of Jersey for chemical and microbiological parameters (see appendix 1).

The surface water monitoring protocol (see appendix 1) is followed to ensure that sampling is carried out consistently.

The surface water monitoring sheet is completed to record field data (see appendix 3). A separate sheet is completed for the samples submitted to the analyst to record the times when the samples were collected.

The current SSI sites are located in: Grouville, Grand Vaux, Longueville, Millbrook, Mourier Valley, Pre d'Auvergne, Tesson Mill, Vallee des Vaux, Pont Rose.

4.1. Related monitoring programmes conducted by Environmental Protection

Environmental Protection undertakes other monitoring which can be linked to the SSI monitoring:

- Macroinvertebrate monitoring of streams is the biological element of surface water monitoring required as part of the assessment of surface water quality under the WFD.
- Groundwater quality monitoring is important because groundwater sustains about 60% of stream flows in Jersey and directly impacts the water quality of streams.
- Outfall and bathing water monitoring is directly linked because the streams monitored within the SSI monitoring programme feed outfalls and subsequently influence bathing water quality.
- Diffuse Pollution Pilot Scheme (DPP) monitoring assesses more closely the impacts of farming on surface water quality.

5. **Analysis and reporting of data**
   Each quarter, the surface water quality data is entered into a spreadsheet, checked for accuracy and loaded onto the WQMIS database. Any abnormal results are investigated. See appendix 2 for a list of reports on surface water monitoring.

6. **Budget, manpower, and resource considerations**
   The analytical cost of the surface water monitoring programme is included within the Service Level Agreement with the Official State Analyst, with the exception of the provision sample bottles.

   Staff time for carrying out the monitoring is 8 days over the course of the year. A further 2 day per year is spent inputting and checking data and following up any abnormal results.

Appendix 1 Surface water quality monitoring protocol

Overview

- The purpose or objective of the Water Resources Section surface water monitoring is to build up a data base of information of background levels of a number of parameters in the Islands surface waters.

Objectives

- The programme is intended to provide baseline quality data in order to characterise the status of the Islands surface water resource at catchment scale.
- Ultimately, the data may be used to assess surface water suitability as a habitat for aquatic life, (drinking) water abstraction and to assist with pollution control and the formulation of water quality objectives.
- This multi purpose monitoring of surface waters is carried out on a monthly basis for each catchment over a minimum period of two years. This is in order to accumulate sufficient (at least 20) data sets to characterise water quality and also identify any trends in a given location over time.
- The days, times, weather conditions and the season at which sampling is carried out are varied in order to provide as representative set of samples as possible.

Location of sampling points

- Sampling points are chosen in order to cover points throughout the catchment.
- Samples are taken from tributaries and the main stream in order to investigate whether catchment water quality is homogeneous or heterogeneous. This might be for example a particularly low quality tributary or a general deterioration or recovery downstream after point source pollution.
- The number of sampling points is chosen on the basis of catchment size/number of tributaries but is also constrained by time, access and resource considerations.

Current sampling points and length of monitoring period

- Grouville 1995 –to date
- Grand Vaux 1995 –to date
- Longueville 1995 –to date
- Millbrook 1995 –to date
- Mourier Valley 1995 –to date
- Pre d'Auvergne 1995 –to date
- St Catherine 1995 –to date
- Tesson Mill 1995 –to date
- Vallee des Vaux 1995 –to date
- Pont Rose 2000 – to date
- Plemont 2000 – to date
- Greve de Lecq 2000 – to date

Equipment List:

- catchment map
- data record sheet
- pH meter and probe
- conductivity meter and probe
- DO meter and probe (calibrate prior to departure)
- standard solution for calibration of on-site monitoring equipment
- sample bottles (sterile: ⊇125ml and non-sterile: ⊇250ml)
- cool box
- distilled water & bottles
- beakers
- marker pen

Sample collection

- One person collects the samples
- Communication such as mobile phone is taken in to the field at all times.
- Sample collection is standardised in order to provide a method that is reliable and reproducible amongst different personnel as well as over time.
- Currently a grab sample is obtained from a predetermined section of the stream. The sample is taken from the centre (transverse section) of the stream against the direction of flow, taking care not to disturb bed materials /solids.

Field work

- Certain tests are performed on site using fresh samples, as some determinands are unstable. For this reason pH, temperature, conductivity and dissolved oxygen are determined in the field by hand held meter that is calibrated prior to use.
- Each field test is performed in duplicate as a minimum to check the validity of the result and then a mean value taken of closely corresponding values.

Samples collected for laboratory analysis

- General guidelines on appropriate containers, sample volumes, storage times etc are specified in references eg Standard Methods for the Examination of Water and Wastewater (18^{th} Ed) (SMEWW).
- All samples are taken using clean bottles and sampling equipment. For analysis of anions, cations and COD the 250ml plastic bottle is filled to exclude air. Samples are also collected in 150ml sterile plastic containers for microbiological determination.
- All samples are stored in dark and cool conditions (cool box with ice blocks) for transport to the laboratory.

Laboratory

- Samples are analysed within a predetermined time (Refer to SMEWW).
- If the sample is to be stored for then it is essential to preserve the sample for later analysis. The preservative will depend on the test to be performed. SMEWW or the analyst who is performing the tests is consulted concerning the exact preservation of samples, depending on time and method of analysis.

2010	
Parameter	Summary of ranges
DATE	
TIME	
pH	6.0 - 9.0
DO_2 %	60-100
ODOUR	
TEMPERATURE ^{O}C	6.0 - 15.0
CONDUCTIVITY uS	400 - 1400
APPEARANCE	
COD mg/l O_2	5 - 100
BOD mg/l O_2	0.10 - 10.0
SOLIDS mg/l	1 - 1000
NITRATE mg/l (NO_3-N)	1 .0 - 40.0
NITRITE mg/l (NO2-N)	0.01 - 1.00
AMMONIA mg/l (NH3-N)	0.001 - 1.000
CHLORIDE mg/l (Cl)	2 - 200
ORTHO PHOSPHATES mg/l (PO_4-P)	0.10 - 10.0
SULPHATE mg/l (SO_4)	1 - 100
SODIUM mg/l (Na)	0.5 - 50
POTASSIUM mg/l (K)	0.5 - 50
MAGNESIUM mg/l (Mg)	0.5 - 50
CALCIUM mg/l (Ca)	0.5 - 50
MICROBIOLOGY TC (cfu/100ml)	100 - 1000000
FC	10 - 100000
FS	2 - 10000
OTHER TESTS	
NOTES	

Appendix 2 Reports on Jersey's Surface water quality

- An Assessment of Surface Water Quality at Sites of Special Interest and in the Plemont, St Brelade and Waterworks Valley Catchments on the Island of Jersey, 2006 (CREH)
- Stream water quality on the Island of Jersey, 1997 (CREH)
- The Trinity Catchment Study – Year 1 – 1994 (BGS- short summary of report)
- The Trinity Catchment Study – Year 2 - 1995
- The Trinity Catchment Study – Year 3 - 1996

Appendix 3 Surface water monitoring field sheet

WRS SSIs Surface Water Monitoring ……../…… (Month/Year)

SAMPLING SITE	WRS SSI 4 Mourier	WRS SSI 8 Grands Vaux	WRS SSI 9 Vallee des Vaux	WRS SSI 7 Longueville	WRS SSI 6 Grouville	WRS SSI 5 St Catherine	WRS SSI GDL2203 Greve De Lecq	WRS SSI PL2 Plemont	WRS SSI 3 Pres D`Auvergne	WRS SSI PR Pont Rose	WRS SSI 2 Tesson
Samplers											
Date											
Time											
pH											
% DO											
Odour											
Temperature / 'C											
Conductivity / µS											
Appearance											
2 x 30 ml Universal Filtered ☑											
Sterile Sample ☑											
Non Sterile Sample ☑											
Other tests											
Weather conditions											
Notes											

Samples Delivered to States Analyst

Part 1	Part 2
Name	Name
Date	Date
Time	Time

	Date / Initials
Data inputted	
Database checked	