



RESILIENT INFRASTRUCTURE IN A CHANGING CLIMATE WORKSHOP SUMMARY

On February 9, 2017, Fraser Basin Council hosted the “Resilient Infrastructure in a Changing Climate” workshop in Prince George. The purpose of the workshop was to bring together professionals from the public sector who are involved in the planning, design, maintenance and management of infrastructure in order to consider the impacts of a changing climate on these activities.

The morning session addressed future climate trends for the Upper Fraser region and how these trends will impact infrastructure, provided guidelines in designing climate resilient transportation infrastructure, and presented case studies of infrastructure risk assessments. In the afternoon, participants were offered training on Engineers Canada’s PIEVC risk assessment protocol through an overview of its applicability and a hands-on, small group exercise.

The following is a summary of the thoughts and ideas expressed by participants during the PIEVC Protocol exercise and group reflections.

KEY LESSONS FROM MORNING DISCUSSIONS

With each presentation on infrastructure resilience during the morning session, there was a question and answer period where speakers addressed key inquiries from the audience. The following are the main lessons from this series of discussions:

- Historical trends can be used to predict future climate in the short term, but are less effective in the long term due to a changing climate and unpredictable human behaviour.
- A good way to test climate models is to use early climate data to see if they can match what is currently happening.
- When you compare land-based climate predictions to those involving oceans, scenarios will look different.
- Municipalities are making progress on stormwater infrastructure resilience guidelines. One case to look at is the City of Ottawa.
- The key to designing resilient infrastructure is to make sure you understand the climate parameters, take steps to incorporate them, and use the tools/solutions that are available to you.
- Examining infrastructure resilience must take into account the maintenance and its timeline.
- Be aware of the different terminology and language used across various professions.

- Make sure to include a combination of technical and impacted stakeholders (eg. Residents) during the PIEVC process. You can discover a lot of things going on that you didn't know and find synergies in the adaptation response. Have as many people at the table as you can afford.
- Having a climate scientist at the table is important to help discover wrong data points in your calculations.
- If you have a limited budget, there is the opportunity to apply the PIEVC Protocol at lower cost through a remote coaching approach.

PIEVC PROTOCOL EXERCISE



Workshop participants went through a condensed version of the PIEVC Protocol through a small group exercise based on the case study of the McMillan Creek Crossing at Aberdeen Road in Prince George. The structural system includes a precast concrete cap beam, steel pipe piles, a retaining wall and engineering fill. Surrounding utilities includes a 200 mm water main, 900 mm storm main, 450 mm sanitary trunk main, gas main, as well as overhead electrical and telephone cables.

Examining this case study, participants considered the infrastructure components and climate factors to identify the following climate risks and recommended actions.

HIGHEST CLIMATE IMPACT RISKS	RECOMMENDATIONS
Heavy rainfall days on sidewalk function	Monitor and further study on pavement structure.
Heavy rainfall days on erosion control	Examination of policies, bylaws and guidelines. Ensure sediment control measures are in place with a control bylaw. Remedial action through staking and bioengineering. Monitoring project for water quality, turbidity, vegetation growth, downstream and upstream configuration impacts.
Heavy rainfall days on culvert	Remedial action on the 900 mm culvert. Consider larger culvert to manage increased demand. Separate storm system from stream. Remedial catch basins.
Heavy rainfall days on procedures and policies	Involve Human Resources to examine policies.
Heavy rainfall days on utility components	Work with utilities to harden their infrastructure and strengthen utility corridors.

High temperature days on personnel	Further study on impact on personnel and potential changes to policies and procedures.
High temperature days on fish habitat	Planting trees to create shade for fish habitat.
Ice storm on emergency response	Planning alternative routes. Monitoring and evaluation after severe events.

After the PIEVC Protocol exercise, participants engaged in a debrief discussion. First impressions were that the PIEVC process would be applicable to a project in its planning stage and that it would be useful to have shovel-ready projects prepared for after emergencies. Participants noted that collaboration and communications between stakeholders, multi-disciplinary involvement, and local knowledge are essential to the process and help in addressing missed aspects. For future PIEVC Protocol practices, participants recommended to reduce the heavy infrastructure focus and to increase private sector engagement. The session facilitator noted that currently, the PIEVC Protocol is a voluntary option as no organization has made it a mandatory procedure. In terms of cost, a 6-month PIEVC process run by a consulting company would be around \$45,000. However, cheaper alternatives are available through a remote coaching model.

FUTURE ROLE FOR FRASER BASIN COUNCIL

Participants remarked that they want Fraser Basin Council to continue offering education and training opportunities around climate change adaptation. In terms of guidelines, participants wanted to see the development of procurement wording similar to MOTI's technical circular. A more specific role suggested for FBC was to lead a regional vulnerability assessment that would involve more regional sectors, such as forestry and other resource sectors, as well as local governments, First Nations and the provincial government.