

Executive Summary:

Implementing Climate Change Adaptation in Prince George, BC Volume 7: Precipitation and Freeze-Thaw

The Prince George climate change adaptation project has been ongoing for several years. With support from the federally funded Regional Adaptation Collaborative (RAC) program, researchers have been working with the City to incorporate adaptation into local process and to address local priority impacts. Most of these actions have been informed by climate information outlined in the report created in partnership with the Pacific Climate Impacts Consortium: *Climate change in Prince George: Past Trends and Future Projections*. However, as the work has progressed, the need for more detailed climate information has arisen to help the City address certain impacts. Therefore, external consultants were contracted to analyze and assess specific aspects of Prince George's climate. Two reports are in the final stages of completion and should be finalized and available on the City's website in the spring of 2012. They are:

Report 1: An analysis of recent changes in temperature, precipitation and freeze-thaw cycles in Prince George (Kerr Wood Leidal Consulting Engineers).

Report 1 looks closely at the intensity, duration and frequency (IDF) of rainfall in Prince George, using data from the airport station from 1950-2009. Precipitation information is used to create IDF curves, which are used to determine the probability of levels of precipitation over periods of time. These curves are used to calculate storm-water capacity and other infrastructure parameters. As IDF curves are created using historical data, they assume that conditions are constant and do not account for climate change. An analysis of rainfall events in the city shows that high-intensity events do not appear to have changed significantly over the last 60 years. The report also examines how freeze-thaw cycles are changing and the trends for hours-above-freezing in the winter. It was found that freeze-thaw cycles are decreasing overall but may be increasing in winter. The report does not make any definitive conclusions as it relies on the one dataset, and future projections are not examined.

Report 2: An assessment of the effects of precipitation and freeze-thaw cycle changes in Prince George (McElhanny Consulting Services Ltd.).

Report 2 uses the information from Report 1 to assess how changes in precipitation and freeze-thaw cycles may impact development, operational practices, and infrastructure. The consultants conclude that, based on the past trends data, it is not currently justifiable to make changes to the IDF curves for Prince George. Some changes related to freeze-thaw cycles and winter thaw temperatures were found, but the shortage of data (from only one climate station) limits the conclusions that can be reached. Snow clearing may get less costly for the City due to warmer winter temperatures and decreasing snowfall, and many other changes have the potential to impact costing. The report recommends that Prince George: collect more and better data to facilitate further analysis, retain the 1-in-10-year return period requirement for storm system design, and carry out a forecasting exercise to determine future projected changes and their impacts on IDF curves.

The analysis and assessment provides comprehensive information about climate variability and change in Prince George over the last 60 years and what it means for the City. The results should be communicated to local engineers and developers, and may help to improve the design and management of local infrastructure (especially storm-water). Prince George can improve its monitoring and local data collection so that more and better analysis can be done in the future. This type of work has not been completed in many communities. Therefore, as Prince George is at the cutting edge of local adaptation, there are difficulties with performing specific analyses and assessments and no future projections were made. As this is a new field of study the information should also be reviewed by climate modellers and compared to similar studies (both completed and ongoing) to verify the methods used and the final results.