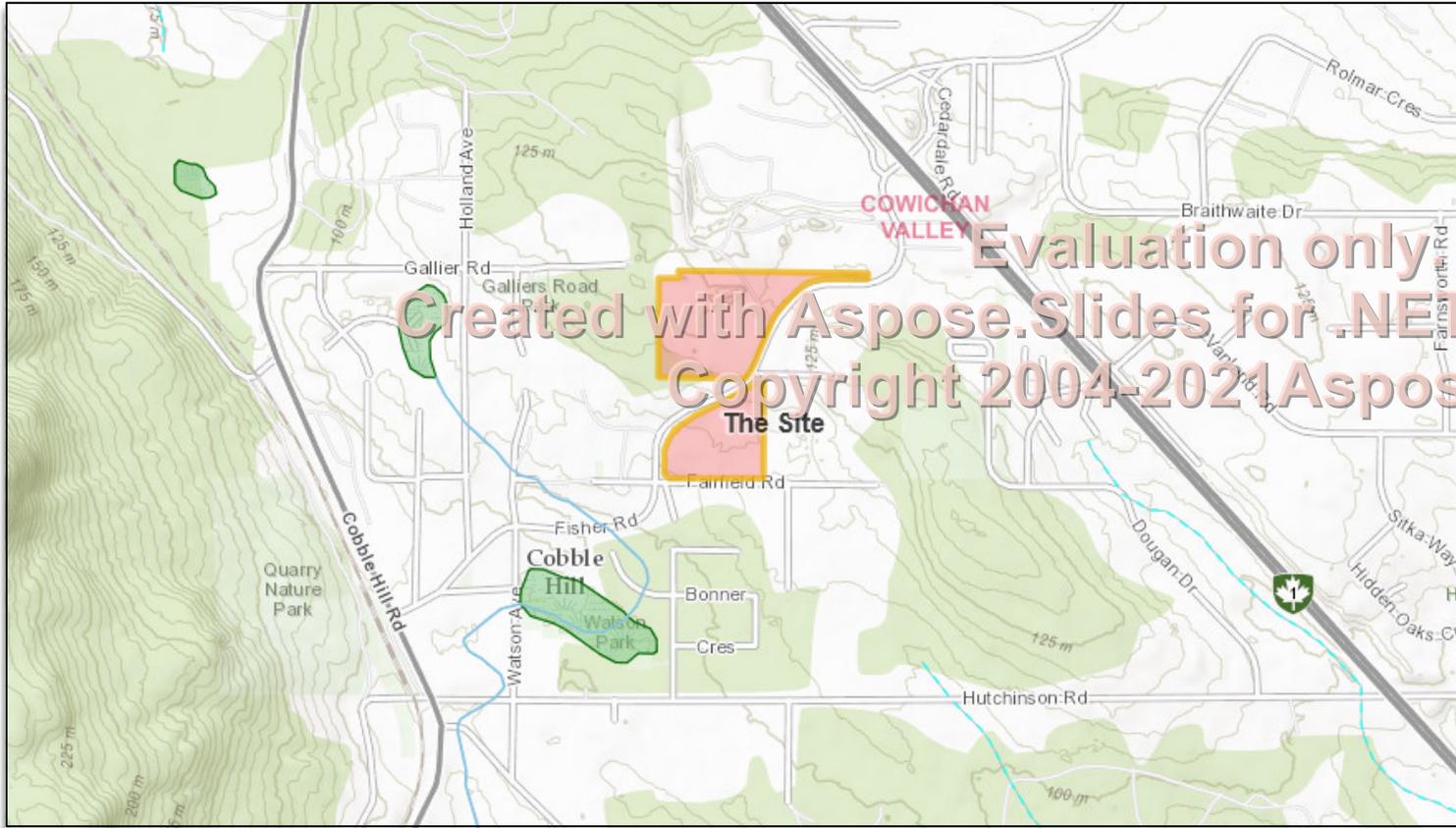


Groundwater Monitoring Program at Fisher Road, Cobble Hill, BC

Prepared for the Regional Services Committee Meeting



Simon Wing, B.Sc., P.Geo.
May 26, 2021



History – Previous Investigations and Ongoing Monitoring

CVRD

- Completed several investigations, installed monitoring wells and conducted groundwater sampling
- Results can be found here: <https://www.cvrld.ca/2464/Facility-Licensing>

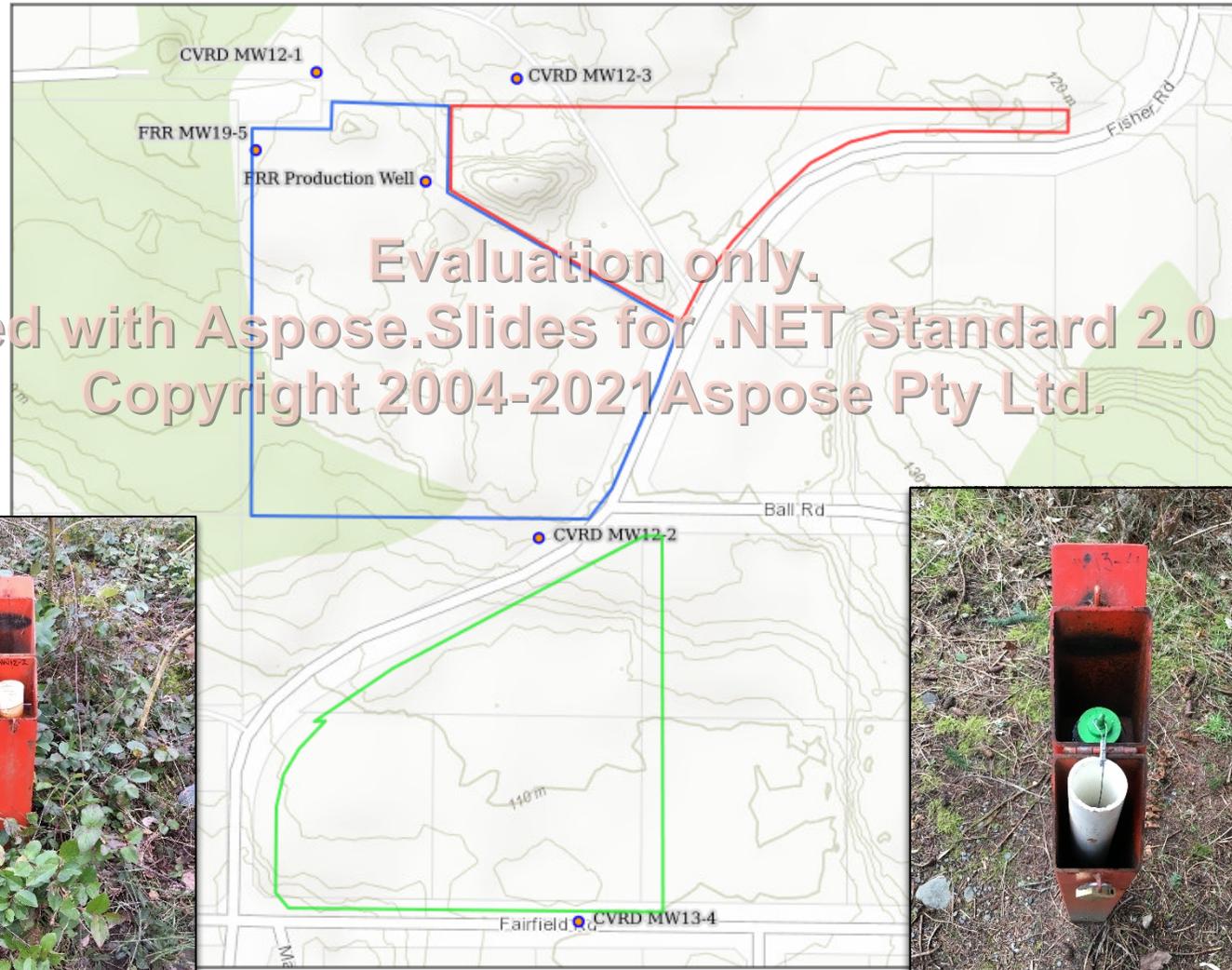
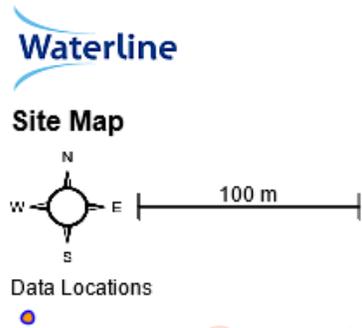
ENV / FLNRORD

- 2002 - Initial Investigation
- 2019 - Groundwater Quality Study of South Cowichan Valley Aquifers ([The Ecological Reports Catalogue](#))

Owners of 1345, 1355, 1360 Fisher Road

- Source control measures implemented at 1345 Fisher Road through a *Pollution Prevention Order*
- Performance monitoring requirements have been mandated at 1345 and 1355 Fisher Road as per the *CVRD Bylaw 2570* and operating permits under the *Organic Matter Recycling Regulation*
- The CVRD is requesting that a Preliminary Site Investigation (PSI 2) be completed at 1360 Fisher Road as part of rezoning

Groundwater Monitoring Well Network at the Site

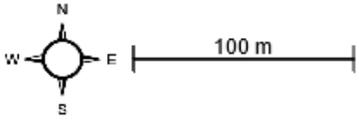


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Groundwater Flow Direction Across the Site

Waterline

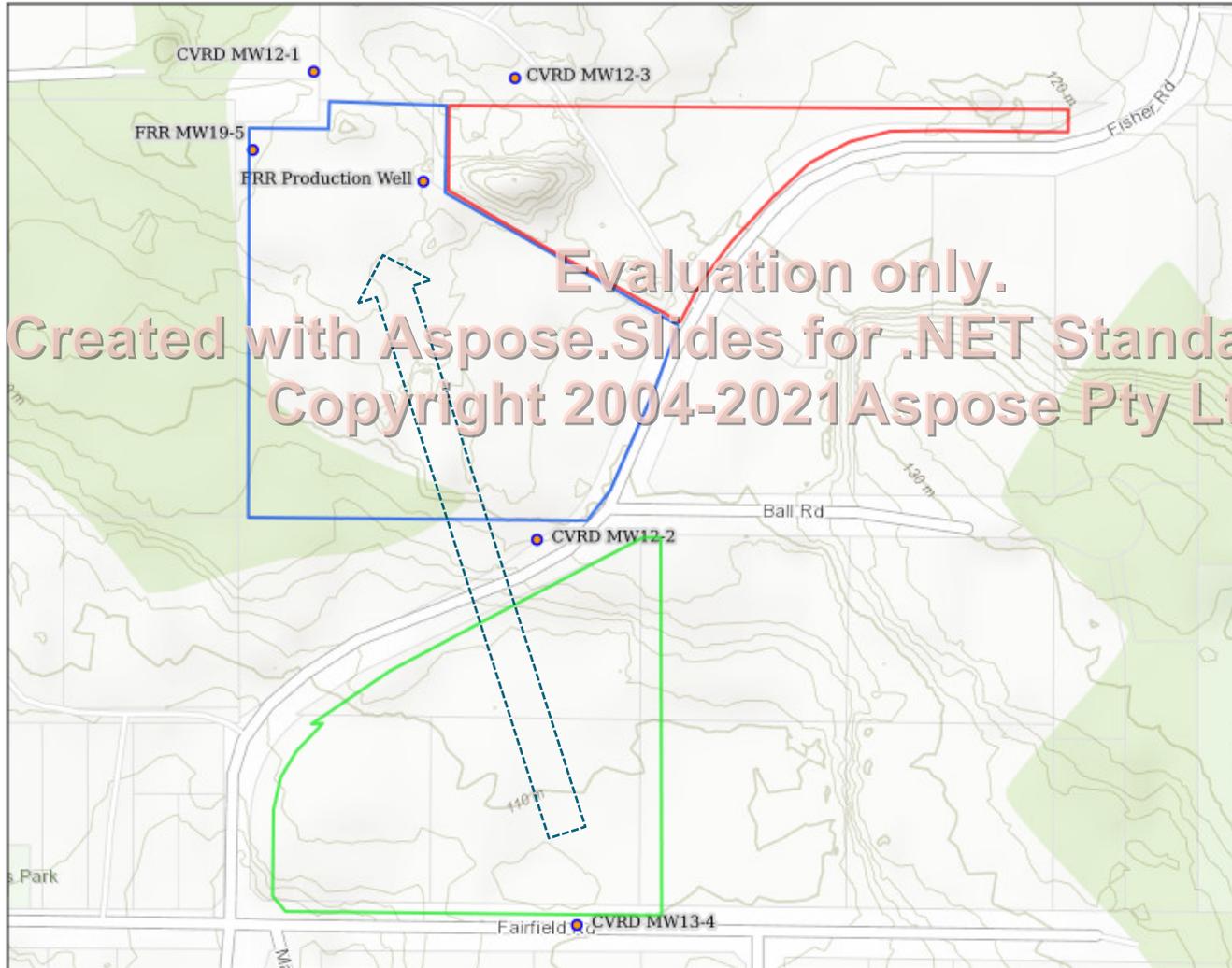
Site Map



Data Locations

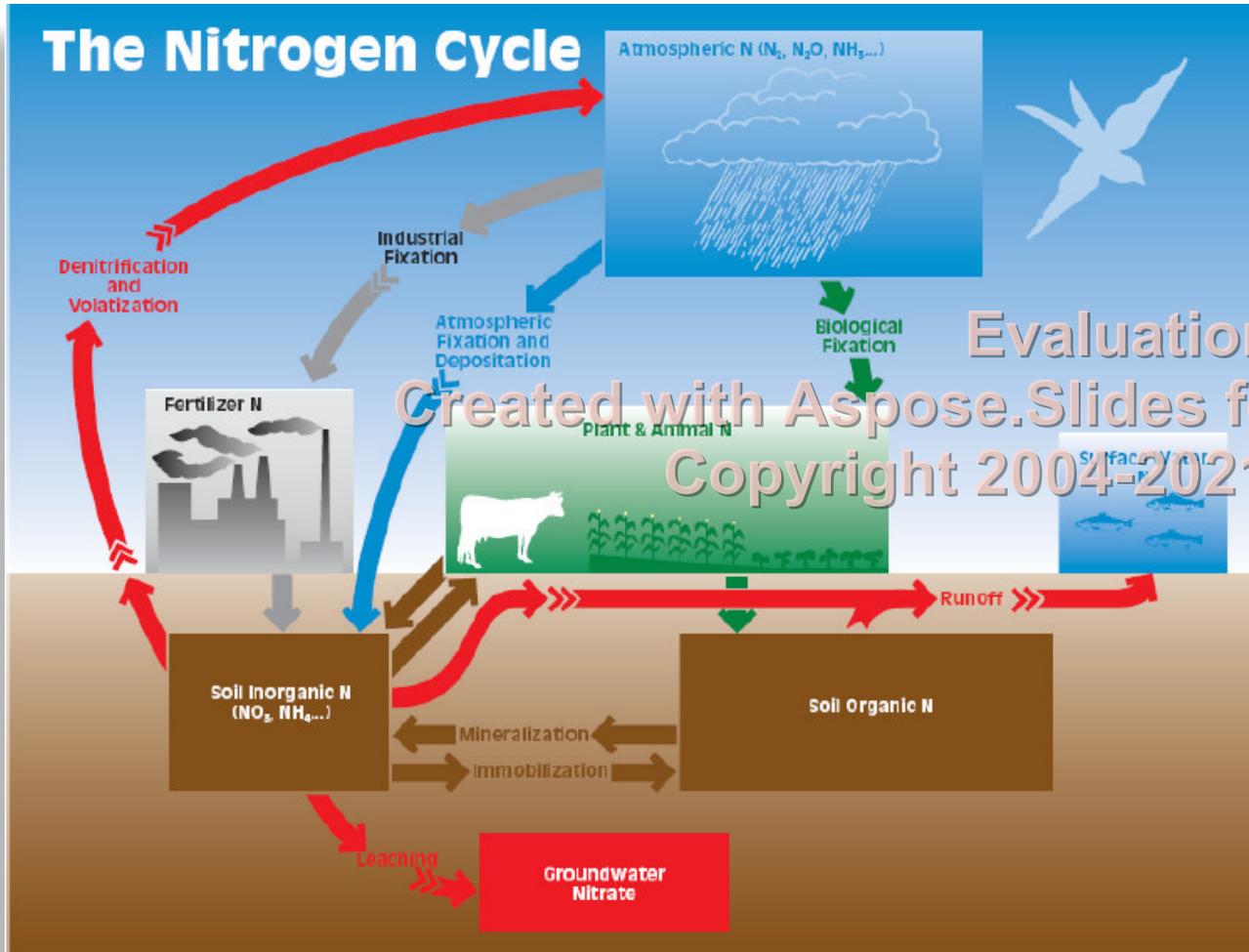


Groundwater Flow Direction



- Flow direction NNW
- Velocity is 4.5 m/year
- Travel time across the site is 97-years
- Does not consider enhancement of groundwater movement from pumping at the Production Well

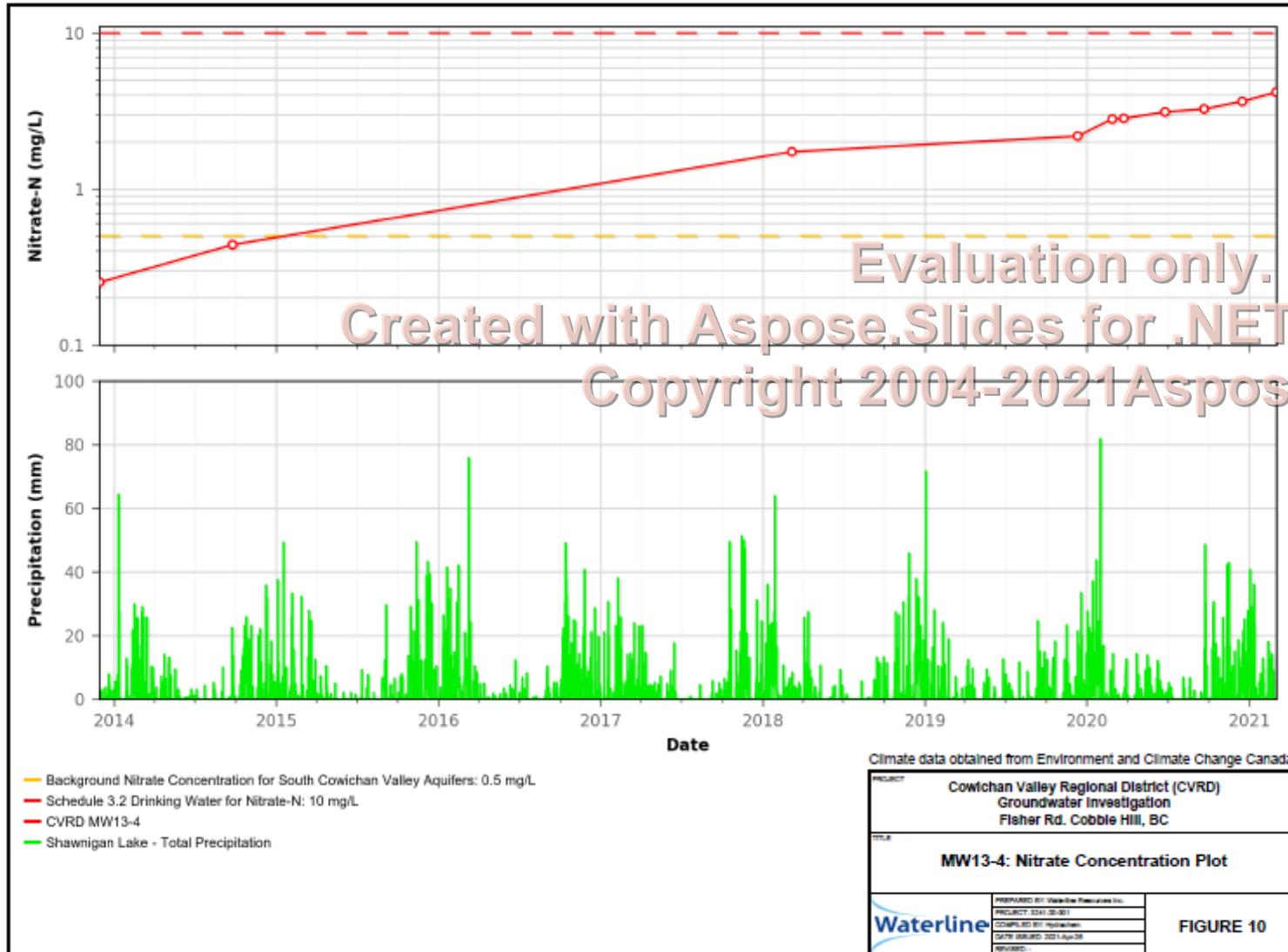
Groundwater Quality Issues - Nitrates



Source - Pathway - Receptor

- ∞ Fingerprinting of Nitrate sources using Isotopes:
 - ∞ Organic source nitrate – degradation of organic matter
 - ∞ Inorganic source nitrate – chemical fertilizers
- ∞ Nitrates at the Site (ongoing or historical):
 - ∞ Offsite agriculture and septic fields
 - ∞ Onsite composting at 1345 and 1355 Fisher Road
 - ∞ The vegetable greenhouses at 1360 Fisher Road
- ∞ Leaching of inorganic and organic nitrates through the soils and into groundwater
- ∞ Drinking water quality standards are 10 mg/L (GCDWQ, 2020 and CSR, 2019)

Groundwater Conditions - Upgradient of the Site



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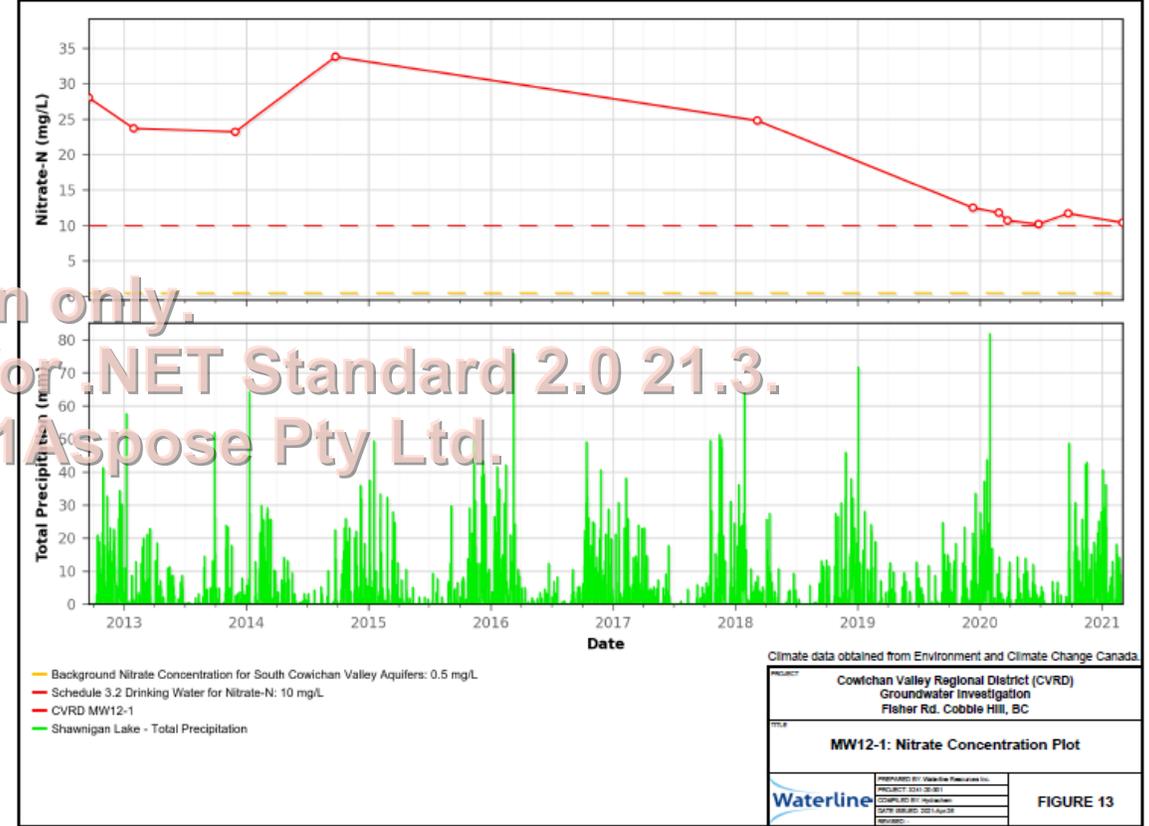
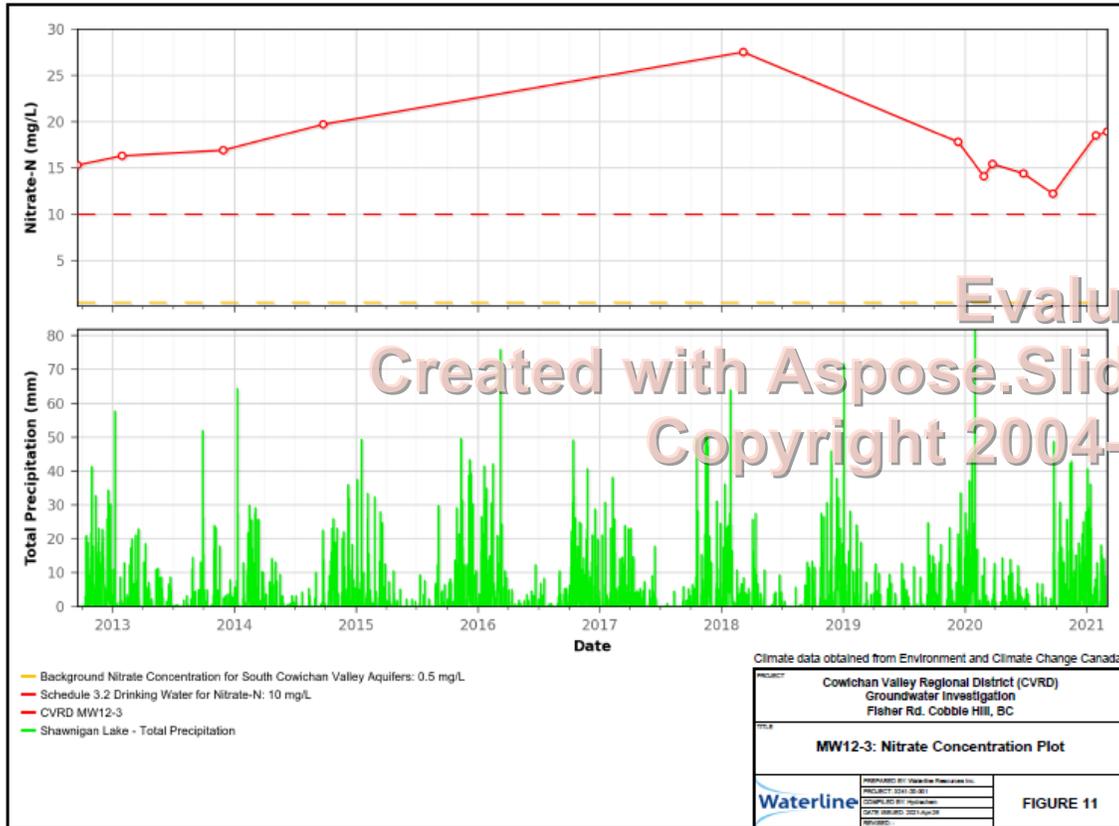
Nitrate concentrations are increasing
 Expected to be the result of local agricultural and septic land use practices

Climate data obtained from Environment and Climate Change Canada.

PROJECT Cowichan Valley Regional District (CVRD) Groundwater Investigation Fisher Rd. Cobble Hill, BC	
TITLE MW13-4: Nitrate Concentration Plot	
PREPARED BY: Waterline Resources Inc.	
PROJECT DATE: 2021	
COMPILED BY: Hydrologist	
DATE ISSUED: 2021 April 28	
REVISED:	FIGURE 10

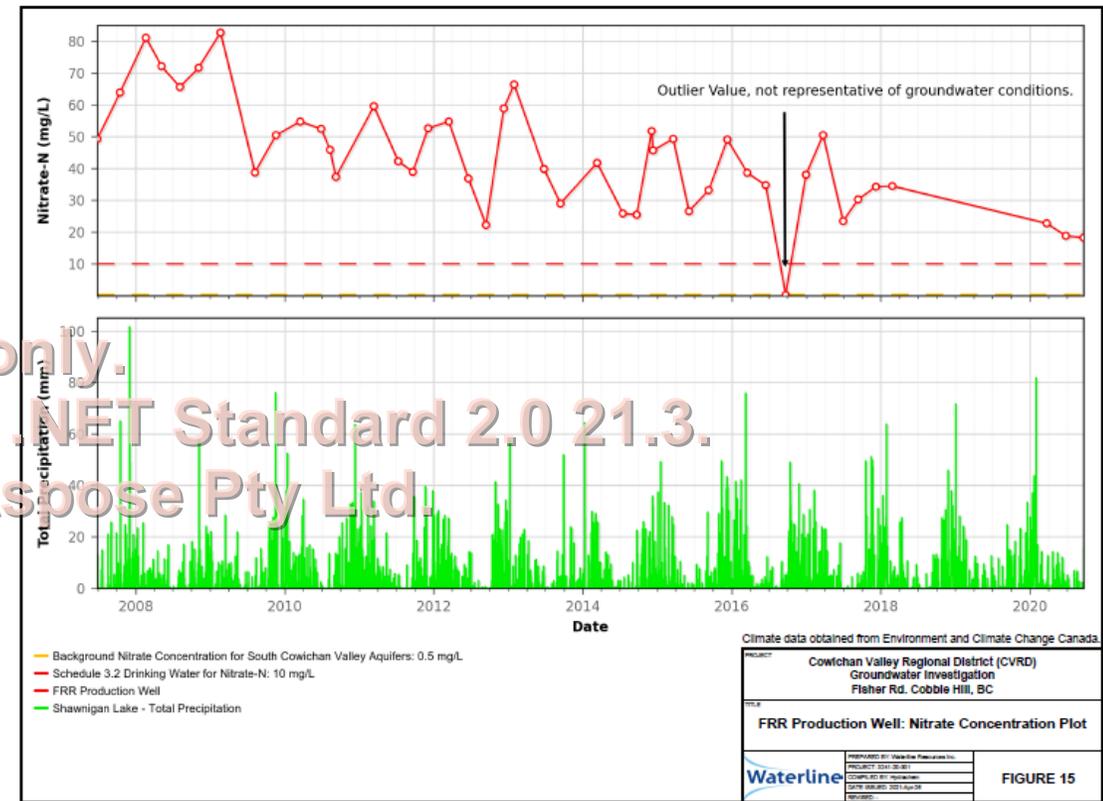
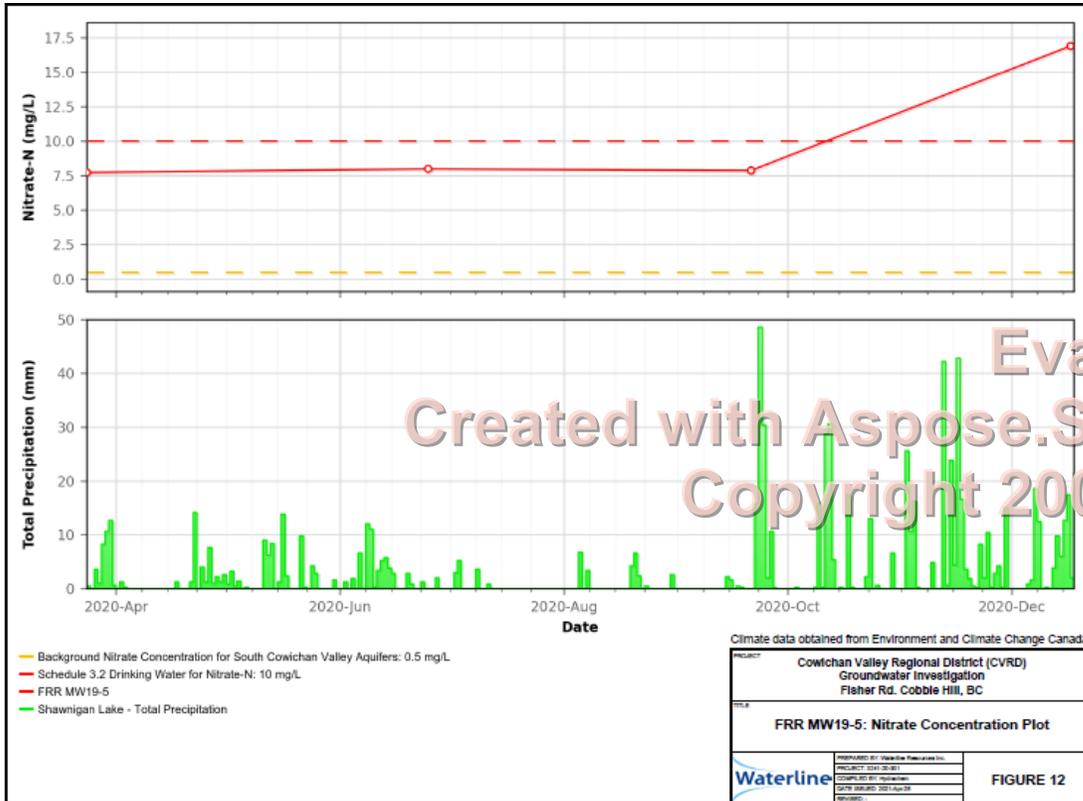


Groundwater Conditions - Downgradient of 1345 and 1355 Fisher Road



- Nitrate concentrations are fluctuating and decreasing, respectively
- Decreases are being aided by source control measures. Composting facilities will keep monitoring MW12-3 and MW12-1

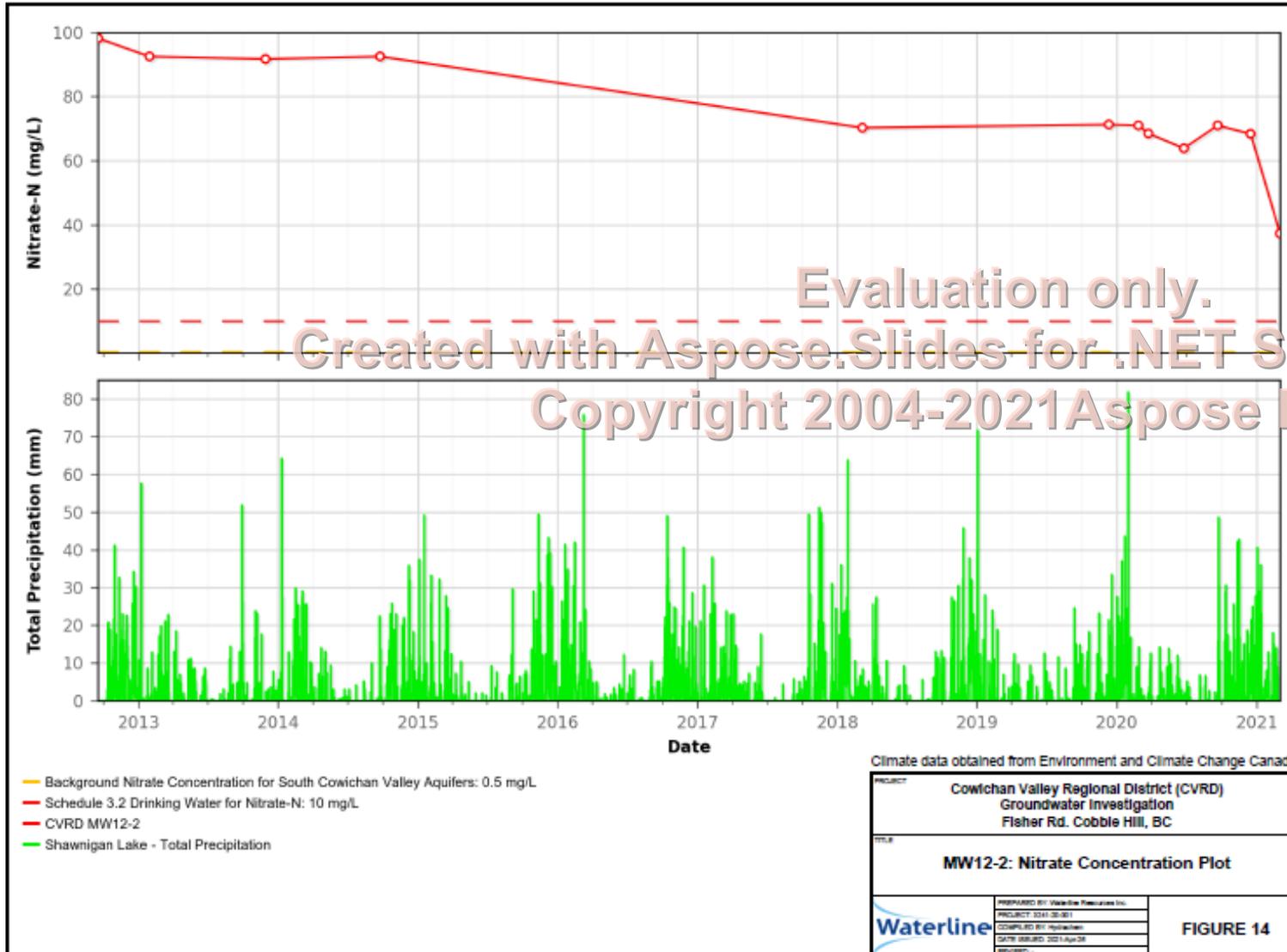
Groundwater Conditions - Onsite at 1355 Fisher Road



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- ☞ Nitrate concentrations are increasing and decreasing, respectively
- ☞ More data is required for a statistical trend analysis at MW19-5
- ☞ It is believed that enhancement of groundwater flow from pumping of the Production Well has resulted in lower concentrations of nitrates from dilution
- ☞ The composting facility will keep monitoring MW19-5 and the Production Well

Groundwater Conditions - Downgradient of 1360 Fisher Road



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Nitrate concentrations are decreasing. Decreases are aided by source containment from pumping at the Production Well

Conclusions from the 2020 – 2021 Groundwater Investigation

- ⌘ Nitrate concentrations at the Site are exceeding background concentrations (0.5 mg/L; Barroso et.al, 2019)
- ⌘ Source control measures are mitigating further leaching of nitrates at 1345 and 1355 Fisher Road
- ⌘ 1360 Fisher Road ceased operations in 2017. The nitrate source has been contained by pumping of the Production well at 1355 Fisher Road. The CVRD has requested that the new owners conduct a PSI 2 as part of the rezoning application
- ⌘ Based on the current source control measures, decreases in nitrate concentrations to below guideline concentrations is expected to take some time

Thank you

