

BACKGROUND

Private wells often provide the water supply for rural subdivisions in Saskatchewan and while they can form a reliable and safe water supply, they also present potential risks. Other types of supply such as pipelines and community wells are subject to government regulation aimed at ensuring the security of the water source from both supply and quality perspectives. However, private well owners are fully responsible for their water supply with little or no oversight.

Increasing development pressures on ground water resources, greater awareness of ground water quality issues and responsible water management dictate that the ground water supply should be investigated early in the subdivision planning process. As it stands now, new subdivisions may be approved and lots sold without verification of a water supply. This could result in homeowners having to drill to significant depths to gain a water supply or worse, not even being able to locate a supply on the property. Also, a supply issue may manifest itself in the future if the aquifer is not of sufficient size to supply the subdivision's demand over the long term. In addition, water quality issues ranging from aesthetic problems such as iron and/or manganese to a variety of health related issues may exist. For example, health related parameters such as pathogens, arsenic and uranium are often found in Saskatchewan ground water at levels exceeding maximum acceptable concentrations. Sampling, of over 4500 private wells used for drinking water, has suggested that 57% exceed at least one or more health parameter and more than 85% will exceed a health and/or aesthetic parameter. Poor water quality can occur naturally or it could be due to human activities such as on-site waste water treatment, if adequate investigations and practices are not followed.

Clearly, there is a need to investigate the adequacy of the ground water supply for new subdivisions from both a supply and water quality perspective. However, that alone is not enough. The water supply and on-site waste water systems should be considered as part of the overall water system, especially when private wells are likely to be completed at shallow depths with little over burden cover. In this situation the supply may be susceptible to drought, over use and impacts of surface activities such as on-site waste water treatment. In fact, the water supply and waste water treatment investigations should be linked given the potential for improper wastewater systems to adversely impact a water well supply. Sufficient work would be done to ensure that suitable on-site wastewater treatment systems are installed in order to minimize contamination of the site and the availability/adequacy of a suitable groundwater supply is reliably determined.

Any investigation and report submitted must satisfy the intent of *The Subdivision Regulations* which states: "in making a decision as to whether or not to approve an application for subdivision approval, the approving authority shall:

Section 14 b) consider the suitability of the land for the proposed subdivision having regard to:

- the availability and adequacy of a water supply, a sewage disposal system and solid waste disposal;

- the need to minimize the likelihood of air, water or soil pollution by the subdivision or the need to protect the subdivision from such pollution by outside influences.”

METHODOLOGY

Following are recommended ground water investigation guidelines for developers, contractors, consultants and regulators. Similar to the on-site wastewater treatment system investigations, less than 10 residential units per quarter section will be considered low density, ten to 39 units will be considered medium density and 40 or more will be considered high density.

Low Density Development (fewer than 10 residential sites)

(For subdivisions with existing development which utilizes well water, a standard assessment is not required.) For low density subdivisions, where there is minimal information, a standard assessment shall be undertaken. This would include sufficient test drilling which includes yield testing and water quality sampling to indicate sufficient water quality and quantity exists for the entire subdivision. This assessment, along with a professional opinion on the ground water potential should be prepared by a geoscience professional* (registered with the Association of Professional Engineers and Geoscientists of Saskatchewan). The standard assessment shall at a minimum include:

- Project description and location maps;
- Drillers log, lithologic record, geophysical log or “e-log” (for small diameter drilled wells) and well completion log;
- For each test well, a continuous pumping test for a minimum of four hours at a rate not less than the anticipated peak water use rate, along with the appropriate records. (Minimum pumping rate agreed by the developer/owner.);
- A water quality sampling and analysis, and comparison to the *Saskatchewan Drinking Water Quality Standards and Objectives*;
- An inventory/review of water wells within 1.6 km radius of the proposed subdivision;
- Identification of any current or historical land use threats to the groundwater quality in the vicinity (e.g. livestock facilities, gas stations, landfills, other commercial/industrial facilities, etc.); and
- Identification of appropriate well completion techniques to minimize contamination from surface.

While completing a well on each lot is obviously the best alternative in terms of ensuring an adequate water supply, other options can be considered. At some locations in Saskatchewan, the potential for a domestic groundwater supply is reasonably well known. In such cases, the developer may undertake a ground water potential study consisting of an office based review, and an executive summary in layman’s terms identifying a summary of the available information. Buyers would then be responsible for installing and testing their own water supply. However, in this case buyers would have to be made aware that a water supply is always uncertain until a well has successfully been completed on the property.

This information, along with a professional opinion on the ground water potential should be provided in a report prepared by a geoscience professional* (registered with the Association of Professional Engineers and Geoscientists of Saskatchewan). The ground water potential study would typically involve:

- Project description and location maps
- Maps illustrating the spatial extent and distribution of potential groundwater resources. (Regional hydrostratigraphy maps are obtainable from the Saskatchewan Watershed Authority website)
- Inventory/review of water wells within 1.6 km radius of the proposed subdivision.
- A water quality sample and analysis, and comparison to the **Saskatchewan Drinking Water Quality Standards and Objectives** .
<http://www.saskwater.com/WhatWeDo/pdfs/Drinking%20Water%20Standards.pdf>
This could be sourced from nearby wells completed *in the same aquifer*.
- Identification of any current or historical land use threats to the groundwater quality in the vicinity (e.g. gas stations, landfills, other commercial/industrial facilities, etc.)
- Documentation of any licensed groundwater works near the proposed subdivision and
- Identification of viable alternative water supply option(s) for any lots in the event of unsuccessful groundwater exploration.

A final alternative where ground water potential is not well established, would be for a developer to undertake some test drilling and possibly installing a test well. Using this option would result in a ground water potential study prepared by a geoscience professional* (registered with the Association of Professional Engineers and Geoscientists of Saskatchewan) which contains the same level of information as noted above.

For both of the previous two options, buyers would have to be made aware that ground water supplies are generally uncertain until a well has successfully been completed on their prospective property and no buildings should be constructed until this has been done.

Medium Density Developments (10 to 39 residential sites)

For medium density developments a Level 2 assessment shall be completed. These require a more rigorous study by a geoscience professional* (registered with the Association of Professional Engineers and Geoscientists of Saskatchewan) due to the cumulative effect of increased development. Additional test drilling, well installations and testing is required. As well, additional analysis is required to ensure that the proposed water supply shall be sustainable for each lot and the entire subdivision. Further, cumulative impacts of adjacent activities (such as neighboring subdivisions) shall be considered. It is important to recognize that depending on the number of lots, neighboring developments and local hydrogeologic conditions there will be considerable variation in the scale of work for Level 2 assessments. Thus two proposed subdivisions of similar size may be subjected to different scales of investigation. The scale of the investigation would be determined by the geoscience professional* (and ultimately agreed to by the Ministries)

The investigation would need to determine the availability, suitability and sustainability of the water supply from water quantity and quality perspectives. Well locations in conjunction with onsite wastewater systems would need to be examined. Ultimately the Level 2 investigation and report should clearly indicate whether groundwater resources will support the proposed subdivision, potential impacts on existing projects and necessary measures to provide protection from contamination. Implementation of water level or quality monitoring programs may also be required. Consequently, the handling of wastewater must be considered in the water supply investigation. It is important to note

that in some cases, such as when a surficial aquifer is present, the investigation may dictate that a municipal water supply will be required for a medium density development.

The Level 2 assessment report must contain sufficient data and analysis to demonstrate that the integrity of the water supply will be maintained for new and existing users, the water supply will be adequate for new users, and the proposed development will not adversely affect existing users. It must also contain an executive summary outlining in layman's terms the engineer's recommendations.

High Density Development (40 or more sites)

For high density development utilizing onsite wastewater systems, a municipal water supply shall normally be required. If wastewater holding units are the option chosen for the development, then consideration can still be given to individual water supplies. However, the higher level of development would need to be reflected in the detail of the investigation. A municipal water supply would be subject to regulation by the Saskatchewan Watershed Authority and the Ministry of Environment.

DISCRETION OF THE MINISTRY AND PHASED DEVELOPMENTS

These are general guidelines and may be subject to alteration at the discretion of the regulating Ministries. For existing and approved subdivisions, any expansion by the addition of lots will require either Level 1 or Level 2 assessments. This may take the form of a supplementary study prepared by a geoscience professional* (registered with the Association of Professional Engineers and Geoscientists of Saskatchewan) to address the cumulative effects of development.

The groundwater assessment addresses the likelihood of obtaining long term water and is not a guarantee that adequate water is available at the proposed site in all instances, regardless of the level of study or the involvement of a professional. Further, the well owner bears full responsibility for the maintenance, operation and water quality of their well.

A copy of this information must be provided to the municipality since they may want to include aspects of the report within their servicing agreement. **Community Planning Branch will require five (5) copies of the report for referral to the: Health Region, Ministry of Environment, Saskatchewan Watershed Authority – Ground Water Division and Regional Office. Alternatively, Adobe PDF versions (on compact disc or suitable for e-mail distribution, i.e. < 1 MB), may be substituted.**

* Any report provided by a geosciences professional must include a statement indicating they are registered with the Association of Professional Engineers and Geoscientists of Saskatchewan, and the work they submit is within their defined scope of practice.