

EPCOR Water Services Inc. Perspective on the NSR and Reflections on its Impact on the Resiliency of Edmonton:

... a response to the discussion paper "Resilient Edmonton- Why and How"

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For a water utility provider like EPCOR, providing Edmonton with a reliable and safe water supply for the 21st century can be challenging when source water conditions vary and the effects of climate change on land and water are uncertain. EPCOR has focused its efforts to accurately predict how water quantity and quality will likely change as a result of water use, land use, climate change, and natural cycles. This is a necessary undertaking if we are to assess the risks of these changes to Edmonton's source water supply and the ability of the North Saskatchewan River (NSR) to remain a healthy ecosystem upstream and downstream of metropolitan Edmonton. In a watershed like ours, this requires partnering and collaboration with other stakeholders, use of sound scientific modeling tools, and applying principles of adaptive management.

For these reasons EPCOR and the City of Edmonton have a comprehensive Watershed Management Program. This partnership includes watershed planning such as leading and/or participating in regional Watershed Planning and Advisory Councils (WPACs), developing and implementing the Source Water Protection Plan, commitments to applied research and watershed monitoring, and taking a holistic approach for both source water quality and quantity. Many of these efforts are already summarized in EPCOR's 'discussion paper' for the City's *The Way We Green* initiative. The purpose of this commentary piece is to provide a follow-up discussion to address some of the issues put forth in the discussion paper "*Resilient Edmonton- Why and How*" (Applegath & Yazer, 2010). That paper focused on the critical issue of water supply on Edmonton's resiliency in the future. By providing additional information in this commentary, EPCOR wants Edmontonians and/or Regional customers to know that we are committed to better understanding our river's water quantity and quality issues for today and future years.

Applegath & Yazer (2010) identified "*Edmonton's most critical weakness to be its dependence on a single and depleting source of water – the North Saskatchewan River*". Maintaining a sustainable supply of water is, of course, of critical importance. EPCOR recognizes this and for many years has partnered with other watershed stakeholders to better understand these risks and to evolve plans to deal with a changing water supply. EPCOR's Source Water Protection Plan – a plan that assesses risks to source waters and develops action plans to mitigate those risks – identifies climate change as a key risk factor for Edmonton's source water supply. This is because it is difficult to be certain of the effects of climate change on the annual and seasonal yield of water in the river.

To help better understand the potential effects of climate change on NSR flows throughout the year, and also the high natural variability in river flows (in the absence of mankind-induced climate change), EPCOR has partnered with the Prairie Adaptation Research Collaborative (PARC) – a team of scientific university researchers based in Western Canada. In addition, through its involvement with the North Saskatchewan Watershed Alliance (NSWA) – the watershed planning and advisory committee for the NSR basin – EPCOR has fostered applied research and management plans on future water supply and demand predictions for the NSR basin. What was learned by the team is not a simple answer but rather an envelope of possible outcomes with ranges of certainty for predicting water flows under natural conditions, with less certainty as we account for a changing climate regime. Flows in the NSR have in fact been extremely variable over the last 1,000 years. Trend analysis over a shorter period of time such as 100 years does not adequately characterize the natural river/climate cycles. Dr. Dave Sauchyn, principal investigator on the Prairie Adaptation Research Collaborative (PARC) project, has commented that:

“precipitation in this part of the province is largely linked to the Pacific Decadal Oscillation and, as far as scientists can tell, a negative shift occurred in 2008-09 and this is likely correlated with an expected increase in precipitation for the next 30 years. This follows the low phase which we’ve experienced for the previous 30 years.”

The Applegath & Yazer prediction that NSR water supply is likely to decline (based on just 100 years of flow data) is misleading. That simplistic prediction is based on broad scale climate models and projects into future years from a very limited 100 year river flow record. Without a doubt the work is insightful, but its limited scope misses the greater climatic patterns and is prone to over simplify or misinterpret the likely outcomes of a changing climate on river yield. Applegath & Yazer suggested for example that recent declines in snowpack in the upstream watershed over the last several years are indicative of future climatic patterns. Climatic shifts are known to occur over timelines of decades and most likely centuries. A trend that spans just 10 years is unreliable and misleading for predicting future climatic trends and related outcomes. PARC’s research on climatic patterns of over 1,000 years in the NSR basin resulted in the discovery of these larger trend cycles (known as the Pacific Decadal Oscillation – PDO) that drive the observed (and inferred river flow through supporting tree ring analysis work) declines in NSR yield.

Over the next 30 years, it is expected that mankind-induced climate change effects will be overlaid upon the PDO background natural trend for increased precipitation in the NSR headwaters. Nonetheless, other research efforts that describe long-term declines in water quantity should not be dismissed out of hand. As Dr. Sauchyn has commented, *“after accounting for PDO, there (still) remains a residual decline in flow, which we can only explain in terms of the impact of a warming climate”*. Interpretations on the effects

of climate change on NSR flows do however need to account for the longer time-scale climatic patterns.

The research findings of the PARC team and that of the NSWA is predicting that the total annual volume of water in the NSR will not change significantly due to anthropogenic climate warming. This is contrary to views expressed by Applegath & Yazer (2010). This however does not mean no change in seasonal patterns. It's expected that the current watershed hydrology will change to having less snowpack, with more rainfall in the winter, and less in the summer months. This presents its own challenges for not only seasonal water quantity supply but as yet uncertain impacts on river water quality.

In a presentation on September 17, 2010 at Edmonton's City Hall, Mr. Craig Applegath commented that "*...flows in the NSR are declining and who knows if a precipitous decline is coming*". EPCOR's research efforts and proactive approach have helped to address this leading question regarding future changes in water supply. Contradictory projections of water supply trends highlight the need for continued adaptive management strategies and to continued research efforts on NSR water supply trends. This includes developing different scenarios, including the worst case ones, to address probable water yield projections and managing water resources for Edmonton within that water budget. That said, future work addressing how current predictions will affect our supply are needed, including scoping the potential for offsite reservoir storage upstream of the City of Edmonton. With the existing Brazeau and Big Horn dams in the upstream watershed, significant capacity already exists to capture snowpack melt water runoff and any winter rainfall events. Perhaps more dam storage capacity is one way of ensuring abundant water supply for Edmonton in the later half of the 21st century. EPCOR's continued support for PARC's research and integrating other climate work underway by the NSWA demonstrates EPCOR's awareness of the importance to ensure Edmonton has water supply resiliency.

In addition to working to manage and predict changes in water quantity, EPCOR is focused on addressing the need to protect source water quality. This need is being met in two ways. First, with the development and on-going implementation of a Source Water Protection Plan and second, through EPCOR's effective collaboration with the NSWA. This multi-stakeholder group, which includes major water users and dischargers in the basin (TransAlta, Alberta Environment, City of Edmonton, EPCOR, etc.), works to maintain healthy aquatic ecosystems, safe and secure drinking water, and reliable, quality water supplies for a sustainable economy through research and planning initiatives. The NSWA has recently released proposed NSR water quality objectives that will act to prevent any further net degradation to source water quality. The work of the NSWA includes modelling water quality under various water quantity scenarios and it also explores potential effects of climate change on water quality. Model refinement and continued research is needed but already this work by the NSWA and its partners has had success in helping to shape understanding of what is need to protect water

quality and quantity in the basin. Based on a watershed approach to water quality and quantity protection, the NSWA is in the process of developing an Integrated Watershed Management Plan which outlines key watershed objectives.

The statement by Applegath & Yazer (2010) that *“the possibility of accidents such as chemical spills or wastewater contamination that undermine its single source of water, Edmonton is on a trajectory that seriously threatens not only its water system but the resilience of its most critical systems”* is perhaps overly dramatic and alarmist. EPCOR has a solid understanding that spills of a catastrophic nature can pose a serious risk to our source water supply. With spill response plans in place, EPCOR proactively mitigates this potential hazard for spill impacts on Edmonton’s drinking water supply, and there are formal systems in place for emergency shutoffs for the water treatment plant intakes. Spill response clean-up measures are also in place at EPCOR. Moreover, the City has a potable water reservoir capacity that can provide for several days supply of water in the event of a catastrophic spill incident. Catastrophe planning is a challenge and EPCOR will continue to be engaged in emergency response planning for all potential hazards that can threaten our source water supply.

Applegath & Yazer (2010) correctly stated that *“the City will want to work with industry stakeholders to continue to monitor its level of preparedness in the event of, for example, a severe and extended drought.”* This is critical and it should be recognized that these relationships and partnerships are well established through the work of the NSWA, Industrial Heartland Cumulative Effects Framework, and partnering with Alberta Environment. It is true that the City does not have direct control of the upstream reservoirs Brazeau and Lake Abraham, which directly affect water quantity in the NSR. However, it should be recognized that the reservoir operators are members of the NSWA and partners in promoting the province’s *Water for Life* goals. Managing in a shared watershed is challenging, but through effective leadership from the provincial government, City of Edmonton, and WPACs we can achieve a shared vision for high quality source water that is also of sufficient quantity, now and for the future decades to come.