City of Prince George

This document summarizes information from the report: Picketts, I., Dyer, D., Curry, J., 2009: *Adapting to Climate Change in Prince George: An Overview of Adaptation Priorities,* which is available at: www.resourcesnorth.org/downloads/dev_ops_adapting_climate_change_adapt_priorities.pdf

Community Context

Often considered the capital of northern BC, the City of Prince George is located in the centre of the province at the confluence of the Nechako and Fraser Rivers. It grew rapidly in the 1960s with the centralization of the forest industry in the area, and now has a stable population of approximately 77,000. The City is surrounded by forests in all directions and has strong ties to the forest industry, which is the major employer in the region.

Potential Climate Change Impacts

One major climate-related impact in and around Prince George has been the rapid spread of the mountain pine beetle. The infestation is partly attributable to warmer winter minimum temperatures over the previous two decades. The vast areas of dead pine trees throughout the central interior of BC and within the city has led to increased forest fire risk, tree deaths in parks and residential areas, and the expectation of future loss of forestry-related employment for many Prince George residents. Hazard mitigation activities began with the removal of infected and dead pine trees throughout the city. Forest fire scenario and management planning and land use planning are also reducing fire hazards in the City.

Prince George suffered severe ice-related flooding in the winter of 2007-2008 that caused extensive damage to areas along the Nechako River. A few months earlier, during the spring freshet of 2007, extensive erosion occurred along the Nechako River just upstream of Prince George. This caused some residents to relocate their homes away from the riverbank due to the highest flows ever recorded on the Nechako. Floods also occurred over this time period in the Fraser River. After these flooding events, the City retained consultants to investigate flood risk, identify areas vulnerable to river flooding and develop flood control solutions. As part of this investigation the City worked with the consultants to investigate the impacts of climate change and the mountain pine beetle on future flood risks.

In 2007, the City and UNBC researchers began studying and planning for the impacts of climate change in the region. Between 2008-2010 activities included: creating future climate change scenarios for the region; identifying climate change impacts and options for adaptation; and exploring options for incorporating climate change adaptation into the City's planning processes. Options for incorporating adaptation into plans included the Smart Growth on the Ground Downtown Revitalization Strategy, the Official Community Plan (OCP) and the Integrated Community Sustainability Plan, entitled "myPG".

Assessment of Climate Change in Prince George

Background

In late 2007, Dave Dyer, Chief Engineer of Prince George, Grant Bain, Manager of Long Range Planning and Dan Milburn, Manager of Current Planning and Development formed a partnership with Ian Picketts, a UNBC graduate student, to prepare an initial climate change adaptation strategy for the City. As a first step, the City retained Pacific Climate Impacts Consortium's (PCIC) scientists, Arelia Werner and Trevor Murdock, along with Ian Picketts to prepare a climate change trends and projections report. The resulting study – *Climate change in Prince George: summary of past trends and future projections (2009)* – projects that Prince George's average annual temperature will warm by 1.6°C to 2.5°C by the 2050s. In addition, annual local precipitation is projected to increase by an average of 3% to 10%, and more precipitation will likely fall as rain. The increases in precipitation and warming are projected to occur especially in winter, resulting in warmer, wetter winters.

As a second step, the City and UNBC, under the guidance of Dr. John Curry and Dr. Eric Rapaport, conducted a climate change adaptation workshop at the 2008 Planning Institute of BC (PIBC) Conference with assistance from the Fraser Basin Council. At the PIBC workshop, Arelia Werner (from PCIC) presented a summary of the potential climate change scenarios for the Prince George area based on the forthcoming climate trends and projections report[1]. After her presentation, planners from across BC identified and discussed potential climate change impacts facing Prince George. The workshop exercise provided the planners with a broad understanding of climate change in BC; however, the City decided more specific information was needed to identify climate change impacts and adaptation solutions for Prince George.

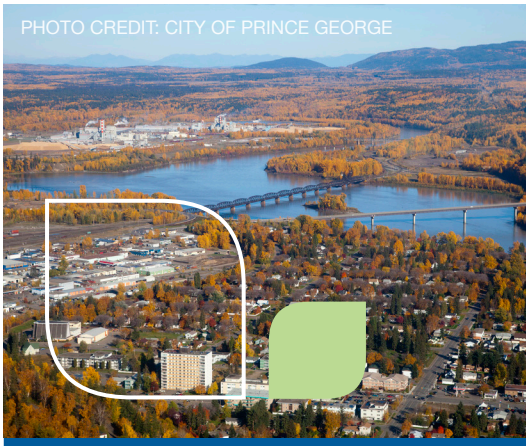

PHOTO CREDIT: CITY OF PRINCE GEORGE

Assessing Climate Change

To further investigate how climate change would affect planning, development, infrastructure and Prince George residents, the City, UNBC and Fraser Basin Council designed a second workshop for Prince George staff and key stakeholders. At the second workshop, participants identified and prioritized future impacts for the City using the climate change scenarios (again presented by Arelia Werner). In the second half of the workshop, staff completed an exercise to assess the risk of each impact, and to identify city departments, plans and operations that could contribute to adaptation solutions. The prioritized impacts from the workshop were comprehensive, as representatives from every city department attended.

In addition to workshop participant input, public stakeholders were given an opportunity to prioritize climate change impacts in a *Smart Growth on the Ground* Survey and in the City's *Quality of Life* Survey. Ian Picketts compiled the results from the two workshops and surveys to form a list of prioritized impacts for the City (see the table on the following page). Within the climate impact priority areas for Prince George[2], workshop and survey participants identified specific vulnerabilities. The adaptation priorities, as well as examples of vulnerabilities, are included in the table on the following page.

PRIORITY LEVEL	IMPACT AREA	EXAMPLE VULNERABILITIES
TOP PRIORITIES	Forests	Increased forest fires and insect outbreaks
	Flooding	Property damage with more frequent floods
HIGH PRIORITIES	Transportation infastructure	More potholes with increased freeze/thaw events
	Severe weather / emergency response	Maintenence of transportation infastructure during severe weather events
	Water Supply	Water shortages as a result of drought
MEDIUM PRIORITIES	Slope stability	Threat of erosion and landslides
	Stormwater	Threat of overflowing systems during storm events
	Buildings and utilities	Impacts of higher temperatures on building materials and structural stability
OTHER PRIORITIES	Health	Increased heat waves threatening vulnerable populations
	Agriculture	Increased agricultural opportunities in the region
	New residents and businesses	Population growth as a result of 'climate refugees' migrating north

Using feedback from the workshops and surveys, Ian Picketts, Dave Dyer and Dr. John Curry summarized the climate change projections, impact priorities and potential adaptation actions for the City in a report called, *Adapting to Climate Change in Prince George: An overview of adaptation priorities.*

Adaptation Actions

The Adaptation Report proposed several actions for each of the 11 prioritized climate change impact areas. The adaptation actions identified in the report were preliminary suggestions and will be further developed during the second phase of the project. Example adaptation actions from the report are included here as samples; a full listing of adaptation actions can be found in the report[3]:

Flooding:

- Design building infrastructure to be resilient to increased flooding, plan development away from flood-prone areas and minimize potential flooding damages wherever possible.

Transportation infrastructure:

- Design roads to be more resilient to freeze thaw cycles (e.g. use different materials). Engage with climate change modeling experts (such as PCIC) to obtain state of the art freeze-thaw predictions to help inform these strategies.

Severe weather / emergency response:

- Create an emergency response task force in Prince George to incorporate climate change adaptation into the emergency response strategy for the City.

Adaptation Planning

The first project phase provided the City with an initial assessment of climate change impacts and adaptation options. The second phase of the project will incorporate the report's recommended adaptation actions into City plans and operations and will further identify needed adaptation actions. To begin, the City integrated adaptation concepts into the *Smart Growth on the Ground* planning process, which focused on its downtown area[4]. The City also considered climate change adaptation priorities throughout the *2010 myPG Plan Process*[5]. The City will include climate change adaptation objectives policies in its updated Official Community Plan (OCP), to be completed 2012.

At the time of the adaptation study, Prince George was undertaking a flood risk assessment, spurred on by the City's investigation of the 2007-2008 ice-jam flooding. Northwest Hydraulics Consultants completed the evaluation, determined new flood profiles and considered flood control solutions. The consultants recommended reviewing the freeboard allowance (i.e. the vertical distance added above the estimated flood level) and increasing it because of the impacts of climate change and the Mountain Pine Beetle infestation. Projected climate changes, as outlined in Climate Change in Prince George report[1], were referenced and used as part of the Northwest Hydraulics Report[5]. It was determined that further analysis of climate change projections, and their influence on hydrologic and streamflow trends, were needed to develop more specific climate-resilient flood control strategies. Further work is planned to assess possible climate change impacts on flooding.

PHOTO CREDIT: PICTURE BC

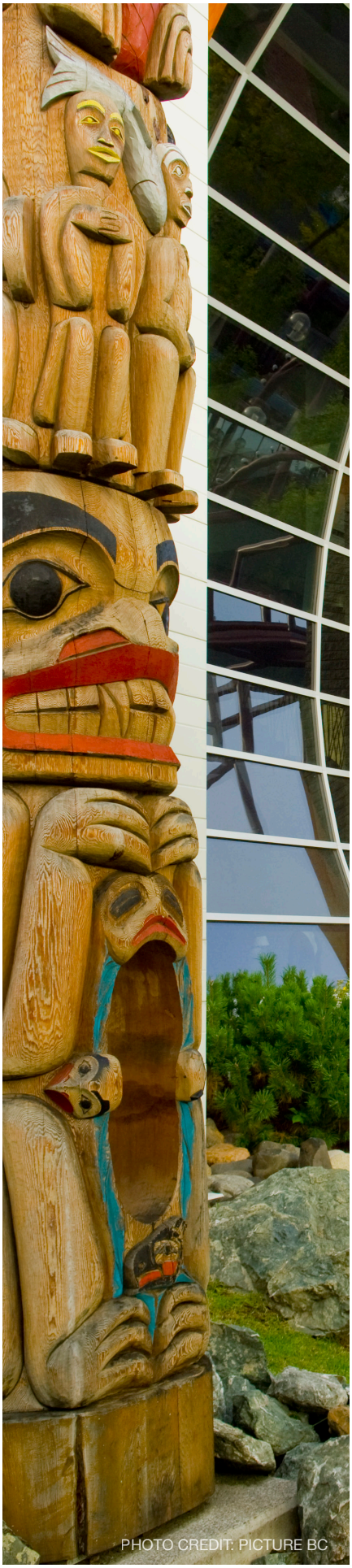

PHOTO CREDIT: PICTURE BC

Lessons Learned and Recommendations

City staff have offered the following suggestions to local governments that are beginning work in climate change adaptation:

- **Look at specific regional climate change impacts** – Climate change impacts differ region to region and there is a need to research the historical climate patterns and future climate change projections specific to each region. Groups like Pacific Climate Impacts Consortium (PCIC) are working toward making this information easily accessible. It is important to communicate this information to practitioners in a clear and straightforward manner.
- **Develop partnerships** – The City developed partnerships with UNBC, Fraser Basin Council, PCIC, Smart Growth on the Ground and others; all of which were instrumental in initial climate adaptation planning and research.
- **Take advantage of existing opportunities** – The City was able to set aside funding within its annual infrastructure planning budget to begin work on climate adaptation, and was able to leverage this to find additional resources through UNBC and the Fraser Basin Council. As well, the City received $10,000 under the Infrastructure Planning Grant Program through the BC Ministry of Community and Rural Development. This has led to continued funding the Natural Resources Canada Regional Adaptation Collaborative program. Also, the adaptation researchers took the opportunity to 'piggyback' and participate in many existing initiatives such as "myPG."
- **Prioritize potential climate change impacts** – Prioritizing the areas most vulnerable to climate change impacts has helped the City focus its work and begin increasing climate change resilience in key areas. Even if the list of priorities changes in the future, the act of determining them is an important learning exercise.

Budget and Timeline Followed

TOTAL PROJECT BUDGET

Phase One: Completion of the Climate Change in Prince George: Summary of Past Trends and Future Projections (2009) and the Adapting to Climate Change in Prince George: An Overview of Adaptation Priorities (2009) reports, which cost $45,000 and was managed by the City's Chief Engineer.

Phase Two: Incorporation of recommended adaptation actions into City plans and operations. The project budget for this second phase is $250,000, with half of the funds coming from Natural Resources Canada, through the Regional Adaptation Collaborative (RAC).

FUNDING SOURCES

City of Prince George, Natural Resources Canada, Fraser Basin Council, BC Ministry of Community and Rural Development.

TIMELINE

The project with UNBC began in 2008 and the *Adapting to Climate Change in Prince George: An Overview of Adaptation Priorities* Report was released in 2009. The City began the second phase of the project in 2010 with Ian Picketts working with the City to include adaptation priorities in the myPG Plan.

Sources

[1] Picketts, I., Werner, A., and Murdock, T., 2009: Climate change in Prince George: summary of past trends and future projections http://pacificclimate.org/resources/publications

[2] Picketts, I., Dyer, D., Curry, J., 2009: *Adapting to Climate Change in Prince George: An Overview of Adaptation Priorities*
www.resourcesnorth.org/downloads/Dev_Ops_Adapting_Climate_Change_adapt_priorities.pdf

[3] Smart Growth on the Ground Downtown Concept Plan
http://princegeorge.ca/citybusiness/longrangeplanning/studies/smartgrowth/Pages/Default.aspx

[4] myPG, community sustainability plan
http://mypg.ca/Pages/welcome.aspx

[5] Flood Risk Evaluation and Control Solutions Reports
www.city.pg.bc.ca/city_services/emergency/icejam/misc/longterm.php

With federal funding support through Natural Resources Canada's Regional Adaptation Collaborative Program

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