

The drop on water

Online Interactive Groundwater Map

The Nova Scotia Department of Natural Resources (DNR) has produced an online interactive groundwater map. The map has information available in layers. Each layer represents a distinct map theme. For example, some of the available layers on the interactive groundwater map include topographic layers, bedrock geology, primary watershed boundaries, and groundwater observation wells. The map layers can be switched on and off, allowing users to create customized views of the map.

The Groundwater Regions of Nova Scotia

The six major groundwater regions of Nova Scotia are shown on the interactive map at gis4.natr.gov.ns.ca/website/nsgroundwater.

You can also download a 1:500,000 scale map of Groundwater Regions of Nova Scotia at www.gov.ns.ca/natr/meb/data/mapgallery/ofm/pdf/ofm_2008-003_d428_dp.pdf. Figure 1 shows the map of Groundwater Regions of Nova Scotia.

The six distinct groundwater regions within Nova Scotia are based on geology, as determined from existing geological mapping. Areas with similar geology, for example rocks of similar age and mineral composition, are grouped together to form a region.

1. Quaternary

The quaternary groundwater region is made up of fairly permeable sediments, consisting mostly of sand and gravel, deposited during and after glaciation. This region does not include less permeable quaternary sediments, such as silt, clay, and till.

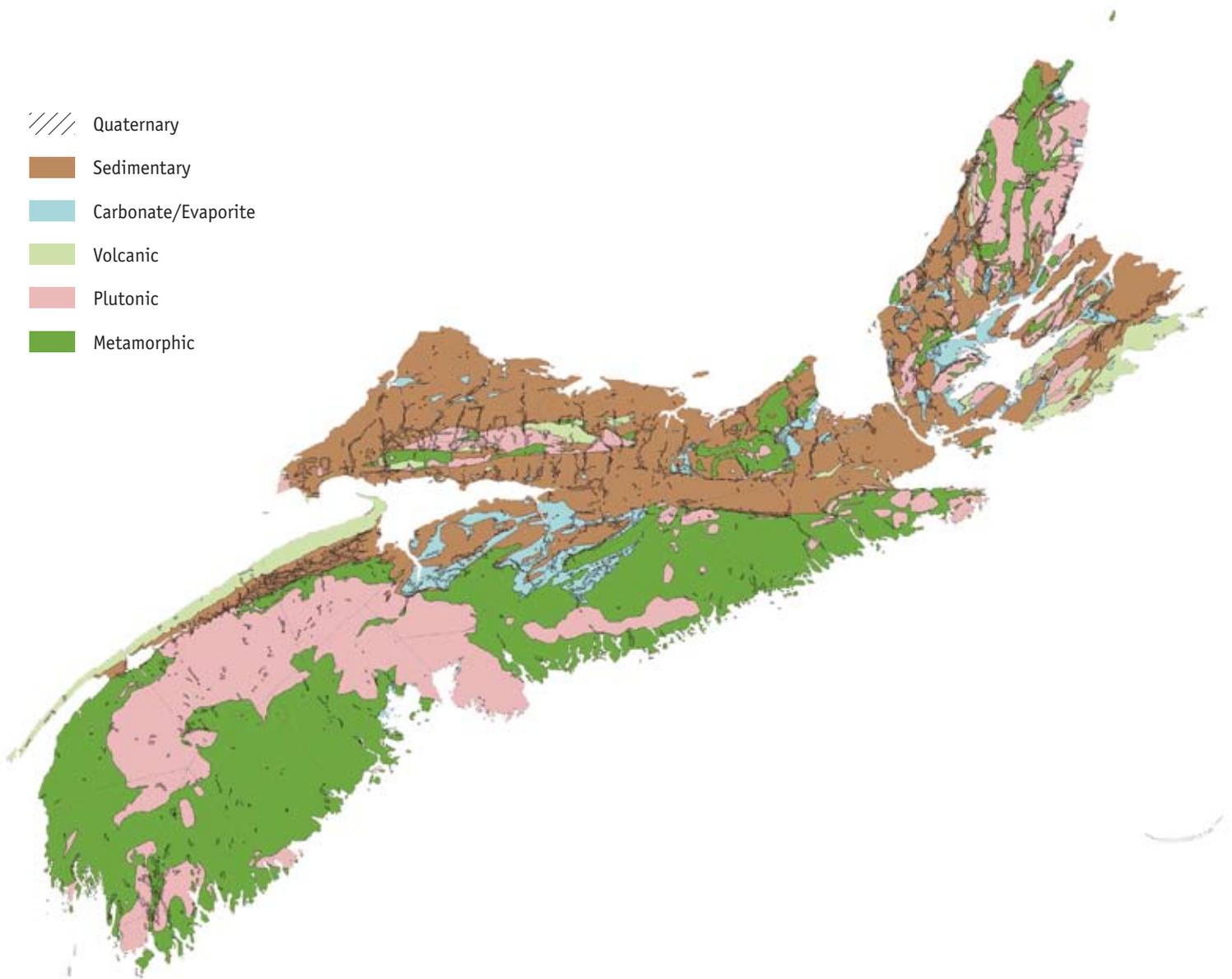
QUICK FACTS

- View the Nova Scotia Department of Natural Resources (DNR) online interactive groundwater map at gis4.natr.gov.ns.ca/website/nsgroundwater.
- Nova Scotia has six major groundwater regions: quaternary, sedimentary, carbonate/evaporite, volcanic, plutonic, and metamorphic.
- Groundwater quantity and quality statistics available on the map provide information on the general characteristics of each of the groundwater regions.
- Other groundwater information can be viewed on the interactive map, including water wells and pumping tests.

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Figure 1 – Groundwater Regions of Nova Scotia.

- //// Quaternary
- Sedimentary
- Carbonate/Evaporite
- Volcanic
- Plutonic
- Metamorphic





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2. Sedimentary

Sedimentary rocks are formed when sediment, such as organic material or sand, is deposited by water, wind, or ice and hardens over long periods of time.

3. Carbonate/ Evaporite

Carbonate and evaporite rocks are types of sedimentary rocks. Carbonate rocks are composed mostly of calcium carbonate (CaCO_3) and/or magnesium carbonate (MgCO_3). Limestone and dolostone are two types of carbonate rocks. Evaporite rocks, such as halite, are formed through the evaporation of surface water, leaving deposits that harden into rock over long periods of time.

4. Volcanic

Volcanic rocks are extrusive igneous rocks, such as basalt, that have formed from the results of volcanic activity at or near the earth's surface. The basalts of the North Mountain are the result of volcanic flows.

5. Plutonic

Plutonic rocks are intrusive igneous rocks that are produced from magma that was solidified below the surface of the earth. The granite rocks of the South Mountain are an example of a plutonic formation.

6. Metamorphic

Metamorphic rocks are rocks that were originally sedimentary or igneous rocks that have been changed to a different rock type through extreme temperature and pressure inside the earth. Examples of metamorphic rocks are quartzite (originally sandstone) and slate (originally shale).

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Characteristics of Groundwater Regions

On the interactive map, statistical tables summarize the groundwater quantity and quality of the six groundwater regions.

The following three common characteristics used to measure the performance of a well or aquifer are included in the statistics table:

- Potential long-term well yield (Q_{20}) – This indicates how much water can be pumped from a well in the long term (20 years).
- Apparent well transmissivity (T) – This indicates how easily groundwater is transmitted through an aquifer to a well.
- Specific capacity (SC) – This indicates how much water can be pumped per unit drop of water level in the well.

In general, the higher the Q_{20} , T, and SC of a well, the more water will be available from the well.

Groundwater Quantity

Wells located in the quaternary groundwater region tend to be the most productive (highest Q_{20} , T, and SC) because these deposits can more readily store and transmit groundwater compared to other groundwater regions.

Wells located in the sedimentary and carbonate/evaporite groundwater regions tend to have higher water yields than those in the other three bedrock groundwater regions. The rocks in the sedimentary and carbonate/evaporite regions tend to be more fractured. Groundwater can flow both along fractures and through the rock itself.

Well yields in the metamorphic, plutonic, and volcanic groundwater regions yield lower quantities of groundwater because groundwater flows only along fractures within the rock.



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Groundwater Quality

Sixteen water chemistry parameters are reported on in the statistics table for each of the six groundwater regions: alkalinity, arsenic, calcium, chloride, fluoride, hardness, iron, magnesium, manganese, nitrate-nitrite, pH, potassium, sodium, sulphate, total dissolved solids, and uranium.

For more information on these water quality parameters see our series of fact sheets *The Drop on Water* at www.gov.ns.ca/nse/water/thedroponwater.asp.

The natural groundwater chemistry depends on the local geology. The groundwater chemistry of the quaternary groundwater region is variable, but is generally characterized as having low alkalinity and hardness with moderate concentrations of dissolved solids. Wells located in the sedimentary or carbonate/evaporite groundwater regions typically have groundwater with moderate to high dissolved solids and hardness as compared to groundwater from the metamorphic, plutonic, or volcanic groundwater regions. Sulphate and salt concentrations may be elevated in the carbonate/evaporite groundwater region.

Naturally occurring trace metals, such as arsenic, iron, manganese, uranium, and occasionally fluoride, may be present in all groundwater regions, although they are most often associated with the metamorphic and plutonic groundwater regions. However, because these naturally occurring contaminants can be present in all regions, all well owners should regularly test their water for chemical quality (every two years) as well as bacteria (every six months). Test more often if you notice changes in physical qualities – taste, smell, or colour.

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Interactive Map Layers

In addition to the six major groundwater regions, the interactive groundwater map includes layers representing the following information:

- various topographic and base layers
- primary watershed boundaries
- bedrock geology
- groundwater observation wells maintained by Nova Scotia Environment (NSE)
- water wells
- pumping test results

The interactive map contains information on over 100,000 water wells constructed in Nova Scotia between 1940 and the present. The interactive map can help locate information about a water well, such as location, depth, groundwater level, depth to bedrock, yield, and the type of well. The interactive map can also be used to search an area for typical water well characteristics, for example, if a new water supply is being planned.

Information on over 900 groundwater pumping tests performed in Nova Scotia between 1960 and present can also be viewed on the interactive groundwater mapping webpage. This data layer represents an inventory of pumping test reports submitted to NSE for higher capacity wells, or wells with non-domestic use. The information available includes location, the aquifer being pumped, and the potential long-term yield.

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Tools on the Interactive Map

Table 1 shows some of the common functions and features of the interactive map and their uses.

Table 1 – Description of Interactive Map Tools

Symbol	Name	Explanation
	Layer/Legend Toggle	This tool allows you to switch between the map legend and the list of layers.
	Overview Map Toggle	This tool turns the overview area of the map on or off – when on, a small map in the upper left corner of the main map display shows the current view area.
	Pan	Use this tool and your mouse to click and drag the map in any direction to obtain a new view of the desired area at the same scale.
	Pan Arrows	These arrows allow you to pan incrementally to the north, south, east, or west.
	Zoom In	You can zoom in or out of an area of interest with this tool by either clicking in the view area or holding down the left mouse button and creating a boxed area that will determine the extent of the new view.
	Zoom Out	
	Zoom to Full Extent	Click this button to reset the map to its full extent.
	Zoom to Extent of Active Layer	This tool sets the map extent to that of the active layer. To activate a layer, simply click the button beside the layer name.
	Zoom to Previous Extent	This tool functions the same way as your internet browser's "back" button. Click this button to return to the previous view.
	Identify Feature Attributes	This tool allows you to view the characteristics of a particular feature. In the Layer view in the far right frame click on the radio button (●) of the desired layer to make the layer active. Clicking on a feature of the active layer on the map will show information (attributes) about the active layer. The information will be displayed at the bottom of the view area. Make sure the desired feature is visible in order to select it with the Identify cursor.

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Symbol	Name	Explanation
	Find Text String	This tool allows you to search for a text string in the attributes of the active layer. This feature is useful when trying to locate specific values, such as a well log number. Note that the search is case sensitive.
	Query Feature Attributes	This button allows you to select features to search for. Choose a Field, Operator and Value and click the Add to Query String button. Click on Get Samples for examples of how the search should be formatted when entering search values in the Value box. Note that the search is case sensitive.
	Select by Rectangle	Drag a rectangle using this tool to define an area of selection and any active feature that touches or falls within the rectangle will be selected and the attributes will be shown.
	Select by Line/Polygon	This button allows you to select all "Active" features that fall along a line or within a customized polygon. If you hit a point by mistake, hit the Delete Last Point button to take it off.
	Clear all Selections	This tool clears any selected features or removes any added graphics such as lines or polygons used with the Line/Polygon tool.
	Measure Tool	This tool allows you to click on two or more points and return the distance between them in the current units. The readout is at the top left of the view screen. By default, this tool will connect the last point to the next point you draw. If you wish to only measure individual lines, clear your selection after you draw each segment using the Clear Selection tool.
	Buffer Tool	Use this tool to create a zone around a specific feature at a designated distance from the feature. To use this tool, you must have features selected.
	Set Units	The map service uses kilometres as the default unit of distance measurement. Change the units using this tool.
	Creates Map Layout for Printing	Use this tool to print a simple map layout of the current view area with a legend. You can choose a custom title for the map.

View additional information about each layer by clicking on the layer title in the layer view shown in the right hand frame on your screen.

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Examples of Interactive Map Searches

Example 1 – How to find information about the groundwater chemistry in my region

- Make either the Bedrock, Groundwater Chemistry Statistics or the Surficial, Groundwater Chemistry Statistics layer active by clicking on the radio button (). Click Bedrock, Groundwater Chemistry Statistics for bedrock wells; click Surficial, Groundwater Chemistry Statistics for dug wells or wells in sand and gravels.
- Using the Zoom In tool (), zoom into the area of interest on the map
- Using the Identify tool (), click on the groundwater region.
- The groundwater chemistry statistics will appear in a table at the bottom of your screen.
- Click on the “Groundwater Chemistry Statistics” layer title in the layer view (frame on the right hand side of screen) to retrieve a description of the fields used in the data table.

Example 2 – How to retrieve water well logs in an area of interest

- Click on the well logs radio button () to make the layer active.
- Using the Zoom In tool (), zoom into an area of interest on the map.
- Using the Identify tool (), click on the individual well points, or using the Select by Rectangle tool (), drag a box around a group of well points. The results will be returned in a table at the bottom of your screen.
- Click on the “well logs” layer title in the layer view to retrieve a description of the fields used in the data table.

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Example 3 – How to retrieve drilled water wells in Hants County, installed after 2005

- Click on the well logs radio button () to make the layer active.
- Using the Zoom In tool (), zoom into an area of Hants County on the interactive groundwater map so that the blue well points become visible.
- Using the Query Feature Attributes tool (), enter the following information:
Select “Type” from list under Field
Select “=” from list under Operator
Enter “Drilled” in Value box
- Click Add to Query String, and then click And
Select “County” from list under Field
Select “=” from list under Operator
Enter “Hants” in Value box
- Click Add to Query String, and then click And
Select “Date” from list under Field
Select “>=” from list under Operator
Enter “2005-01-01” in Value box
- Click Add to Query String and then click Execute to perform your search.

Features will be highlighted and the results will be returned in a table. At the bottom of the table the zoom to link can be clicked to centre the map on the selected features. The table window is limited to 100 records. You will have to click on the more records link to scroll through all returned records.



FOR MORE INFORMATION

Contact

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