



# REPORT

## The Granby Project

### The Re-Establishment of Smelter Lake Preliminary Assessment



November 2013

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# Executive Summary

## Introduction

The City of Grand Forks (the City) recently completed its *Asset Management Plan* (AMP) and the *Sustainable Community Plan* (SCP) which provides a vision for the community and guidance in addressing several key challenges facing the City and the region. These challenges are:

1. *What can we do to make the community more sustainable and self-sufficient?*
2. *How do we strategically, and sustainably, deliver affordable services to our community?*
3. *What will the City's future economic base be comprised of?*
4. *How do we attract young working families to the community?*

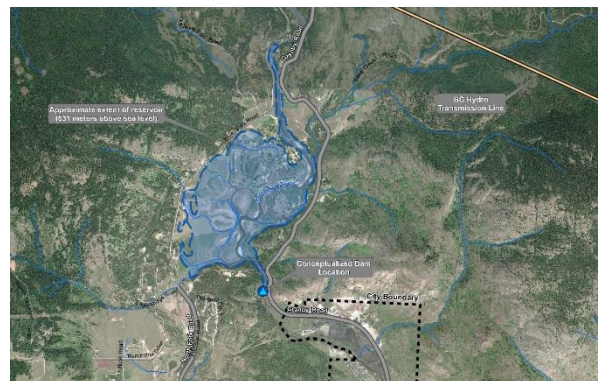
The City has been investigating potential opportunities, since the adoption of the SCP and AMP, to develop local economic development projects to assist in overcoming these challenges. Through the creation of local economic development opportunities, the City aims to overcome these challenges identified above and create a more vibrant and resilient community.

The former Smelter Lake hydroelectric facility, located on the Granby River near Grand Forks, provided significant community, economic, cultural, and social benefit until the late 1940's. The old Smelter Lake project once represented both an important resource to the economic vibrancy of the Grand Forks area, and provided significant recreational amenities for local residents prior to being decommissioned in 1948.

In 2012, the City completed a study to investigate the potential for hydropower generation at the

original Smelter Lake location. The study examined the costs and potential revenues for developing a power generation facility for three potential dam configurations. This analysis indicated that there was potential for hydroelectric generation. The scope of the study did not include a review of the economic, social, environmental, and cultural effects of re-establishing Smelter Lake in the Grand Forks region.

To better appreciate the potential benefits, costs, and impacts of the Granby Project (i.e., the re-establishment of Smelter Lake), the City identified a need for an additional assessment that incorporated the sustainability principles of the SCP, to determine if the proposed project was worthy of further investment and investigation. The City consulted with and garnered the support of the Regional District of Kootenay Boundary (the District) earlier this year for in-kind assistance for completing this preliminary assessment. The City recognized that there are a number of key unknowns about the project concept and the poten-



tial for speculative land acquisition; therefore, before engaging in a public consultation and engagement process it was critical for the City and the District to better understand the attributes of the Granby Project prior to releasing any information to the public.



Based on the need to reduce the potential for land speculation and understand the project viability, it was determined that an in-camera desktop-based preliminary assessment of the social, economic, and environmental attributes of the proposed project concept was required. It is intended that this preliminary assessment of the project will provide decision-makers from the City and the District with a much clearer understanding of the project concept and the potential benefits and costs that could arise from the Granby Project.

To achieve these objectives this preliminary assessment provides a desktop-based review of the financial feasibility; economic impacts; social influences; and, environmental attributes of two project development scenarios for the Granby Project. These scenarios are summarized as follows:

- **Scenario 1:**  
Hydroelectric Scenario  
(Power Project Only)

The proposed hydroelectric project will be located on the north fork of the Kettle River (i.e., Granby River), approximately 2.8 kilometres northwest of the City and have a net head of 8 metres. The estimated project capacity for this project is 3.7 megawatts, with an estimated annual power output of 9,500 megawatt hours and annual

revenue of approximately \$1M. The proposed reservoir would impact 23 properties and approximately 246 hectares of ALR land.

- **Scenario 2:**  
Community Development Scenario  
(Hydroelectric Power Project and Community Amenities)

Similar to project Scenario 1, Scenario 2 would see the development of a reservoir based hydroelectric project, but could also include the establishment of amenities such as:

- a boat launch;
- a constructed beach area;
- campfire pits;
- picnic areas;
- interpretive trails;
- a pier; and,
- an active transportation pathway linking the TransCanada Trail (i.e., Kettle Valley Rail Trail) within the City, with an estimated total distance of 5.5 kilometres.

## Preliminary Assessment Findings

### Financial Feasibility Review

In order to obtain a better understanding of the financial costs and benefits associated with the two proposed project scenarios of the Granby

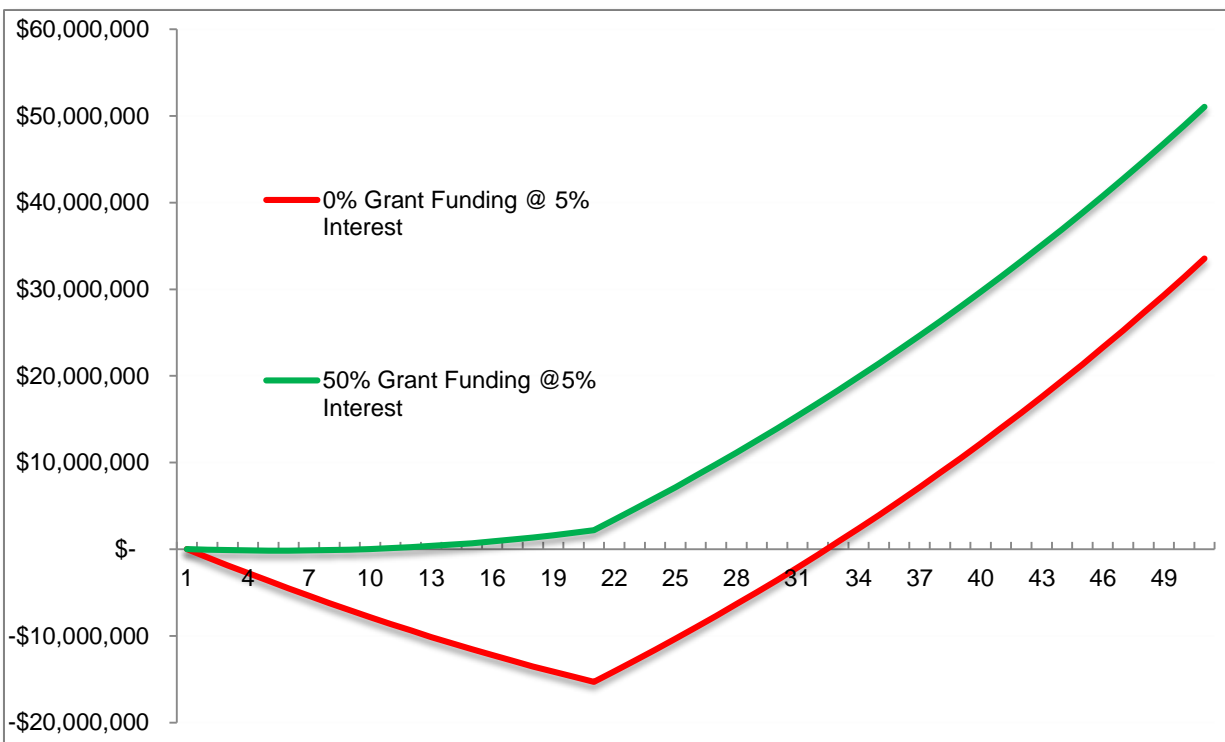
Project, a financial review was undertaken. Based on previous reports, known conditions of the project site, and the key assumptions used for the assessment, it is estimated that project Scenario 1 will have a total development cost of approximately \$19.5M, where project Scenario 2 will have a total development cost of approximately \$21.7M.

Based on the analysis, neither Scenario 1 nor Scenario 2 are likely to offer a positive return on investment without the assistance of significant grant funding. This is due to the fact that the anticipated revenue generated per unit of energy produced is less than the unit energy cost (including debt servicing costs). The sensitivity of grant funding is illustrated below.

of privately produced power in the province. This could influence the timing and likelihood of the Granby Project securing a power purchase agreement under the BC Hydro SOP. It will be a critical first step to monitor how these recent policy announcements evolve over the next 6-12 months and their potential impact on the success of the project's development.

### Economic Impact Review

In addition to understanding the financial characteristics of the Granby Project, the City of Grand Forks wished to gain a better understanding of the project's potential influence on the local and regional economy. In response to this, a preliminary economic impact analysis was conducted. From this preliminary analysis, it is evi-



It is also important to note that over the course of September 2013, BC Hydro made a number of policy announcements that may inhibit the growth

dent that the project will have significant impact to the local and regional economy through the creation of local economic development. The



Granby Project has the potential to be a strong catalyst for supporting and creating a more vibrant local economy. More specifically, the development of a hydroelectric facility, Scenario 2, is estimated to create the following:

- Generate \$16M in expenditures to the region over 10 year horizon
- creation of 12 person-years of employment (construction) and two permanent 0.5 FTE positions (operations)
- creation of 120 regional jobs
- 15% increase in housing prices for adjacent homes.

## Social Review

There will potentially be changes to the social fabric of the local and regional community with the development of the Granby Project. For this assessment, an external community engagement process was not feasible, since this project was completed in-camera. Therefore, desktop research and conversational interviews with select individuals were undertaken to support the analysis. Based on this approach, several key findings have been identified that may arise from the project. These key findings include:

- Land improvement and improved community amenity benefits for recreation
- Supply enough power for approximately 900 homes (avg. residential usage)
- A water source to support wildfire protection
- Increased community awareness and pride
- Expected to retain younger residents to the region
- Increased tourism
- A Doukhobor cultural heritage site identified nearby
- Project falls within the traditional territories of the Syilx Okanagan Nation Alliance (no “statement of intent” for territorial claims on record)

- Presence of three sensitive archeological records within a 500 metre radius of the project.

## Environmental Review

The findings of the environmental investigation suggest that due to the project size of 3.7 megawatts (BCEAA < 50 MW; CEAA < 200 MW) it will likely not trigger a “comprehensive” environmental assessment. This could reduce the time and resources required to secure project approvals. However, proactive environmental investigations will be required to support beneficial environmental outcomes.

Given the region’s commitment to environmental sustainability, many of the potential impacts and associated mitigation measures will need to be further studied prior to development. Doing so will likely enhance community and stakeholder support for the project and ensure the project meets all of the key regulatory and approval requirements identified in this assessment. The following lists the key findings:

- Proposed project size does not trigger comprehensive Environmental Assessment
- Proactive investigations required to identify the actual presence of any species at risk (7 identified in the region)
- Several provincial and federal Acts to be followed and could take upwards of 7 years to acquire all approvals:
  - DFO (Fisheries Act)
  - Transport Canada (Navigable Waters Act)
  - Environment Canada (SARA, Migratory Birds Convention Act)
  - MFLNRO approvals under Water Act, Environmental Management Act
  - Agricultural Land Commission

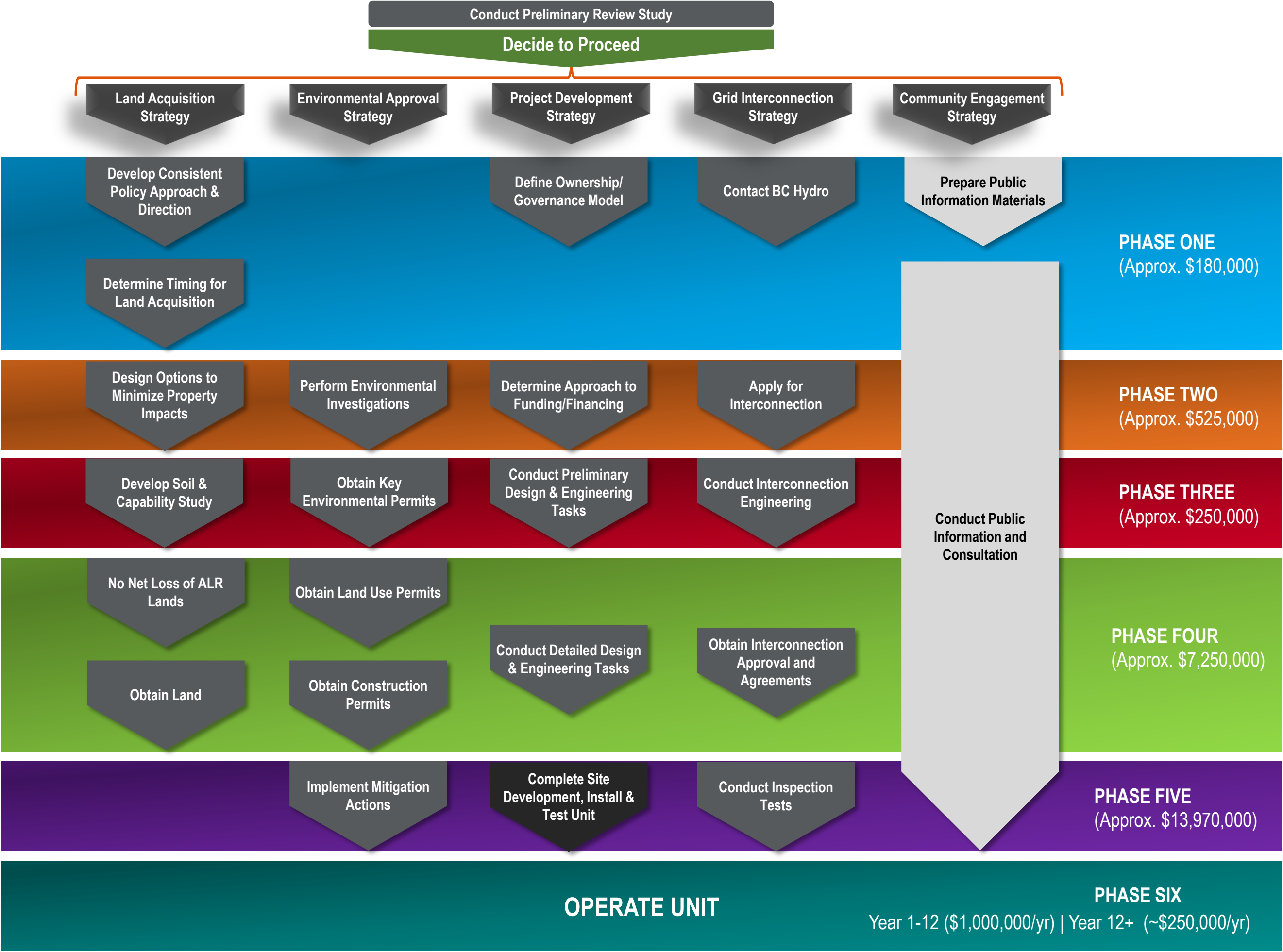
- Fish flows and passage will need to be maintained during and after construction
- Groundwater Assessment to be completed to identify subsurface seepage through the soils and impacts to Wards Lake and Grand Forks Aquifer
- Increased ability to balance water flows and supply future water demand in the Granby River during periods of low flow
- Nine hours of flood protection during full pool and peak flow condition

## Moving Forward

Based on the potential for this project to help create a more vibrant and sustainable region through local economic development, should the City of Grand Forks and the Regional District of Kootenay Boundary decide to pursue further investigations and investments in the Granby Project, there are a number of key factors to consider. In particular, effort will need to be directed towards securing an agreement with BC Hydro, determining the governance and ownership model for the project, securing the required lands, accessing key grant funding and financing resources, and obtaining all regulatory permits and approvals for the project.

Additionally, the most critical success factor for the project is securing support from the community. A series of recommendations, strategies, and key next steps are illustrated for the City of Grand Forks and Regional District of Kootenay Boundary's consideration below.

The Granby Project – Key Next Steps



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# Section One

## INTRODUCTION.

The following section of this report provides an introduction to the Granby Project and sets the context for the project. It does so by introducing why the City developed the preliminary assessment, provides an overview of the approach used to complete the preliminary review, and discusses the attributes of the project.

**Why?** The City of Grand Forks' (the City) recently completed its Asset Management Plan and the *Sustainable Community Plan* (SCP) which provides a vision for the community and guidance in addressing several key challenges facing the City and the region. The aims to overcome this challenges by investigating opportunities to create local economic development project to assist in creating a strong and vibrant community.

**How?** To better appreciate the potential benefits, costs, and impacts of the Granby Project, the City concluded there was a need for an additional assessment to be completed that incorporates the sustainability principles of the SCP to determine if the proposed project is worthy of further investment and investigation. It is intended that this preliminary assessment of the project will provide decision-makers from the City and the Regional District a much clearer understanding of the project concept and the potential benefits and costs that could arise from the Granby Project.

**What?** To achieve these objectives this preliminary assessment provides a desktop-based review of the financial feasibility; economic impacts; social influences; and, environmental attributes of two project development scenarios for the Granby Project. These scenarios are summarized as follows:

- **Scenario 1: Hydroelectric Scenario**

(Power Project Only)

The proposed hydroelectric project will be located on the North Fork of the Kettle River (a.k.a. Granby River), approximately 2.8 kilometres northwest of the City and have a net head of 8 metres. The estimated project capacity for this project is 3.7 megawatts, with an estimated annual power output of 9,500 megawatt hours.

- **Scenario 2: Community Development Scenario**

(Hydroelectric Power Project and Community Amenities)

Similar to project Scenario 1, Scenario 2 would see the development of a reservoir based hydroelectric project, but also could include the establishment of amenities such as:

- a boat launch;
- a constructed beach area;
- campfire pits;
- picnic areas;
- interpretive trails;
- a pier; and,
- an active transportation pathway linking the TransCanada Trail (i.e., Kettle Valley Rail Trail) within the City, with an estimated total distance of 5.5 kilometres.



# 1.0 Introduction

## 1.1 Why the Granby Project

The City of Grand Forks (the City) recently completed its *Asset Management Plan* (AMP) and *Sustainable Community Plan* (SCP) which provides a vision for the community and guidance in addressing several key challenges facing the City and the region. These challenges are:

1. *What can we do to make the community more sustainable and self-sufficient?*
2. *How do we strategically, and sustainably, deliver affordable services to our community?*
3. *What will the City's future economic base be comprised of?*
4. *How do we attract young working families to the community?*

The City has been investigating potential opportunities, since the adoption of the SCP and AMP, to develop local economic development (LED) projects to assist in overcoming these challenges. Through the creation of LED opportunities, the City aims to overcome these challenges identified above and create a more vibrant and resilient community.

The former Smelter Lake hydroelectric facility, located on the Granby River near Grand Forks, provided significant community, economic, cultural, and social benefits until the late 1940's. The old Smelter Lake project once represented both an important resource to the economic vibrancy of the Grand Forks area, and provided significant recreational amenities for local residents prior to being decommissioned in 1948. The City, with support from the Regional District of Kootenay Boundary (the District), aims to determine if the re-establishment of Smelter Lake (referred to as the Granby Project in this assessment report) is worthy of further investment and investigation to assist in the creation of a more sustainable and self-sufficient region. The Granby Project involves the re-establishment of Smelter Lake by restoring the dam and reservoir and installing power-generating equipment at the location of the old Smelter Lake dam along with significant recreational/tourism development along the foreshore of the lake. The City also aims to understand if there are partnership opportunities that should be considered (i.e., regional, provincial, federal, First Nation).

*“Grand Forks is recognized as a self-sufficient community incorporating sustainable principles – social, economic, environmental and cultural – into its decision making process.”*

*- SCP, 2011*



## 1.2 Purpose of the Preliminary Assessment Report

In 2012, the City completed a study to investigate the potential for hydropower generation at the original Smelter Lake location. The study examined the costs and potential revenues for developing a power generation facility for three potential dam configurations. This analysis indicated that there was potential for hydroelectric generation. The scope of the study did not include a review of the economic, social, and cultural effects of re-establishing Smelter Lake to the Grand Forks region.

To better appreciate the potential benefits, costs, and impacts of the Granby Project, the City concluded there was a need for an additional assessment to be completed that incorporates the sustainability principles of the SCP to determine if the proposed project is worthy of further investment and investigation. The City consulted with and garnered the District's support earlier this year for in-kind assistance for completing this preliminary assessment. It was recognized that there are a number of key unknowns about the project concept and the potential for land acquisition; therefore, before engaging in a public consultation and engagement process it was critical for the City and the District to better understand the attributes of the Granby Project prior to releasing any information to the public.

Based on the need to reduce the potential for land speculation and understand the project viability, it was determined that an in-camera desktop-based preliminary assessment of the social, economic, and environmental attributes of the proposed project concept was required. It is intended that this preliminary assessment of the project will provide decision-makers from the City and the District a much clearer understanding of the project concept and the potential benefits and costs that could arise from the Granby Project.

To do so, the preliminary assessment aims to:

- facilitate the refinement of the proposed project concept;
- better predict the benefits and impacts of the proposed project on local residents and communities;
- identify solutions to reduce potential negative effects and strategies to improve benefit effects;
- articulate the process to successfully implement and support the project development (i.e., approvals, community support, etc.); and,
- provide a resource to guide decision-making with respect to the Granby Project.

To achieve these objectives this preliminary assessment includes a:

- financial feasibility review;
- economic impact review;
- social review; and,
- environmental review.

Additionally, this assessment discusses the importance of project funding and key funding options, various ownership models for the project, and a series of key next steps should the City and the District wish to further explore and develop the Granby project.

## 1.3 Preliminary Assessment Approach

As previously mentioned, the City identified potential energy generation benefits that may arise from the proposed Granby Project. In addition to the benefits identified to date, there are a number of likely adverse effects. A preliminary assessment review of the project's financial, economic, social, and environmental attributes has been identified, by the City, as an important undertaking to help better understand the potential direct and indirect benefits and impact to the community.

The methodology for this assessment utilizes the principles outlined by the Integrative Dam Assessment Modeling tool (IDAM), designed to integrate environmental, social, economic, and financial perspectives, developed and sanctioned by the World Commission on Dams. This methodology is premised on an open, incremental process that allows for flexible responses to contingencies that may arise or improvements that may be identified during project investigations. From the outset, it invites and encourages the active participation and input of the project team members and applicable stakeholders. As this assessment was

completed in-camera, the methodology was modified to reflect limited stakeholder and no community engagement; which will be the focus of future efforts should this project proceed.

The preliminary investigations, extended over the summer of 2013, encompassed both literature reviews and secondary research. A number of studies, documents, and statistics were identified and reviewed. The approach was to build on existing efforts not replicate or duplicate them. As the project was completed in-camera, the consulting team was unable to engage the community and key stakeholders during the investigation process. However, the analysis of the collected information was premised on firm logic and a conservative approach. Where information for the City was imputed from regional or sub-regional data, care was taken to ensure that observations made were legitimate and fully supportable via cross-referencing with other imputed data and/or via anecdotal comments.

## 1.4 The Granby Project: Context and Goals

Energy sustainability is one of the foundations of a community's well-being. Ensuring that a community has access to a stable, reliable, and affordable energy supply is critical to supporting the economic and social vibrancy of the community.

Traditional sources of energy, primarily fossil fuel energies like oil, coal, and natural gas, and large-scale hydroelectricity are becoming scarcer and more costly. Furthermore, the environmental footprint associated with producing and consuming traditional energy supplies include: greenhouse gas emissions, which contribute to global climate change; air pollution, which reduces local air quality; as well as, land-based disturbances that can reduce the integrity of natural ecosystems.

The opportunity to mitigate and reduce the negative effects of traditional energy supplies exists. Doing so will require leadership and action from the global community, national and provincial governments, and local communities.

Over the past few years the City and the District have completed a number of community planning processes that established several desired and shared community outcomes. Several of these shared community outcomes are summarized as follows:

- enhance community identity;
- improve sustainability practices;
- contribute to the local agricultural sector;
- protect the local and regional environment;
- encourage the heritage values of the community;
- support community self-sufficiency;
- work collaboratively with community members, other local governments and First Nations;
- improve and enhance communications;
- provide new recreation opportunities; and,



- create local and regional jobs to support a vibrant economy.

To contribute to the achievement of these shared community outcomes, the City has identified a number of tangible project opportunities. Many of these projects have the potential to enhance the long-term health and vibrancy of the region and contribute to the goals and objectives of various planning documents. In this spirit, a keystone project that has been (re)identified is the Granby Project.

The desire to further explore the Granby Project is driven by a number of shared objectives related to the project opportunity. These include the following:

- regional partnerships and collaboration;
- secure a new revenue stream to support/ enhance the delivery of local government services within the region;
- strengthen the local economy;
- enhance regional energy security via the establishment of a local renewable power generation facility;
- boost community safety through enhanced wild fire protection capacities;
- increase water resource availability to minimize the impact of drought conditions and offer a resource to enhance economic activities;
- develop a site that offers recreational and community amenities to enhance community vibrancy (tourism); and,
- support a project that is developed in an environmentally and socially responsible manner.

The project team chose to utilize a research methodology that explores the Granby Project using two project development scenarios (described further below) and encompassed both exploratory investigations and in-depth descriptive research of both qualitative and quantitative factors.

## Overview of How Hydroelectric Dams Work

Hydroelectric power facilities capitalize on the kinetic energy of falling water to produce electricity. Kinetic energy exists in any body of water that flows, by force of gravity, on a downhill slope. The amount of energy that can be generated is related directly to the amount of height change (head) that exists and water flow.

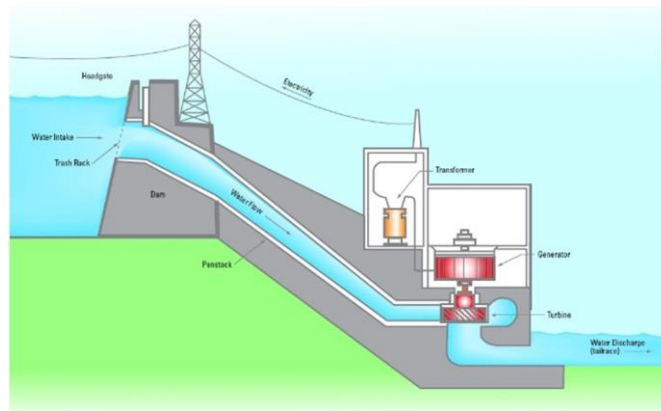
While there are many naturally occurring hydroelectric opportunities — like rivers and waterfalls — conventionally hydroelectric power plants manipulate the force of the water with dams. The purpose of the dam is to retain large amounts of water in a reservoir, and form head that enhances the kinetic energy of falling water.

The contained water is used to store energy in the form of potential energy. The energy conversion process begins at the intake structure where the gates of the dam are opened, and the water unleashed into a pipeline known as the penstock, which leads to the turbine. As the water rushes down the gradient of the penstock, it gains pressure. The water strikes the turbine and forces the blades to turn. This motion in turn powers a generator.

The generator, attached to the turbine via a shaft, contains a series of magnets that spin and move past copper coils forcing the movement of electrons creating alternating current. Used water is evacuated through pipelines known as tailraces and directed back into the river, downstream of the power station.

Hydroelectric storage offers a big advantage over many other electricity generation project types, as it can respond to increases in electrical demand almost immediately - by releasing extra water which spins the turbines faster and generates more electricity.

**Figure 1: Diagram of Reservoir Hydroelectric Power Station**



Source: Ontario Power Generation: How Hydroelectric Generation Works.

Available at: <http://www.opg.com/power/hydro/howitworks.asp>

### 1.4.1 GENERAL DESCRIPTION OF PROJECT DEVELOPMENT SCENARIOS

To facilitate this preliminary assessment, two project scenarios have been reviewed.

**Scenario 1:** Hydropower project only.

**Scenario 2:** Hydropower and community/tourism development (i.e., reservoir as a recreation site that includes beach, boat launch, pier, interpretative trails, campfire pits, picnic areas and a connection to the Trans Canada Trail).

This approach aims to provide decision-makers with a clear picture of what is involved in developing the hydroelectric power project separate from the costs and opportunities of adding amenities such as a beach area and pathways. The assessment will focus on the key areas as outlined below.

#### Financial Assessment

This part of the assessment focuses on the financial considerations behind the project including:

- preliminary and preparation costs, including public information and consultation;
- site development, construction and ongoing operation and maintenance costs;
- potential revenue;
- identification of other potential revenue sources, such as grants;
- payback period for both scenarios with and without grants;
- potential factors that can impact costs and revenues; and,
- differences between costs and potential revenues.

#### Social and Economic Review

This part of the assessment explores how the project will both directly, and indirectly, impact the properties and surrounding area required for restoring the reservoir as well as social and economic factors such as employment, business, and tourism opportunities.

Specifically, this part of the assessment focuses on:

- identification of the necessary changes in land use in order to restore the reservoir and the potential impacts to landowners (e.g., homeowners, farmland use);
- direct, indirect, and other economic impacts from dam construction and operation, including potential job creation;
- economic development opportunities based on restoring the reservoir such as tourism and new industry;
- identification of potential business and development opportunities (including secondary, and tertiary) and related impacts; and,

- identification of health, safety, and cultural heritage impacts.

## Environmental Review

This part of the assessment scopes the potential impacts of the project on fish, wildlife, riparian habitat, water use, and other environmental components of the project site. This review aims to support future efforts to complete more comprehensive and detailed environmental investigations should the project progress beyond the scope of the current assessment. As well, this review will look at how the project could be developed to reduce or manage potential impacts.

## Scenario 1: Hydroelectric Scenario

The hydroelectric project would have a net head of 8 metres. Based on the analysis completed by Associated Engineering Ltd., (2012) the project would have a design flow of 58 m<sup>3</sup>/s and associated exceedence of 20% were selected for this scenario. With a net head of 8 metres and a design flow of 58 m<sup>3</sup>/s, the project is well suited to a Kaplan Pit turbine arrangement. The estimated project capacity for this project is 3.7 megawatts, with an estimated annual power output of 9,500 megawatt hours.

In this configuration, the turbine and generator would be located in a concrete channel adjacent to the Granby River bank. The generator would be located inside a sealed unit upstream of the turbine. Flow would pass either side of the generator and through the turbine wicket gates into the turbine housing. Flow would then be returned to the Granby River via a submerged draft tube.

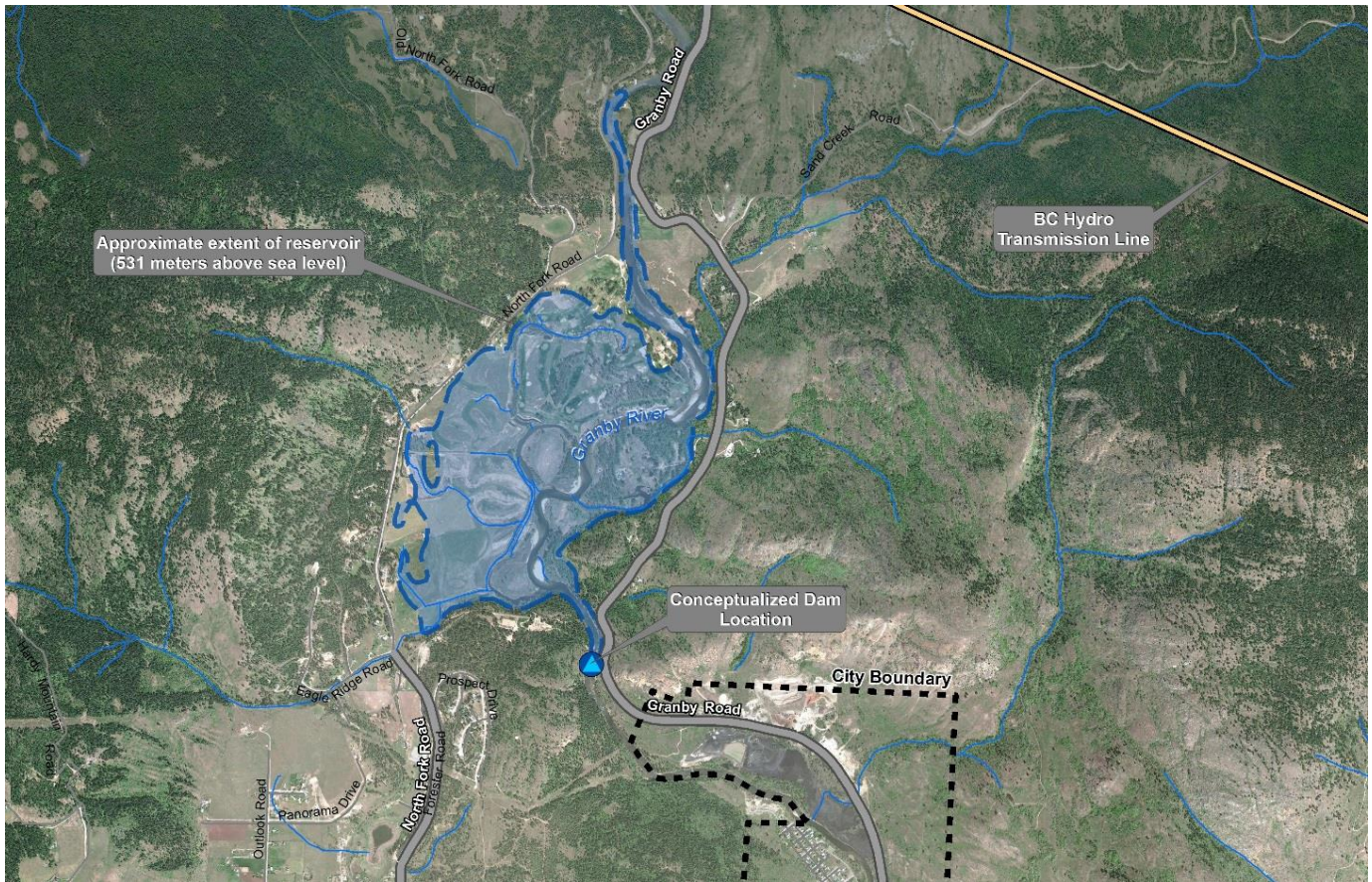
A mechanical room would be located above the turbine and generator for operator access and maintenance of the equipment. The electrical, protection, and controls equipment would be housed in a separate enclosure on the river bank, adjacent to the dam. A spillway and bypass gate would be required to bypass excess flows and to facilitate the flushing of accumulated sediment downstream of the dam. A fish ladder would also be provided for this option to enable the passage of fish in an upstream direction.

In order to benefit from BC Hydro's Standing Offer Program (SOP), electrical interconnection would take place at the nearest suitable power distribution or transmission line operated by BC Hydro.

**Figure 2**, below provides a general schematic of a reservoir based hydroelectric facility.



**Figure 2: General Schematic of a Reservoir Based Hydroelectric Facility**



## Scenario 2: Community Development Scenario

Similar to project Scenario 1, Scenario 2 would see the development of a reservoir based hydroelectric project with a net head of 8 metres, have a project capacity of 3.7 megawatts, and an estimated annual power output of 9,500 megawatt hours. Recognizing the historical uses of the former Smelter Lake facility, the City recognizes that there is an opportunity to complement the hydroelectric project with recreational and community amenities and environmental enhancements. For the purpose of this assessment, it is *assumed* that the following amenities will be included in the development in conjunction with the hydroelectric project:

- a boat launch;
- a constructed beach area;
- campfire pits;
- picnic areas;
- interpretive trails;
- a pier; and,
- an active transportation pathway linking the TransCanada Trail (i.e., Kettle Valley Rail Trail) within the City, with an estimated total distance of 5.5 kilometres.

Figure 3: Community Amenities Illustration of Project Scenario 2



These community amenities also represent the opportunity to establish a Tourism Development Area.<sup>1</sup>

For discussion purposes this project scenario has been illustrated in **Figure 3**.

It is expected that an investment into amenities such as those highlighted above will support the City's efforts with respect to:

- place-making by providing local residents new recreational opportunities;
- increase local and regional tourism;
- enhance local environmental conditions; and,
- restore an important historical resource to enhance community economic development.

It is important to note that while these amenities are included in this assessment, they do not necessarily represent a specific proposal. It is expected that the specific amenities for this project development scenario would be defined by community members and key stakeholders. Once that process has been completed, a more refined cost estimate can be developed.

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<sup>1</sup>Tourism Area Development Asset - refers to an identified geographic area in which has been purposively and strategically committed to for the purpose of creating and promoted as a cluster of tourism assets (often called products) in order to foster economic development through attracting tourist who in return inject dollars in to the local economy. For this assessment, this represents the conceptualized community amenities in Project Scenario 2.

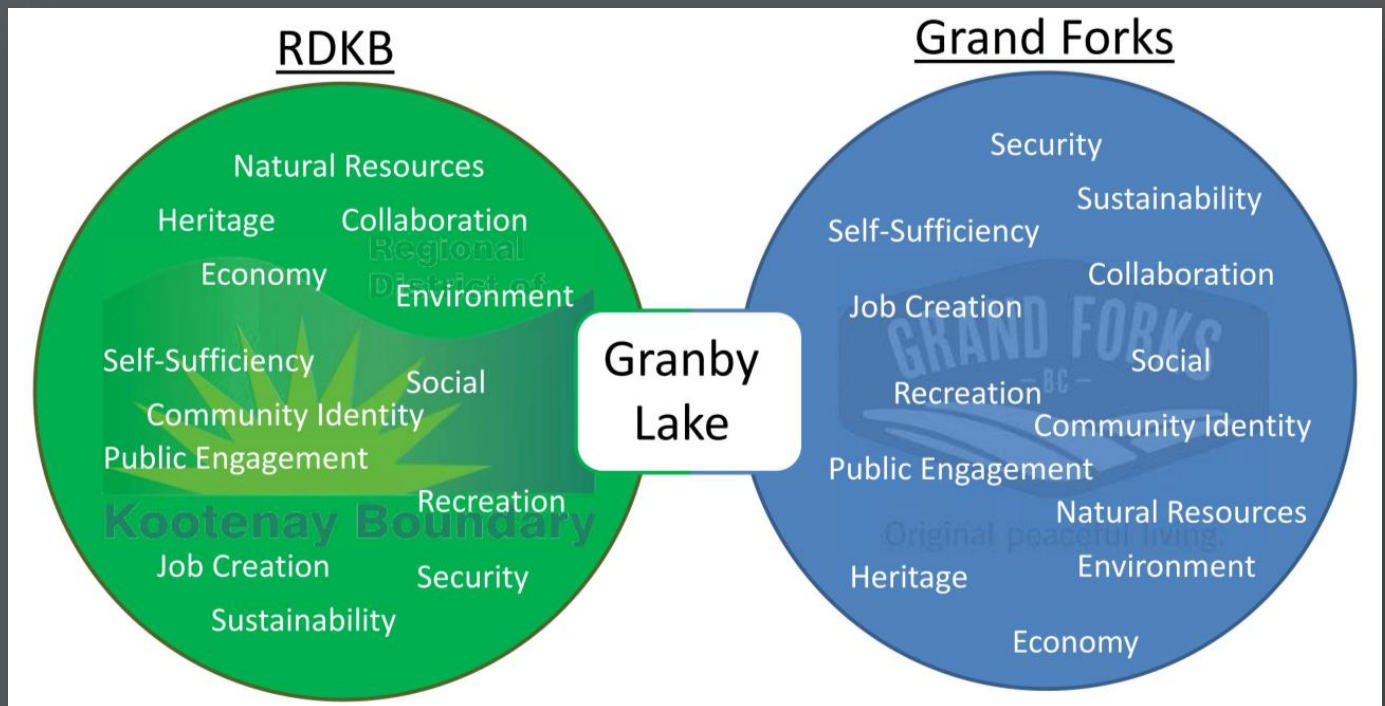


# Section Two

## PROJECT CONTEXT SUMMARY.



The following section of this report provides additional context both historical and present-day for the Granby Project. It does so by introducing how the Granby Project could potentially support a number of shared environmental, social and economic outcomes between the City of Grand Forks and the Regional District of the Kootenay Boundary. There are several shared goals between both governments this section aims to set the context of how a project like Granby Lake fit into each respective vision.



## 2.0 Project History, Community Context and Overview

### 2.1 A Brief History of the Granby Project

Completed by the Granby Mining Corporation in the summer of 1900, the Granby Dam was built on the Granby River to produce hydroelectric power while permitting recreational activities in and around its water reservoir – the Granby Reservoir (i.e., Smelter Lake). The dam was located approximately 2.8 kilometres northwest of the City on the north fork of the Kettle River.<sup>2</sup> The main function of the dam was to supply power for the operation of the Granby Copper Smelter which, during its operation, was the largest smelter of its type in the British Empire. During the early 1900s, the smelter employed 800 men. However, the smelter closed down in 1914 at the beginning of World War I after the British government declared that copper was an absolute contraband of war.<sup>3</sup> Not only did the dam supply power for the copper smelter, but it also provided electricity to the City. In 1926, the City purchased the dam and water license and constructed a new power generating facility adjacent to the dam.<sup>4</sup> The new facility began generating power in 1932. However, due to unmanageable maintenance and replacement costs for the deteriorating structure, combined with the City's limited financial resources, the dam was removed in 1948.<sup>5</sup> At this time, to improve its financial status, the City sold the accessible lakebed land. Approximately one square mile of land became available for development when Smelter Lake was drained and agricultural operations began to dominate land use in the lakebed. In 1977, the planning department of the Regional District of Kootenay Boundary prepared a study to evaluate if the dam and reservoir should be restored because the Granby Dam and Smelter Lake offered excellent multiuse capacity for local residents in the early 1900s.

Residents used Smelter Lake for outdoor recreational activities such as swimming, boating and fishing and viewed the area and the activities it afforded as important to the community.<sup>6</sup> The quality of lake water was clean and residents used to harvest ice from the reservoir during the winter.<sup>7</sup> However, residents were cautious about safety risks associated with boating on and swimming in the lake. Prior to inundation of the reservoir, many tree stumps were not properly removed resulting in reduced navigation on the lake and increased boating and swimming hazards. Accounting for navigation risks, local residents still valued the lake as an important, valuable, multiuse resource for the community.

Before it was drained, Smelter Lake offered excellent multiuse capacity for regional and municipal residents. In 1977, observing the potential to increase the region's self-sufficiency through hydroelectric generation

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<sup>2</sup> Associated Engineering Ltd., *"City of Grand Forks Hydropower Feasibility Assessment"*, 2012.

<sup>3</sup> British Columbia Copper, 1915

<sup>4</sup> Community Energy Association, *"Renewable Energy Options Review: Prepared for the City of Grand Forks"*, 2010.

<sup>5</sup> J.J. Baron, Regional District of East Kootenay, *"Smelter Lake Study – A Preliminary Assessment"*, 1977.

<sup>6</sup> J.J. Baron, Regional District of East Kootenay, *"Smelter Lake Study – A Preliminary Assessment"*, 1977.

<sup>7</sup> J.J. Baron, Regional District of East Kootenay, *"Smelter Lake Study – A Preliminary Assessment"*, 1977.

while enhancing local recreational activities, the District developed an assessment for restoring the Granby Dam and Smelter Lake. The District wanted to evaluate whether or not establishing the Granby Dam would benefit the community of Grand Forks. The study's purpose was to address the question: "Should the primary use continue to be rural-agricultural or should a lake be established which could function as a source of hydroelectric power, a reservoir and a recreational area?"<sup>8</sup> The lake area studied was 830 acres and, according to the assessment, 585 acres of privately owned land was to be inundated. Private lands existed within the Agricultural Land Reserve (ALR) and land uses included cultivation, pasture, deciduous vegetation, coniferous vegetation, open range, and rock.<sup>9</sup> While land owners' homes would not be inundated by the project, there was a potential for sewage disposal conflict. Nine property owners held lands within the proposed area for inundation. Some owners considered the dam a positive development for the larger community while others considered it an irresponsible waste of agricultural land or a tragic loss of their home. Within Grand Forks' community, some citizens believed that restoring Smelter Lake would adversely affect the water levels of Ward Lake and negatively impact the aquifer in that area. The 1977 assessment highlighted that the area between Smelter Lake and Ward Lake appeared to be part of an ancient river channel and, therefore, the permeability of the soil between lakes may have caused fluctuations in water levels. Also, the District emphasized that over the 48 year lifetime, the stability of Smelter Lake was established. Therefore, if restored, Smelter Lake water levels should not be higher than in the past. If water levels increased, erosion would most likely be stimulated at the lake's perimeter reducing the perimeter's stability. Taking this into account, the District recommended that, if re-established, successful recreational development of Smelter Lake should:

- remove all vegetation, including stumps, from the lakebed;
- remove all top soil from the lakebed to prevent mud and algae development;
- plant extensively on the site to provide shade and buffer areas; and,
- re-slope certain areas to create beaches.<sup>10</sup>

It is unclear from the desktop research why the project did not progress in 1977. Though Smelter Lake was never restored in the 20th century, incentives like new revenues from hydroelectric generation and recreational capacity are still powerful drivers for the District and City to consider when deciding to re-establish the lake today.

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<sup>8</sup> J.J. Baron, Regional District of East Kootenay, "*Smelter Lake Study – A Preliminary Assessment*", 1977.

<sup>9</sup> J.J. Baron, Regional District of East Kootenay, "*Smelter Lake Study – A Preliminary Assessment*", 1977.

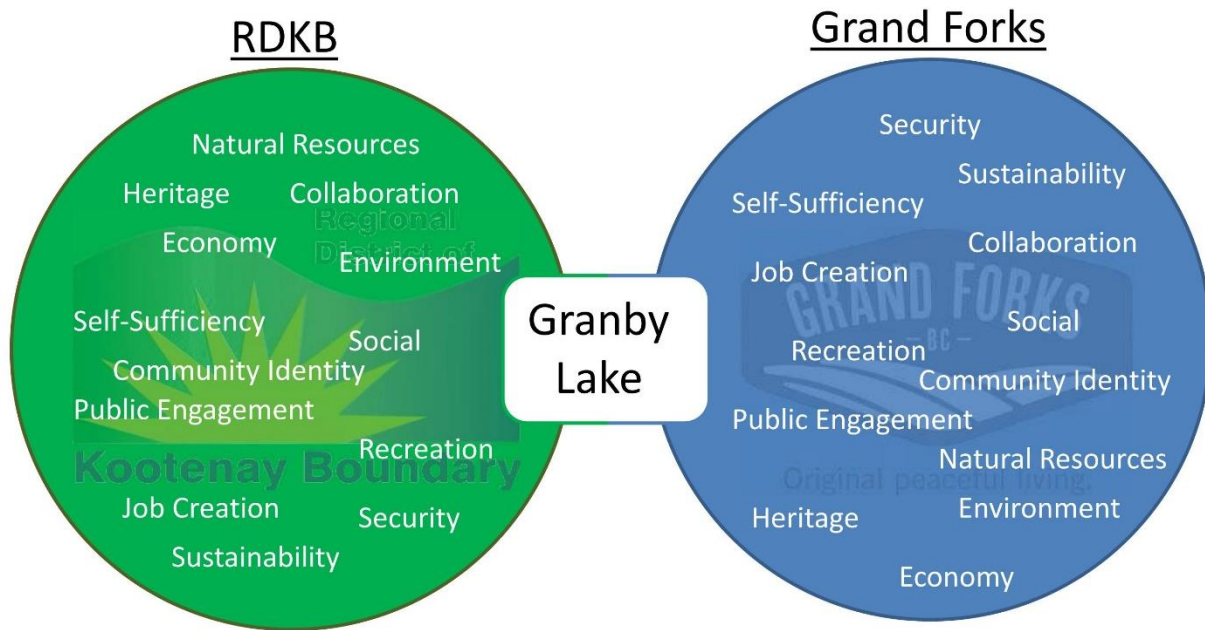
<sup>10</sup> J.J. Baron, Regional District of East Kootenay, "*Smelter Lake Study – A Preliminary Assessment*", 1977.

## 2.2 Project and Community Context

After reviewing the City's and the District's strategic plans, it was determined that the potential benefits that may arise from the Granby Project are consistent with the vision, priorities and goals for each. Therefore, a discussion is offered on how the development of the Granby Project is potentially consistent with achieving the strategic planning priorities of the City and the District.

### 2.2.1 ALIGNMENT WITH COMMUNITY PLANNING OBJECTIVES

When assessing whether or not a development project is appropriate for a community, identifying the community's goals and vision is important. Policy documents such as official community plans (OCPs) help guide communities by defining public policy for local resources, land use, transportation, and housing. Therefore, examining OCPs can help determine if a development project should proceed. If a development is deemed appropriate, it should be constructed to meet the needs of the community. Based on the District's and City's strategic plans, the potential benefits and process of the Granby Project are consistent with the vision, priorities, and goals of both jurisdictions. Strategic plans for the District and the City are compared below.





## Regional District of Kootenay Boundary Electoral Area ‘D’ Official Community Plan

The District is responsible for governing Electoral Area ‘D’ which includes the rural areas surrounding the City of Grand Forks. The current official community plan for the area was established in 1999 with the latest amendment to the plan occurring on June 24, 2010. The purpose of the OCP is to act as a “... guide for both public and private decision-making concerning the physical, economic and social development of the Plan area.”<sup>11</sup> The OCP aims to balance development potential with actual demand for new lots in Area D while protecting environmental values and resources. The OCP highlights agriculture as an important component of the local economy, as well as, several resource based industries with production facilities generally located in Grand Forks. The plan also outlines 15 community goals; community goals that can be used to assess if restoring the Granby Dam is appropriate, during the public engagement process. These goals include: public participation, rural character, agricultural land use, coordinating land use and services, heritage properties and buildings, natural environmental quality, residential serviced objectives, industrial objectives, parks and wildland objectives, and servicing objectives.

## City of Grand Forks Sustainable Community Plan

Currently, demographic trends indicate that Grand Forks will see a significant proportion of its population retired within the next few years.<sup>12</sup> Furthermore, the population of Grand Forks is declining below 4,000 residents for the first time in over 15 years.<sup>13</sup> Compounding these issues are current economic challenges facing the area’s primary source of industry – the forestry industry.<sup>14</sup> Taking these factors into account, “the economic viability of the community is of very high concern.”<sup>15</sup> Therefore, in collaboration with Urban Systems and with funding under the Integrated Community Sustainability Planning (ICSP) program, the City of Grand Forks developed a Sustainable Community Plan to guide its community towards a healthy, sustainable future. When developing its SCP, the city asked itself a number of questions including:

*What will the City’s future economic base be comprised of?*

*How do we attract young working families to the community?*

*What can we do to make the community more sustainable and self-sufficient?*<sup>16</sup>

Answering these questions expresses the City’s “commitment to [a sustainable] future and ensures that all three components of sustainability are considered: the social, economic, environmental and cultural.”<sup>17</sup>

<sup>11</sup> Regional District of Kootenay Boundary, “Electoral ‘D’ Official Community Plan Bylaw No. 852. Trail, BC: Canada”, 1999

<sup>12</sup> Urban Systems, “City of Grand Forks Sustainable Community Plan Bylaw No. 1919. Kelowna, BC: Canada”, 2011.

<sup>13</sup> Urban Systems, “City of Grand Forks Sustainable Community Plan Bylaw No. 1919. Kelowna, BC: Canada”, 2011.

<sup>14</sup> Urban Systems, “City of Grand Forks Sustainable Community Plan Bylaw No. 1919. Kelowna, BC: Canada”, 2011.

<sup>15</sup> Urban Systems, “City of Grand Forks Sustainable Community Plan Bylaw No. 1919. Kelowna, BC: Canada”, 2011.

<sup>16</sup> Urban Systems, “City of Grand Forks Sustainable Community Plan Bylaw No. 1919. Kelowna, BC: Canada”, 2011.

<sup>17</sup> Urban Systems, “City of Grand Forks Sustainable Community Plan Bylaw No. 1919. Kelowna, BC: Canada”, 2011.

The vision outlined in the City's plan states:

*“Grand Forks is recognized as a self-sufficient community incorporating sustainable principles – social, economic, environmental and cultural – into its decision making process.”*



The table below identifies community interests for the District and City and compares statements from the District Electoral Area ‘D’ OCP as well as the City of Grand Forks SCP and visioning document – *Imagine Grand Forks* – that guide community development. The table also identifies how the Granby Project could impact planning goals.

**Table 1: A Comparison between Interests Outlined in Community Planning Documents for the District and the City.**

Also, included is a description of how re-establishing Smelter Lake could address community interests.

STATEMENTS			
	<i><b>RDKB Electoral Area ‘D’ OCP</b></i>	<i><b>City of Grand Forks Sustainable Community Plan and Imagine Grand Forks</b></i>	<b>Granby Project</b>
<b>Public Consultation</b>	“The public expects change to occur in a predictable fashion, it also desires mechanisms for dealing with its unpleasant effects and it wants to influence development.”	“Develop a ‘co-responsible’ environment where government, businesses, not-for-profit organizations, schools and citizens work in partnership to achieve common, sustainable goals.”	Excellent opportunity to engage the community and seek public input.
<b>Community Identity</b>	“Peace and quiet, natural beauty, wildlife diversity, minimal pollution, privacy, open spaces, low population density, large lot sizes, access to outdoor recreation and good farmland”	“Enhance the visual appearance of the entire community through well-designed streetscaping, landscaping, land use designations, heritage preservation and quality built form.”	<p>A restored reservoir could enhance the visual appearance of the area emphasizing relationship between recreation, water and wildlife.</p> <p>Foster a sense of place as a ‘green’ community.</p> <p>Improve external community brand.</p> <p>Increase citizen pride.</p>

Agriculture	“Minimize the opportunities for incompatible land uses to become established in predominantly agricultural areas.”	“Support and encourage agriculture as a vital contributor to the local regional economy.”	<p>Inundated lands would not be available for agricultural practices.</p> <p>Productive agricultural land would need to be allocated elsewhere to ensure a net loss of zero ALR land.</p>
Sustainability	“Guide future development in such a way that the benefits of growth and change are secured while negative impacts are avoided.”	<p>“In order to thrive and prosper, Grand Forks must be able to meet the needs of its citizens today without compromising the ability of future generations to meet their needs.”</p> <p>“Ensure long-term sustainable municipal infrastructure.”</p>	<p>The Granby Project could help manage water resources sustainably while producing clean energy for the local community.</p> <p>Could create additional revenue streams for local governments creating enhanced financial sustainability.</p>
Environment	“In the public interest to avoid environmental damage and avoid expensive extensions to water services whenever possible.”	<p>“Maintain and foster environmental quality”</p> <p>“Move towards a zero waste future.”</p>	<p>Monitoring reservoir levels may reduce erosion at the reservoir’s perimeter if water levels are too high.</p> <p>Local fish populations could be negatively impacted during spring and fall spawning months.</p> <p>Infrastructure such as fish ladders could reduce impacts on fish populations.</p>
Heritage	“Encourage the preservation and use of buildings in Electoral Area D which have historical value to the community.”	“Protect and enhance the heritage values of the community.”	There is potential to incorporate historical elements of old Granby Dam into the new project site. For example, panels along the dam or reservoir could detail the area’s history. Consultation with First Nations and key stakeholders such as the Doukabours is required.

Natural Resources	<p>“Encourage wise use of natural resources, ensuring long-term community stability and prosperity.”</p> <p>“Establish land use and density policies which are cautious, especially concerning those activities which may impact on groundwater quality.”</p>	<p>“Conserve energy and water and support the sustainable production of food.”</p> <p>“Ensure that steps are taken to address the potential groundwater conditions and/or flood hazards.”</p>	<p>The dam/reservoir could provide increased security for sustainable management of water resources for industrial, commercial and public use.</p> <p>Source for renewable energy production.</p>
Self Sufficiency		<p>“Increase the production and consumption of local food, materials and energy so that Grand Forks is less reliant on outside sources for these necessities.”</p> <p>“Control [energy] cost, maintain a level of affordability for the City’s plant and its citizens and meet its Provincial requirements for carbon-neutrality.”</p>	<p>Increased local power production.</p> <p>Reduced dependency on outside power providers.</p> <p>Creation of local economic development projects along the foreshore.</p>
Land Use	<p>“Avoid future land use conflicts by identifying suitable locations for industrial land uses.”</p> <p>“Ensure that land use/density and servicing are co-ordinated.”</p> <p>“Ensure that development occurs at a pace appropriate to the available level of services.”</p>	<p>“Integrate open spaces, residential, commercial, institutional and industrial facilities, and transportation into an integrated plan.”</p>	<p>There is the potential for conflict between industrial and agricultural land uses.</p> <p>Opportunity to integrate open space with industrial and institutional facilities/activities.</p>

Collaboration	<p>Work in cooperation with the City of Grand Forks to ensure that the area has sufficient availability of industrial land.”</p> <p>“Establish and maintain effective communication links between the Regional District and other service providers in Electoral Area D.”</p>	<p>“Planning processes engage community members and other partners to support community sustainability (e.g., First Nations, neighbouring communities, NGOs, private sector, other levels of government).”</p> <p>“Strengthen ties with other communities through regional collaboration.”</p>	<p>Regional collaboration could help strengthen ties with other communities.</p> <p>Reduced conflict over project development.</p> <p>Opportunity to identify and ensure mechanisms in place to address ongoing opportunities and concerns and work towards solutions of mutual benefit or interest.</p>
Recreation	<p>“Encourage the provision of appropriate public parks and recreation facilities for the residents of the Regional District.”</p>	<p>“Provide a variety of linked recreational opportunities.”</p> <p>“Identify future areas for parks and open space.”</p>	<p>The Granby Project could have multi-use capacity for boating, swimming, walking, and camping.</p>
Economy	<p>“Agriculture is an important component of the local economy, as are several resource-based industries.”</p> <p>“There are certain commercial land uses supporting the rural economy which should be encouraged to locate in Area D.”</p>	<p>“Support a diversified economy.”</p> <p>“Attract sustainable industries”</p> <p>“Plan for green infrastructure (water, sewer, “Greater Grand Forks must ... seek partners for investment in the alternative energy infrastructure...”</p>	<p>Creates a source of renewable energy and green infrastructure resulting in an increase in investment, business retention, and expansion.</p> <p>Increased economic resiliency.</p>
Job Creation	<p>“There are certain commercial land uses supporting the rural economy which should be encouraged to locate in Area D.”</p>	<p>“Greater Grand Forks must diversify its population by attracting new industry to retain its youth and invigorate the workforce with new workers.”</p>	<p>It will create new jobs in construction, dam maintenance and operation, water resource management, and recreation management.</p> <p>There will also be increased investment and business retention and expansion resulting in new jobs.</p> <p>Opportunity for educational study.</p>

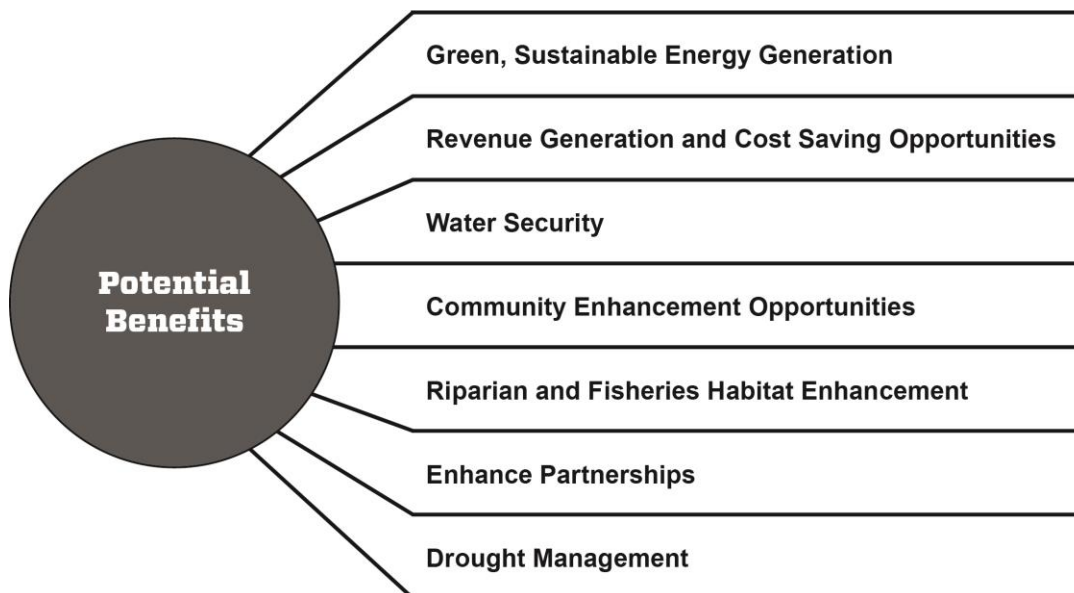


Based on regional and municipal planning documents, the Granby Project reflects the vision, priorities, and goals of both the District and City. If constructed and managed effectively, the dam and its reservoir could provide a source for new jobs, diversify the local economy, reduce dependency on outside power providers, enhance management of water resources, increase local recreational capacity, and help foster a sense of place for the community while being an excellent platform for inter-jurisdictional collaboration and public engagement. The remaining sections of this assessment investigate these potential benefits further to help facilitate future decision-making efforts led by the City and the District.

## 2.3 How the Granby Project Could Contribute to Key Community Objectives

The following potential benefits discussed below and summarized in **Figure 4** are consistent with achieving the objectives identified above. It is important to note that the actual validity of the benefits is dependent on a number of key factors including the design and structure of the Granby Project. Therefore, these benefits are offered for discussion purposes. Many of these benefits are further discussed throughout the key sections of this assessment.

**Figure 4: Potential Benefits**





### 2.3.1 POWER GENERATION

- **Power Generation**

The Granby Project would provide an opportunity to generate electrical power. A preliminary feasibility analysis suggests that the project could generate up to 9,500 megawatt hours of carbon-neutral power.

*Note:* Unfortunately this project would not be eligible to create carbon credits under the provincial *Emission Offset Regulation*. This is due to the fact that new power generation projects do not result in greenhouse gas reductions given that the Province's electricity supply (primarily from hydropower) is "carbon-neutral".

### 2.3.2 REVENUE GENERATION AND COST SAVING OPPORTUNITIES

- **Revenue Generation**

The proposed project could generate annual gross revenues of \$1M from power sales to BC Hydro. There may also be additional revenue streams from recreational/ residential developments.

## 2.4 Water Resources

- **Enhanced Water Supply for Agricultural Activities**

The Granby Project could provide a complementary but separate supply of water for local and regional agricultural activities. This may represent an important climate change adaptation measure.

- **Flood Control**

Depending on the attributes of the reservoir and dam height, the development of a reservoir could provide a limited means for the City and the District to manage the risks of flood conditions during the spring freshet.

- **Extend Water Supply Availability**

With the effects of global climate change growing, it is possible that the region could face drought conditions more regularly. The Granby Project could help to mitigate the associated impacts of drought conditions given it would hold a significant quantity of raw water in a typically dry region.

- **Supplement Aquifers**

If Smelter Lake was restored, there may be a benefit to the aquifer since it has been reported that there may have been sub-surface leakage from the original reservoir towards Wards Lake. This could benefit users of the Grand Forks aquifer due to the potential influx of subsurface flow.

- **Supplementing Low Flows in the Kettle River**

Releases from the Granby Lake could be used to supplement low flows in the Kettle River downstream of the confluence during periods of drought.

### 2.4.1 COMMUNITY ENHANCEMENT OPPORTUNITIES

- Local and Regional Recreational Site**  
 It is understood that the Smelter Lake Reservoir was once an important recreational amenity for the Grand Forks community. Through the Granby Project it could provide a unique opportunity to establish both natural and built recreational amenities, improving on what was there previously.
- Waterfront Property Development Opportunities**  
 With careful planning and appropriate servicing the Granby Project could provide an opportunity to develop a model waterfront community with multiple recreation opportunities. This could also enhance existing property values and promote residential development in the immediate area (e.g., Copper Mountain).
- Downstream Opportunities**  
 Controlling downstream water flows may have recreational benefits as well (e.g., fishing, paddle boarding).

### 2.4.2 RIPARIAN AND FISHERIES HABITAT ENHANCEMENT

- Riparian Habitat Enhancement**  
 With the re-establishment of the reservoir there are likely to be additional impacts to existing riparian landscapes. However, there will also be opportunities to enhance the riparian lands around the site. This could create ecological benefits.
- Fisheries Habitat Enhancement**  
 In addition to enhancing surrounding riparian habitats, efforts could be proactively taken to support local fish habitat conditions.
- Ecotourism**  
 If appropriate investments were made, the proposed project could lead to new ecotourism opportunities. This would support new economic development opportunities for local and regional residents and companies.

### 2.4.3 ENHANCED PARTNERSHIP OPPORTUNITIES

- The City of Grand Forks and the Regional District of Kootenay Boundary**  
 Given the significance of the project there will be many opportunities for collaboration between both government agencies. It will be important for both parties to proactively work in collaboration to *support* and develop mutually beneficial outcomes.
- City of Grand Forks and First Nations Communities**  
 Given the many potential opportunities associated with this project, and its significance, it will be important to proactively engage First Nation stakeholders. Opportunities for partnerships should be explored.

#### *2.4.4 DISCUSSION ON BENEFITS IDENTIFIED*

While many of these benefits are introduced here, several are explored in greater depths throughout this Preliminary Assessment. Additionally it is important to note that several of the benefits that have been identified are dependent on many different factors including, but not necessarily limited to:

- project design;
- project development timelines;
- level of investment into additional community amenities; and,
- level of effort made with project proponents in support of enhancing partnerships.



## Section Three

### PHYSICAL DESCRIPTION INFLUENCES ON LAND SUMMARY.

This section provides an overview of the potential physical footprint of the Granby Project. It also discusses existing land uses and zoning at the project site. It also outlines the framework for a land acquisition strategy. Key findings in this section are as follows:

- At an elevation of 531m, the proposed reservoir will cover 246.65 hectares
- 23 properties are directly impacted
- Area is zoned (Zoning Bylaw No. 1299, 2005) AGR2
- Project area is subject to the *Agricultural Land Commission Act*, regulations, and orders of the Agricultural Land Commission (236Ha)
- Located 600m from the Grand Forks Aquifer

## 3.0 Description of Project Physical Characteristics and Influences to Existing Land Uses

To develop a better understanding of the potential for the Granby Project, the following section describes the physical footprint of the project, and outlines the framework for a land acquisition strategy.

### 3.1.1 PHYSICAL FOOTPRINT

At an elevation of 531 metres, the proposed reservoir will cover 246.65 hectares based on contour mapping developed from the province's Terrain Resource Information Management Program (TRIM). Based on this mapping, 23 properties are directly impacted by the development of a new reservoir. This is illustrated in Figure 5 below.

Figure 5: Expected Physical Footprint of the Granby Project Area



The existing land uses and zoning were taken from the following District bylaws.

- Official Community Plan (OCP) Bylaw No. 852 (Area 'D')
- Zoning Bylaw No. 1299 (Area 'D')

Area 'D' is currently undertaking a review of OCP Bylaw No. 852. It is anticipated that a new OCP bylaw will be adopted mid-2014. This project may stimulate the requirement for future amendments to the new bylaw.

### 3.1.2 EXISTING LAND USE

The existing designated land use of the project area from the Official Community Plan Bylaw No. 852, 1999 is Extensive Agricultural. The bylaw defines Extensive Agriculture uses as:

*“agriculture, farm produce sales, single family dwelling, single wide mobile home, accessory buildings and structures, bed and breakfast, guest ranches, campgrounds and home-based business all subject to the Agricultural Land Commission Act, regulations and orders. Golf courses too may be considered an appropriate use but only by way of rezoning.”*

It is important to note that the proposed project area is subject to the *Agricultural Land Commission Act*, regulations, and orders of the Agricultural Land Commission.

A copy of the land use map is located in **Appendix A**.

### 3.1.3 EXISTING ZONING

The existing designated zoning of the project area from Electoral Area 'D' Zoning Bylaw No. 1299, 2005 is AGR2 (extensive agricultural resource). The following provisions apply to lands in the Extensive Agricultural Resource 2 Zone; only the following principal uses are permitted:

- a) Agriculture
- b) Campgrounds, only if approved by the Agricultural Land Commission (See Sections 303 and 318)
- c) Golf courses, only if approved by the Agricultural Land Commission
- d) Intensive agriculture, only on properties located within the Agricultural Land Reserve
- e) Processing of agricultural products, only if a minimum of 50% of products processed are grown on-farm
- f) Sales of agricultural products grown or raised in the area, only if sales floor area is less than 112 m<sup>2</sup>
- g) Single family dwelling

It is anticipated that amendments to both the OCP and zoning bylaws will be required to reflect the development of the community amenities and reservoir.

### 3.1.4 EXISTING SOIL PROFILE

The 1977 report identified a variety of soils in the former Smelter Lake area. The primary soil composition was termed “the Suanier complex”. This soil profile consists of alluvial deposits which have a high water table and the fertility ranges from fair to moderate. The 1977 report indicates that irrigation is typically required during mid summer for areas with forage crops. Overall, the soils in the former lakebed are well to imperfectly draining. The deposits around the periphery promote good drainage, consist of stable material, and are therefore suitable for development.<sup>18</sup>

### 3.1.5 LAND ACQUISITION

The implementation of the Granby Project and associated lake will require the strategic acquisition of properties within the affected (i.e., inundated) area. Key to this project will be obtaining a deeper understanding of the ownership, status, and area of the affected properties. From this, the City and the District will be able to develop a coordinated land strategy which will involve a variety of professionals (e.g., appraisers, surveyors, lawyers, negotiators, and communications specialists), in order to successfully manage the transfer of lands from private to public ownership if the decision is made to proceed with the project.

### Property Overview

The table below provides a listing of properties which potentially could be affected by the Granby Project. Additional research will be required to refine the information which, for the moment, includes a number of duplicate PIDs (property identification numbers) and some missing ownership information. The 23 properties listed below comprise an affected area of approximately 382 hectares (944 acres), based on a flood elevation of 531 metres above sea level.

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<sup>18</sup> J.J. Baron, Regional District of East Kootenay, “*Smelter Lake Study – A Preliminary Assessment*”, 1977

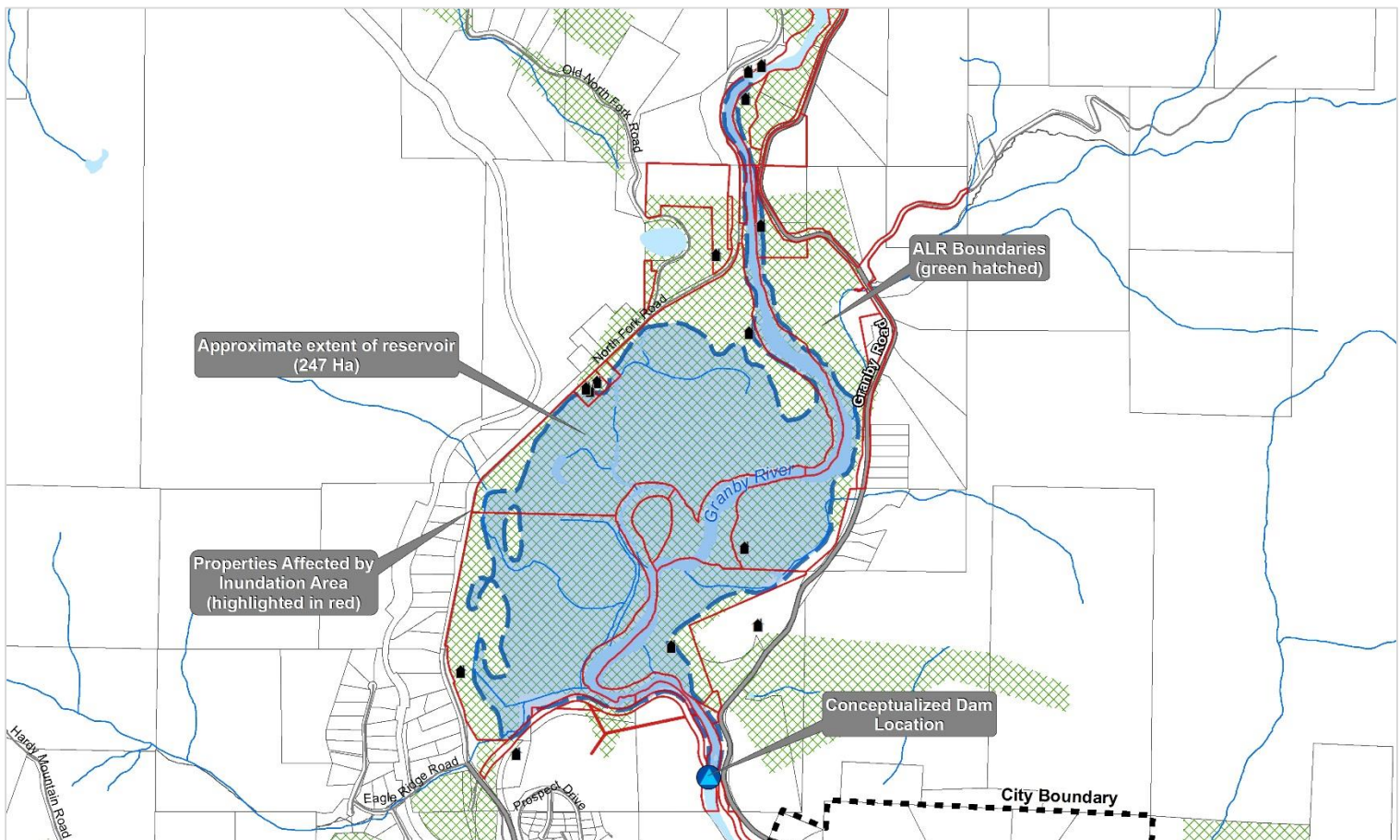


Table 2: List of Potentially Affected Properties

PID	CIVIC ADDRESS	OWNERSHIP	AREA (SQ. METRES)
015225500	9695 GRANBY RD	PRIVATE	74849.33
		UNKNOWN	4449.55
008221987	9270 NORTH FORK RD	PRIVATE	7948.09
014785234		CROWN MUNICIPAL	17779.19
		UNKNOWN	124039.22
004141130	9625 AND 9655 GRANBY RD	PRIVATE	38519.68
		UNKNOWN	114757.33
003930793	9280 NORTH FORK RD	PRIVATE	7739.34
008221952	9290 NORTH FORK RD	PRIVATE	7731.88
014777207		CROWN PROVINCIAL	1391.69
008271798	8810 AND 8820 NORTH FORK RD	PRIVATE	822608.64
014883864		CROWN PROVINCIAL	13818.44
016469551	9510 NORTH FORK RD	PRIVATE	1267274.76
014785731		CROWN MUNICIPAL	142112.88
002223201		PRIVATE	5499.74
002924170	9175 AND 9385 GRANBY RD	PRIVATE	544678.12
		UNKNOWN	102823.35
		UNKNOWN	137430.91
		UNKNOWN	4721.57
002223201		PRIVATE	43872.47
002223201	8845 GRANBY RD	PRIVATE	268036.37
		UNKNOWN	17186.75
013435175		CROWN PROVINCIAL	47655.98

Of the 382 hectares, approximately 22 hectares (55 acres) is in public ownership either Provincial Crown land or municipally owned. This leaves a difference of approximately 359 hectares (888 acres) of which 51 hectares (125 acres) has an unknown ownership status (i.e., some of it could be publically owned such as an easement or right of way). Finally, of the affected area (based on the 531 metre elevation), approximately 236 hectares (583 acres) of land is located within the Agricultural Land Reserve, which must be taken into consideration as part of the strategy.

**Figure 6: Affected Parcels and ALR**



## Discussion and Key Considerations

Before any significant funds or efforts are spent on the lands strategy, it is very important that the City and the District review and discuss a number of key considerations, in order to come up with a consistent policy approach and direction to the potential land acquisition program for the Granby Project. Some of these considerations include, but are not limited to, the following:

- 1) ***Determine the Highest and Best Use*** – common terminology used in both the community planning and appraisal professions is “highest and best use”. This term is often taken into consideration when dealing with property assembly and acquisition. The Appraisal Institute of Canada defines it as, “... *the reasonably probable and legal use of property, that is physically possible, appropriately supported, and financially feasible, and that results in the highest value*”. Although not an exact science, the highest and best use of a property is determined by a number of factors, including the following: current zoning, future land use designation, infrastructure and servicing, site conditions (taking into account environmental, topographic, and geotechnical features), market conditions, and comparable site analysis. It is recommended that the City’s project team engage the services of an appraiser and/or strategic property advisor to help determine the appropriate valuations of the affected properties, as part of the basis for potential compensation.
- 2) ***Potential for down-zoning / designation*** – related to the above point, the highest and best use is partly related to the zoning and OCP designation of the affected properties. The local government does have the ability to change the zoning and/or designation of the subject lands (i.e., down-zone), albeit through the appropriate process which includes a bylaw amendment and public hearing. In addition, the local government cannot zone a private property for a use that allows for only public uses, without appropriate compensation. This public process will undoubtedly raise questions and speculation amongst the community, so its use is not recommended in this situation.
- 3) ***Potential for expropriation*** – once the appropriate valuation of each of the properties has been obtained, negotiations with individual (or combined) property owners could begin. As soon as the broader community becomes aware of this initiative, the potential for land speculation will surface, to the point where the asking price may escalate well beyond what the appraisal value and/or the reasonable market value of the land. This has impacted a number of re-development projects in the past across the province, including downtown redevelopment, transportation improvements (e.g., highways, recreation facilities, transit, and light rail), and other land assembly initiatives. If the decision is made to proceed with the Granby Project, we recommend that the City and/or the District be prepared (both legally and financially) to expropriate the lands based on the appraised value (or slightly above) of the respective properties. It is highly recommended to seek the advice and expertise of a solicitor as part of this component of the land strategy.
- 4) ***Timing of property acquisition*** – the City and the District should consider the potential for acquiring key properties as early in the process as possible. Funds could be obtained through existing land sale reserves and/or other reserves, and expended outside the public eye through an in-camera decision of the City and/or Regional Board. This would help to curb speculation (at least initially) in order to minimize the financial impact with respect to property acquisition. We are also aware of a

local government establishing a separate numbered company (permitted under the Community Charter) and using a real estate agent to broker the deal and complete the land sale. The timing of potential property acquisitions would need to be discussed carefully to map out the most appropriate and strategic approach.

- 5) ***No net loss of ALR lands*** – as mentioned, the Granby project could inundate approximately 236 hectares (583 acres) of land within the ALR. In addition to the financial impact, the City and the District should consider the “no net loss” policy of the Agricultural Land Commission. A detailed review of the soil and land capability of the affected lands should be undertaken, and a potential strategy for no net loss (i.e., inclusion into the ALR of other similar lands elsewhere in the vicinity) should be carefully considered by the City and Regional Board.
- 6) ***Design options to minimize property impacts*** – depending on the scale and financial impacts of the potential property acquisitions, it may be more efficient and cost-effective to consider alternative design options. This could include re-shaping the land (based on the 531 metre elevation mark) through berms, dykes, and other structures to both reduce property impacts to land and buildings, as well as, potentially enhance specific properties (e.g., providing lakefront access next to existing houses). This would require some additional investment into more detailed mapping information (e.g., LIDAR, on-site survey), as the current topographic information is not at a scale appropriate for considering these types of design options.

For any project at a scale and complexity as this, it is imperative to carefully consider, discuss, and map out the land acquisition strategy at early and on-going stages in the process. The financial, legal, and political ramifications of a poorly thought-out land strategy are indeed significant. However, based on the appropriate discussions and key policy direction from the City and Regional Board elected officials, it is possible that the Project Team (including key administrative staff and professionals) can execute the land strategy effectively and efficiently in order to make the Granby Project a success.





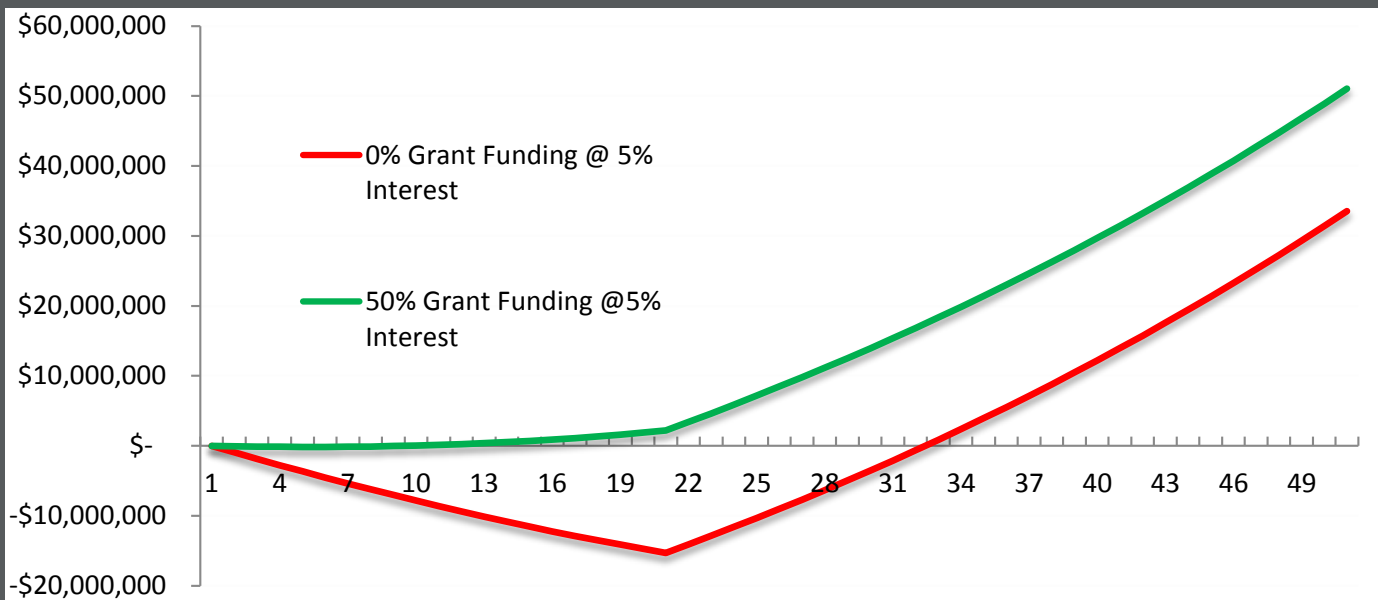
# Section Four

## FINANCIAL REVIEW PROJECT SCENARIOS SUMMARY.



In order to obtain a better understanding of the financial costs and benefits associated with the two proposed project scenarios of the Granby Project, a financial review was undertaken. Based on previous reports, known conditions of the project site and the key assumptions used for the assessment, it is estimated that project Scenario 1 will have a total development cost of approximately \$19.5M, where project Scenario 2 will have a total development cost of approximately \$21.7M.

Based on the analysis, neither Scenario 1 nor Scenario 2 are likely to offer a positive return on investment without the assistance of significant grant funding. This is due to the fact that the anticipated revenue generated per unit of energy produced is less than the unit energy cost (including debt servicing costs). The sensitivity of grant funding is illustrated below.



It is also important to note that over the course of September 2013, BC Hydro has made a number of policy announcements that may inhibit the growth of privately produced power in the Province. This could influence the timing and likelihood of the Granby Project securing a power purchase agreement under the BC Hydro SOP. It will be critical to monitor how these recent policy announcements evolve over the next 6-12 months and their potential impact to the success of the project's development.

## 4.0 Financial Review of Project Scenarios

To gain a better understanding of the financial costs and benefits associated with the proposed project scenarios for the Granby Project, the following financial review is presented. This financial review builds from the report authored by Associated Engineering Ltd., completed in June 2012.<sup>19</sup> More specifically, this review references the project development cost estimate and power production profile for “Storage Scenario 3 – SOP”<sup>20</sup>, which is equivalent to *Scenario 1: Hydroelectric Scenario* described in this assessment. This project scenario also represents the basis for *Scenario 2: Community Development Scenario*, for which a preliminary cost estimate (allowance) has been developed for the following community enhancement amenities:

- a boat launch;
- a constructed beach area;
- campfire pits;
- picnic areas;
- interpretive trails;
- a pier; and,
- an active transportation pathway linking the TransCanada Trail (i.e., Kettle Valley Rail Trail) within the City of Grand Forks, with an estimated total distance is 5.5 kilometres.

To support this financial review, the RETScreen Clean Energy Project Analysis Software was utilized. RETScreen is a unique decision support tool developed by the Government of Canada to enable the assessment of renewable-energy and energy-efficient technologies.

### 4.1 Key Financial and Economic Assumptions

#### Updated Financial Assumptions Relative to 2012

After reviewing the Associated Engineering Ltd., 2012 report, a number of high-level financial and cost assumptions have been updated for the purpose of this project. These updates are intended to reflect direction provided by the City. Additionally, a number of macro-economic changes have occurred, and therefore, several modifications to key financial assumptions were required.

The main changes to the financial and cost assumptions used in the 2012 report in regards to the analysis herein are presented in **Table 3** on the following page.

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<sup>19</sup> City of Grand Forks, “*Hydroelectric Feasibility Assessment Report*”, June 2012.

<sup>20</sup> Ibid.



**Table 3: Summary of Changes to Project Configuration/Analysis**

ASSUMPTION	ASSOCIATED ENGINEERING (2012)	UPDATED ANALYSIS
Borrowing Costs	3%	5% to better align with the likely interest rate offered by the Municipal Finance Authority (MFA) for a long-term loan.
Project Contingency	15% of project costs	30% of project costs, as is best practice for Class D cost estimates.
Project “Soft Costs”		Approximately \$400,000 of additional project soft costs was included for environmental approvals and community engagement processes.
Project Life	20 years	30 years, as many hydroelectric facilities can have very long useful lives, without the need for significant repairs and upgrades.
Operation and Maintenance Costs	\$50,000	2% of capital hydroelectric project costs and 1.1% of power line costs. Plus water rental of \$1.304 per MWh/y.
Discount Rate	Not disclosed	5% which is assumed to be an appropriate rate for non-private sector enterprises.

In summary, the key financial and economic assumptions used in this review are summarized as follows.

The key assumptions used in this review are based on class “D” cost estimates, and therefore include a 30% contingency allowance for unknown conditions. It has been assumed that the project’s capital is derived 100% from borrowing from the Municipal Finance Authority (MFA). The financing period is assumed to be 20 years (to match a 20 year minimum purchasing agreement with BC Hydro). Current market interest rates for a 20 year term are approximately 4%; a rate of 5% would account for small interest rate increases prior to potential project start-up. The MFA rates are lower than market (currently approximately

1%); however, quoted rates are only available for a 10 year term. Since the overall MFA rate for a 20 year term is difficult to predict, based on the information above, a market rate of 5% is used for the purposes of cost comparison. MFA suggests the use of a 4.44%<sup>21</sup> interest rate for analysis purposes for a 20 year MFA debenture. Therefore, the 5% rate applied to this analysis provides a degree of conservatism.

These and other key economic and financial parameters are used to support the project feasibility reviews summarized in the table below. A detailed overview of these assumptions is provided in **Appendix C** of this assessment.

**Table 4: Financial Parameters Used in the Clean Energy Project RETScreen Analysis**

PARAMETER	VALUE USED
Inflation Rate	2.5%
Discount Rate	5%
Electricity Export Rate*	\$109.50/MWh
Electricity Export Escalation Rate	1%
Debt ratio	100%
Debt interest rate	5%
Debt term	20 years
Contingency	30%

\* Based on BC Hydro Standing Offer Program Rules, February 2011

It is important to note that the financial and economic assumptions highlighted above can have a significant influence on the project's total development costs, financial feasibility, and overall attractiveness as an investment opportunity.

## 4.2 Summary of Findings

In addition to highlighting the key design parameters and financial indicators of each project configuration in **Table 5** and **Table 6**, a comparative cash flow analysis is highlighted in **Figure 7**. The cumulative cash flow of a project represent the net after-tax flows accumulated from year 0 of the project. This metric helps to illustrate when a project is estimated to provide a positive cash flow to the proponent, i.e., the point in time in which project revenues begin to exceed project costs.

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<sup>21</sup> Municipal Finance Authority, *Long-Term Rates*, <http://www.mfa.bc.ca/long-term-lending-rates> (September 2013)

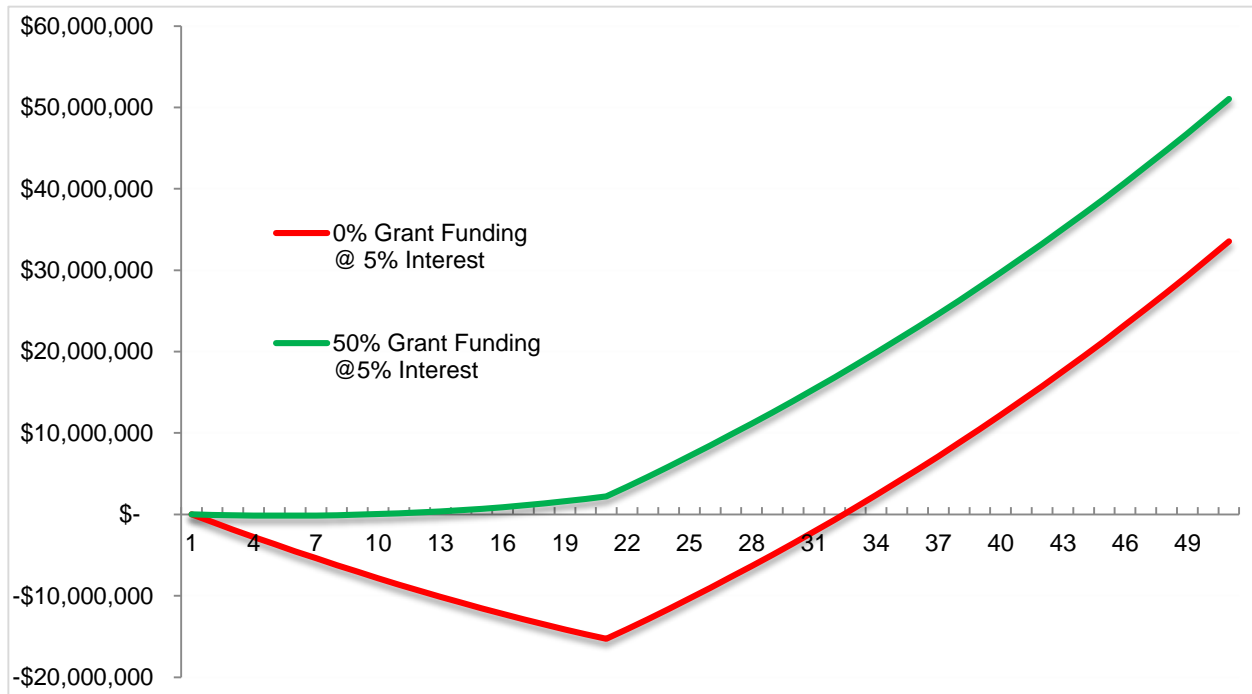
**Table 5: Financial Review Summary for the Granby Project**  
**Scenario 1** (assumes no senior government support)

Hydropower Project Granby Project - Scenario 1 Case Summary - Results obtained using RETScreen Project Analysis Software (NRCan)		
<b>Energy System</b>	<b>Components</b>	
	Design Flow	58 m <sup>3</sup> /s
	Head	8 m
	Turbine Type	Kaplan Pit
	Project Power Capacity	3.7 MW
	Approximate Annual Energy Exported to Grid	9,500 MWh
<b>Cost Estimate</b>	<b>Initial Capital</b>	
	Development	\$938,221
	Engineering	\$739,000
	Hydro Turbine	\$3,750,000
	Roads	\$0
	Transmission Line	\$100,000
	Substation/Interconnection	\$585,100
	Site Preparation and Works	\$223,000
	Remedial Works Allowance	\$200,000
	Concrete Works and Superstructure	\$1,014,200
	Power House/ Building/ Mechanical Equipment	\$72,100
	Land Acquisition	\$6,696,196
	Contingencies (30%)	\$4,295,328
	Interest during Construction (5% -24 months)	\$930,654
	<b>Subtotal</b>	<b>\$ 19,544,000</b>
	<b>Annual Debt Repayment</b>	<b>\$ 1,568,241</b>
	<b>Total Project Cost w. 20 Year Debt</b>	<b>\$ 31,364,812</b>
<b>Financial Metrics</b>	<b>Annual O &amp; M</b>	
	Hydropower Project O&M & Water Resource Rental	\$ 162,500
	<b>Subtotal</b>	<b>\$ 162,500</b>
	<b>Total Annualized Cost</b>	<b>\$ 1,730,741</b>
	<b>Revenue Sources</b>	
	Average Unit Energy Cost (BC Hydro)	109.5 \$/MWhr
	<b>Total Annual Energy Revenues</b>	<b>\$ 1,040,095</b>
	<b>Total Energy Production Cost (\$/MWhr)</b>	<b>\$ 121</b>
	<b>Pre-tax Internal Rate of Return (Equity)</b>	<b>2.5%</b>
	<b>Simple Payback Period (years)</b>	<b>22</b>
	Debt Ratio	100 %
	Debt Interest Rate	5 %
	Debt Term	20 years

**Table 6: Financial Review Summary for the Granby Project  
Scenario 2 (assumes no senior government support)**

<b>Hydropower Project</b>		
<b>Granby Project - Scenario 2</b>		
<b>Case Summary - Results obtained using RETScreen Project Analysis Software (NRCan)</b>		
<b>Energy System</b>	<b>Components</b>	
	Design Flow	58 m <sup>3</sup> /s
	Head	8 m
	Turbine Type	Kaplan Pit
	Project Power Capacity	3.7 MW
	Approximate Annual Energy Exported to Grid	9,500 MWh
<b>Cost Estimate</b>	<b>Initial Capital</b>	
	Development	\$938,221
	Engineering	\$739,000
	Hydro Turbine	\$3,750,000
	Roads	\$0
	Transmission Line	\$100,000
	Substation/Interconnection	\$585,100
	Site Preparation and Works	\$223,000
	Remedial Works Allowance	\$200,000
	Concrete Works and Superstructure	\$1,014,200
	Power House/ Building/ Mechanical Equipment	\$72,100
	Land Acquisition	\$6,696,196
	Contingencies (30%)	\$4,790,328
	Interest during Construction (5% -24 months)	\$1,037,904
	<b>Community Amenities</b>	
	Boat Launch	\$75,000
	Pier, Constructed Beach Area and Associated Facilities	\$1,225,000
	Recreational Path (5.5 Km)	\$350,000
	<b>Subtotal</b>	<b>\$ 21,797,000</b>
	<b>Annual Debt Repayment</b>	<b>\$ 1,748,967</b>
	<b>Total Project Cost w. 20 Year Debt</b>	<b>\$ 34,979,340</b>
	<b>Annual O &amp; M</b>	
	Hydropower Project O&M & Water Resource Rental	\$ 162,500
	Community Amenity O&M	\$ 83,000
	<b>Subtotal</b>	<b>\$ 245,500</b>
	<b>Total Annualized Cost</b>	<b>\$ 1,994,467</b>
<b>Financial Metrics</b>	<b>Revenue Sources</b>	
	Average Unit Energy Cost (BC Hydro)	109.5 \$/MWhr
	<b>Total Annual Energy Revenues</b>	<b>\$ 1,040,095</b>
	<b>Total Energy Production Cost (\$/MWhr)</b>	<b>\$ 142</b>
	<b>Pre-tax Internal Rate of Return (Equity)</b>	<b>-0.9%</b>
	<b>Simple Payback Period (years)</b>	<b>27</b>
	Debt Ratio	100 %
	Debt Interest Rate	5 %
	Debt Term	20 years

**Figure 7: Cumulative Cash Flow Projections for Project Scenarios  
(with and without grant funding)**



### 4.3 Discussion on Findings

As highlighted in **Table 5** and **Table 6** and illustrated in **Figure 7**, neither Scenario 1 nor Scenario 2 are likely to offer a positive return on investment based on the referenced cost estimate and key assumptions without the assistance of significant grant funding. This is due to the fact that the anticipated revenue generated per unit of energy produced is less than the unit energy cost (including debt servicing costs), resulting in an economically unviable project. The sensitivity of grant funding is discussed in Section 4.4 Sensitivity Analysis

The main assumptions that impact the success of the project lie in both the costs and revenues, and are also related to project financing costs over the lifespan of the project. More specifically, this assessment assumes that 100% of the required equity for the project is to be financed at 5%. This adds a substantial cost to the project's overall costs and annual cash flows. Furthermore, the estimated annual O&M costs of the project represent a significant cost. The estimated O&M costs were calculated based on 2% of hydro-

electric project costs and 1.1% of power line costs. Plus water rental of \$1.304 per MWH/y and any additional O&M required to support Scenario 2 (assumed to be 5% of the invested dollars into community amenities). Finally, in Scenario 2, the development costs of the community amenities do not contribute to the overall amount of electricity produced. While these amenities are likely to contribute to a variety of different community benefits (see Section 6.0 Social Assessment for more detail), they represent a “sunk cost” to the hydroelectric power component of the project. As a result the project is likely to be a negative cash flow project for many years.

If the costs are examined in more detail through additional engineering and design work, a more accurate cost estimate could be produced that references specific material and site specific information, thereby reducing the contingency costs which have been valued at 30%. It is recommended that this be undertaken in short order, should the City decide to proceed with the project in any form or fashion.

In summary, the poor financial feasibility of the project scenarios can be attributed to a number of factors which include:

- project development and O&M costs relative to the power output and revenues;
- additional costs of community amenities (Scenario 2) with no direct and additional financial benefit to the hydroelectric component of project, but may contribute additional benefits to the community;
- the assumed cost of project financing; and,
- no assumed grant funding or project subsidies.<sup>22</sup>

Note - this financial review did not account for any large-scale project upgrades or repairs. Proper O&M practices will potentially help defer such upgrades beyond 20-30 years; however it is possible that they could be required within a shorter timeframe.

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<sup>22</sup> It is important to note that many renewable energy projects require financial support from senior level governments to improve project feasibility.



## 4.4 Sensitivity Analysis

A sensitivity analysis was completed to assess the benefit of pursuing a grant and equity funding arrangement. For the sensitivity analysis, two additional analyses were considered for project Scenario 2.

One analysis assumed that 25% of the initial capital costs (approximately \$5.45M) of project Scenario 2 were assumed to be covered by grants and equity. A second analysis was considered where 50% of the initial capital costs (approximately \$10.9M) for project Scenario 2 were assumed to be covered by grants and equity. **Table 7** highlights the analysis considered in this sensitivity analysis, which references two financial metrics:

1. Simple payback period;<sup>23</sup>
2. Net present value.

**Table 7: Sensitivity Analysis - Impact of Grant Funding on Project Feasibility**

GRANT FUNDING	REMAINING BORROWED CAPITAL COST	SIMPLE PAY-BACK	NET PRESENT VALUE
\$0	\$21,795,000 @ 5%	27 years	- \$2,895,000
\$5,450,000 25% of Project Costs	\$16,350,000 @ 5%	20 years	- \$650,000
\$10,900,00 50% of Project Costs	\$10,900,000	14 years	\$4,750,000

An additional sensitivity analysis was undertaken to review the impact of project development costs, different borrowing rates, debt ratios, and O&M cost structures. The findings of this analysis can be found in **Appendix D** of this assessment.

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<sup>23</sup> The RETScreen model calculates the Net Present Value (NPV) of the project, which is the value of all future cash flows, discounted at the discount rate (10%), in today's currency. NPV is related to the internal rate of return (IRR). NPV is thus calculated at a time 0 corresponding to the junction of the end of year 0 and the beginning of year 1. Under the NPV method, the present value of all cash inflows is compared against the present value of all cash outflows associated with an investment project. The difference between the present values of these cash flows, called the NPV, determines whether or not the project is generally a financially acceptable investment. **A positive NPV values are an indicator of a potentially feasible project.** In using the net present value method, it is necessary to choose a rate for discounting cash flows to present value. As a practical matter, organizations put much time and study into the choice of a discount rate. The RETScreen model calculates the NPV using the cumulative pre-tax cash flows.

## 4.5 Conclusions on Project Financial Assessment

The financial review provided in this assessment indicates that power generation from the Granby Project under both project scenarios would represent a net loss with no financial return on investment under the current project configuration, financial assumptions, and power unit pricing offered by BC Hydro without significant grant funding.

Therefore, it is concluded that as a “stand-alone” project that does not account for the additional (direct and indirect) economic benefits of associated recreational amenities that may arise from the additional investments under project Scenario 2 overall, the feasibility of the proposed hydroelectric power project is poor. As such, the project should not be pursued solely based on its financial feasibility unless significant grant funding is secured from outside agencies. This suggestion is based on the sensitivity analysis completed for this assessment, which indicates that with sufficient grant funding and reduced borrowing rates (see **Appendix D**), the project could provide a long-term financial benefit to the City and the District.

It is recommended that if the City and the District decide to develop the project, consideration should be placed on the feasibility and probability of securing the required grant funding needed to make the project economically and financially attractive. Based on this core recommendation, two series of additional recommendations are offered for the City and the District’s consideration.

**Recommendation Series 1:** The following recommendations should be considered if it is determined that the feasibility and probability of securing the required funding is strong.

- Submit applications for identified funding sources (see Section 8.2) to support further feasibility work and secure capital dollars to reduce the City’s borrowing requirements and costs.
- Initiate dialogue with potential funding partners to explore and secure funding opportunities to support the Granby Project.
- If funding can be obtained, then pursue the next steps outlined in Section 8.5 of this assessment and move towards project development.

If the City and the District choose to accept the recommendations listed above, the following steps would be required:

1. Contact representatives from funding organizations to obtain details on eligibility and application requirements.
2. Pursue potential funding partnerships and funding sources for the project and determine the desired level of involvement and investment by the City and the District in such partnership(s).
3. Conduct further development work in support of the project (e.g., engage BC Hydro, water license application, hydrometric program, detailed feasibility review and engineering, community engagement and consultation, First Nation engagement and consultation, etc.).

**Recommendation Series 2:** If it is determined that the feasibility and probability of securing the required funding is poor or undesired, the following recommendations should be considered.

- Review the findings of this assessment and the Associated Engineering Ltd., report in detail to fully appreciate the financial attributes of the proposed project.
- Further investigate the project to identify real cost saving opportunities associated with the project's development.
- Undertake a significant campaign to secure grant funding dollars and low cost financing options before ruling out the project altogether.
- Determine if further investment is warranted or valid.

In closing, while the financial feasibility of pursuing project Scenario 1 or Scenario 2, does not appear to be strong there are clear drivers that support the project's pursuit, such as:

- support the shared outcomes outlined in both the City's and the District's community planning documents and strategies;
- enhance the City's and the Region's energy security and reliability;
- promote green innovation and community pride;
- support local economic development opportunities;
- enhance local government financial security, self-sufficiency and innovation; and,
- recognize the many diverse benefits associated with Scenario 2 (see Section 5.6 for more details).



## Section Five

### ECONOMIC IMPACT ASSESSMENT SUMMARY.

In addition to understanding the financial characteristics of the Granby Project, the City of Grand Forks wished to gain a better understanding of the project's potential influence on the local and regional economy. In response to this, a preliminary economic impact analysis was conducted. From this preliminary analysis, it is evident that the project will have a significant impact to the local and regional economy through the creation of local economic development. The Granby project has the potential to be a strong catalyst for supporting and creating a more vibrant local economy. More specifically, the development of a hydroelectric facility, Scenario 2, is estimated to create the following:

- Generate \$16M million in expenditures to the region over 10 years
- Creation of 12 person-years of employment (construction) and two permanent 0.5 FTE positions (operations)
- Creation of 120 regional jobs
- 15% Increase in housing prices

## 5.0 Economic Impact Preliminary Assessment

The objective of this preliminary assessment on the economic impact of the Granby Project is to outline the broader economic costs and benefits associated with the creation of a hydroelectric dam on the Granby River. As discussed previously in Section 1.4.1 there are two scenarios being explored in this preliminary assessment:

- Scenario 1:** Hydroelectric Scenario (hydroelectric project only); and,
- Scenario 2:** Community Development Scenario (hydroelectric project combined with a Tourism Area Development Asset).

This section will evaluate Scenario 1 and the impact the development of a hydroelectric project on the Granby River will have on the local economy. Although this analysis will be applicable to both scenarios it will focus primarily on the direct and indirect economic impacts resulting from the hydroelectric dam component of the project.

Renewable energy projects, such as the proposed Granby Project, can and have provided significant economic stimulus to British Columbia's economy. Dam projects generate a vast array of economic impacts both in the region where they are located, and at inter-regional, provincial, and national levels. In fact, the value of capital investment in existing independent power projects across BC is estimated at \$2.8 billion with capital investment in potential projects estimated at \$26.1 billion.<sup>24</sup> While potential clean energy projects (projects in planning stages) during the construction phase alone are estimated to stimulate the economy by creating \$11.719 billion in GDP; 117,140 person years of employment; and, government revenues of \$2.326 billion.

On another equally important level, beyond these statistical and qualitative assessment insights, it is important to consider the relative contributions a hydroelectric project could make towards the economic vitality of a community, region, province or nation. Currently, provincial policies are powering British Columbia's market for small scale renewable electricity – the *British Columbia Energy Plan* requirement to achieve electricity self-sufficiency is creating a key local market for renewable electricity development.<sup>25 26</sup>

### 5.1 Analytical Framework

There are a variety of economic impact models and approaches that can be used when it comes to measuring the impact of a specific project and economic stimulus. The approach or methodology chosen was largely driven by the specific context of the Granby Project to provide a preliminary assessment of an early stage hydroelectric dam. The investigation utilizes a variety of methodologies including the work of Clean

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<sup>24</sup> Based on 2009 replacement cost.

<sup>25</sup> Business Council of British Columbia, *“Realizing British Columbia's Second Renewable Electricity Revolution An Outlook 2020 Topic Paper”*, 2010.

<sup>26</sup> Caveat - the Government of British Columbia has made some recent policy announcements with respect to privately developed projects. These announcements have yet to be formalized in an official policy document, however they may limit the market significantly.

Energy of BC established in 2010.<sup>27</sup> As stated previously, the basic premise underlying this investigation is the identification and articulation of individual and aggregate economic impacts accruing to the City, and the District that can be specifically attributed to the construction and operational phases of the Granby Project. In particular, the activities (e.g., investing, spending producing, providing, employing, and/or utilizing) that would not have taken place in the absence of that stimulus (Granby Project). The key to this analysis is the isolation and measurement of the incremental activity – including direct, indirect/induced and tertiary effects.



Conventionally economic impacts are reported at the direct, indirect, and tertiary levels. These levels are generally defined below.

- Direct Impacts** are incremental changes in production that occur in businesses that would initially receive expenditures and operating revenue as a direct consequence of the operations and activities of a project (e.g., the purchase of construction materials or equipment from a local supplier).
- Indirect Impacts** results from increased production by area businesses who supply primary and intermediate goods and services (e.g., purchase of merchandise from factory by local business supplying the project).
- Induced Impacts** refers to the impacts derived from the spending of income gained as a result of the wages and salaries paid to end product sellers and producers as well as from primary and intermediate goods and services providers.

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<sup>27</sup> This section of the report utilizes a variety of methodologies, including multipliers, to estimate aggregate indirect and induced impacts. Multipliers are derived from input-output (I/O) tables. I/O methodology is based on the notion that the production of an output (goods and/or services) requires inputs (goods, services and factor inputs; labour and capital). Therefore, an increased demand for goods and services because of an initial expenditure by a stimulus (Granby Project) will generate economic activity by producers (suppliers) of those products. Production by suppliers will further increase demand for inputs and so on. The magnitude of a multiplier varies depending upon the structure or economic sophistication of a community.



As mentioned earlier an extra element of analysis and assessment has been conducted on the development of a Tourism Area Development Asset <sup>28</sup> in order provide the most accurate representation of the full benefits the Granby Project can have on the community.

**Tertiary Impacts** refers to the supplementary activity as a result of the creation of a Tourism Area Development Asset, such as the Granby Lake, and the impact of spending as a result of this economic development catalyst. A Tourism Area Development Asset built around the proposed reservoir will likely result in a ripple effect that would positively impact other enterprises, organizations, and individuals within the City and the District.

In order to conduct this analysis a two phased approach was used:

- 1) **Determine Direct, Indirect/Induced Impacts** - Analyze and determine of the economic impacts of the Granby Project as a hydroelectric dam.
- 2) **Determine Tertiary Impacts** - Conduct a preliminary assessment of possible tertiary economic impacts based on the scenario of investing in the creation of a reservoir to generate a Tourism Area Development Asset to act as an economic development catalyst.

The second phase of the analyses was completed to answer the question - other than a hydroelectric dam and reservoir, how else could the community leverage this project into an opportunity to strengthen the local economy? Specifically, what could the impact be of creating a lake focused on tourism and creating community amenities? An analysis was completed in Section 6.0 Social Assessment based on these questions and a preliminary vision of what this area could look like following the implementation of the Granby Project. Potential tourism assets considered in this analysis include: a boat launch, campsite, beach, picnic areas, recreational homes, washrooms, drinking water, trails, and an interpretive walk (highlighting area history/culture). Overall, this assessment of economic impacts endeavors to quantitatively measure the potential economic impacts derived from investment in the proposed Granby Project. It is understood that clean energy projects of this nature may produce many qualitative benefits for a region. Therefore, the measurement of economic impacts is focused on the quantitative; most commonly expressed in terms of value added (or gross domestic product (GDP)), government (federal, provincial and municipal) tax revenues, and employment generated from the project.

**Table 8** summarizes the sources and types of impacts expected.

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<sup>28</sup> Tourism Area Development Asset - refers to an identified geographic area in which has been purposively and strategically committed to for the purpose of creating and promoted as a cluster of tourism assets (often called products) in order to foster economic development through attracting tourist who in return inject dollars in to the local economy. For this assessment, this represents the conceptualized community amenities in Project Scenario 2.

Table 8: Sources and Types of Expected Impacts

<b>VALUE ADDED (GDP)</b>	The “value added” to the economy is the unduplicated total value of goods and services. It includes only final goods to avoid double counting of products sold during an accounting period.
<b>GOVERNMENT TAX REVENUE</b>	The total amount of tax revenues generated for different levels of government.
<b>EMPLOYMENT</b>	Number of additional jobs created. It represents the number of full-time jobs and is expressed in equivalent person years.

Table 9: Summary of Expected Economic Impacts

<b>IMPACTS</b>	<b>STIMULUS</b>	<b>TYPES OF IMPACTS</b>
Direct Impacts	<b>Dam Construction</b>	Construction Employment, Supply-Chain Community/regional incomes, outputs, value added and employment
Indirect/Induced Impacts	Ripple or “spin off” effect of initial <b>Hydroelectric Facility</b> spending; and spending and the ripple effect of the spending of construction workers, and supply chain activities	Community/regional incomes, outputs, value added and employment
Tertiary Impacts	Spending occurring as a result of investment in a reservoir as an economic development catalyst. Creating additional community amenities (i.e., a <b>Tourism Area Development Asset</b> ) will result in the ripple effect of economic benefit for other enterprises, organizations and individuals within the City and within the District.	Other social, economic, demographic and intangible impacts.

Although the project is located within the Boundary area, not all economic impacts resulting for the project will remain and/or occur within the region. Typically there is spending that occurs outside the region for specialized services and equipment. Specific to this industry, and BC based projects, spending will occur in regions that have an optimal combination of economies of scale and transportation costs. For example, technical production and services are generally located in major centres such as the Lower Mainland. Where possible special attention was paid to assess and describe the economic impacts that the region can expect to gain from the Granby Project (e.g., number of jobs). However, in some cases a provincial impact was calculated. This is largely due to the availability of area specific econometric data and multipliers. With this in mind the following economic impacts are stated in the provincial context, and, where possible, related back to the economic impacts expected for the region.

## 5.2 Granby Project: Scenario 1

### Direct/Indirect/Induced Impacts

The Granby Project will have impacts during both the construction and operational phases through direct contributions to the economies of the City and the District region. The majority of economic impacts from building the dam will be realized throughout the construction period as direct employment and spending in the Grand Forks area. However, there are long lasting employment impacts from the operating phase of the dam and for this reason employment is measured in person year impacts.<sup>29</sup>

#### 5.2.1 DIRECT IMPACTS

Based on a 3.7 megawatt hydroelectric dam project, it has been estimated that the direct impacts of the Granby Project will be the creation of 11.99 person years of employment; as well as a GDP impact of \$2.25M; and, an increase in government revenues by \$0.43M directly through the construction of the Granby Project (as shown in **Table 10**).

**Table 10: Estimated Economic Direct Impacts for Granby Project, Scenario 1**  
(Based on 2009 \$'s in Millions)

IMPACT	CONSTRUCTION	OPERATIONS
GDP Impact	\$2.25	\$2.5
Employment (person years) 30	11.99	1.0 FTE/year
Government Revenues	\$0.43	Data not available

<sup>29</sup> PricewaterhouseCoopers, “*Economic Impact Analysis of Independent Power Projects in British Columbia*”, December 2009, [http://www.greenenergybc.ca/Assets/PriceWaterhouseCoopers\\_IPPBC\\_report.pdf](http://www.greenenergybc.ca/Assets/PriceWaterhouseCoopers_IPPBC_report.pdf) (September 2013).

<sup>30</sup> The majority of employment comes directly from the construction of the dam in which some will be part-time and seasonal and is therefore considered in person year impacts rather than fulltime jobs. As when part-time and/or seasonal workers are used, this can be a misleading measure resulting in an overstatement of economic impact.

### 5.2.2 *INDIRECT/INDUCED IMPACTS*

The magnitude of the indirect impacts of the Granby Project (Scenario 1), in regards to spending and the disbursement of economic benefits between industries, will depend on the strength of linkages amongst various sectors of the economy. The breadth and depth of indirect impacts arising from the operations of the Granby Project, and by implication the operation of all related activities, is especially significant to the Grand Forks region. The ripple or spin off effects of the Granby Project expenditures is estimated to total an impact of \$1.82M in GDP, 28.71 person years of employment and increased government revenues by \$0.35M (as shown in **Table 11**).

**Table 11: Indirect/Induced Impacts of the Granby Project (Scenario 1)**

IMPACT	INDIRECT & INDUCED
GDP Impact	\$1.82
Employment (person years)	28.71
Government Revenues	\$0.35

### 5.2.3 *TOTAL ECONOMIC IMPACTS OF SCENARIO 1*

As mentioned earlier the most significant economic impact is derived from the construction phase. The total impact (direct + indirect/induced) of the establishment of the Granby Project – Scenario 1 is: a GDP increase of \$6.57M, an estimated 40.7 person years of employment, including two 0.5 full time equivalent (FTE's)<sup>31</sup> for every year the dam is in operation; and, \$0.78M in increased government revenues. As presented in **Table 12**.

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<sup>31</sup> The ratio of the total number of paid hours during a period (part time, full time, contracted) by the number of working hours in that period Mondays through Fridays. The ratio units are FTE units or equivalent employees working full-time. In other words, one FTE is equivalent to one employee working full-time.

Table 12: Total Estimated Impact of the Granby Project (Scenario 1)

IMPACT	DIRECT	INDIRECT & INDUCED	OPERATIONS	TOTAL IMPACTS
GDP Impact	\$2.25	\$ 1.82	\$2.5	\$6.57
Employment (person years)	11.99	28.71	1 FTE	40.70 + 2 0.5 FTE/year
Government Revenues	\$0.43	\$0.35	Data not available	\$0.78

### 5.3 Tertiary Impacts

There is substantive empirical research that supports the contention that, over and above those direct and indirect/induced impacts arising from the construction and operations of the Granby Lake dam the community can capitalize on a number of other possible tertiary impacts that will ripple throughout the community and region.

In particular, ripple benefits would be in the form of utilization of the reservoir as a local economic development catalyst. The engagement has included a detailed analyses exploring the impacts (direct and indirect) in greater detail in an effort to understand how the Granby Project (Scenario 1) could be leveraged into a local economic development catalyst (Scenario 2). In order to fully explore the tertiary impacts the next section of the assessment has been devoted to it.

## 5.4 Granby Project: A Community Economic Development Catalyst

The creation of a Tourism Area Development Asset on Granby Lake has the potential to be an economic development catalyst for the City and the District. This section will evaluate options for Scenario 2 and the impact of developing a Tourism Area Development Asset on the regional economy and tourism.

*Local economic development (LED) refers to the process in which local governments engage to enhance economic prosperity and quality of life.*



Source: PictureBC

It has been suggested that the City and the District should explore the tertiary opportunities with the proposed Granby Project by leveraging the reservoir into an economic development catalyst (i.e., investing in the community amenities highlighted in the description of project Scenario 2). This type of leadership and initiative by local governments encapsulates the essence of local economic development (LED).

LED refers to the process in which local governments engage and take ownership of the solutions to enhance economic prosperity and quality of life. Worldwide there is a resurgence of interest and commitment to LED in large measure because LED has been proven to be particularly effective in promoting and fostering broad scale development, and perhaps more importantly LED is premised on a more equitable and more sustainable sharing of responsibilities; and collectively results in a greater realization and more equitable distribution of the benefits of economic development amongst all citizens. Successful sustainable communities are those that are able to balance the competing needs of all local strategies while respecting the challenges and realities of their situation. It is important that practitioners in municipal government balance the economic development needs of an area with its social, community, and environmental needs.



## 5.5 Realities of Rural Communities in British Columbia<sup>32</sup>

The City and the District are not alone. There has been a shift in focus toward the current realities rural communities are facing today and in the near future. Many of the recent studies and analyses of rural BC have identified the same recurring systemic concerns, which are summarized as follows:

- much slower rates of population growth in rural areas than in urban centers;
- much slower rates of population growth in the age cohort of young adult and young family;
- much slower rates of employment creation and labour force growth;
- a significant decline in natural resource sector employment in BC over the past 40 years, resulting from the need for natural resource-based industries to become more capital and technology intensive in order to compete in a global market;
- overwhelming concentration of the employment in the new emerging sectors such as technology, digital media, and bio-technology in larger urban centres;
- slower rates of small business and entrepreneurial development;
- investment of almost all venture capital in BC flowing into metropolitan Vancouver, Victoria and the central Okanagan businesses; and,
- loss of government services and jobs in rural areas as a result of downsizing and centralization.

It is appreciated that every community has their own unique characteristics and challenges. The above list of realities that rural communities are experiencing speaks directly to the motivation for community leaders to engage in LED efforts.

### Community Local Economic Development - Preconditions For Success

There are certain common guiding principles in every successful local economic development project, as well as common themes and characteristic for successful communities. The City and the District are at a cross roads and need to make an important decision of whether or not to pursue the Granby Lake project. This decision making process should consider the role of LED to determine what option best meets their unique circumstances and needs. When evaluating options for the establishment of a Tourism Area Development Asset on Granby Lake it should be understood that local economic development is built upon four fundamental pillars: economic, social, environmental and institutional (see Figure 8). Collectively these four pillars represent the enabling environment. In a practical sense these pillars or foundations either serve to support or impede overall community prosperity. As such, when we look at LED planning and programming in the pursuit of community prosperity (as will be discussed in subsequent chapters) it is the enabling environment that plays a significant role in setting out what is realistic and practical in any LED effort.

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<sup>32</sup> Rural British Columbia Project Steering Committee, Discussion Paper Series, “What Does Rural BC Need to Succeed?”, <http://www.ominaccoalition.ca/Strategies/RuralBCProject/pdf/RuralBCNeedfinal.pdf> (September 2013).

## 5.6 Tourism Area Development Opportunities Arising from Scenario 2

The most significant opportunity that the City and the District can leverage from the Granby Project is the creation of a Tourism Area Development Asset. This preliminary assessment for creating a Tourism Area Development Asset on Granby Lake involves analyzing the potential impacts this development could have on the City and the District. This involves developing an understanding of the existing economic conditions of the region and then evaluating how these will change with the creation of a Tourism Area Development Asset on Granby Lake. The objective of this analysis is to provide local governments with some context and information to support the decision making process so both communities can make the best decision regarding the project's fit for the region. This will also help to facilitate the decision making process for the overall Granby Project by providing an objective overview of the potential economic impacts of development Scenario 2- Community Development Scenario (Hydroelectric Project combined with a Tourism Area Development Asset).

### Providing the Opportunity

#### PLACE-MAKING

Place-making is a multi-faceted approach to community planning, design and management. Place-making leverages local community assets, inspiration, and potential, ultimately creating public spaces that promote a community's quality of life and well-being. Place-making is both a process and a mindset.

Urban Systems

Figure 8: Four Fundamental Pillars

### Mandates



Such as:  
Systems of government and governance  
Manner and support for LED  
Development regulations and legislation  
Transparency and accountability

### Economic Circumstance and Opportunity



Such as:  
Competitiveness and competitive advantage  
Entrepreneurship  
Enterprise character, focus, and manner of development  
Incomes and employment  
Labour and capital markets

### Social Development and Social Capital



Such as:  
Gender equality/ equity  
Civil society  
Culture, education, health, housing and safety

### Environmental Character and Sustainability



Such as:  
Land, air, and water – character, capacities  
Environmental regulation and behaviour  
Greening alternatives and opportunities



Tourism is a major economic development opportunity for many communities and a means of improving the livelihood of its residents. Both the public and private sectors involved in tourism depend on leveraging community assets to achieve sustainable tourism development that respects the local community, creates appropriate employment, maintains the natural environment, and delivers a quality visitor experience. The creation of the hydroelectric facility and associated reservoir presents a unique opportunity for further economic development and economy stabilization in the region. There are three options to consider:

1. **Do not proceed**  
It is an option to not proceed with the hydroelectric dam and focus resources (human and financial) on other efforts in order to improve quality of life within the region.
2. **Primary purpose - creation of hydroelectric dam (Scenario 1)**  
Proceed with the creation of a 3.7 megawatt hydroelectric dam and the creation of a reservoir with the primary purpose of power generation.
3. **Leverage hydroelectric dam/reservoir as an opportunity to create a tourism area development asset (Scenario 2)**  
Similar to project option 2, option 3 would see the development of a reservoir based hydropower project with a net head of 8 metres, a project capacity of 3.7 megawatts and an estimated annual power output of 9,500 megawatt hours. Recognizing the historical uses of Smelter Lake, the City of Grand Forks understands there is an opportunity to complement the hydropower project with a Tourism Area Development Strategy and the creation of tourism and community assets. For the purpose of this the assessment, it is assumed the following amenities will be developed in conjunction with the hydropower project:

Potential Tourism Assets	Tourism Activities
Boat Launch	Canoeing
Campfire Pits	Cycling
Picnic Areas	Hiking
Campsites	Fishing
A Pier	Pet walking
Washrooms	Swimming
Drinking Water	Windsurfing
Trails	Winter recreation
Interpretive walk (Highlighting areas history/culture)	Mountain Biking



## RESERVOIR OPPORTUNITIES AND BENEFITS

### TOURISM ACTIVITIES

-  Canoeing
-  Cycling
-  Hiking
-  Fishing
-  Pets on a Leash
-  Swimming
-  Windsurfing
-  Winter Recreation

### TOURISM ASSETS

-  Boat Launch
-  Campfires
-  Drinking Water
-  Picnic Areas
-  Pit or Flush Toilets
-  Wheelchair Access
-  Vehicle Accessible Camping

## 5.7 Tourism Area Development Impacts

The following section outlines the direct, indirect/induced and tertiary impacts of developing a Tourism Area Development Asset on the proposed Granby Lake. In order to understand the full extent of the project's projected economic benefits there is a need to evaluate these impacts in the provincial, regional, and local context. This analysis will focus primarily on how Scenario 2 will affect changes in the tourism industry and function as a catalyst for economic development in the region.

### 5.7.1 PROVINCIAL

*“When it comes to tourism, who we are matters. The pride and passion of people in this industry breathes life into the landscape for visitors and their skills and knowledge enhance our global visibility and reputation. By improving coordination of tourism activities, shifting provincial marketing efforts to focus on high potential products, and actively pursuing emerging markets, we can support the sector to increase revenue and visitor numbers, and create jobs for families across British Columbia.”*

The Honourable Christy Clark  
Premier of British Columbia

The tourism industry is one of British Columbia's leading economic sectors, and benefits our province in many ways. Its economic benefits extend into every region of the province. In 2010, tourism employed 127,000 British Columbians, generated over \$13.4 billion in revenue and contributed over \$1.2 billion to provincial government revenues.

During the last decade, tourism in BC grew more rapidly than our economy as a whole, despite challenging international events. With our province's exceptional diversity of places, people, and experiences, British Columbia is uniquely placed to satisfy the increasing demand for high quality, authentic experiences. To capitalize on this opportunity, the government of British Columbia has identified tourism as a key element of *Canada Starts Here: The BC Jobs Plan*.

### 5.7.2 REGIONAL

The Boundary area is part of the Thompson Okanagan tourism region. The Thompson Okanagan covers 94,000 km<sup>2</sup> of the province, which is characterized by distinctive landscapes that range from desert and arid grasslands to abundant valleys, lakes, forested highlands, and alpine meadows. The population of the Thompson Okanagan continues to grow and is characterized by an older demographic than the province as a whole, with 51% aged 45 years or older compared to the provincial average (46%).

According to Destination BC, in 2010, there were an estimated 5.6 million visitors to the Thompson Okanagan tourism region, of these 3,309,000 (59%) were overnight stays and 2,291,000 (41%) were same-day travelers. In 2012, there were 673,703 visitors to visitor information centres (VICs) in the whole of the Thompson Okanagan Region, and the total number of visitors to VICs in the Boundary Country was 32,882 people or 4.88% of the total number of surveyed visitors in the Thompson Okanagan tourism region. Of



these travelers to Boundary Country 54.7% were same-day visitors and 45.3% stayed at least one night and for an average of 3.29 nights (# overnight visitors /# of nights stayed).

### 5.7.3 BOUNDARY COUNTRY

Boundary Country is fortunate to have a mixture of numerous natural amenities, heritage, and culture that make the region unique. There is little quantitative data regarding tourism visitation, expenditures and impacts for the Boundary region. Therefore, the study and associated expenditures and economic impacts are extrapolated from numerous sources. A primary source for information was *Destination BC Regional Profiles and the Visitor Information Centre Survey*, which was conducted in both Grand Forks and Christina Lake in 2003. Findings from this survey included:

- The majority of travelers were very flexible (65%) in the activities that they planned to participate in while in the area.
- Travelers primary leisure activities were spent sight-seeing (35%), or swimming/other water sports (18%). Less frequently mentioned activities included: touring, walking/hiking; cycling; camping; visiting the Rock Candy Mine or local museums; or golfing.
- Most travellers that visited the Grand Forks VIC indicated they learned about a new activity or destination at the VIC. Sixty-six percent replied they would make another trip to British Columbia and 28% replied they would stay another night as a result of information obtained at the VIC.
- The majority (57%) indicated that there were no additional attractions that could extend their stay in the Boundary region. The remaining 43% replied that initiatives like improved hiking trails; washrooms at the VIC; events/festivals; campgrounds; a waterpark; casino; fishing guides; golf; and, a Russian building/museum would extend their stay in the area. In terms of visiting an expanded Doukhobor museum, 64% of travelers indicated they would visit such a museum, while 31% replied they would not and 5% didn't know.
- Positive responses were dominated by the natural beauty of the Boundary region (24% of positive responses), followed by the friendly people (15%), the local history/historical attractions or museums (9%), and Christina Lake/other lakes (9%).

### Market trends that show potential for rural tourism

- A growing interest in heritage, tradition, authenticity and rural life.
- A desire for multiple holidays annually, with shorter breaks spent in rural areas.
- A growing interest in healthy rural lifestyles offering fresh air, activities and less stress.
- Market interest in high-tech outdoor equipment: clothing, all-terrain bikes and climbing equipment.
- A search for solitude and relaxation in a quiet natural place.
- An aging but active population retiring earlier, but living longer and travelling farther.

### 5.7.4 ECONOMIC IMPACT OF TOURISM IN BOUNDARY COUNTRY

Overnight travelers surveyed represented 45.3% of all visitors to Boundary Country, and the number of people staying overnight in 2012 was approximately 14,898. This represented 4.62% of all surveyed overnight visitors in the Thompson Okanagan region (n=322,704) in 2012. According to Destination BC there

were an estimated 3,309,000 overnight stays in the Thompson-Okanagan total. From this figure, we estimate that 4.62% or 152,760 overnight visitors were in the Boundary Country. Visitors stayed for an average of 3.29 nights and the number of recorded night stays from visitor centre surveys in the Boundary region was 48,960 (Greenwood, Christina Lake and Grand forks) meaning that overnight visitors spend a total of 502,581 days (152,760 x 3.29) in Boundary Country.

Same-day travelers surveyed represented 54.7% of all visitors to Boundary Country, and the number of recorded same-day visits from VICs in Boundary Country was 17,984. This represented 5.12% of all same-day visits in the Thompson Okanagan (n= 350,999) in 2012. According to Destination BC, there were an estimated 2,291,000 same-day travelers to the Thompson Okanagan total. From this figure, we estimate that 5.12% or 117,388 visits were in Boundary Country.

#### **5.7.4.1 Tourism Expenditures Direct Impact**

The number of overnight traveler days (n= 502,581 visitor days) combined with same day visitors (n= 117,388 visitors) provides an estimate of the number of daily visits for the year 2012 (n= 619,969) in Boundary Country.

According to *Regional Profiles and the Visitor Information Centre Survey*, the average daily expenditure for a tourist party in Boundary Country was \$146.3833 dollars and the average party size was 2.6 people. This amount is considered to be the same today with the exception of inflation. Considering that visitors spent an estimated 620,260 visitor days total in Boundary Country and spent approximately \$146.38 per party (2.6 people per party) means that tourism expenditure could be estimated at \$34,904,264 for the year 2012. ( $619,969 / 2.6 \times \$146.38 = \$34,904,264$ ). This equaled approximately 3.17% of the Thompson Okanagan region's total tourism revenue.

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<sup>33</sup> Inflation adjusted

#### 5.7.4.2 Indirect and Induced Expenditures<sup>34</sup>

The breadth and depth of indirect and induced impacts arising from tourist expenditures within the region, and by implication the operation of all related activities (of the hospitality industry); is especially significant to the region. Specifically:

- The yearly expenditures and spin off effects of those expenditures made by tourists in Boundary Country expected to conservatively total: \$1,396,171 per year - calculated as follows:  $(1.04 \times \$34,904,264)$ . Over a ten year period these expenditures would add an additional \$13.96M in spending in the local economy.
- Total direct and indirect jobs created pursuant to those activities noted above: 120FTE/Year.

#### 5.7.4.3 Impacts on Land Values and Taxes

If Project Scenario 2 were to be implemented, it will have an impact on the property values in the immediate vicinity and by extension the tax revenues to local government. The properties impacted are based in two

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<sup>34</sup> This section of the report utilizes a variety of methodologies, including multipliers, to estimate aggregate indirect and induced impacts. Multipliers are derived from input-output (I/O) tables. I/O methodology is based on the notion that the production of an output (goods and/or services) requires inputs (goods, services and factor inputs; labour and capital). Therefore, an increased demand for goods and services because of an initial expenditure by a stimulus (Granby Project) will generate economic activity by producers (suppliers) of those products. Production by suppliers will further increase demand for inputs and so on. The magnitude of a multiplier varies depending upon the structure or economic sophistication of a community. Smaller communities tend not to have the sectorial interdependencies which facilitate the retention of monies spent during the first and subsequent rounds of expenditures. In terms of the tourism sector it has been estimated that income multipliers will tend to range in the order of 1.04 to 1.07 depending on the relative sophistication of the community in which the activity is located, e.g. with Toronto or Vancouver being closer to 1.07 and centers such as Grand Forks considerably less. For the City of Grand Forks and the surrounding region we have chosen to utilize an income multiplier of 1.04. In terms of an employment multiplier the derivation of an acceptable coefficient is more difficult. In part the challenges lies in arriving at a coefficient that reflects sustainable, full time jobs not FTE's, which is a common but misleading measure utilized in many "tourism" impact assessments. Further, there is a challenge in weighting sectorial multipliers based on those sectors most significantly impacted by the Tourism Industry and its related activities such as equipment manufacturing/supply; food and beverage operations; accommodation services; automotive rentals and services; and so forth. Of further concern and particularly when forecasting: the actual number and types of jobs that are created today and over the next few years through indirect/induced impacts depends largely on the existing infrastructure within the community today; the extent of capacity utilization and the magnitude of labour productivity by occupation within the community today; the population base industry can draw upon; and the skill sets that the area can provide. The assessment proxies utilizes a cost/job proxy in the order of \$30,170 per job based on the average income for Grand Forks as stated in Community Facts (BC Stats). British Columbia Local Area Economic Dependencies - 2006, BC Statistics. Economic Base and Input-Output Multipliers A Comparison for Vancouver, B. C. H. Craig Davis, University of British Columbia, Canada. March 31, 2005. 2004 British Columbia Provincial Economic Multipliers, Garry Horne, March 2008 BC Stats. Income and Employment Multipliers for Seven British Columbia Regions. Canadian Journal of Regional Science 9 Davis, H. Craig. (Spring 1986).

broad categories 1) inundated (or possible) land and 2) land along the perimeter of the newly developed reservoir.

### Inundated Properties/Lands

It was determined that nine (9) properties would be directly impacted by the creation of a reservoir by being either inundated or partially inundated. In an effort to achieve conservatism the calculation of impacted lands was overly predicted. The combined assessed value of these lands is \$2,351,844<sup>35</sup> with an estimated tax revenue generation of \$6,486.15<sup>36</sup>.

- Due to the full or partial inundation of these properties the District will lose the tax revenues of \$6,486.15 per year.

### Properties along Granby Project Perimeter

It has been determined that a total of thirty-three (33) properties will gain views of Granby Lake as they will be located along the perimeter of the newly developed reservoir and will therefore benefit from added value. The assessed value of these thirty-three (33) properties is \$8,481,098<sup>37</sup>. It is being predicted that the creation of the Tourism Development Asset will impact the properties by increasing their values by ~10% for Scenario One and ~15%<sup>38</sup> for Scenario Two<sup>39</sup>. Based on the development of this area, the District can expect the Surveyor of Taxes to increase the tax rate levied against the properties in the area. Ultimately, this increase in property value is based on market demand being increased due to the heightened desirability of the area as an attractive place to buy or build homes. Centered on the increase in property values and desirability of the area the added benefits to the region are:

- increase in property value by an estimated \$1,272,164;
- potential increase in property taxes for the District;
- increase of residents' individual net worth increasing the borrowing capacities that would allow them (if desired) to increase mortgages. Monies can be spent on expenses such as renovations; and,
- increased transfer of property (buying and selling) also resulting in increased economic impact through professional fees and taxes (federal, provincial, and municipal).

#### 5.7.4.4 Future Economic Impacts

As previously demonstrated Boundary Country currently makes up a very small portion of the tourism market in the Thompson Okanagan region. The primary driver for tourism in the area is Christina Lake, which represents 72.09% of all tourism expenditure in the Boundary region. This is likely driven by the numerous

<sup>35</sup> BC Assessment, <http://www.bcasessment.ca/Pages/default.aspx> (September 2013).

<sup>36</sup> Based on 2.7579 per 1,000 based on 2013 rates and account for taxes collected by RDKB Area D

<sup>37</sup> BC Assessment, <http://www.bcasessment.ca/Pages/default.aspx> (September 2013).

<sup>38</sup> This estimated increase in value is estimated to occur once construction has been completed and the tourism assets have been competed making it a desirable tourism destination.

<sup>39</sup> These increased land values are based on an analysis of the sale price difference of properties between river view and non-river view properties with Grand Forks and Area D within a close proximity to the proposed Granby project. It was estimated that properties that have river view were selling at a 7.93% premium.

options for accommodation and recreation that attract large numbers of overnight visitors staying for several nights in a row (3.29 nights on average). This supports the notion that the City could use an attraction to encourage more overnight stays and provide recreational opportunities to tourists. Therefore, creating a Tourism Area Development Asset under project Scenario 2 may allow the City to capture a greater proportion of the tourism market in Boundary Country and in the region as a whole and solve some of the main challenges with tourism in the Grand Forks region; including: the need for an attraction that will attract RV and long haul travellers and, provide tourists with an additional reason to stay extra days (presently the average overnight tourist spends 2 days or less).

If the community can successfully create a tourism destination by leveraging the Granby Project the community could expect an increase in their tourism activity by 5-10%. Resulting in an increased annual economic benefit of (as shown in **Table 13**):

- Direct Expenditures \$3,490,426
- Indirect and Induced \$139,617
- Total Impacts \$3,630,043
- Creation of an additional 120.32 FTE's

**Table 13: Annual Economic Impact of Existing and Potential Tourism Industry**  
(Based on 10% Increase)

IMPACTS	PRESENTLY	INCREASED POTENTIAL BENEFITS	TOTAL POTENTIAL BENEFITS
Direct Expenditures	\$ 34,904,264	\$ 3,490,426	\$ 38,394,690
Indirect and Induced	\$ 1,396,171	\$ 139,617	\$ 1,535,788
Total Impacts	\$ 36,300,435	\$ 3,630,043	\$ 39,930,478
FTEs	1,203	120	1,324

#### 5.7.4.5 Qualitative Benefits of Tourism Development Initiatives

Well developed and implemented Tourism Area Development Asset initiatives benefit the community in numerous ways beyond that of quantitative measures.

##### Direct Spending by Tourists and the Associated Economic Multiplier Effect

Tourism generates different types of income for a community: business income, wage earnings, share earnings, rates, and levies. Direct spending by visitors has a positive impact on business profitability and employment growth. The money that is then circulated and re-spent in the economy is often referred to as

indirect spending or the multiplier effect. Because much of a region's tourism patronage comes from metropolitan centres, it is an effective way to redistribute wealth from urban to rural areas.

### Varied Economic Base

The expectations and needs of visitors can often lead to the creation of new businesses and commercial activities. This builds a more diverse economic base and reduces reliance on one or two traditional industries, which is often the case in rural communities.

### Employment

Tourism is a labour intensive industry and operates 24 hours a day, seven days a week. There are many opportunities for employment for young people and for people interested in part time or casual work. While some of the employment is skilled, there are also opportunities for people who are less skilled and lack formal qualifications.

## 5.7.5 TERTIARY BENEFITS OF TOURISM AREA DEVELOPMENT

There is substantive empirical research that supports the argument that, over and above those direct and indirect/induced impacts arising from the creation and successful implementation of tourism area development, there are a number of other impacts that will ripple throughout the community and region. Many of these ripple effects are intangible and thus difficult to measure exactly. They are nonetheless very real and arguably significant. Some examples of tertiary benefits of tourism area development include:

**New business:** A thriving tourism industry supports growth in other sectors, such as transport, construction, agriculture, and retailing. As tourism increases, there are more opportunities for small business to develop.

**Increased commercial and residential development:** Tourism area development within the District will result in increased revenue to councils through rates and other charges. In order to effectively develop the tourism area along Granby Lake there will need to be private investment for accommodations (campsites, recreational homes) and services. Tourism acts as a shop window for the lifestyle of the area. It is increasingly common for people who visit and are impressed with the area to return as residents, thereby increasing demand for housing and other services.

**Increasing community facilities:** The proposed tourism area development activity will stimulate new and expanded community facilities and infrastructure initiatives, such as a boardwalk, beach, trails, sport services, and facilities. This will increase the quality of life for the community, which may not otherwise warrant the improvement, based on the residential population alone.

**Preservation of cultural heritage:** Tourism activity often prompts the conservation of cultural heritage, either as a result of increased awareness and pride, or because it can be justified on economic grounds as a tourist attraction.

**A broadened community outlook:** Tourism area development initiatives often encourage communities to widen their outlook and to embrace new ideas. It provides opportunities for residents to interact with other people, lifestyles, and cultures.

**Flood control:** The creation of a dam will help regulate water flow in the Granby River providing a degree of flood control for areas downstream.

**Re-population:** Rural communities who successfully develop Tourism Area Development Assets have helped to slow or curb the latest trend of population loss to cities, by not only making the local area and its employment opportunities more attractive to young people, but by attracting citizens who are seeking rural community quality of life.





## Section Six

### ENVIRONMENTAL REVIEW SUMMARY.

The findings of this environmental investigation suggest that due to the project size of 3.7MW (BCEAA < 50 MW, CEEA < 200MW) it will likely not trigger a “comprehensive” environmental assessment. This could reduce the time and resources required to secure project approvals. However, proactive environmental investigations will be required to support beneficial environmental outcomes.

Given the region’s commitment to environmental sustainability, many of the potential impacts and associated mitigation measures will need to be further studied prior to development. Doing so will likely enhance community and stakeholder support for the project and ensure the project meets all the key regulatory and approval requirements identified in this assessment. The following lists the key findings:

- Proposed project size does not trigger comprehensive Environmental Assessment
- Proactive investigations required to identify the actual presence of any species at risk (7 identified in the region)
- Several provincial and federal Acts to be followed and could take upwards of 7 years to acquire all approvals
- Fish flows and passage will need to be maintained during and after construction
- Groundwater Assessment to be completed to identify subsurface seepage through the soils and impacts to Wards Lake and Grand Forks Aquifer
- Increased ability to balance water flows and supply future water demand in the Granby River during periods of low flow
- 9 hours of flood protection during full pool and peak flow condition

## 6.0 Preliminary Environmental Review of the Granby Project Area

### 6.1 Background

A desktop environmental review was undertaken for the Granby Project site. The proposed project area is situated on the lower reaches of the Granby River, just north of the City of Grand Forks in the Boundary Country of the West Kootenay region of south-central British Columbia. It encompasses private and public lands, which include agricultural, residential and recreational land uses. A portion of the land base is located within the Agricultural Land Reserve (ALR).

This environmental review included a desktop scan of topography, climate, geophysical characteristics, terrestrial habitat, biodiversity conditions, surface water, groundwater, fisheries resources, wildlife and species at risk. Furthermore, the environmental review summarized regulatory requirements, potential environmental effects and appropriate preventative and mitigated measures. If the project proceeds, several additional environmental investigations and associated stakeholder consultation will need to be completed.

### 6.2 Information sources

The following information sources were used for the preparation of this assessment:

- BC Ministry of Agriculture and Lands Integrated Land and Resource Registry;
- BC Ministry of Environment Conservation Data Centre;
- BC Ministry of Environment Habitat Wizard;
- BC Ministry of Environment Water Resources Atlas;
- Environment Canada, Canadian Wildlife Service Species at Risk web site; and
- Species at Risk & Local Government: A Primer for British Columbia.

### 6.3 Description of the Environment

#### 6.3.1 ENVIRONMENTAL SETTING

The proposed project area is situated on the Granby River, which is a tributary of the Kettle River. The area is located within the Interior Douglas-fir very-dry-hot (IDF<sub>vh</sub>) biogeoclimatic zone. This zone occupies some of the major valleys of the Southern Interior Plateau. It is characterized by hot, dry summers that result in large moisture deficits during the growing season. Frequent stand-maintaining wildfires have played an important role in the ecology of this zone. In undisturbed areas, typical vegetation in this zone would consist of Douglas-fir and some ponderosa pine with an understory of pinegrass, tall Oregon-grape, field Pussytoes, Saskatoon and birch-leaved spirea.

### 6.3.2 SURFICIAL GEOLOGY AND SOILS

A search of the BC Water Resource Atlas indicates that the Granby River watershed is predominantly comprised of sedimentary rocks (described as sharpstone conglomerate, limestone, argillite and minor volcanics) and soils that consist of alluvial and glacial drift (mainly sand, gravel, silt and clay).

### 6.3.3 SURFACE WATER

The project area encompasses the lower reaches of the Granby River, which is a tributary of the Kettle River within the Columbia River watershed. The Granby River is a fifth order stream that is approximately 126 kilometres in length. A portion of the project area also occupies Sand Creek; a second order stream that is approximately 9.4 kilometres in length and Hardy Creek; a second order stream that is approximately 5.3 kilometres in length. Other smaller unnamed connecting streams and drainages are also present in the vicinity of the project area.

### 6.3.4 GROUNDWATER

A search of the BC Water Resource Atlas identified provincially mapped aquifers (both bedrock and sand and gravel) and several groundwater wells within a 500 m radius of the project area (Ministry of Environment, 2013)<sup>40</sup>. The Grand Forks aquifer is of particular importance to the community of Grand Forks as a source of good quality groundwater for domestic and agricultural uses. This aquifer is described as an unconfined formation that is underlain by silty sand and clay deposits. A map showing the results of the groundwater well search has been included as **Appendix E**.

To further understand potential groundwater issues discussions with hydrological specialists were undertaken. It is evident that potential changes to groundwater resources are an important factor to consider in moving forward. More specifically, the Granby Project could influence Wards Lake. Wards Lake is a small 3 hectare lake located approximately 1.2 kilometres south of the Granby Project area. During the period that the original Smelter Lake was in use, 1900-1948, it is reported<sup>41</sup> that water levels in Wards Lake were 3-5m higher than they are today. Storage above a dam at the former Smelter Lake dam site would increase head difference between the new Smelter Lake and the existing Wards Lake if the new dam was constructed to the same height as the old dam and the new full pool level was similar to the former full pool level.

In theory, this would increase flow through the southwest corner of the full pool reservoir, (i.e., storage losses via subsurface seepage through the soils). The potential volume of losses could be estimated based on the proposed full pool elevation. It is possible that if the new reservoir had a lower full pool level that the groundwater losses could be reduced or eliminated. It would require field work and modeling to get a more accurate estimate of the volume of seepage and what impacts, if any, may be caused on down-gradient areas near Wards Lake. The groundwater study could also determine the approximate elevation that water

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<sup>40</sup> BC Ministry of Environment, “Water Resource Atlas” web application, [http://www.env.gov.bc.ca/wsd/data\\_searches](http://www.env.gov.bc.ca/wsd/data_searches) (June 2013).

<sup>41</sup> J.J. Baron, Regional District of East Kootenay, “Smelter Lake Study – A Preliminary Assessment”, 1977.

would leak out of Granby Lake towards Wards Lake. If the seepage was substantial, it may be possible to control it by constructing a 1 kilometre saddle dam set in the bedrock.

The 1977 report indicated a potential for water intake/sewage disposal issues for several properties immediately upstream of the reservoir due to the backwater effect on river levels when the reservoir was at/near full pool. There may also be a flood risk to the homes near the river during high freshet flows.

Based on the review of previously completed reports it is estimated the height of the original dam was likely approximately 10m. The average reservoir depth was reported at approximately 5m and the reservoir area was approximately 270 hectares. Using these values the maximum storage has been estimated to be approximately 12,330,000 m<sup>3</sup>.

The 2012 Hydropower Feasibility Assessment<sup>42</sup> used three dam heights, 2m, 4m and 8m and it was estimated that the 8m dam would impound approximately 8,500,000 m<sup>3</sup> of water (69% of the original volume). There was no explanation in the 2012 report regarding the basis for choosing the three dam heights and not including the original height as an option. Based on discussions with Grand Forks, the 2012 report and follow-up discussions with staff and council recommended investigating the 8m scenario.

### 6.3.5 FLOOD CONTROL

If the new reservoir had the same volume as the old one, i.e., ~12.3 million cubic metres, at a peak flow of 385 cubic metres/second (max Q of record) it would require ~9 hours to fill the reservoir. As a result, there would be a negligible effect of the reservoir on a large flood.

### 6.3.6 FISHERIES RESOURCES

A study of streams within the project area using the BC Ministry of Environment's Fish Habitat Wizard resulted in four recorded fish species for the Granby River and one recorded fish species for Sand Creek (BC Ministry of Environment, 2013)<sup>43</sup>. The species listed for Granby River included brook trout, rainbow trout, mountain whitefish and speckled dace; the species listed for Sand Creek included rainbow trout.

### 6.3.7 WILDLIFE AND SPECIES AT RISK

Species at Risk are ranked and listed by both federal and provincial government agencies. The provincial and federal Species at Risk ranking processes are discussed in greater detail below.

#### Federal Species at Risk Rankings

On the federal level, species ranking is conducted by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), established under Section 14 of the *Species at Risk Act* (SARA). COSEWIC is a committee of experts that assesses and designates, under Sections 15 to 21 of the SARA, those wild species of animal, plant or other organisms that are in danger of disappearing from Canada. Schedule 1 of the SARA is the official list of species that are classified as extirpated, endangered, threatened and of

<sup>42</sup> Associated Engineering Ltd., "City of Grand Forks Hydropower Feasibility Assessment", 2012

<sup>43</sup> BC Ministry of Environment, "Habitat Wizard", web application <http://www.env.gov.bc.ca/habwiz/> (June 2013)

special concern. It should be noted that only species listed on Schedule 1 of the SARA are considered protected under the Act. Species on Schedules 2 and 3 of the SARA are not protected under the Act, but they have been assessed by COSEWIC and may eventually be listed under Schedule 1. Below is a listing of the status categories used by COSEWIC to rank or list a species:

- Extinct: a species that no longer exists.
- Extirpated: a species no longer existing in the wild in Canada, but occurring elsewhere.
- Endangered: a species facing imminent extirpation or extinction.
- Threatened: a species likely to become endangered if limiting factors are not reversed.
- Special Concern: a species that is particularly sensitive to human activities or natural events, but is not an endangered or threatened species.
- Data Deficient: a species for which there is inadequate information to make a direct, or indirect, assessment of its risk of extinction.
- Not At Risk: a species that has been evaluated and found to be not at risk.

### Provincial Species at Risk Rankings

The BC Conservation Data Centre (CDC) tracks and categorizes species according to their conservation status in BC. Provincially, the CDC assigns a provincial rank or listing of ‘Red’ or ‘Blue’ or ‘Yellow’ to a species based on its status within BC. The CDC listing is an advisory and a management tool and is not a legal designation in the province. The rankings or provincial listing categories described below highlight the wildlife and plant species as well as natural plant communities that require special attention:

- **Red:** any indigenous species, subspecies or plant community that is extirpated, endangered, or threatened in BC. Extirpated elements no longer exist in the wild in BC, but do occur elsewhere. Endangered elements are facing imminent extirpation or extinction. Threatened elements are likely to become endangered if limiting factors are not reversed.
- **Blue:** any indigenous species, subspecies or community considered to be vulnerable (of special concern) in BC. Vulnerable elements are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed elements are at risk, but are not extirpated, endangered or threatened.
- **Yellow:** indigenous species which are not at risk in British Columbia.

A rare occurrence search of the BC Ministry of Environment’s Conservation Data Centre was conducted to determine documented sightings of Red-listed and Blue-listed species within the vicinity of the project area. The search revealed two masked sensitive occurrences and six non-sensitive occurrences within a 3 kilometre radius of the centre of the project area (Ministry of Environment, 2013)<sup>44</sup>. An information request was made to the CDC regarding the sensitive species occurrences. A response from CDC has not been provided to date. A copy of the BC CDC Species at Risk search results is provided in **Appendix F**.

In addition to the BC CDC search, the Species at Risk and Local Government: A Primer for British Columbia website ([www.speciesatrisk.bc.ca](http://www.speciesatrisk.bc.ca)) was queried for potential Species at Risk in disturbed, grassland, large river, riparian, sparsely vegetated and woodland ecosystems in the District. This website was developed

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<sup>44</sup> BC Ministry of Environment, “Conservation Data Centre Mapping Service”, <http://www.env.gov.bc.ca/cdc/> (June 2013)

using data from multiple sources including the CDC's occurrence records, COSEWIC status reports and other relevant field guides in the few instances in which neither CDC nor COSEWIC data was sufficient to place species within the District with confidence. The results of this search indicated that no Species at Risk are present in the vicinity of the project area (Pearson and Healey, 2013)<sup>45</sup>. A copy of the Species at Risk search results is contained in **Appendix F**.

In addition to the search results summarized above, anecdotal information indicates that there is a high potential for Lewis's woodpecker, an endangered species that nest in black cottonwoods, to be present in the vicinity of the project area. **Table 14** contains a list of all species at risk that have been identified, their preferred habitat and potential threats. A detailed assessment of the study area conducted during the appropriate season is the only way to confirm presence or absence of species at risk.

**Table 14: Species at Risk**

Common Name	Scientific Name	Taxon	SARA Status	Provincial Status	Habitat	Potential Threats
American badger	<i>Taxidea taxus jeffer-sonii</i>	Mammals	Schedule 1: Endangered	Red List	Extremely large ranges including open habitats that contain sufficient prey to eat and friable soil.	Habitat loss or fragmentation, extermination, under abundance of prey.
Bobolink	<i>Dolichonyx oryzivorus</i>	Birds	Schedule 1: Threatened	Blue List	Agriculture lands, pasture land, grassland, shrub, meadow	Incidental mortality from agricultural operations, habitat loss and fragmentation and pesticide exposure.

<sup>45</sup> Pearson, M. and Healey, M., "Species at Risk and Local Government: A Primer for British Columbia", <http://www.speciesatrisk.bc.ca> (June 2013).

Common Name	Scientific Name	Taxon	SARA Status	Provincial Status	Habitat	Potential Threats
Great Basin Spadefoot	<i>Spea intermontana</i>	Reptiles	Schedule 1: Threatened	Blue List	Dry grasslands and open woodlands – need water (temporary pools) for breeding and development.	Loss of suitable habitat due to urbanization and development.
Lewis's woodpecker	<i>Melanerpes lewis</i>	Birds	Schedule 1: Special Concern	Red List	open, mature ponderosa pine forests; riparian black cottonwood stands adjacent to open areas; and recently logged or burned coniferous forests with standing snags.	
Speckled Dace	<i>Rhinichthys osculus</i>	Fish	Schedule 1: Endangered	Red List	Occurs in many kinds of habitats: riffles, runs, and pools of cool flowing headwaters, creeks, and small to medium rivers with mostly rocky substrates. Stream populations spawn in swift water over rocky substrates.	Forestry harvesting; habitat alterations/loss; exotic and other fish species introductions; urbanization; agricultural and industrial pollution; hydroelectric development.



Common Name	Scientific Name	Taxon	SARA Status	Provincial Status	Habitat	Potential Threats
Western Screech-Owl <i>macfarlanei</i> sub-species	<i>Megascops kennicottii macfarlanei</i>	Birds	Schedule 1: Endangered	Red List	Lower elevation forested areas, frequently close to water. They tend to use cavities in large diameter deciduous trees.	Loss of suitable habitat.
Blotched Tiger Salamander	<i>Ambystoma mavortium</i>	Amphibians	Schedule 1: Endangered	Red List	Shallow, temporary or permanent water bodies, grassland, shrub steppe or open forest (generally within 100 m of the breeding pond).	Habitat loss and fragmentation due to urban and agricultural development.

## 6.4 Potential Environmental Impacts

The following environmental impacts are common to most reservoir based hydroelectric facilities. Many of these impacts will need to be further investigated prior to project development and likely conditional to securing approvals from regulatory agencies.

While some of these impacts can be mitigated, many cannot be mitigated given the nature and characteristics of the Granby Project (i.e., reservoir). Therefore compensation and ecological enhancement investments may be required to secure approvals and permits, as well as demonstrate the proactive commitment of the City and the District to environmental and community sustainability.

The likely impacts identified to date include:

**Water quality changes:** Changes in water quality are likely to occur within and downstream of the development as a result of impoundment. The residence time of water within a reservoir is a major influence on the scale of these changes, along with bathymetry, climate and catchment activities. Major issues include reduced oxygenation, temperature, stratification potential, pollutant inflow, and propensity for disease proliferation, nutrient capture, algae bloom potential and the release of toxicants from inundated sediments.

Some of these potential impacts are discussed in greater detail below.

**Reservoir stratification:** Reservoirs can significantly slow the rate at which the water is moving downstream. Surface temperatures tend to become warmer as the slower moving or “slack” water absorbs heat from the sun.

In addition to surface water warming, the colder water sinks toward the bottom because of its higher density. This causes a layering effect called stratification. The bottom layer is the coldest and the top layer the warmest.

When stratification occurs, there is also another ecosystem effect. Specifically, the colder water that sinks toward the bottom contains reduced oxygen levels. Further, at some sites when water is released from the colder, oxygen-depleted depths, downstream habitat conditions change because of the reduced oxygen level in the water.

At this time, it is difficult to predict the significance of this impact. Therefore, it should be investigated further prior to development.

**Super-saturation impact to fish:** Super-saturation occurs when air becomes trapped in water spilled over a dam as it hits the pool below, creating turbulence. Because air is comprised of 78% nitrogen, the level of nitrogen dissolved in the water can increase dramatically. The affected water does not lose the excess nitrogen quickly. For fish and other aquatic species, supersaturated water can enter tissues. If fish swim from an area supersaturated with nitrogen to a lower pressure area, a condition similar to “the bends” in scuba diving can occur. This effect causes injury and can even cause death to fish.

At this time, it is difficult to predict the significance of this impact given the design of the project has yet to occur. Once detailed engineering and design work has been initiated, this impact should be investigated further prior to development.

**Lake level change:** Once built, storage projects can also raise and lower the level of water in a reservoir on a daily, weekly or seasonal basis to produce electricity. One term used to describe this process is “power peaking”.

These occurs when, for instance, more water is released in the morning because electricity demands increase as people wake up and begin taking hot showers, using kitchen appliances, etc. In a riparian zone, (the area where moist soils and plants exist next to a body of water) this may result in shoreline vegetation not being effectively re-established.

Appropriate management of releases offers a potential tool to respond to drought management needs within the region. This will need to be considered in light of the project’s operational practices.

**Sedimentation:** Sediments, which are fine organic and inorganic materials that are typically suspended in the water, can collect behind a dam because the dam itself is a physical barrier. From the time a project is built, human-made and natural erosion of lands adjacent to a reservoir can lead to sediment build-up behind a dam.

First, downstream habitat conditions can decline because these sediments no longer provide important organic and inorganic nutrients.

Second, where sediment builds up behind a dam, an effect called “nutrient loading” can cause the supply of oxygen to be depleted. This happens because more nutrients are now available, thus more organisms populate the area to consume the nutrients. As these organisms consume the nutrients, more oxygen is used, depleting the supply of oxygen in the reservoir.

Similarly, gravel can be trapped behind a dam in the same way as sediment. In cases where the movement of gravel downstream is part of establishing spawning areas for fish, important habitat conditions can be affected.

Sedimentation could also potentially starve agricultural land of soil and nutrients during flooding events, calling for the costly use of fertilisers and irrigation systems.

**Release time/practice of waters and downstream conditions:** Some dams withhold water and then release it all at once, causing the river downstream to suddenly flood. This action can disrupt plant and wildlife habitats and affect drinking water supplies.

At the same time, the appropriate management of releases offers a potential tool to respond to drought management needs within the region. This will need to be considered in light of the project's operational practices.

**Downstream hydrology and environmental flows:** Changes to downstream hydrology have an impact on river hydraulics, instream and streamside habitat, and can affect local biodiversity. Additionally, it can influence groundwater conditions, as is likely to be the case for Ward Lake.

At this time, it is difficult to predict the significance of this impact. Therefore, it should be investigated further prior to development.

**Riparian habitat loss from inundation:** Building a storage project can raise the water level behind a dam from a few feet to several hundred feet. When stream banks and riparian areas become covered by the reservoir's higher water level, the result is called inundation. Habitat conditions change and a new equilibrium emerges. As this occurs, a different set of dynamics begin impacting species that traditionally grow, nest, feed, or spawn in these areas.

While key species likely to be impacted have been identified from this study, further investigation is required to determine the significance of this impact. Therefore, it should be investigated further prior to development.

**Terrestrial habitat change:** The riparian vegetation of the River and its bordering waters provide critical habitat for birds, waterfowl, and small and large mammals. When a hydroelectric project results in inundation of a free-flowing river, the nesting, forage, and cover provided by these areas is temporarily or permanently lost.

When habitat is lost, animals are forced to move to higher ground or other areas where habitat conditions may be less suitable, predators are more abundant, or the territory is already occupied.

In cases where water levels stabilize at a new height, vegetation in riparian zones can re-emerge and species can re-populate an area. With storage projects, the riparian zone that re-emerges has conditions that now reflect that of a reservoir or lake rather than a free-flowing river. When such conditions occur, certain species will begin to decline, others will become more abundant, and some will populate these areas for the first time.

Ducks and geese are examples of waterfowl that are strongly attracted to the habitat conditions found in reservoirs. For some of these species, reservoirs are providing an important alternative to the wetland areas that they formerly occupied.

While key species likely to be impacted have been identified from this study, further investigation is required to determine the significance of this impact. Therefore, it should be investigated further prior to development.

**Erosion:** Changing water levels and a lack of streamside vegetation can also lead to increased erosion. For example, the lack of vegetation along the shoreline means that a river or reservoir can start cutting deeply into its banks. This can result in further changes to a riparian zone and the species which it can support. Increases in erosion can also increase the amount of sedimentation behind a dam.

At this time, it is difficult to predict the significance of this impact. Therefore, it should be investigated further prior to development.

**Fish (anadromous) habitat:** Fish can face a number of impacts arising from hydroelectric projects. Some of the most common impacts include:

- **Barriers to spawning:** When adult salmon and other fish migrate upstream, the dam can again present itself as a physical barrier. If a “fishway” does not exist, then passage to spawning grounds is lost.
- **Spawning habitat loss:** Reservoirs can create changes to habitat conditions which may be ideal for spawning.
- **Supersaturation:** as noted above is a danger for fish going over a dam or through its spillway. If too much nitrogen is absorbed in the bloodstream, air bubbles form and create the equivalent of what divers call “the bends.”
- **Direct impact:** Fish passing through or around a dam can become stressed, injured, disoriented, or die because of contact with turbines, the walls of the dam, or deflection screens.
- **Enhanced habitat for prey:** reservoirs can create environments that are more favourable to certain species that prey on smolts.
- **Other:** There can also be effects to fish from loss of riparian vegetation, sedimentation, erosion, and temperature changes. Unlike the impacts listed above, however, these effects are also caused by non-dam activities such as farming, logging, and land development. As a result, when studying the health of habitat along a particular reach of river or tributary, all sources of environmental impacts should be reviewed.

A fish ladder and habitat enhancement investments will help to mitigate these potential impacts. Other project design characteristics that provide enhancements to fish habitat should be considered.

**Invasive/ exotic species or native pest species:** In some regions a significant long-term issue with reservoirs, irrespective of their use, is the introduction of exotic or native pest species. The change in environment caused by storage creation often results in advantageous colonisation by species that are suited to the new conditions, and these are likely to result in additional biological impacts. In some instances, proliferation may interfere with power generation (e.g. clogging of intake structures) or downstream water use through changes in the quality of discharge water (e.g. algae bloom toxins, deoxygenated water).

At this time, it is difficult to predict the significance of this impact. Therefore, it should be investigated further prior to development.

**Greenhouse gas emissions from inundation:** The construction of a dam will cause the land upstream to permanently flood. Any vegetation that is submerged due to the rise in water level can decay anaerobically, producing methane, which has a higher global warming potential than carbon dioxide.

## 6.5 Environmental Mitigation Measures

Various mitigation options have been identified to address the potential environmental impacts of the project. The options include, but are not limited to the following:

- Acquire all necessary permits and approvals from regulatory agencies prior to the commencement of construction. Ensure that regulatory requirements have been adequately addressed and incorporated into the design and construction of the project;
- Engage a qualified environmental professional to prepare appropriate environmental protection plans and monitoring programs;
- Avoid impacts to environmentally sensitive areas;
- Conduct detailed assessments of the study area to confirm presence or absence of Species at Risk.
- Avoid causing a net loss of fish habitat by way of appropriate compensation;
- Whenever possible, maintain natural stream stability and character and limit disturbance to riparian and wetland habitat;
- Conduct any instream work during the approved reduced activity timing window;
- Ensure fish movement/passage is maintained under all flow conditions;
- Isolate the worksite and carry out a fish salvage operation prior to conducting any instream work;
- Conduct vegetation clearing outside of bird nesting period unless a nesting survey has been conducted by a qualified environmental professional;
- Prevent the release of silt, sediment, sediment laden water or any other deleterious substance into any ditch, watercourse, or stormwater drain;
- Ensure equipment and machinery is in good operating condition, free of leaks, excess oil and grease. No equipment re-fuelling or servicing should be undertaken within 30 m of a stream or stormwater drainage;

- Conduct all fuelling and maintenance in an appropriate designated area and have an approved spill response plan in place prior to project initiation;
- Keep a spill containment kit readily accessible on-site and train all on-site staff in its proper use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at 1-800-663-3456;
- Identify and implement appropriate erosion and sediment control measures to help prevent sediment from being introduced into any stream or water body;
- Dispose of waste and hazardous materials off site in a manner that prevents them from being deposited into any watercourse or stormwater drainage; and
- Ensure that all works involving the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediment, debris, concrete, concrete fines, wash or contact water into or about any stream or water body.

## 6.6 Regulatory Framework

The proposed Granby Project will likely require referrals and approvals from senior government agencies. A brief summary of the anticipated legislative and regulatory requirements of the agencies that are likely to have jurisdiction over the proposed project is provided below.

It is important to note that this project is not likely to trigger the *Canadian Environmental Assessment Act* 2012 because it does not meet the definition of a “designated project” under the Regulations Designating Physical Activities. Under these regulations, an assessment is only required for a hydroelectric generating station with a production capacity of 200 megawatts or more. In addition, this project is not anticipated to trigger the *British Columbia Environmental Assessment Act* as it does not meet the definition of a “reviewable project” under Reviewable Projects Regulation (the hydroelectric power plant will not exceed a capacity of 50 megawatts of electricity production).

### 6.6.1 FEDERAL REGULATORY AGENCIES

#### The Fisheries Act

The federal *Fisheries Act* deals with fish passage and fish habitat protection including water quality, riparian areas, and vegetation. The *Fisheries Act* defines fish habitat to be “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes”. Based on this definition, the Granby River (a fish-bearing stream) could be considered fish habitat, even though there may never actually be fish present in the stream.

Recently this Act was amended (July 6, 2012), to evolve the approaches used to manage Canada’s fisheries resources. Several sections of the newly amended Act apply to various components of the proposed hydropower development. Specifically, authorization under the Act will be required in event that the project results in a harmful alteration, disruption or destruction (HADD) of fish habitat. In addition, the Act prohibits the harming of fish by any means, including the release of sediment or other deleterious substances and

impacts to fish passage. It is anticipated that this project would be deemed an alteration and requires approval from the Department of Fisheries and Oceans Canada.

### Canadian Environmental Assessment Act

While the *Canadian Environmental Assessment Act* is administered by the Canadian Environmental Assessment Agency, it is applicable to hydroelectric projects primarily when the Department of Fisheries and Oceans Canada (DFO) needs to issue an authorization to a project. If the BC *Environmental Assessment Act* is triggered (see below), reviews are coordinated with CEAA reviews. A CEAA review is done before DFO or another federal department issues an authorization. This is typically a ‘screening review’ that documents predicted environmental effects, specifies redesign options or mitigation, and identifies additional studies required. Projects with greater potential environmental impacts may require a comprehensive study that can lead to a detailed assessment. If the environmental effects of a project are uncertain or potentially significant, or if public concern warrants, a review by an independent EA review panel or mediator may be required.

Again, it is important to note that the Granby Project is not likely to trigger the *Canadian Environmental Assessment Act 2012* because it does not meet the definition of a “designated project” under the Regulations Designating Physical Activities.

### Navigation Protection Act

Transport Canada’s Navigable Waters Protection Agency administers the *Navigation Protection Act (NPA)*. In order to minimize the impact on navigation, works built in, on, over, under, through or across navigable waterways must be submitted for review to the Navigable Waters Protection Program of Transport Canada. On December 14, 2012, the *NPA* received Royal Assent. The Navigable Waters Protection Program is currently reviewing regulations pursuant to the *Navigable Waters Protection Act*. At this time, the proposed amendments to the Minor Works and Waters (NWPA) Order are still being developed.

This project would require review under the Navigable Waters Protection program to determine approval requirements and to ensure that all project components and activities minimize interference on navigation.

### Migratory Birds Convention Act

Environment Canada’s Wildlife Enforcement Division administers the *Migratory Birds Convention Act*. Most migrating birds found in Canada are protected under the *Migratory Birds Convention Act*. The Act is administered by the Wildlife Enforcement Division of Environment Canada in cooperation with provincial governments. To accommodate construction of any of the proposed works, the removal of any trees, vegetation or ground cover will have to comply with specified timing windows to reduce risks to nesting birds in order to maintain compliance with the *Migratory Birds Convention Act*. If this is not feasible, then an active nest survey must be completed under the advisement of a qualified environmental professional.

### Species at Risk Act

As previously mentioned, Environment Canada’s Wildlife Enforcement Division administers the federal *Species at Risk Act (SARA)*. This Act provides protection to Species at Risk included on Schedule 1 under



the Act and their critical habitat, both of which are found on federal lands. It also provides protection to aquatic species and migratory birds (covered by the *Migratory Birds Convention Act*), wherever they are found. In order to avoid potential impacts to Species at Risk a qualified environmental professional should be contacted to conduct a detailed assessment of the habitat and species present within the proposed project area, and if necessary, to devise appropriate mitigation recommendations.

## 6.6.2 PROVINCIAL REGULATORY AGENCY LEGISLATION AND APPROVALS

### The Water Act

The province owns all water in the streams, rivers and lakes of British Columbia and manages it for the public good. Individuals or companies who wish to divert, use or store this “surface” water are required by law to obtain a licence under the *British Columbia Water Act*. The *Water Act* regulates the diversion and storage of water, construction in and around streams, alterations of a stream or channel, and the installation of fish screens or guards. All applications are treated on a first come, first served basis until such point that all available water (not considered necessary for fish) is allotted. However, even though *Water Act* approval is obtained, a proponent may not proceed to take water until the *Fisheries Act* and other legislation is also approved, as applicable. The water licence specifies the terms and conditions under which the right to use water is granted, including the maximum quantity and rate of water use. There are restrictions on many aspects of the facilities that manage water, such as structures and operating procedures, and environmental protection measures for fish. Increasingly, because of the *Fish Protection Act* (see below), there are also requirements for the operational monitoring of impacts to fish, as well as water flow. The newest Water Licenses for hydroelectric projects include very detailed fish-related monitoring requirements. These licence conditions reflect the uncertain science of determining in stream flows for fish.

Once a water licence is granted, the provincial Crown will charge an annual fee for the water used. A water licence is legally considered part of (or “appurtenant to”) the land or project for which the licence was granted. Therefore, if the land or project is sold the water licence automatically passes to the new owner. Currently, water licences are issued by the Ministry of Forests, Lands and Natural Resource Operations. Power projects are given water licences for terms of 40 years, after which they can be renewed. This will allow adjustments for changing environmental conditions, as well as for changing societal expectations

Section 9 of the *Water Act* requires that a person may only make “changes in and about a stream” under an Approval; in accordance with Part 7 of the Water Regulation.

As defined by the *Water Act*, “changes in and about a stream” include:

- Any modification to the nature of the stream, including the land, vegetation, natural environment or flow of water within the stream, or
- Any activity or construction within the stream channel that has or may have an impact on a stream.

The diversion of surface water from streams or rivers requires a provincial water licence. If dams or diversions are to be constructed or operated, the design and construction plans must be reviewed and approved prior to construction. If structures (e.g., powerhouse, penstock, and access roads or transmission line) are proposed for Crown land, application(s) for Crown land tenure(s) is required.

It is anticipated that an approval process will need to be initiated for the Granby Project prior to commencing any construction activities.

### The Land Act

In many cases the developer of a hydroelectric project will require the use of land owned by the Province, and must apply for the land, as is the case with the Granby Project. The Province may sell, lease, grant a right of way over or grant a licence to occupy Crown land. In the sale or use of Crown land, the minister may impose various conditions, including stipulations where the applicant must occupy and/or do work on the land within a specified period of time. Crown land located below the natural boundary of a body of water generally cannot be sold or leased, but rights of occupation can be granted.

Applicants under the *Land Act* may be required to provide further information, which could include feasibility studies, environmental assessments, timber cruises or land valuation appraisals. Crown land tenures are currently issued by the Ministry of Agriculture and Lands, Integrated Lands Management Bureau.

### Fish Protection Act

The objective of the *Fish Protection Act* is to protect the health of fish bearing streams, including water flows in these streams. The *Fish Protection Act* states that, when reviewing an application for a water licence, the Comptroller of Water Rights or the Regional Water Manager may consider impacts on fish and fish habitat. The Comptroller may set conditions to protect fish or fish habitat, including a requirement for the licence to monitor stream flow. Where regulatory conflict arises, the *Fish Protection Act* and regulations supersede the *Water Act*.

A key feature of the Act is Section 4, which prohibits new dams on 17 protected rivers. The Granby River is not listed as a protected river.

Section 6 of the *Fish Protection Act* was brought into force on March 10, 2000 and allows the province to designate certain streams as “sensitive streams” in order to protect fish populations considered to be at risk. Sensitive streams are those that require special protection because of inadequate water flows, or because fish habitat is damaged or endangered. Fifteen streams have been designated as sensitive streams to date. A water licence on a sensitive stream may be issued only if there is no significant adverse impact on fish or if the impact is fully compensated for by an enhancement elsewhere. Sensitive streams are listed in Section 6 under the *Fish Protection Act*. Unless otherwise stated, the sensitive stream includes tributaries, as well as the main stream.

The Act gives authority to designate water management areas for the evaluation of water availability and the planning of water use when there is conflict among water users or between users and in stream flow requirements, risks to water quality (including those caused by water withdrawal), or concerns relating to fish or fish habitat. The Act suggests that water management plans may contemplate reducing water rights to provide more water for fish and fish habitat, and allows for the ordering of a temporary reduction in licenced water use in cases of drought.

The Act also allows for stream-flow protection licences. Such licences may be issued only to organizations considered to have a community-based interest in the stream, and the licence must undertake works or activities in relation to fish and fish habitat in the stream.

## BC Environmental Assessment Act

The *BC Environmental Assessment Act* (BCEAA) is directly relevant only for those projects with a capacity of 50 megawatts (MW) or higher, and therefore is likely not applicable to the Granby Project (given it is only proposed to be 3.7 megawatts). However, the minister may designate a project as reviewable if there is a public interest in doing so or if a significant adverse effect is expected. The Environmental Assessment Office (EAO) is a neutral provincial agency that coordinates assessment of the impacts of major development proposals. They administer the Act to prevent or mitigate adverse effects and provide a neutral process that invites participation by the public, proponents, First Nations and different levels of government. Environmental, economic, social, heritage and health effects are considered.

Projects of 50 megawatts or higher are subject to more scrutiny than those with lesser capacities, and they are also reviewed in a more transparent fashion on a specified timetable. The BCEAA has three phases: 1) an application phase in which detailed, but not exhaustive, information on the project is provided; 2) a project report review phase where report specifications are designed by multi-stakeholder technical committees, and technical studies are undertaken (these studies can be intensive, even for small hydroelectric projects); and 3) a public hearing phase. Following the completion of the three phases, a decision is made by the Cabinet of the British Columbia government.

The Granby Project is not anticipated to trigger the BCEAA as it does not meet the definition of a “reviewable project” under the Reviewable Projects Regulation (e.g. the hydroelectric power plant will not exceed a capacity of 50 megawatts of electricity production).

## The Wildlife Act

The *Wildlife Act* deals in large part with hunting and angling. It also protects nesting birds and the nests of certain bird species, therefore, it can be a consideration in the construction phase of a project. Otherwise, the Wildlife Act is not generally a consideration in hydroelectric project development, as it does not protect wildlife habitat except in special cases. The act does protect virtually all vertebrate animals from direct harm, except as allowed by regulation (e.g., hunting or trapping). Legal designation under the Act may confer special protection for selected red- and blue-listed species, their residences, or their critical habitat. Designating a species as Endangered or Threatened increases the penalties for harming a species, and also enables the protection of habitat in a Critical Wildlife Management Area. At present, only four species are legally designated: the Vancouver Island Marmot, American White Pelican, and Burrowing Owl as Endangered, and the Sea Otter as threatened.

## Other Acts

There are many other acts that may apply to different phases or aspects of a small hydroelectric project, including its construction. For example:

- *Forest Act* approvals are given to cut trees and use roads;
- *Waste Management Act* for the management of wastes and materials during construction;
- *Highway Act* should the project influence affect designated roads, highways and access to highways and require the construction of a road;
- *Fire Services Act* should the project require more than 22.5 liters of fuel stored on site;
- *Heritage Conservation Act* to permit the excavation or alteration of a provincial heritage or archaeological site;
- *Health Act* to approve water supplies and sanitary facilities;
- *International Rivers Improvement Act* will require an exception, unless the project will not impact the volume and timing of flow of water across the Canada – US Border;
- *Workers Compensation Act* compliance to ensure work place safety.

Additionally, the Granby Project will likely trigger the *Municipal Act* and applicable zoning bylaws to support rezoning and approve site land uses.

## 6.7 Discussion on Preliminary Environmental Review

This preliminary environmental review has identified a diversity of environmental values that may be impacted by the Granby Project. More specifically, it is recognized that proposed project could impact fish habitat, fish migration patterns, and habitat for certain species at risk. The species that may be impacted by the project are summarized below:

### **Fish species that may be impacted:**

- Brook Trout
- Rainbow Trout
- Mountain Whitefish
- Speckled Dace

### **Species at risk that may be impacted:**

- American Badger
- Bobolink
- Great Basis Spadefoot Toad
- Speckled Dace
- Lewis Woodpecker
- Western Screech Owl
- Blotched Tiger Salamander

There are a number of mitigation and enhancement measures available to minimize potential impacts to fish and wildlife habitat, and other identified environmental values. These measures will negate many of the impacts that may arise with the project and provide opportunities to further enhance the local natural environment.

Based on this preliminary environmental review it is evident that the project will likely not trigger a comprehensive federal or provincial environmental assessment process. This will reduce the timing and resources required to secure project approvals. However, proactive environmental investigations will be required to

minimize impacts, secure required approvals and permits and support beneficial environmental outcomes to the project area and beyond.

Additionally, there are some important hydrological and groundwater issues that may arise should the Granby Project proceed. These issues should be further studied to ensure potential impacts are appropriately managed and mitigated.

## 6.8 Closing

As the scope of this work was limited to a desktop review, further sources of information should be reviewed to determine a comprehensive list of environmental values, including habitat and rare species which may have the potential to be impacted by the Granby Project.

# Section Seven

## SOCIAL ASSESSMENT SUMMARY.



There will undoubtedly be changes to the social fabric of the local and regional community with the development of the Granby Project. For this assessment, an external community engagement process was not feasible, since this project was completed 'in-camera'. Therefore, desktop research and conversational interviews with select individuals were undertaken to support the analysis. Based on this approach, several key findings have been identified that may arise from the project. These key findings include:

- Land improvement and improved community amenities benefits for recreation;
- Supply enough power for ~900 homes (avg. residential usage);
- A water source to support wildfire protection;
- Increased community awareness and pride;
- Expected to retain younger residents to the region;
- Increased tourism;
- A Doukhobor cultural heritage site identified nearby;
- Project falls within the traditional territories of the Syilx Okanagan Nation Alliance (no "statement of intent" for territorial claims on record);
- Presence of three sensitive archeological records within a 500m radius of the project.

## 7.0 Social Impact Assessment

The objective of this preliminary social impact assessment of the Granby Project is to outline the broader social costs and benefits associated with the creation of a hydroelectric dam on the Granby River. The social impact of the Granby Project will vary between the two scenarios, so the goal of this section will be to evaluate and compare the social impact of each scenario on both the City and the District.

Social impact assessments vary by definition and as a result the most appropriate approaches are based on the industry and applications of assessment. For the purpose of this assessment the International Association for Impact Assessment definition was adhered to.

*“Social impact assessment includes the processes of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions.”*





The primary purpose of a social impact assessment is to bring about a more sustainable and equitable biophysical and human environment. The proposed Granby Project could have impacts on existing social and cultural institutions and these impacts will define relationships between the project and the surrounding communities during the construction and operation phases of the project. Hydroelectric dams of this nature require community leaders to make social and economic decisions in the face of dynamic changes in costs and benefits streams; at times this can be a very challenging task for community leaders. It is the intention of the social impact assessment to provide objective analysis in an effort to capture both the benefits and costs and where possible provide mitigation alternatives. Most commonly critics of such development projects suggest there is limited opportunity for local governments or the public to influence or participate in project assessments and approvals. As this project has been uniquely driven by local government much of the foundation of criticism and the resulting impacts are under the control of the community itself.

Typically the social impact assessment process follows a two phase approach:



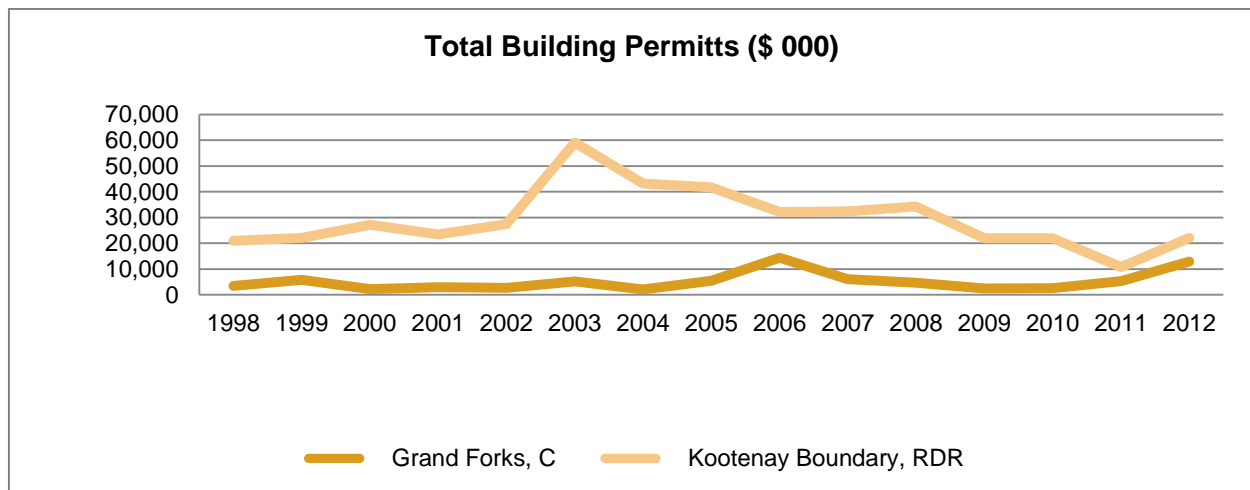
As outlined in the above diagram the two phase approach is typical of social impact assessment. Due to the stage of the project and the sensitivity of the project it was felt, at this time, to keep the project in-camera, and as a result the methodology was adapted to fit this context. Specifically, the exclusion of primary research and work with the community to determine the extent of the development impacts (community perceptions) was not included in the scope. Social elements assessed within the scope of this engagement relate directly to the social and cultural consequences to citizens of the City and the District; including how they live, work, play, and recreate. Key assessment elements considered in this process include:

- Housing and Property
- Population
- Health & Safety
- Culture Heritages

It should be noted that although the following assessment highlights activity that may occur based on the proposed scenarios, certain impacts such as changes to the population or changes in character of a community can be difficult to assess. Some citizens will perceive this project as a negative while other members of the community will argue it as a positive. Thus impacts are not simply positive or negative in themselves (such as land loss is negative; influx of workers is positive), they are subject to the value judgments of individuals. The assessment does not judge. It reports how different segments of a community are likely to respond to proposed development projects. There is no question that the construction of this project has a short-term impact on the local environment. What this assessment tries to do is balance is the consideration of both short-term and long-term results. Therefore, it utilizes scenario planning approaches to provide and descriptive research and analysis of possible outcomes. Housing and Property

The development of the proposed Granby Project is likely to have a substantial social impact on housing

**Figure 9: Total Building Permits**



and property, especially for those residents that may need to be relocated. This social impact is a controversial topic surrounding many hydroelectric dam projects because of the impact it will have on property (land and structures). Housing impacts our communities at almost all levels. In assessing the implications of this project on housing and property for the region this assessment uses a balanced analysis that takes into account the adverse effects and benefits on land/housing values, housing conditions, the relocation of individuals or families, and changes in land use. In conducting this assessment special attention was focused on incorporating lessons learnt from the longstanding history and experience of hydroelectric dam developments.

### 7.1.1 BASELINE AND PRESENT TRENDS

In order to facilitate a discussion around this project, its themes, and the assessment of its impacts, it is important to articulate the existing context used to define these impacts. The following section highlights existing trends and baseline indicators that will be used to establish and contextualize the impacts of building a hydroelectric dam on the Granby River.

- The Kootenay region<sup>46</sup> was not impervious to the global economic crises in 2008. With an aggregated devaluation in housing prices being 5.6% since 2008 (2009 -4.9%, 2010 -0.1% and 2011 -.05%).
- There were 13.5 months of inventory at the end of July, down from 15.7 months a year earlier but still above the long-run average for this time of the year. The number of months of inventory is the number of months it would take to sell current inventories at the current rate of sales activity bases on historic and present conditions.
- The average price of homes sold in the Kootenay region for July 2013 was \$291,153. This was an increase of 6% over July 2012; this is lower than the provincial average sale price (\$534,360), which increased by 18%.
- Construction within the region fluctuates tremendously from year to year (See Figure 9). The region has experienced significant fluctuation in building permits. Fluctuations have been as much as decreases of 157% year over year and increases as high as 63%.<sup>47</sup>

### 7.1.2 HOUSING AND PROPERTY PRELIMINARY ASSESSMENT

Regardless of the scenario there are specific land and property impacts that will be realized as a result of the re-establishment of Smelter Lake (Granby Lake).

**Table 15: Land Use**

TYPE	HECTARES
Buildings/Structures	0.59
Agriculture	96.06
Closed Golf Course	62.53
Open Space/Treed	55.03
Water	32.44

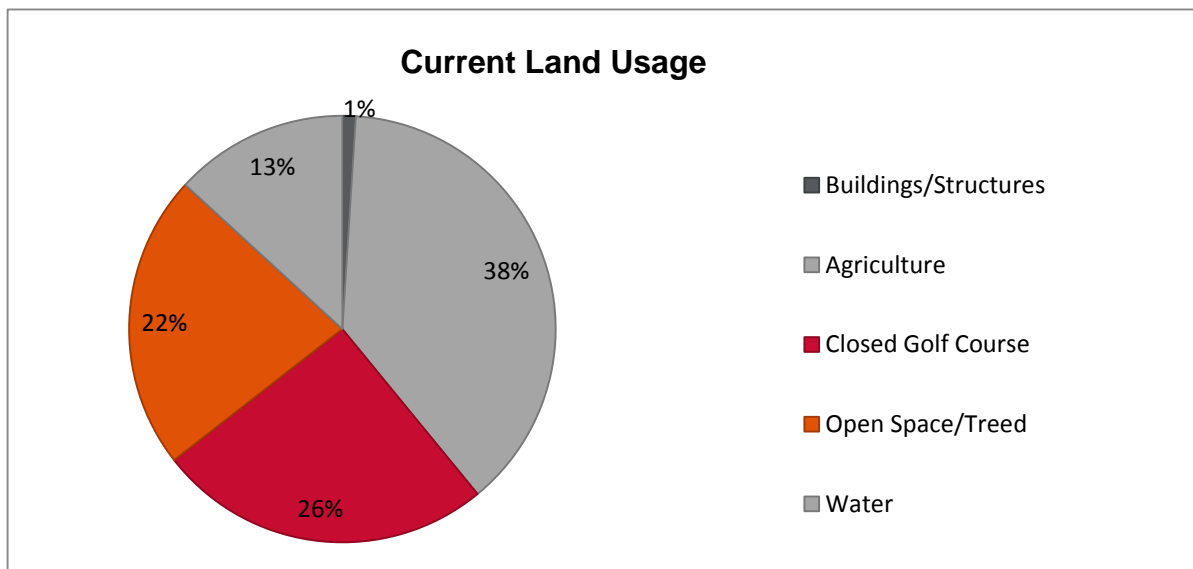
- Total area physical area required for the re-establishment of Smelter Lake is 246.65 hectares.
- There are 23 parcels of properties impacted by the reservoir being re-established.
- Nine (9) properties will be impacted (inundated or partially inundated).

<sup>46</sup> Housing statistics have to be derived from the Kootenay region as data is not available for the Kootenay-Boundary region.

<sup>47</sup> Statistics Canada, produced by BC Stats, <http://www.bcstats.gov.bc.ca> (September 2013).

- Three (3) homes are estimated to be inundated and seven (7) more homes potentially inundated.<sup>48</sup>
- There are 33 properties along the perimeter of the proposed reservoir that will have their value impacted - 11 are privately owned, 5 are crown owned (provincial or municipal) and 7 are undetermined by databases.
- Land within the Agricultural Land Reserve accounts for 96.06 hectares of inundated land.
- It has been estimated that the land acquisition required for the re-establishment of the reservoir will be \$6,696,196 (Land - \$3,959,389 and Improvements - \$2,736,807).<sup>49</sup>
- The creation of a well-managed reservoir does have an impact on property values in the immediate surrounding properties. The total value of the 33 properties predicted to be impacted is estimated to increase by \$1,272,164 dollars.
- Through GIS mapping it has been determined that the current land uses (shown in **Table 14**) are primarily dedicated to agricultural production, with the closed golf course occupying the second greatest amount of land and open spaces; and water/trees occupying an aggregated total of 87.5 hectares, or 35% of total space (as shown in **Figure 10**).
- With the re-establishment of the reservoir current land uses will be lost resulting in an impact to District revenues through property taxes. It has been estimated that the annual amount lost will be through a net tax decrease of \$2,977 (lost tax revenues \$6,486 less incremental tax revenues as a result of scenario two \$3,508).

**Figure 10: Current Land Usage**



<sup>48</sup> Presently the GIS mapping has been completed at a high level with +/- 10 m of accuracy.

<sup>49</sup> Associated Engineering Ltd., "City of Grand Forks Hydropower Feasibility Assessment", 2012.

### 7.1.3 HOUSING AND PROPERTY PRELIMINARY ASSESSMENT

POTENTIAL IMPACT		DESCRIPTION
<p><b>Land &amp; Housing Values</b></p> <p>An important element to consider is the impact of housing values as it speaks to both cost of living (affordability) and the personal net worth of its citizens.</p>	<b>Scenario One</b>	<p>If the creation of the reservoir is done for the means of power generation and the surrounding area is left undeveloped, it can be speculated that the properties along the perimeter of the reservoir will have long-term increase in values.</p> <p>It has been estimated that a total of 33 properties would be impacted in relation to their market values. Including the proposed second phases of the Copper Mountain development.</p> <p>Based on a comparative study identifying housing/properties with water views and properties/land without them it was determined that there was a ~7.93% increase in value for the properties that had water (river) views. Therefore, it can be conservatively estimated that the land along the perimeter of Granby Lake (reservoir) will have an increase of ~10% in value based on scenario one.</p>
	<b>Scenario Two</b>	<p>Factors such as economic opportunity, cultural activity, recreation, and social equality ultimately equate to quality of life. The livability of a place will shape the behavior of future population movements and motivate settlement decisions, especially in younger cohorts. The project's potential to combine increased access to recreational activities and economic opportunities will help attract a younger demographic to the Boundary area.</p> <p>Leveraging the reservoir into an economic development catalyst will help create a magnet for attracting population. In this scenario the recreation and employment opportunities generated will be well suited for families and younger cohorts. Although, this project may not inspire substantial population growth it could help counteract population decline in the area.</p> <p>Often the sharpest debate regarding hydropower development projects revolves around population displacement and resettlement. It is evident that 23 property lots will be directly impacted by inundation. However, the presence of the reservoir may increase demand for residential housing in the area and provide land owners with new opportunities.</p> <p>Based on a comparative study identifying housing/properties with water views and properties/land without them it was determined that there was a ~7.93% increase in value for the properties that had water (river) views. Therefore, it can be conservatively estimated that the land along the perimeter of Granby Lake (reservoir) will have an increase of ~15% in value based on scenario one.</p>

<b>Housing Conditions</b>  The potential influx and potential out flux of temporary workers (“Boomtown effects”) on housing needs.	<b>Scenario One</b>	<p>The construction period of the hydroelectric dam will encourage an influx of a limited number workers to the region.</p> <p>Construction demand for skilled labour during construction would exceed the local labour supply. This population change catalyst would have the potential to affect demands for housing, community infrastructure and services.</p> <p>As estimated in the Economic Impact Assessment section, 40.70 (direct and indirect) employment years have been estimated. The project is estimated to include two (2) years of construction, but it is possible that 3-5 years of planning and assessment will be required, totaling a total project lifecycle of 5-7 years.</p>
	<b>Scenario Two</b>	<p>This influx of workers would result in an increase in the local population and a change in demographics that would temporally redistribute the weights of age cohorts in the community to fall more in line with provincial norms. Specifically, the age cohort of 25-44.</p> <p>The timing of labour mobilization will ebb and flow as a result of construction timeframe. It is often misunderstood that the influx of a major construction project is equally distributed over the project lifecycle (e.g. the number of job will vary at different stages of the project).</p> <p>As the dam project will be driven by local municipalities they will be able to negotiate employment conditions to require developers to hire a large percentage of the work force locally. This will create a greater Economic Impact locally and help control the influx temporary workforces.</p>

<b>Presence of seasonal (leisure) residents</b>	<b>Scenario One</b>	There will minimal seasonal residents impacts with scenario one.
	<b>Scenario Two</b>	<p>It is predicted that the proposed Community Development amenities may create an environment that is attractive for seasonal (leisure) residents in the Grand Forks area to some marginal level.</p> <p>Respecting that the potential community assets developed will be located on a reservoir and not a natural lake it is still relevant to consider that Christina Lake, which is 20 minutes east of Grand Forks, is home to many resorts and summer homes and its year round population of 1000 swells to 6000 during the Summer. Thus supporting the assessment that the number of tourism visitors can be conservatively predicted to increase by ~10%.</p> <p>It is expected that the housing and accommodation market has a buffer in existing supply to lessen the impact of the increase in seasonal residents and tourists.</p>
<b>Changes in Land Use</b>	<b>Scenario One</b>	Both scenarios have the same effects regarding the impacts on existing land owner and families within the re-establishment area for the reservoir; this was set out at the beginning of this section.
	<b>Scenario Two</b>	

- There is expected to be an increase in housing prices in both scenarios: Scenario One ~10% and Scenario Two ~15%. In absolute dollars it suggests that the average selling price for a house in 2011 (\$272,285) will be able to sell for \$299,513 in Scenario One and \$313,128 in Scenario Two.
- The increase in demand and ultimately sales of houses and properties has a positive economic impact. Residential real estate provides a significant contribution to the BC economy. Every 100 MLS® residential sales in 2007 generated 28 full-time equivalent (FTE) jobs. This means more than 28,000 jobs were generated in BC because of residential sales activity in 2012.<sup>50</sup>
- Increasing the supply of housing ultimately increases the quality of housing and supports related industries (professional service, building) whose products and services complement the housing sector. The increase in income for example in construction firms, leads either to increased income for firm employees, including the owner, or is transferred into firm investment, to bring increased

<sup>50</sup> British Columbia Real Estate Association, <http://www.bcrea.bc.ca/> (September 2013).



returns in the future. Regardless of the time period in which it takes place, increased income increases spending, which if spent in the local economy provides income for other City and District residents through a rippling effect. This effect is particularly large for the construction sector, as it is relatively labor-intensive, spending a bigger portion of its revenue on employee wages as opposed to machinery or production materials.

- The projected demand for rental housing has the potential to create temporary low vacancy rates when labour requirements and population effects are peaking, which is expected to be low in magnitude and duration as the market responds.

Because the housing market is expected to respond to the changes in demand, and new units are, and will continue to be built in response to increased demand, the residual effect of the project on housing is not considered to be significant. Other mitigation measures will be implemented as required in consultation with the local community.

## 7.2 Population

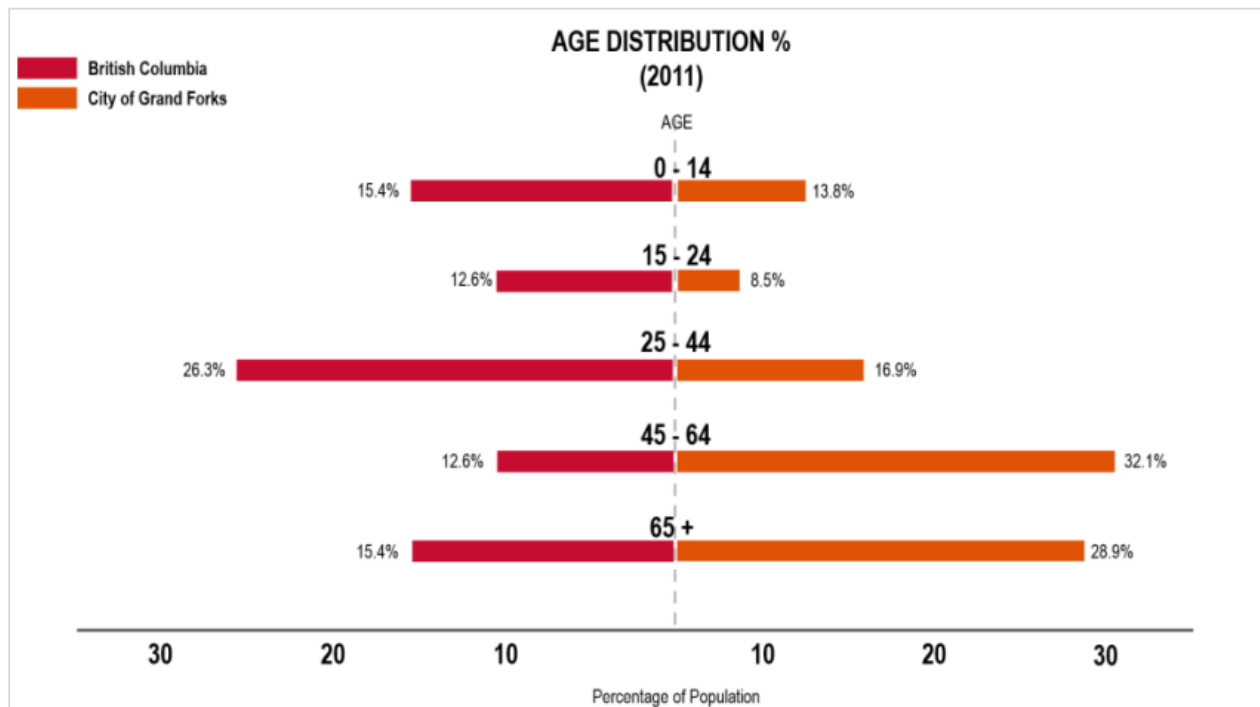
The development of the proposed Granby Project is likely to have a substantial social impact on population, especially when considering the potential impacts of employment and labor demands. Population is a heavily debated issue surrounding proposed hydropower development projects, particularly in regard to population change, influx, and potential out flux of temporary workers, presence of seasonal (leisure) residents, and the relocation of individuals or families. These factors contribute to a community's perception of a project and can often become controversial issues if not managed properly.

The assessment of how a hydroelectric dam project effects population takes into account both the construction and operational phases of the project. The closest community is the City of Grand Forks. The hydroelectric dam project will be located approximately 2.8 kilometres northwest of the City on the north fork of the Kettle River, with the largest portion of the reservoir being approximately 5 kilometres along North Fork Road.

### 7.2.1 BASELINE AND PRESENT TRENDS

In order to facilitate a discussion around this project, and the assessment of impacts, it is important to articulate the existing context used to define these impacts. The following section highlights existing trends and baseline indicators that will be used to establish and contextualize the impacts of building a hydroelectric dam on the Granby River.

Figure 11: Age Distribution



- Like many rural areas in interior BC the City and the District have experienced low to negative growth in recent years. In 2011 the population of the City was 3,985. This was a decrease of 1.3% since 2006 (BC Stats). The population of unincorporated areas in the surrounding District have also changed. The population of the City is influenced by these neighbouring regional electoral areas. These areas include Electoral Area D – Rural Grand Forks (2011 Census population of 3,176 increase of 0.3% from 2006); and Electoral Area C (2011 Census population of 1,391 a decrease of 11.8%). It should be noted that while OCPs exist for both Electoral Area C (2004, as amended) and Electoral Area D (1999, as amended), a regional Growth Strategy Plan is not in place.<sup>51</sup>

<sup>51</sup> Urban Systems, “City of Grand Forks Sustainable Community Plan Bylaw No. 1919. Kelowna, BC: Canada”, 2011.

<sup>a</sup> City of Grand Forks, “Sustainable Community Plan”, 2011.

<sup>b</sup> GFEDTF, n.d.

<sup>c</sup> GFEDTF, 2011

- The District has experienced a decline in population of 3.5% from 2006 to 2011 (30,742 people to 31,843 people respectively). In the same period of time the province as a whole has seen an increase of 5.3%. This again highlights the population challenges faced by rural communities in the region.
- Comparing the age composition of the region to that of BC shows that the population of the City of Grand Forks is somewhat older. More specifically, the region has a larger proportion of people aged 50 and older than the province as a whole (Grand Forks 28.9% vs. BC 15.7%). Furthermore, the age cohorts of 15-24 (Grand Forks 8.5% vs. BC 12.6%) and 25-44 (Grand Forks 16.9% vs. BC 26.3) are significantly lower than provincial averages.

**Table 16: Source of Total Income**

SOURCE OF TOTAL INCOME 2009			
	Grand Forks		BC
	\$ Thousands	% of Total	% of Total
Employment	92,223	49.9	63.7
Pension	49,596	26.8	13.8
Investment	13,770	7.4	9.8
Self-Employed	7,022	3.8	5.3
Other	15,514	8.4	5.3
Tax Exempt	6,817	3.7	2.0
Total	184,941	100.0	100.0

- The City of Grand Forks' aging citizen base has resulted in 26.8% of its population deriving its income from pensions. This is much higher than the provincial average of 13.8% (as shown in **Table 14**) having significant impact on household incomes and the consumer spending power of the community. The combined influence of having an aging, low-income population has resulted in a weakened regional economy, lacking the presence of a substantial economic catalyst.
- During the 2011/2012 school year School District 51 had 1,317 students (818 Elementary students, 498 Secondary students and 1 Graduated adult) enrolled and operated 11 schools (7 Elementary schools, 1 Elementary-Junior Secondary school, 3 Secondary schools).<sup>52</sup> Based on 2011/2012 enrolment the School District operates at a 53.2 % utilization rate and has only one class with more than 30 students; in 2005/06 there were four.<sup>53</sup>

Overall, baseline community data has indicated that the City of Grand Forks is facing substantial population decline; a trend that will likely become more intensified with time. The aging population and large number of residents collecting pensions have the potential to inhibit economy growth and limit

<sup>52</sup> School District 51 includes the Big White Community School and is beyond the impacted areas of the proposed development project.

<sup>53</sup> School District Profile- School District 51, Ministry of Education.

opportunities for economic development. This again highlights the need for an economic development catalyst to curb economic decline in the City of Grand Forks and the region as a whole.

### 7.2.2 POPULATION PRELIMINARY ASSESSMENT

POTENTIAL IMPACT		DESCRIPTION
<b>Population Change</b>  It is important to consider how a project could influence the population of the Grand Forks community and surrounding area.	<b>Scenario One</b>	<p>The creation of the reservoir is done for the means of power generation and the surrounding area is left undeveloped. In this scenario there will likely be minimal impact on long-term population growth, however, it may help curb the current rate of population decline.</p>
	<b>Scenario Two</b>	<p>Factors such as economic opportunity, cultural activity, recreation, and social equality ultimately equate to quality of life. The livability of a place will shape the behavior of future population movements and motivate settlement decisions, especially in younger cohorts. The projects potential to combine increased access to recreational activities and economic opportunities will help attract a younger demographic to the Boundary area.</p> <p>Leveraging the reservoir into a community development catalyst will help create a magnet for attracting population. In this scenario the recreation and employment opportunities generated will be well suited for families and younger cohorts. Although, this project may not inspire substantial population growth it could help counteract population decline in the area.</p> <p>Often the sharpest debate regarding hydropower development projects revolves around population displacement and resettlement. It is evident that 23 property lots will be directly impacted by inundation. However, the presence of the reservoir may increase demand for residential housing in the area and provide land owners with new opportunities.</p> <p>Overall, it could be estimated that this type of project could reverse population decline to a growth rate similar to other areas in the Kootenay-Boundary region with growing tourism markets. Between 2006 and 2011 the Regional District of Kootenay Boundary grew at a rate of 1.3%, this could be used as a reasonable estimate of growth for the area in scenario two.</p>

<b>Fluctuation of Workforce</b>  Influx and potential out flux of temporary workers  A collective set of Social-cultural impacts are long known issues of projects such as the proposed Granby project. The sudden inflow of additional construction workers and related groups within small, often traditional and remote local community's causes social/health/economic and cultural problems at the local community level.	<b>Scenario One</b>	Influx of workers will encourage a minor change in the local population and demographics.
	<b>Scenario Two</b>	<p>It is likely the demand for skilled labour during construction will exceed the local labour supply. This population change would have the potential to affect demands for housing, community infrastructure and services.</p> <p>As estimated in the Economic Impact Assessment section, 40.70 employment years have been estimated. The project period is estimated to include two (2) years of construction, but it is possible that several years of planning and assessment totaling 5-7 years will be required. This could lead to an influx of skilled workers and younger cohorts of people.</p> <p>Labour mobilization reflects the ebb and flow of the level of influx workers (e.g., the number of job will vary at different stages of the project). As the dam project will be driven by the City of Grand Forks and the Regional District of Kootenay Boundary they will be able to negotiate employment conditions to require developers to hire a large percentage of the work force locally. This will create a greater Economic Impact locally and help control the influx temporary workforces.</p>
<b>Presence of Seasonal (Leisure) Residents</b>	<b>Scenario One</b>	In this scenario the development of a hydroelectric dam and reservoir will have limited impact on seasonal residents.
	<b>Scenario Two</b>	Respecting that the potential community assets developed will be located on a reservoir and not a natural lake it is still relevant to consider that Christina Lake, which is 20 minutes east of Grand Forks, is home to many resorts and summer homes and its year round population of 1000 swells to 6000 during the Summer. Therefore, it is predicted that the proposed Community Development amenities may create an environment that is attractive for seasonal (leisure) residents in the Grand Forks area to some marginal level.
<b>Relocation of Individuals or Families</b>	<b>Scenario One</b>	Both scenarios have the same effects regarding the impacts on existing land owner and families within the re-establishment area for the reservoir.
	<b>Scenario Two</b>	

- The timing of labour mobilization will ebb and flow as a result of the construction schedule (e.g., the number of job will vary at different stages of the project). It is often misunderstood that the labour influx of a major construction project is equally distributed over the project lifecycle. In reality fewer workers are needed at the outset and conclusion of a project, and more are required during the main construction period. As a result the surge in population expected does not occur lessening the negative impacts to a more manageable level resulting in less stress being placed on the community's physical and social infrastructure.
- As the Granby Project will be driven by the City and the District they will be able to negotiate employment conditions to require developers to hire a large percentage of the work force locally. This will create a greater economic impact locally and help control the influx temporary workforces. Recreation is important criteria for defining quality of life for residents of Western Canada & United States. In the winter, the ski areas provide downhill, cross-country and heli-skiing. In the summer, the area is famous for mountain biking, canoeing, kayaking, hiking, waterskiing, fishing, boating and golf. The proposed Community Development scenario speaks directly to what motivates residents to decide where to locate their home. The addition of a recreation feature would have positive impacts for the both retention of citizens and emigration.
- Many people (including community leaders) have a legitimate concern that population growth could deplete resources and can trigger social or economic misfortune if it is not contained. As discussed in the preceding section, the region has experienced continued negative growth and disproportionate demographic in the area have the potential to exacerbate this trend. . This combined with the scale of the project being categorized as small in nature will moderate the potentially negative impacts of the project on the community's physical and social infrastructure. The growth stresses that are typical of regions experiencing high growth rates alongside underdeveloped social services will likely not be an issue. The region has excess capacities within its education system and in most cases an increase in the number of students and young people to the community would contribute to long-term social and economic sustainability.

## 7.3 Health & Safety

Much concern and attention has been focused on the health and safety impacts of hydroelectric dams. Regulation of dams in Canada is a provincial/territorial responsibility and is similar to other areas of provincial jurisdiction such as health and education.<sup>54</sup> There is a considerable amount of regulation and legislation in place to protect citizens from the health and safety risks associated with dam creation, operation and deconstruction. Typically, a hydroelectric dam of the proposed magnitude carries with it minimal risks in regard to health and safety. With that being said it is very important to properly assess the possible impacts a dam can have on the community and this preliminary assessment explores the dam creation process in relation to general pollutants, noise, safety during construction and safety during the operation phase of the proposed dam.

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<sup>54</sup> Canadian Dam Association, 2010 Annual Conference

### 7.3.1 BASELINE AND PRESENT TRENDS

The *Water Act* of British Columbia, originally established in 1909, has authority over dams and holds dam owners liable for any damage caused by the construction, operation or failure of their dam. Under the *Water Act*, dam owners are responsible for: obtaining a water license and complying with its terms and conditions, and maintaining historical records of all observations, inspections, maintenance items, instrumentation readings, etc. Under the *Water Act*, dam owners are responsible for: obtaining a water license and complying with its terms and conditions, and maintaining historical records of all observations, inspections, maintenance items, instrumentation readings, etc.

The *Dam Safety Regulation* was passed into law as *Regulation 44/2000* under the *Water Act* effective February 11, 2000.<sup>55</sup> The objective of the Regulation is to mitigate loss of life and damage to property and the environment from a dam breach by requiring dam owners to inspect their own dams, undertake proper maintenance, and ensure that these dams meet ongoing engineering standards. The requirements under the Regulation are based on the complexity of the dam and the potential downstream consequences defined in Schedule 1 of the Regulation. Dam owners must satisfy all ongoing requirements and may also need to meet special and/or additional requirements.

The 2007 Dam Safety Guidelines:

- Define principles applicable to all dams, which should be understood by dam owners, regulators, managers, operators, and others; and,
- Outline processes and criteria for the management of dam safety in accordance with the principles.

The Canadian Dam Association (CDA), a volunteer organization was formed in the 1980s to provide dam owners, operators, consultants, suppliers and government agencies with a national forum to discuss issues of dam safety in Canada. The Dam Safety Guidelines developed by the CDA can provide regulators with a basis for evaluating the safety of dams within their respective jurisdictions.

The CDA has also published a companion series of technical bulletins on dam safety topics. The technical bulletins suggest methodologies and procedures for use by qualified professionals as they carry out dam analyses and safety assessments. The bulletins are updated and augmented separately from the Guidelines.

1. Inundation, Consequences, and Classification for Dam Safety (2007)
2. Surveillance of Dam Facilities (2007)
3. Flow Control Equipment for Dam Safety (2007)
4. Public Safety and Security Around Dams (DRAFT) - Withdrawn on publication of Guidelines for Public Safety Around Dams (2011)

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<sup>55</sup> And amended as BC Reg. 108/2011 (June 9, 2011) and subsequently as B.C. Reg. 163/2011 (September 12, 2011 with enactments on November 30, 2011).



5. Dam Safety Analysis and Assessment (2007)
6. Hydrotechnical Considerations for Dam Safety (2007)
7. Seismic Hazard Considerations for Dam Safety (2007)
8. Geotechnical Considerations for Dam Safety (2007)
9. Structural Considerations for Dam Safety (2007)
10. The relations between water pollution, air pollution and solid wastes must be known very well from a broad perspective.

### 7.3.2 HEALTH AND SAFETY PRELIMINARY ASSESSMENT

POTENTIAL IMPACT		DESCRIPTION
<b>General Pollutants</b>  It is important to consider the possible introduction of general pollutants that may or may not occur as a result of the dam creation and operation.	<b>Scenario One</b>	<ul style="list-style-type: none"> <li>As with any major construction project there is the introduction of general pollutants within the immediate area such as dust. However, it is possible to mitigate such effects during construction.</li> <li>The operations of hydroelectric projects do not create any harmful pollutants; therefore, there will be no detrimental effect on the health of the local residents.</li> <li>There will be noise pollutants during the 2 year construction period. However, hydroelectric projects do not generate noise pollutants during general operations.</li> </ul>
	<b>Scenario Two</b>	<ul style="list-style-type: none"> <li>With the exception of dust, hydroelectric projects do not create any harmful pollutants; therefore, there will be no detrimental effect on the health of the local residents due to the remote location of the project.</li> <li>There will be noise pollutants during the 2 year construction period. However, hydroelectric projects do not generate noise pollutants during general operations.</li> <li>During the construction of tourism assets and the filling of the reservoir there will be sight pollution by the way of construction and changes to the scenery.</li> </ul>

<b>Safety Dam Creation and Operations</b>	<b>Scenario One</b>	<ul style="list-style-type: none"> <li>• There will be an increase in traffic on both the North Fork (3.5 km from Crowsnest Hwy) and Granby roads (2.4 km from Crowsnest Hwy). Resulting in increased safety concerns with increased construction traffic.</li> <li>• Structural collapse is an unforeseen event, which could cause structural collapse of major elements dam, which will be above accepted design practices.</li> <li>• Flood control benefits; it decreases and removes the possible flood effects of the Granby River positively impacting agricultural, industrial and residential properties downstream.</li> <li>• The opportunity to use the body of water as a fire suppression asset for the region increases both human and property/land safety.</li> </ul>
	<b>Scenario Two</b>	<ul style="list-style-type: none"> <li>• There will be an increase in traffic on both the North Fork (3.5 km from Crowsnest Hwy) and Granby roads (2.4 km from Crowsnest Hwy). Resulting in increased safety concerns with increased construction traffic.</li> <li>• Structural collapse is an unforeseen event, which could cause structural collapse of major elements dam, which will be above accepted design practices.</li> <li>• Flood control benefits; it decreases and removes the possible flood effects of the Granby River positively impacting agricultural, industrial and residential properties downstream.</li> <li>• Adding tourism assets such as the ones described in the report do have inherent safety concerns, especially when operating in a reservoir. Therefore, it would be important to appreciate that a successful recreational development of Smelter Lake should: <ul style="list-style-type: none"> <li>○ Remove all vegetation, including stumps, from the lakebed.</li> <li>○ Remove all top soil from the lakebed to prevent mud and algae development.</li> <li>○ Plant extensively on the sites to provide shade and buffer areas.</li> <li>○ Re-slope certain areas to create beaches.<sup>56</sup></li> </ul> </li> </ul>

- The project will engage professional engineering consultants to design the dam and oversee the construction process done by qualified contractors as to exceed all government regulations and legislative requirements.

<sup>56</sup> J.J. Baron, Regional District of East Kootenay, “*Smelter Lake Study – A Preliminary Assessment*”, 1977.

- The project will be designed to address anticipated operation malfunctions and/or accidents, and design factors to ensure the project meets design codes and accepted standards of construction.
- With respect to waste during the construction period, a hydroelectric project does not produce toxic or waste materials.
- Both scenarios have safety concerns regarding increased traffic during the 2 years of construction.
- Scenario two would have an increased amount of traffic (over above scenario one) regarding construction and tourists traffic on the North Fork road (3.5 kilometres from Crowsnest Hwy). Resulting in increased safety concerns with increased construction traffic.
- It is necessary to state the potential for structural collapse of the dam within this section of the assessment. However, it is important to note that these unforeseen events, which could cause structural collapse of major elements, are predicted to be above accepted design practices in an effort to mitigate the chances of this occurrence.

## 7.4 Culture, Recreation and Heritage

Large hydroelectric dams have had significant impacts on regions through the impact on local cultural, recreation and heritage resources. This is a significant concern to British Columbians and as a result recently BC's provincial government responded to public opinion by legislatively protecting important salmon rivers against future dams under the *Fish Protection Act*. In addition, BC has embraced two important programs — the "BC Heritage Rivers System" and the "Canadian Heritage Rivers System" — which officially commemorate BC rivers that represent outstanding values of provincial and national significance. These values include history, culture, economy, recreation, and ecology.

### 7.4.1 BASELINE AND PRESENT TRENDS

- Smelter Lake represented a significant part of the history for the region and specifically the residents of Grand Forks. As the Granby Project is a re-establishment of Smelter Lake which was removed in 1948.<sup>57</sup> Residents used Smelter Lake for outdoor recreational activities such as swimming, boating and fishing and viewed the area and the activities it afforded as important to the community.<sup>58</sup> The quality of lake water was clean and residents used to harvest ice from the reservoir during the winter.<sup>59</sup>
- However, residents were cautious about safety risks associated with boating on and swimming in the lake. Prior to inundation of the reservoir, many tree stumps were not properly removed resulting in reduced navigation on the lake and increased boating and swimming hazards. Accounting for navigation risks, local residents still valued the lake as an important, valuable multiuse resource for the community.

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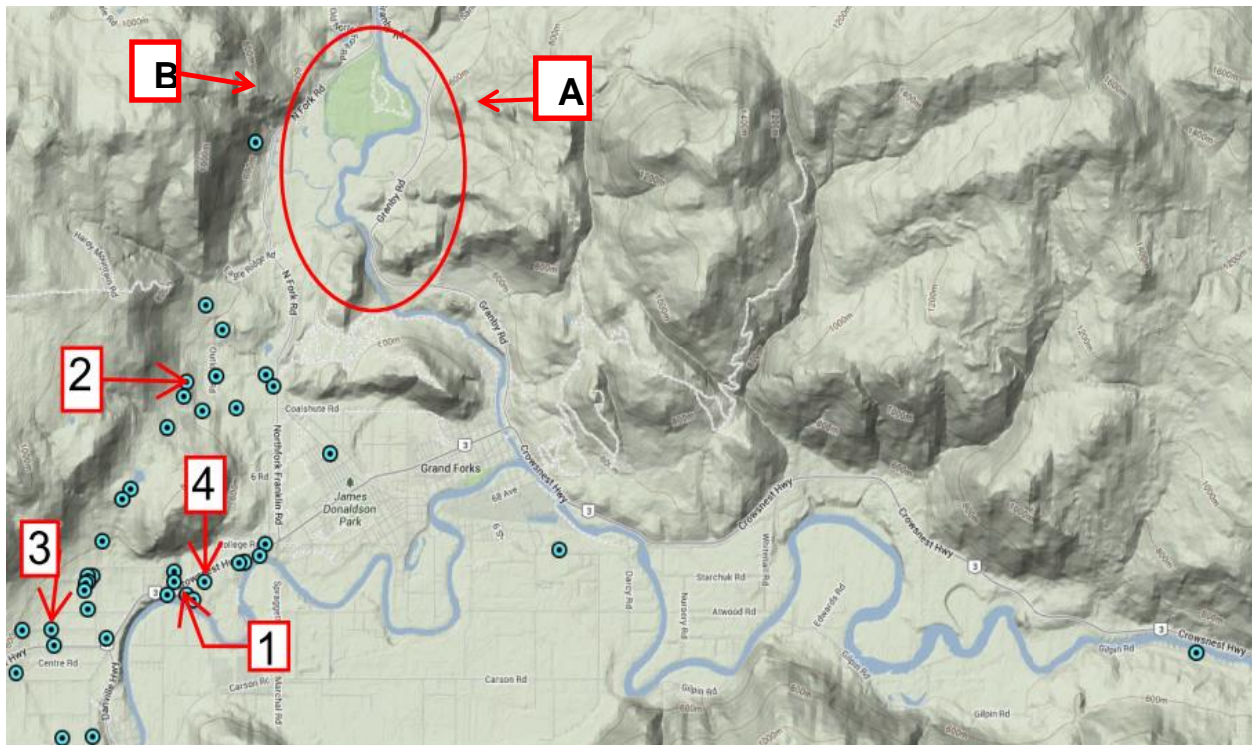
<sup>57</sup> J.J. Baron, Regional District of East Kootenay, "Smelter Lake Study – A Preliminary Assessment", 1977.

<sup>58</sup> J.J. Baron, Regional District of East Kootenay, "Smelter Lake Study – A Preliminary Assessment", 1977.

<sup>59</sup> J.J. Baron, Regional District of East Kootenay, "Smelter Lake Study – A Preliminary Assessment", 1977.

- The regions' cultural diversity is reflected in its local cuisine, artistry and many attractions and community events.
- Boundary area is home to significant number Doukhobor settlements.<sup>60</sup> The map below highlights the location of Doukhobor communal settlements near Grand Forks from 1908-1938.

**Figure 12: Settlements of Potential Archeological Significance**



<sup>60</sup> At the beginning of the 1900's roughly 7500 Doukhobors, nearly a third of the total existing population, settled on the Canadian prairies establishing dozens of communal village settlements in the Province of Saskatchewan. In the early 1900's the Doukhobors were confronted with a breach of agreement by the Canadian Government and they were forced to give up their land claims in Saskatchewan. This led a large percentage of Doukhobors to migrate to British Columbia in 1908 where they settled on large parcels of privately purchased land. They established dozens of villages (about 60) in the Kootenay area of BC, with several located in and around Grand Forks. The Doukhobors who settled here worked and lived in communal establishments until 1938, when many of the communes folded due to the onset of the depression and active efforts by outside forces to bring about assimilation. By the 1960's, many of the old villages had disappeared or were purchased for individual dwellings and building materials; some were destroyed by arson. This resulted in the disappearance or degradation of many artifacts and archeological resources related to Doukhobor cultural heritage.

These settlements may represent areas of potential archeological significance. Doukhobor Villages were generally self-sufficient, and all of the large communal homes built by the Doukhobor people in the Kootenay-Boundary region of BC are based on the same traditional design brought with them to Canada in the early 1900's. Some significant points of cultural heritage are noted on the map in **Figure 12**. These include:

Site 1 - Pride of the Valley Flour Mill

Site 2 - The Hardy Mountain Doukhobor Village Historical Site

Site 3 - The School House

Site 4 - USCC Community Centre

The Boundary area study area includes ten (10) provincial parks, the most significant of which are Gladstone Provincial Park north and adjacent to Christina Lake, and Granby Provincial Park, which encompasses the headwaters of the Granby River.

1. Conkle Lake
2. Johnstone Creek Provincial Park
3. Boundary Creek Provincial Park
4. Rock Creek Provincial Park
5. Jewel Lake Provincial Park
6. Gilpin Grasslands
7. Boothman's Oxbow Provincial Park
8. Christina Lake Provincial Park
9. Gladstone Provincial Park
10. Granby Provincial Park

As mentioned previously, the Granby Project falls within the traditional territories of the Syilx Okanagan Nation Alliance. Their territory is approximately 69,000 km<sup>2</sup> in the Southern Interior of British Columbia and an additional 5,568 km<sup>2</sup> in Northern Washington State. The Okanagan Nation is comprised of seven Canadian bands. These bands are:

- Upper Nicola Indian Band (Merritt, BC)
- Okanagan Indian Band (Vernon, BC)
- Westbank First Nation (Westbank, BC)
- Penticton Indian Band (Penticton, BC)
- Osoyoos Indian Band (Oliver, BC)
- Upper Similkameen Indian Band (Keremeos, BC)
- Lower Similkameen Indian Band (Hedley, BC)

Christina Lake and Gladstone. Approximately 51,100 people used the Christina Lake Provincial Park from April to October 1998. Currently, this park serves as a day-use facility, supporting activities such as picnicking, boating, fishing, and swimming. The region is also served by numerous private and public campgrounds.

#### 7.4.2 CULTURE AND HERITAGE PRELIMINARY ASSESSMENT

POTENTIAL IMPACT	DESCRIPTION	
<p><b>Recreational Sites/Activities</b></p> <p>To consider how a project could influence the local citizens recreational activities and loss of potential tourism assets.</p>	<b>Scenario One</b>	<ul style="list-style-type: none"> <li>There will be an impact on exiting recreational assets and usages of the Granby River. Specifically, for the approximately 4.5 km<sup>61</sup> of the Granby River that will be flooded.</li> <li>Presently, tourism and recreational use in the impacted land include river rafting, wilderness camping, mountain biking, canoeing, kayaking, tubing, horseback riding, swimming, fishing, hunting, snowmobiling, snowshoeing, picnicking, and historical site touring.</li> <li>In essence the loss of land based recreation will be based on the unique characteristics of a river and replaced with those that are gained by the creation of a reservoir (swimming, boating, fishing, beaches, etc.). The additional/change in usage will be: , mountain biking, canoeing, horseback riding, swimming, fishing, hunting, snowmobiling, snowshoeing, picnicking, and historical site touring.</li> <li>Resulting in the loss of river rafting and kayaking along a 4.5 km long section of the river</li> </ul>

<sup>61</sup>The length of the Granby River that will be part of the inundated area.

<p><b>Cultural Sites</b></p> <p>To consider how a project could influence the cultural assets within the region.</p>	<p><b>Scenario Two</b></p> <ul style="list-style-type: none"> <li>• Within the development of scenario two the similar loss or changes in use for the approximately 4.5 km<sup>62</sup> of the impacted Granby River will still occur. With present tourism and recreational usage in the impacted land including: river rafting, wilderness camping, mountain biking, canoeing, kayaking, tubing, horseback riding, swimming, fishing, hunting, snowmobiling, snowshoeing, picnicking, and historical site touring.</li> <li>• However, there would be a significant gain in tourism assets, such as: <ul style="list-style-type: none"> <li>○ Boat Launches</li> <li>○ Campfire Pits</li> <li>○ Beach Pier</li> <li>○ Picnic Areas</li> <li>○ Campsites</li> <li>○ Recreational Homes</li> <li>○ Washrooms</li> <li>○ Drinking Water</li> <li>○ Trails</li> <li>○ Interpretive walks (Highlighting areas history/culture)</li> </ul> </li> <li>• Resulting in a significant increase in usages, such as: <ul style="list-style-type: none"> <li>○ Canoeing</li> <li>○ Cycling</li> <li>○ Hiking</li> <li>○ Fishing</li> <li>○ Pet walking</li> <li>○ Swimming</li> <li>○ Windsurfing</li> <li>○ Mountain Biking</li> <li>○ Winter recreation</li> </ul> </li> <li>• See Tourism Area Development Opportunities, Section 3.0 for comprehensive details and analysis.</li> </ul>
	<p><b>Scenario One</b></p> <ul style="list-style-type: none"> <li>• The Granby Project falls within the traditional territories of the Syilx Okanagan Nation Alliance.</li> <li>• Boundary area is home to significant number Doukhobor settlement, and creation of a dam could potentially have an impact on Doukhobor cultural heritage in the area. Several former Doukhobor settlement areas and potential archeological resources along the Kettle and Granby Rivers could be impacted depending on the extent of the flooding. For example, the former Doukhobor settlement Syidarovoe. Although it is unlikely Doukhobor cultural heritage will be impacted by the dam due to the relative newness of the land being used there (post Smelter Lake), these potential issues can be further discussed and mitigated through targeted community engagement.</li> </ul>

<sup>62</sup>The length of the Granby River that will be part of the inundated area.



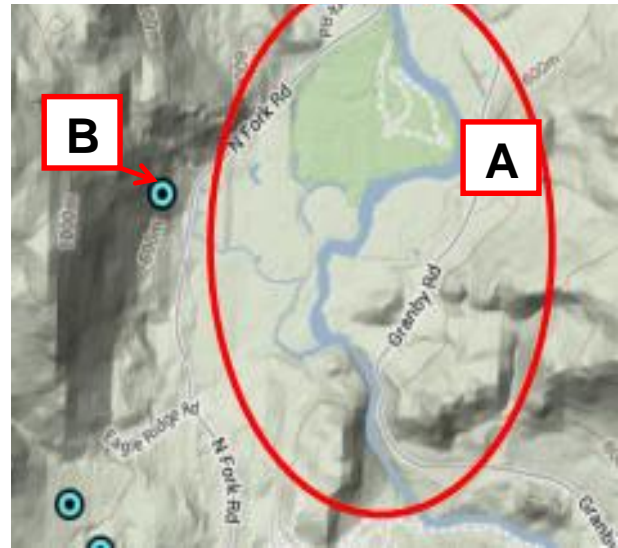
	<b>Scenario Two</b>	<ul style="list-style-type: none"> <li>• The Granby Project falls within the traditional territories of the Syilx Okanagan Nation Alliance.</li> <li>• Boundary area is home to significant number Doukhobor settlement, and creation of a dam could potentially have an impact on Doukhobor cultural heritage in the area. Several former Doukhobor settlement areas and potential archeological resources along the Kettle and Granby Rivers could be impacted depending on the extent of the flooding. For example, the former Doukhobor settlement Syidarovoe. Although it is unlikely Doukhobor cultural heritage will be impacted by the dam due to the relative newness of the land being used there (post Smelter Lake), these potential issues can be further discussed and mitigated through targeted community engagement.</li> <li>• Enhancements made to the Granby Lake area through the creation of an interpretive walk (highlighting the area's history/culture) would further enhance and build on existing cultural assets, which will gain increased exposure, awareness and visitation.</li> </ul>
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### 7.4.3 CONCLUDING THOUGHTS

- Due to the relative newness of the land being used (post Smelter Lake) there has been limited infrastructure investment by the way of tourism attraction and recent cultural activities.
- Presently, tourism and recreational use in the impacted land include river rafting, wilderness camping, mountain biking, canoeing, kayaking, river rafting, horseback riding, swimming, fishing, hunting, snowmobiling, snowshoeing, picnicking, and historical site touring.

- It is felt that the development of this site for its heritage and historical values will provide a valuable day-use and overnight attraction for tourists.
- The development of a hydroelectric dam and the subsequent flooding of the Granby River Valley (Note: the area circled in red and labeled “A”), could potentially have an impact on Doukhobor cultural heritage in the area. Several former Doukhobor settlement areas and potential archeological resources along the Kettle and Granby Rivers could be impacted depending on the extent of the flooding. For example, the former Doukhobor settlement Syidarovoe (labeled “B”) is located near the section of the Granby River Valley that will be impacted by flooding. Although it is unlikely Doukhobor cultural heritage will be impacted by the project due to the relative newness of the land being used there (post Smelter Lake), it may be relevant to consider the potential impacts of the project may have on the Doukhobor’s perceived cultural landscape. These potential issues can be further discussed and mitigated through targeted community engagement.
- Enhancements made to the Granby Project area through the creation of an interpretive walk (highlighting the area’s history/culture) would further enhance and build on existing cultural assets, which will gain increased exposure, awareness and visitation.

Figure 13: Doukhobor Cultural Sites



The results of this socio-assessment have demonstrated that if the City and the District are to proceed with the Granby Project they would need to implement mitigated measures to ensure maximum benefit from the project is achieved. Overall, it appears that the Granby Project is likely to have a positive social impact on local communities. The following table summarizes the positive and negative social impacts of the Granby Project:

<b>SOCIO SUMMARY POSITIVE IMPACTS</b>	<b>Scenario One</b>	<ul style="list-style-type: none"> <li>• The attraction of younger cohorts to the City.</li> <li>• A curbing of population decline.</li> <li>• Increased employment in construction and services- Job creation for the construction and operation of the dam</li> <li>• Increased employment in construction and services.</li> <li>• Increased property values around the reservoir.</li> <li>• Increased opportunities for recreation</li> <li>• Flood control benefit</li> <li>• An increase in housing prices for properties around the reservoir ~10%.</li> </ul>
	<b>Scenario Two</b>	<ul style="list-style-type: none"> <li>• The attraction of younger cohorts to the City</li> <li>• A curbing of population decline.</li> <li>• Increased employment in construction and services- Job creation for the construction and operation of the dam</li> <li>• Increased employment (long-term) in the tourism and service sectors</li> <li>• Increased opportunities for a large variety of year around recreation activities</li> <li>• Economic development opportunities from growth in the tourism sector</li> <li>• Heritage enhancements made to the Granby Lake area through the creation of an interpretive walk</li> <li>• Flood control benefits</li> <li>• Opportunity for residential and resort development.</li> <li>• An increase in housing prices for properties around the reservoir ~15%</li> </ul>
<b>SOCIO SUMMARY NEGATIVE IMPACTS</b>	<b>Scenario One</b>	<ul style="list-style-type: none"> <li>• Potential for increased population to put pressure on the local housing market.</li> <li>• Minor pollution around the dam from dust during the construction period.</li> </ul>

	<p><b>Scenario Two</b></p>	<ul style="list-style-type: none"> <li>• Increased local traffic during the construction period.</li> <li>• Loss of some recreational activities in the 4.5 km stretch of the river that will be converted into a reservoir.</li> <li>• Safety risks associated with boating on and swimming in the lake.</li> <li>• Minor potential for impacting cultural heritage.</li> <li>• Unlikely potential for structural collapse of the dam</li> <li>• Noise pollutants during the 2 year construction period.</li> </ul>
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# Section Eight

## MOVING FORWARD.



Based on the potential for this project to help create a more vibrant and sustainable region through local economic development, should the City of Grand Forks and the Regional District of Kootenay Boundary decide to pursue further investigations and investments in the Granby project, there are a number of key factors to consider. In particular, effort will need to be directed towards securing an agreement with BC Hydro, determining the governance and ownership model for the project, securing the required lands, accessing key grant funding and financing resources, and obtaining all regulatory permits and approvals for the project.

Additionally, the most critical success factor for the project is securing support from the community. A series of recommendations, strategies and key next steps are illustrated for the City of Grand Forks and Regional District of Kootenay Boundary's consideration.

As noted in the financial review of the Granby Project, it is evident that grant funding will be fundamental to the success of the project. Also, a series of key funding programs are outlined. These represent a preliminary inventory of programs that are most likely to offer the needed funding to support the progression towards development.

In closing a series of recommendations and key next steps are outline for the City and Regional District's consideration.

## 8.0 Moving the Granby Project Forward

### 8.1 Common Ownership Models for Community-Based Renewable Energy Projects

It is understood that the City and the District wish to understand the possible governance and ownership models available to support the development and operation of the conceptualized Granby Project.

It is expected that the desired ownership model will need to provide a means to cost effectively and efficiently recover the large initial capital investments needed to establish the project, support the ongoing operation and maintenance requirements of the project and operation, and long term commitments of the project to its customer(s), i.e., BC Hydro/Grand Forks Electric Utility. Recognizing this, there are four core options for ownership of a clean energy project such as the proposed hydroelectric project. They include:

1. Full ownership and operation. In this model the project would be owned and operated directly by the City and/or the District;
2. Establishment of a wholly-owned subsidiary. In the model, the City and/or the District would utilize an existing or create a subsidiary company to own and operate the project;
3. Community ownership-private sector operation. In this model the City and/or the District would retain ownership of the project and secure a private sector partner to take on the project's operation and maintenance requirements;
4. Joint-Venture. In this model, the City and/or the District would own a portion of the project – either ownership of part of the project or a share (percentage) of the project through a joint-equity project with a private sector partner.
5. Community Co-Op. While still relatively new in Canada, this model would see the establishment of an organization (i.e., the co-op) that is owned by the members who use its services or have other motives of ownership. Many renewable energy focused co-ops are the community level to promote renewable energy or to help raise investment and support project development.

Each model has its advantages and disadvantages. These are summarized in the following table. The preferred ownership option depends on a number of factors including: efficacy, degree of control, efficient governance, cost of capital, risk, expertise, tax incentives and regulatory requirements.

**Table 17: Summary of Advantages and Disadvantages of Different Ownership Models**

OWNERSHIP MODEL	ADVANTAGES	DISADVANTAGES
<b>Full ownership</b>	<ul style="list-style-type: none"> <li>• Retain project control;</li> <li>• Manage and set rate structures;</li> <li>• Secure and leverage grant dollars;</li> <li>• Recognize synergies with other municipal operations.</li> </ul>	<ul style="list-style-type: none"> <li>• Greater financial risk;</li> <li>• Greater legal and liability risk;</li> <li>• Need to engage “in-house” expertise to commission, operate and maintain project.</li> </ul>
<b>Establishment of a wholly-owned subsidiary</b>	<ul style="list-style-type: none"> <li>• Reduced liability for the local government, since the corporation would be a separate legal entity;</li> <li>• Significant control retained by community;</li> <li>• Secure and leverage grant dollars.</li> </ul>	<ul style="list-style-type: none"> <li>• Financial risk borne by a local government owned subsidiary company;</li> <li>• Legal and liability risk placed upon subsidiary company;</li> <li>• Need to engage “in-house” expertise to commission, operate and maintain project.</li> </ul>
<b>Community Ownership-Private Sector Operation</b>	<ul style="list-style-type: none"> <li>• Community retains some project control, but constrained by legal partnership;</li> <li>• Potential to benefit from private sector expertise in delivering energy services;</li> <li>• Still able secure and leverage grant dollars.</li> </ul>	<ul style="list-style-type: none"> <li>• Less control by the community;</li> <li>• Financial risks and benefits shared with private sector partner.</li> </ul>
<b>Joint-Venture</b>	<ul style="list-style-type: none"> <li>• Risks are shared with private-sector partners;</li> <li>• Enables the project to benefit from private sector expertise;</li> <li>• Capital costs are shared with private-sector partners.</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of project control;</li> <li>• Loss of potential revenues from project.</li> </ul>



Community Co-Op	<ul style="list-style-type: none"> <li>• Can provide an effective way to raise capital for a project;</li> <li>• Provides a way to directly return financial benefits of a renewable energy project to community members;</li> <li>• Can enhance community support for a project.</li> </ul>	<ul style="list-style-type: none"> <li>• Decentralized ownership structure;</li> <li>• Requires a large number of investors to raise needed capital;</li> <li>• May not be suitable for projects that require significant project funding from senior level governments.</li> </ul>
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### 8.1.1 A NOTE ON PRIVATE PARTNERSHIPS / JOINT-VENTURES

A private partnership is another potential method to facilitate the funding, financing and delivery of the Granby Project. However, prior to entering into a private partnership it is important to address some key questions which include:

- What exactly is a private partnership?
- When should a private partnership be considered?
- Will the private partner be interested?
- What should be addressed prior to becoming involved in a private partnership?
- What is the legislative framework and authority?
- Are there criteria to determine merit?
- Do the benefits outweigh the costs?

Fortunately, there are resources to answer these and other questions. With appropriate planning, a private partnership can be a successful project delivery financing method.

## 8.2 Overview of Financing and Funding Options

This section provides an introduction to the various project financing and funding options that are available to the City and the District.

### 8.2.1 *MUNICIPAL FINANCE AUTHORITY OF BC*

The Municipal Finance Authority of British Columbia (MFA) was created in 1970 to contribute to the financial well-being of local governments throughout BC. The MFA pools the borrowing and investment needs of BC communities through a collective structure and is able to provide a range of low cost and flexible financial services to our clients equally, regardless of the size of the community. The MFA is independent from the Province of British Columbia and operates under the governance of a Board of Members appointed from the various regional districts within the province.

It is recommended that the City and the District approach the MFA to support the equity financing needs of the Granby Project should it proceed to construction. The financing rates of the MFA are available at: <http://mfa.bc.ca/long-term-lending-rates>

### 8.2.2 *TRADITIONAL FORMS OF PROJECT FINANCING: DEBT AND EQUITY*

For most small hydro projects, financing is usually comprised of debt and equity. In addition to a proponent's "sweat equity" i.e., the efforts put forward to identify a site, review its feasibility, etc., all projects need an appropriate level of financial resources to cover the capital costs of a project's development.

In addition to sweat equity and internal resources, equity can be generated from a number of sources which include:

- Private capital (angel investors, friends, relatives);
- Formation of a company and issuing shares to the public or a small number of "sophisticated" investors (subject to securities regulations);
- Loans through government development agencies (as long as such loans are in second place to any other debt placed on the project);
- Government grants (as highlighted earlier in this section);
- Venture capital; and
- Affiliations with senior independent power producers (who may agree to carry a large proportion of the funding in exchange for a commensurate share in the project).

In addition to the equity sources noted above, debt funding offers another means to generate the needed finances to enable a project's development. The following lending groups can be used to help finance a project's development:

- Schedule A banks;
- Schedule B banks;
- Trust companies;
- Lease and capital companies;
- Some government agencies; and
- Life insurance companies.

It is important to note that the baseline feasibility reviews completed within this assessment, assumed that a project's development would be 100% financed through debt. This, as illustrated in the analysis, is a much more costly means to support a projects development as the interest on a project of this size can be significantly reduce its financial feasibility. However, with the support of senior government funding programs the project is financially feasible. The following section outlines some potential funding programs.

## 8.3 Funding Programs

### 8.3.1 *GAS TAX FUND*

The Gas Tax Fund (GTF) is an agreement between the Government of Canada and the provinces that ensures predictable, long-term funding for municipal infrastructure. The intent of the GTF is to support infrastructure projects that achieve positive environmental outcomes, particularly cleaner air, cleaner water and the reduction of greenhouse gas emissions. Examples of eligible infrastructure projects include:

- Drinking water
- Wastewater
- Public transit
- Community energy systems
- Solid waste management
- Local roads

In British Columbia, the Gas Tax Fund is administered by the Union of B.C. Municipalities (UBCM) in partnership with the provincial and federal governments. Through the GTF, approximately \$1 billion is to be delivered to B.C. communities between 2010 and 2014. These funds are available through four different programs, which are detailed below.

## Community Works Fund

The Community Works Fund supports local priorities in alignment with the desired outcomes of the Gas Tax Fund. The program provides funding directly to eligible local governments, with no application required. Level of funding allocated to local governments depends on their Tier as defined by the Gas Tax Agreement.

## Innovations Fund

The Innovations Fund (IF) supports projects that reflect an innovative approach to achieving the desired GTF outcomes of reduced GHG emissions, cleaner air and cleaner water. Unlike the Community Works Fund, the IF involves a competitive process. All local governments in BC are eligible to apply for the IF and approximately \$50Min funding is available for the 2010/2011-2013/2014 fiscal years.

## General Strategic Priorities Fund

The General Strategic Priorities Fund (GSPF) is targeted towards strategic investments that are larger in scale or regional in impact. Like the Innovations Fund, the GSPF is a competitive process that provides funds for projects that are in line with the intentions of the Gas Tax Fund. Approximately \$107M has been allocated to the GSPF for the 2010/2011-2013/2014 fiscal years. Tier 1 and 2 local governments are eligible to apply.

## Regionally Significant Projects

Funding is currently available for Regionally Significant Projects (RSPs) that are to be located in Tier 2 regions. The Kootenay Boundary Regional District, within which Grand Forks is located, is considered a Tier 2 region and has been allocated approximately \$4.3Min funding for RSPs. In order to be eligible for RSP funding, the application process must be driven by a Region/UBCM/BC working group. Information about RSP funding and the other Gas Tax Fund programs noted above is available on the UBCM website <http://www.ubcm.ca/>

### 8.3.2 *EcoENERGY – INNOVATIONS INITIATIVE*

EcoEnergy is a federal program offered by Natural Resources Canada (NRCAN) that is geared towards the promotion of sustainable energy. The program includes a number of initiatives and sub-programs, one of which is the EcoEnergy Innovations Initiative (EcoEII).

EcoEII was introduced in 2011 as part of the Next Phase of Canada's Economic Action Plan. The objective of the program is to support energy technology innovation that results in the production and use of energy in a more clean and efficient manner. The program was allocated \$97Min Budget 2011 to fund research and development (R&D) and demonstration projects that fall into five strategic priority areas:

- Energy Efficiency
- Clean Electricity and Renewables

- Bioenergy
- Electrification of Transportation
- Unconventional Oil and Gas

EcoEI involves a competitive process wherein applicants must respond to a call for Letters of Expression of Interest (LOIs). An LOI is not a complete proposal but rather an outline of a potential project. Information about the Innovations Initiative and other EcoEnergy programs is available on the Government of Canada's EcoAction website.

### Green Municipal Fund – Energy Projects

The Green Municipal Fund (GMF) is a federal program offered by the Federation of Canadian Municipalities (FCM). The intent of the program is to fund projects that display leadership and innovation in municipal sustainable development. The GMF is a comprehensive program, with funding (loans and grants) available for plans, feasibility studies/field tests and capital projects in the areas of:

- Brownfields
- Energy
- Transportation
- Waste
- Water

Within the energy stream of the GMF, FCM states that it will fund energy recovery projects that demonstrate the potential to capture and use residual energy and reduce energy consumption by at least 20% for one or more existing municipal facilities within one year of implementation. While a hydro project would not necessarily reduce energy consumption, it would certainly demonstrate the potential to capture and use residual energy. For this reason, the Green Municipal Fund could be explored as a potential funding source.

The FCM is accepting new applications for the GMF and is proceeding with an open intake (no deadline). Approximately \$45Min loans and \$5Min grants for capital projects in the energy, transportation, waste and water sectors is said to be available. Additional information about the GMF generally, and the energy stream specifically, can be found on the Federation of Canadian Municipalities' website.

### P3 Canada Fund

A public private partnership (PPP) is a potential method to facilitate the funding and delivery of a power project. Amendments to the Municipal Act in 1998 expanded opportunities for public private partnerships for the delivery of public facilities and services; however, there is much uncertainty with the structure and logistics of such a relationship.

The P3 Canada Fund is a \$1.2 billion federal program administered by Public-Private Partnerships (PPP) Canada. The program was created to improve the delivery of public infrastructure and provide better value, timeliness and accountability by increasing the effective use of P3s.

The P3 Canada Fund supports projects in fifteen different infrastructure categories, one of which is green energy infrastructure. Within this category, PPP Canada identifies “renewable electricity generation facilities for municipal consumption” as an eligible type of infrastructure.

## 8.4 Risk Identification and Mitigation Strategies

If the City and the District decide to pursue a project, it is important to recognize key project risks. Estimation of risk is based on a combination of the likelihood (probability) of failure and the consequences of a failure. The product of these two factors provides risk rating for each asset.

Figure 14: Risk Score Matrix

		Risk Score Matrix		
Consequence	High	HL	HM	HH
	Medium	ML	MM	HM
	Low	LL	ML	HL
		Low	Medium	High
		Likelihood		

Any project of this kind will inherently include a number of sources of risk for the developer(s). In the context of developing a hydroelectric project on the Granby River, the primary sources of risk identified, and potential mitigation measures are as follows:

### Revenue pricing

#### Risk: High-Medium

**Mitigation Measure:** It is important understand all potential revenue sources and determine validity and applicability prior to moving forward. For example, monitor the SOP price updates and review other pricing incentives. If the City decides to pursue a project, it should seek to secure an EPA with BC Hydro as soon as possible, as such an agreement would significantly reduce revenue pricing and overall project risks.

It is also important to note that over the course of September 2013, BC Hydro has made a number of policy announcements that may inhibit the growth of privately produced power in the Province. This could influence the timing and likelihood of the Granby Project securing a power purchase agreement under the BC Hydro SOP. It will be critical to monitor how these recent policy announcements evolve over the next 6-12 months and their potential impact to the success of the project's development.

## Higher than expected capital cost

**Risk: High-Medium**

**Mitigation Measure:** continue to include an appropriate contingency when estimating project costs, utilize the best available site information, and pursue sources of grant funding to offset direct capital investments made by the City. A sensitivity analysis that reviews the impact of capital cost variations and a number of other financial factors is included in **Appendix D** of this assessment for project Scenario 2.

## Flow availability

**Risk: High-Medium**

**Mitigation Measure:** while this assessment, and previously completed reports utilized the best available hydrological data, if the City decides to pursue the project it will be critical to conduct a flow monitoring study that refines water flow conditions including climate effects, and obtain license for water power.

## Environmental requirements

**Risk: High-Medium**

**Mitigation Measure:** As the City and project partners continue to consider the development of the Granby Project, it is critical understand all environmental requirements and when appropriate contact regulatory agencies early in the process. The sections above provides an overview of the likely environmental requirements.

## Community Support

**Risk: High-Medium**

**Mitigation Measure:** Upon completion of this assessment and deliberations by the City and Regional District a decision to proceed with the project further will be made. Should it be decided that the project will proceed further in its development, a community engagement initiative will be undertaken to solicit feedback from the local and regional communities.



## First Nations Support

### Risk: Medium

**Mitigation Measure:** The Granby project falls within the traditional territories of the Syilx Okanagan Nation Alliance. This was confirmed through a search of the BC Ministry of Agriculture and Lands Integrated Land Resource Registry indicated no “Statement of Intent” First Nation Traditional Territory records in close proximity to the project area.

Their territory is approximately 69,000 km<sup>2</sup> in the Southern Interior of British Columbia and an additional 5,568 km<sup>2</sup> in Northern Washington State. The Okanagan Nation is comprised of seven Canadian bands. These bands are:

- Upper Nicola Indian Band (Merritt, BC)
- Okanagan Indian Band (Vernon, BC)
- Westbank First Nation (Westbank, BC)
- Penticton Indian Band (Penticton, BC)
- Osoyoos Indian Band (Oliver, BC)
- Upper Similkameen Indian Band (Keremeos, BC)
- Lower Similkameen Indian Band (Hedley, BC)

The Okanagan Nation Alliance will need to be consulted and engaged in project deliberations once the project goes out of camera.

A search for archaeological records was conducted on September 10, 2013 through the BC Ministry of Agriculture and Lands Integrated Land Resource Registry. The results indicate the presence of three sensitive archaeological records within a 500 m radius of the estimated project area. See **Appendix G** for the complete search report and map.

Furthermore, it is recommended that the City and the District consider engaging with local First Nation communities and key stakeholders. Doing so, will provide opportunities for developing new partnerships, enhance financing and funding options for the project and potentially enhance the efficiency in securing regulatory approvals and permits.

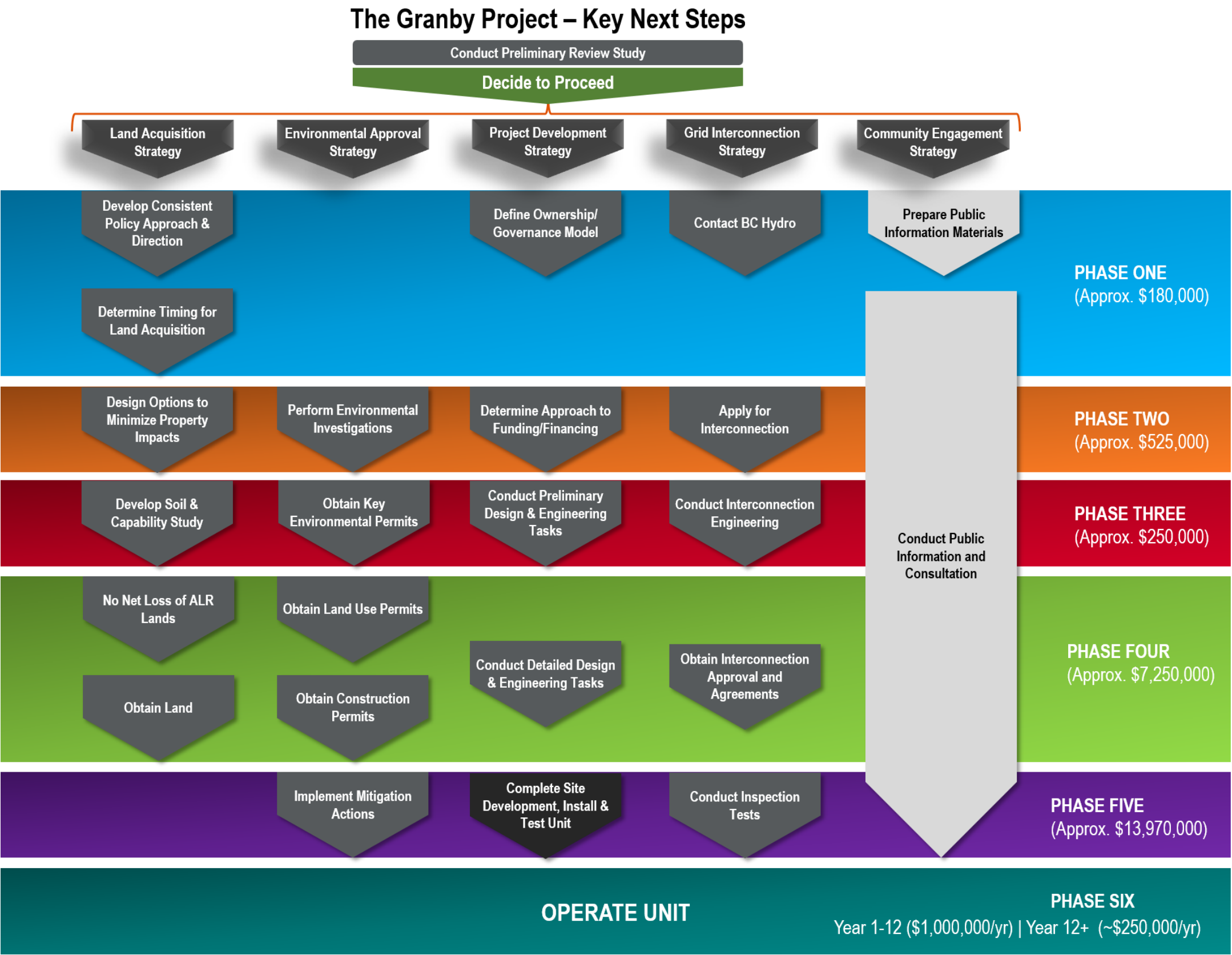
## 8.5 Key Next Steps

When considering the lifecycle of a project such as the Granby Project it is important to highlight all of the foundational steps to take a project from concept through to development. The following provides a high-level overview of the key next steps that the City and Regional District should consider, if a positive decision to proceed with the project is made in the fall of 2013. These next steps are summarized under five core “strategies: which include:

- Land acquisition strategy
- Environmental approvals strategy
- Project development strategy (ownership model)
- Grid interconnection strategy
- Community engagement strategy

For each of the core strategies identified a number of activities have been identified, as illustrated in **Figure 13**.

Figure 15: Key Next Steps in Developing the Granby Project should the City and Regional District decide to further pursue the project.



### 8.5.1 LAND ACQUISITION STRATEGY

**Purpose:** efficiently and cost-effectively secure the required lands to enable the Granby Project to project in a fashion that respects current land owners and users.

Before any significant funds or efforts are spent on the lands strategy, it is very important that the City and Regional District review and discuss a number of key considerations, in order to come up with a consistent policy approach and direction to the potential land acquisition program for the Granby Project. Some of these considerations include, but are not limited to, the following:

- Determine the Highest and Best Use
- Potential for down-zoning / designation
- Potential for expropriation
- Timing of property acquisition
- No net loss of ALR lands
- Design options to minimize property impacts

### 8.5.2 PUBLIC INFORMATION AND COMMUNITY CONSULTATION STRATEGY

Communication and consultation is a strategic priority for this project. Obtaining public input and eventual approval is a necessary condition for the project to proceed. Ensuring that key stakeholders are engaged and involved early and often, that the public is informed and consulted in a timely manner and that relevant concerns are addressed and reported out are key steps to ensuring a successful process. The added challenge for this project is the need to conduct the Preliminary Assessment and initial discussions in camera due to the potential for land acquisition.

A detailed Public Information and Community Consultation Plan will be developed to guide project planning, approvals and implementation. The purpose of the plan is to provide a detailed process to identify stakeholder and community concerns and opportunities, and to assess the level of support and acceptance for the project. The consultation process will also be used to solicit specific feedback necessary to verify some of the findings in the Preliminary Assessment, such as some of the social and economic impacts that were identified. It is also intended to provide opportunities to enable deeper community engagement through the implementation of various activities ranging from face-to-face meetings with individuals and community groups to a robust public information and consultation campaign. The outcomes of the public information and community consultation process will be used to further inform and guide elected officials in their deliberations.

The plan will include specific strategies to inform and engage key stakeholders and the community at different phases in the process. The plan will need to be responsive and flexible—able to adapt to the decisions made throughout the process. For example, a detailed strategy would be developed to support conversations with land owners as part of the Land Acquisition Strategy in Phase 1. The strategy would be implemented once the decision was made to proceed with discussions. The plan will also include a detailed

action plan for the development and implementation of the materials and activities required for various project phases.

### **Phased Approach**

If decisions are made to move to subsequent Phases, a coordinate and staged approach to public information and consultation is recommended. Given the sensitive nature of the topic, it will be important to ensure that the timing ensures that those that need to know – those that are more impacted – hear it first from the City and RDKB. The following provides a high level overview of what would be required over the course of the project.

### **Initial Announcement: Consultation with Landowners, Member Municipalities and BC Hydro**

This is a sensitive step that involves communication with landowners who would be impacted by the proposed restoration of the reservoir. It is anticipated that these communications would happen before release to the general public. Identified member municipalities would also need to be informed in camera in advance, as well as key stakeholders at BC Hydro. At this time, it is anticipated that decisions to move the project from in camera to open council/board would also be made. Other tasks include developing key messages and materials, identifying spokespersons, providing detailed orientation and preparing the public announcement.

### **General Announcement: Launch Public Information and Community Consultation Campaign**

This involves the strategically timed and coordinated release of the information to the media and key stakeholder groups, as well as the public at large. This stage would involve a robust campaign to inform and engage and would include meetings with community groups and key stakeholders, community meetings, media and advertising, newsletters, web based information, surveys, social media, media monitoring, responding to inquiries and issues management. The recommended activities and communication tools would be identified in the detailed action plan for this section. The ability to implement these steps will also be contingent on an allocation of human resources to implement and manage the process.

### **Follow Up: Report out, Consult and Confirm**

This step involves taking the feedback received in the initial consultation campaign and reporting out to key stakeholders and the community on the findings. Steps in this part of the campaign may follow those in the initial communications and consultation campaign, seeking to confirm the feedback received, address concerns heard and advise on next steps.

### **Seek Assent: Referendum or AAP campaign**

If the project continues to this point, a referendum or alternate approval process may be required. This final step would involve encouraging public participation in the process to seek the assent of the electorate. Similar steps to the initial campaign would be necessary to enable individuals to make informed decisions or it may be part of the follow up campaign, depending on timing.

Once these key steps have been completed and support for the project is secured the project will likely be able to proceed with the completion of site work, development and equipment installation (i.e., project construction). Once completed, the project will transition to “Commercial Operation”.

### 8.5.3 ENVIRONMENTAL APPROVALS STRATEGY

**Purpose:** proactively undertake key environmental investigations and collaboratively work with senior government approval agencies to support the authorization of the Granby Project.

The main activities under this strategy include:

1. Preform environmental investigations: This activity should include fish wildlife habitat impact investigations, watershed and groundwater assessments and further archeological assessments.
2. Obtain key environmental approvals: The above section provides an overview of the likely environmental approval requirements for the proposed project.
3. Obtain land use permits and authorizations: A number of regional land use and zoning approvals and authorizations will be required to support the development of the project.
4. Obtain construction permits: Prior to project construction a number of permits and approvals will need to be secured.
5. Implement mitigation actions: Upon completion of further environmental site investigations and building from the proposed strategies outlined in this review assessment an environmental impact mitigation strategy should be developed and implemented.

### 8.5.4 PROJECT DEVELOPMENT STRATEGY

**Purpose:** undertake required engineering and design work to refine the project’s feasibility assessment, develop and formalize a governance model for the project and work to secure project funding and financing.

The main activities under this strategy include:

1. Determine approach to funding and financing: as noted in the Financial Review section of this assessment grant funding and low cost financing will be critical. Therefore, it will be important for the City to proactively approach potential funding programs and partners in short order, if it is determined that the project will proceed further. This effort should culminate into an overarching project funding and financing plan.
2. Conduct design and engineering tasks: the proposed project will require a significant amount of design and engineering work. This includes civil, mechanical and electrical engineering design work. It is suggested that the preliminary engineering and design phase be undertaken to allow for a more detailed project cost estimate to be developed and the financial feasibility of the project further refined. This preliminary design phase will also provide greater flexibility with respect to the approach to construction and development.
3. Define the project’s ownership and governance model: as noted above, there are a number of ownership and governance models available to support the development of the Granby Project.

These options should be further reviewed by the City and Regional District to determine which approach would be best suited for the Granby Project and each local government.

### 8.5.5 GRID INTERCONNECTION STRATEGY

**Purpose:** a major milestone in the Granby Project’s development is securing an agreement with BC Hydro under the SOP. With an agreement in place, the project will be able to interconnect to either the local distribution system or regional transmission lines. Securing an interconnection agreement with BC Hydro under the SOP represents the primary means for the project to generate revenues.

The main activities under this strategy include:

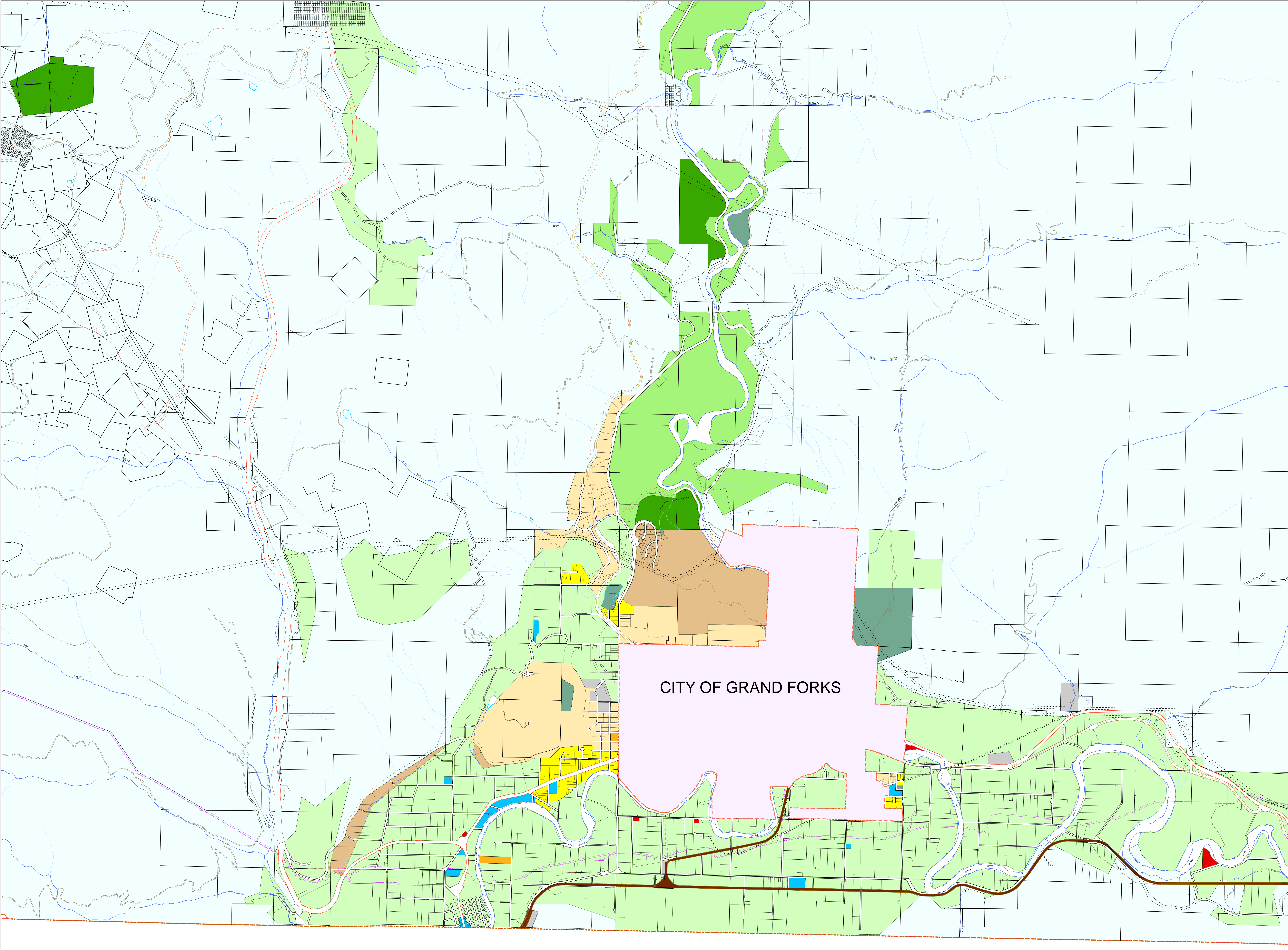
1. Contact BC Hydro: proactively engaging BC Hydro will be of significant importance to this project. This is due to the fact that BC Hydro has a significant screening and project assessment process that requires a number of studies and much analysis.
2. Apply for interconnection: once BC Hydro has been engaged, it is likely that they will request a number of interconnection studies to be undertaken. These studies can vary in scope and cost. Once the appropriate studies have been completed, the Project will need to apply to the appropriate “power purchase program”, (likely the SOP). BC Hydro will undertake further reviews and determine if it wishes to purchase the produced power.
3. Conduct interconnection engineering work: It is likely that this activity will occur concurrently with several of the other engineering tasks that are likely required for the Granby Project. Additionally, this engineering work may need to occur prior to a formal application to BC Hydro.
4. Obtain interconnection approval and agreements: Once an Electricity Purchase Agreement has been secured, the Granby Project will have a long-term (likely 25 years) contract to sell electrical power to BC Hydro.



## **Appendix A**

### Land Use Map





**ELECTORAL AREA D  
OFFICIAL COMMUNITY PLAN  
SCHEDULE B: LAND USE MAP**

SHOWING AREA ADJACENT TO  
THE CITY OF GRAND FORKS  
SCALE 1:15,000

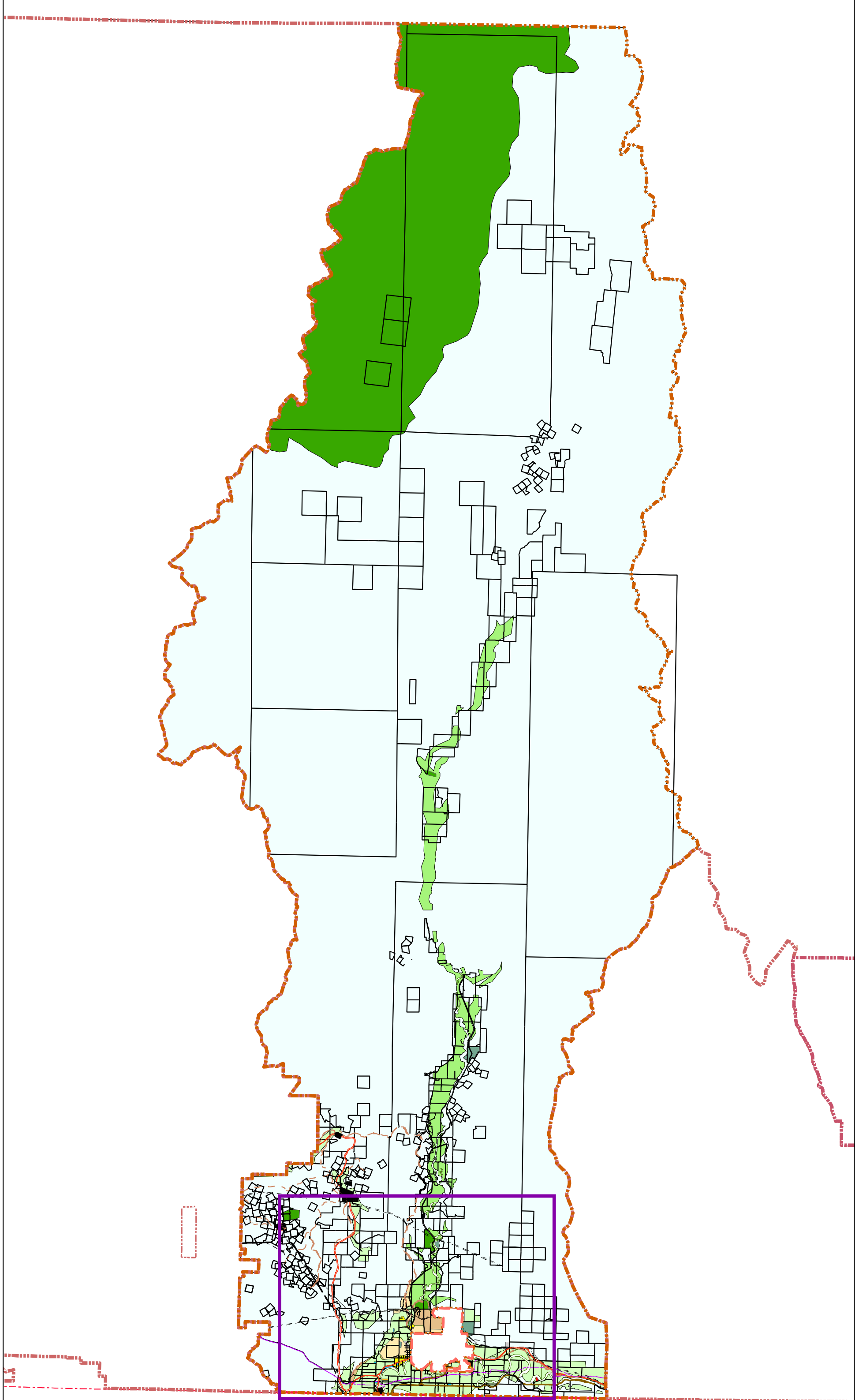
**LEGEND**

- Residential Serviced A
- Residential Serviced B
- Estate Lot Residential
- Manufactured Home Residential
- Agricultural Resource
- Extensive Agricultural
- Rural Resource
- Institutional/Community Lands
- Commercial
- Industrial
- Park/Wildlife Reserve
- Recreational Resource
- Rail Corridor

OFFICE CONSOLIDATION:  
Bylaw 1213 June 22, 2004  
Bylaw 1237 July 28, 2004  
Bylaw 1286 Oct. 27, 2005  
Bylaw 1363 Nov. 27, 2006  
Bylaw 1405 April 29, 2010  
Plot Date: Dec. 19, 2011

**BYLAW 852**

**CONSOLIDATED FOR CONVENIENCE ONLY**  
Consolidated bylaws are consolidated for convenience only and are merely representative. Each consolidated bylaw consists of the original bylaw text and maps, together with current amendments which have been made to the original version. Copies of all bylaws (originals and amendments) may be obtained from the RDKB Planning and Development Department.



SCALE 1: 220 000



## **Appendix B**

### Assumptions & Limitations

As with any consulting effort, regardless of the care taken and especially inherent to preliminary assessments of development projects of this nature, certain limitations are inherent. As much as possible the project team has tried to minimize the impact of these limitations. The project team has confidence in the preliminary review of the Granby Project and feel our analyses and recommendations are credible and realistic. Nevertheless, it is acknowledged that certain limitations exist and it is important for the reader of this document to be aware of these limitations.

- (1) This project assignment focuses a 'preliminary multiple bottom-line assessment' on the matter of creating a hydroelectric dam in its conceptualization stage. It was not within the mandate of this effort to neither review the broader aspects of economic development facilitation that currently exists within the City of Grand Forks nor make recommendation thereto. However, despite being presented in a distinct manner, recommendations in respect of capitalization of the possible introduction of an economic development catalyst such as dam creation and resulting reestablishment of Smelter Lake economic development and more specifically Tourism Area Development efforts should not be viewed separately. In fact, they should be premised on established goals and objectives and serve as to build on and complement existing efforts.
- (2) Certain circumstances that existed as the project team started this project may no longer exist and some assumptions were obliged to make in drafting this report may no longer be valid. As such certain observations and recommendations proposed herein may need to be revisited and revised.
- (3) As noted this project effort draws from statistics and observations that may/may not be specifically relevant to the circumstances within the City of Grand Forks, i.e. in some instances information drawn from the Region are inputted to reflect circumstances in the community. Certain observations made and conclusions drawn are based on this broader perspective and may or may not be completely accurate.
- (4) This Situation Analysis is not a static document. By design it discusses projects, programs, and actions to be developed and implemented in the future. As such, as economic and social conditions evolve in the City, so must the plan.
- (5) Urban Systems has relied upon the completeness, accuracy and fair presentation of all the information, data, advice, opinions or representations obtained from public sources and the Client (collectively, the "Information"). The findings in the Report are conditional upon such completeness, accuracy and fair presentation of the Information. Urban Systems has not verified independently the completeness, accuracy and fair presentation of the Information. We are providing no opinion, attestation or other form of assurance with respect to our work and we did not verify or audit any information provided to us.
- (6) It is appreciated that this report may be provided to the Government representatives, external stakeholder groups and to organizations and individuals beyond the project team. This report uses information from public and private sources that were known and available as of August 31, 2013.

## **Appendix C**

### Additional Information on Financial Assumptions

In completing feasibility review of a project it is important to highlight the key assumptions made behind each clean energy assessment. The following economic and financial assumptions were made in support of the analyses presented in this report and were applied to each clean energy project development feasibility assessment:

- An inflation rate of 2.5% was used. This value reflects recent trends in Canadian inflation and aligns with the Bank of Canada's current inflation-control target of 2%.<sup>1</sup>
- The discount rate applied to each small hydroelectric project scenario was 5%. The discount rate is used to discount future cash flows in order to obtain a project's present value. The rate selected for an analysis typically reflects an organization's weighted average cost of capital; involving the blending of the costs of all investments, both debt and equity. In the context of this study, a 10% discount rate was selected as this represents a commonly used discount rate for North American electric utilities.
- The electricity export rate (\$106.70 per megawatt hour (MWh)) references BC Hydro's proposed Standing Offer Program pricing for the East Kootenay region, which takes into account off-peak, peak and super peak demand rates. The pricing used was proposed by BC Hydro in February 2011.
- An annual revenue escalation rate (also known as the electricity export escalation rate) of 1% was used for each assessment. Under an electricity purchase agreement with BC Hydro, purchase prices escalate at half of the consumer price index (CPI). Since we cannot predict CPI exactly, we have included a 1% increase, which is a conservative estimate relative to the 2.5% inflation rate.
- Project capital is derived 100% from borrowing (debt).
- A 20 year financing period, also known as a "debt term", was assumed to match 20 year minimum purchasing agreement with BC Hydro.
- Debt interest rate of 5% was applied to all financing. Current market rates for a 20 year term fall between 4 and 5%; a rate of 5% would account for the upper end of this range.
- Preliminary cost estimates include a 30% contingency allowance for unknown conditions.

These key economic and financial parameters outlined above have been summarized in Table A-1.

**Table A-1. Financial Parameters Used in the Clean Energy Project RETScreen Analysis**

Parameter	Value Used
Inflation Rate	2.5%
Discount Rate	5%
Electricity Export Rate*	\$109.50/MWh
Electricity Export Escalation Rate	1%
Debt ratio	100%
Debt interest rate	5%
Debt term	20 years
Contingency	30%

---

<sup>1</sup> Bank of Canada (2013). Inflation and Price Stability. <http://www.bankofcanada.ca/about/backgrounders/inflation-price-stability/>

\* Based on BC Hydro Standing Offer Program Rules, February 2011

Unless otherwise stated, these financial parameters were applied to all clean energy project opportunities assessed in this report. By consistently applying these key financial parameters, it is possible to compare and contrast the financial attributes of each project opportunity.

### ***Revenue from Interconnection***

The principal revenue source for power production is the sale of electricity to BC Hydro. Since 2000, BC Hydro has added a new form of Electricity Purchase Agreement (EPA) called the Standing Offer Program (SOP). This program was designed to encourage the development of small, clean energy projects under the BC Energy Plan. The program applies to projects with a nameplate capacity of greater than 0.05 megawatts, but smaller than 15 megawatts, and is intended to make the application process much easier for small developers.

The following is a summary of the key terms and conditions of a standard EPA under the SOP as described by BC Hydro:

1. The Developer is required to sell all energy from the Project to BC Hydro at a pre-determined price (subject to escalation and delivery time adjustments) during the EPA Term.
2. The Developer can select an EPA term of twenty (20) to forty (40) years from Construction Operation Date (COD) in whole years only.
3. The Target COD specified in the Developer's Application must be within three (3) years after signing the EPA. After EPA signing, either BC Hydro or the Developer may adjust the Target COD to reflect the Project's revised interconnection schedule as indicated in the Interconnection Facilities Study (as defined in the Standard Form EPA).
4. The Developer is required to deliver the energy from the Project to the Point of Interconnection (POI).
5. BC Hydro pays for the quantity of Clean, Renewable or High Efficiency Co-generation energy delivered to the POI after COD.
6. The Developer is required to transfer title to BC Hydro of all Environmental Attributes associated with the energy delivered and sold under the Project EPA to BC Hydro.
7. BC Hydro pays an additional amount for Project energy that has received Environmental Certification.
8. There is no requirement to deliver a specified quantity of energy to BC Hydro at specified times. BC Hydro accepts energy if and when it is delivered to the POI. However, the Project EPA provides BC Hydro with the right to terminate the Project EPA in certain circumstances including, among others, a failure to achieve COD within two (2) years after the Target COD, or a failure to deliver any energy for a continuous period of two (2) years.
9. There are no liquidated damages payable under the Project EPA and the Developer is not required to post performance security. However, the Developer is required to provide BC Hydro with the NU Security at the time specified in Section 5.8. of the Rules. See Section 5.8 for further information on the NU Security.
10. Special rules apply to certain Project configurations.



When SOP prices were updated in 2010, the base purchase price for power produced in the East Kootenay Region was \$102.18/MWhr;

The effective price for power sold under the SOP also needs to be adjusted for the following factors:

- Monthly and hourly demand variation.
- Escalation to account for start of production following construction completion (assume 1 year minimum).

The effective adjusted price for energy purchase from the East Kootenay Region is \$106.70/MWhr.

The RETScreen Clean Energy Project Analysis Software was utilized to support the feasibility reviews of each project configuration. RETScreen is a unique decision support tool developed by the Government of Canada to enable the assessment of renewable-energy and energy-efficient technologies.

## **Appendix D**

### Sensitivity Analysis

There remain several key uncertainties regarding the proposed project. Therefore a sensitivity analysis was completed for project Scenario 2, to investigate the robustness of the financial feasibility of the proposed project.

The following section provides a sensitivity analysis on the key financial factors that can influence a project's viability. The sensitivity analysis presented below measures the viability of project Scenario 2 using a net present value<sup>1</sup> metric with a threshold of \$0. More specifically, the analysis uses a sensitivity range of 50% on a number of key factors including:

- Initial project costs;
- Debt ratio;
- Debt interest rate;
- O and M Costs.

The cells highlighted in orange within each table indicate that the project does not achieve a positive net present value under the financial variables assumed in the sensitivity analysis.

**Table B-1: Sensitivity Analysis on Initial Costs and Debt Ratio**

		Initial costs				\$
Debt ratio		10,897,997	16,346,995	21,795,994	27,244,992	32,693,991
%		-50%	-25%	0%	25%	50%
50%	-50%	15,218,962	12,494,463	9,769,964	7,045,465	4,320,966
75%	-25%	12,494,463	8,407,714	4,320,966	234,217	-3,852,532
100%	0%	9,769,964	4,320,966	-1,128,033	-6,577,031	-12,026,030
125%	25%	7,045,465	234,217	-6,577,031	-13,388,279	-20,199,527
150%	50%	4,320,966	-3,852,532	-12,026,030	-20,199,527	-28,373,025

<sup>1</sup> The RETScreen model calculates the Net Present Value (NPV) of the project, which is the value of all future cash flows, discounted at the discount rate (10%), in today's currency. NPV is related to the internal rate of return (IRR). NPV is thus calculated at a time 0 corresponding to the junction of the end of year 0 and the beginning of year 1. Under the NPV method, the present value of all cash inflows is compared against the present value of all cash outflows associated with an investment project. The difference between the present value of these cash flows, called the NPV, determines whether or not the project is generally a financially acceptable investment. **A positive NPV values are an indicator of a potentially feasible project.** In using the net present value method, it is necessary to choose a rate for discounting cash flows to present value. As a practical matter, organisations put much time and study into the choice of a discount rate. The RETScreen model calculates the NPV using the cumulative pre-tax cash flows.

**Table B-2: Sensitivity Analysis on Initial Costs and Debt Interest Rate**

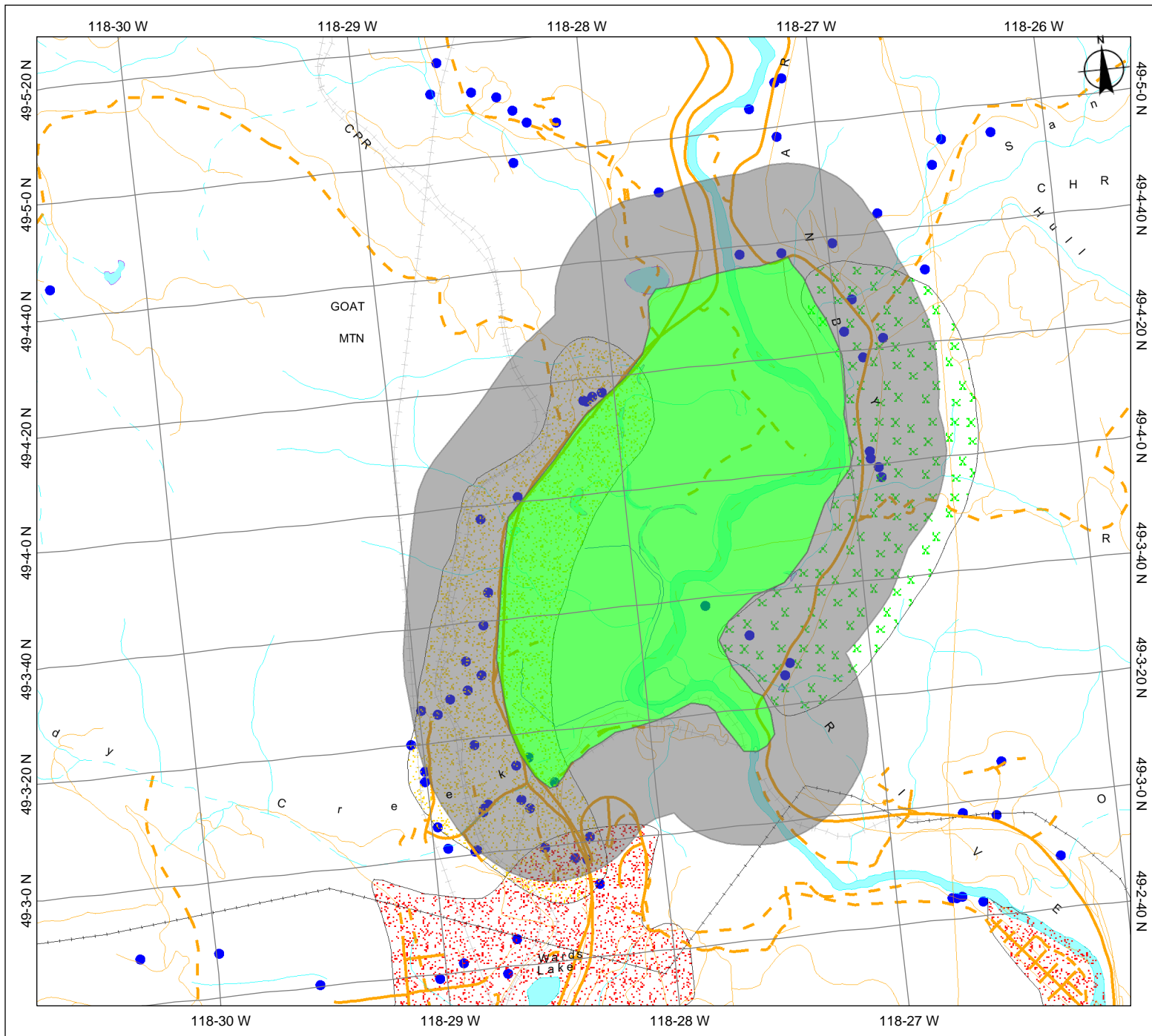
		Initial costs				\$
Debt interest rate		10,897,997	16,346,995	21,795,994	27,244,992	32,693,991
%		-50%	-25%	0%	25%	50%
2.50%	-50%	11,955,939	7,599,927	3,243,916	-1,112,095	-5,468,106
3.75%	-25%	10,894,563	6,007,864	1,121,166	-3,765,533	-8,652,232
5.00%	0%	9,769,964	4,320,966	-1,128,033	-6,577,031	-12,026,030
6.25%	25%	8,585,717	2,544,595	-3,496,527	-9,537,649	-15,578,772
7.50%	50%	7,345,753	684,650	-5,976,454	-12,637,558	-19,298,662

**Table B-3: Sensitivity Analysis on Initial Costs and O&M Costs**

		Initial costs				\$
O&M		10,897,997	16,346,995	21,795,994	27,244,992	32,693,991
\$		-50%	-25%	0%	25%	50%
122,887	-50%	12,967,427	7,518,428	2,069,430	-3,379,569	-8,828,567
184,330	-25%	11,368,695	5,919,697	470,698	-4,978,300	-10,427,298
245,773	0%	9,769,964	4,320,966	-1,128,033	-6,577,031	-12,026,030
307,216	25%	8,171,233	2,722,234	-2,726,764	-8,175,763	-13,624,761
368,660	50%	6,572,501	1,123,503	-4,325,496	-9,774,494	-15,223,493

## **Appendix E**

### Groundwater Well Search



## Groundwater Well Search Map

### Legend

Water - Rivers, Creeks, Shorelines, etc. (1:20,000)

- Glacier
- Icefield
- Canal
- Dam
- Dam - Beaver
- Ditch
- Falls
- Flume
- Rapids
- River or Stream - Definite
- River or Stream - Dry
- River or Stream - Indefinite
- River or Stream - Left Bank
- River or Stream - Right Bank
- Dam - section Base
- Flooded Land - Inundated
- Lake - Definite
- Lake - Indefinite
- Lake - Intermittent
- Reservoir - Definite
- Reservoir - Indefinite
- Reservoir - Intermittent
- Marsh
- Swamp
- Breakwall or Breakwater - Large
- Dyke or Levee
- Island - Definite
- Sand Bar

0 425 850 m.

Scale: 1:30,000  
Coastline - Definite  
Transportation - Roads, Railroads

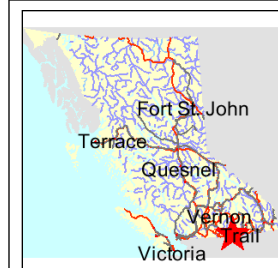
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Datum/Projection: NAD83, Albers Equal Area Conic

### Key Map of British Columbia



## **Appendix F**

### BC CDC Species at Risk Search Results



#### Coordinate Position

BC Albers: 1550382, 479280

Geographic: 49° 3' 57" N, 118° 27' 47" W

UTM 11N: 393134, 5435813

#### Masked Sensitive Occurrences

Shape ID: 44611

#SHAPE#:[Geometry]

AREA: 152888764.990624

LEN: 47149.3231184924

Shape ID: 12793

#SHAPE#:[Geometry]

AREA: 102310674.211876

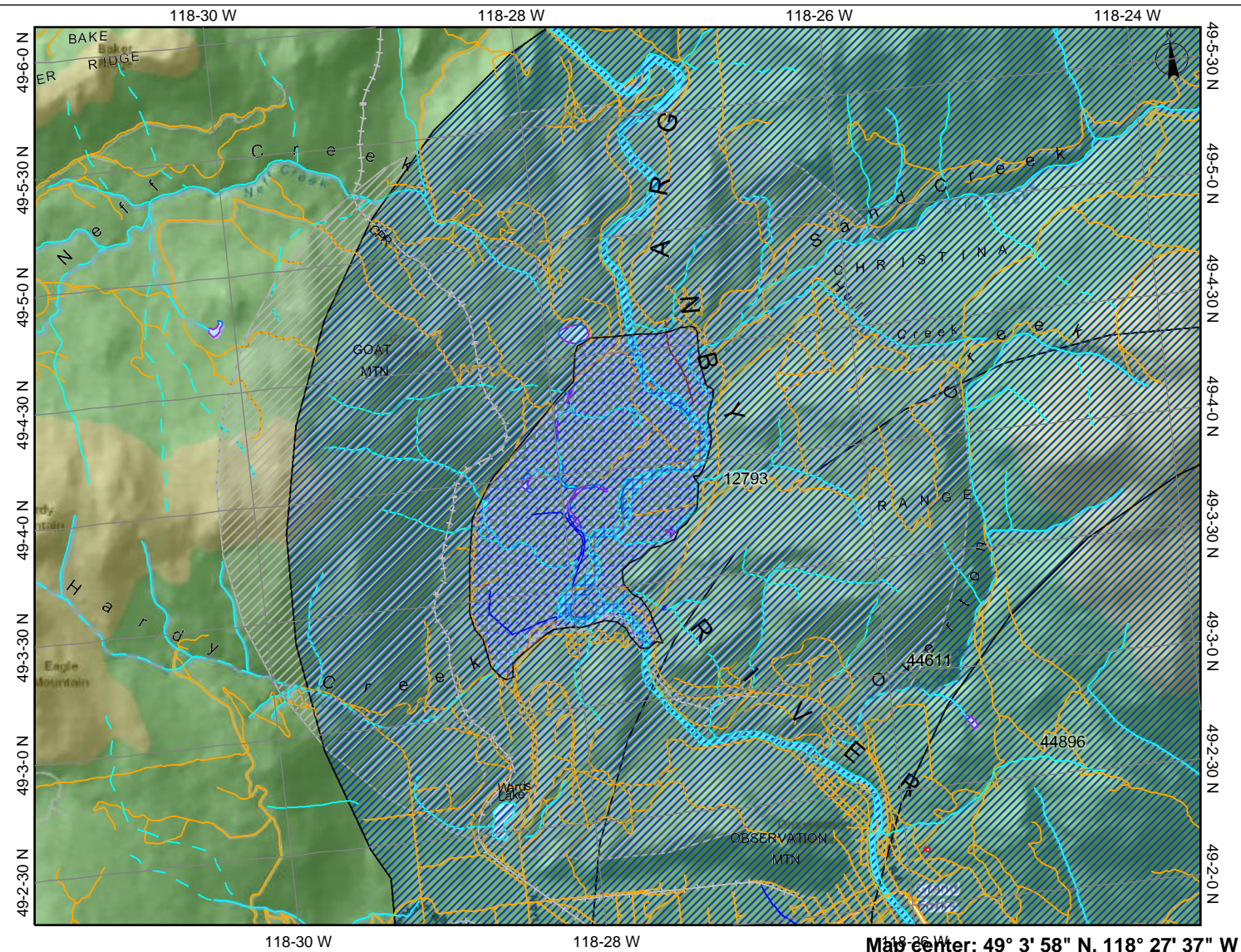
LEN: 36334.1153522443

June 06, 2013



# BC Conservation Data Centre - Occurrence Report

## Sensitive Species Occurrence Search Map



MAP COMPILATION  
Projection: Albers Equal Area Conic  
Datum: NAD 83

0 1500 3000 4500 m.  
Scale: 1:50,000

Map center: 49° 3' 58" N, 118° 27' 37" W

### Legend

#### Non-sensitive Occurrences

- Animal - Vertebrate
- Animal - Invertebrate
- Plant - Vascular
- Plant - Non-vascular
- Ecological Community

#### Masked Sensitive Occurrences

- Big Trees

Occurrence data is updated frequently.  
This map should be considered out of  
date 6 months after  
**June 6, 2013**

For more information about the BC CDC  
visit: <http://www.env.gov.bc.ca/cdc/>

### Index Map



Province of British Columbia  
Ministry of Environment  
Map Created June 6, 2013



## BC Conservation Data Centre: Occurrence Report ( 74373 )

June 6, 2013

*Taxidea taxus*  
American Badger

Field definition document available at

<http://www.env.gov.bc.ca/atrisk/ims.htm>

This is a summary report. For a complete record contact the CDC (cdcddata@gov.bc.ca).

### Identifiers

<b>Occurrence ID:</b>	10214	<b>Status:</b>	
<b>Shape ID:</b>	74373	Global:	G5
<b>Type:</b>	Vertebrate Animal	Provincial:	S1
		COSEWIC:	E (NOV 2012)
<b>Taxonomic Class:</b>	mammals	BC List:	Red
<b>Data Sensitive:</b>	N	SARA Schedule:	1

### Locators

<b>Survey Site:</b>	OKANAGAN VALLEY
<b>Directions:</b>	U.S. border to the north end of Okanagan Lake.

### Survey Information

<b>First Obs. Date:</b>	1913-05	<b>Last Obs. Date:</b>	2012-09
<b>Occurrence Data:</b>	There are 498 sightings of badgers (mostly collected between 1995 and 2012) represented by the polygon, including 51 observations of family groups (Weir and Davis 2012). Badgers consistently occur throughout the EO with concentrations in grassland/agricultural interface zones in the Vernon, Lumby, Mission Creek, Osoyoos, Anarchist Mountain/Rock Creek, and Grand Forks areas. Badgers also consistently occur in disturbed mid-elevation forests with suitable soils in the Aberdeen Plateau, Upper Kettle River, Beaverdell, and Venner Meadows areas. Badgers in the area have large home ranges (15-50 km <sup>2</sup> ; Weir et al. 2003).		

### Occurrence Rank and Occurrence Rank Factors

<b>Rank:</b>	C Fair estimated viability	<b>Rank Date:</b>	2012-09
<b>Rank Comments:</b>	Roads are significant mortality source of both adults and young. Local occupancy affected by habitat suitability (soil conditions, prey), mortality risk (roads, persecution) and proximity to other occupied areas (R. Weir, pers. comm. 2012).		
<b>Condition of Occurrence</b>	Fair. There are gaps in connectivity in the mid-Okanagan Valley and overall densities are very low but populations have continued to persist and reproduce. Females capable of producing 2-4 kits per year, but survival of offspring to adulthood is low. Roads are significant mortality source of both adults and young. Local occupancy affected by habitat suitability (soil conditions, prey), mortality risk (roads, persecution) and proximity to other occupied areas (R. Weir, pers. comm. 2012).		
<b>Size of Occurrence:</b>	As of 2012, it is estimated that there are 35-65 badgers within the Okanagan-Boundary subpopulation (R. Weir, pers. comm. 2012).		
<b>Landscape Context:</b>			

### Description

#### General Description:



**Vegetation Zone:**

**Habitat:** TERRESTRIAL: Grassland/Herbaceous, Forest Needleleaf, Shrubland, Roadside

**Documentation**

**References:** Weir, R. 2013. Methodology for creation of badger element occurrences in BC. BC Ministry of Environment, Victoria, BC.  
 Weir, R. Personal communication. Senior Wildlife Biologist, Artemis Wildlife Consultants, Victoria, BC.  
 Weir, R. and H. Davis. 2012. Electronic spreadsheet of badger sightings 1997-2012. Artemis Wildlife Consultants, Victoria, BC.  
 Weir, R.D., H. Davis, and C. Hoodicoff. 2003. Conservation Strategies for North American Badgers in the Thompson and Okanagan Regions. Final Rep. for the Thompson-Okanagan Badger Project. Artemis Wildl. Consultants. 103pp.

**Version**

**Version Date:** 20-NOV-12

**Mapping Information**

**Estimated Representation** Very Low

**Accuracy:**

**Confidence Extent:** N

**BC Conservation Data Centre: Occurrence Report ( 11228 )**

June 6, 2013

*Dolichonyx oryzivorus*  
Bobolink

Field definition document available at

<http://www.env.gov.bc.ca/atrisk/ims.htm>

This is a summary report. For a complete record contact the CDC (cdcdata@gov.bc.ca).

**Identifiers**

<b>Occurrence ID:</b>	5091	<b>Status:</b>	
<b>Shape ID:</b>	11228	Global:	G5
<b>Type:</b>	Vertebrate Animal	Provincial:	S3B
		COSEWIC:	T (APR 2010)
<b>Taxonomic Class:</b>	birds	BC List:	Blue
<b>Data Sensitive:</b>	N	SARA Schedule:	

**Locators**

**Survey Site:** GRANBY RIVER, NORTH OF HARDY CREEK

**Directions:** Along North Fork Road, in meadows 2.3 to 5.0 km north of Grand Forks city limits.

**Survey Information**

**First Obs. Date:** 1994-06-07      **Last Obs. Date:** 1994-06-07

**Occurrence Data:** 1994-06-07: total of 13 males in song flight over hayfields at 4 locations. Fields of tall grasses, buttercups, purple aster, horsetail, sedges, red clover, and daisies (VanDamme 1995).

---

**Occurrence Rank and Occurrence Rank Factors**


---

**Rank:****Rank Date:****Rank Comments:****Condition of Occurrence****Size of Occurrence:****Landscape Context:**


---

**Description**


---

**General Description:** Hayfields on floodplain of montane river.**Vegetation Zone:****Habitat:** TERRESTRIAL; GRASSLAND/HERBACEOUS; RIPARIAN

---

**Documentation**


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**References:** Van Damme, L.M. 1995. Status report on the Bobolink, *Dolichonyx oryzivorus*, in British Columbia. Unpubl. rep. submitted to B.C. Minist. Environ. Lands and Parks, Wildl. Program, Penticton.

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**Version**


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**Version Date:** 21-JUL-95

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**Mapping Information**


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**Estimated Representation****Accuracy:****Confidence Extent:****BC Conservation Data Centre: Occurrence Report ( 39497 )**

June 6, 2013

*Spea intermontana*  
Great Basin Spadefoot

Field definition document available at

<http://www.env.gov.bc.ca/atrisk/ims.htm>

This is a summary report. For a complete record contact the CDC (cdcdata@gov.bc.ca).

---

**Identifiers**


---

<b>Occurrence ID:</b>	7550	<b>Status:</b>	
<b>Shape ID:</b>	39497	Global:	G5
<b>Type:</b>	Vertebrate Animal	Provincial:	S3
		COSEWIC:	T (APR 2007)
		BC List:	Blue
		SARA Schedule:	1
<b>Taxonomic Class:</b>	amphibians		
<b>Data Sensitive:</b>	N		

---

**Locators****Survey Site:** NEFF CREEK, SAND CREEK**Directions:** On the east side of the Granby River, near Granby Road (north of Sand Creek and south of Snowball Creek).

---

**Survey Information**


---

<b>First Obs. Date:</b>	2006-05-20	<b>Last Obs. Date:</b>	2006-05-20
<b>Occurrence Data:</b>	2006: Two breeding age Great Basin Spadefoots heard calling from one location (Noble 2006).		

---

**Occurrence Rank and Occurrence Rank Factors**


---

<b>Rank:</b>	E Verified extant (viability not assessed)	<b>Rank Date:</b>	2006-05-20
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**Rank Comments:****Condition of Occurrence****Size of Occurrence:****Landscape Context:**


---

**Description**


---

**General Description:****Vegetation Zone:****Habitat:** TERRESTRIAL: Roadside

---

**Documentation**


---

<b>References:</b>	Noble, R. Okanagan and Thompson-Nicola Region Great Basin Spadefoot (Spea Intermontana) Inventory - 2006. BC Conservation Core report prepared for Ministry of Environment, Penticton, BC. 4pp.
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**Version**


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<b>Version Date:</b>	19-DEC-08
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**Mapping Information**


---

**Estimated Representation** High**Accuracy:****Confidence Extent:** N
**BC Conservation Data Centre: Occurrence Report ( 5328 )**

June 6, 2013

*Rhinichthys osculus*  
Speckled Dace

Field definition document available at

<http://www.env.gov.bc.ca/atrisk/ims.htm>

This is a summary report. For a complete record contact the CDC (cdcddata@gov.bc.ca).

---

**Identifiers**


---

<b>Occurrence ID:</b>	3988	<b>Status:</b>	
<b>Shape ID:</b>	5328	Global:	G5
<b>Type:</b>	Vertebrate Animal	Provincial:	S2
		COSEWIC:	E (APR 2006)
		BC List:	Red
		SARA Schedule:	1
<b>Taxonomic Class:</b>	ray-finned fishes		
<b>Data Sensitive:</b>	N		

---

**Locators**


---

**Survey Site:** GRANBY RIVER, BETWEEN SNOWBALL AND SAND CREEKS  
**Directions:** Granby River, backwater between Snowball and Sand creeks.

#### Survey Information

**First Obs. Date:** **Last Obs. Date:** 1977-10-07  
**Occurrence Data:** 3 collected.

#### Occurrence Rank and Occurrence Rank Factors

**Rank:** **Rank Date:**

**Rank Comments:**

**Condition of Occurrence**

**Size of Occurrence:**

**Landscape Context:**

#### Description

**General Description:** Backwater of river, with algae-covered cobbles on bottom.  
**Vegetation Zone:**  
**Habitat:** MEDIUM RIVER; HIGH GRADIENT; MODERATE GRADIENT

#### Documentation

**References:** Peden, A.E., and G.W. Hughes. 1980. Life history notes relevant to the Canadian status of the speckled dace (*Rhinichthys osculus*). Syesis 14:21-31.  
Peden, A.E., and G.W. Hughes. 1981. Status of the speckled dace *Rhinichthys osculus* in Canada during 1980. Unpubl. rep., B.C. Prov. Mus., Victoria.  
Peden, A.E., and G.W. Hughes. 1984. Status of the speckled dace, *Rhinichthys osculus*, in Canada. Can. Field-Nat. 98:98-103.  
Royal British Columbia Museum. 675 Belleville Street, Victoria, BC. V8V 1X4.

#### Version

**Version Date:**

#### Mapping Information

**Estimated Representation**

**Accuracy:**

**Confidence Extent:**



#### BC Conservation Data Centre: Occurrence Report ( 6030 )

June 6, 2013

*Megascops kennicottii macfarlanei*  
Western Screech-Owl, *macfarlanei* subspecies

Field definition document available at <http://www.env.gov.bc.ca/atrisk/ims.htm>

This is a summary report. For a complete record contact the CDC (cdcdata@gov.bc.ca).

#### Identifiers



<b>Occurrence ID:</b>	3075	<b>Status:</b>	
<b>Shape ID:</b>	6030	Global:	G5T4
<b>Type:</b>	Vertebrate Animal	Provincial:	S2
		COSEWIC:	T (MAY 2012)
<b>Taxonomic Class:</b>	birds	BC List:	Red
<b>Data Sensitive:</b>	N	SARA Schedule:	1

#### Locators

<b>Survey Site:</b>	GRANBY RIVER, NIAGARA/SAND CREEK
<b>Directions:</b>	"Niagara" site: North fork 10.9 km N of Hwy. 3 (Cannings 1997), 370 m N of Fisherman Creek bridge. "Sand Creek" site: On the east side of the Granby River; from Granby Rd. head approx. 500m north on Sand Creek Road, the location is on the east side of the road along the creek.

#### Survey Information

<b>First Obs. Date:</b>	1996-06-15	<b>Last Obs. Date:</b>	2006-06-15
<b>Occurrence Data:</b>	Niagara Site: Extensive old black cottonwood along an old oxbow of the Granby River. 1996-06-16/17: A single owl (probably male) responded both day and night to bouncing ball calls (Cannings 1997). Sand Creek Site: 2006-06: a pair was detected (Bunge 2010). 2003-04: 1 adult male seen and 1 "bouncing ball" call heard from an adult male. 2003-07-15: 1 adult male and 1 juvenile detected (Cannings and Hobbs 2004).		

#### Occurrence Rank and Occurrence Rank Factors

<b>Rank:</b>	E Verified extant (viability not assessed)	<b>Rank Date:</b>	2006-06-15
--------------	--	-------------------	------------

#### Rank Comments:

#### Condition of Occurrence

#### Size of Occurrence:

#### Landscape Context:

#### Description

<b>General Description:</b>	EO is within the dry mild and very dry hot Interior Douglas-fir biogeoclimatic zones. Niagra Site: extensive, old black cottonwood stand along an old oxbow of the Granby River (Cannings 1997). Sand Creek Site: riparian corridor along a creek.
-----------------------------	--

#### Vegetation Zone:

<b>Habitat:</b>	RIPARIAN; FOREST NEEDLELEAF; FOREST BROADLEAF; RIPARIAN; CREEK
-----------------	--

#### Documentation

<b>References:</b>	Bunge, S. 2010. Western Screech-Owl macfarlanei detections database. Electronic database prepared for BC Ministry of Environment. Cannings, R. J. and Hobbs, J.. 2004. Western Screech-owl, macfarlanei spp. Unpublished spreadsheet of observations, updated irregularly. Cannings, R.J. 1997. A survey of the western screech-owl (Otus kennicottii macfarlanei) in the interior of British Columbia. Unpubl. rep. for B.C. Minist. Environ., Lands and Parks, Victoria, BC. 27pp.
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**Version****Version Date:** 06-APR-10

---

**Mapping Information**

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**Estimated Representation** Medium**Accuracy:****Confidence Extent:** N

---

**BC Conservation Data Centre: Occurrence Report ( 30998 )**

June 6, 2013

*m ystoma mavortium*  
Blotched Tiger Salamander

Field definition document available at

<http://www.env.gov.bc.ca/atrisk/ims.htm>

This is a summary report. For a complete record contact the CDC (cdcdata@gov.bc.ca).

---

**Identifiers**

<b>Occurrence ID:</b>	7033	<b>Status:</b>	
<b>Shape ID:</b>	30998	Global:	G5
<b>Type:</b>	Vertebrate Animal	Provincial:	S2
		COSEWIC:	E (NOV 2012)
<b>Taxonomic Class:</b>	amphibians	BC List:	Red
<b>Data Sensitive:</b>	N	SARA Schedule:	1

---

**Locators**

---

**Survey Site:** WARDS LAKE

**Directions:** North Fork Road, north of Grand Forks

---

**Survey Information**

---

**First Obs. Date:** 1996-07-20      **Last Obs. Date:** 1997-09-03

**Occurrence Data:** 1997: Various aged individuals found up to approximately 1.5km north from Wards Lake and 350m south. 1996 trapping; 5 juveniles from the lake (Sarell 2004a). 2006: Trapped for a total of 38 hours without finding any (Noble and Spendlow 2006).

---

**Occurrence Rank and Occurrence Rank Factors**

---

**Rank:** E Verified extant (viability not assessed)      **Rank Date:** 1997-09-03

**Rank Comments:** Failed to find in 2006.**Condition of Occurrence****Size of Occurrence:****Landscape Context:**

---

**Description**

---

**General Description:** Ephemeral pond.**Vegetation Zone:**

**Habitat:** PALUSTRINE: Temporary Pool, Pond; TERRESTRIAL: Roadside

---

**Documentation**

---

**References:** Noble, R. and I. Spendlow. 2006. South Okanagan, Similkameen and Kettle Valley Tiger Salamander (*Ambystoma tigrinum*) Inventory - 2006. BC Conservation Corps Project Completion Report prepared for the Ministry of Environment, Penticton , BC. 14 pp.  
Sarell, M. 2004a. *Ambystoma tigrinum* (Tiger Salamander) electronic database compiling known locations. Obtained via Orville Dyer (April 2006)

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**Version**

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**Version Date:** 12-MAR-07

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**Mapping Information**

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**Estimated Representation** Very High

**Accuracy:**

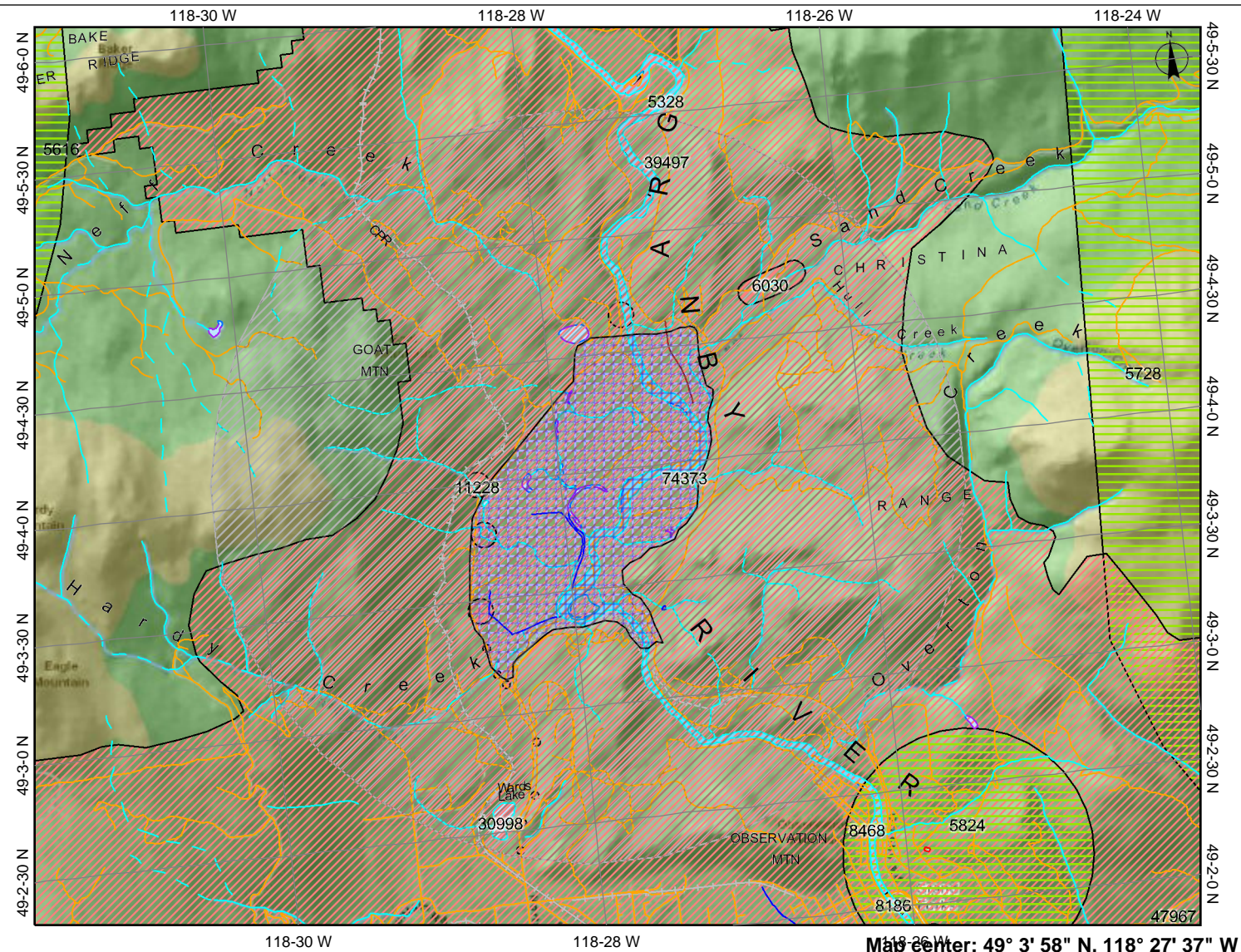
**Confidence Extent:** ?  
June 6, 2013

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# BC Conservation Data Centre - Occurrence Report

## Non-Sensitive Species Occurrence Search Map



### Legend

#### Non-sensitive Occurrences

- Animal - Vertebrate
- Animal - Invertebrate
- Plant - Vascular
- Plant - Non-vascular
- Ecological Community

#### Masked Sensitive Occurrences

- Big Trees

Occurrence data is updated frequently.  
This map should be considered out of  
date 6 months after  
**June 6, 2013**

For more information about the BC CDC  
visit: <http://www.env.gov.bc.ca/cdc/>

### Index Map



MAP COMPILATION  
Projection: Albers Equal Area Conic  
Datum: NAD 83

0 1500 3000 4500 m.  
Scale: 1:50,000

Province of British Columbia  
Ministry of Environment  
Map Created June 6, 2013





**Species at Risk & Local Government:**  
A Primer for **British Columbia**

## Advanced Search

### Search Results - Short Format [\(Switch to the Long Format\)](#)

#### Summary

Species		Status	
Nb of Species	0	BC Red List	0
Mammals	0	BC Blue List	0
Birds	0	Identified Wildlife	0
Breeding Birds	0	COSEWIC Endangered	0
Reptiles	0	COSEWIC Threatened	0
Amphibians	0	COSEWIC Special Concern	0
Fishes	0	SARA Schedule 1	0
Insects	0	Extirpated fom BC	0
Molluscs	0	Extinct	0
Vascular Plants	0		
Mosses	0		
Fungus	0		

No Search Results for this query

### Search Criteria

Taxonomic Group	Mammals,Birds,Breeding Birds,Reptiles,Amphibians,Fishes,Insects,Molluscs,Vascular Plants,Mosses,Fungus
Jurisdiction	All
COSEWIC	Special Concern,Threatened/Special Concern,Threatened,Endangered
BC Status	Red,Blue
BC Wildlife Act	Endangered
Identified Wildlife	All
SARA	Schedule 1
Management Category	Reptile,Habitat Specialist,Songbird,Metapopulation,Marine Shellfish,Marine Mammal,Wide Ranging Mammals,Freshwater,Marine Bird,High Sensitivity to Disturbance,Food Attracted Carnivore,Forest Mollusc,Ground Nesting Bird,Fire Dependent,Butterfly,Burrowing,Vascular Plants, Mosses and Lichens,Birds of Prey and Bats,Amphibious,Marine Fish,Cave Dwelling,Unclassified
Habitat	Disturbed area,Grassland,Large River,Riparian,Sparsely Vegetated,Woodland
Regional District	Kootenay Boundary Regional District: Grand Forks
Forest District	All Forest Districts

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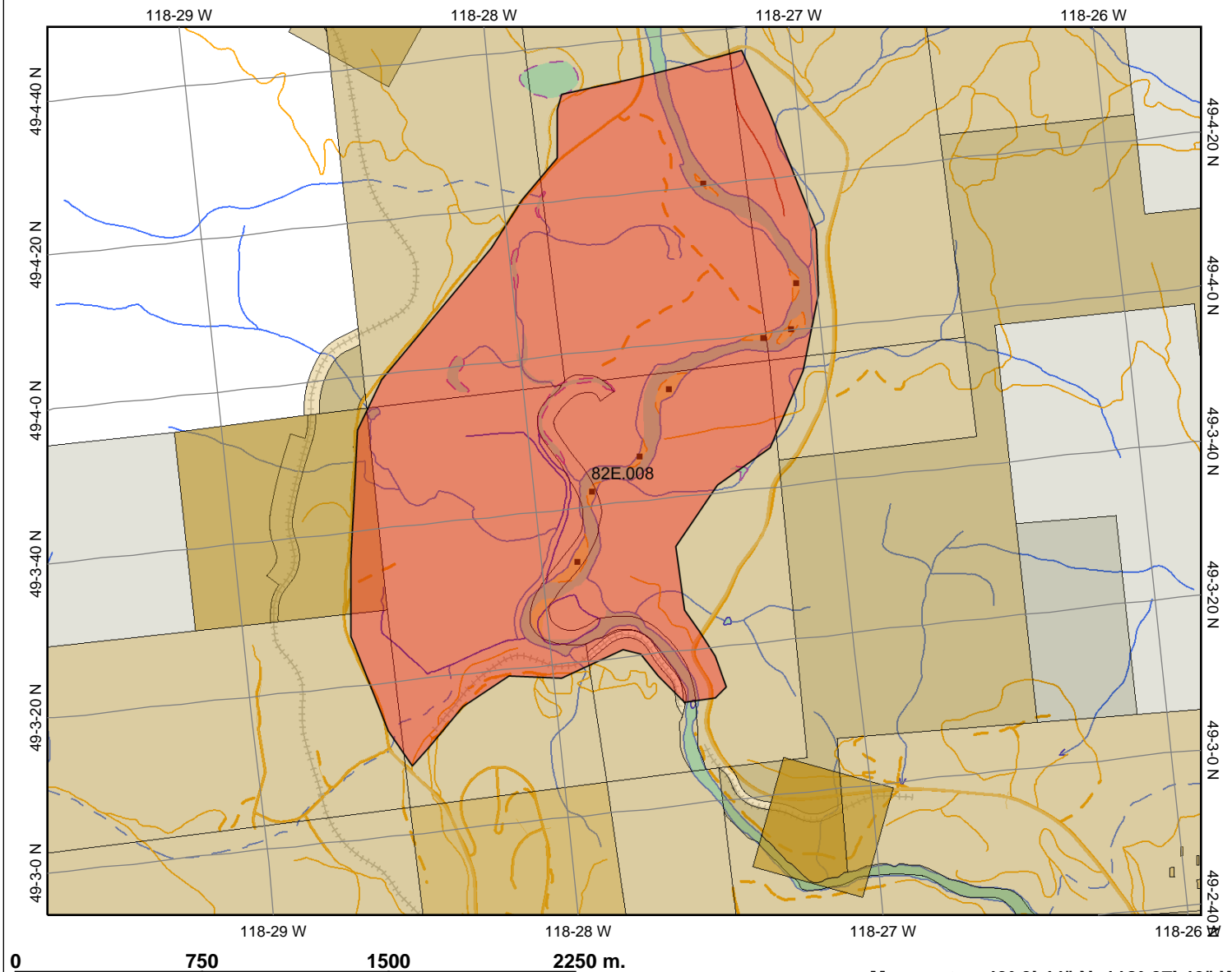
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## **Appendix G**

### Archeological Search

# Archaeological Sites Search Map



## Legend

Heritage Conservation Sites



Scale: 1:25,000

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.



## Generate Report : Summary



Overlay Report requires exactly 1 record to be selected.

### Report Results

3 Interest Record(s) found.

Identifier: All

Report Description:

Select	ILRR Interest Identifier	Issuing Agency	Business Identifier	Status	Type	Responsible Agency
<input type="checkbox"/>	NOTICE	MSRM	Unable to display detailed interest record. This interest record contains sensitive information governed by the Heritage Conservation Act. Please contact the Archaeology Branch in the Ministry of Tourism, Sport and the Arts.			
<input type="checkbox"/>	NOTICE	MSRM	Unable to display detailed interest record. This interest record contains sensitive information governed by the Heritage Conservation Act. Please contact the Archaeology Branch in the Ministry of Tourism, Sport and the Arts.			
<input type="checkbox"/>	NOTICE	MSRM	Unable to display detailed interest record. This interest record contains sensitive information governed by the Heritage Conservation Act. Please contact the Archaeology Branch in the Ministry of Tourism, Sport and the Arts.			

This report may contain information of a confidential and sensitive nature.  
Please protect the information accordingly.

## **Appendix H**

### Further Considerations

It is critical for a community that wishes to participate in hydroelectric dam initiatives is aware of their role and strategic moves that they can successfully implement. At the local level, the assessment works mostly in elements in which they can influence such as becoming investment ready, development of a clear and agreed upon vision for their future and the development of strategic moves that fit within the larger context of region, province and nationally. Most local governments will not have the resources to undertake the implementation required to be effective in isolation of partners in hydroelectric dam creation. The process is extremely comprehensive and requires specific skills and knowledge to navigate successfully there are government and private sector partners that can enhance the communities chances for success, so there is no reason to duplicate it at the local level. For implementation, if the local governments may consider targeting partnerships identified by the industry or provincial strategies, this work can be accomplished through targeted partnerships at the broader level.

## 1.0 The Cascade Heritage Power Project (Seabreeze)

The Cascade Heritage Power Project (Seabreeze) claims to have potential **benefits** like:

- Enough clean sustainable energy to satisfy the needs of 10,000 people;
- Employment opportunities for the Okanagan Region;
- Minimal effect on the environment (i.e. no flooding, protects fish habitats, and no harmful atmospheric emissions associated with coal, gas and biomass projects);
- Use of pre-existing transmission system means lower environmental footprint;
- Maintains scenic beauty of the local area.<sup>1</sup>

The Project **goals** according with the same website are:

- New weir incorporating a rubber dam will be constructed at the site of the former weir. While the 1897 - 1919 weir raised the water level some 6.5 meters the proposed new weir will raise the water level only 1.2 meters and its effect will extend only 350 meters upstream;
- No private land will be flooded;
- A new 800 meter long tunnel will convey water from the intake directly to the powerhouse with no disturbance along the Cascade Canyon or the Trans Canada Trail;
- The hydroelectric project will have turbines and generators with a capacity of 28 megawatts. Water will be returned to the river through a tailrace;
- A transmission line extension from the powerhouse using an existing right-of-way and tying in to Fortis BC's existing 69-kilovolt transmission lines, 300 meters north of the powerhouse;
- The explanation about why the project has not proceeded maybe can be justified by the most recent document written in July 27, 2011 available at the following link:  
[http://a100.gov.bc.ca/appsdata/epic/documents/p55/d33577/1312398575864\\_c480dbe2cbe99b707facbe1932969065b12438a41c84a488927fbb495e936294.pdf](http://a100.gov.bc.ca/appsdata/epic/documents/p55/d33577/1312398575864_c480dbe2cbe99b707facbe1932969065b12438a41c84a488927fbb495e936294.pdf).

This document relates to a decision of executive director of the Environmental Assessment Office (EAO) about a request for a five-year extension to Environmental Assessment Certificate E06-02 pursuant to section 18(2) of the act for the Project.

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<sup>1</sup> According to proponent website: <http://www.seabreezepower.com/media/09-6-1-Cascade-Handout.pdf>

This document also contains background information about the proponent and project description, British Columbia Environmental Assessment, Federal Environmental Assessment, Local Government and the Public, other approvals and EA Certificate Extension Review Process.

The discussion has two topics, the first is a Consideration of Potentially Significant Adverse Effects and Practical Means for Preventing or Reducing Effects and the second topic is First Nations.

The conclusion in this document is:

“EAO is satisfied that: The project will not have significant adverse environmental, economic, social, heritage or health effects, taking into account practical means of preventing or reducing to an acceptable level, any potential adverse effects; and the Project will not adversely impact asserted Aboriginal rights including title.”

The document ends with a brief recommendation from the EAO:

“The executive Director issue an Order under section 18(2) of the Act (Appendix C) to the Proponent in response to the request for a one-time only five- year extension to the Certificate for the Project.”

Through conversations directly with Seabreeze, it is understood that this project will not be developed in the short-term. This is primarily due to the company's other investment priorities, community feedback on the project and current BC Hydro SOP policies.

## Kettle River Watershed Management Plan

The Kettle River watershed plan is still under development However, the Phase 1 (technical study) is complete and available at <http://kettleriver.ca/state-of-watershed/>.

Several key points in the plan that may affect the re-establishment of Smelter Lake:

1. Concern for fish species endemic to the region, alteration of flow regimes from hydro power projects may be a threat to these species.
2. Water use planning requires additional information related to streams flows during periods of low flow, stream flow should not be lower than the 7Q10. The 7Q10 in the Granby River is 0.911m<sup>3</sup>/s (with a 10% chance of occurring in any given year). Low flows typically occur in the Kettle River during August and September.
3. There is some concern about understanding future water demand- potential changes in demand from agriculture and industry as these are typically more difficult to estimate.

As the Kettle River Watershed Management plan is very significant study and a critical community stakeholder, it is recommended that the City (RDKB) engage with this stakeholder once the project is taken out of camera and the decision to proceed is made.