



Rural Water Wells: ...maintaining a valuable resource



Water management is critical for agricultural sustainability and to support agriculture, rural residents, rural communities and economic development.

A safe and reliable water supply is essential to address water-related issues, to improve the competitiveness of the agriculture and agri-food sector, and to protect the environment.

Through programs, knowledge and information, Agriculture and Agri-Food Canada (AAFC) is working with partners to help expand information and develop new technologies in the areas of water quality and supply, and agricultural beneficial management practices.



Groundwater supplies are the main water source for more than 80 per cent of rural Canadians, with over

Groundwater Information Network: www.gw-info.net

1.3 million water wells constructed across Canada since 1960. Figure 1 illustrates the distribution of water wells across Canada, with groundwater supplies situated in all agricultural regions of the country.

The rural agricultural sector often prefers groundwater over surface water supplies since groundwater is fairly accessible, relatively inexpensive and requires less treatment.

Although there is generally a high dependence on groundwater by the agricultural sector, wells are usually managed with a "set and forget" attitude, which often leads to a poor understanding of the conditions that cause many of the problems associated with water well supplies. As a result, when well performance or water quality issues arise, remedial measures are often applied that are less effective since significant well deterioration has already occurred. Because of the high reliance on groundwater supplies in the rural agricultural sector, it's essential that practices and technologies are in place to ensure the safety and sustainability of water well supplies, in order to prevent premature failure and well abandonment.



Figure 2. Typical Well Design makes water level monitoring difficult.





Figure 3. Well Design Considerations.

An essential aspect of water well management is monitoring the water level in the well on a regular basis. However, this is often neglected since the design and construction of a well is generally not "user-friendly" for performing ongoing monitoring and maintenance (see Figure 2). Therefore, proper design and construction practices are vital in maximizing the performance and lifespan of a water well.

Regular monitoring is important if problems are to be identified early and rectified before significant deterioration occurs. The best opportunity to incorporate design elements, which facilitate proper monitoring and maintenance, is during the well installation. Once the well is completed and secured with a well cap, the well often becomes difficult to access for monitoring and maintenance. Important well design elements that can be included to facilitate monitoring and maintenance are shown in Figure 3.

One of the challenges to sustaining and extending the life of rural farm wells is the ability to easily monitor changes in the water well environment. Fortunately, new technologies that provide "direct" water level readouts without the continual removal of the well cap are now available. Several of these devices are now being field tested and evaluated by Agriculture and Agri-Food Canada's Agri-Environment Services Branch (AESB) at various sites across Canada.

One of the most promising technologies currently being field tested is a monitoring device that consists of a pressure sensor and a display unit that provides a "real-time" water level reading, as shown in Figure 4. For this device, the probe is connected via a cable to a display unit that can be located up to 600 metres from the well and provides a direct read-out of the height of the water column in the well. The monitoring device can also record and store the maximum (non-pumping) and minimum (pumping) water levels. The device also has data logging capabilities, which allows water level readings to be stored and downloaded via a USB port.

New technologies such as this can provide timely water level data to a water well owner ensuring early detection of problems related to well and aquifer performance. This also allows preventative measures to be implemented in a timely manner to reduce potential long-term impacts.



Figure 4. *Water Level Monitoring Device.*

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