

Township of Langley Groundwater Management: Case Study

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for

Watershed Watch

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The 17th *Speaking for the Salmon* workshop on Groundwater and Salmon

In 2006, the Township of Langley (the ‘Township’) was confirmed as the first municipality to develop a Water Management Plan under new (2004) provisions of the *BC Water Act*. This particular plan will focus specifically on groundwater. Permits or licenses to extract groundwater are not currently required in British Columbia, and this poses problems for the sustainable management of groundwater. A new Water Management Plan in the Township will consider permitting along with a suite of other options related to quality and quantity.

The Township of Langley in the Fraser Watershed

The Fraser River watershed drains one-third of the province, and supports a massive diversity of salmon and other fish populations. The Township of Langley has about 100,000 residents in 327 square kilometres bordering the Fraser River in the lower Fraser watershed. These lower reaches of the Fraser are contained in the Fraser Valley, which supports a large portion of British Columbia’s population. Despite agricultural and urban pressures, this area still contains critically important fish habitat.

The Township contains approximately 700 kilometres of fish bearing streams and numerous wetlands (Ministry of Environment 2006) in 14 watersheds that drain either into the Fraser River, south to Washington State, or to Boundary Bay through the municipality of Surrey (Township of Langley 2007). Most of this area is still fish habitat, and fish species present include seven salmonids and two endangered species – the nooksack Dace and salish sucker (Ministry of Environment 2006). Two streams - West Creek and Nathan Creek - are designated ‘sensitive streams’ under the *BC Fish Protection Act*. The Township's streams are typically groundwater fed and originate in low-lying areas, in contrast to the region's typical mountain streams. This means that stream headwaters are often located in prime lands for agriculture and development, making their protection a challenging task (Township of Langley 2007).

Water uses in Langley

The Township is one of the few municipalities in the Lower Mainland that relies heavily on groundwater, for agricultural, commercial, industrial and residential uses; 23% of the Township is not supplied by the municipal drinking water system, and residents in these areas rely on private wells. However, the majority of the Township’s population live in areas served by one of two municipal water systems. The smaller eastern system is entirely groundwater based, while the larger western system supports 61% of the Township’s total population, and is a mix of groundwater (40%) and Greater Vancouver

Regional District (GVRD) surface water (60%). The Township prefers to use its own available groundwater, as it is significantly cheaper than purchasing surface water from the GVRD. The Township of Langley operates 18 municipal wells, and private wells number at least 5,000 (Township of Langley 2007). The actual number of private wells is not known, as permits are not required when wells are drilled. In the absence of provincial regulation of groundwater taking, it is unknown just how much groundwater is extracted for domestic, agricultural and commercial purposes.

Approximately three-quarters of the Township's land is in the Agricultural Land Reserve, and these rural areas are outside of the municipal system. Groundwater extracted here for agricultural purposes is significant, and as with other uses, has the potential for depleting the groundwater resource.

Groundwater quantity a key issue

The provincial Ministry of Environment monitors observation wells in the Township, and water levels in these wells and in other municipal wells are dropping, from between four and 51 centimetres per year (Golder 2005). Groundwater modelling (Golder 2005) indicates that these declines are due to excessive extraction, and expected population growth and intensification of agriculture and commercial activities will only accelerate the drop in water tables. While the amount of groundwater extraction is for the large part unknown, land use patterns were used to estimate current water use for the

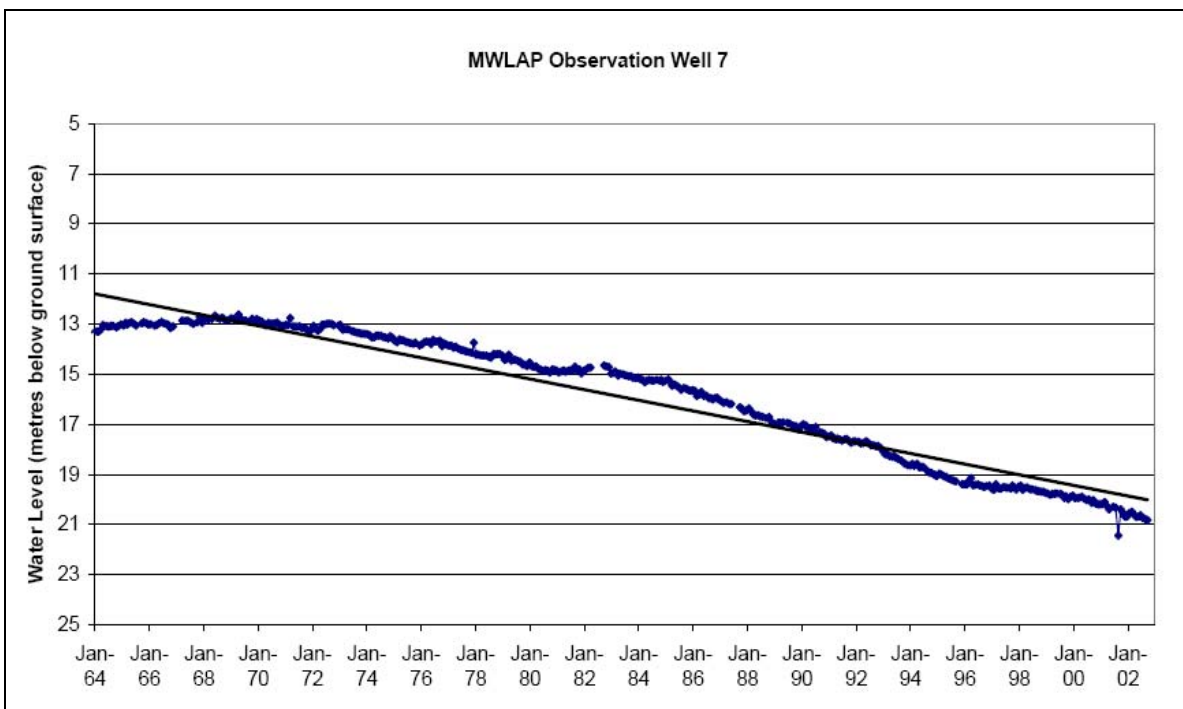


Figure 1: Water level data over time from a Ministry of Environment observation well (Golder 2005)

groundwater modelling. The modelling indicates that this over-extraction has already caused base flows to decline in some perennial streams. In the Township of Langley, as in other places, the stream flows that sustain salmonids and other fish are provided almost exclusively by groundwater during the summer months (Township of Langley 2004).

The Township has 18 major aquifers in total, and five of these are used preferentially because they are the most accessible and economic (Township of Langley, 2007). However, four of the five are unconfined, which means they are relatively shallow and susceptible to contamination. Using water from unconfined aquifers is also of concern to fisheries managers, because groundwater pumping creates a short-term potential for affecting surface water flows, as well as a long-term potential for lowering the water table. The groundwater modelling (Golder 2005) done on the main aquifers found that well pumping rates (whether Township wells or private wells) generally result in aquifer water level declines as well as water being drawn from nearby streams and creeks. A comparison with pre-development conditions suggests that for four of the heavily used aquifers, stream baseflows within the aquifer boundaries have decreased between 12 and 70 percent. While these numbers are only modelling estimates, they are cause for concern. Furthermore, the Official Community Plan for the Township can be expected to increase groundwater demand by a factor of 1.8 by 2018, which will further reduce baseflows. For one of the aquifers (Aldergrove AB aquifer), model results predict baseflow to be less than zero by 2018, which means that water from Bertrand Creek would flow into the aquifer, rather than the reverse. If private water use increases by a factor of 1.8 for another aquifer (the Hopington AB aquifer), baseflow within the Salmon and Nicomekl Rivers would be reduced by an additional 36% (though with currently proposed zoning changes little change in demand will occur). However, an overall reduction in baseflow is still predicted due to demand outside of the area. At this time it appears that future withdrawals in two of the aquifers (Aldergrove AB and Brookwood) likely can't be sustained without compromising baseflow in local watercourses.

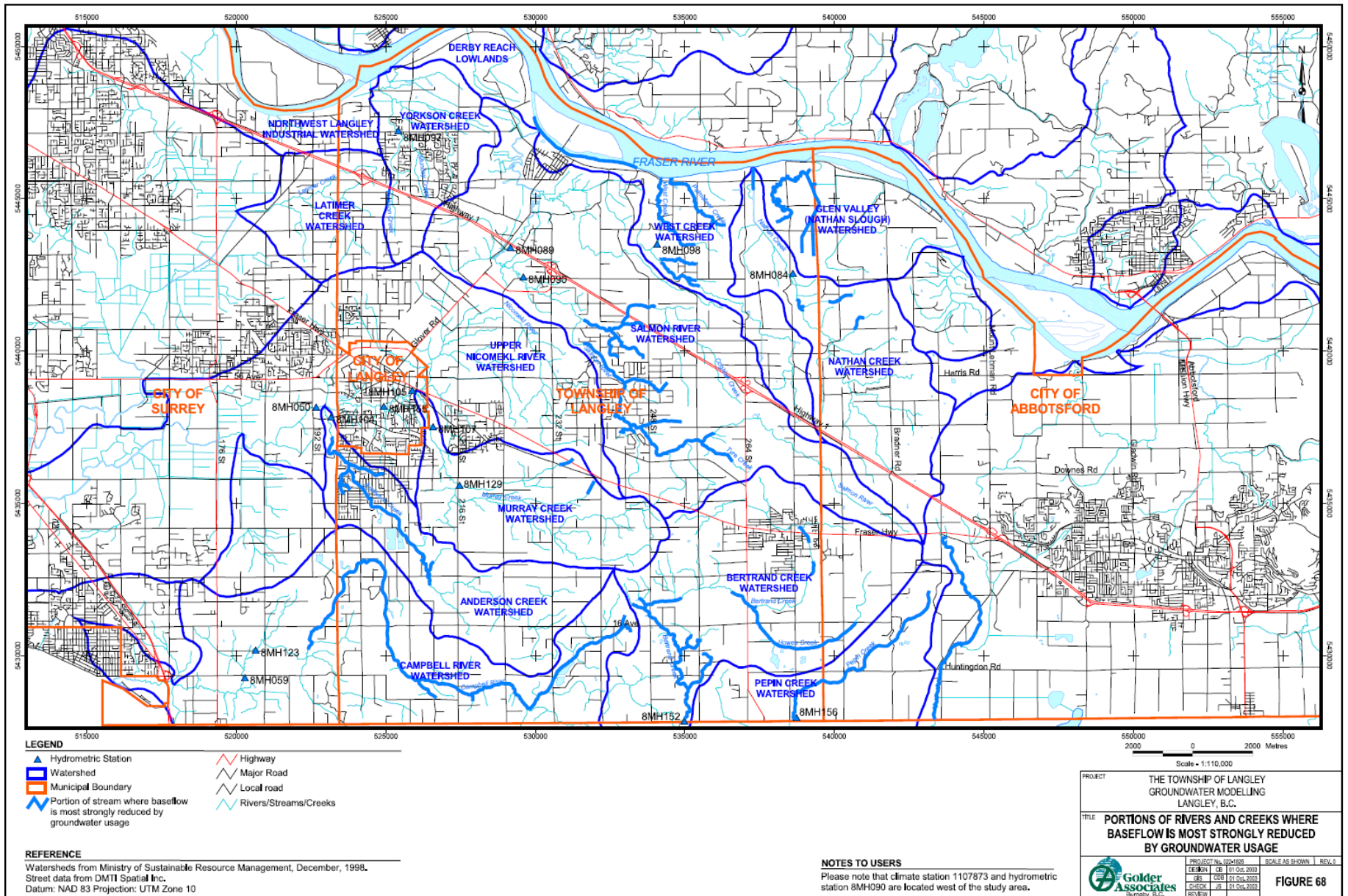


Figure 2: The portions of rivers and creeks in the Township where baseflow is most strongly reduced by groundwater usage (Golder 2005).

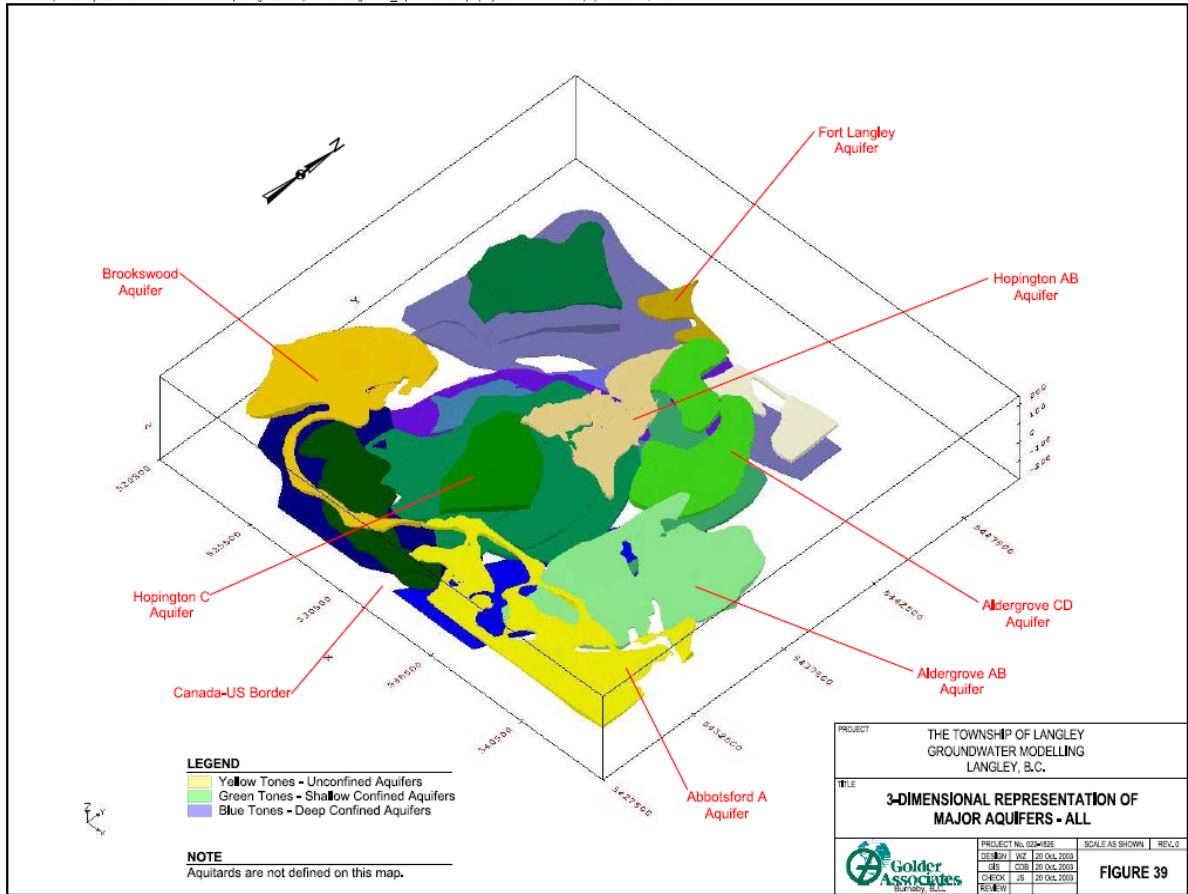


Figure 3: The Township's 18 aquifers, shown in three dimensions (Golder 2005)

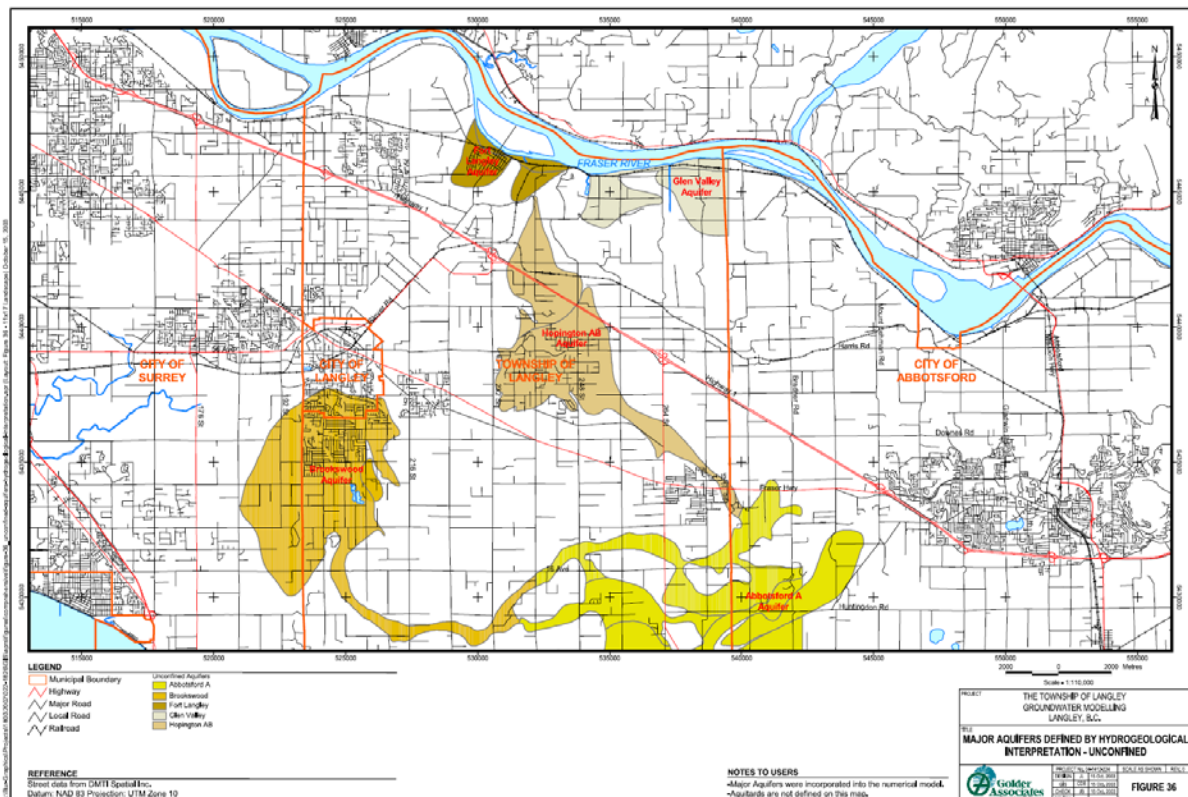


Figure 4: The Township's shallow, unconfined aquifers (Golder 2005)

Water Resource Management Strategy

A Water Resource Management Strategy (WRMS) was passed by Council in 2002, to provide the Township with a comprehensive approach for managing the quantity and quality of its local groundwater and surface water resources. The Strategy's goals were to provide a clean and sustainable supply of groundwater and surface water for residential, agricultural, commercial and industrial use; to conserve and enhance water quality and quantity for aquatic habitat and recreational use; and to minimize flooding and erosion (Township of Langley 2007). The Strategy's 20-Year Action Plan is addressing these goals through three initiatives: 1) public outreach, 2) studies, and 3) management options (Golder 2002). The studies address gaps identified during the development of the Strategy, and the groundwater modelling done for the Township in 2005 (Golder 2005) fills an important gap. Integrated stormwater management plans have also been completed, to guide appropriate development and mitigate future development impacts (Township of Langley 2007).

Following the WRMS guidance, public outreach has become a major focus in the Township of Langley. A Water Wise program, launched in 2002, informs residents of the importance of local groundwater resources, and provides practical information on how to protect drinking water. The program is based on door-to-door visits by volunteers and students, and more than 6,700 homes were visited between 2002 and 2005. Recent (2006) visits occurred in Aldergrove, the area in Langley with the most acute issues related to groundwater depletion. Other public outreach initiatives include a low-flow rebate program for renovations, a water-wise garden contest, rain barrels, and water-saver kits. In addition to water conservation, the Water Wise program educates the public about the importance of protecting groundwater quality. For example, the Private Well Network encourages well owners to regularly test their well water and to publicly post their results. Members of the network get 30% off water testing, and it is hoped that by taking the necessary steps to improve their own water quality, residents will prevent contamination of a common water resource (Township of Langley, 2007, and Antigone Dixon-Warren, Township of Langley Hydrogeologist, personal communication).

Water Management Plan

The Township of Langley will be the first municipality in BC to develop a Water Management Plan under Part 4 of the BC *Water Act*. Water management plans are intended to provide local solutions to surface and groundwater issues. If approved by the provincial government, a plan will be made into law with a specific supporting regulation, making the plan legally binding. Each plan will differ, and the extent to which groundwater is addressed will depend on local concerns. In the Township, groundwater is the primary focus of the plan. One reason the Township sought to become involved in this planning is that under provincial law, it and other municipalities do not have legal authority to regulate the development of private wells nor the extraction of groundwater. (While water resources are under the jurisdiction of the provincial government, there is currently no mechanism to regulate groundwater taking in BC outside of this new mechanism of Water Management Planning.) Some of the Township's aquifers are being depleted, so some new form of management and regulation is required to prevent water conflicts and risks, including risks to fish. As noted above, groundwater quality is also a

concern due to the Township's vulnerable unconfined aquifers. Some aquifers already show signs of degradation, and the Township wants to address these as well as being proactive in protecting those aquifers that are currently uncontaminated.

The planning is intended to address or prevent conflicts between water users, and to protect and address the quantity and quality of groundwater supplies. This may include structuring the allocation of groundwater (i.e., requiring permits for its extraction), as well as creating new regulations to protect groundwater recharge, quantity and availability. Water users include fish, and the plan intends to assess the contribution of groundwater to base flows in specified fish-bearing streams. The contribution of wetlands to groundwater recharge will also be assessed, and recommendations made to protect groundwater base flows and recharge, in order to maintain suitable base flows for healthy fish habitat (Ministry of Environment 2006).

It is important to note that agricultural uses place additional stresses on the groundwater resource. The Ministry of Agriculture and Lands currently has a confidential program where landowners can create and get feedback on an Environmental Farm Plan, which considers water use and protecting surface water and groundwater. These plans, however, are only voluntary. The Ministry of Agriculture and Lands is represented on the Water Management Planning team, and new policy tools are being examined to ensure sustainable water use in the agricultural areas.

The final plan is due to be submitted to the Provincial Minister of Environment by December 31st, 2007.

Other Township Actions to Protect Water

The Township has the authority to regulate land use and types of development (outside the Agricultural Land Reserve), and is therefore able to take limited steps to protect the quality and quantity of groundwater. In areas where groundwater supplies for new developments are insufficient, or where increased impervious area would negatively affect fish habitat or water quality, the Township can require the developer to address these issues. For example, one new development called the Routley neighbourhood was designed with bioswales and infiltration pits, to mitigate stormwater impacts to a nearby salmon stream. A by-law change also allows a total ban on lawn sprinkling in some areas during drought conditions, in addition to regulating when residents can water their lawns in the summer months.

Challenges in the Township

Water management challenges in the Township include the stresses on water quantity and quality caused by increasing population growth and development. New areas continue to be developed, and existing agricultural, industrial and commercial land uses are intensifying. Global climate change is likely to exacerbate water management challenges, as changing precipitation patterns are predicted to cause more frequent droughts. The Township aims, however, to provide safe and sustainable groundwater for its community and it hopes that the water management plan will assist with obtaining this goal.

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