

Project Name:	Peace Project: Mapping of Groundwater Aquifers in Montney Area
Project Number:	EI-2015-06
Proponent:	Geoscience BC
Funding Envelope:	Environmental Impacts
Timeframe:	July 1, 2014 – June 30, 2017

Project objectives

The objectives of this project are to map shallow aquifers in North East B.C.'s northern Montney Gas Fairway through the integration of shallow well data, shallow 3D seismic and airborne EM. A public GIS-based decision support tool will be developed to house groundwater and aquifer information gathered as part of the project.

Project description

In support of the new Water Sustainability Act and of the burgeoning LNG industry, this project will undertake to map out aquifers within the Montney gas play, through multidisciplinary work which will include airborne geophysical mapping of shallow aquifers along with the integration of shallow 3D seismic data and shallow well data. Potential aquifers delineated by the airborne electromagnetic (EM) surveys will be verified through the drilling of shallow wells and comparison to 3D seismic data, previous aquifer characterization and mapping work, and available well data. Pumping tests will be conducted at the newly drilled wells to assess aquifer hydrogeologic properties. Groundwater quality will be assessed at the new wells and reviewed with existing datasets to characterize aquifer groundwater quality. Where appropriate, some of the wells drilled to ground truth the EM shallow aquifer mapping, will be converted into Provincial regional "monitoring" or "observation" wells.

The project has a three year timeframe from July 1, 2014 to June 30, 2017. Project funding partners include Geoscience BC, BC Oil and Gas Research and Innovation Society, Northern Development Initiative Trust, ConocoPhillips and Progress Energy.

Project background

The province of British Columbia will be introducing a new regulatory framework for groundwater in 2015 with the introduction of the Water Sustainability Act. The modernization of water use in British Columbia is long overdue and is being driven, in part, by the current and upcoming demands on the Province's groundwater resources from shale gas development and the Province's LNG strategy. Part of the modernization will see the licensing of groundwater extraction and use in the province. A primary component of this new framework will be the Northeast Water Strategy; a process to ensure the sustainable use of water so as to maintain healthy aquatic ecosystems. A key part of the Northeast

Water Strategy is the Northeast Water Monitoring System, a proposed network of observation points which will provide baseline information on water quality and use from subsurface aquifers.

The ability to properly monitor groundwater requires a solid understanding of the distribution, thickness and quality of water aquifers. Unfortunately, the regional knowledge of aquifers in northeast BC is very poor. The ability of the Ministry of Environment to adequately map aquifers is generally restricted to areas where a robust data set exists due to a large number of water wells that have been drilled and reported. In NEBC, this is restricted to portions of the south Peace area where aquifers have been utilized through agricultural activity. Although aquifers can be delineated through drilling, this is time consuming and cost prohibitive from a regional mapping perspective. A more cost effective approach is to carry out a remote sensing survey, supported by existing surface and subsurface data, to delineate groundwater aquifers.

Project approach

This project will acquire a large (~10 000 km²) airborne EM survey which will allow the delineation and quantification of shallow aquifers in the North Montney play. To aid the interpretation of the EM survey where possible, shallow 3D seismic will be integrated into the interpretation along with geological and geophysical data from the shallow wells. Additional shallow test wells will be drilled, geophysically logged, and pump tested to calibrate the EM interpretation and gain further insight into the aquifers. A major outcome of this project will be a regional delineation of major groundwater aquifers that can be effectively observed within the Northeast Water Monitoring System.

The project will be staged with an initial phase being flown over the northern part of Montney and second phase will encompass the southern portion of the play. It is expected that this project will deliver a key component of the data set needed by First Nations, industry, governments, and the regulator to make informed decisions on sustainable groundwater use and protection in the Montney Play.

The project is a multi-phased project covering a 3 year timeframe.

Phase 1 activities focus on initial project planning and data collection (Quaternary mapping, EM survey of the northern part of the Montney, acquiring and reprocessing shallow 3D seismic from partners). Planning and contracting for Phase 2 activities will also take place, and the decision support tool will begin development. This phase will take place between July 1, 2014 and March 31, 2016.

Potential Phase 2 activities include an EM survey of the southern part of the Montney, as well as completion of the inversion and hydrogeological components and the decision support tool. Phase 2 activities are scheduled to start in early 2016.

Project deliverables

The deliverables from this project include the following:

1. Geophysical maps (e.g. resistivity, resistivity depth-slices), aquifer information including delineated areas of newly identified aquifers, updates to previously mapped aquifer extents, and aquifer characterization information (e.g., aquifer material/lithology, thickness, hydrogeologic properties), interpreted Quaternary depth maps, reports for new groundwater monitoring wells (including well logs and pumping test results).
2. A GIS-based decision support tool to allow open access to data gathered from the project.