

Jersey Groundwater 2002

Groundwater Systems and Water Quality Programme Commissioned Report CR/03/102N

BRITISH GEOLOGICAL SURVEY

COMMISSIONED REPORT CR/03/102N

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Executive Summary

Groundwater levels remained healthy throughout the year, and in some areas groundwater levels have been showing a positive trend for some years. A continued decline in nitrate concentrations in Jersey groundwater reflects improved agricultural practise. This rapid response to changed agricultural practice reflects the shallow depth to water over much of the island. Concentrations of other ions tend to remain stable with seasons and years. Chlorthal continues to occur in groundwater with high concentrations at some sites. Like nitrate, its presence seem to be declining. In order to optimise the use of the groundwater data sets that area being collected it is recommended that the existing spread sheets be imported into a spatially referenced database. This will allow trend analysis to be carried out with ease and will greatly improve understanding of the island-wide water resources. It is also recommended that consideration be given to the creation of a post of Senior Hydrogeologist in order to facilitate the issuing of robust and defensible groundwater abstraction licenses.

1 Introduction

Monitoring of groundwater levels and water quality in selected boreholes continued throughout 2002. These data not only provide baseline information regarding the status of the island groundwater resource but also provide a valuable temporal data set that can be interrogated to identify change. The newly created Water Resources Section (WRS) of the Public Services Department (PSD) carries out the measurements, sampling, chemical analysis and data assembly for this work. The British Geological Survey (BGS) is retained to provide *ad hoc* advice and assistance in interpreting data collected from the monitoring activity and to review the monitoring network from time to time to ensure that the data gathered are fit for purpose and value for money. Periodic visits are made by BGS staff to assist in this activity. The key objectives of the monitoring programme are:

- to provide baseline reference data from which to monitor change,
- to help determine the state of the groundwater resource in terms of its physical and chemical status,
- to provide data which will ultimately assist in refining the groundwater balance estimate.

BGS also provides advice and assistance regarding resource management in general and, from time to time, also on specific issues relating to groundwater as they arise. Specific issues include groundwater protection and likely impacts of selected planning proposals.

Specific issues considered during 2002 were:

- Consolidation of data holdings within a GIS¹ based database system,
- Expert witness for a groundwater contamination incident at Ville Bree,
- Advice on the remediation of a fuel spill near Bellozanne,
- Hydrogeological impacts of La Gigoulande Quarry extension.

This report is part of a series of annual reports prepared by BGS for the States of Jersey informing the status of groundwater resources and on issues considered during the report year. It is not intended as a stand alone report, and reference should also be made to the detailed description of the Jersey aquifer system prepared by Robins and Smedley (1998).

¹ Geographical Information System to facilitate holding and analysis of spatially distributed information.

2 Groundwater Status During 2002

2.1 GROUNDWATER LEVELS

Appendix 1 contains a selection of long-term hydrographs, representative of the monitoring points on the island. For ease of comparison, the same monitoring points are shown as in last years report.

In contrast to 2001, very little recharge was seen at the start of 2002, this being reflected in the fact that most sites showed a maximum 2001-2 winter water level below that seen in other years. Despite the lack of early recharge, Summer 2002 minimum levels were generally consistent with other years. The onset of the autumn recharge occurred at around the normal time (September to October) and was reflected as a particularly sharp and sudden increase in water levels. The hydrographs that continue beyond the end of the year e.g. St. George's Estate, show that this trend has continued, providing expectation that the early 2003 rise would be large.

The long-term hydrographs at Jubilee Youth Centre, Mont Sohier Cottages, Redwood and St George's Estate, along with several others not reproduced in this report, show a rising trend in groundwater levels over the past few years. This could be due to a number of factors - an overall increase in rainfall providing a local increase in recharge, a reduction in groundwater abstraction or a combination of both.

2.2 INORGANIC CHEMISTRY

The previously reported apparent annual decline in nitrate values continued throughout 2002. Appendix 2 shows that although the percentage of sites sampled with nitrate values of over 100 mg/l and over 150 mg/l showed a small increase, the percentage of sites sampled with nitrate levels over 50mg/l fell - dramatically in the November sampling round. This shows the trend noted in 2001 of "background" levels falling with the isolated "high" sites remaining. Of the 49 samples collected in November 2002, only 11 (22%) exceeded the EC maximum admissible concentration of 50 mg NO₃ l⁻¹; this compares favourably with the 43 samples collected in November 2001 of which 18 (35%) exceeded the EC maximum admissible concentration.

Major ion analysis continued and showed no new notable time-dependant trends.

2.3 ORGANIC CHEMISTRY

After the peaks in Chlorthal that occurred during the period 2000 to 2001, concentrations have now reduced to pre-2000 levels. Chlorthal remains a useful indicator of pollution and sites where concentrations remain significant should be monitored carefully for a range of organic compounds which reflect local usage. Concentrations of Chlorthal ranged up to 5000 ng 1^{-1} , although at one site the concentration in November 2002 was 34 000 ng 1^{-1} , but had fallen from a concentration of 140 000 ng 1^{-1} measured the previous November.

2.4 GROUNDWATER ABSTRACTION

Until the Draft Water Resources Management (Jersey) Law is active, annual abstraction data are inadequate in number with which to make rational judgement of island-wide groundwater abstraction. Once licensed sources are metered then useful information will be forthcoming which will in the estimation of island-wide and catchment scale water balances.

3 Topical Issues

3.1 DATABASING

There is an urgent need to review the groundwater data held by PSD in order to:

- Enable the monitoring network to be rationalised and ensure that effort is focussed and useful,
- Enable the data holdings to assist with the process of issuing abstraction licences under the forthcoming Water Resources (Jersey) Law,
- Identify island-wide and catchment-scale trends e.g. nitrate concentrations in groundwater versus revised agricultural practice.

Groundwater data are currently held in Bellozanne on a series of independent theme/site spreadsheets. Themes are groundwater level, groundwater inorganic and organic chemistry and groundwater abstraction, bacteriology and pesticides. Sites are boreholes, located according to name and grid reference, that have been measured or sampled at any time since the water scarcity Emergency Powers were temporarily invoked in 1989. The data holding has now grown to the extent that independent spreadsheets are no longer appropriate for interrogation and analysis and a move towards a GIS supported database has been recommended. Only when this is complete can the data be sensibly reviewed and full analyses taken from it.

Work is currently in hand to obtain a comprehensive environmental data holding which will include the groundwater data. However, it is believed that this will not greatly assist interrogation of the groundwater data.

It is now urgently recommended that consideration be given to importing the spreadsheet data into a GIS supported database such as Arcview/Access. Without this facility the objectives of the monitoring network will remain unfulfilled and largely unobtainable. Preliminary work regarding a comprehensive review of the data and its interpretation was agreed by the construction of a metadata document early in 2003.

3.2 GROUNDWATER CONTAMINATION AT VILLE BREE

An expert witness statement was prepared on a groundwater pollution incident at Ville Bree following a site inspection in late August.

3.3 GROUNDWATER CONTAMINATION AT HOPELEY FARM

Advice was provided regarding attempts by consultants to remediate groundwater contaminated by fuel oil at Hopeley Farm near Bellozanne.

3.4 LA GIGOULANDE QUARRY EXTENSION

A technical report prepared by UK consultants Enviros Ltd. on the hydrogeological impacts of the proposed La Gigoulande Quarry extension was reviewed for the Planning & Environment Committee during May. The report successfully addressed technical concerns that were raised by BGS from an earlier submission by Granite Products during 2001. Those concerns were:

- That the increased open area of the quarry may require increased dewatering what are the design volumes of sump pumping and borehole interception for the quarry extension?
- Are there existing groundwater users in the vicinity that may be derogated by the enhanced dewatering?
- Will there be any significant derogation of adjacent surface waters by the dewatering?

The key conclusions of the Enviros Ltd. study in terms of possible risk were:

- Risk of small scale derogation of existing groundwater users in the vicinity of the quarry extension,
- Potential increase of peak stream flows below the quarry area,
- Marginally reduced recharge and storage within the granite aquifer,
- Small reduction in low stream flow below the quarry.

Monitoring of the existing quarry boreholes was recommended in order to identify any significant change occurring to the groundwater regime.

3.5 DRAFT WATER RESOURCES (JERSEY) LAW

Inspection of the Draft Water Resources (Jersey) Law shows that the main driver behind the text is the need for a regulatory instrument, whilst the technical arguments behind this need seem to have been forgotten. The primary role of this proposed law is not to impose an additional burden on either PSD or groundwater users, but to enable groundwater abstraction data to be collected from selected groups of users and heavy users of groundwater in order to assist in refining the island-wide water balance. The water balance is needed in order to optimise the utilisation of the overall water resource, both surface and groundwater. This will provide the Island with the best options for developing its available resource potential given the uncertainty of climate change.

For abstraction licenses to be meaningful licensed sources must be independent from derogation from other sources, and incapable of derogating other sources including basefow to streams. Issuing of abstraction licenses will require detailed local knowledge of groundwater occurrence and availability as well as full knowledge of all of the groundwater users in the vicinity of any given source. In addition the relationship between groundwater and nearby surface waters will need to be properly understood.

These hydrogeological constraints on abstraction licensing require the States to consider whether it considers itself to be suitably equipped to implement and maintain the Law. In order to enhance capability it is recommended that a post of senior hydrogeologist be considered in order to provide the expertise necessary to evaluate groundwater abstraction licence applications on a sound, technical and defensible basis.

4 References

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0 May-95 May-93 Sep-93 Jan-94 May-94 Sep-94 Jan-95 Sep-95 Jan-96 May-96 Sep-96 Jan-97 May-97 Sep-97 Jan-98 May-98 Sep-98 Jan-99 May-99 Sep-99 Jan-00 May-00 Sep-00 Jan-01 May-01 Sep-01 Jan-02 May-02 Sep-02 Jan-03 Date La Hougue Bie Well 0 -2 Depth to water (m) -4 -6 -8 -10 -12 -14 -16 -18 Sep-93 Jan-94 May-94 Sep-94 Jan-95 May-95 Jan-96 May-96 Sep-96 May-97 Sep-98 May-99 Sep-99 Jan-00 May-00 Sep-00 Sep-01 Jan-02 May-02 Jan-03 Sep-02 May-93 Sep-95 Jan-97 Sep-97 May-98 Jan-01 May-01 Jan-98 Jan-99 Date



Le Verseau

Jubilee Youth Centre

Appendix 1 Selected Borehole Hydrographs



Mont Sohier Cottage



Orchid Foundation



Redwood

St. George's Estate



Date



Appendix 2 Nitrate trends over time for bi-annual borehole sampling



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