

The City of Nelson, British Columbia Adapting Infrastructure, Processes and People to a Changing Climate



Chris Gainham
Manager of Municipal Services
City of Nelson

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“The price of doing the same old thing is far higher than the price of change”

Bill Clinton

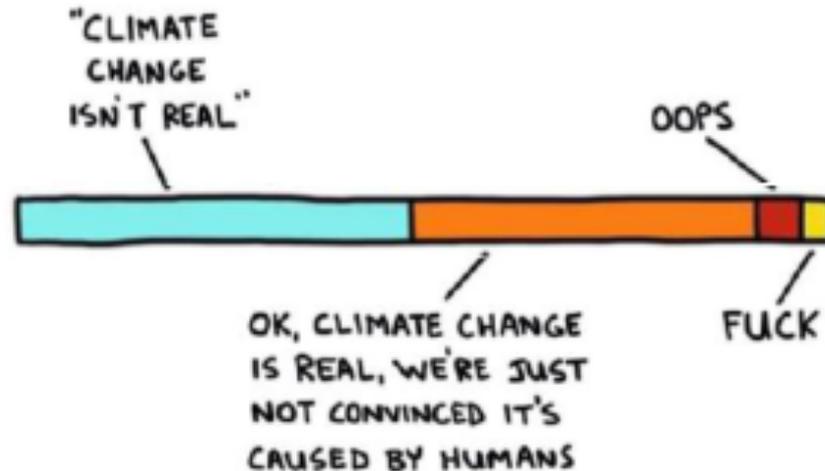
- Building Climate Change into Strategy Guidance Documents
- City's approach to Climate Change
- City Initiatives integrating Infrastructure and Asset Management
- Culture Change
- Case Study
- Future Direction



CITY OF NELSON

Climate Change in the Columbia Basin What to Expect!

City of
NELSON
BRITISH COLUMBIA



Climate Change in the Columbia Basin

Water
Supply



Wildfire



Flooding





Climate Change in the Columbia Basin What to Expect!

- Changes in precipitation patterns, temperature, sea levels, and the frequency and intensity of extreme events.
- More severe forest fires, floods, and droughts – impacts ability to deliver sustainable services.
- Climate Change makes it more difficult to deliver desired levels of service. It amplifies risk and increases costs to built infrastructure.
- Also impacts the integrity and ecological function of natural assets that our built infrastructure is often designed to protect.
- New **infrastructure** assets should be prioritized, planned, **designed**, built and operated to account for the changes that may occur over their planned lifespan.

Climate Change in the Columbia Basin

Climate Model Projections for the SW Columbia Basin

Climate Element		By 2050s (RCP 8.5)	
Average Temperature	ANNUAL	+3.3°C	(+2.4 to +4.2)
Average Precipitation	ANNUAL	+4%	(-1% to +8%)
Average Temperature	SUMMER	4.0°C	(+2.8 to +5.3)
Average Precipitation	SUMMER	-14%	(-29% to -4%)
Average Temperature	WINTER	3.1°C	(+2.2 to +4.0)
Average Precipitation	WINTER	+6%	(-5% to +15%)



Some Progress!

In August 2019 The City of Nelson was identified by the Green Communities Committee as achieving “Corporate Carbon Neutrality” for the 2018 reporting year (CARIP)

Pleased to be recognized but realize that there is much work remaining!



Where did we start?

NELSON PATH TO 2040 Sustainability Strategy

(Stantec, 2010)

- Intended as a Living Document....not a “shelf elf”
- Approached Climate Change planning, not from an infrastructure perspective per-se, but rather in a holistic way that included community values in charting a path forward.
- Built upon OCP. Included local residents, businesses, community organizations, staff and Council
- Developed Sustainability Principles and Directions, Focus Areas and an Assessment Tool to chart a forward path

Focus Area → End State Goal → Objectives

The following **Principles** were identified as part of the **Strategy**:

- Cultural Strength
- Healthy Neighbourhoods
- Robust Ecosystems
- Prosperity
- Resiliency

While the Principles don't at first glance directly relate to Public Works, the underlying objectives are directly related to what we do.

2040 Objectives

- Reduce water consumption
- Support human powered transportation
- Reduce energy consumption, and greenhouse gas emissions
- Ensure bylaws are in place or developed that support sustainability
- Improve cycling amenities
- Promote affordable mixed use housing
- Anticipate and plan to adapt to climate changes
- Focus new growth in the downtown and waterfront
- Improve inter and intra community transit
- Foster connectivity downtown
- Reduce dependence on fossil fuels
- Reduce personal vehicle use



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From Interpretation to Action....Make these objectives more than motherhood statements!

Facilities Division – Focus on Mitigation – Move away from “like for like” replacement

WWTP Biogas Boilers, City Hall High Efficiency Condensing Boilers, City wide LED conversion (Parks and Street Lighting)...coupled with CPTED where appropriate

Digital Data Control Initiatives – automated control of equipment or processes, useful in identifying things like amperage spikes and build more complex rules into building systems.

Outcome - Reduce carbon emissions, improve occupant comfort and energy savings

Trade-offs - Added complexity, added cost, longer turnaround times for repair

From Interpretation to Action!

Water Division– Focus on Infrastructure Replacement, Security and Diversity of Supply, and Conservation

Education and Outreach

Aggressive infrastructure Replacement

Build Aggressive Conservation Targets into Master Planning

Diversify Water Sources – Master Planning

-In ten years we have achieved an ~25-30% reduction in Summer Max Day demand

-Built a lake based emergency water source

-Continue to seek new sources – Legislative and bureaucratic hurdles





From Interpretation to Action!

Wastewater Division – Focus on Infrastructure Renewal, Management of Wet Weather Flows

Aggressive infrastructure Renewal – Trenchless Rehab

Tight control on build quality of new infrastructure and any new connections to the system.

Infiltration/Inflow – Trackdown and Removal via in-house smoke testing, flow and rainfall monitoring for I/I assessment.

Challenges – Significant increase in BOD and WWTP plant process partially attributable to a reduction in dilution from groundwater infiltration.

Wastewater Cont'd

If you're not careful, your new sewer infrastructure can look great in dry conditions, but look like this with wet weather!





Interpretation to Action!

Roads – Capital Paving Programs and Major Storm System Improvements

Incorporating newly (2018) completed 1d and 2d hydraulic modeling of the storm system into road and drainage reconstruction, improving the function of the major system.

Interpretation to Action!

Stormwater—Storm System Optimization

- Leveraging modeling, operator knowledge and flooding databases into managing flows within the minor system
- Better understanding of capacities and constraints, flow management via catch basin vortex flow regulators, better focused inspection and flushing programs.





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Interpretation to Action!

Investments in Human Capital –

City is assembling a Climate Action Working Group

New Hires:

- *Climate Change Coordinator*
- *Emergency Management Coordinator*
- *Green Initiatives Coordinator*
- *Data and Analytics Coordinator*

Interpretation to Action!

Change Management – Ensuring staff buy-in and understanding is key to making any change initiative stick.

- Ensuring that strategy permeates down to the front line staff day-to-day operations and mindset.
- Build Climate Change thinking into policies, procedures
- Ensure that the voices, opinions and knowledge of front line staff are heard and incorporated into the way we do business.
- Build heuristics into your operations

Change Management – **Example – Real Time Control Project – City of Hamilton**

~\$50M project to manage wet weather flows, combined sewer overflows and basement flooding, designed with climate change scenarios

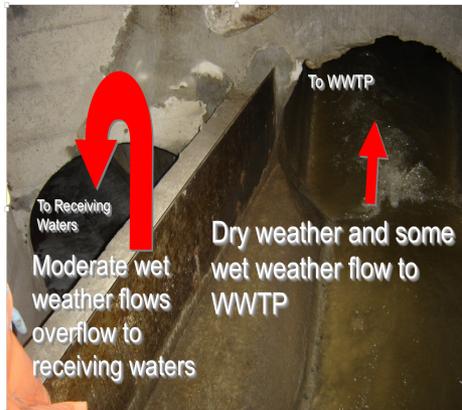
Introduction of new infrastructure (gates, pumps) and control strategy – **automated control (let the system do it's thing).**

Manage flows using existing infrastructure to the greatest degree possible. Fraction of the cost of new grey CSO storage infrastructure. More flexible to changes in climate over the lifespan of the system

Good analogy - Traffic control for sewer systems

Change Management – Example – Real Time Control Project

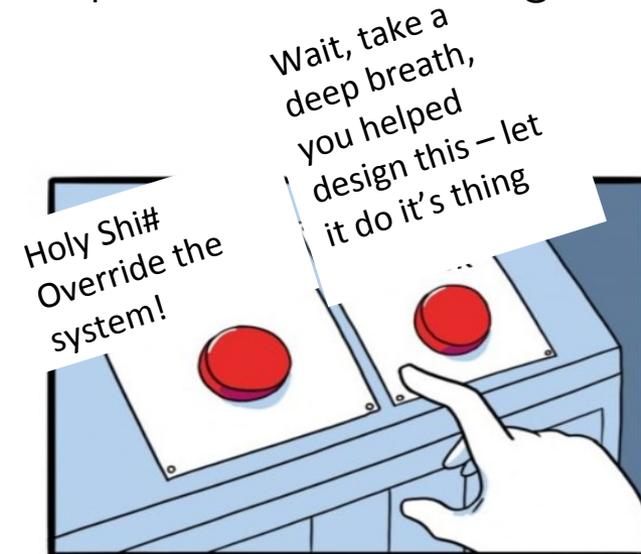
Replace static structures



With control gates, coordinated logic and fail-safe measures.



And try to prevent Operators from doing this



Change Management –

Example – Real Time Control Project – City of Hamilton

Previous iteration of Real Time Control built in the late 90's fell into disrepair due to lack of change management and operator input/trust.

When rolling out operations initiatives that are driven by strategy, and with a reliance on operators for success- don't cheap out!

This phase of RTC involved all aspects of operations from start to finish... wait...there is no finish...

Operators selected instrumentation, designed HMI, project engineers sat with operators for over a year; through midnight and weekend storms, gathering information and input.

Operating manuals are short and sweet, less than 10 pages per site 



Interpretation to Action!

Change Management –

Developing an Operations Business Plan, intended for a Supervisor to Front Line Worker audience.

Describes how overarching City strategies and objectives relate to operational projects, programs and day-to-day activities that we do.

Links objectives, to activities, levels of service, staff responsibility and KPI's

City of Nelson Municipal Services Strategic Business Plan

City of Nelson Guiding Objective	Overall Division Objective	Municipal Service	Department Objective	Service Area	Primary Service Objective	Operational Objectives/Programs	Staff Leadership	KPI's
To provide the best service for taxation value of any municipality in Canada.	Deliver Services That Bring Our Community To Life	Water, Wastewater and Stormwater Services	Protect Public Health, Property and the Environment	Water	Provide clean, safe, efficient, uninterrupted, drinking water and fire services	<ul style="list-style-type: none"> Drinking Water Sampling Program Water Treatment Maintenance Program PRV Maintenance Program Water Conservation Program Unidirectional Flushing Program Water Model Maintenance Hydrant Maintenance Program Reservoir Inspection/Cleaning Waterworks By-Law Review Cross Connection and Backflow Prevention Program SCADA Masterplan Develop/Update Facility Operations Manuals and SOP's 	<ul style="list-style-type: none"> MG MG MG CG MG CG, CM CM, FA CG CG CG CG, MG CG 	<ul style="list-style-type: none"> 100% regulatory compliance 100% regulatory compliance, 90% uptime for critical process equipment 1 75% of system flushed annually Model updated annually 100% of hydrants inspected and maintained annually Reservoir inspected annually, cleaned semi annually Annual review 100% regulatory compliance Completed by Q4 2018 Completed by Q4 2019

PUBLIC WORKS STRATEGY EXECUTION Operational Objective / Initiative – Action Plan

Primary Objective: (Reference PW Strategy Execution Action Plan - Example: 1. Exceptional Customer Service)
3.0 Well Planned Infrastructure

Date of Preparation: DD/MM/YY
03/03/2008

Period of Implementation: MM/YYYY To MM/YYYY
05/2008 – 05/2009

Secondary Objective: (Reference PW Strategy Execution Action Plan - Example: 1.1 Service Level Standards)
3.3 Capital Programs

Operational Objective / Initiative Title & Description: (What are we trying to accomplish through this operational objective / initiative?)
3.3.2 Develop SCADA Master Plan

Why this Operational Objective / Initiative is Important? (How will the department benefit from this operational objective / initiative?)

As a result of the City's aggressive development, sustainable asset management and water quality initiatives, a large number of construction activities is anticipated in the short and long term. A SCADA master plan will ensure the SCADA system is expanded in the most efficient manner possible preventing operational disruption and regulatory non-compliance related to the collection and storage of critical data.

Approach to be developed: (What key activities have to be undertaken? use a point / bullet format)

- Develop terms of references
- Retain consulting engineering services
- Develop project team
- Undertake workshops
- Develop recommendations and implementation schedule
- Develop TOR for each approved upgrades
- Award construction contract
- Deploy upgrades as required

Indicators of Achievement: (How will we know that we have been successful? Is there any key performance indicator or operational measures that will change?)

Completion of initiative by 05/2009
Completion within budget

Linked to: (Is there any current or proposed operational objective / initiative that is linked to this operational objective / initiative?)
3.3.1, 3.3.2

Future Initiatives

Climate Analogs – *What City will we look like in the future?*

Climate-analog mapping involves matching the expected future **climate** at a location with current **climate** of another, potentially familiar, location - thereby providing a more relatable, place-based assessment of **climate** change.

Due Dilligence outreach and information gathering from our “Future Sister Climate City”.