

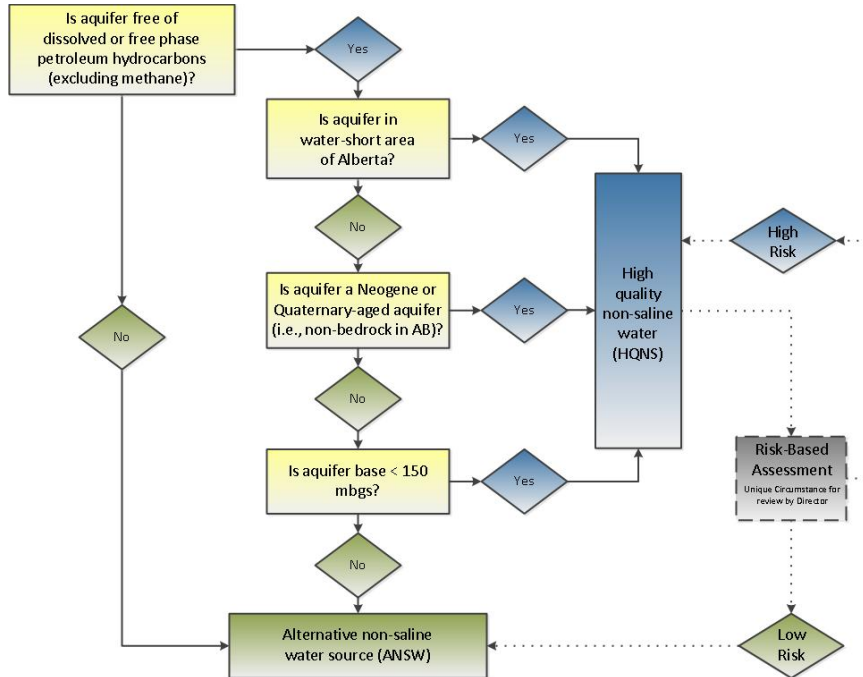
EXECUTIVE SUMMARY

Petroleum Technology Alliance Canada (PTAC), through their Water Innovation Planning Committee (WIPC), retained Matrix Solutions Inc. to propose recommendations to refine the definitions of “alternatives” to high quality non-saline water (HQNS) originally presented by Alberta Environment and Parks (AEP; AEP 2016). For this project, “alternatives” are defined as “alternative non-saline water sources” (ANSW).

To meet the objectives of the project, Matrix met with AEP, the Alberta Energy Regulator (AER), Alberta Geological Survey, and PTAC industry representatives, and reviewed relevant water management practices from Alberta and other jurisdictions. Water management review of other jurisdictions was mostly conducted in the context of non-saline groundwater that is economically and technologically impractical for drinking water purposes. Based on these meetings and water management review, two recommendations are provided.

The primary recommendation is to consider and adopt a consistently applied decision framework to define and distinguish ANSW versus HQNS groundwater resources. The decision framework recognizes that some non-saline groundwater is economically and technologically impractical to use for drinking water or livestock purposes, which then could serve as an ANSW groundwater source. The recommended methodology, presented as a decision tree in Figure A, embodies important considerations including the presence of hydrocarbons (excluding methane), local water availability, aquifer age and type, aquifer depth, and in unique circumstances, a more refined assessment of risk. The proposed decision framework, and in particular, the risk-based assessment presented on Figure A, are based on the fundamental axiom of the importance of managing groundwater considering local and sub-regional hydrogeological conditions - a concept that could be further explored, refined, and implemented by AEP/AER when considering future groundwater management approaches. As per Alberta’s *Water for Life* strategic goals, the proposed risk-based assessment on Figure A is envisioned to assess risk to healthy ecosystems and drinking water supplies in the context of providing reliable water supplies for a sustainable economy.

FIGURE A Recommended Decision Framework to Define Alternative Non-saline Groundwater Sources



The secondary recommendation for AEP/AER to consider a series of additional possible ANSW sources as proposed by PTAC industry representatives. Proposed water sources, pending further vetting, would effectively expand AEP’s draft *Water Conservation Policy for Upstream Oil and Gas Operations* “alternatives” list. Proposed water sources include:

- impacted non-saline groundwater
- surface water runoff from upstream facilities that does not meet release to environment requirements
- previously disposed produced water
- wastewater that would otherwise be disposed