

1 Introduction

In 2012, The Regional District of Nanaimo (RDN) initiated the Water Budget project to better understand the sustainable availability of water within a number of local water use areas. The project consists of two phases: Phase 1, which includes development of hydrogeological conceptual models and water budgets, and Phase 2, which will include a more detailed analysis, such as groundwater numerical modeling based on the results of Phase 1. This report presents results of Phase 1 for the Regional District's Electoral Area B, which encompasses Gabriola, Mudge, and DeCourcy islands (Figure 1).

Most of the study area relies on groundwater as its primary source of drinking and irrigation water. On Gabriola Island, groundwater in the fractured rock aquifers is recharged from rainwater and, in light of increased development and climate change, there are concerns about the groundwater resource and its sustainability and quality; a view shared by many of the islands' residents.

Several water resource studies concerning the islands have been completed to date. Phase 1 seeks to improve the understanding of regional water resources and, in particular, provide better descriptions of the hydrological cycle, available water quantity, the flow system, and water demand, along with a discussion of factors affecting sustainability.

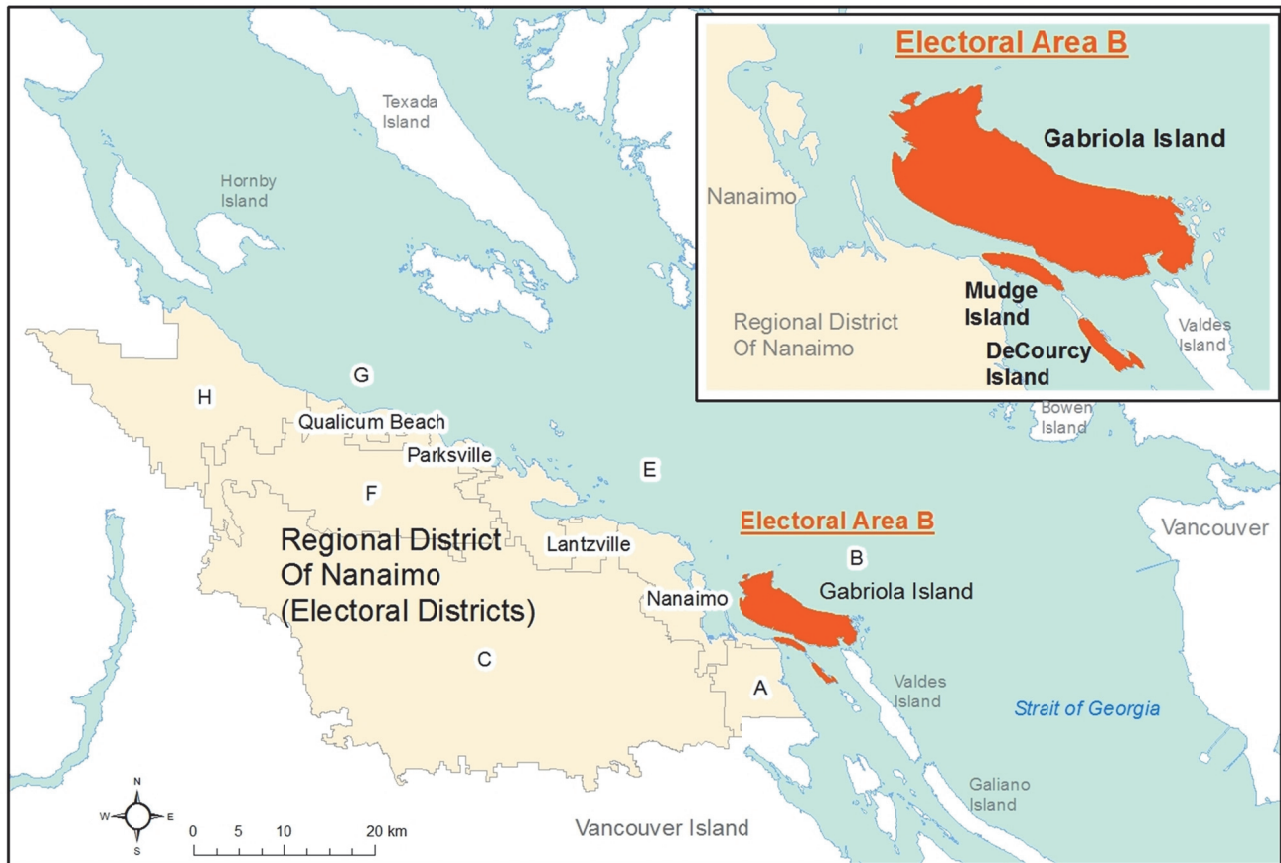


Figure 1: Regional District of Nanaimo and Electoral Area B.

1.1 Objectives

The specific objectives of the Phase 1 project for Gabriola, Mudge, and DeCourcy islands are:

- To update and review the existing hydrogeological information to improve the understanding of the groundwater system on Gabriola Island and nearby islands and to link all available information within one updated conceptual model.
- To develop a three-dimensional representation of the geological and hydrogeological system.
- To develop a water budget as a first step in understanding current groundwater and surface water utilization, as well as sustainable extraction.
- To assess groundwater extraction “stress” on aquifers.
- To identify data gaps or additional requirements that can be used to improve the RDN’s plans for expansion of the long term groundwater observation well network.

1.2 Project Scope and Tasks

As specified in the Request for Proposals (Water Budget Project: Phase One—RDN Gabriola, DeCourcy, & Mudge Islands), the scope of work for the SRK/Thurber Engineering team included:

1. Development of an updated hydrogeological conceptual model
2. Completion of a data gap analysis and suggestions for additional data collection
3. Estimation of groundwater and surface water balance components
4. Assessment of the water demand stress in each island water region
5. Presentation of results to the RDN and the Islands Trust

Over the course of the data gap analysis, a suggestion was made to conduct a short data collection program to provide additional information on hydraulic properties. This additional task was completed during late summer 2012.

1.3 Report Organization

This report has been formatted to present the Phase 1 findings of this project to a wide readership, including island residents, Island Trust members, and managers at the Nanaimo Regional District. The main report provides an overview of the hydrogeology of Gabriola, Mudge & DeCourcy Islands, water budget methods and results. As specified by the RDN, the text of this report was written in less technical language than typical engineering reports, but the text is based on technical information described in detail in the appendices. For this reason, in the main text of this report there are no specific references to journal papers or reports, except general references to work done previously and to the appendices of this report. Details on specific components, methodologies and calculations, and technical references are presented in the accompanying appendices.

Most figures presented in main document text are symbolic and designed to visually introduce some sections and to improve understanding of text by non-technical readers. There are detailed figures of technical graphs and maps in the Appendices.