Aquifer Factsheet - Companion Document

Updated March 2025

This companion document provides information about the terms, procedures, and data sources used to compile the Aquifer Factsheets.

Disclaimer

The Aquifer Factsheets have been prepared from information readily available to the BC government. As this information may be limited, the Factsheets only provide a broad overview of the general aquifer characteristics and are not intended as a comprehensive or detailed description of the aquifer. The Factsheets are provided as a public service on an "as is" basis and without any warranty as to the fitness or suitability of the information for any particular purpose. Information in the Factsheets has not been verified by the BC Government. Persons using the Factsheets should take steps to independently verify the information provided.

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Aquifer Description (based on Subtype)

The aquifer description is a generic description based on the subtype classification of the aquifer assigned at the time of mapping. A complete list of aquifer subtype code descriptions is available on the BC Government website: https://www2.gov.bc.ca/gov/content?id=0F269CD141464E2EBCEB8856F3509327 . A detailed description of the types of aquifers in BC can be found here.

Water District

British Columbia is divided into named and described water districts. A complete list of the Water Districts isprovided in the Water Districts Regulation under the Water Sustainability Act. See: https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/38_2016

Number of Wells Correlated to Aquifers

The number of wells correlated to an aquifer represents the number of wells that were identified as being completed within the aquifer at the time of mapping (i.e., wells that draw water from the geologic unit associated with the aquifer). There are several reasons why wells appearing within the aquifer boundary may not be correlated to the aquifer including:

- the well was constructed after the time of mapping and has not yet been correlated to the aquifer
- there is no lithological information provided on the well log, which is used to determine the geologic unit that supplies water to the well
- the well was completed (draws water from) a different geologic unit or aquifer that is either below or above the identified aquifer unit

Vulnerability, Productivity and Aquifer Classification

Values are determined at the time of aquifer mapping according to the BC Aquifer Classification system, which is described in the Guide to using the BC Aquifer Classification Maps for the Protection and Management of Groundwater: https://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/aquifers/reports/aquifer_maps.pdf. This guide presents a detailed description of the BC Aquifer Classification System, as well as the methodologies employed in classifying the aquifer, and discussions on some of the limitations of the data. This should help the reader to better understand the criteria used to identify, delineate and classify an aquifer. The classification component characterizes the aquifer based on the level of development of the groundwater resource (the water supply available relative to the demand) at the time of mapping and based on the vulnerability of the aquifer to contamination.

Aquifer Hydraulic Properties

Aquifer hydraulic properties (Hydraulic Conductivity, Transmissivity, Storativity) determine how water moves through and is stored in aquifers. Aquifer tests (pumping tests) are performed to estimate site-specific values for the hydraulic properties of aquifers. Hydraulic conductivity is a measure of an aquifer's capacity to transmit water. It represents the rate of flow of water through a unit cross sectional area of an aquifer, at a unit hydraulic gradient. Transmissivity is the rate of flow under a unit hydraulic gradient through a unit thickness of aquifer. It is equal to the hydraulic conductivity times the thickness of an aquifer. Storativity of an aquifer is the volume of water released from storage per unit surface area of the aquifer per unit decline in hydraulic head. Values are presented as a range based on the hydraulic property data in GWELLs for those wells correlated to the aquifer.

Reported Well Yield

Reported well yields are based on the estimates recorded by the driller at the time of well construction. It is only an estimate and is not necessarily based on measured values. As defined in The Guide to using the BC Aquifer Classification Maps – For the Protection and Management of Groundwater, estimated yields are categorize as follows:

- < 0.3 L/s are considered “Low” yield
- 0.3 - 3.0 L/s are considered “Medium” yield
- 3.0 L/s are considered “High” yield

Reported Static Water Depth

Water depth is reported in meters below ground surface and represents the water level measured by the driller at the time of well construction.

Reported Well Depth

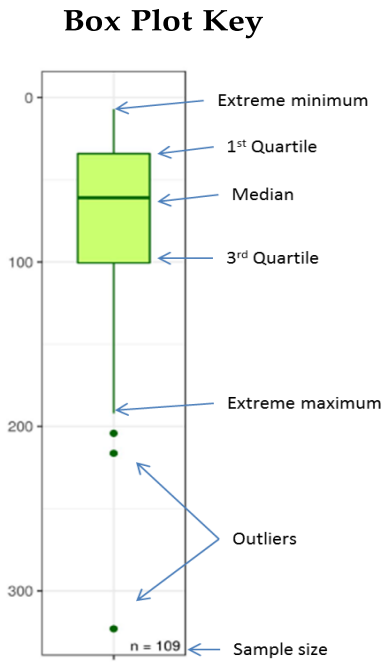
The well depth is reported in meters below ground surface as measured by the driller at the time of well construction.

Summary of Box Plots for Well Yield, Static Water Depth and Well Depth

The box plots provide a graphical summary of well data statistics for all wells that are correlated to the aquifer:

- n = the number of wells included in the summary
- upper 'hinge' = first quartile (25th percentile)
- lower 'hinge' = third quartile (75th percentile)
- crossbar = median (50th percentile)
- box length = interquartile range (IQR), which displays the spread of the middle half of the dataset
- whiskers = maximum and minimum values in the dataset that fall within 1.5 x IQR beyond the first and third quartiles
- points = dataset outliers beyond the whiskers

Note: Data are not plotted when n < 5. Extreme Outliers (points > 50 x IQR beyond the first or third quartiles) are removed when n > 10



Groundwater Level Data and Precipitation Summary Plot

The Groundwater Level Summary Plots are based on data collected through the Provincial Groundwater Observation Well Network (PGOWN):

https://www2.gov.bc.ca/gov/content?id=B03D0994BB5C4F98B6F7D4FD8610C836 . The monitoring data were accessed through the BC Data Catalogue, see: https://catalogue.data.gov.bc.ca/dataset/57c55f10-cf8e-40bb-aae0-2eff311f1685

The PGOWN dataset includes daily mean groundwater levels for all provincial observation wells. Historically, groundwater levels were collected at varying measurement frequencies that have changed over the years. To summarize the monthly groundwater level, a median value was calculated for any month with more than one reading. The overall median and percentile values plotted on the graph were then calculated from the monthly median values for all years available. These monthly groundwater level summaries are produced for observation wells with a minimum of 10years of data. "Preliminary" summary plots are provided for data sets with between 5 and 10 years of data. The extreme minimum and maximum groundwater levels represent the highest and lowest values ever recorded in a particular month.

The Precipitation Summary Plots are based on the Canadian Climate Normals (1981-2010) dataset accessible from the Environment Canada website: https://climate.weather.gc.ca/climate_normals/. The climate station with the best quality data within 15km of the nearest station to the observation well was selected as representative. The selected station was typically within 10km of the observation well.

Trend Analysis

The groundwater level trend plots were obtained from Environmental Reporting BC: https://www.env.gov.bc.ca/soe/indicators/water/groundwater-levels.html . Trend analyses were

conducted using monthly groundwater level data from observation wells with a minimum of 10 years of data. The state of groundwater level trends is updated every five years, with the most recent update in 2024. The groundwater trends were computed using the R package "groundwater-levels-indicators": https://github.com/bcgov/groundwater-levels-indicator. The source code for repeating the analysis is available on GitHub. A description of the technical methods for groundwater level trend analysis is available from Environmental Reporting BC:

https://www.env.gov.bc.ca/soe/indicators/water/print_ver/envreportbc_gwl_Sept2024.pdf .

Piper Plot

A Piper diagram is a graphical representation of the chemistry of a water sample. The major cations (calcium, magnesium, and sodium plus potassium) and major anions (sulfate, chloride and carbonate plus hydrogen carbonate) are shown on separate ternary plots and then projected onto the diamond. Water samples shown on the Piperplot can be grouped into hydrochemical facies which provide insight into the flow path and chemical alteration of a sample

The groundwater chemistry data presented in the Piper plot data were collected from provincial observation wells. The data were obtained from the Environmental Monitoring System (EMS) web reporting site : https://a100.gov.bc.ca/pub/ems/mainmenu.do?userAction=mainmenu using the R package "rems: https://github.com/bcgov/rems/blob/master/README.Rmd. Chemistry results were screened for data quality by assessing the charge balance error (CBE). Only samples with a charge balance error of less than 10% were included on the piper plot. Outliers (defined as samples with water types not within the top 75% described) were removed where there were more than 5 samples. Data download, quality screening, summarizing, and plot generation were performed with the BC Groundwater Chemistry Analysis R-package Tool (BCGWCAT): https://bcgov.github.io/bcgwcat/.