

## 16.0 CONCLUSIONS AND RECOMMENDATIONS

One of the challenges in undertaking this study is related to the availability of comprehensive and reliable information on actual water use. Although AENV maintains a detailed listing of all licences and registrations, allowing accurate assessments of water allocations and licensed use, its Water Use Reporting System (WURS) contains very few reports on actual water use. This lack of comprehensive, current and reliable information on actual water use will create significant problems for water management because, without knowing how water is actually being used, it will be very difficult for Watershed Planning and Advisory Councils (WPAC's) to develop effective or accurate basin management plans; it will be impossible to measure any of the effects of efficiency or conservation programs; and, it is impossible to correctly determine natural flows, which are calculated as the sum of observed flows and estimated consumption. Consequently, to develop the information required to better understand actual water use, the following recommendations identify initiatives for each water use sector.

### 16.1 MUNICIPAL SECTOR

Estimates of municipal water use were developed by using limited data in the WURS database, combined with available information from Environment Canada's Municipal Water and Wastewater Survey (MWWS). For some of the sub-basins, reasonably reliable estimates could be developed by determining average annual per capita consumption and combining this with the regional population to estimate total water use. However, the data actually used to produce these per capita estimates is quite limited. As shown in Table 16-1, per capita estimates for nine of the sub-basins relied upon information from three sources, and the resulting estimates ranged from 6 m<sup>3</sup> to 76 m<sup>3</sup> per capita per year. This large range raises questions about the overall accuracy of the water use estimates.

**Table 16-1: Assumptions and Methods Used to Calculate Municipal Water Use**

Sub-Basin	Data Source/Method	Average Annual Consumption
Cline	Same as Ram	26 m <sup>3</sup>
Brazeau	Same as Ram	26 m <sup>3</sup>
Ram	MWWS data for Rocky Mountain House	26 m <sup>3</sup>
Clearwater	Same as Ram	26 m <sup>3</sup>
Modeste	MWWS data for the NSSRB	12 m <sup>3</sup>
Strawberry	MWWS data for Parkland County	76 m <sup>3</sup>
Sturgeon	Same as Strawberry	76 m <sup>3</sup>
Beaverhill	Same as Strawberry	76 m <sup>3</sup>
White Earth	MWWS data for the NSSRB	12 m <sup>3</sup>
Vermillion	MWWS data for three communities	29 m <sup>3</sup>
Frog	MWWS data for three communities	6 m <sup>3</sup>
Monnery	MWWS data for Lloydminster	24 m <sup>3</sup>

While the reliability of the information may improve over time as an increasing number of municipalities report their annual withdrawal information to Alberta Environment, the determination of actual use is complicated by the fact that the reporting of return flows (treated

municipal effluent) is a requirement of the Alberta *Environmental Protection and Enhancement Act* and the databases for withdrawals and return flows are not directly linked.

One solution to this problem would be to undertake a detailed comprehensive survey of municipal water use, such as was done in 1992 by Reid Crowther, entitled “*Technical Review of Water Conservation Options for Alberta Municipalities*”. Reid Crowther gathered data from seven sources<sup>1</sup> to assess Alberta municipal water use patterns in detail and also identified the key factors that influence municipal water use, including the use of water meters, climate (aridity index<sup>2</sup>), the proportion of non-residential to residential water use in the community, and billing rates, as well as other factors such as source limitations, commercial and institutional uses, system leakage, water main breaks, sale of water outside the municipality, treating of wastewater from outside the municipality and partial distribution systems. The information contained in this report is invaluable for assessing water use efficiency and the potential benefits of conservation, but is now 15 years old and needs updating.

While there are concerns about the reliability of municipal water use information for communities not served through the Edmonton Capital Region, this use actually accounts for a relatively small proportion of water use in the North Saskatchewan River Basin. Of greater concern is the lack of information about water flows within the Edmonton Capital region which serves 92 percent of the basin’s population. This is a very complicated system (see Figure 2-1) and there is not much detailed information about the flows of treated water and wastewater among all the various components of the system. While a water balance model was developed as part of this project and was used to estimate water use in the Edmonton Capital Region, the resulting model (see Appendix A) is quite crude and should be refined. It is recommended that the NSWA undertake a study to prepare a detailed assessment of water use in the Edmonton Capital Region, so that the potential implications of growth and unlicensed commercial and industrial water demand can be assessed.

## 16.2 AGRICULTURAL SECTOR

In the NSRB, agricultural sector is divided into two main activities: private irrigation and stockwatering. Each has its own specific data availability and reliability issues.

Neither AENV nor AAFRD have any information regarding water use by private irrigators. For purposes of this analysis, it was assumed that private irrigators were using their full licence entitlements. To fully understand water use by this sector, it would be advantageous to know the extent to which private irrigators are exercising their entitlements, how they are using water, the crops they raise, the irrigation technology they employ, and any water-related issues they face. However, given the small allocation to irrigation in the NSRB, it is suggested that a

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<sup>1</sup> Official population list 1990; AB hamlets 1991 (Municipal Services Branch, Municipal Affairs); AB Water and Wastewater Facilities Survey 1990 (AENV Standards and Approvals Division, Municipal Branch); Water treatment plant operating reports (AENV Standards and Approvals Division, Municipal Branch); Economics and water use data (AENV Planning Division); Residential Property Survey 1986 including utilities charges and rate structure (Municipal Affairs); Water license database (now called EMS)

<sup>2</sup> Aridity index in the Reid Crowther report is the depth to which the soil must be watered to grow a reference crop, although the most common current definition is that of the UNEP, which states that the aridity index is precipitation / potential evapotranspiration.

thorough assessment of water use by private irrigators be undertaken once full information is available about the other larger water use sectors in the basin.

There is also no actual water use information for stockwatering. For this assessment, water use estimates have been derived based on livestock population numbers, specifically cattle from 2001 Census. Given that the cattle industry has gone through significant changes since 2001, an update based on the latest available Census data from 2006 would provide a more current water use estimates. Consequently, it is recommended that the estimates of water use by livestock be updated once the 2006 Census of Agriculture is available. Other information for the other agricultural data used in this analysis could also be updated. It is expected that comprehensive Census information on farms and operator data will be available on May 16, 2007, and the Agricultural Community Profiles will be released in the fall of 2007.

### **16.3 COMMERCIAL SECTOR**

WURS contains very limited water use information for the commercial sector. This is not considered to be an issue in this assessment because allocations for the commercial sector are so small, accounting for less than 1 percent of total allocations in the NSRB. However, commercial sector allocations are of more importance in some sub-basins than others and, to improve the overall reliability of water use estimates, it is recommended that further study be undertaken in these sub-basins. For example, commercial water use is estimated to account for 35 percent of water use in the White Earth Sub-basin.

### **16.4 PETROLEUM SECTOR**

All of the information for injection and thermal activities in this report related to the petroleum sector is based on the results of a recent assessment by Geowa Technologies of water use information submitted to the EUB. While the EUB has comprehensive information on petroleum-related water use, this information is reported by operator and legal land description, not by water licence, and extensive effort is required to marry the water licence and water use databases to provide water use estimates for individual river basins. Fortunately, Geowa undertook this exercise fairly recently so summarizing information for individual basins did not require significant effort. Had the Geowa report not been available, a detailed analysis of water use information by basin would have been impossible given the budget available for this study.

Throughout the report, petroleum water forecasts have assumed that water use for injection will continue to use the same mix of surface and groundwater. This assumption likely overstates future surface water use because, under the 2006 Water Conservation and Allocation Policy for Oilfield Injection Policy, petroleum operators are expected to use non-potable water sources. However, the overall effects of they policy are not yet evident. It is suggested that the NSWA work with Alberta Environment to monitor and report water use for oilfield injection to measure the success of the Policy in the NSRB.

## **16.5 INDUSTRIAL SECTOR**

Estimates of water use for the industrial sector are considered to be fairly reliable because water use information for cooling and forestry activities, which account for 95 percent of the industrial water allocation in the province, was available in WURS or through discussions with major water holders. For the remaining industrial water allocations WURS contained some information for chemical plants, fertilizer plants, and mines for other than coal but very little information for industrial activities. Allocations for these other industrial activities are relatively small within the NSRB so the lack of information is not expected to significantly affect estimates of total water use. However, better information for these other industrial activities would provide a better assessment of industrial water use. Hopefully this problem will be resolved as Alberta Environment works to increase the number of industrial licensees that submit annual water use reports.

## **16.6 OTHER SECTOR**

Current allocations to the other sector account for about 2 percent of water allocations in the NSRB, but there is no information about actual water use. This lack of information is problematic in those sub-basins where allocations for other purposes account for a reasonably large portion of water use. For example, water use for other purposes is estimated to have accounted for 68 percent of water use in the Sturgeon Sub-basin, 14 percent in the White Earth Sub-basin, 46 percent in the Vermilion Sub-basin, 22 percent in the Frog 22 Sub-basin, and 10 percent in the Monnery Sub-basin. The majority of licensees in this sector have been issued for water management and habitat enhancement, primarily to Alberta Environment and Ducks Unlimited. However, neither of these organizations have reported their annual water use. For purposes of this analysis, it was assumed that all licensees in the other sector were using their full entitlement. While this may not have a significant effect on total water use estimates for the North Saskatchewan River Basin, the accuracy of water use estimates becomes suspect in those sub-basins noted above.

A review of licences issued to Alberta Environment for other purposes in other parts of Alberta suggests that there may be some double counting of water allocations. For example, water diverted from the Highwood River to the Little Bow River under the terms of a licence issued to Alberta Environment may be withdrawn by users in the Little Bow Basin who may have their own licences. This would result in double-counting. The extent of this problem is uncertain in the NSRB, but it is recommended that AENV undertake a review of all licences issued to itself to ensure that there is no double counting of allocations or water use.

## **16.7 OTHER RECOMMENDATIONS**

Based on the experience of preparing this study, there are a number of issues that relate to more than one water use sector and need to be addressed if reliable estimates of water use are to be developed on a regular basis.

A first issue is that there appears to be some potential for duplication of water licences or allocations. It was noted that some licences issued for petroleum purposes have been issued to

the same company and have the same priority number, allocation, and legal land description and it is not clear whether this is one allocation that allows a specified volume to be withdrawn from a combination of groundwater wells or whether each licence is unique. In addition, some companies have licences that allow them to switch from one source to another (surface or groundwater) depending on surface water availability, so counting each licence separately may also overstate allocations. Potential situations of duplication should be identified and reviewed and the EMS database revised to ensure that there is no double counting of allocations.

A second issue in this report water use has been reported on an annual basis, even though use may actually vary significantly from season to season, month to month, or even day to day. Given that better information is now required for water management in capped basins and to ensure that minimum flows are being respected, it is recommended that the NSWA work to develop seasonal water use estimates for the various sectors in different parts of the basin.

Third, not all water uses are licensed and there is no information on household or exempted agricultural purposes. While this study has attempted to quantify this water use by estimating water use on the basis of regional populations of people and livestock, the accuracy of this information is unclear. To better understand these uses the NSWA may want to consider undertaking an assessment of unlicensed uses in at least some sub-basins so that this aspect of water use can be better understood.



## 17.0 REFERENCES

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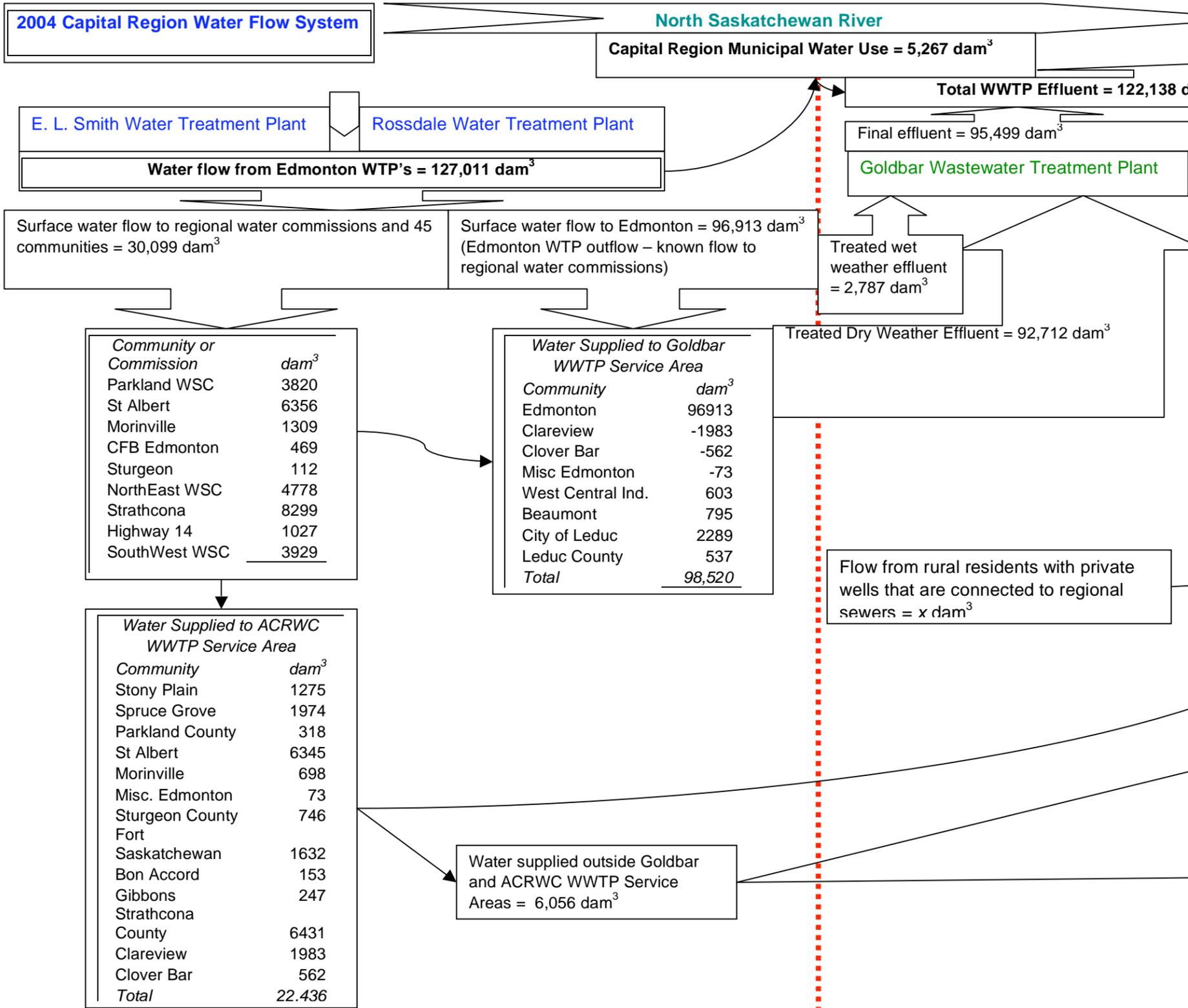


## **APPENDIX A**

### **Capital Region Water and Wastewater System Diagram**



**Appendix 1 Capital Region Water and Wastewater System Diagram**



North Saskatchewan Watershed Alliance  
Current and Future Water Use in the North Saskatchewan River Basin  
September 2007

