

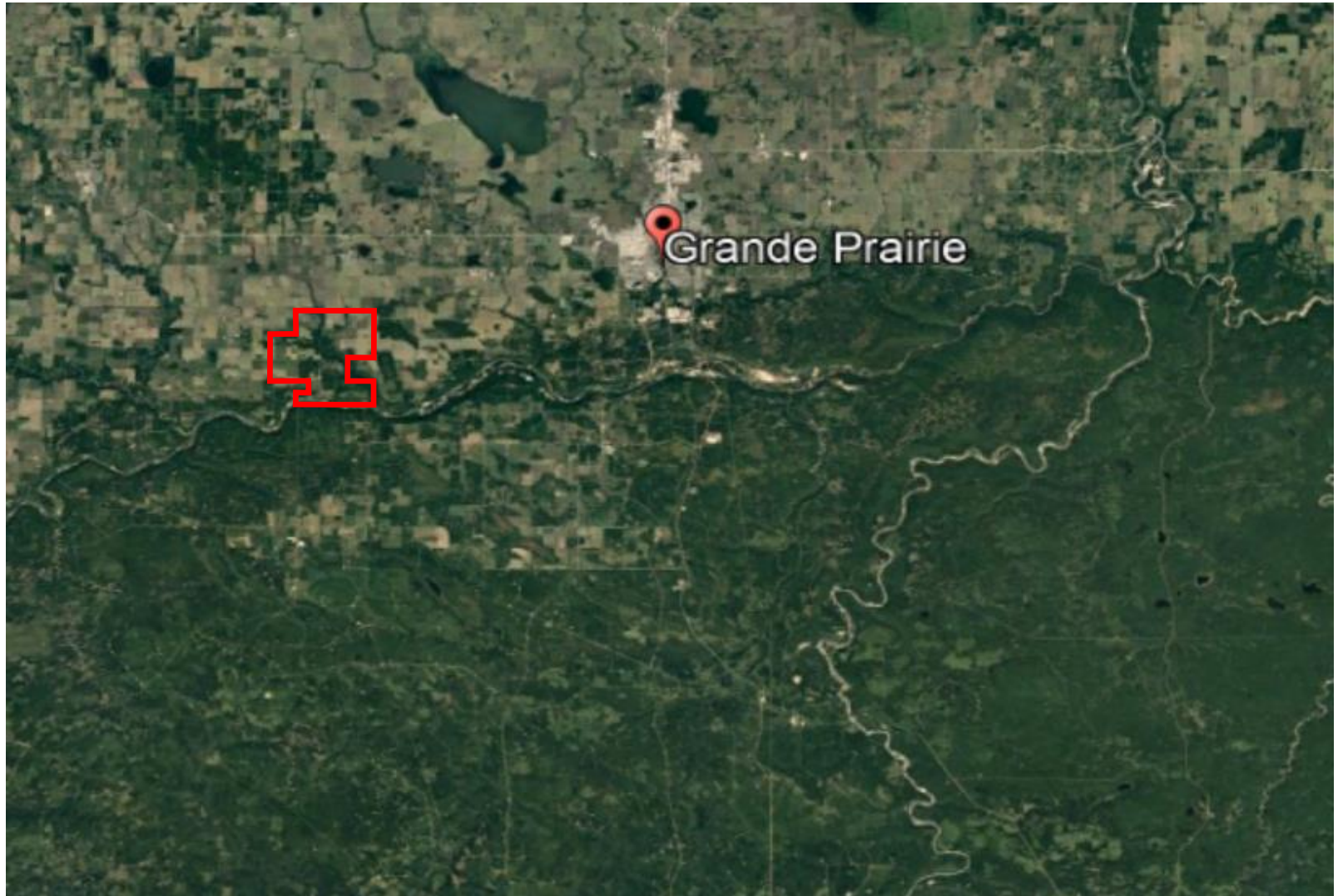
Hydrology and hydrogeology of the Pipestone project area



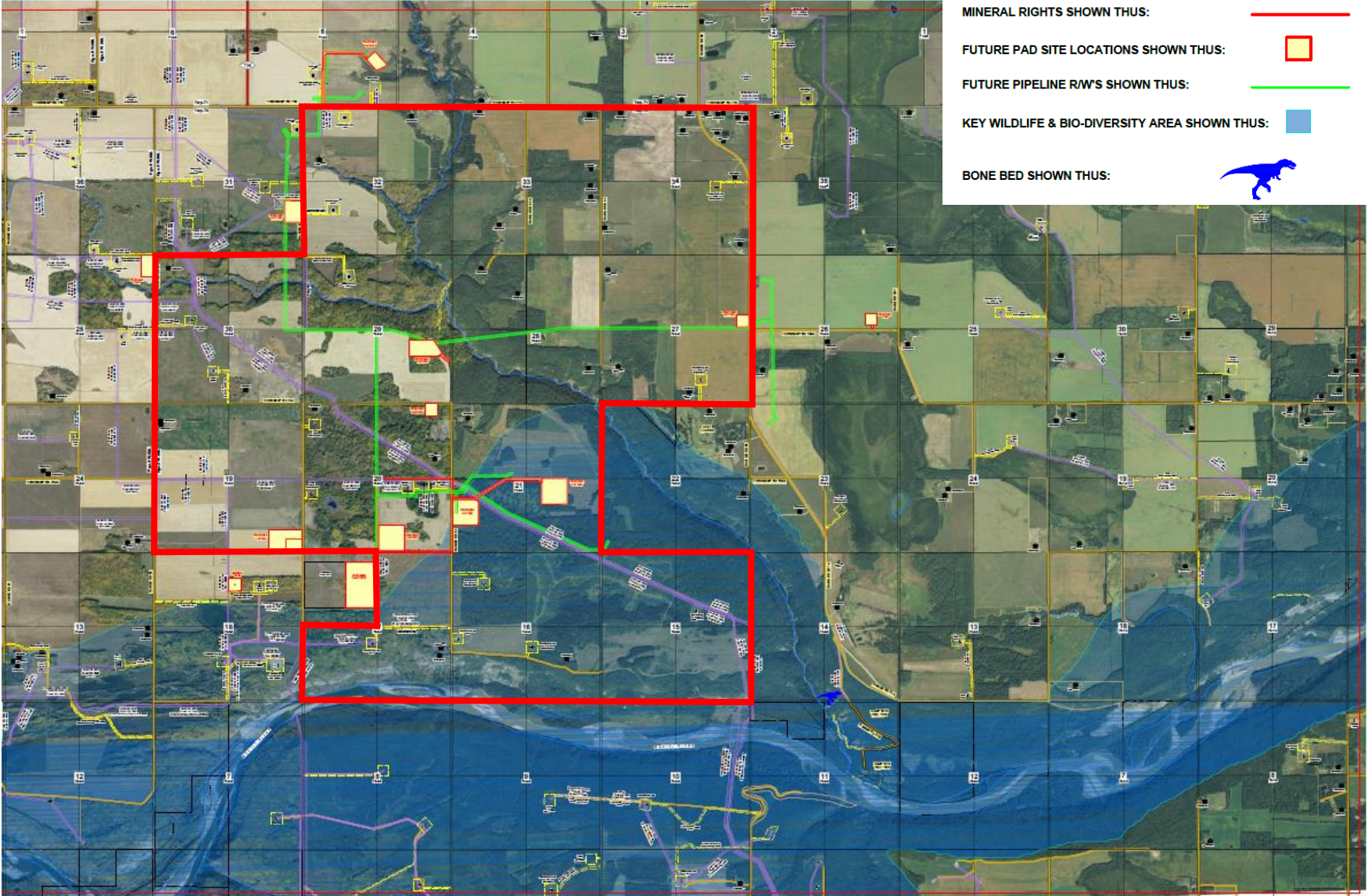
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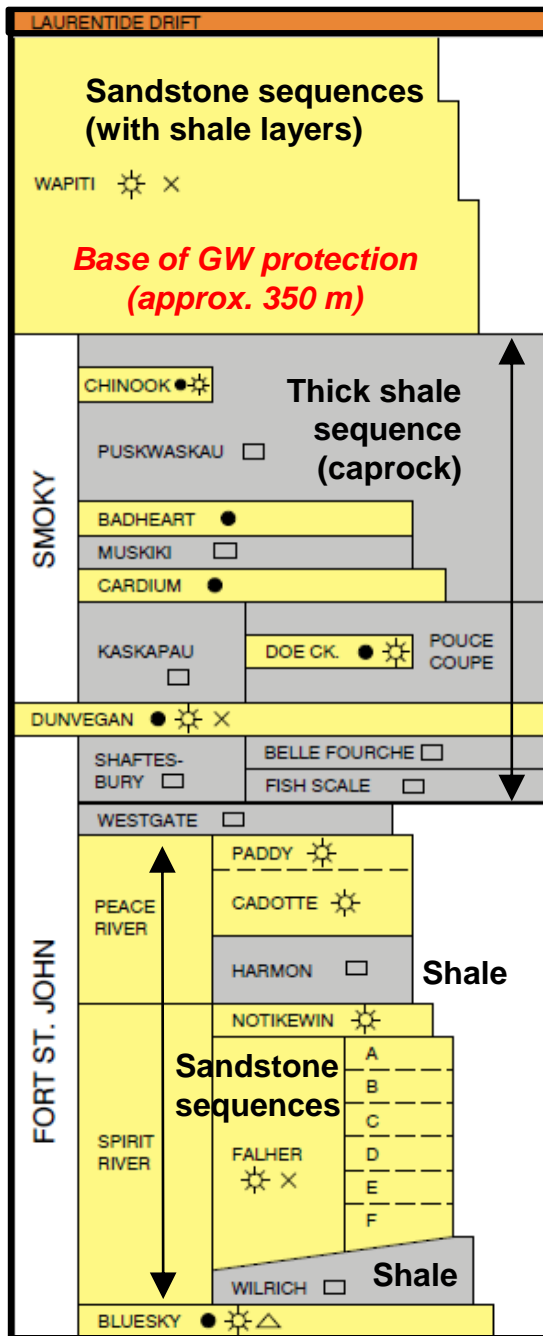
Regional setting



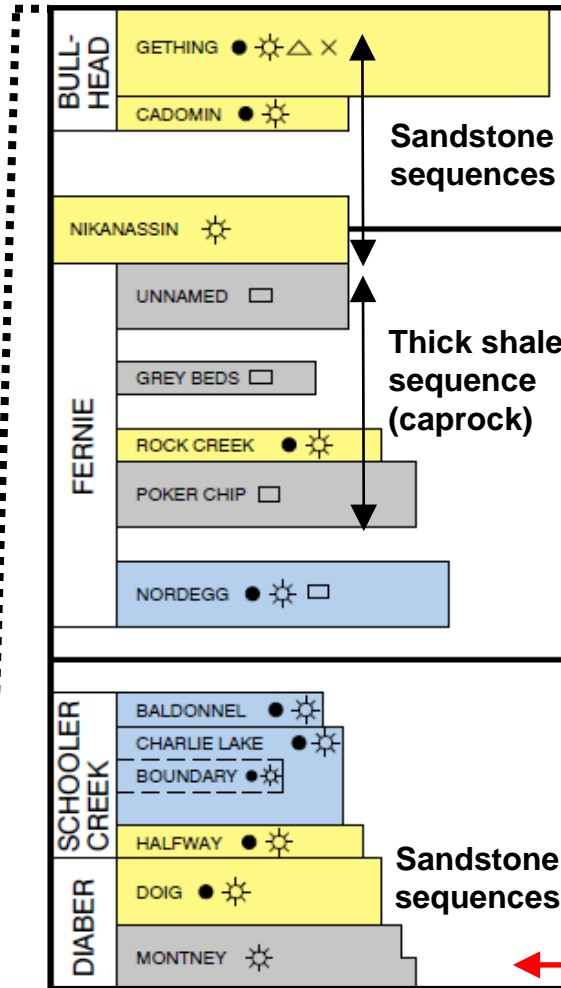
Pipestone lease



Geology & hydrogeology of the area



Most water wells

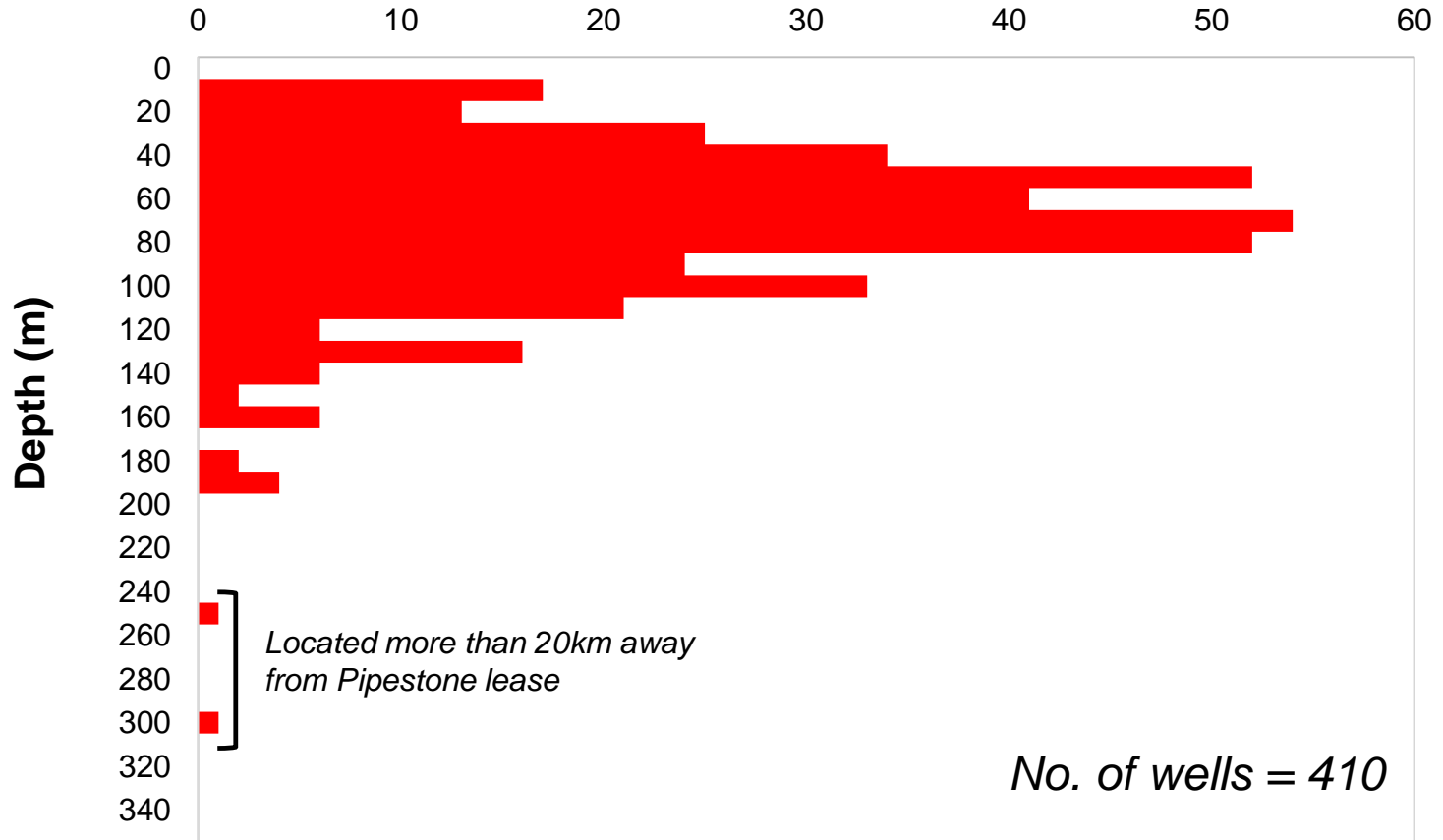


- Glacial deposits (drift, soils)
- Clastics (sandstones, siltstones, conglomerates)
- Shales
- Carbonates (limestone, dolomite)
- ☀ Gas
- Oil
- △ Bitumen
- × Coal mining
- × Coal occurrences
- Shale gas potential

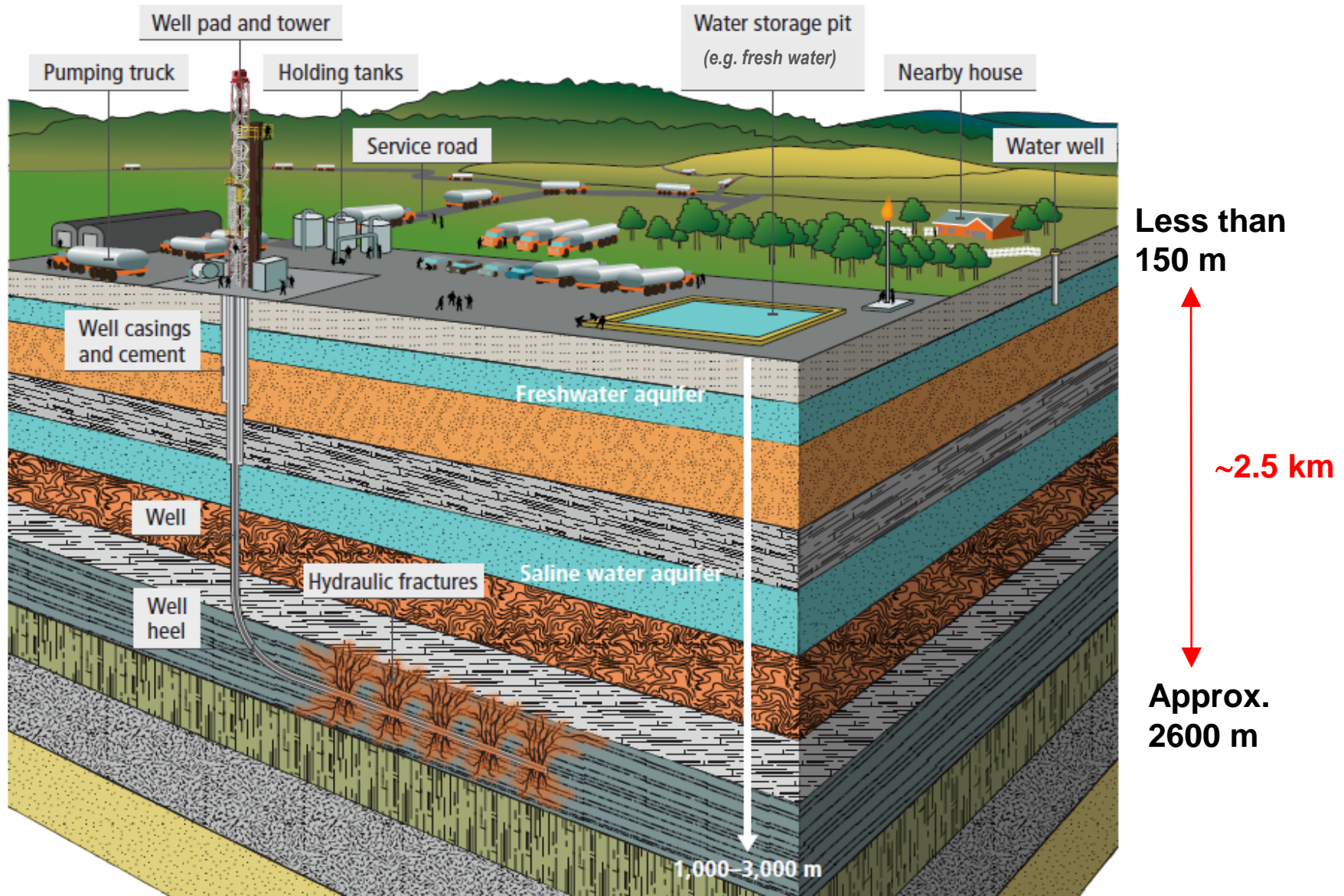
Zone of interest

Documented water wells

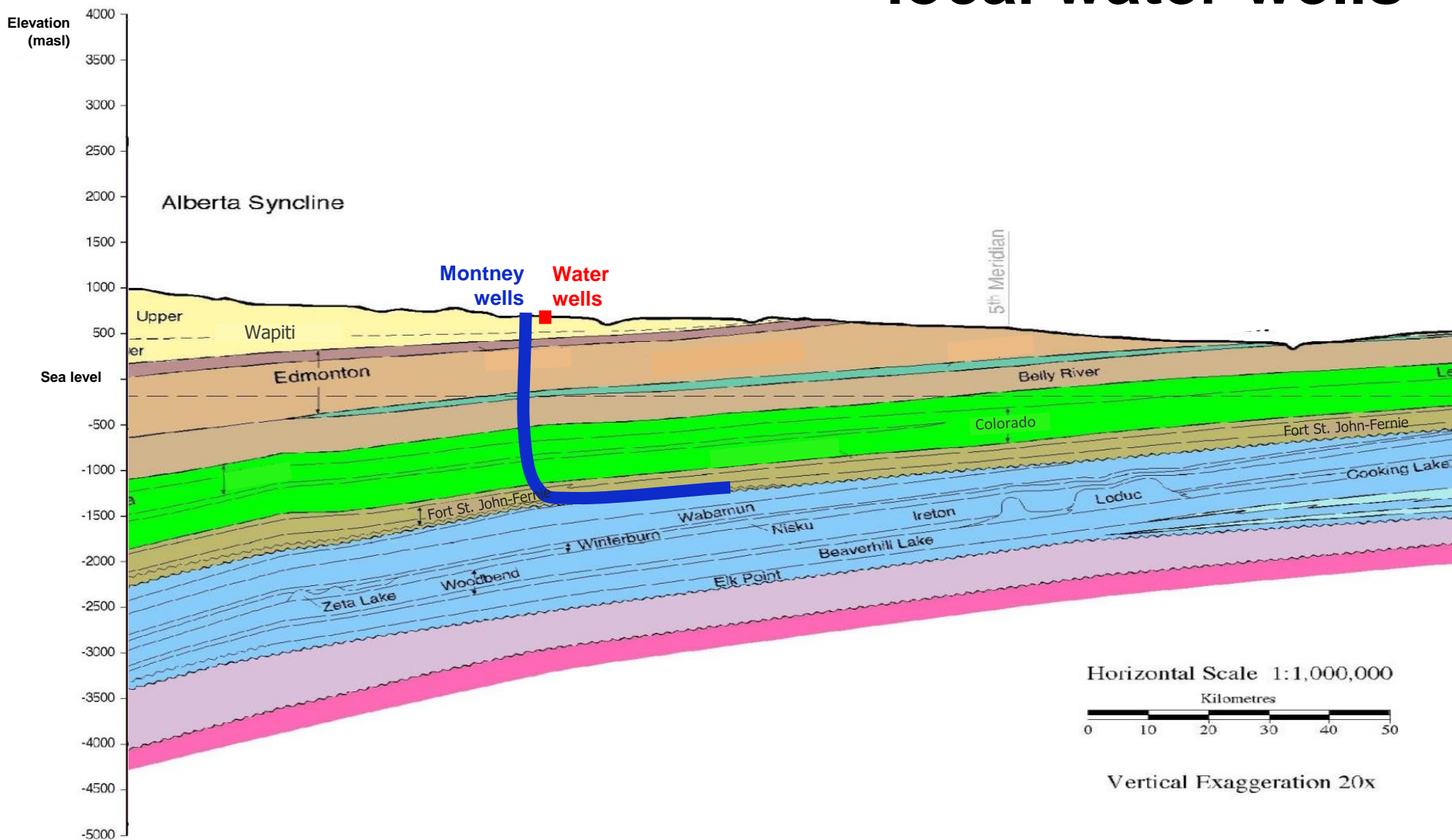
Frequency of AWWID water wells
(within 10 km search radius of Pipestone lease area)



Typical Montney development pad



Depth of activity in relation to local water wells



Comparison of water qualities

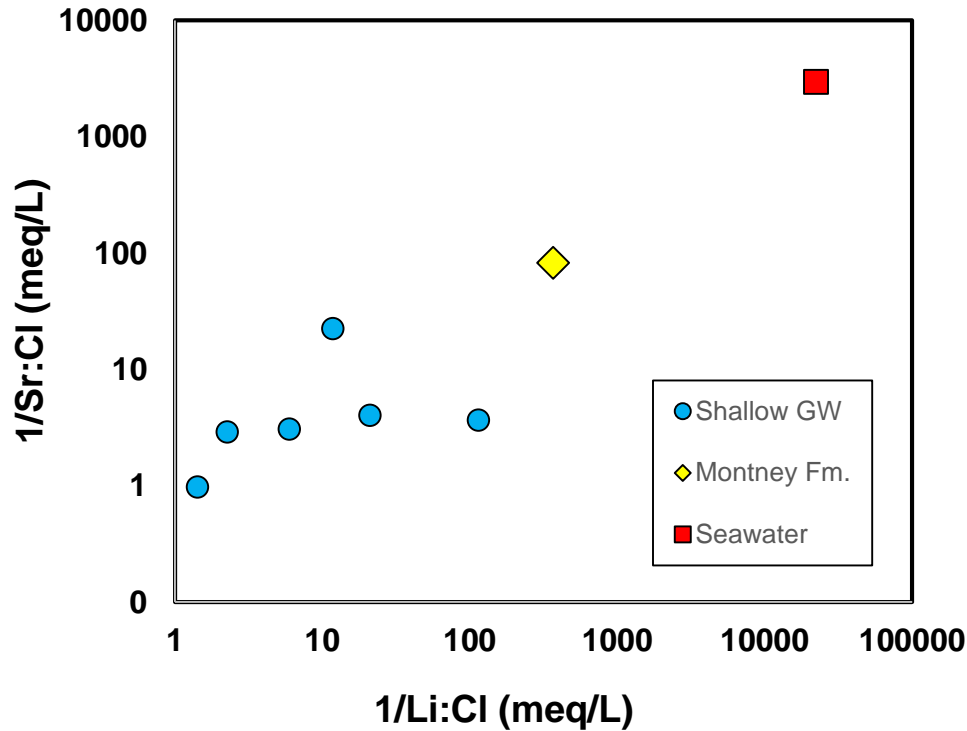
Parameter	Local water wells	Montney Fm.	CDWQG (2017)
Hydrochemical type	Na-HCO ₃	Na-Cl	--
pH	7.8 to 8.6 S.U. <i>(median = 8.2)</i>	6.8 to 7.0 <i>(median = 6.9)</i>	--
Hardness	5 to 89 mg/L <i>(median = 21)</i>	1,933 to 16,625 mg/L <i>(median = 9,280)</i>	--
TDS	941 to 1,851 mg/L <i>(median = 1,285)</i>	67,000 to 97,000 mg/L <i>(saline; seawater = 30,000)</i>	500 mg/L (AO)
Sodium	393 to 720 mg/L <i>(median = 532)</i>	18,900 to 29,000 mg/L <i>(median = 23,950)</i>	200 mg/L (AO)
Sulphate	1 to 500 mg/L <i>(median = 47)</i>	73 to 1320 mg/L <i>(median = 697)</i>	500 mg/L (AO)
Iron	0.3 to 1.7 mg/L <i>(median = 0.73)</i>	--	0.3 mg/L (AO)
Manganese	0.004 to 0.56 mg/L <i>(median = 0.015)</i>	--	0.05 mg/L (AO)
Fluoride	0.1 to 3.1 mg/L <i>(median = 1.2)</i>	--	1.5 mg/L (MAC)

Note: AO = aesthetic objective; MAC = maximum acceptable concentration for drinking water

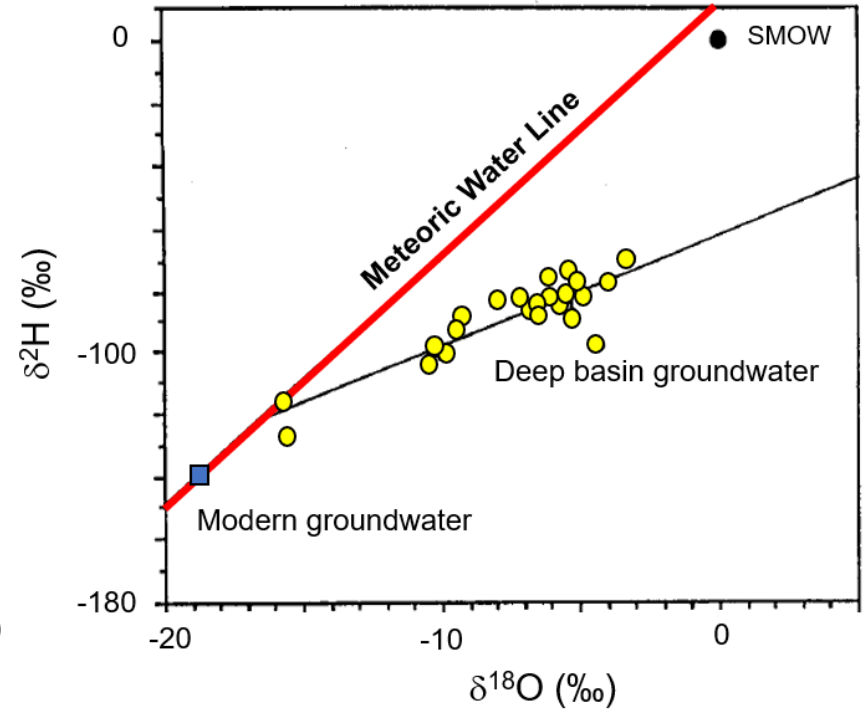
Characteristics fingerprints

(examples)

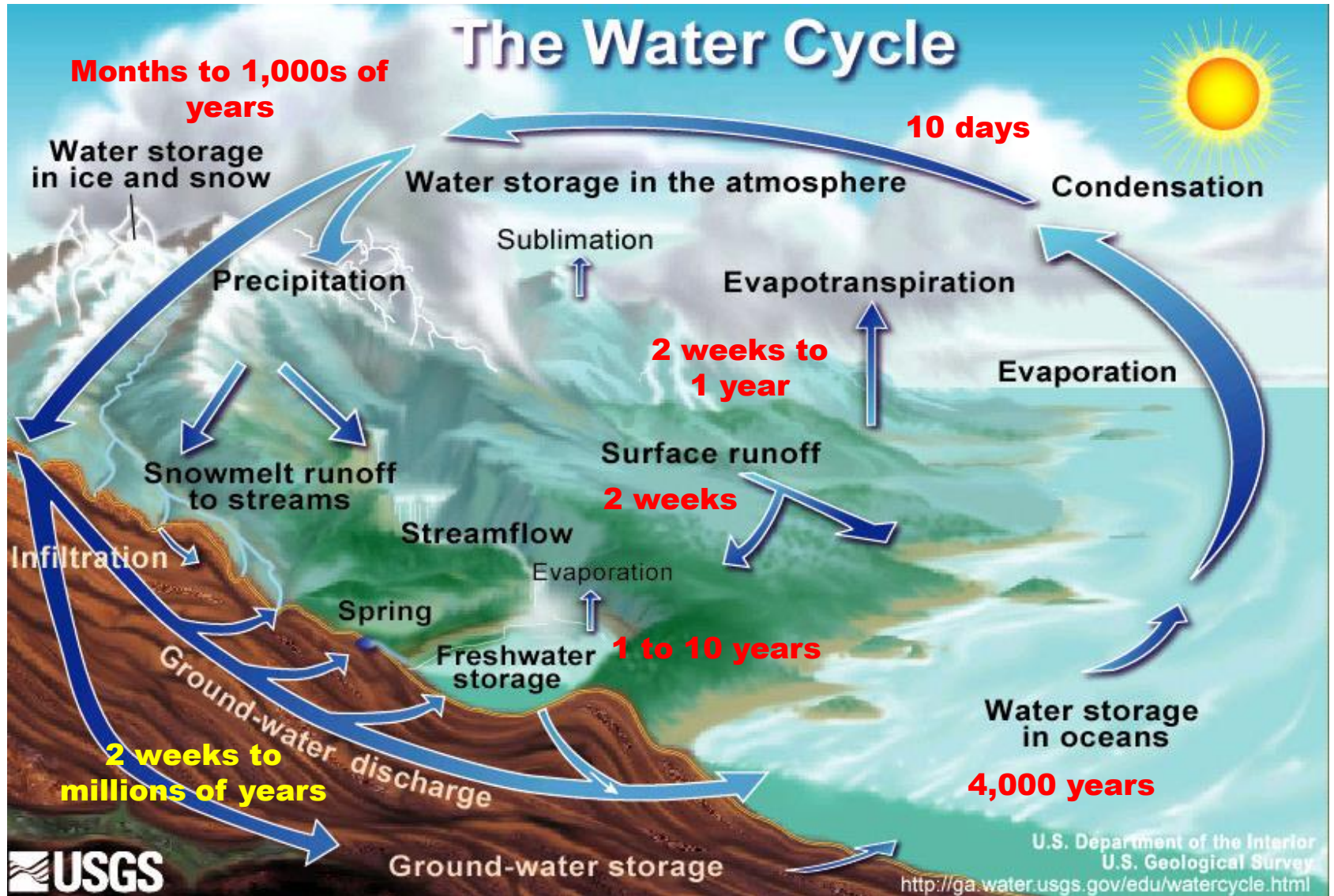
Trace elements



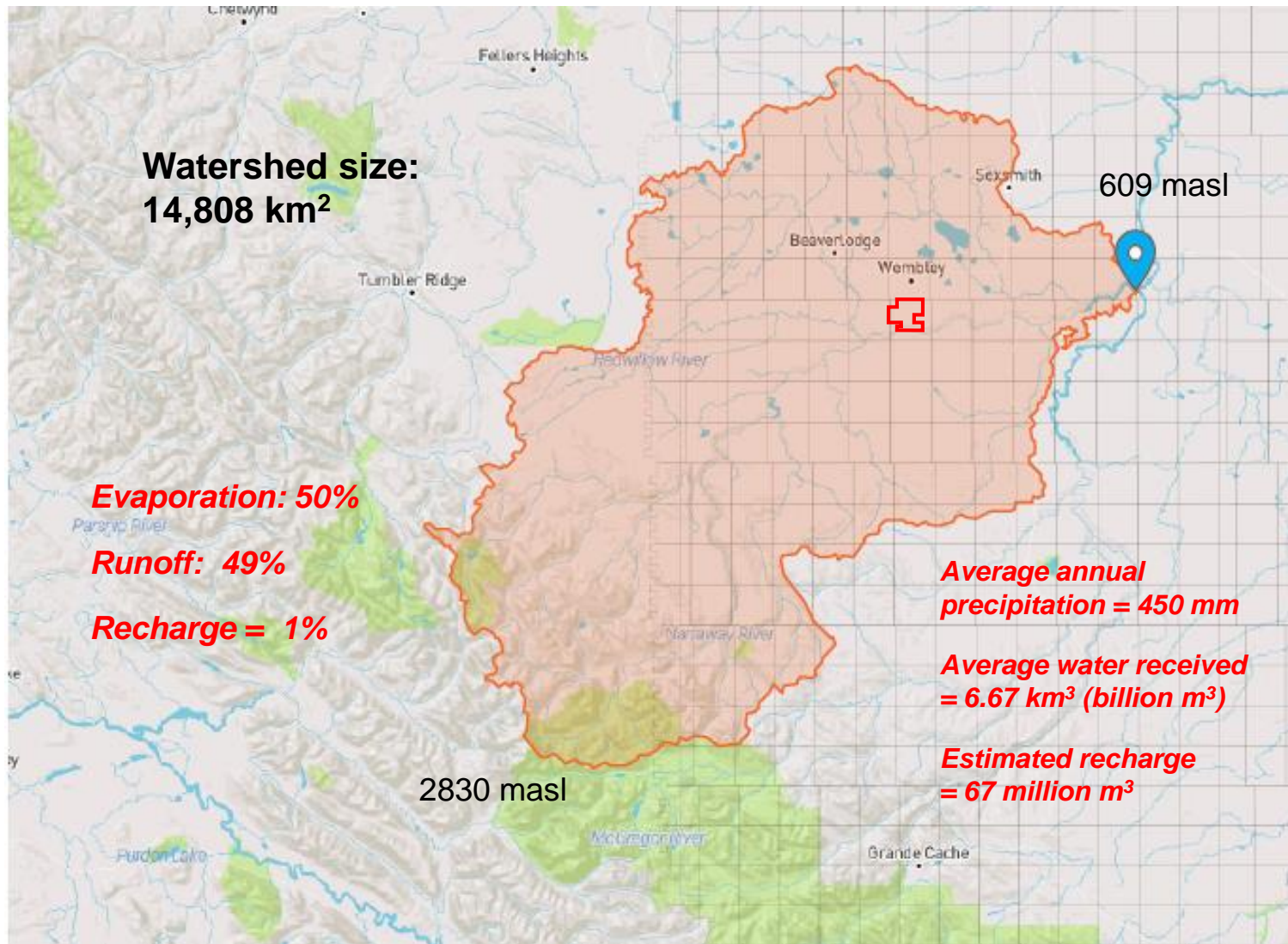
Stable isotopes



A renewable resource



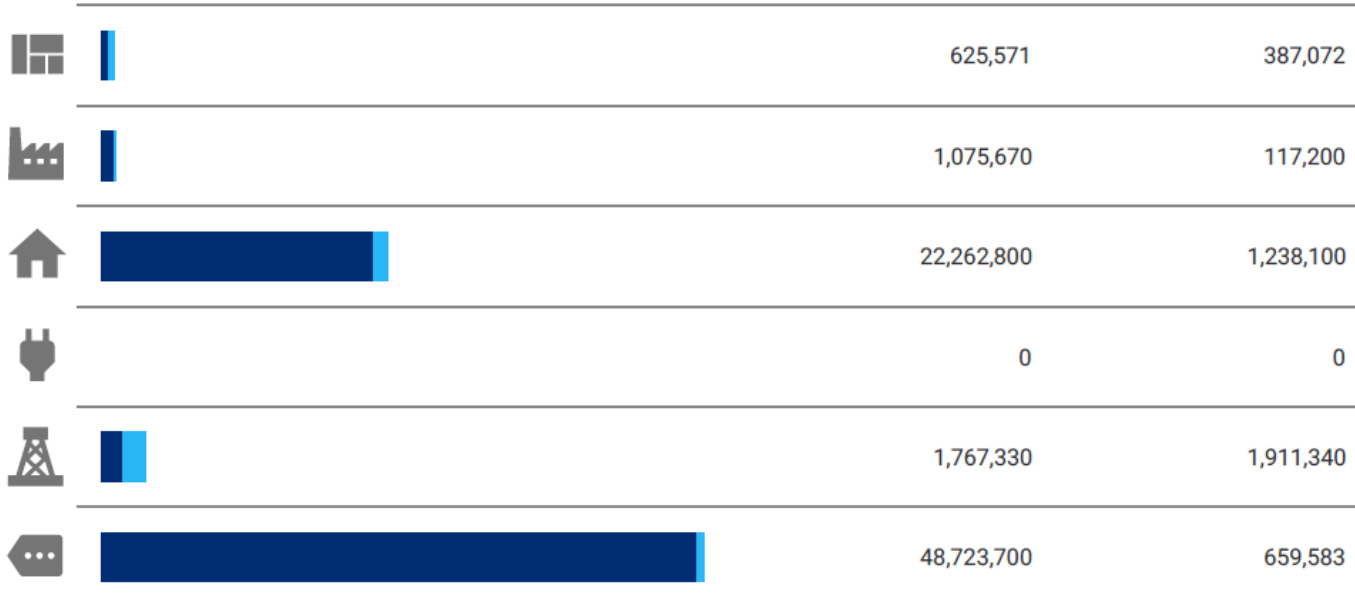
Wapiti River watershed



Current allocations

Sector

● Surface water (m³/yr) ● Groundwater (m³/yr)



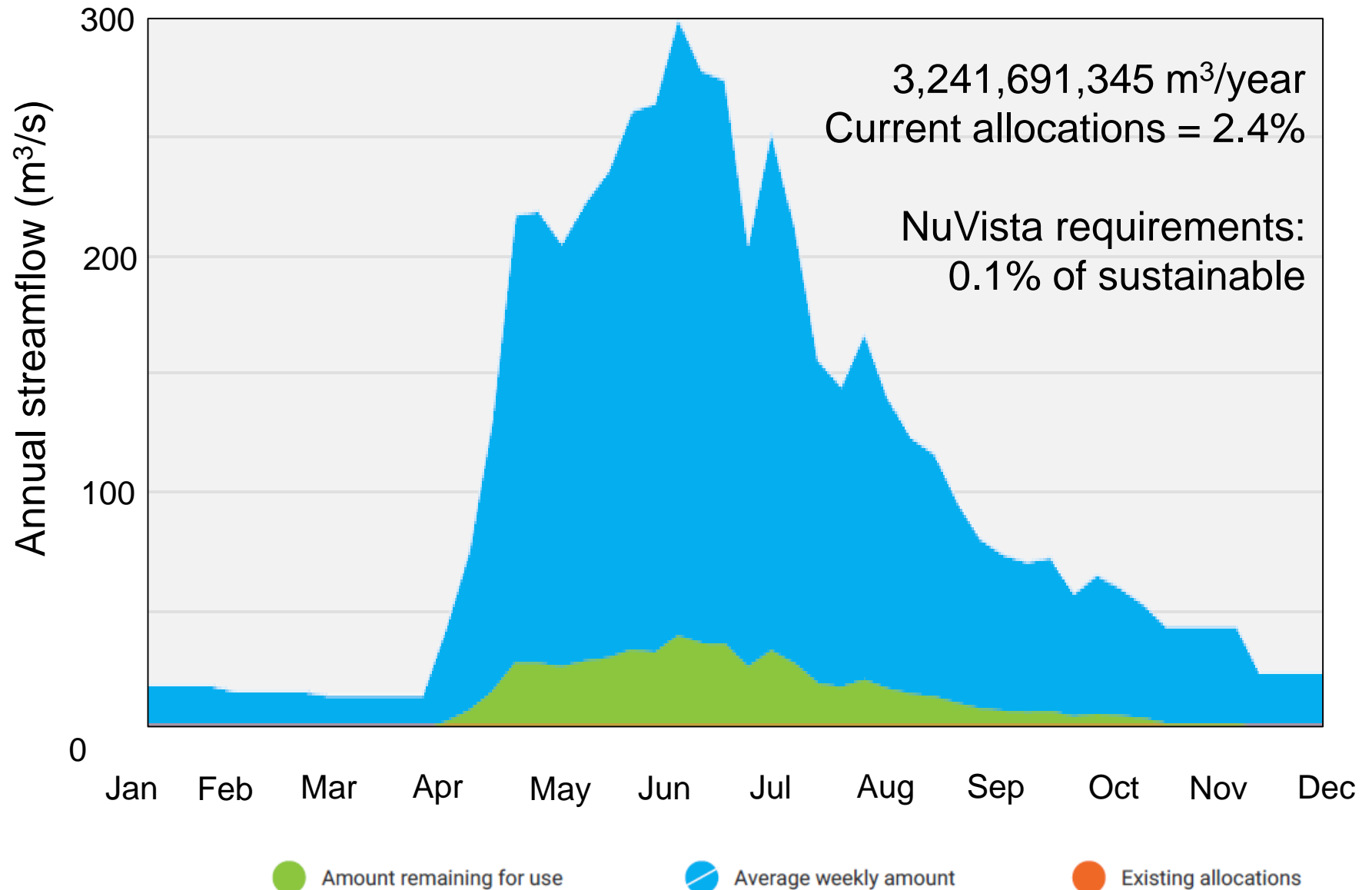
30-50% of allocations typically used

Total = 74,455,071 (94.5%) 4,313,295 (5.5%)

Agriculture
 Commercial
 Municipal
 Power
 Oil / Gas
 Other

Licence	Purpose	Licence No.	Quantity (m ³ /yr)
International Paper Canada Pulp Holdings Ulc	Other from Wapiti River	00038194-00-00 (AB)	31,315,500
Aquatera Utilities Inc.	Urban from Wapiti River	00277161-00-00 (AB)	14,192,000
International Paper Canada Pulp Holdings Ulc	Other from Wapiti River	00038194-00-00 (AB)	9,189,440
Aquatera Utilities Inc.	Urban from Wapiti River	00038080-00-00 (AB)	4,811,810
Aquatera Utilities Inc.	Urban from Wapiti River	00038080-00-00 (AB)	2,466,960

Flow vs. allocated and sustainable



NuVista Corporate Water Strategy

Water is critical to the success of unconventional oil and gas development in Canada. As the industry evolves, the sophistication of water management is increasing, as is regulatory scrutiny. The need for a **consolidated approach to water management** is emerging. This strategy is meant to outline our goals and commitments with respect to responsible water management **across the corporation.**

Our Commitment

NuVista is committed to excellence when it comes to water management. This commitment is achieved by **balancing analysis, planning and execution** of projects to define clear objectives and **manage weaknesses** and water security risks.

Guided by NuVista's values

1. Honesty and Integrity
2. Excellence
3. Respect
4. Empowerment and Accountability
5. Safety



Management processes

Storage:

- Reduce trucking and related pressures/risks to the surrounding area
- Reduce stress on Wapiti River (*eliminates needs during lower flow periods*)

Cardium Fm. groundwater offset:

- Situated well below base of groundwater protection
- Reduce need for fresh water from Wapiti River and other sources

Assessing water recycling:

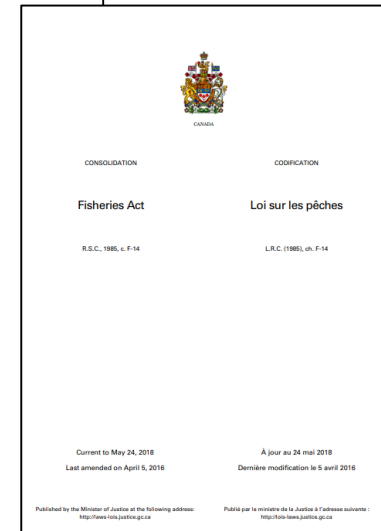
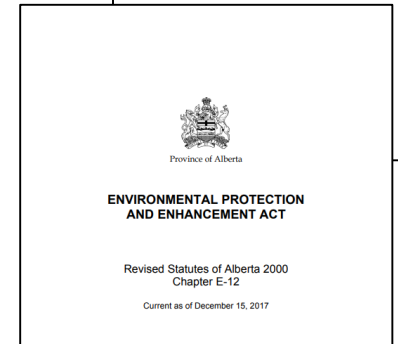
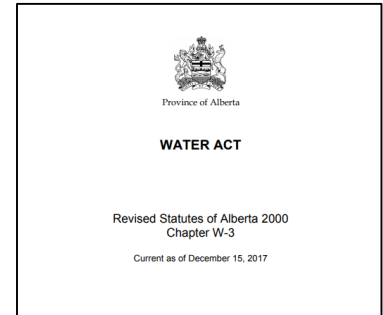
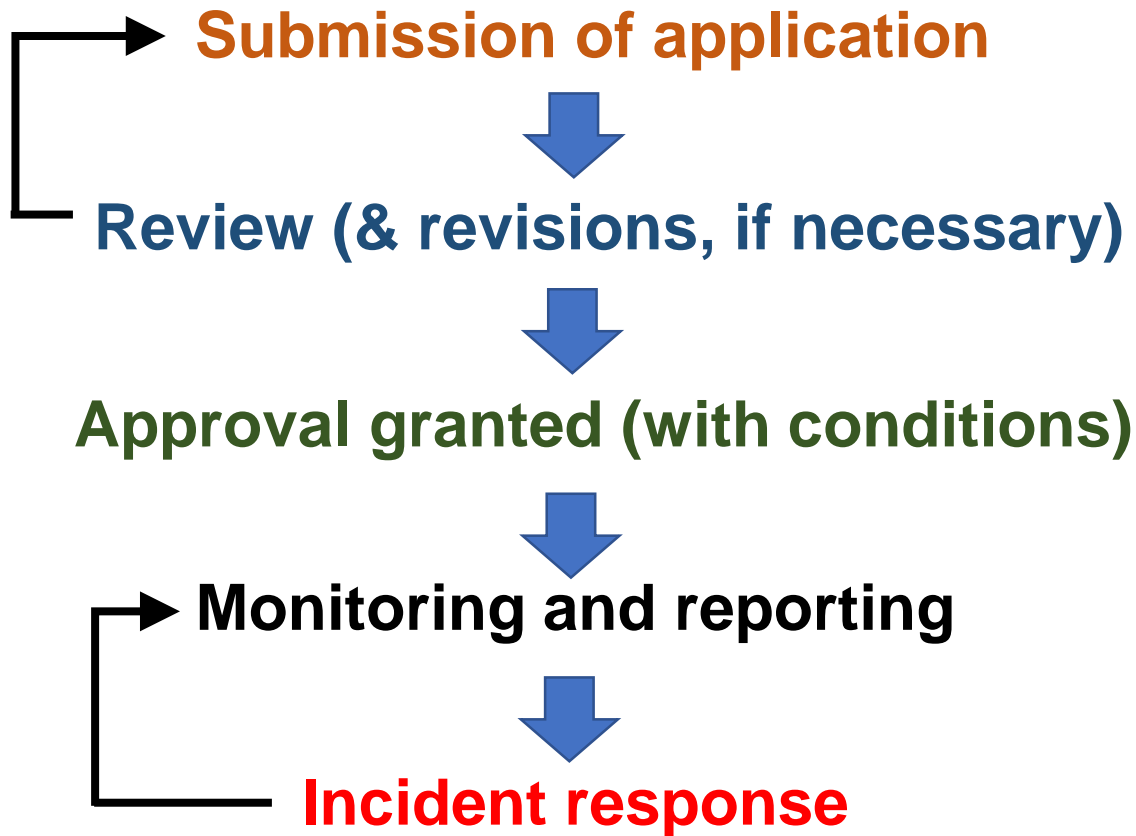
- Reduce need for fresh make-up water
- Reduce sourcing and disposal costs

Baseline testing

- Assess groundwater quality in vicinity of operating assets



Regulatory requirements



Discussion