Iosegun River at Waskahigan River Provincial Recreation Area (photo by M. Hervieux)

Enabling the Use of Alternatives to High-quality Non-saline Water by the Oil and Gas Sector in the MD of Greenview

RECOMMENDATIONS TO THE ALBERTA ENERGY REGULATOR AND ALBERTA ENVIRONMENT AND PARKS FROM THE MULTI-STAKEHOLDER PANEL FOR THE AREA-BASED REGULATION PILOT PROJECT

June 21, 2017

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DEFINITIONS

Allocation – The volume, rate and timing of a diversion of water (as defined in the *Water Act*[1]).

Alternative sources – A source that can be used in place of high-quality, non-saline water. These sources can include: low-quality non-saline water; saline water; produced fluids; flow-back fluids; and municipal or industrial wastewater.

Class A watercourses – Water body of highest sensitivity; fish habitat areas are sensitive enough to be potentially damaged by any type of activity within the water body; known habitats in the water body are critical to the continued viability of a population fish species in the area. (as defined in the *Guide to the Code of Practice for Watercourse Crossings, including guidelines for complying with the Code of Practice, revised April 2001*).

Deep water sources – Groundwater that is greater than 150 m deep.

High-quality non-saline water (HQNS) – Non-saline groundwater and surface water supplies that support instream and aquatic ecosystem needs and/or are useable with standard treatment for drinking water supplies and livestock watering.

Low-quality non-saline water (LQNS) – Water with total dissolved solids less than 4000 mg/L but that is not of sufficient quality to be considered HQNS (potable). May include: recycled or reconditioned industrial/municipal wastewater; naturally occurring non-saline water containing hydrocarbons; and non-saline groundwater that is economically and technically impractical to use as drinking water or livestock water.

Saline groundwater – Water that has total dissolved solids exceeding 4000 mg/L (as defined in the *Water (Ministerial) Regulation*).

Strahler Stream Order – Used to define stream order size based on a hierarchy of tributaries; the size ranges from the smallest, a first-order stream, to the largest, a twelfth-order stream. The headwaters are the first order and downstream segments are defined at confluences. When two **first-order** streams come together, they form a **second-order** stream. When two second-order streams come together, they form a **third-order** stream. Streams of lower order joining a higher order stream do not change the order of the higher stream. Thus, if a first-order stream joins a second-order stream, it remains a second-order stream. It is not until a second-order stream combines with another second-order stream that it becomes a third-order stream.

Water – All water upon or under the surface of the ground, whether in liquid or solid state (as defined in the *Water Act*).

[1] *Water Act,* RSA 2000, c. W-3. (Hereinafter referred to as the "*Water Act*".)

ACRONYMS

ABR – Area-based Regulation

AEP – Alberta Environment and Parks

AER – Alberta Energy Regulator

FITFIR – First in time, first in right (aka, Priority of Rights)

HQNS – High-quality non-saline

LQNS – Low-quality non-saline

MD – Municipal District

MOWP – Multi-Operator Water Plan

TDL – Temporary Diversion Licence

1.0 INTRODUCTION AND BACKGROUND

1.1. Area-based Regulation Pilot Project

The Alberta Energy Regulator (AER) is responsible for ensuring the safe, efficient, orderly and environmentally responsible development of hydrocarbon resources in Alberta, over their entire lifecycle. To effectively fulfill its mandate, the AER is working to ensure that its regulatory processes and requirements keep pace with an ever-evolving energy industry and ever-evolving public expectations.

To that end, the AER has developed the Area-based Regulation (ABR) approach. The ABR approach aims to make geographically-specific rules and practices that consider the unique environmental, energy resource and community conditions in a defined geographic area, in collaboration with the people who live, work and recreate in the area.

Three key factors that are driving the development of the ABR approach are:

- a shift in the focus of energy development from conventional to unconventional development;
- a renewed emphasis on a cumulative effects management approach to environmental management; and
- the need to build trust amongst and enhance the participation of Albertans when it comes to energy development.

From a process perspective, the ABR approach has three main components (Figure 1.1):

- **Integrated Area Assessment**: Alberta's extensive knowledge of its geology and energy resources (the subsurface) is leveraged, alongside a solid understanding of the current state of environmental impacts due to energy development (the surface), to understand the current state of energy and environment and forecast the potential evolution of energy development in a defined area.

- **Collaborative Engagement**: Seeks to enhance participation so that local perspectives, whether they are area residents, indigenous communities or stakeholders, can be incorporated into the regulatory system for energy development. Through these efforts, people who live, work and recreate in the area influence how energy development in the area should take place.

- **Area Practices and Requirements**: The subsurface and surface science elements (Integrated Area Assessment), and the perspectives gathered through the direct participation of indigenous communities and stakeholders (Collaborative Engagement), are brought together to develop practices and requirements for how energy development is to be undertaken in the defined area.

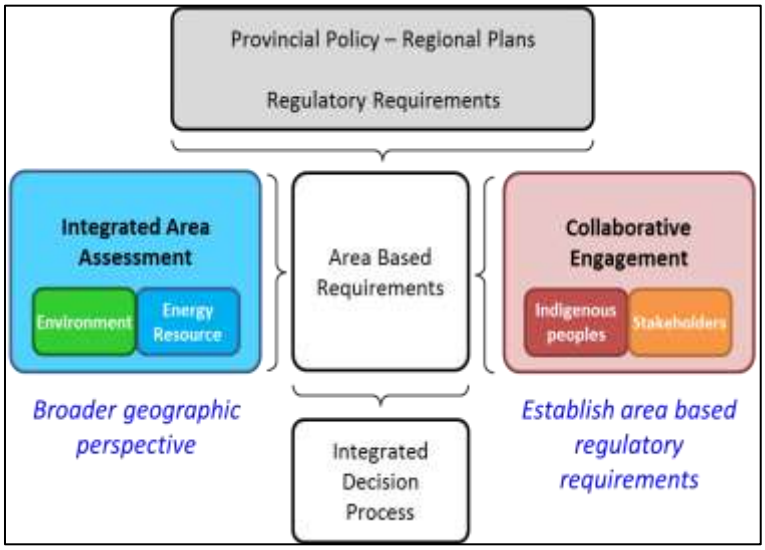

Figure 1.1 Area-based Regulation Model

In 2016, the AER began a pilot project within the Municipal District (MD) of Greenview to test the feasibility of certain aspects of the ABR approach. These included the creation of local integrated assessments of energy resources and environmental conditions, and the use of those assessments to inform deliberations by local stakeholders on practices and requirements for energy development in the area. A schematic of the ABR pilot project area is provided in Figure 1.2.

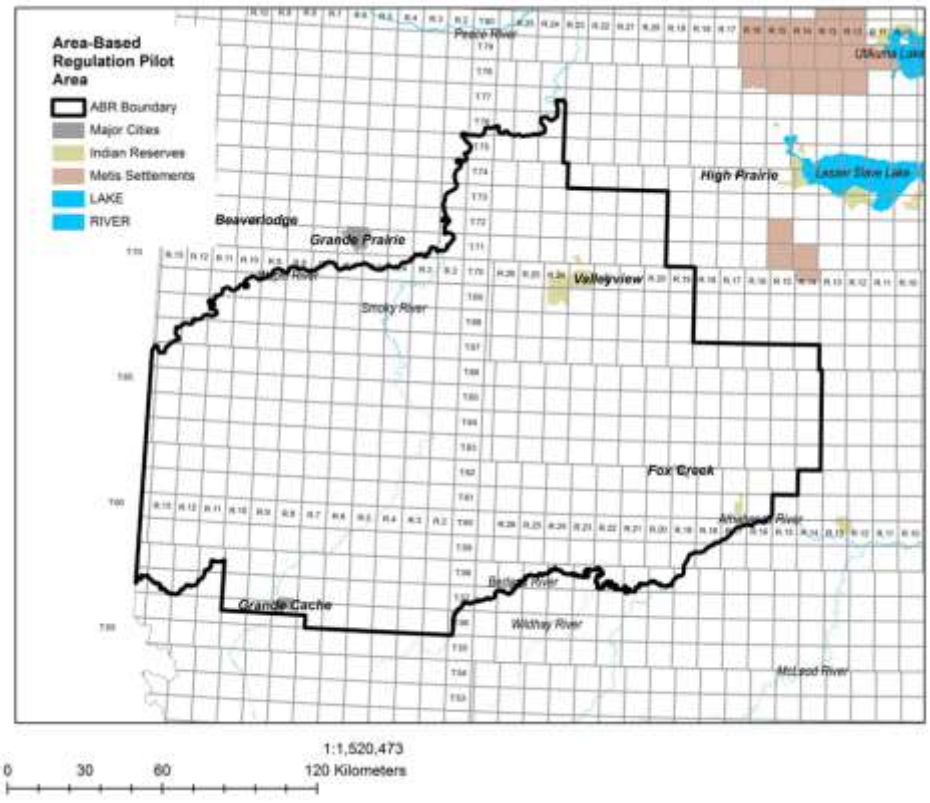

Figure 1.2 Area-Based Regulation Pilot Project Area

As part of the pilot, a multi-stakeholder panel was established with a specific focus. The focus of the multi-stakeholder panel was to recommend area practices that will support the energy sector's increased use of alternative water sources in the MD of Greenview.

1.2. Draft Water Conservation Policy

The draft *Water Conservation Policy for Upstream Oil and Gas Operations, October 2016* (the "Draft Policy") is an update of the *Water Conservation and Allocation Policy for Oilfield Injection* (2006). The Draft Policy expands the application of wise water management principles to oil sands mining operations and unconventional energy developments using hydraulic fracturing.

The Draft Policy acknowledges that the use of HQNS water is needed to support energy development, but emphasizes minimizing or avoiding the use of HQNS water in favour of LQNS water, saline water and technological alternatives.

To support the increased use of alternative sources, the Draft Policy mandates the assessment of environmental net effects, so that the overall understanding of environmental impacts from alternative sources can support regulatory decisions.

The Draft Policy also introduces the Multi-Operator Water Plan (MOWP) as a tool to optimize the use and management of water in unconventional oil and gas developments. The MOWP concept encourages cooperation and collaboration amongst energy operators on water management to minimize cumulative effects on water resources and aquatic ecosystems.

The Draft Policy also describes a flexible water allocation approach that is more aligned with energy developments that occur at a larger geographic scale.

The Draft Policy describes several performance measures that will be used to assess the attainment of desired outcomes, including:

- Trend in water allocation volumes;
- Trend in water use;
- Ratio of non-saline water use to hydrocarbon production;
- Trend in non-saline water use to regional, sectoral and river basin targets; and
- Trend in applications using alternative sources of water.

In spring 2016, Alberta Environment and Parks (AEP) began preparations to test implementation of the Draft Policy through a regional pilot in the Fox Creek area. This provided opportunities to learn how best to implement the Draft Policy before applying it to oil and gas operations on a province-wide basis.

Given the close alignment between the intent of the AEP's pilot and the intent of the AER's pilot on the ABR approach, the two organizations decided to merge the two pilot efforts. Consequently, the Draft Policy was reviewed and considered in the Panel's deliberations and is referred to throughout this report.

2.0 ABR PILOT PROJECT MULTI-STAKEHOLDER PANEL

2.1. Panel Purpose and Outcomes

To demonstrate the collaborative engagement aspects of the ABR approach, a multi-stakeholder panel (the "Panel") was established. The Panel was given broad direction by the AER and AEP to examine water use by the energy sector. At an early stage, the Panel defined within its Terms of Reference a mandate to explore and discuss opportunities and practices to achieve three overarching objectives:

1. Reduce, minimize and responsibly manage impacts to aquatic ecosystems from energy sector activities (social and environmental).
2. Increase the use of alternative sources to HQNS water to the extent practical based upon environmental, social and economic considerations.
3. Identify barriers to innovation in water management for the energy sector.

In addition, any recommendations made by the Panel were to: encourage collaboration; consider the cumulative impacts relating to water withdrawal and use; and focus on enabling the use of alternative sources of water for energy development activities.

2.2. Panel Formation

The following organizations and individuals were invited to participate in the Panel, and were provided with a standing invitation to participate during the duration of the Panel's sessions. The AER and AEP co-led the Panel under the ABR pilot.

- Government Organizations
  - Alberta Energy Regulator
  - Alberta Environment and Parks
  - Aboriginal Consultation Office
- Indigenous organizations
  - East Prairie Metis Settlement
  - Metis Nation of Alberta
  - Western Cree Tribal Council
  - Sturgeon Lake Cree First Nation
- Municipal organizations
  - Town of Fox Creek
  - Municipal District of Greenview
- Landowner or Member-at-Large
- Energy Industry Companies
  - Chevron Canada
  - ConocoPhillips Canada
  - EnCana Corporation
  - Shell Canada
  - Seven Generations Energy
- Environmental organizations
  - Alberta Environmental Network
- Watershed Planning and Advisory Councils
  - Mighty Peace Watershed Alliance
  - Athabasca Watershed Council
- Energy sector service companies
  - Clear Environmental Solutions
  - ATCO Energy Solutions

2.3. Integrated Area Assessment

One of the key components of the ABR approach is an Integrated Area Assessment. The Integrated Area Assessment is intended to include:

- an assessment of the current state of water;
- a modelled forecast of future development and water needs; and
- an assessment of the cumulative energy sector water allocations.

An assessment of the current state of water was presented to the Panel. However, neither modelled forecasts of the future state of water nor an assessment of cumulative energy sector water allocations were available to support the Panel's discussions.

2.4. Panel Discussions

The Panel used a collaborative, consensus-based process to reach agreement on its recommendations. For the purposes of this Panel, consensus was defined as occurring when *each participant agrees that they can live with the outcome of a particular recommendation or action*.

Participants were expected to represent the perspectives of their sector or community so that all perspectives were included in Panel discussions. They were also encouraged to seek mutual understanding and work together to create mutually satisfactory solutions. Each delegate had an identified alternate in the event that they were unable to attend a Panel session.

The Panel began with a list of concerns that had been previously raised to the AER by indigenous communities and stakeholders. Panel members made some additions to this list. The topics in the list were sorted into categories and linked to the three mandate areas included in the Panel's Terms of Reference.

The topics were then slotted into upcoming meeting agendas for detailed discussion by the Panel. As the Panel deliberations occurred, draft recommendations were recorded. Many of these draft recommendations underwent further revision and became final Panel recommendations. Other draft recommendations were tabled, either because they were deemed to not be feasible, or were deemed to not be a priority given the timelines available.

The Panel's recommendations were divided into primary recommendations and supporting recommendations. Primary recommendations are those which most directly advance achievement of the Panel's overarching objectives. Supporting recommendations are those which will help support achievement of the overarching objectives by addressing a number of public concerns regarding the effectiveness of water management in the MD of Greenview.

Between September 2016 and April 2017, the Panel held ten in-person meetings at three-week intervals in Fox Creek, Alberta. Cumulatively, panel members contributed over 1400 hours to in-person Panel discussions, with individual Panel members investing approximately 90 hours each to Panel sessions.

A full record of the Panel's discussions, including recommendations that did not go forward, will be maintained by the AER.

2.5. Consensus

Consensus was achieved on the recommendations in this report from amongst the organizations that were able to participate throughout the pilot project. These included:

- Government Organizations
  - Alberta Energy Regulator
  - Alberta Environment and Parks
- Municipal organizations
  - Town of Fox Creek
  - Municipal District of Greenview
- Landowner or Member-at-Large
- Watershed Planning and Advisory Councils
  - Mighty Peace Watershed Alliance
  - Athabasca Watershed Council
- Energy Industry Companies
  - Chevron Canada
  - ConocoPhillips Canada
  - EnCana Corporation
  - Shell Canada
  - Seven Generations Energy
- Environmental organizations
  - Alberta Environmental Network
- Energy sector service companies
  - Clear Environmental Solutions
  - ATCO Energy Solutions

3.0 PRIMARY RECOMMENDATIONS

The Panel identified a number of "primary" recommendations that would most directly support the three outcomes desired by the Panel (summarized in Appendix A). The Panel believes that acceptance and implementation of these primary recommendations would have a marked impact in shifting water use and management behaviours in the energy sector.

The Panel's primary recommendations cover three main areas:

- *Barriers to the use of alternative sources of water*;
- *Approaches to basin management*; and
- *Implementation*.

Barriers to the use of alternative sources of water:

Early in its discussions, the Panel recognized that there are two inter-related types of barriers preventing the energy sector from limiting its use of HQNS water and increasing its use of alternative sources: the existing rules, regulations and policy directions that prevent the increased use of alternative sources; and the cost to access and use alternative sources. It was also identified that different barriers exist across the lifecycle of water use (e.g., access, transport, storage, use, disposal and sharing) and for different sources of water (e.g., HQNS, LQNS, effluent, produced, flowback, saline). The Panel aimed to identify some of the main barriers and recommend solutions that should enable operators to better use alternative sources of water.

Approaches to basin management:

While it is important to address the barriers created by the regulatory and policy system, the increased use of alternative sources of water requires a regulatory backstop that ensures effective basin management, environmental and aquatic ecosystem protection, and operator performance. The Panel believes such a backstop would promote a broader adjustment in energy sector water use (beyond those operators who are willing to make greater use of alternative sources once regulatory and policy barriers have been addressed). The Panel has found that the risks posed by HQNS water withdrawal are linked primarily to water availability, cumulative allocation of water, timing, and the location of withdrawals.

Implementation

In keeping with the nature of the ABR pilot, wherein new regulatory approaches are being tested before broader implementation, it was felt that an adaptive management approach was needed for implementing the Panel's recommendations. Such an approach enables the Panel's recommended directions to be tested and adjusted as necessary, before full policy implementation.

3.1. Barriers to the Use of Alternative Sources of Water

One priority identified by the Panel was the identification of regulatory barriers (e.g., policy, regulation, requirements) that are currently preventing access to and use of alternative sources of water in energy development activities.

Several barriers were identified, including:

- ***Regulatory definitions –*** Fluids are labelled and regulated according to established definitions that do not necessarily reflect the risks posed by the fluid. In addition, the commingling of sources changes the label and regulation of the entire volume to the most stringently-regulated source.
- ***Inter-basin transfer*** – Transfers of water, as defined under the *Water Act*, across major basin boundaries are not allowed, regardless of whether the end use of the transferred water is consumptive or non-consumptive.
- ***Sharing –*** The sharing of an existing licensed allocation is not allowed without an approved Water Management Plan that authorizes such sharing, and so unused volumes of water are not available to other users. The concept of a MOWP may be a mechanism to improve sharing, but details of the requirements and process have yet to be defined.
- ***Mineral rights conflicts*** – Access to and use of the water from a zone where mineral rights are owned by another company comes with risk for a company seeking water.
- ***Storage volume*** – Currently there are limits on the allowable storage volume of above-ground engineered storage (e.g., C-rings). In-ground reservoirs for alternative sources of water are allowed with additional regulatory process that is considered lengthy and ambiguous.
- ***Term and Temporary Diversion licence conditions*** – The regulatory process that can allow one operator to use water stored by another operator requires a licence linked to the original diversion source of the stored water. This means that there may be conditions (e.g., timing restrictions) placed on the diversion of stored water that are relevant only to the original diversion's source watercourse.

Through its analysis and discussions, the Panel noted that regulatory barriers differed among the potential sources of water and across the development lifecycle for each potential source. Table 3.1 summarizes the barriers by water source and lifecycle stage.

Sources	Access	Transport	Storage	Use	Sharing	Disposal
Water ≤4000 mg/L total dissolved solids (subject to the *Water Act*)						
Surface Water (HQNS)		Inter-basin Transfer	Regulatory definitions		Licence conditions Sharing	Regulatory definitions
Groundwater (HQNS)		Inter-basin Transfer	Regulatory definitions		Licence conditions Sharing	
Deep Fresh Water (LQNS)	Mineral Rights Conflict	Regulatory definitions Inter-basin transfers	Regulatory definitions		Licence conditions Sharing	
Industrial or Municipal Effluent		Regulatory definitions Inter-basin Transfer	Regulatory definitions	Regulatory definitions	Licence conditions Sharing	
Water >4000 mg/L total dissolved solids (not subject to the *Water Act*)						
Deep Saline Water	Mineral Rights Conflict		Regulatory definitions			Regulatory definitions
Flowback Water		Regulatory definitions	Storage Volume Regulatory definitions			Regulatory definitions
Produced Water		Regulatory definitions	Storage Volume Regulatory definitions		Sharing	Regulatory definitions

Table 3.1 Regulatory barriers by water source and stage of development lifecycle

While not necessarily a barrier, coordination between AEP and the AER is critical because the two organizations each have regulatory responsibilities for water. For example, AEP regulates industrial or municipal effluent until this potential alternative source is used in an oilfield application; at that point, it is then regulated by the AER. Navigating this kind of interaction between regulators can be challenging and time consuming for operators.

The Panel developed the following recommendations aimed at reducing or eliminating identified barriers.

3.1.1 Risk-Based Fluids Management

Issue

Although the Draft Policy articulates a preference for the use of alternative sources over HQNS water sources, the regulatory system restricts or prohibits the use of many alternative sources. This prevents

energy operators from creating treatment, transportation, storage and use schemes that could reduce risks and increase the use of alternative sources.

Currently, all byproducts of drilling and completion of energy wells are defined as waste and must be disposed of in accordance with regulations. This prevents reuse or recycling of fluids, and fails to recognize that these fluids often have the same risk profile and risk treatment as saline groundwater.

In cases where fluids with different risk profiles are co-mingled (e.g., HQNS water and produced water), the resulting mixture is regulated as the higher risk fluid, regardless of the actual composition of the co-mingled fluids. Furthermore, higher risk fluids that have been treated to a lower risk profile are treated under regulations as if they continue to be higher risk. This approach often prevents transport, storage and use of fluids that are considered to be alternative sources under the Draft Policy.

Desired Outcome

The energy sector can effectively access and use alternative sources of water because these fluids are regulated based on the risk they pose to safety and the environment and in ways that accommodate changes in a fluid's risk profile.

This supports the Panel's overarching objectives to:

- *increase the use of alternative sources to HQNS water to the extent practical*;
- *identify barriers to innovation in water management for the energy sector*.

Recommendation

The AER should develop a risk-based, full-lifecycle fluid management framework that improves industry performance in the use of alternatives to HQNS water by:

- Applying regulatory controls for treatment, transportation, storage and use that are based on the risk profile for alternatives to HQNS water.
- Accommodating changes in fluid composition that may occur as a result of treatment or co-mingling.
- Reporting on the trends in use of HQNS water and alternative sources to HQNS water for hydraulic fracturing in the MD of Greenview.
- Requiring industry reporting on character of the fluids, their associated risk, and range of potential contamination over the full activity lifecycle described.
- The removal of these barriers would enable companies to achieve progressively higher rates of use of alternatives to HQNS water should that become a regulatory requirement.

This recommendation is contingent on removing barriers to alternative water use and enables the Basin Regulatory Framework. This recommendation should be piloted in the MD of Greenview, as described in recommendation 3.3.3.

Rationale

- Creating a regulatory framework that enables logical and safe use and re-use of alternative sources (including fluids currently classified as saline groundwater, produced water, formation water and flowback fluid) will minimize the use of HQNS water in the MD of Greenview.
- Enabling increased use of alternative sources will drive innovation to improve treatment, transport and storage.
- The increased use of alternative sources may result in more centralized fluid handling, similar to the approaches used by midstream energy operators to gather and handle hydrocarbon production.
- A risk-based approach could incorporate some of the existing risk-management systems and strategies employed by some operators.
- The application process could integrate aspects of risk assessment, perhaps by having an operator provide their risk management plan as part of their initial application for use of an alternative source to HQNS water.

Key Related Initiatives:

- Performance metrics and reporting undertaken by AER Industry Operations.
- Draft *Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging, and Testing Requirements* revision.
- AER project: Centralized Fluid Storage for Hydraulic Fracturing Fluids.
- British Columbia Oil and Gas Commission *Management of Saline Fluids for Hydraulic Fracturing Guideline*, February 5, 2016.

3.1.2 Above-Ground Engineered Fluid Storage

Issue

Currently, there are prescribed limits on the volume of storage of flowback and produced water in above-ground engineered storage. The AER's *Directive 055: Storage Requirement for the Upstream Petroleum Industry* specifies a volume limit of 3000 m^3 for above-ground walled synthetically-lined storage systems (AWSS) and a dismantling deadline of one year. Operators can apply for larger engineered above-ground storage systems through the alternative storage system approval process. To date, the AER has approved volumes up to 6600 m^3 for engineered storage.

This type of storage is typically used to hold flowback and produced water used during well completion operations. As a result of the existing limits on storage volume, a single hydraulic fracturing operation often cannot be completed without the use of multiple storage units.

Desired Outcome

Operators can safely store sufficient fluid volume in above-ground engineered storage to support well completions and increase the rate of fluid re-use and recycling, managed to an appropriate level of risk.

This supports the Panel's overarching objective to:

- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

Replace the volume and duration restrictions for above-ground engineered storage facilities with a risk-based approach (i.e., location, design, mitigation of risk (e.g. berms), installation, and operation) that considers the type of fluid being stored, the method of storage, and the potential environmental and safety risks.

This links to and could be incorporated into a risk-based fluid management framework (Recommendation 3.1.1).

This recommendation could be piloted in the MD of Greenview, as described in recommendation 3.3.3.

Rationale

- Allowing additional storage capacity would enable increased rates of re-use of alternative sources and minimize the need to divert and store HQNS water.
- A risk-based approach would take into consideration the fluid being stored and the risks to groundwater, water bodies and land in considering the siting of an AWSS, its design (including mitigation measures such as the berms) and the operation and reclamation of the facility.
- Under a risk-based approach, applicants would submit a risk management plan (including a maintenance schedule) for handling the fluids they intend to transport and store. The AER would assess the merits of the plan when issuing the approval and could incorporate the proposed risk mitigation measures into the approval.

Key Related Initiatives:

- AER project: Centralized Fluid Storage for Hydraulic Fracturing Fluids

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3.1.3 Temporary Surface Hoses and Pipelines

Issue

The inability to use surface hose (e.g., lay flat hose) or temporary surface pipelines (e.g., welded thick walled plastic pipe) to convey alternative sources of water, beyond the existing criteria (*AER Bulletin 2014-38*), may increase potential impacts to the environment from greater truck traffic and/or the use of in-ground pipelines.

Under *Bulletin 2014-38*, the AER currently allows the use of temporary surface hoses and surface pipelines only for the transportation of source water that has:

- Chloride content of 640 milligrams per litre or less;
- Electrical conductivity of 2.0 decisiemens per metre or less;
- pH value between 6.5 and 9.0;
- No hydrocarbon sheen;
- Does not contain municipal wastewater, water affected by industrial process, or produced or process water from an oil-and-gas activity;
- No chemical added to the water at source or any time during transport in the pipeline.

Temporary surface hoses and surface pipelines cannot be used for water or fluid sources other than those described above.

Desired Outcome

Operators are able to safely use temporary surface hoses and surface pipelines to transport alternative sources of water, in accordance with the fluid management framework (Recommendation 3.1.1).

This supports the Panel's overarching objectives to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems;*
- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

The Panel acknowledges the environmental risk associated with this recommendation as well as the opportunity to enable increased use of alternatives. This recommendation must be developed and implemented with a high level of oversight by industry and the regulator. It potentially requires a prescriptive solution.

The AER should expand which fluids it allows to be transported using temporary surface hose and pipeline, using evidence of environmental performance and protection, including heightened operational oversight by industry. This expansion should include demonstrated reduction of fragmentation (linear disturbance footprint) risk and any needed monitoring and public reporting for performance assurance.

This recommendation should be piloted in the MD of Greenview, as described in recommendation 3.3.3.

Rationale

- An increased use of temporary surface hoses or surface pipelines connecting storage locations with drilling locations would reduce overall truck traffic in the MD of Greenview.
- Temporary surface hoses require less deforestation and land fragmentation than buried pipe.
- Temporary surface hoses and surface pipelines, when combined with the ability to store larger volumes of fluids from alternative sources, could significantly improve the economics of using alternative sources rather than HQNS water.
- Efforts to improve the performance of temporary surface hoses are already occurring.
- The use of temporary surface hoses and surface pipelines in non-energy sectors could inform the development of a risk-based approach for the energy sector.

Key Related Initiatives

- Alberta Upstream Petroleum Research Fund project "Use of layflat surface hose for the transport of alternative water".

3.1.4 Subsurface Mineral Rights Conflicts for Alternatives

Issue

There are two inter-related issues regarding access to and use of some sources of LQNS groundwater and saline groundwater:

1. **Consent from a mineral lessee to operate in the same subsurface space.** Companies targeting deep water sources must seek the consent of the mineral rights lessee (or, in the case of undisposed mineral rights, the Alberta Department of Energy) as required by the AER's *Directive 056: Energy Development Applications and Schedules*. This requirement is intended to prevent conflict between operators targeting the same subsurface space. However, companies seeking consent will often be denied access or access may become cost prohibitive as mineral rights lessees seek compensation for potential lost hydrocarbon production revenue.
2. **Potential for trespass with a mineral rights holder.** Operators targeting deep water sources are likely to encounter hydrocarbons mingled with the water in non-commercial quantities. When this occurs in a zone where the mineral rights are held by another company, the operator targeting the deep water can be found in trespass of the mineral rights holder under the *Mines and Minerals Act*. Trespass investigations occur regardless of the amounts of hydrocarbons encountered and there is no minimum hydrocarbon threshold that is permitted to be produced.

Both of these issues need to be resolved in order to achieve the desired outcome.

Desired Outcome

There are clear rules to differentiate operators who are accessing deep water sources from those who are targeting petroleum resources, so that the use of deep LQNS and deep saline water sources can be accessed and their use maximized in the MD of Greenview.

This supports the Panel's overarching objective to:

- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

To enable access and use of alternatives to HQNS water in the MD of Greenview:

- *Issue 1*: AER adjust *Directive 056: Energy Development Applications and Schedules* (s.7.11.11) to require notification only from operators targeting deep LQNS and deep saline water, instead of the current requirement for obtaining consent from the mineral rights lessee for the water sourcing activity.
- *Issue 2*: Department of Energy set clear criteria including minimum hydrocarbon content to trigger trespass investigations for wells under the *Mines and Minerals Act* (s.54(1)) to allow for access to deep LQNS and saline water sources.

Rationale

- Mineral tenure rights granted by the Department of Energy are intended to allow access to and development of hydrocarbon resources, not to make water resources inaccessible.
- Potential conflict with mineral rights holders is likely because the majority of the mineral rights for formations with abundant deep LQNS and saline water are privately held, with only 10% held by the Crown.
- This would provide a clear differentiation between operators who are targeting deep water sources (LQNS and saline) and those who are targeting commercially viable hydrocarbons.
- Typically, formations with abundant deep LQNS and saline water are not sources of economically producible hydrocarbon resources, so companies targeting these formations are not seeking hydrocarbon resources.

- This approach provides certainty to operators targeting deep water who cannot predict prior to drilling a water well what quantity of hydrocarbons might be encountered.

Key Related Initiatives

- The Panel is not aware of any related initiatives.

3.1.5 Low-Risk Inter-basin Transfers for Consumptive Use

Issue

Under the *Water Act*, s. 47*,* the transfer of water between major basins in Alberta is not permitted except by a special Act of the Legislature. The issue of inter-basin transfer of water is sensitive to many Albertans. The provisions in the *Water Act* require a high level of scrutiny for potential inter-basin transfers and are intended to:

- protect ecological integrity and water quality (e.g., resulting from transfer of biota, biological or chemical parameters);
- consider trans-boundary water management implications where the diversion of water between river basins within Alberta may, as a consequence, alter the amount of water that is expected to be received by downstream jurisdiction(s), which may or may not be subject to a formal agreement; and
- prevent major inter-basin diversion schemes intended to move significant quantities of water amongst basins (e.g., from lesser-allocated to higher-allocated basins).

For the 50-60 energy companies with holdings that straddle the major boundaries of the Peace and Athabasca river basins within the MD of Greenview (Figure 3.1), the prohibition on inter-basin transfers results in companies duplicating water hubs, reservoirs and other infrastructure. This, in turn, can increase these companies' overall environmental footprints. In addition, companies may not be able to reduce their overall environmental net effects because they are only permitted to use HQNS water from the major basin the well they are drilling is in. (The environmental net effects may be lower if water from a neighboring major basin could be used).

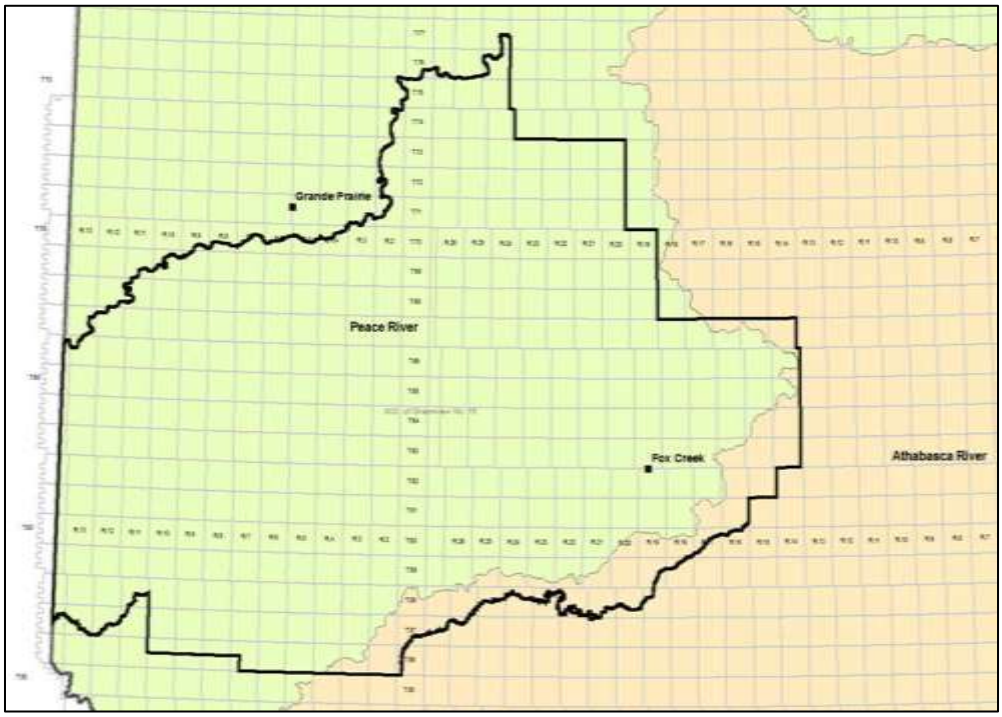


Figure 3.1 Major basins in the MD of Greenview

Unlike HQNS water or alternative sources, the transfer of treated municipal and treated industrial wastewater for reuse can be authorized under the *Environmental Protection and Enhancement Act* (Inter-basin Transfer Information Letter, AEP, Water Conservation, 2015, No. 1). This process involves both AEP and the AER when treated wastewater is to be used by the energy sector.

Desired Outcome

Transfer of water across major basin boundaries is allowed in specific, low-risk situations.

This supports the Panel's overarching objectives to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems;*
- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

For basins not currently under water restrictions, enable low-risk transfers of water (as defined under the *Water Act*) across major basin boundaries when intended for consumptive use by operators who can demonstrate an overall decrease in net environmental effects resulting from a transfer.

The transfer of water across major basin boundaries could be considered "low-risk" for:

- Subsurface water sources whose aquifer does not conform to major basin boundaries.
- Non-saline water (high and low quality) in circumstances where a transfer across major basin boundaries will lower environmental net effects.

The Panel has noted that a robust and proven method for determining environmental net effects is required to enable any potential transfer.

It is understood that any changes relating to inter-basin transfer will require legislative amendments with associated public consultation (*Water Act*, s. 48).

Rationale

- The potential for negatively affecting ecological integrity would be mitigated since the use of water by unconventional energy development activities (e.g. hydraulic fracturing) is consumptive. (That is, there is no water returning to the ecosystem.)
- A transfer across major basin boundaries would only be considered if it could be demonstrated that the overall environmental net effects are lower than if the water is taken from the designated basin.
- Potential legislative amendments would support water re-use objectives beyond the scope of the energy sector.

Key Related Initiatives

- The Panel is not aware of any related initiatives.

3.2 Environmental Management and Protection

The Panel believes that improvements in basin management would likely result from a three-pronged approach. The first prong is to provide a regulatory backstop to support the reduction of HQNS water use in favour of alternative sources. This backstop would create transparency and certainty for operators, the public and the regulatory system. The second prong is to improve the protection of sensitive waterbodies and management of water withdrawal sites. The third prong is the effective use of MOWPs as a mechanism to improve coordination and cooperation in an area's water use.

3.2.1 Basin Regulatory Framework

Issue

The Draft Policy seeks to minimize the use of HQNS water by the energy sector and encourage increasing use of alternative sources of water (e.g., LQNS and saline water) where possible. The policy recognizes:

- The preferred use of saline groundwater and other alternatives to HQNS water;
- Opportunities exist to minimize HQNS water use;
- Water availability varies seasonally, annually, and across the landscape;
- Ongoing access to HQNS water is required to support energy development;
- The use of HQNS water, when it is abundant, may represent the lowest overall risk to the environment.

In the current regulatory system, water users in the energy sector cannot predict in advance of their applications if and when they will need to limit HQNS water use in favour of alternative sources. Users do not have access to information that could inform their planning and operations (such as cumulative water allocations or basin condition, and the expectations associated with those varying environmental conditions). In addition, stakeholders and the public are unable to see if or when this information is factored into a regulatory decision on an application.

Desired Outcome

Basin condition and the availability of HQNS water is understood by the energy sector and the regulatory system and this understanding is used to further minimize HQNS water use, when these supplies become constrained, in favour of alternative sources.

This supports the Panel's overarching objectives to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems;*
- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

The AER and AEP should develop a tiered regulatory framework with associated regulatory requirements and expectations for energy sector water use that is based on cumulative water allocations at the sub-basin level. (An example framework is provided below.)

In developing the framework, AEP and AER should consider:

- Current barriers to accessing, transporting, storing, using, and disposing of alternative sources of water (Section 3.1) will limit the increased use of alternative sources of water if they are not addressed.
- Assessing the current state of cumulative water allocations, predicting water use trends based on foreseeable development activity, and making this information publicly available.
- Assigning an interim overall cumulative water allocation for the energy sector until a regional plan for the area can be developed.
- Requiring progressive increased use of alternative sources of water as a result of increasing levels of cumulative HQNS water allocation that includes:
    - Increasing co-ordination and co-operation among operators
    - Increasing levels of monitoring
    - Mechanisms to ensure improved compliance
    - Measures of industry readiness to increase the use of alternatives
    - Incenting the use of alternatives to HQNS water
    - Specific enforceable targets for use of alternative to HQNS water
- Testing the framework for unintended consequences.

Example of a Basin Management Framework

Name	Level 1	Level 2	Level 3	Level 4
Description	Very low cumulative water allocation to the energy sector.	Low cumulative water allocation to the energy sector.	Moderate cumulative water allocation to the energy sector.	High cumulative water allocation to the energy sector.
Zone (overall cumulative water allocations to trigger each level)	To be determined			
Management Intent	Emphasis on improving efficiency of HQNS water use and readiness to increased use of alternative sources of water.	Increasing emphasis on use of alternative sources of water in regulatory decisions.	High emphasis on use of alternative sources of water in regulatory decisions.	Allocations of HQNS water restricted to exceptional or emergency circumstances.
Other Potential Requirements (may vary by management level)	- Usage targets for alternative sources of water. - Requirements to review or possibly return unused allocations. - Changes in the ability to secure temporary diversion licences. - Expectations for cooperative management plans amongst operators. - Adjustable administrative or application requirements based on operator performance.			

Rationale

- This would provide a regulatory backstop for shifting water use in the energy sector away from HQNS water to alternative sources, based on the availability of HQNS water (and specifically, surface water and shallow groundwater that is connected to surface water).
- The system would be risk-based, where the risk of using HQNS water is balanced against the risk of using alternative sources.

- This approach would demonstrate cumulative effects management for the energy sector and regulatory system.
- Because information on basin condition and associated regulatory expectations would be available to industry and the public, energy operators would be able to undertake planning.
- This would provide regulatory certainty regarding water management.
- The overall transparency of information used in regulatory decisions would be improved.

Key Related Initiatives:

- AER cumulative effects assessment for water allocations in the MD of Greenview
- AER Cumulative Effects Management framework (not public)

3.2.2 Multi-Operator Water Plans

Issue

As described in the Draft Policy, a MOWP is intended as a mechanism to enable collaborative and co-operative water management among industry operators at a sub-regional level. Currently, it is not clear how MOWPs will function, how they will be reviewed and assessed, or what regulatory tools are needed to provide sufficient oversight.

The Draft Policy describes a MOWP as a "collaborative water management opportunity through [the use of] integrated management infrastructure for sourcing, distribution, storage, treatment, and disposal". The mechanisms to authorize integrated infrastructure, and the MOWPs leading to such infrastructure, have yet to be determined.

Desired Outcome

The regulatory requirements and processes for MOWPs are clear and MOWPs are actively used by the energy industry.

This supports the Panel's overarching objectives to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems;*
- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

The AER and AEP should collaboratively, along with industry and service companies, define the requirements and processes for MOWPs. In developing the requirements, AER and AEP should consider:

- What a MOWP needs to include
- How a MOWP is authorized
- If new regulatory instruments are needed to support a MOWP
- What the requirements are to participate in an existing MOWP (e.g., for new operators to join)
- What the monitoring and reporting requirements are under a MOWP
- Thresholds associated with requirements for MOWPs. This is tied closely to Basin Regulatory Framework 3.2.1
- How MOWPs can demonstrate reduced HQNS water use to the public and stakeholders
- Criteria for if and when participation in MWOPs is mandatory.

This recommendation should be piloted in the MD of Greenview, as described in recommendation 3.3.3.

Rationale

- Existing regulatory instruments and processes may need to be adapted, or new tools developed, to meet the intent of a MOWP to enable integrated management infrastructure for sourcing, distribution, storage, treatment and disposal.
- Close collaboration between the AER and AEP is required, because the role and authority of an established MOWP needs to be defined in alignment with the direction of the Draft Policy.

Key Related Initiatives:

- Fox Creek Operators Group (FCOG) Water Sub-committee.
- In 2017 Petroleum Technology Alliance of Canada (PTAC) will be sending out a request for proposal to initiate an Alberta Upstream Petroleum Research Fund project on multi-operator agreements. The project start date could be in fall 2017.
- Facility approvals may include requirements for companies to become funding members of ambient airshed monitoring organizations; may be used as an applicable model. Facility approvals may include requirements for companies to become funding members of ambient airshed monitoring organizations; may be used as an applicable model.

3.2.3 Withdrawal Restrictions

Issue

Some aquatic environments are considered sensitive because they provide habitat for important species or simply cannot withstand a large degree of disturbance. In the MD of Greenview these sensitive waterbodies can include small streams and groundwater-fed streams, lakes and wetlands.

The AER uses the *Alberta Desktop Method for Establishing Environmental Flows in Alberta Rivers and Streams* (Locke and Paul 2011), as well as specific knowledge of the area, as the basis for water allocation decision-making. In addition, the AER limits diversion rates from watercourses during the winter (November through March), restricts water diversions from lakes when under ice conditions, and applies breeding season timing restrictions for waterbodies identified as important breeding sites for trumpeter swan, piping plover, American white pelican and great blue heron. The AER also restricts groundwater diversions to maximum sustained yield.

Within the MD of Greenview there is still concern that small streams, lakes and other sensitive waterbodies are being impacted by water diversions, especially in the winter and other sensitive periods, including droughts and high temperature events. This concern arises in part from the understanding that the *Alberta Desktop Method* is most appropriately used for larger streams and may not be fully protective of smaller streams and lakes that often provide critical habitat for key aquatic species (e.g., Arctic grayling).

Desired Outcome

Impacts to sensitive aquatic environments from water diversions by the energy industry are prevented.

This supports the Panel's overarching objective to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems.*

Recommendation

No energy industry surface water allocations or diversions should be allowed from Strahler stream order 1, 2 or 3 and Class A watercourses, except for nominal uses such as ice building for winter road crossings, horizontal directional drilling for crossings, pipeline geotechnical and hydrostatic testing. A map of MD of Greenview watercourses is provided in Appendix B.

In addition, AEP and the AER should pilot a decision-support tool similar to the Desktop Method to support water allocation decisions on lakes in the MD of Greenview.

Rationale

- Impacts to water users in the energy sector would be low given the limited allocation of water to the energy sector from small streams within the MD of Greenview (as outlined in Table 3.2).
- Eliminating water allocations from the smallest streams would mean that allocations and associated impacts would shift to generally larger, more resilient watercourses.
- This would provide additional protection, beyond existing requirements, for waterbodies that are considered sensitive.
- Truck access to small streams within the MD of Greenview would be minimized which supports Recommendation 3.2.4 Withdrawal Locations.
- This would develop a science-based method for lakes to support decisions regarding the allocation of water from lakes.
- Closing order 1-3 and Class A watercourses may incent the use of alternative sources of water.
- This could increase trucking distances to access HQNS surface water and traffic in other areas.

Key Related Initiatives:

- The Panel is not aware of any related initiatives.

Table 3.2 Water allocation for stream order 1, 2, and 3 for 2016 issued by both AER and AEP.

Stream order	Licence Type	Files	2016 Allocation Volume[a] (m^3)
1	Water Resources Licence	0	0
	Water Act Licence	9	26,802
	Water Act Registration	560	176,188
	Water Act Temporary Diversion Licence	37	115,151
	Water Act Hydrostatic Testing	2	7,598
Order 1 Total		**608**	**325,739**
2	Water Resources Licence	2	3,710
	Water Act Licence	12	45,346
	Water Act Registration	290	84,902
	Water Act Temporary Diversion Licence	36	51,260
	Water Act Hydrostatic Testing	1	1,479
Order 2 Total		**341**	**186,697**
3	Water Resources Licence	31	2,226,440
	Water Act Licence	6	139,010
	Water Act Registration	200	58,089
	Water Act Temporary Diversion Licence	45	343,645
	Water Act Hydrostatic Testing	0	0
Order 3 Total		**282**	**2,767,184**
MD of Greenview Total		**7,244**	**253,012,792**

[a] 2016 data for Peace and Athabasca river drainages intersecting and within the MD of Greenview

3.2.4 Withdrawal Locations

Issue

Access to watercourses and the deployment of temporary diversion works can result in environmental impacts, including damage to public lands and compromised riparian buffers through the loss of vegetation, increased erosion and risk of watercourse siltation.

In addition, different approval mechanisms (e.g., Licence of Occupation or Temporary Field Authorization) are used under the *Public Lands Act*, depending on the duration of the activity. These different mechanisms carry different responsibilities, especially with regard to reclamation. For example, some approval types do not include a requirement for reclamation.

At some withdrawal sites, there is little or no containment used for pumping equipment, which increases the risk of contamination.

Desired Outcome

Impacts to aquatic environments at temporary water diversion locations are minimized.

This supports the Panel's overarching objective to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems.*

Recommendation

The AER should develop a regulatory standard for selecting, constructing, maintaining, and decommissioning sites used for temporary diversions. A standard could include:

- Emphasis on use of existing diversion sites and sharing of diversion sites.
- Natural or engineered approaches; rig matting, or direct access from roadway wide enough to allow traffic to continue to pass.
- The use of above-ground engineered storage located off-stream and outside the riparian area with temporary piping to the waterbody.
- Use of a consistent approval mechanism under the *Public Lands Act*.
- Decommissioning and reclamation requirements, with timelines for completion.
- Education, compliance monitoring, and enforcement activities for the standard.
- Consideration of habitat conditions at the site.
- No restrictions to public access to water.

Rationale

- Improved site selection and management would reduce environmental impacts over a diversion activity's lifecycle and cumulative environmental impacts.
- Regulatory standards would provide clarity and consistency for users.
- Established standards should make compliance monitoring and enforcement easier.
- This would provide opportunities for industry collaboration, perhaps as part of multi-operator planning efforts.

Key Related Initiatives:

- The Panel is not aware of any related initiatives.

3.2.5 Regional Plans

Issue

A regional plan enacted under the *Alberta Land Stewardship Act* would provide clear direction and enhance the ability to address cumulative effects in the area or to inform implementation of some of the Panel's recommendations.

Desired Outcome

A regional plan for the Upper Peace Region has been created and implemented.

This supports the Panel's overarching objectives to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems;*
- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

Creation of a regional plan for the Upper Peace region is undertaken in the near-term.

Rationale

- The Panel feels strongly that a regional plan is needed to support efforts to guide orderly development, via thresholds and limits, in the area.
- A regional plan would provide direction to the implementation of the Panel's recommendations.

Key Related Initiatives

Regional planning efforts led by the Alberta Land-use Secretariat.

3.2.6 Alternative Reclamation Options

Issue

Community residents have expressed a desire for more natural-looking water storage structures and for these structures to be left to support recreation opportunities once they are no longer required to support energy development. However, existing reclamation requirements are a barrier to doing things better. The Panel sees potential environmental benefits in supporting alternative reclamation.

Currently, constructed water storage structures (ponds) must be reclaimed at end-of-life to a capability equivalent to the land's original state. Companies are able to construct these structures in ways that are more appropriate for wildlife, which support future recreation opportunities, or which are more aesthetically natural-looking, but this comes with additional construction costs. These additional construction costs could be balanced in part by lower reclamation costs if the water storage structures could be left on the landscape.

Desired Outcome

Industry is allowed to construct more natural-looking water storage structures and leave them in place as waterbodies.

This supports the Panel's overarching objective to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems.*

Recommendation

Clarify reclamation guidelines, regulatory requirements and process to allow for alternative reclamation plans (e.g., constructed water bodies) and how this can be enabled.

The new water bodies must be hydraulically connected to enable surface or groundwater recharge.

Rationale

- The aesthetics of large storage facilities for HQNS water would be improved.
- Companies would be less reluctant to invest in constructing to a higher standard if full reclamation to original land use is not required.

Enabling this change would avoid adding further energy sector sites to the landscape that require reclamation and would help address concerns about net loss of wetlands.

Key Related Initiatives

- The Panel is not aware of any related initiatives.

3.2.7 Municipal Water Priority

Issue

In some circumstances, an industrial water user may hold a higher priority water licence (e.g., term licence for surface or groundwater) than another user. In some cases this means during low water periods a municipal water supply is required to stop withdrawing while the industrial withdrawal may continue.

Municipal water serves basic human needs. The Panel considers these needs to be more important than industrial uses such as energy development.

Desired Outcome

Municipal users in the MD of Greenview have secure access to water during low water periods.

This supports the Panel's overarching objective to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems.*

Recommendation

Prior to a low water event, energy operators accessing the same water sources (surface or ground) as a municipality or domestic user put in place a water sharing agreement that allows municipal/domestic access to water during low water periods.

This recommendation does not affect priority of rights under the *Water Act* and should be considered an AER practice, not a regulatory requirement.

Rationale

- The security of municipal water supplies during low water periods would be increased.
- This would demonstrate cooperation among users in times of low water availability.
- Municipalities may not need to incur additional costs to supply drinking water.

Key Related Initiatives

- Lower Athabasca Regional Plan (LARP)

3.3 Implementation

3.3.1 Policy Approval

Issue

There is currently no comprehensive policy regarding water conservation for the upstream oil and gas sector. The water conservation policy currently in place applies only to conventional water flooding and thermal *in situ* oil sands operations.

The *Water Conservation Policy for Upstream Oil and Gas Operations* (WCP) has been drafted and is pending final approval and implementation by the Government of Alberta.

Desired Outcome

A policy on water conservation exists for reference and use by the upstream oil and gas sector in the province.

Recommendation

The Department of Environment and Parks should seek approval for the draft *Water Conservation Policy for Upstream Oil and Gas*.

Rationale

- Meets the *Water for Life: Alberta's Strategy for Sustainability* goals of:
  - Safe, secure drinking water;
  - Healthy aquatic ecosystems;
  - Reliable, quality water supplies for a sustainable economy.
- The policy would guide the use and conservation of HQNS water.
- The principles of wise water management would be applied to energy subsectors.
- The Draft Policy will allow for effective environmental management systems and will improve water use data management and reporting.
- The Draft Policy outlines the preferred use of alternative water sources to HQNS water.

Key Related Initiatives:

- AER draft hydraulic fracturing guideline

3.3.2 Implementation Response

Issue

Members of the Panel have actively supported the development of recommendations and wish to remain involved and informed of ongoing progress on implementing the recommendations.

Desired Outcome

Panel participants are informed about the AER's and AEP's response to the Panel's recommendations, including implementation actions and timelines for undertaking those actions. A forum exists to table

issues of concern that may arise during the development and implementation of the AER's and AEP's response to the Panel's recommendations and to clarify the Panel's intent.

Recommendation

AER and AEP should provide written and verbal updates on the progress of implementing the ABR Panel recommendations through existing channels - such as e-mail and Talk.aer, as well as periodic in-person panel meetings beginning in fall 2017.

Rationale

- The Panel wishes to remain aware and engaged as the AER and AEP develop and implement responses to the Panel's recommendations.
- Periodic meetings would provide a mechanism by which the Panel can raise issues and provide input regarding the intent of the recommendations and their implementation.
- Establishing a feedback loop and demonstrating progress is important to Panel participants.
- Maintaining communication and responding to each of the Panel's individual recommendations will offer accountability and transparency.
- Panel participants may be able to assist with implementation of the recommendations.

Key Related Initiatives

- The Panel is not aware of any related initiatives.

3.3.3 ABR Pilot Implementation

Issue

Many of the Panel's recommendations are intended to work in concert with one another to achieve the outcomes laid out in the Draft Policy. They are not intended to be 'picked and chosen from individually' without connection to other supporting actions.

While the Panel believes its recommendations will be successful in catalyzing an increase of energy sector use of alternative sources to HQNS water, the Panel feels it prudent to test the direction of its recommendations (where feasible) before fully binding requirements are established.

Desired Outcome

The direction provided in the Panel's recommendations are tested through an area-based pilot prior to full implementation. Learnings from the tests, through the application and approval process under revised policy and regulatory regimes, are used to inform and improve implementation. Outcomes of the regional pilot are evaluated with metrics to determine the level of success.

Recommendation

AER, AEP, and industry representatives of the Panel implement applicable ABR Panel recommendations as an area-based pilot.

Rationale

- This may expand the traditional regulatory development process to consider a broader set of interconnected requirements.
- The application process can be used in a closely-controlled and limited format with defined performance monitoring.
- The application process will enable energy companies to provide insight into achieving desired outcomes and adjusting potential requirements as needed.
- Any testing can be scoped to include only select practices or combinations of practices where an application may illustrate a change in performance measures.
- Panel recommendations that have been considered most applicable for piloting are the:
    - Risk-based Fluid Management (Recommendation 3.1.1);
    - Temporary Surface Hoses and Pipelines (Recommendation 3.1.3);
    - Withdrawal Restrictions (Recommendation 3.2.3).

Key Related Initiatives

- The Panel is not aware of any related initiatives.

4.0 SUPPORTING RECOMMENDATIONS

In addition to primary recommendations, the Panel identified a number of recommendations that are more supportive in nature (summarized in Appendix A). These recommendations are aimed at helping address a number of public concerns regarding water use in the MD of Greenview. The Panel believes that acceptance and implementation of its supporting recommendations would enable decision-makers and water users to more effectively manage water resources in the area. This would support achievement of the primary recommendations and the overall desired outcomes that drove the Panel's work.

The Panel's supporting recommendations related to four main areas:

- *Data, information and monitoring* – Taking action to support the enhancement of data gathering and public reporting, so that decision-makers and water users can make more informed decisions about the use and management of water in the area.
- *Compliance* – Undertaking efforts to strengthen energy sector compliance with policies, practices and requirements regarding the use and management of water and providing effective oversight on behalf of Albertans.
- *Communications* – Improving the ability of stakeholders and members of the public to access information about water use in the area.
- *Supplementary Opportunities* – Other opportunities that fall outside the scope of the Panel but which the Panel feels could be helpful to the applicable organizations.

4.1 Data, Information, and Monitoring

4.1.1 Advancing Winter Instream Flow Science

Issue

Decisions regarding water withdrawal from watercourses in Alberta are often made using the instream flow needs desktop method. This method helps identify the water flows needed to maintain the ecological health of rivers, streams and other flowing water bodies where no site-specific data is available. The desktop method is attuned generally to larger watercourses during the open water period, in part because more flow data is available for these watercourses.

Winter flow monitoring data is often collected by operators and through a few four-season government monitoring stations. This information could be made available to advance the understanding of instream flow needs during the winter season and in smaller watercourses.

Desired Outcome

There is improved understanding of instream flow needs for all Alberta watercourses during all seasons.

This supports the Panel's overarching objective to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems*.

Recommendation

AER, AEP, and operators compile winter flow information for scientists specializing in instream flow-needs to support further development of Alberta's instream flow-needs science and the desktop method.

Rationale

- Few hydrometric stations operate during the winter months, so it would be useful to gather additional monitoring information directly from operators who have such information.
- Winter flow data is an acknowledged gap that increases uncertainty in winter flow estimates.
- Winter flow measurements, especially in the smaller watercourses, would help validate a flow assessment tool is currently under development for ungauged basins.
- This would demonstrate collaboration amongst area stakeholders to improve decision-making tools relating to water allocation.
- Winter flow information would be made more available, helping to support public reporting needs.

Key Related Initiatives

- The Panel is not aware of any related initiatives.

4.1.2 Standardized and Public Reporting and Metrics

Issue

The data provided by industry to the AER on water diversion and use is not easily available for further analysis by the AER or for near 'real-time' public reporting. Currently the data is reported by companies in an inconsistent and often inaccessible manner.

As a condition on a water licence or other approval documents, the AER requires reporting of specific data regarding water diversion and use. There is no consistent format for how this data is reported. There is also some variation in what data is reported, due in part to the evolution of data reporting requirements over time. For example, older licences do not contain more recent reporting requirements.

Desired Outcome

Data and information for the use of HQNS water and alternative sources is provided in a consistent and easily usable format, and industry performance with regard to water use is publicly reported.

This supports the Panel's overarching objective to:

- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

The AER should develop and implement a standard submission format and timeframe for industry to report on the diversion and use of HQNS water and alternatives to HQNS water. Based on the existing requirements, the development of standardized reporting should consider:

- A consistent format for industry reporting of
    - HQNS water allocation, diversion, and use.
    - Fluid production from wells and the use of alternatives to HQNS water.
- Including, where available, the upstream and downstream flow measurements at the time of extraction.
- Clarity on reporting frequency.

- A plan for how the data will be analyzed and used for decision making and for public communication.
- Clarity on frequency of public communication.
- Collection and reporting of data in a form that enables an audit.

The AER should develop performance metrics for both HQNS water and alternatives to HQNS water, and report publicly against these metrics. Metrics should include the use of water and alternatives, and production-based performance measures.

Rationale

- Historical data collection systems for HQNS water and fluids from alternative sources were not designed to meet the current needs of stakeholders, the AER and AEP.
- A standardized reporting format would improve overall reporting and the availability of information.
- Industry has the capacity to provide the required information in a timely manner.
- To be effectively used, the cumulative effects management approach requires timely, accurate and readily useable data.
- Regular public reporting against established metrics would provide area stakeholders with a more complete and transparent picture of water allocations, diversion and use for hydraulic fracturing in the area.

Key Related Initiatives

- AER Industry Operations is/has released performance reporting and metrics that apply industry wide.

4.1.3 Amending Temporary Diversion Licenses

Issue

The water licensing process and the associated electronic systems do not allow amendments to temporary diversion licences (TDLs).

In cases where a water diversion has not yet commenced, the AER may cancel and reissue a TDL with the corrected information. In cases where a water diversion has already commenced, the AER will issue a second TDL that can include adjusted diversion amounts. This can result in duplication of the allocation volumes and the appearance that higher-than-requested volumes have been allocated.

Desired Outcome

The AER's TDL processes and electronic information systems correctly reflect the amount of water allocated using TDLs, thereby providing increased transparency for water allocations and the use of alternative sources.

This supports the Panel's overarching objective to:

- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

Modify the current AER licensing process and electronic systems for TDLs to allow volume and other administrative amendments.

Rationale

- This would enable the accurate tabulation of water volumes allocated using TDLs.
- Public reporting of water allocations would be improved.

Key Related Initiatives

- The Panel is not aware of any related initiatives.

4.1.4 Unused Allocation Review

Issue

Many water allocations have been issued in the MD of Greenview. It is likely that some of these allocations are not being used, potentially because the original applicant is no longer in business or because the allocation is no longer needed. These unused allocations may limit the availability of new allocations as the rate of energy development increases in the area.

The AER may decide not to renew a water license if there has been no diversion of any of the water allocated in the license during a period of three years and there is no intent to divert all or part of the water specified in the license. Many historical licences do not have a term for renewal and so are not reviewed through a renewal process.

Desired Outcome

All unused allocation volumes are returned to the Crown and are available for re-allocation when needed, ensuring improved accuracy in water allocation accounting

This supports the Panel's overarching objective to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems*.

Recommendation

The AER conduct a periodic administrative review of energy sector water allocations in the MD of Greenview to identify unused water allocations that have been in place for some time for the purpose of returning those allocations to the Crown. Such a review should also consider:

- Situations where the company has no intent to use the water or is defunct.
- Providing notice to licensees in the area of the intention to review the use of allocations.
- Defining an acceptable "expectation of use"; i.e. if a licence is unused for 10 years, it will be reviewed, to scope the review of licences and perhaps inform future licence or renewal conditions.
- Allow a reclamation period, where licence volume is reduced to a nominal volume until reclamation is done, so that associated diversion infrastructure can be removed.

- Prompting industry to review their own licenced allocations so that unused licences can be returned to the Crown.
- Watersheds that represent more risk due to location.
- Allocations that represent more risk (e.g., higher allocated volumes).

Rationale

- A review with clear criteria will differentiate between companies that are not using or intending to use their water allocation and companies with low water use because they are successfully utilizing alternative sources to HQNS surface water.
- Water allocation accounting in the area would improve and unused allocations would be removed from the overall water allocation total.
- This would support an improved assessment of cumulative water allocations.
- This may make more water available for allocation.

Key Related Initiatives

- The Panel is not aware of any related initiatives.

4.1.5 Streamflow Monitoring

Issue

There are concerns amongst the public and Panel that the existing streamflow monitoring network in the MD of Greenview is insufficient to fully understand surface streamflow conditions and to manage cumulative effects in light of anticipated increases in unconventional development. The only year-round metering station is considered too distant from the main areas of energy development activity.

Desired Outcome

The existing streamflow monitoring network is sufficient to meet the needs of expanding unconventional resource development and increased water use in the MD of Greenview.

This supports the Panel's overarching objectives to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems;*
- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

AEP and the AER should assess the existing surface streamflow monitoring network in the MD of Greenview for monitoring gaps and develop an action plan, including funding requirements, to address deficiencies.

Rationale

- Cumulative effects management relies on the availability of high-quality environmental monitoring data and adequate monitoring coverage of the area that is to be managed. The existing monitoring network may not be adequate to support effective cumulative effects management.
- The current streamflow monitoring network existed before the onset of unconventional resource development in the MD of Greenview.

- All stakeholders recognize the importance of making decisions based on accurate and complete information wherever possible.
- In discussions with the Town of Fox Creek in mid-2006, the Alberta Minister of Energy committed to increase water streamflow monitoring. Additional meters have not been provided to date.

Key Related Initiatives:

- AER cumulative effects assessment for water allocations in the MD of Greenview.

4.2 Compliance

4.2.1 Compliance and Education

Issue

The compliance assurance activities of the AER are generally not visible to the public, communities and, in some cases, energy companies. This can lead to concerns amongst stakeholders and the public about the capacity of the AER to monitor and enforce rules in the MD of Greenview, particularly since there is increasing unconventional resource development in the area. It also raises concerns about the degree of cooperation amongst regulatory agencies (e.g., the AER and AEP).

Desired Outcome

AER monitoring and enforcement visibility has increased in the MD of Greenview, with demonstrated collaboration with AEP. Industry has improved compliance and awareness of the rules.

This supports the Panel's overarching objectives of:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems;*
- *increase the use of alternative sources to HQNS water to the extent practical*.

Recommendation

The AER should increase monitoring and compliance efforts (e.g., the number of person days) with a focus on risk programs targeting water diversion and use in the MD of Greenview.

The AER, in coordination with AEP and the municipality, develop a communication strategy to enhance education and compliance, as well as increase awareness of existing compliance efforts.

Rationale

- Public confidence (regarding current and new rules related to the use of HQNS water, transportation, storage, and use of alternatives) in industry compliance will increase if the AER increases its industry education, monitoring and enforcement activities, and scales up its monitoring and compliance assurance capacity as industry activity increases in an area.
- Compliance monitoring would become easier as licensees and contractors become better aware of and better understand the conditions, rules and regulations associated with their operations.
- Improved visibility of the AER and AEP should lead to a reduction in compliance issues and, potentially, a reduction in the number of statements of concern and operational complaints that are received.

Key Related Initiatives

- The Panel is not aware of any related initiatives.

4.3 Communications

4.3.1 Site Signage

Issue

There are concerns amongst stakeholders and the public regarding the legitimacy of water trucks at diversion sites, whether points of diversion have been approved, and who holds the diversion licence. When signs are used at diversion sites, the information that is displayed and the methods used to display the information are inconsistent across operators.

Desired Outcome

There is transparency of water use and licensing information, such that members of the public can verify the validity of the information.

This supports the Panel's overarching objective to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems.*

Recommendation

AER revises the terms and conditions of all term and temporary diversion licences (TDL) to require licensees to display information at the point of diversion in addition to having the information available from the driver and a copy posted on site at all times.

An example water licence condition could read:
The licensee shall identify a water diversion site by the use of a conspicuous sign erected at the point of diversion as described in the licence that indicates at a minimum:

- *the name of the licensee or operator*
- *licence number*
- *the legal location of the point of diversion*
- *if the area is fish-bearing habitat*
- *where to obtain further information (i.e. a link to the Authorization Viewer)*

The licensee must also have copies of the licence accessible at the point of diversion at all times as well as with any person transporting water by truck under the authority of the water licence.

Figure 4.1 Examples of point of diversion signage with licence attached.

Rationale

- This would improve public visibility of regulatory information associated with water diversions.
- Monitoring and compliance could be enhanced since anyone, including members of the public, would be able to see and verify that a valid licence is in place for a water diversion and could follow-up to confirm details of the licence.

4.3.2 Single Information Source

Issue

Overall, there is very limited ability for stakeholders to access information regarding water allocation and water use by the energy sector. For example, allocation information is available only by accessing individual approvals (Link to Authorization Viewer).

The inability to access complete information in one location creates a barrier to transparency and prevents stakeholders from having a good understanding of current water management. This, in turn, erodes public confidence.

Desired Outcome

Water information is available to the AER, the Government of Alberta, industry, indigenous communities, stakeholders and the public from a single location, essentially creating a one-stop portal for data, information and analysis relating to water.

This supports the Panel's overarching objective to:

- *reduce, minimize and responsibly manage impacts to aquatic ecosystems*.

Recommendation

The AER should create a single online source of publicly available water information, including at minimum:

- Surface and groundwater information
- Water allocation and water use volumes
- Category of water used (high-quality non-saline, low-quality non-saline, saline, other).
- Water licence information, including operator, withdrawal location, point of use locations, conditions, etc.
- Cumulative assessment of water allocations and information relating to the Basin Regulatory Framework (Recommendation 3.3.2).

Online availability should include mobile functionality (e.g., smartphone or tablet).

Implementation could begin with periodically updated static information with eventual availability of dynamic information (e.g., updated live with changes in information).

Rationale

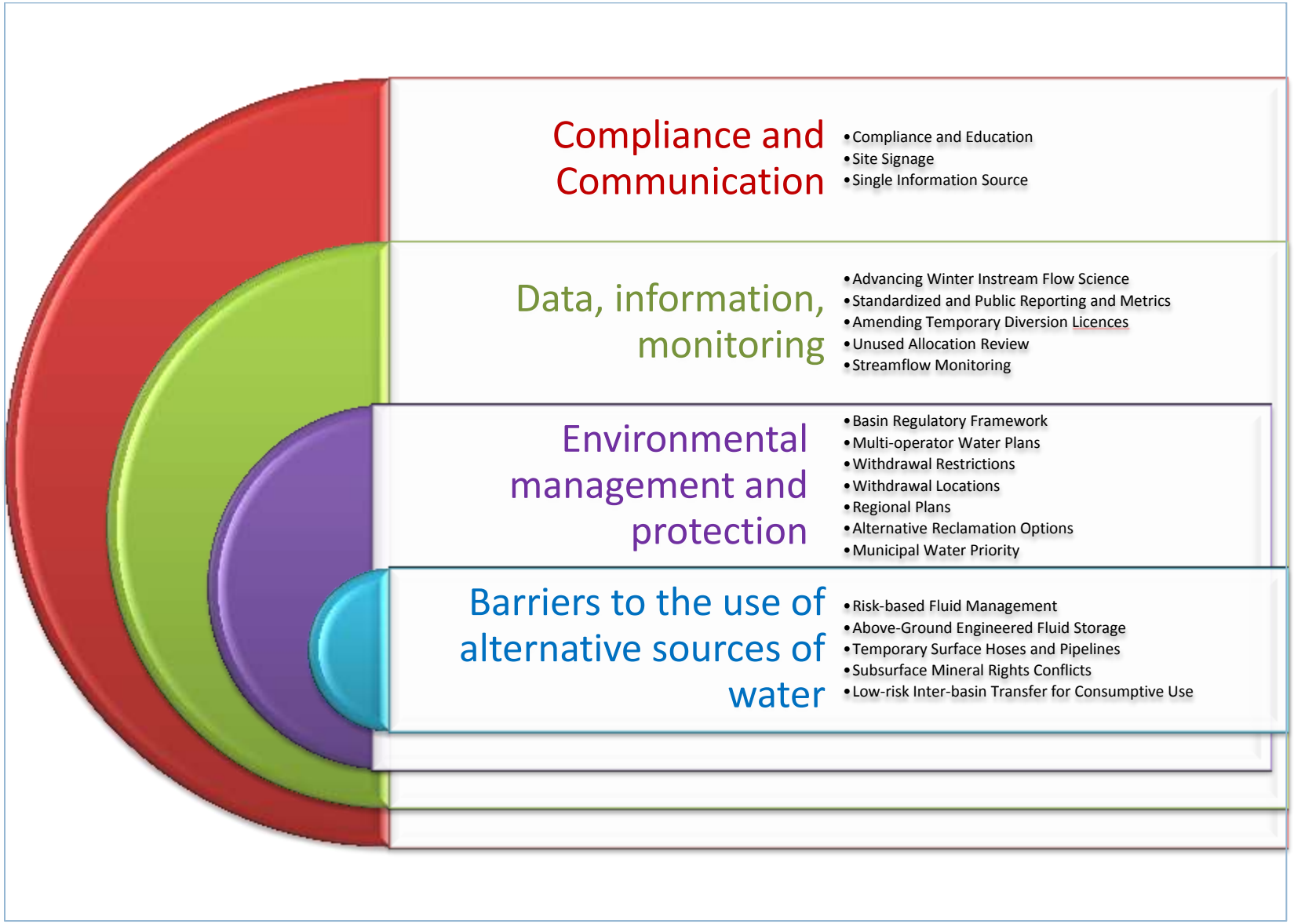
- Online and mobile access to information would improve the transparency of information relating to a vital public resource.
- Providing information through a single portal, as opposed to multiple sites or searches, will facilitate access to and a more complete understanding of water-related information.
- Companies could use the information to determine which water sources are available for further allocations, which are potentially constrained, and which are not available.
- Companies could use this information to understand and account for potential water restrictions to justify requests for new allocations.
- Industry supports the publication of water use data. Most of this information is already collected and reported by industry through the Water Use Reporting System (WURS) and the *Directive 59: Well Drilling and Completion Data Filing Requirements* Digital Data Submission (DDS) system.
- The AER and AEP require the information to effectively undertake cumulative effects management and make informed decisions.

Key Related Initiatives

- Water Performance Report

APPENDIX A:
Consolidated Recommendations

A depiction of the progression of recommendations to support increasing the use of alternative sources of water:



ISSUE	RECOMMENDATION
Barrier Recommendations	
3.1.1 Risk-Based Fluids Management The regulatory system restricts or prohibits the use of alternate sources of water that are preferred by the draft *Water Conservation Policy*.	The AER should develop a risk-based, full-lifecycle fluid management framework that is based on fluid chemistry and that can accommodate changes in fluid chemistry throughout its lifecycle of use.
3.1.2 Above-Ground Engineered Fluid Storage A prescribed limit on above-ground engineered storage volumes makes them ineffective to support operations.	Replace the volume and duration restrictions for above-ground engineered storage facilities with a risk-based approach that considers the type of fluid being stored, the method of storage, and the potential environmental and safety risks.
3.1.3 Temporary Surface Hoses and Pipelines Overall environmental impacts may be greater because of the inability to use surface hose or temporary surface pipelines to convey alternative sources of water.	The AER should expand which fluids it allows to be transported using temporary surface hose and pipeline, using evidence of environmental performance and protection, including heightened operational oversight by industry.
3.1.4 Subsurface Mineral Rights Conflicts for Alternatives Access to some alternative sources of water is hindered because of requirements for consent from a mineral lessee and the potential for trespass with a mineral rights holder.	AER should adjust *Directive 056* to require notification only from operators targeting deep low-quality, non-saline and deep saline water, and Department of Energy set clear criteria including minimum hydrocarbon content to trigger trespass investigations for wells under the *Mines and Minerals Act*.
3.1.5 Low-risk Inter-basin Transfers for Consumptive Use The transfer of water between major basins in Alberta is not permitted except by a special Act of the Legislature.	For basins not currently under water restrictions, enable low-risk transfers of water across major basin boundaries when intended for consumptive use and when an overall decrease in net environmental effects will result from the transfer.
Environmental Management and Protection	
3.2.1 Basin Regulatory Framework Water users in the energy sector cannot predict in advance of their applications if and when they need to limit HQNS water use in favour of alternative sources.	The AER and AEP should develop a tiered regulatory framework with associated regulatory requirements and expectations for energy sector water use that is based on cumulative water allocations at the sub-basin level.
3.2.2 Multi-Operator Water Plans It is not clear how Multi-Operator Water Plans will function, how they will be reviewed and assessed, or what regulatory tools are needed to provide sufficient oversight.	The AER and AEP should collaboratively, along with industry and service companies, define the requirements and processes for MOWPs.
3.2.3 Withdrawal Restrictions Small streams are considered sensitive because they provide habitat for important species or simply cannot withstand a large degree of disturbance.	No energy industry surface water allocations or diversions should be allowed from Strahler stream order 1, 2 or 3 and Class A watercourses, except for nominal uses. In addition, AEP and the AER should pilot a decision-support tool similar to the Desktop Method to support water allocation decisions on lakes in the MD of Greenview.
3.2.4 Withdrawal Locations Accessing watercourses for temporary water diversions damages public lands and riparian buffers.	The AER should develop regulatory standards for selecting, constructing, maintaining, and decommissioning sites used for temporary diversions.
3.2.5 Regional Plans A regional plan enacted under the Alberta Land Stewardship Act would provide clear direction and enhance the ability to address cumulative effects in the area or to inform implementation of some of the Panel's recommendations.	Creation of a regional plan for the Upper Peace region is undertaken in the near-term.

ISSUE	RECOMMENDATION
3.2.6 Alternative Reclamation Options Water storage structures (ponds) must be reclaimed at end-of-life to a capability equivalent to the land's original state. Alternative reclamation strategies, such as constructing ponds to remain on the landscape, are rarely permitted.	Clarify reclamation guidelines, regulatory requirements and process to allow for alternative reclamation plans (e.g., constructed water bodies) and how this can be enabled.
3.2.7 Municipal Water Priority Municipal water licences do not always hold priority, which can mean that during low water periods, a municipality must stop withdrawing while higher priority industrial user may continue.	Prior to a low water event, energy operators accessing the same water sources (surface or ground) as a municipality or domestic user could put in place, as an AER practice, a water sharing agreement that allows municipal/domestic access to water during low water periods.
Implementation	
3.3.1 Policy Approval The *Water Conservation Policy for Upstream Oil and Gas Operations* has been drafted and is pending final approval and implementation.	The Department of Environment and Parks should seek approval for the draft *Water Conservation Policy for Upstream Oil and Gas*.
3.3.2 Implementation Response The Panel wish to remain involved and informed of ongoing progress on implementation.	AER and AEP should provide updates on the progress of implementing the ABR Panel recommendations, including an in-person panel meeting in fall 2017.
3.3.3 ABR Pilot Implementation Recommendations should be tested, individually or in combination prior to full implementation.	AER, AEP, and industry representatives of the Panel implement applicable ABR Panel recommendations as an area-based pilot.
Data, Information, and Monitoring	
4.1.1 Advancing Winter Instream Flow Science Winter flow monitoring data is not available to advance the understanding of instream flow needs during the winter season and in smaller watercourses.	AER, AEP, and operators compile winter flow information for scientists specializing in instream flow-needs to support further development of Alberta's instream flow-needs science and the desktop method.
4.1.2 Standardized and Public Reporting Metrics Water diversion and use data is reported by companies in an inconsistent and often inaccessible manner, which prevents further analysis and near 'real-time' public reporting.	The AER should develop and implement a standard submission format and timeframe for industry to report on the diversion and use of HQNS water and alternatives to HQNS water.
4.1.3 Amending Temporary Diversion Licences The water licensing process and the associated electronic systems do not allow amendments to temporary diversion licences (TDLs).	Modify the current AER licensing process and electronic systems for TDLs to allow volume and other administrative amendments.
4.1.4 Unused Allocation Review Unused allocations may limit the availability of new allocations as the rate of energy development increases in the area.	The AER conduct a periodic administrative review of energy sector water allocations in the MD of Greenview to identify unused water allocations for the purpose of returning those allocations to the Crown.
4.1.5 Streamflow Monitoring The existing streamflow monitoring network in the MD of Greenview is insufficient to fully understand surface streamflow conditions and manage cumulative effects.	AEP and the AER should assess the existing surface streamflow monitoring network in the MD of Greenview for monitoring gaps and develop an action plan, including funding requirements, to address deficiencies.
Compliance and Education	

ISSUE	RECOMMENDATION
4.2.1 Compliance and Education There is the potential to improve compliance efforts through a coordinated communication strategy and a focus on risk programs targeting water diversion.	The AER should increase monitoring and compliance efforts, focusing on water diversion and use in the MD of Greenview. The AER, AEP, and the municipality, develop a coordinated communication strategy to enhance education and compliance, as well as increase awareness of existing compliance efforts.
Communications	
4.3.1 Site Signage Stakeholders and the public are concerned about whether points of diversion have been approved. When site signs are used at diversion sites, the information displayed and the methods used are inconsistent across operators.	AER revise the terms and conditions of all term and temporary diversion licences (TDL) to require licensees to display information at the point of diversion in addition to having the information available from the driver and a copy posted on site at all times.
4.3.2 Single Information Source There is no ability to access complete water allocation, diversion and use information in one location.	The AER should create a single online source of publicly available water information for surface and groundwater information.

PRIMARY RECOMMENDATIONS			
Number	**Title**	**Issue**	**Recommendation**
3.1.1	Risk-Based Fluids Management	Although the Draft Policy articulates a preference for the use of alternative sources over HQNS water sources, the regulatory system restricts or prohibits the use of many alternative sources. This prevents energy operators from creating treatment, transportation, storage and use schemes that could reduce risks and increase the use of alternative sources.	The AER should develop a risk-based, full-lifecycle fluid management framework that improves industry performance in the use of alternatives to HQNS water by: • Applying regulatory controls for treatment, transportation, storage and use that are based on the risk profile for alternatives to HQNS water. • Accommodating changes in fluid composition that may occur as a result of treatment or co-mingling. • Reporting on the trends in use of HQNS water and alternative sources to HQNS water for hydraulic fracturing in the MD of Greenview. • Requiring industry reporting on character of the fluids, their associated risk, and range of potential contamination over the full activity lifecycle described. • The removal of these barriers would enable companies to achieve progressively higher rates of use of alternatives to HQNS water should that become a regulatory requirement. This recommendation is contingent on removing barriers to alternative water use and enables the Basin Regulatory Framework. This recommendation should be piloted in the MD of Greenview, as described in recommendation 3.3.3.

Number	Title	Issue	Recommendation
3.1.2	Above-Ground Engineered Fluid Storage	There are prescribed limits on the volume of storage of flowback and produced water in above-ground engineered storage. The restriction on volume means that insufficient volume is available to complete a single hydraulic fracturing operation without multiple storage units.	Replace the volume and duration restrictions for above-ground engineered storage facilities with a risk-based approach (i.e., location, design, mitigation of risk (e.g. berms), installation, and operation) that considers the type of fluid being stored, the method of storage, and the potential environmental and safety risks. This links to and could be incorporated into a risk-based fluid management framework (Recommendation 3.1.1). This recommendation could be piloted in the MD of Greenview, as described in recommendation 3.3.3.
3.1.3	Temporary Surface Hoses and Pipelines	The inability to use surface hose (e.g., lay flat hose) or temporary surface pipelines (e.g., welded thick walled plastic pipe) to convey alternative sources of water, beyond the existing criteria (*AER Bulletin 2014-38*), may increase potential impacts to the environment from greater truck traffic and/or the use of in-ground pipelines.	The Panel acknowledges the environmental risk associated with this recommendation as well as the opportunity to enable increased use of alternatives. This recommendation must be developed and implemented with a high level of oversight by industry and the regulator. It potentially requires a prescriptive solution. The AER should expand which fluids it allows to be transported using temporary surface hose and pipeline, using evidence of environmental performance and protection, including heightened operational oversight by industry. This expansion should include demonstrated reduction of fragmentation (linear disturbance footprint) risk and any needed monitoring and public reporting for performance assurance. This recommendation should be piloted in the MD of Greenview, as described in recommendation 3.3.3.

Number	Title	Issue	Recommendation
3.1.4	Subsurface Mineral Rights Conflicts for Alternatives	There are two inter-related issues regarding access to and use of some sources of LQNS groundwater and saline groundwater: • Consent from a mineral lessee to operate in the same subsurface space • Potential for trespass with a mineral rights holder	To enable access and use of alternatives to HQNS water in the MD of Greenview: • *Issue 1*: AER adjust *Directive 056: Energy Development Applications and Schedules* (s.7.11.11) to require notification only from operators targeting deep LQNS and deep saline water, instead of the current requirement for obtaining consent from the mineral rights lessee for the water sourcing activity. • *Issue 2*: Department of Energy set clear criteria including minimum hydrocarbon content to trigger trespass investigations for wells under the *Mines and Minerals Act* (s.54(1)) to allow for access to deep LQNS and saline water sources.
3.1.5	Low-risk Inter-basin Transfers for Consumptive Use	Under the *Water Act*, s. 47, the transfer of water between major basins in Alberta is not permitted except by a special Act of the Legislature. The issue of inter-basin transfer of water is sensitive to many Albertans. The *Water Act* provisions require a high level of scrutiny for potential inter-basin transfers and are intended to: • Protect ecological integrity and water quality • Consider trans-boundary, water management implications • Prevent major inter-basin diversion schemes	For basins not currently under water restrictions, enable low-risk transfers of water (as defined under the *Water Act*) across major basin boundaries when intended for consumptive use by operators who can demonstrate an overall decrease in net environmental effects resulting from a transfer. The transfer of water across major basin boundaries could be considered "low-risk" for: • Subsurface water sources whose aquifer does not conform to major basin boundaries. • Non-saline water (high and low quality) in circumstances where a transfer across major basin boundaries will lower environmental net effects. The Panel has noted that a robust and proven method for determining environmental net effects is required to enable any potential transfer. It is understood that any changes relating to inter-basin transfer will require legislative amendments with associated public consultation (*Water Act*, s. 48).

Number	Title	Issue	Recommendation

3.2.1	Basin Regulatory Framework	The Draft Policy seeks to minimize the use of HQNS water by the energy sector and encourage increasing use of alternative sources of water (e.g., LQNS and saline water) where possible. The policy recognizes:
		• The preferred use of saline groundwater and other alternatives to HQNS water;
		• Opportunities exist to minimize HQNS water use;
		• Water availability varies seasonally, annually, and across the landscape;
		• Ongoing access to HQNS water is required to support energy development;
		• The use of HQNS water, when it is abundant, may represent the lowest overall risk to the environment.
		
		In the current regulatory system, water users in the energy sector cannot predict in advance of their applications if and when they will need to limit HQNS water use in favour of alternative sources. Users do not have access to information that could inform their planning and operations (such as cumulative water allocations or basin condition, and the expectations associated with those varying environmental conditions). In addition, stakeholders and the public are unable to see if or when this information is factored into a regulatory decision on an application.
			The AER and AEP should develop a tiered regulatory framework with associated regulatory requirements and expectations for energy sector water use that is based on cumulative water allocations at the sub-basin level.
			
			In developing the framework, AEP and AER should consider:
			• Current barriers to accessing, transporting, storing, using, and disposing of alternative sources of water (Section 3.1) will limit the increased use of alternative sources of water, if they are not addressed.
			• Assessing the current state of cumulative water allocations, predicting water use trends based on foreseeable development activity, and making this information publicly available.
			• Assigning an interim overall cumulative water allocation for the energy sector until a regional plan for the area can be developed.
			• Requiring progressive increased use of alternative sources of water as a result of increasing levels of cumulative HQNS water allocation that includes:
			  ○ Increasing co-ordination and co-operation among operators
			  ○ Increasing levels of monitoring
			  ○ Mechanisms to ensure improved compliance
			  ○ Measures of industry readiness to increase the use of alternatives
			  ○ Incenting the use of alternatives to HQNS water
			  ○ Specific enforceable targets for use of alternative to HQNS water
			• Testing the framework for unintended consequences.

Number	Title	Issue	Recommendation
3.2.2	Multi-Operator Water Plans	As described in the Draft Policy, a MOWP is intended as a mechanism to enable collaborative and co-operative water management among industry operators at a sub-regional level. Currently, it is not clear how MOWPs will function, how they will be reviewed and assessed, or what regulatory tools are needed to provide sufficient oversight.	The AER and AEP should collaboratively, along with industry and service companies, define the requirements and processes for MOWPs. In developing the requirements, AER and AEP should consider: • What a MOWP needs to include • How a MOWP is authorized • If new regulatory instruments are needed to support a MOWP • What the requirements are to participate in an existing MOWP (e.g., for new operators to join) • What the monitoring and reporting requirements are under a MOWP • Thresholds associated with requirements for MOWPs. This is tied closely to Basin Regulatory Framework 3.2.1 • How MOWPs can demonstrate reduced HQNS water use to the public and stakeholders • Criteria for if and when participation in MOWPs is mandatory. This recommendation should be piloted in the MD of Greenview, as described in recommendation 3.3.3.
3.2.3	Withdrawal Restrictions	Some aquatic environments are considered sensitive because they provide habitat for important species or simply cannot withstand a large degree of disturbance. In the MD of Greenview these sensitive waterbodies can include small streams and groundwater-fed streams, lakes and wetlands.	No energy industry surface water allocations or diversions should be allowed from Strahler stream order 1, 2 or 3 and Class A watercourses, except for nominal uses such as ice building for winter road crossings, horizontal directional drilling for crossings, pipeline geotechnical and hydrostatic testing. A map of MD of Greenview watercourses is provided in Appendix B. In addition, AEP and the AER should pilot a decision-support tool similar to the Desktop Method to support water allocation decisions on lakes in the MD of Greenview.

Number	Title	Issue	Recommendation
3.2.4	Withdrawal Locations	Access to watercourses and the deployment of temporary diversion works can result in environmental impacts, including damage to public lands and compromised riparian buffers through the loss of vegetation, increased erosion and risk of watercourse siltation.	The AER should develop a regulatory standard for selecting, constructing, maintaining, and decommissioning sites used for temporary diversions. A standard could include: • Emphasis on use of existing diversion sites and sharing of diversion sites. • Natural or engineered approaches; rig matting, or direct access from roadway wide enough to allow traffic to continue to pass. • The use of above-ground engineered storage located off-stream and outside the riparian area with temporary piping to the waterbody. • Use of a consistent approval mechanism under the *Public Lands Act*. • Decommissioning and reclamation requirements, with timelines for completion. • Education, compliance monitoring, and enforcement activities for the standard. • Consideration of habitat conditions at the site. • No restrictions to public access to water.
3.2.5	Regional Plans	A regional plan enacted under the *Alberta Land Stewardship Act* would provide clear direction and enhance the ability to address cumulative effects in the area or to inform implementation of some of the Panel's recommendations.	Creation of a regional plan for the Upper Peace region is undertaken in the near-term.

Number	Title	Issue	Recommendation
3.2.6	Alternative Reclamation Options	Currently, constructed water storage structures (ponds) must be reclaimed at end-of-life to a capability equivalent to the land's original state. Companies are able to construct these structures in ways that are more appropriate for wildlife, which support future recreation opportunities, or which are more aesthetically natural-looking, but this comes with additional construction costs. These additional construction costs could be balanced in part by lower reclamation costs if the water storage structures could be left on the landscape.	Clarify reclamation guidelines, regulatory requirements and process to allow for alternative reclamation plans (e.g., constructed water bodies) and how this can be enabled. The new water bodies must be hydraulically connected to enable surface or groundwater recharge.
3.2.7	Municipal Water Priority	In some circumstances, an industrial water user may hold a higher priority water licence than another user. In some cases this means during low water periods a municipal water supply is required to stop withdrawing while the industrial withdrawal may continue.	Prior to a low water event, energy operators accessing the same water sources (surface or ground) as a municipality or domestic user put in place a water sharing agreement that allows municipal/domestic access to water during low water periods. This recommendation does not affect priority of rights under the *Water Act* and should be considered an AER practice, not a regulatory requirement.

Number	Title	Issue	Recommendation
3.3.1	Policy Approval	There is currently no comprehensive policy regarding water conservation for the upstream oil and gas sector. The water conservation policy currently in place applies only to conventional water flooding and thermal *in situ* oil sands operations. The *Water Conservation Policy for Upstream Oil and Gas Operations* (WCP) has been drafted and is pending final approval and implementation by the Government of Alberta.	The Department of Environment and Parks should seek approval for the draft *Water Conservation Policy for Upstream Oil and Gas*.
3.3.2	Implementation Response	Members of the Panel have actively supported the development of recommendations and wish to remain involved and informed of ongoing progress on implementing the recommendations.	AER and AEP should provide written and verbal updates on the progress of implementing the ABR Panel recommendations through existing channels - such as e-mail and Talk.aer, as well as periodic in-person panel meetings beginning in fall 2017.
3.3.3	ABR Pilot Implementation	The Panel feels it prudent to test the direction of its recommendations (where feasible) before fully binding requirements are established.	AER, AEP, and industry representatives of the Panel implement applicable ABR Panel recommendations as an area based pilot.

Number	Title	Issue	Recommendation
SUPPORTING RECOMMENDATIONS			
4.1.1	Advancing Winter Instream Flow Science	Winter flow monitoring data is often collected by operators and through a few four-season government monitoring stations. This information could be made available to advance the understanding of instream flow needs during the winter season and in smaller watercourses.	AER, AEP, and operators compile winter flow information for scientists specializing in instream flow-needs to support further development of Alberta's instream flow-needs science and the desktop method.

Number	Title	Issue	Recommendation

4.1.2	Standardized and Public Reporting Metrics	The data provided by industry to the AER on water diversion and use is not easily available for further analysis by the AER or for near 'real-time' public reporting. Currently the data is reported by companies in an inconsistent and often inaccessible manner.	The AER should develop and implement a standard submission format and timeframe for industry to report on the diversion and use of HQNS water and alternatives to HQNS water. Based on the existing requirements, the development of standardized reporting should consider:
			• A consistent format for industry reporting of
			  ○ HQNS water allocation, diversion, and use.
			  ○ Fluid production from wells and the use of alternatives to HQNS water.
			• Including, where available, the upstream and downstream flow measurements at the time of extraction.
			• Clarity on reporting frequency.
			• A plan for how the data will be analyzed and used for decision making and for public communication.
			• Clarity on frequency of public communication.
			• Collection and reporting of data in a form that enables an audit.
			
			The AER should develop performance metrics for both HQNS water and alternatives to HQNS water, and report publicly against these metrics. Metrics should include the use of water and alternatives, and production-based performance measures.

4.1.3	Amending Temporary Diversion Licences	The water licensing process and the associated electronic systems do not allow amendments to temporary diversion licences (TDLs).	Modify the current AER licensing process and electronic systems for TDLs to allow volume and other administrative amendments.

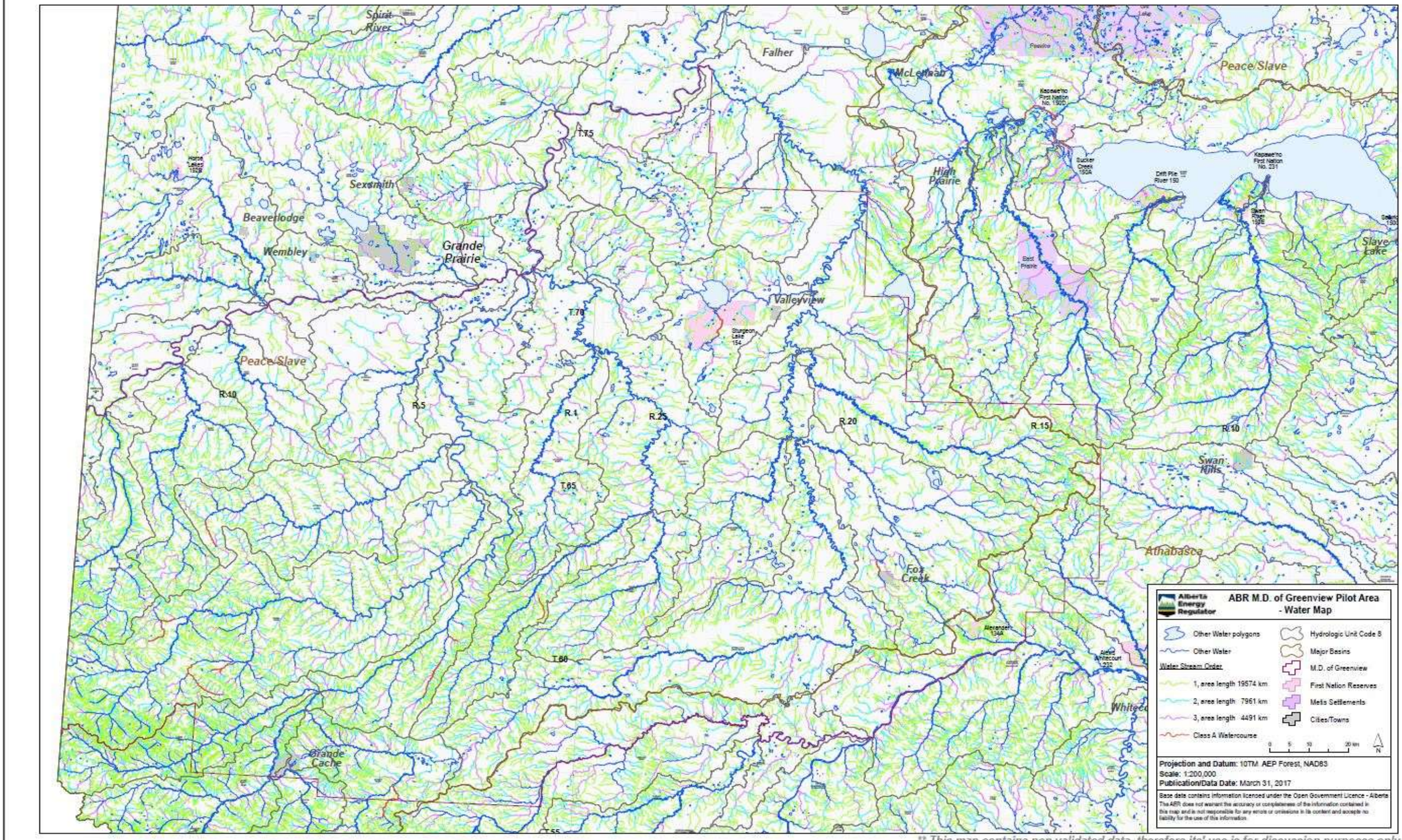
Number	Title	Issue	Recommendation
4.1.4	Unused Allocation Review	Many water allocations have been issued in the MD of Greenview. It is likely that some of these allocations are not being used, potentially because the original applicant is no longer in business or because the allocation is no longer needed. These unused allocations may limit the availability of new allocations as the rate of energy development increases in the area.	The AER conduct a periodic administrative review of energy sector water allocations in the MD of Greenview to identify unused water allocations that have been in place for some time for the purpose of returning those allocations to the Crown. Such a review should also consider: • Situations where the company has no intent to use the water or is defunct. • Providing notice to licensees in the area of the intention to review the use of allocations. • Defining an acceptable "expectation of use"; i.e. if a licence is unused for 10 years, it will be reviewed, to scope the review of licences and perhaps inform future licence or renewal conditions. • Allow a reclamation period, where licence volume is reduced to a nominal volume until reclamation is done, so that associated diversion infrastructure can be removed. • Prompting industry to review their own licenced allocations so that unused licences can be returned to the Crown. • Watersheds that represent more risk due to location. • Allocations that represent more risk (e.g., higher allocated volumes).
4.1.5	Streamflow Monitoring	There are concerns amongst the public and Panel that the existing streamflow monitoring network in the MD of Greenview is insufficient to fully understand surface streamflow conditions and to manage cumulative effects in light of anticipated increases in unconventional development. The only year-round metering station is considered too distant from the main areas of energy development activity.	AEP and the AER should assess the existing surface streamflow monitoring network in the MD of Greenview for monitoring gaps and develop an action plan, including funding requirements, to address deficiencies.

Number	Title	Issue	Recommendation
4.2.1	Compliance and Education	The compliance assurance activities of the AER are generally not visible to the public, communities and, in some cases, energy companies. This can lead to concerns amongst stakeholders and the public about the capacity of the AER to monitor and enforce rules in the MD of Greenview, particularly since there is increasing unconventional resource development in the area. It also raises concerns about the degree of cooperation amongst regulatory agencies (e.g., the AER and AEP).	The AER should increase monitoring and compliance efforts (e.g., the number of person days) with a focus on risk programs targeting water diversion and use in the MD of Greenview. The AER, in coordination with AEP and the municipality, develop a communication strategy to enhance education and compliance, as well as increase awareness of existing compliance efforts.

Number	Title	Issue	Recommendation
4.3.1	Site Signage	There are concerns amongst stakeholders and the public regarding the legitimacy of water trucks at diversion sites, whether points of diversion have been approved, and who holds the diversion licence. When signs are used at diversion sites, the information that is displayed and the methods used to display the information are inconsistent across operators.	AER revises the terms and conditions of all term and temporary diversion licences (TDL) to require licensees to display information at the point of diversion in addition to having the information available from the driver and a copy posted on site at all times. An example water licence condition could read: *The licensee shall identify a water diversion site by the use of a conspicuous sign erected at the point of diversion as described in the licence that indicates at a minimum:* • *the name of the licensee or operator* • *licence number* • *the legal location of the point of diversion* • *if the area is fish-bearing habitat* • *where to obtain further information (i.e. a link to the Authorization Viewer)* *The licensee must also have copies of the licence accessible at the point of diversion at all times as well as with any person transporting water by truck under the authority of the water licence.*

Number	Title	Issue	Recommendation
4.3.2	Single Information Source	The inability to access complete information in one location creates a barrier to transparency and prevents stakeholders from having a good understanding of current water management. This, in turn, erodes public confidence.	The AER should create a single online source of publicly available water information, including at minimum: • Surface and groundwater information • Water allocation and water use volumes • Category of water used (high-quality non-saline, low-quality non-saline, saline, other). • Water licence information, including operator, withdrawal location, point of use locations, conditions, etc. • Cumulative assessment of water allocations and information relating to the Basin Regulatory Framework (Recommendation 3.3.2). Online availability should include mobile functionality (e.g., smartphone or tablet). Implementation could begin with periodically updated static information with eventual availability of dynamic information (e.g., updated live with changes in information).

APPENDIX B:
Watercourses in the MD of Greenview



** This map contains non validated data, therefore its' use is for discussion purposes only.