

## 7. Recommendations

The present study has been based on information available from the groundwater database. The database has three problems:

- 1) the quality of the data
- 2) the coordinate system used for the horizontal control
- 3) the distribution of the data.

The quality of the data in the groundwater database is affected by two factors: a) the technical training of the persons collecting the data, and b) the quality control of the data. The possible options to upgrade the database include the creation of a “super” database, which includes only verified data. The first step would be to field-verify the 114 existing water wells listed in Appendix E. These water well records indicate that a complete water well drilling report is available along with at least a partial chemical analysis. The level of verification would have to include identifying the water well in the field, obtaining meaningful horizontal coordinates for the water well and the verification of certain parameters such as water level and completed depth. There are three water wells for which the County has responsibility, of which only one satisfies the above criteria. For the remaining two water wells, a legal location, an aquifer name, and a completed depth are available in the groundwater database; all three of the County-operated water wells are shown in Appendix E. It is recommended that these two County-operated water wells plus the 114 water wells be field-verified, water levels be measured, a water sample be collected for analysis, and a short aquifer test be conducted. An attempt to update the quality of the entire database is not recommended.

An attempt to link the AENV groundwater and licensing databases was about 57% successful in this study (see CD-ROM). About 43% of licensed water wells do not appear to have corresponding records in the AENV groundwater database. There is a need to improve the quality of the AENV licensing database. It is recommended that attempts be made in a future study to find and add missing drilling records to the AENV groundwater database and to determine the aquifer in which the licensed water wells are completed.

While there are a few areas where water-level data are available, on the overall, there are an insufficient number of water levels to set up a groundwater budget. One method to obtain additional water-level data is to solicit the assistance of the water well owners who are stakeholders in the groundwater resource. In the M.D. of Rocky View and in Flagstaff County, water well owners were being provided with a tax credit if they accurately measured the water level in their water well once per week for a year. A pilot project indicated that approximately five years of records are required to obtain a reasonable data set. The cost of a five-year project involving 50 water wells would be less than the cost of one drilling program that may provide two or three observation water wells. Monitoring of water levels in domestic and stock water wells is a practice that is recommended by PFRA in the “Water Wells That Last for Generations” manual and accompanying videos (Alberta Agriculture, Food and Rural Development, 1996). Of the 114 water wells recommended for field verification, ten of the bedrock water wells and 15 of the surficial water wells are in areas of water-level decline. Because the flow through the Lower Sand and Gravel Aquifer is significantly less than the total of the licensed and unlicensed diversions, it is strongly recommended that a groundwater-monitoring program be established.

A second approach to obtain water-level data would be to conduct a field survey to identify water wells not in use that could be used as part of an observation water well network. County personnel and/or local residents could measure the water levels in the water wells regularly.

**In general, for the next level of study, the database needs updating. It requires more information from existing water wells, and additional information from new ones.**

Before an attempt is made to provide a major upgrade to the level of interpretation provided in this report, the accompanying maps and the groundwater query, it is recommended that the 114 water wells listed in Appendix E for which water well drilling reports are available be subjected to the following actions (see pages C-2 to C-3):

- 1) The horizontal location of the water well should be determined within ten metres. The coordinates must be in 10TM NAD 27 or some other system that will allow conversion to 10TM NAD 27 coordinates.
- 2) A four-hour aquifer test (two hours of pumping and two hours of recovery) should be performed with the water well to obtain a realistic estimate for the transmissivity of the aquifer in which the water well is completed.
- 3) Water samples should be collected for chemical analysis after five and 115 minutes of pumping, and analyzed for major and minor ions.

A list of the 114 water wells that could be considered for the above program is given in Appendix E and on the CD-ROM.

In addition to the data collection associated with the existing water wells, all available geophysical logs should be interpreted to establish a more accurate spatial definition of individual aquifers.

There is also a need to provide the water well drillers with feedback on the reports they are submitting to the regulatory agencies. The feedback is necessary to allow for a greater degree of uniformity in the reporting process. This is particularly true when trying to identify the bedrock surface. One method of obtaining uniformity would be to have the water well drilling reports submitted to the AENV Resource Data Division in an electronic form. The money presently being spent by AENV to transpose the paper form to the electronic form should be used to allow for a technical review of the data and follow-up discussions with the drillers.

An effort should be made to form a partnership with the petroleum industry. The industry spends millions of dollars each year collecting information relative to water wells. Proper coordination of this effort could provide significantly better information from which future regional interpretations could be made. This could be accomplished by the County taking an active role in the activities associated with the construction of lease sites for the drilling of hydrocarbon wells and conducting of seismic programs.

**Groundwater is a renewable resource and it must be managed.**

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