BRITISH COLUMBIA | Ministry of Environment and Climate Change Strategy

Introductions and Updates
BCGWA Conference

April 5, 2018

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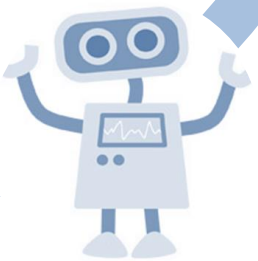
Water Protection and Sustainability Branch

Outline

Legislation - The Water Sustainability Act and Groundwater Protection Regulation

Our Approach and Our Data

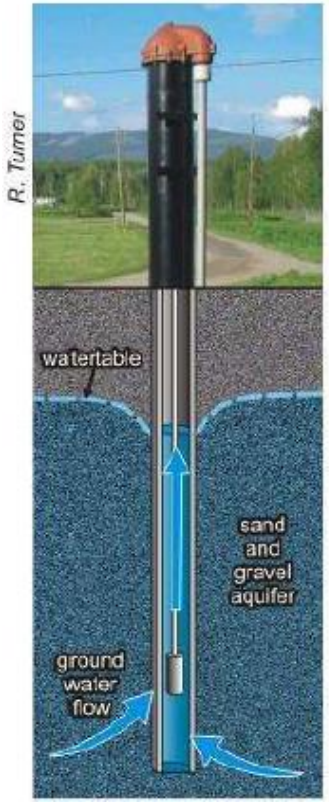
Borehole Closures and Flowing Well Advisories



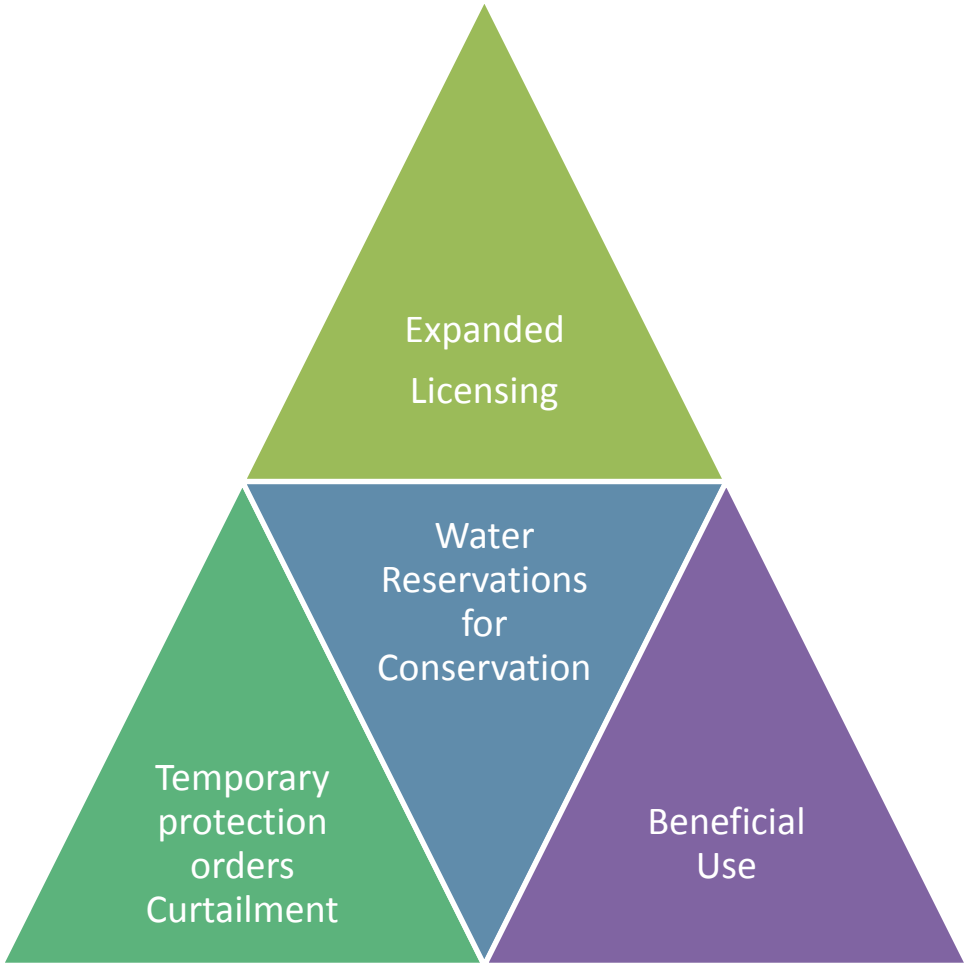
Under Development

2016 Water Sustainability Act

- Licensing of groundwater use
- Measuring & Reporting of Use
- Protection for streams
- Manage Water Scarcity
- Water Sustainability Plans
- Setting Objectives: Quality & Quantity



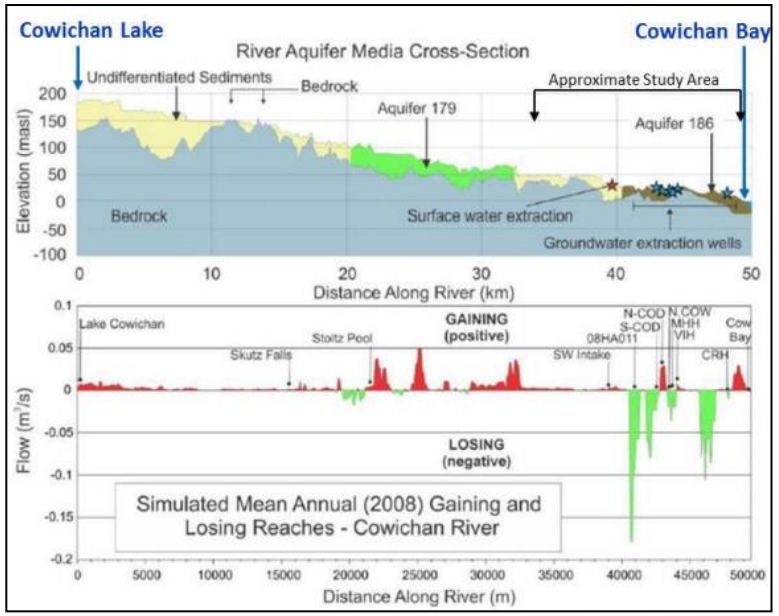
Protecting Aquatic Ecosystems (Environmental Flow Needs)

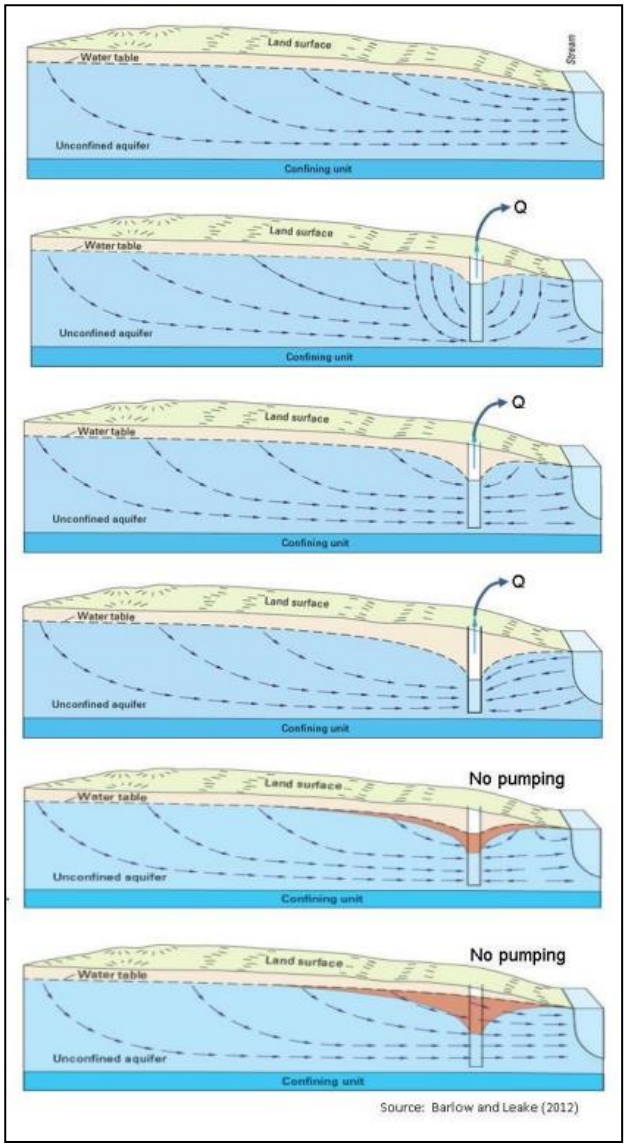


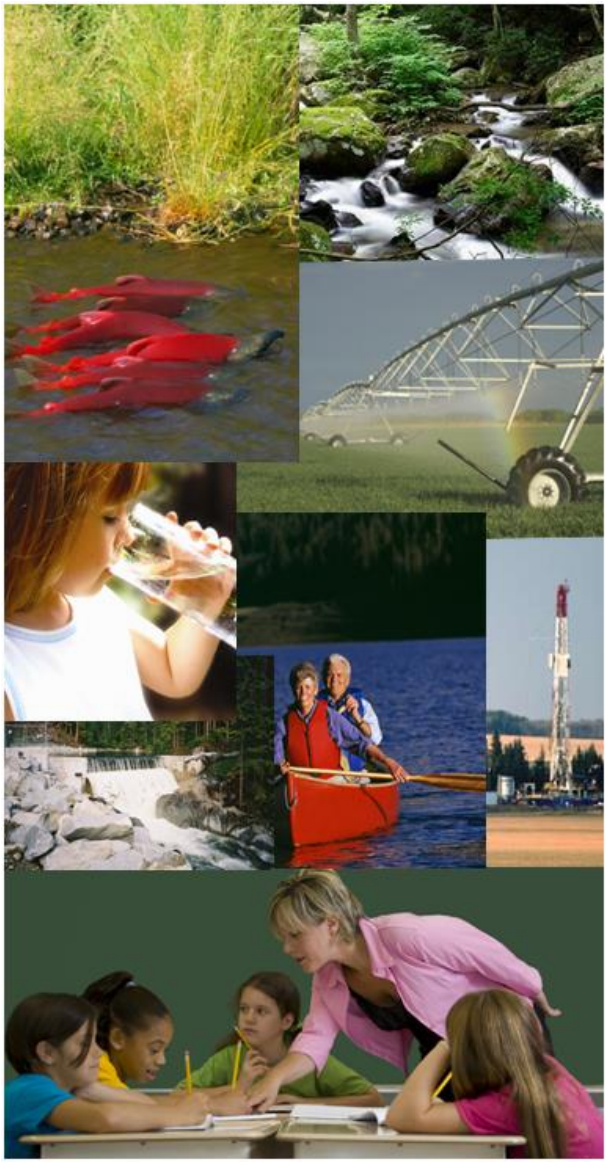
Temporary Protection Orders

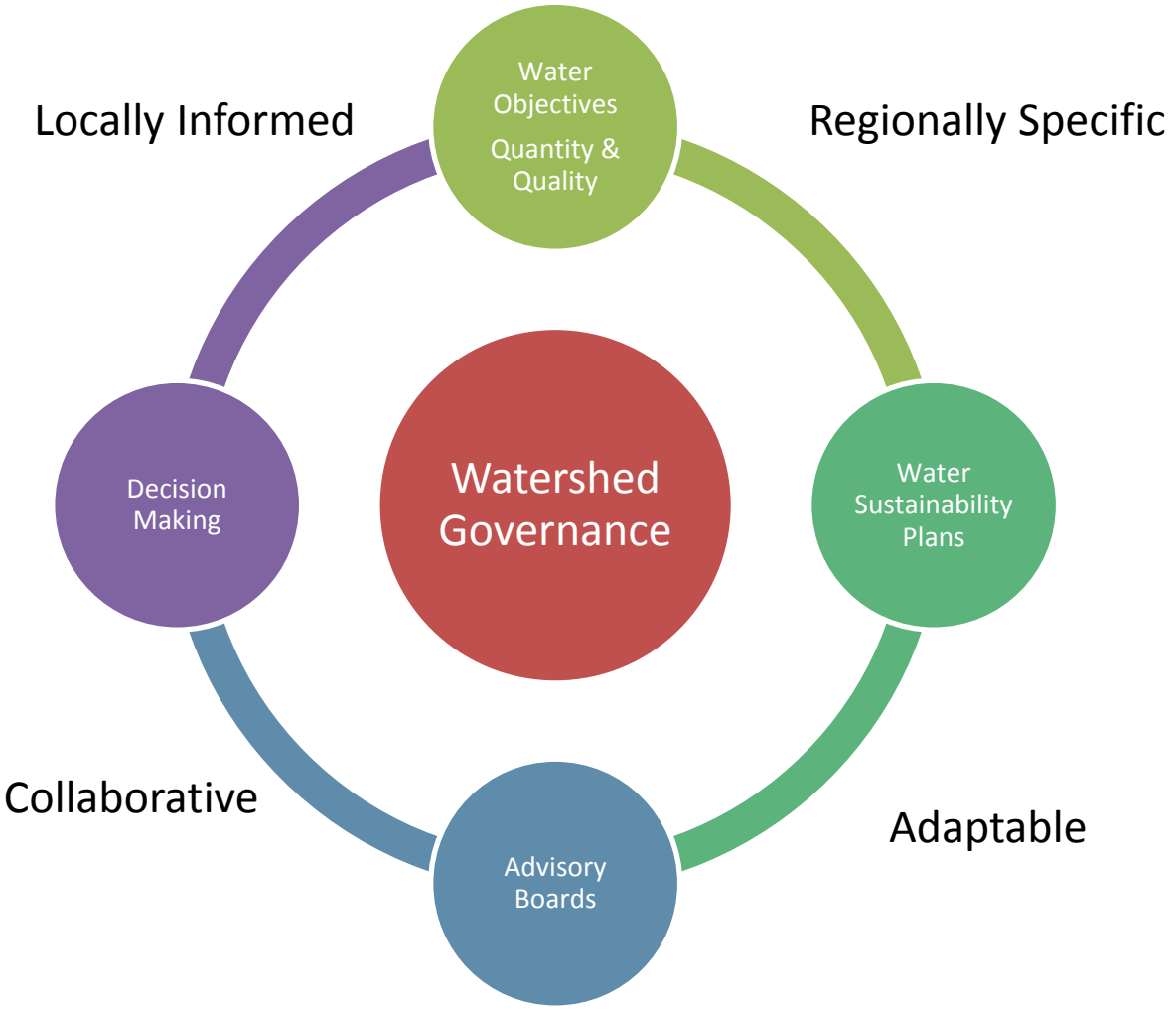
To address

- Seasonal Water Scarcity
- Drought








Locally Informed
Water Objectives
Quantity & Quality
Regionally Specific
Decision Making
Watershed Governance
Water Sustainability Plans
Collaborative
Advisory Boards
Adaptable

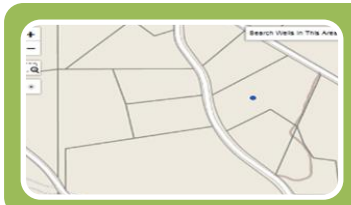
WSA Part 3 – Protecting Water Resources
Division 3 – Wells and Groundwater Protection

- Provisions for well construction, deactivation, decommissioning, and operation; provisions for well pumps
  - Restrictions on activities in relation to wells and well pumps
  - Detailed provisions in GWPR
- Controlling artesian flow during construction and controlling existing flowing artesian wells
- Prohibition on introducing ‘foreign matter’ into well and Remediation orders in relation to ‘foreign matter’ in wells

GWPR follows the life cycle of a well

Part 1	Interpretation and application
Part 2	Well drillers and well pump installers
Part 3	Well construction
Part 4	Well caps and well covers
Part 5	Well pumps and related works
Part 6	Well identification
Part 7	Well operation and maintenance
Part 8	Artesian flow
Part 9	Well deactivation and decommissioning
Part 10	Well reports
Part 11	General (records retention and offences)

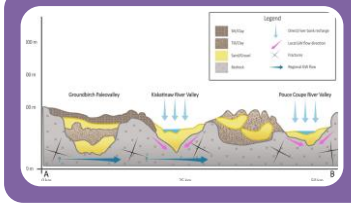
Our Approach:
Data Systems & Analysis



WELLS

Mapping

Water Budgets

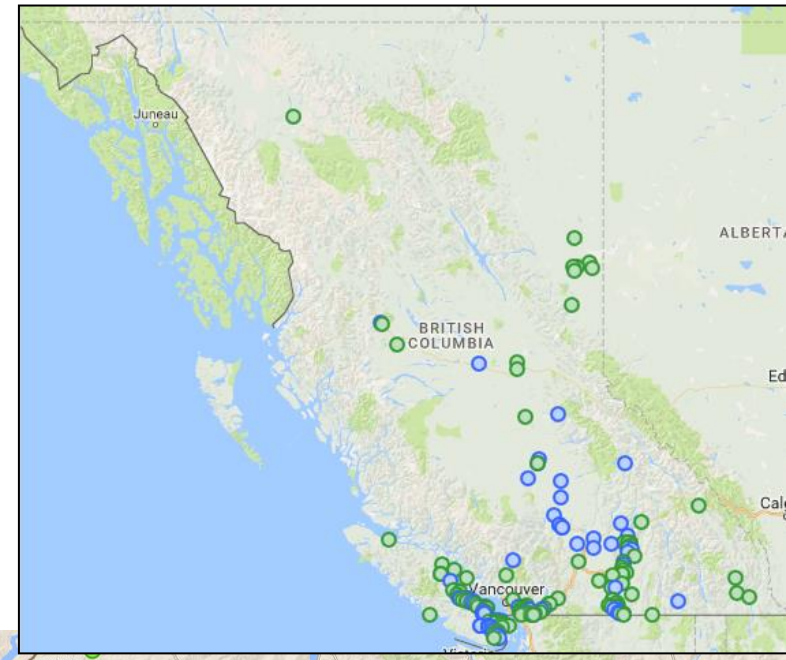


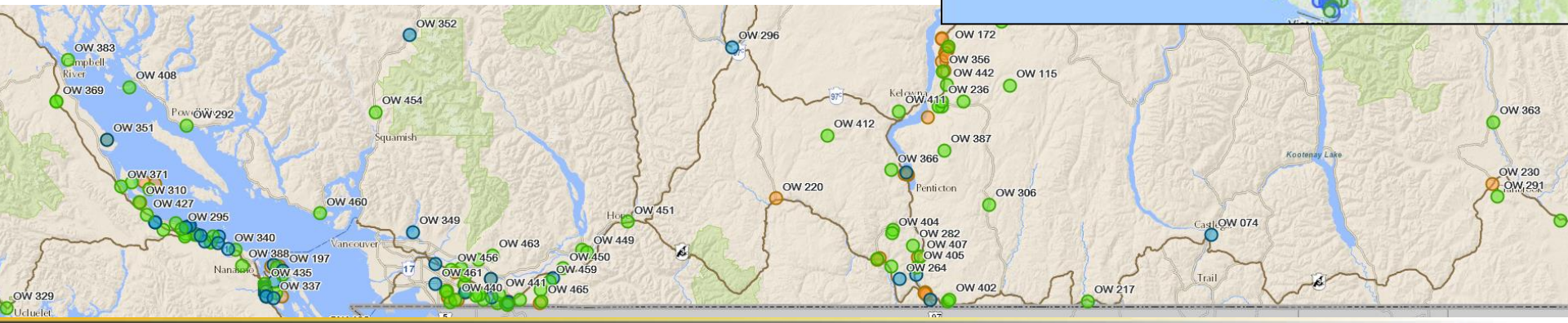
Modelling & Characterization Projects

Our Approach: Monitoring

Provincial Groundwater Observation Well Network

- Established 1961
- 190 active wells in the network
- Groundwater Levels & Chemistry
- Shared FLNR / ENV Responsibility





Our Approach:
Research Partnerships

SFU SIMON FRASER UNIVERSITY ENGAGING THE WORLD

University of Victoria

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

Example:

Assessment of Aquifer-Stream Connectivity Related to Groundwater Abstraction in the Lower Fraser Valley

Phase 1 Field Investigation

Glenn Hall, Diana M. Allen, Mike Simpson, Habtamu Tolera, Bryan Jackson, Mary Ann Middleton, and Michele Lepitre

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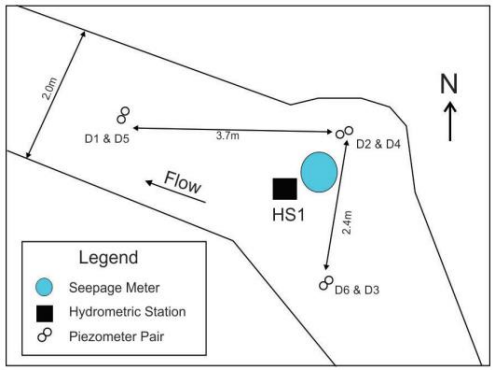
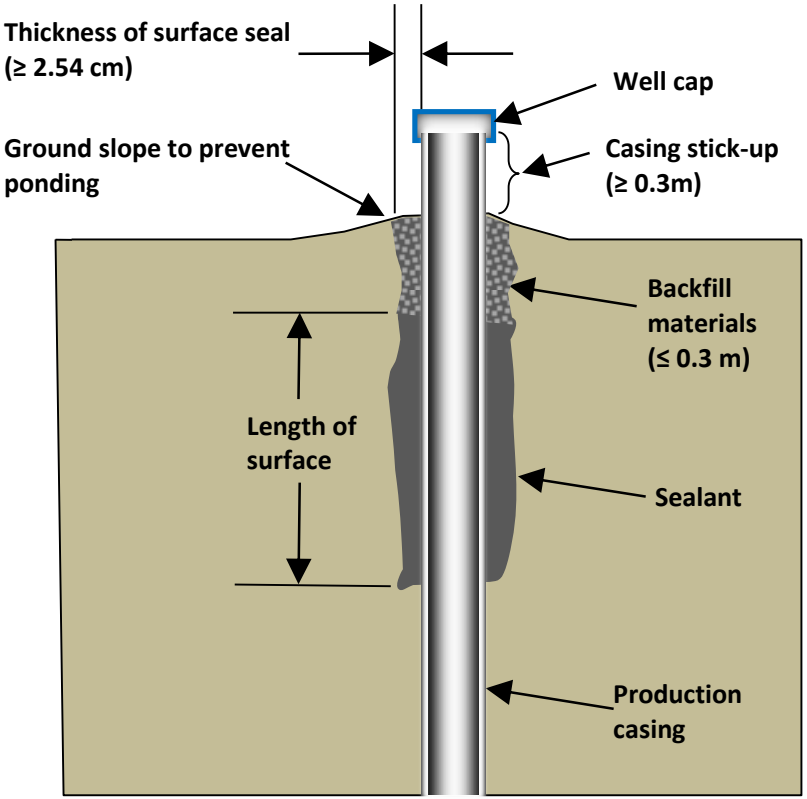


BRITISH COLUMBIA

Ministry of Environment and Climate Change Strategy

Covers and Closures:

GWPR prescribes minimum well construction requirements for sanitation and aquifer protection

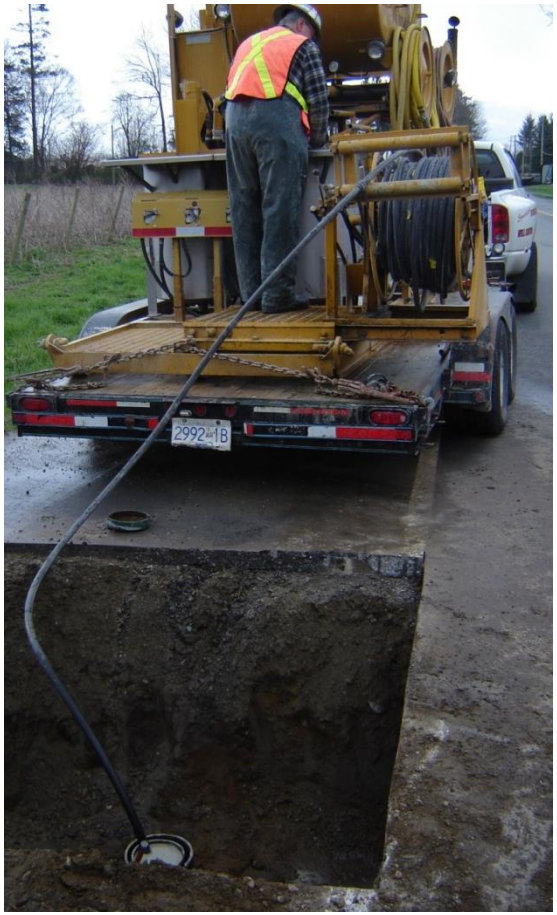


Well Caps and Covers

- All wells are required to have a proper well cap regardless of when they were drilled
- New water supply wells (including open-loop geoexchange wells) and monitoring wells must have a secure well cap
- Geotechnical wells (boreholes, test pits) and closed loop geoexchange wells do not require well caps

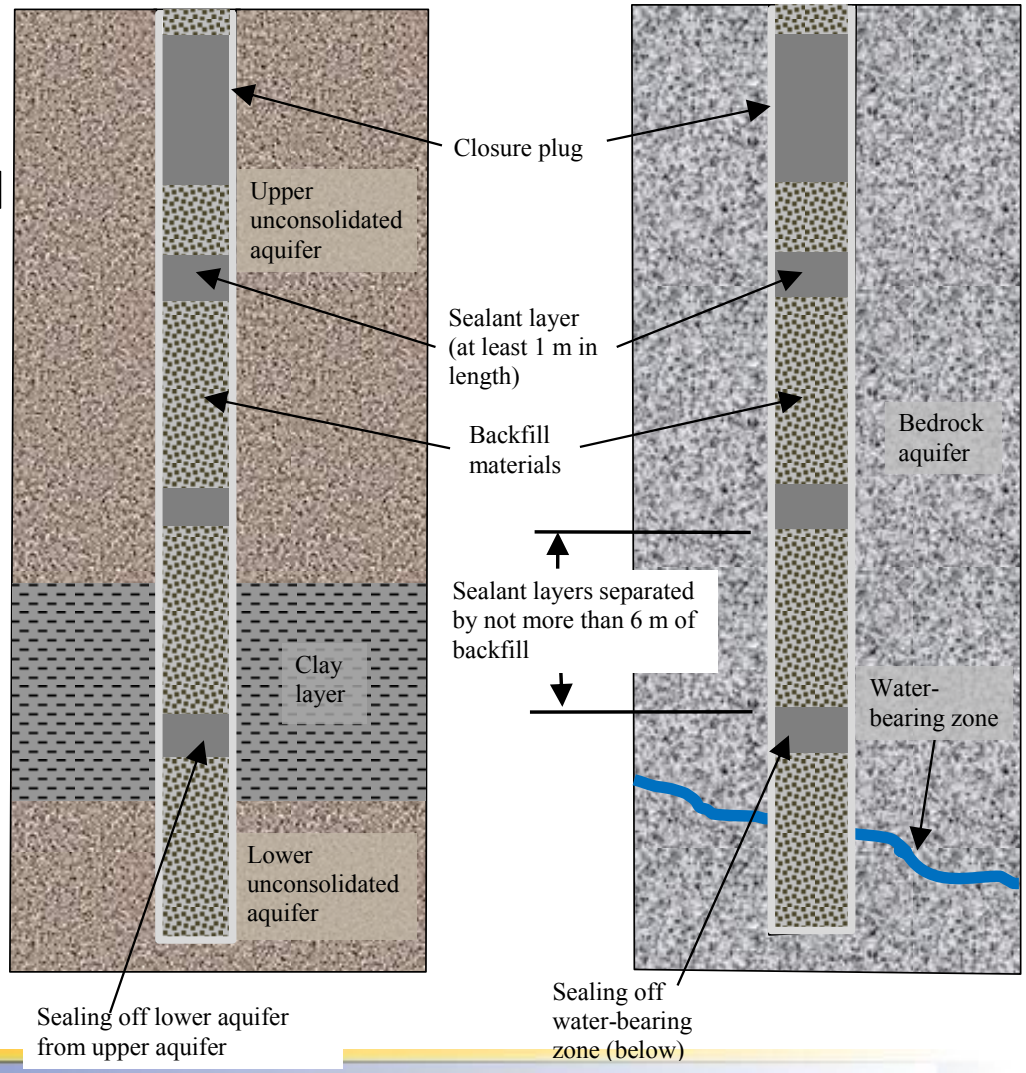
Unused wells must be deactivated or decommissioned after 5 years

- Wells can be deactivated for up to 5 years (decision maker can extend deactivation period)
- Deactivation means
  - Turn off pump or disconnect pump handle
  - Take equipment out of operation (e.g. monitoring, geoexchange)
  - Control artesian flow
  - Continue to maintain until decommissioned

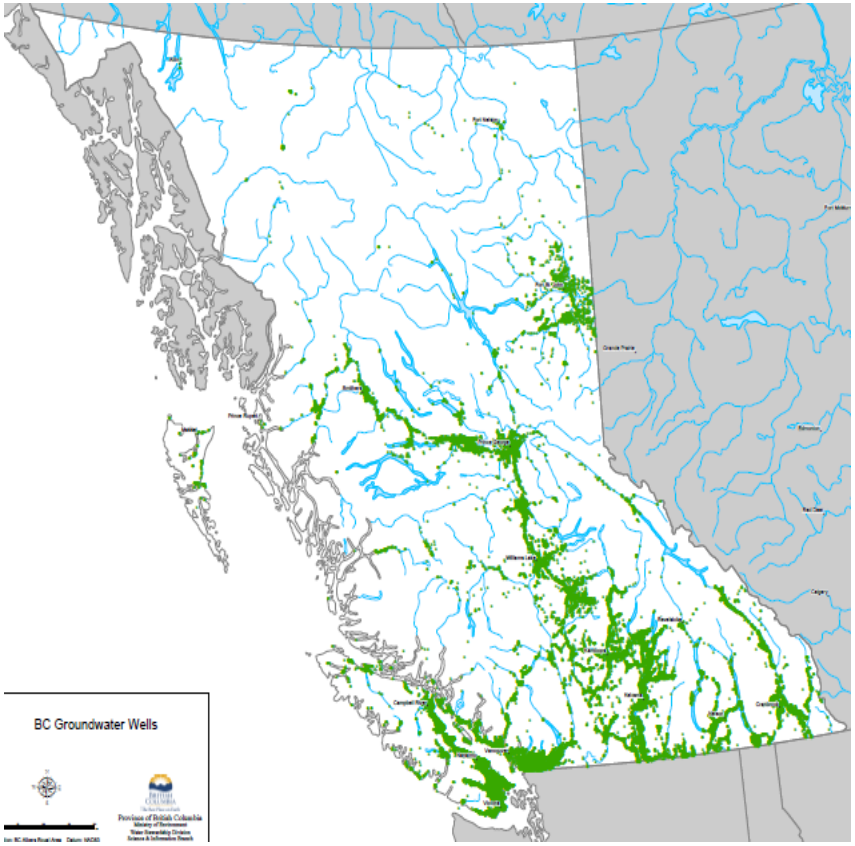


Wells deactivated for 5 years must be decommissioned

- Remove pump/equipment
- Fill well with sealant and backfill materials
- Seal off known aquifers
- Install closure plug
- Geoexchange well: remove circulation fluid
- Alternative specifications possible
- Within 30 days boreholes also decommissioned or made into a temporary or permanent well



Well driller must submit well construction and decommission reports



- Reports must be given to the well owner for all wells
- Reports must be submitted (in 90 days) to the comptroller for:
  - water supply wells
  - recharge or injection wells
  - permanent dewatering wells
  - closed-loop geoexchange wells (one report per system)
  - flowing artesian wells

Artesian flow must be stopped or brought under control (WSA s. 52, 53)

- Responsible parties:
  - Driller at time of construction
  - Well owner or land owner for existing well
- "Under control" means:
  - Clear of sediment
  - Entirely conveyed through casing (if applicable)
  - Can be turned off indefinitely
  - Does not pose a threat to property, public safety or the environment

Managing Artesian Flow

- Artesian flow may be managed in accordance with directions of a decision maker, if the decision maker is satisfied that:
  - Due to exceptional circumstances it is not practicable to bring artesian flow under control, and
  - Based on report of a professional, the artesian flow can be managed without posing a threat to property, public safety or the environment

Review of Major Flowing Artesian Wells

A review of six major flowing wells – 2007-2016 carried out by Mike Wei for ENV in March 2018.

Goal: identify commonalities, lessons learned and opportunities for improved policy and practice.

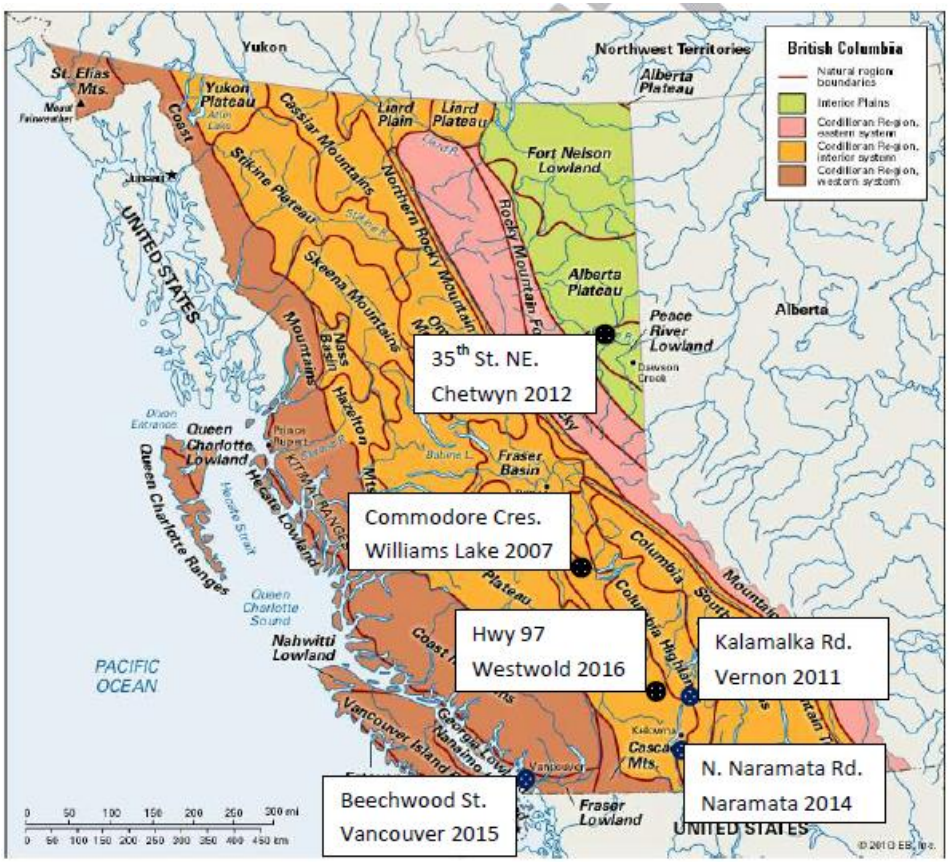


Figure 1. Map showing the six flowing wells discussed in this report. Black (+)-hatched circles represent water supply wells; blue (x)-hatched circles represent GX wells.

Review of Major Flowing Artesian Wells

Improvements since 2016 (introduction of WSA) include:

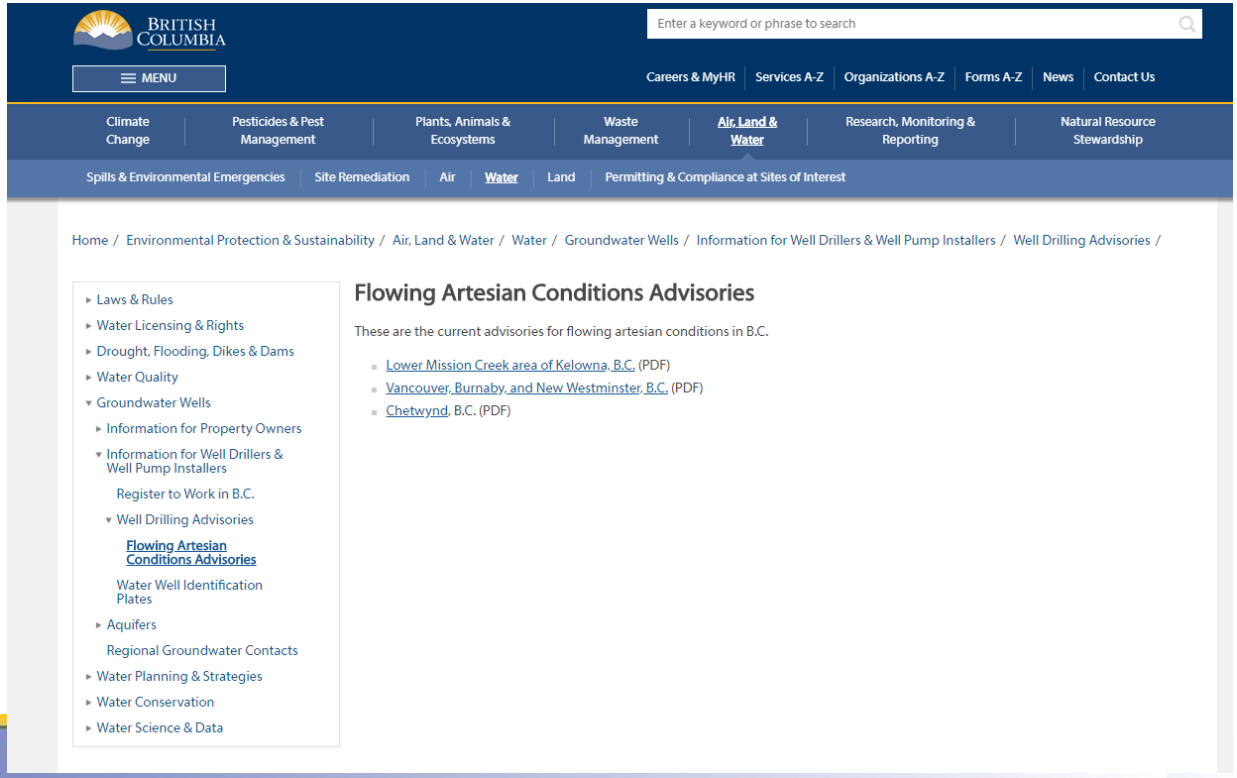
- GX drilling now a restricted activity, requiring qualified well drillers
- Definition of ‘under control’ has been clarified
- Submission of well records now mandatory
- New flowing artesian advisories have been developed

Opportunities include:

- Reviewing artesian conditions
- Improved drilling practices
- Submission of artesian well condition reports
- Continue to work collaboratively with BCGWA

Flowing Artesian Conditions Advisories

- https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/groundwater-wells/information-for-well-drillers-well-pump-installers/well-drilling-advisories/flowing-artesian-conditions-advisories
- Or Google Flowing Artesian Conditions



Flowing Artesian Conditions Advisories

Known flowing artesian wells in south Vancouver, Burnaby and New Westminster

A review of the BC WELLS database indicates that four (4) known wells in the area had reported flowing artesian conditions at the time of drilling. It is possible that there are additional flowing wells in the area, but these wells have not been registered in the BC WELLS database (submission of well records for most types of wells became mandatory in 2016. Until this point, well records were submitted on a voluntary basis.) Of the known artesian wells, flow rates range up to 1363 m^3/day (250 US gallons per minute). The depths at which these wells have encountered the artesian aquifer range from 25 to 73 m (82 to 239 feet) below ground surface.

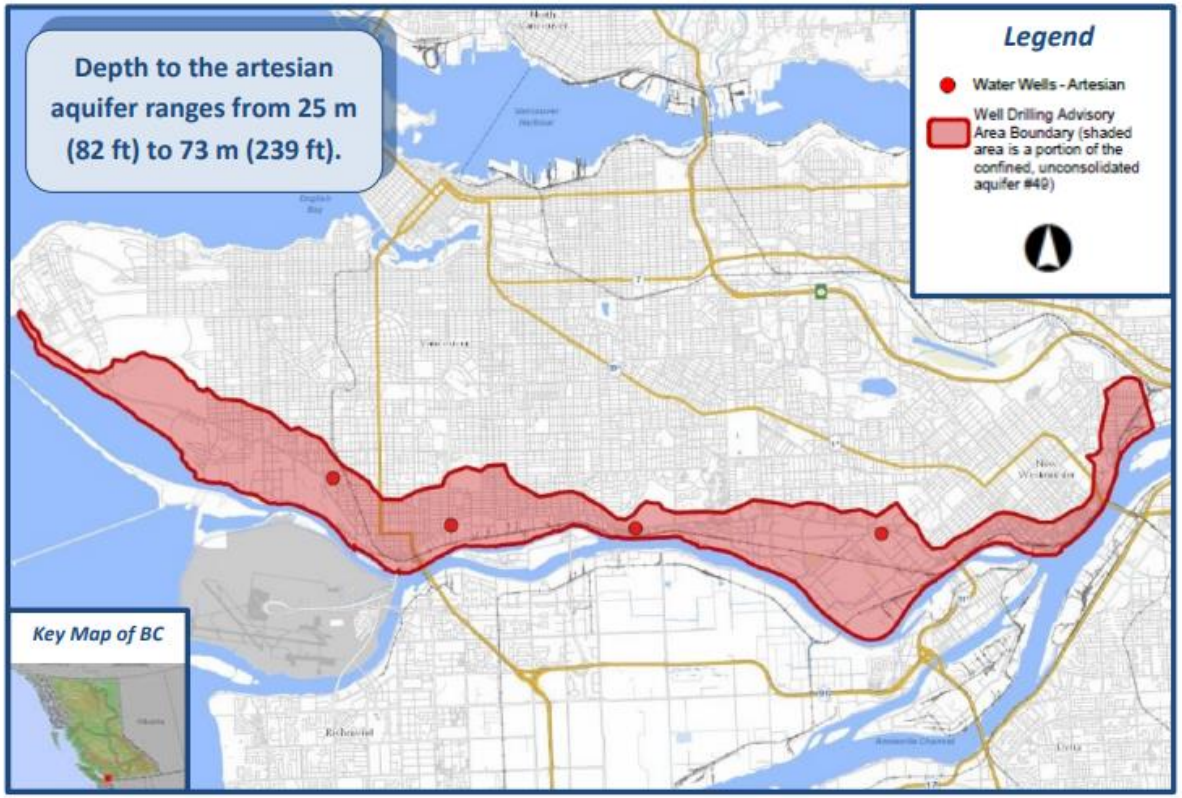
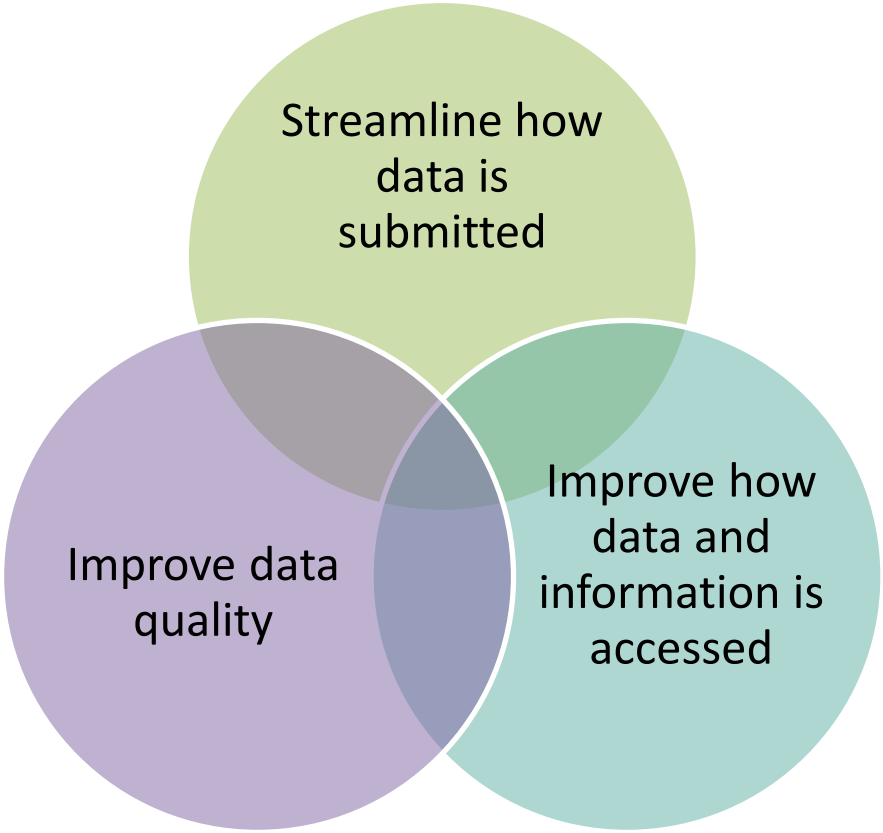


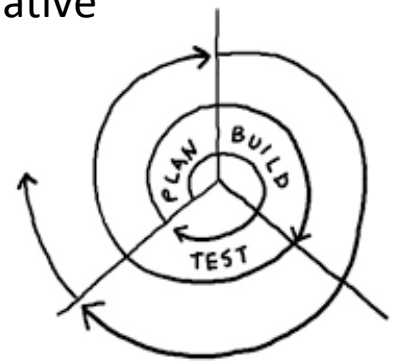
Figure 2: Map of the location of potential flowing artesian conditions (part of aquifer #49) in Vancouver, Burnaby and New Westminster, B.C.

New & Under Development:

GWELLS (the new WELLS)



Iterative

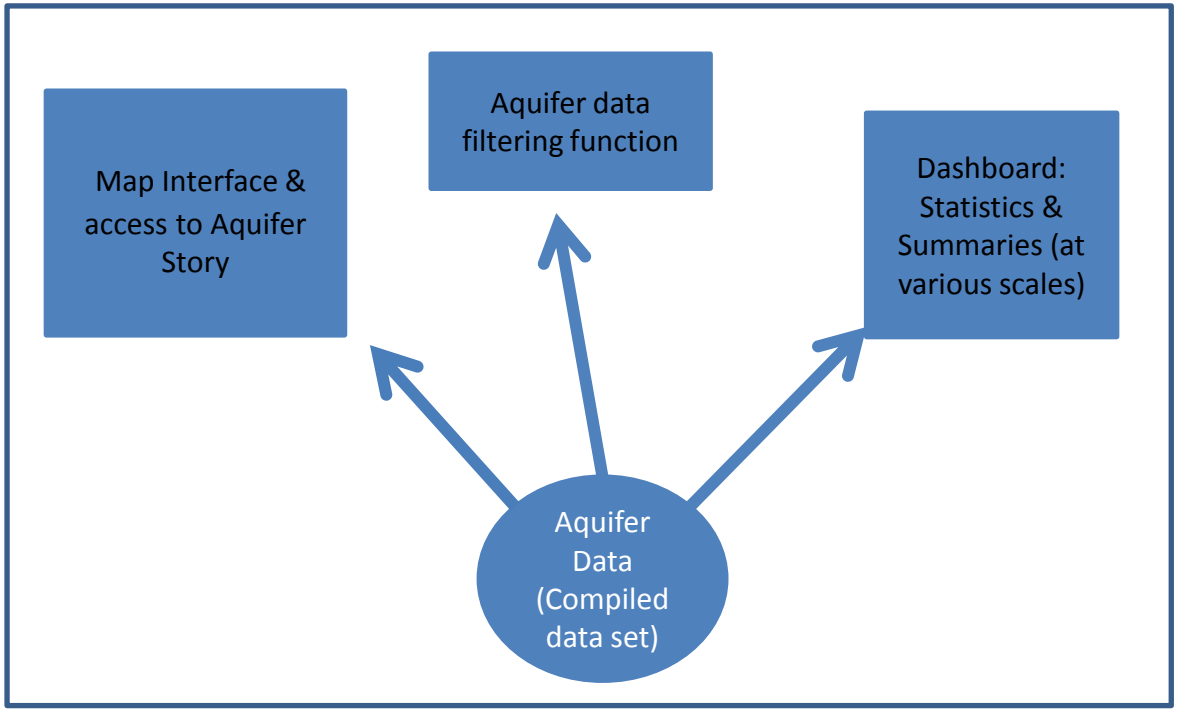


Collaborative

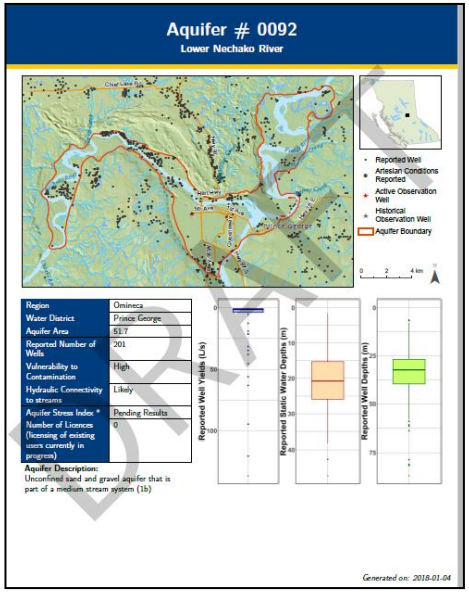
New & Under Development:

Aquifer Dashboard (Hub / Portal)

- Pulling available groundwater information together
- Aquifer based platform



Interactive map based tool

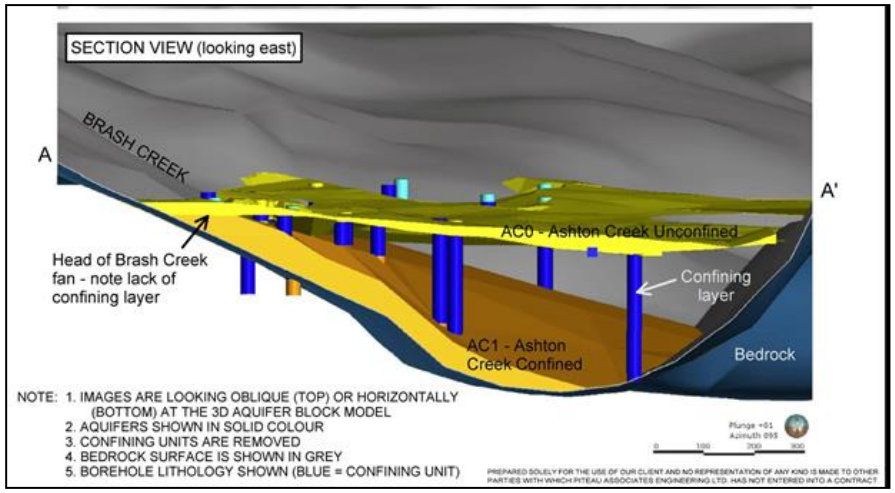


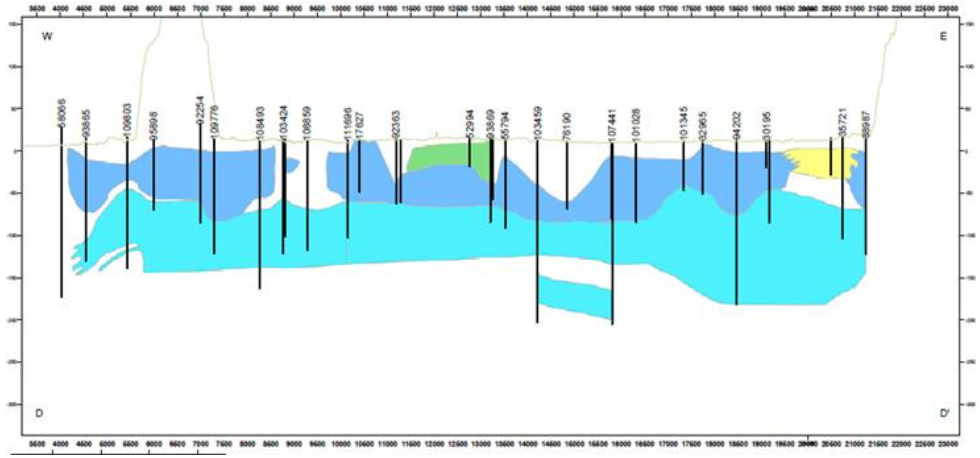
Aquifer Factsheets

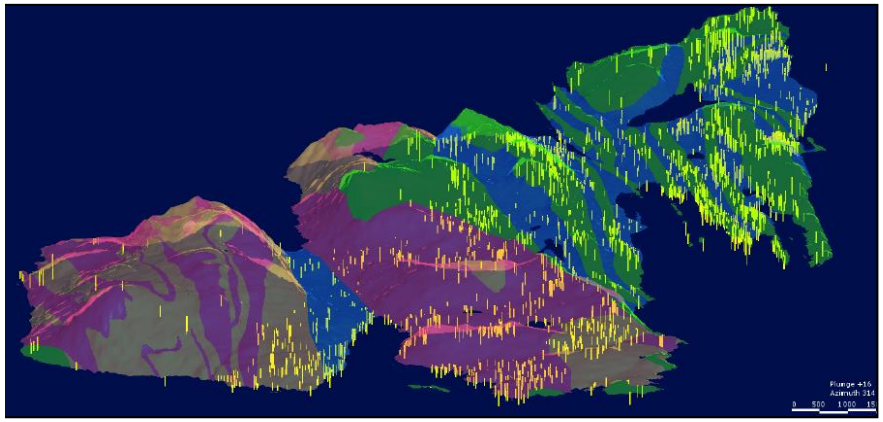
New & Under Development:

Hydrogeologic Mapping

- More rigorous approach
- Better Support For:
  - Analysis
  - Modelling
  - Water Management Decisions & Planning







New & Under Development:

Groundwater Knowledge Framework

- Informs Data Systems
- Approach to Water Management

Current to future

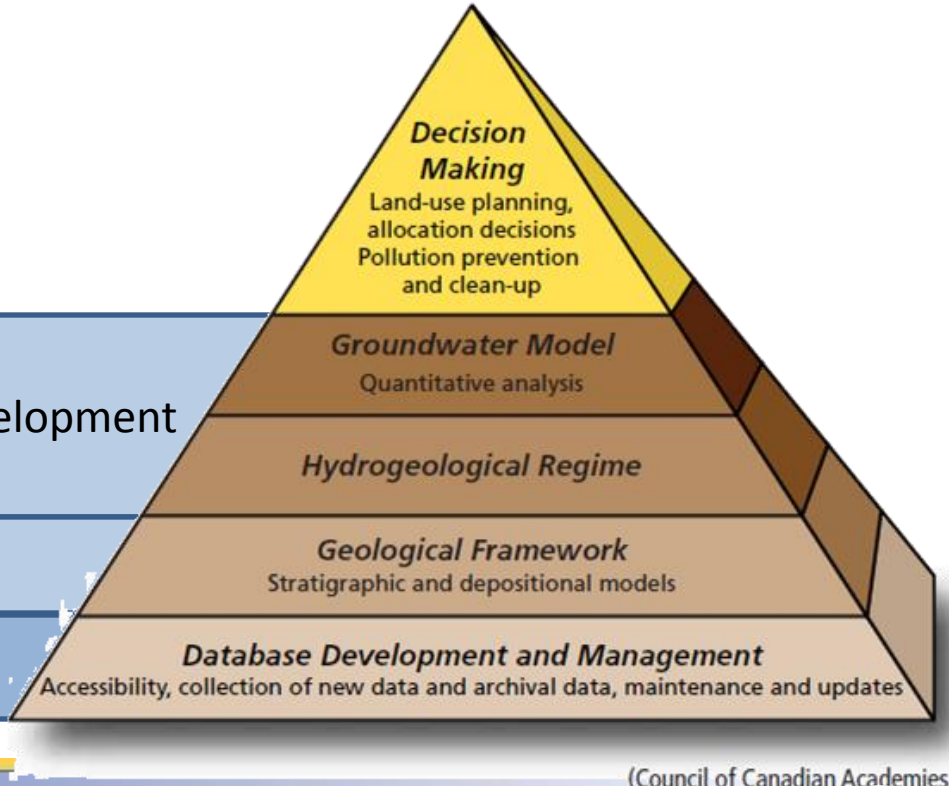
1990s to current

1960s to current

BC ENV Framework in Development

Current BC ENV Aquifers

BC ENV WELLS Database



(Council of Canadian Academies, 2009)

Figure 4.1
Science requirements for groundwater sustainability.

New and Under Development:

Approach to Water Management supports our decisions and policies

- Land use and Watershed Planning
- Bilateral Water Agreements
- Drinking Water Protection Regulation
- Supports working collaboratively with various partners and First Nations (UNDRIP)

Questions, suggestions, advice?

Thank you!

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