

1984/49. Groundwater monitoring in the Devonport-Port Sorell-Sassafras area : Ideas for future work.

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Abstract

Work carried out up to June 1984 on the groundwater monitoring programme is outlined. A list of existing data and preliminary results of a water users survey are presented. Ideas on the drilling programme are discussed.

INTRODUCTION

The purpose of this report is to record the work that has been carried out on the Devonport groundwater monitoring project. Ideas on the drilling programme planned to start later this year are presented but responsibility for detailed planning and supervision must be the responsibility of the geologist taking over this project.

WORK TO DATE (June 1984)

The three main activities already started are:

- (1) Compilation of existing data.
- (2) Survey of water users.
- (3) Planning of drilling programme.

As far as the first activity is concerned, a list of the maps and papers that have been collected for this project is given in Appendix 1. The documents themselves are held by the Supervising Geologist, Engineering Geology Section.

The results to date of the survey of water users are given in Appendix 2. A major purpose of the survey was to talk to the major users of groundwater, encourage them to monitor their own bores, and to explain the purpose of the forthcoming drilling programme. All landowners contacted were co-operative and thought the project was worthwhile. They were all happy to let us drill on their property but nobody has been signed up.

In April 1984 a preliminary estimate of drilling requirements for the project (Table 1) was given to the Supervising Engineering Geologist and the Drilling Engineer. Some thoughts on the proposed drilling programme are given in the next section.

Table 1. PRELIMINARY ESTIMATE OF TOTAL DRILLING REQUIREMENT

Number of holes:	15 to 20
Depths:	60 to 150 m
Total drilling:	1500 to 2000 m
Maximum pump testing capability required:	750 l/min (10,000 g.p.h.) from 150 m.
Casing required in some holes:	say 500 to 800 m.
Most holes to be preserved with minimum of 50 mm casing.	
Pump testing required immediately after drilling.	

PROPOSED DRILLING PROGRAMME

As stated earlier a detailed drilling programme is not presented here. Planning and clear objectives are important in the early stages of any major project but actual details of depths, locations and bore developments will be influenced by early drilling results and continued input from the user survey. For this reason close field supervision is required, particularly during the early part of the project.

The monitoring of bores in the project area could be considered in the following two categories:

- (1) Local monitoring in intensively used areas.
- (2) Regional monitoring systems.

The local monitoring systems could be regarded as observation bores for seasonal 3 to 5 months pump tests conducted during the irrigation seasons. Two areas suitable for these detailed studies would be Mr Alan Duff's property at Northdown and Mr Reuben Radford's property at Moriarty. Each owner operates at least three major irrigation bores on their respective properties. It is considered that a minimum of three observation holes for each 'borefield' would be needed. More information on these two local monitoring systems is given in Appendix 3. Other locally intense monitoring systems could also be considered.

The regional monitoring systems could consist of single bores scattered throughout the project area. No definite proposals are given but the names of some people eager to have monitoring bores drilled on their property are given with the user survey results in Appendix 2.

NEED FOR CLOSE SUPERVISION

There is need for very close supervision of the drilling and pump testing, particularly in the first couple of months of this project. It is expected that decisions about depths, exact locations of holes, abandoning holes, depths of casing, rates and lengths of pump testing, and installation of monitoring systems will have to be made in the field. In addition to this, the user surveys and project planning will have to continue. Continuing contact with landowners over the whole project area is vital to the long-term success of the monitoring programme.

[12 July 1984]

APPENDIX 1

List of available maps and papers

The following list is not intended to be an exhaustive bibliography. It is a list of maps and documents which I assembled while working on the Devonport monitoring project. Every item listed below has been passed on to the Supervising Geologist, Engineering Geology Section.

10 copies of unpublished report 1979/16 by W.C. Cromer. One of these copies was for my use. The remainder were intended for landowners in the Devonport area who expressed interest in the work. Copies have already been sent to Mr Ron Loane and Mr Clive Loane (Appendix 2).

A set of large scale maps and diagrams from the above report. Some of these maps have been hand coloured.

Copy of letter and report by W.L. Matthews on the proposed Sassafras irrigation scheme.

Copies of W.L. Matthews' compilations of water bore information for the Devonport, Sheffield, Beaconsfield and Frankford Quadrangles, including analysis and location maps (bore card records are also available).

Six 1:25 000 series maps covering the project area (Devonport, Latrobe, Railton, Port Sorell, Harford, and West Frankford). A single map compilation (4 sheets stuck together) at a scale of 1:50 000 is also available.

Three maps (1:31 680) from the Valuation Section of the Lands Department showing current property boundaries. A list of owners is available at the Lands Department.

Some notes on survey of water bores in the Sassafras area.

APPENDIX 2

Preliminary results of water users survey

OBJECTIVES

The following is a list of objectives of the water users survey:

- (1) To obtain a year-by-year estimate of the total amount of groundwater extracted from the project area.
- (2) To identify areas of high groundwater usage.
- (3) To explain the project to the local landowners, to obtain their co-operation, to encourage them to keep their own records of water use, and to encourage them to monitor water levels in any future bores. This last objective depends on changed bore design. Either an airline can be installed or a small separate PVC tube to allow dipmeter measurements. Information on how irrigation bores recover during winter will be vital to the success of the monitoring project.

To achieve the first two objectives it will be desirable to identify all major irrigation bores in the project area and to keep a record of their yearly use.

RESULTS TO DATE (June 1984)

Table 2 summarises the data already obtained. Only a small number of major users (mainly in the north of the project area) have been contacted so far. More details of the Sassafras survey are given in the next section.

SASSAFRAS SURVEY

In response to a problem with a bore on the property of Graham Garland (reference Sheffield bore No. 293) data was collected on bores in the Sassafras area. Notes on the bores obtained from bore records and sketch maps showing locations were assembled. These are listed in Appendix 1 and have been passed on to the Supervising Geologist.

Groundwater usage in the Sassafras area was discussed with Gerald Spaulding (March 1984). I would guess that the total irrigation season usage in the area covered by the sketch map would be between 100 and 200 Ml but a user survey will result in a better estimate. Graham Garland is keen to have a regional monitoring bore on his property.

COMMENTS ON TOTAL USAGE

I am not in a position to give a reliable estimate of the groundwater used in the entire project area during the 1983/84 irrigation season. If I had to guess I would suggest that it might be between 2000 and 4000 Ml but it is only a guess. However, the response of landowners to the users survey is encouraging and when more of the major users are contacted it should be possible to get a reasonable estimate. Use will vary widely from season to season so it is essential that continuing contact is kept with all major users contacted. To this end I have spoken (by telephone) to all landowners that I have previously contacted to let them know what is going on.

TABLE 2

PRELIMINARY RESULTS OF WATER USERS SURVEY

Name of landowner contacted	AMG Reference to house	Telephone number (area code 004)	Groundwater used in 1983/84 season (Ml)	Remarks
Alan Duff	4575 54419	28 4020	150	Site for intensive local monitoring (Appendix 3) He will be away for a couple of weeks in September.
Reuben Radford	4578 54394	26 9208	150	Site for intensive local monitoring (Appendix 3) Borefield is 2km from house, close to Moriarty
Clive Loane	4557 54412	28 4010	100 ?	Gerald Spaulding pump tested bore No. 357 at 8000g.p.h. for 3½ hours during June 1984. The bore will be used next season.
Ron Loane	4548 54415	28 4013	10	Recent new bore close to No. 156. To about 150m still in the Thirlstane Basalt. 4600g.p.h. (2 day test) from near surface. Interested in project-candidate for regional monitoring bore? His property includes coastal sands at Northdown Beach and he would appreciate groundwater appraisal (1 to 2 days with Triefus)
Alan Wilson	4564 54405	28 4022	15	He is interested in project (he thinks it is overdue!) Candidate for regional monitoring bore?
Graham Garland	4576 54298	26 7223	Domestic use only	Recommended site for regional monitoring bore. He has had some bore problems (contact him and discuss on site)
Neville Badcock	4571 54360?	26 9284	230	He has not been contacted. Information on usage from Lloyd's report (Appendix 1)

NOTES: Usage estimates are rough guides only (assume $\pm 20\%$). It would be better to seek confirmation of these figures, rather than to assume they are correct. It would be preferable not to quote these figures to the people concerned.

APPENDIX 3

Thoughts on local monitoring systems at Northdown (Alan Duff) and Moriarty (Reuben Radford)

INTRODUCTION

As discussed earlier the objective of local monitoring systems is to provide observation bores in intensively used areas. The extraction of groundwater during the irrigation season can be regarded as a long-term pump test. The changes in water levels in observation holes close to irrigation bores should provide useful information on aquifer characteristics.

CHOICE OF SITE

The two properties suggested for detailed analysis were chosen because each has at least three irrigation bores operating in a fairly small area. In both cases the bores extract most of their water from the Thirlstane Basalt which is the major aquifer in the region. The owners of both properties are very interested in the whole project and are willing to co-operate by allowing us to drill and by keeping records of bore usage.

EXISTING INFORMATION

Existing information at the two properties consists of bore card records (Devonport Quadrangle Bores 75 to 84, and 287 for Alan Duff and Bores 218 to 224 for Reuben Radford).

SITE VISIT AND BORE SITING

The first task of the new project geologist will be to contact the owners and arrange a site visit to locate all the existing bores and find out how much they are used.

As far as bore siting is concerned I suggest that a minimum of three bores be considered for each property. One bore may give no response at all, two bores may give conflicting results. At least three will be needed to have any confidence in any pattern of behaviour observed.

I have no definite ideas on actual bore sites. One could be sited near the middle of the borefield. Local site factors, such as landowners preference, ease of access, and topography will need to be considered. Probable second and third sites at each property should be selected when the first site is chosen but these may be changed as the programme continues.

THOUGHTS ON BOREHOLE DESIGN

The boreholes should be designed to monitor water levels in the aquifer which is supplying the water. In both cases this appears to be the Thirlstane Basalt but this should be confirmed if possible. If this is the case then the Moriarty Basalt (if present) and the Wesley Vale Sands should be sealed off. All holes should be pump tested immediately on completion of the drilling. The results of the pump test may affect the decision on the next site and whether the hole should be permanently preserved. All bores required for monitoring should be preserved by installing casing with a minimum diameter of 50 mm. This is to allow monitoring floats to be installed. Four water level recorders have been

purchased (as at June 1984). One is with Kerry Richardson and three are with Peter Stevenson.

Some of the bores should be taken to the base of the Thirlstane Basalt (about 150 m at Northdown and about 100 m at Moriarty).

CONTACT WITH GERALD SPAULDING

I have kept in close contact with Gerald Spaulding during the time I have been working on the project. Gerald thinks the project is worthwhile and he has encouraged local landowners to co-operate. He realises how useful it could be to monitor irrigation bores (during winter recovery) and he has installed air lines on some of his recent bores. Gerald has a great deal of experience in drilling in the project area and it is clearly in our interests that close co-operation with him continues.