



North Saskatchewan River Basin Water Management Roadmap

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Acronym List

AEPA	Alebrta Environment and Protected Areas
AER	Alberta Energy Regulator
CEP	Conservation, Efficiency, Productivity
EMRB	Edmonton Metropolitan Region Board
FITFIR	First-in-Time, First-in-Right
IWMP	Integrated Watershed Management Plan
NSR	North Saskatchewan River
NSRB	North Saskatchewan River Basin
NSWA	North Saskatchewan Watershed Alliance
PES	Payment for Ecosystem Services
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
WCO	Water Conservation Objectives

A Roadmap for Collaborative Water Management in the North Saskatchewan River Basin

The North Saskatchewan River Basin (NSRB) plays a critical role in supporting Alberta's economic prosperity, agricultural production, municipal development, and environmental integrity. As demands on water resources continue to grow, driven by industrial activity, population growth, land use change, and climate variability, there is a clear need for a coordinated and forward-looking approach to water management that strengthens long-term water security across the province.

This **Roadmap for Collaborative Water Management** (*Roadmap*) outlines a set of priority objectives developed through engagement with a broad cross-section of partners and stakeholders. The objectives are grounded in science, guided by community knowledge, and designed to align with Alberta's regulatory frameworks and strategic commitments, including the *Water for Life* strategy, regional land-use planning, and the work of the North Saskatchewan Watershed Alliance's (NSWA) Integrated Watershed Management Plan (IWMP).

The *Roadmap* is organized around four strategic drivers that reflect Alberta's evolving water management landscape:

- **Enhance the Use of Sustainable Water Management Practices**
Supporting innovation and efficiency in water use across sectors through conservation, reuse, data improvements, and basin-level planning is essential to managing water allocation sustainably.
- **Conserve and Restore Ecosystems to Maintain and Improve Watershed Health**
Natural assets such as wetlands, riparian zones, and connected floodplains are integral to watershed function. Restoring and managing these assets supports ecological resilience and contributes to Alberta's environmental objectives.
- **Maintain or Improve Water Quality**
Protecting drinking water sources—including tributaries, lakes, and small community supplies, requires improved monitoring, data-sharing, and support for infrastructure solutions that are both environmentally sound and economically viable.
- **Advance Inclusive, Shared Governance in Water Management**
Effective water management requires collaboration across governments, sectors, and communities.

The *Roadmap* reflects a shared commitment to sustainable, integrated water management that is responsive to Alberta's water realities. It offers clear direction for aligning provincial, municipal, and community actions while upholding environmental protection and enabling economic growth. By acting on these priorities, we can collectively strengthen water resilience in the NSRB and serve as a model for collaborative watershed stewardship.

Indigenous Perspectives

The worldview and perspectives of Indigenous peoples are important considerations in any discussion concerning the management of water and aquatic ecosystems, due to the cultural and traditional relationship between Indigenous People and water, as well as the need to recognize and build upon Treaty relationships and reconciliation between Indigenous and non-Indigenous Albertans.

The *Roadmap* project benefited from the participation of Indigenous individuals, who could not and should not represent the broader group of Indigenous Nations and communities. A much deeper dialogue and a better working relationship with Indigenous People on water and water issues is required.

The following quote provided to the Alberta Water Futures project completed by the Alberta Water Council in 2021 illustrates some of the challenges raised by the Indigenous participants during the *Roadmap* project.

The biggest challenges facing how water and water affecting activities are regulated concern historical issues about jurisdiction and responsibility towards water and the environment. These challenges stem from treaty relationships, and Indigenous peoples' rights and responsibilities in managing their relationships with water.

Indigenous communities have been left as by-standers in the management of natural resources during any discussions concerning water regulation. Beginning conversations about water regulation without addressing the fundamentally different perspectives on issues like water ownership, stewardship, and rights shared by Indigenous communities does not set the stage to start on equal footing.

The overlapping responsibilities of three governing bodies—the Government of Canada, the Government of Alberta, and Samson Cree Nation—plus other stakeholders further complicate our ability to practice self-determination. [...] Jurisdictional issues will be further complicated by a changing climate that already disproportionately affects Indigenous and vulnerable communities in an increasingly water stressed region.

There is tremendous opportunity to include Indigenous communities in a deep and respectful way so that future challenges can be approached in collaborative partnership. Indigenous communities should be front and center in issues like water regulation from the outset. There are many opportunities to create long-lasting partnerships, but we must be included in determining the scope and parameters of involvement. We would love to see a world where Albertans are educated about water issues and Indigenous issues so that they can approach these concerns in a respectful and reciprocal manner.

***Excerpts from the project survey response, used with permission
Nipîy Committee, Samson Cree Nation, Treaty 6.***

Roadmap Overview

The *Roadmap* outlines a set of 12 priority objectives designed to advance sustainable water management in the NSRB, including:

1. **Establish an Approved NSRB Water Management Plan** to guide water management decision-making.
2. **Establish Basin-scale Conservation, Efficiency, and Productivity (CEP) Targets** for municipalities and industry to incentivize sustainable water use.
3. **Support the Development and Implementation of Water Reuse Projects** in collaboration with industry and municipalities
4. **Improve Access to and Use of Alternative Water Sources** for consumptive operations, including improved availability of supporting data.
5. **Develop Aquifer Management Plans** informed by Alberta Energy Regulator (AER) and Government of Alberta objectives.
6. **Develop Natural Asset Programs and Tools** to support ecosystem services and fill key information gaps.
7. **Implement the North Saskatchewan River Wetland Strategy** to support implementation of the Alberta Wetland Policy in the NSRB.
8. **Improve Water Quality in Non-Mainstem Drinking Water Sources**, including lakes and tributaries.
9. **Improve Water Security for Indigenous Communities**, ensuring adequate and safe water is available for drinking, households, community needs, and emergency services.
10. **Create an Indigenous-Guided Future Roadmap** for Water in the NSRB.
11. **Enhance Connection with Alberta's Land-use Framework** and other existing regulatory frameworks.
12. **Explore Establishing a Collaborative Relationship with Hydro Facilities**, in support of shared understanding.

OBJECTIVE #1

Establish an Approved North Saskatchewan River Basin (NSRB) Water Management Plan to Guide Water Management Decision-Making

Description:

In Alberta, an approved water management plan is a formal planning instrument developed under the authority of the *Water Act*. It provides strategic direction for the allocation, use, and conservation of water within a defined watershed or basin. These plans are designed to support the long-term sustainability of water resources by balancing environmental, social, and economic needs.

This objective calls for the creation of a formally approved, basin-wide water management plan tailored to the unique context of the NSRB. The plan would offer a coordinated, science-based framework for water management and allocation decisions that would enhance clarity, consistency, and sustainability for all water users and ecosystems across the basin.

Rationale:

The North Saskatchewan River Basin is facing growing pressure from population growth, economic development, and climate variability. Water allocation decisions are currently made without the benefit of a unified, long-term strategy at the basin scale. This fragmented approach can lead to inconsistent outcomes and limit the effectiveness of conservation efforts.

An approved water management plan carries legal authority under the Alberta *Water Act* and must be considered in regulatory decisions (e.g., issuing water licences). Approval gives the plan significant policy weight, ensuring that decisions align with shared long-term priorities rather than short-term or reactive interests.

Developing an NSRB Water Management Plan would:

- Support integrated watershed management under Alberta's *Water for Life* strategy.
- Provide greater clarity and transparency for water users, regulators, and the public.
- Balance ecological and human needs, with science-based protections for instream flows and water conservation.
- Strengthen drought preparedness and water resilience in a changing climate.

Key First Actions:

1. Establish a multi-stakeholder process to scope, develop, and secure funding for the plan.

A representative, basin-wide planning process is essential to ensure the plan reflects shared priorities, builds legitimacy, and secures long-term support from governments, Indigenous communities, industry, agriculture, and environmental groups.

2. Conduct an instream flow needs assessment for the regulated river system.

This science-based analysis will inform environmental flow thresholds, ensuring the plan

supports the health of aquatic ecosystems, which are a foundational requirement for sustainable water allocation.

- 3. Develop science-based Water Conservation Objectives (WCOs) through the stakeholder process, with consideration of economic viability.**

WCOs will form a key component of the plan, helping to balance ecological integrity with water use needs in a transparent and justifiable way.

- 4. Apply the Surface Water Allocation Directive to tributaries and lakes, as appropriate, within the planning framework.**

Integrating this directive into the plan will promote consistent, basin-wide application of provincial policy tools and support coordinated water allocation across jurisdictions.

- 5. Develop a drought management component within the plan to promote water conservation and user education.**

Embedding drought preparedness into the water management plan ensures that the basin is better equipped to respond to climate variability and scarcity and provides a clear framework for action during low-flow periods.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 4 to 6 years, with high-level benefits such as greater clarity and transparency for users, balanced ecological and human needs, and increased drought preparedness.

OBJECTIVE #2

Establish Basin-scale Conservation, Efficiency, and Productivity (CEP) Targets for Municipalities, Industry, and Agricultural Producers to Incentivize Sustainable Water Use

Description:

Improving water use efficiency across sectors is a key strategy for meeting future water demand while protecting aquatic ecosystems. CEP targets set measurable goals for reducing waste, optimizing use, and improving outcomes per unit of water used.

This objective calls for the development of sector-specific CEP targets for municipalities and industry within the NSRB. These targets would guide long-term planning, investment, and operational decisions, helping to reduce pressure on water supplies and improve resilience to drought and climate variability.

A collaborative and informed approach is essential to ensure that targets are realistic, meaningful, and aligned with existing regulatory, operational, and financial frameworks. By embedding CEP targets in municipal and industrial practices, the NSRB can enhance water security and drive innovation in water use and reuse.

Rationale:

Water demand is expected to increase in the NSRB due to population growth, industrial expansion, and climate change. At the same time, water availability may become less predictable. Improving water-use efficiency is one of the most cost-effective and immediate ways to address these challenges, particularly in municipalities and industries that are high-volume users.

However, efficiency gains cannot be mandated without understanding sector-specific constraints, motivations, and risks. By working closely with stakeholders to identify both barriers and opportunities, the basin can develop targeted strategies that promote efficiency without compromising economic viability or service delivery.

Establishing CEP targets would:

- Encourage innovation and investment in water-saving technologies and practices.
- Support municipal water utilities in managing demand and reducing infrastructure costs.
- Enhance regional water security and climate resilience.
- Signal leadership and accountability in sustainable water management.
- Align with Alberta's *Water for Life* goals to improve efficiency and productivity by 30%.

Key First Actions:

- 1. Engage and consult with industry stakeholders to understand their drivers, principles, and constraints related to efficiency.**

A sector-specific understanding will ensure that targets are relevant, actionable, and aligned with operational realities. Engagement will also help build trust and support for voluntary or regulatory approaches.

2. Identify policy and regulatory barriers, opportunities, and risk tolerances across sectors.

This assessment will highlight where existing policies may hinder efficiency efforts or where regulatory adjustments or incentives could support innovation and adoption of best practices.

3. Explore and pilot opportunities to reduce municipal water use, including tools such as tiered utility billing.

Tiered pricing structures reward efficient users and encourage conservation, particularly during periods of peak demand or drought. Other opportunities may include leak detection programs, public education, and greywater reuse strategies.

4. Engage with agricultural producers to identify opportunities for water use efficiency gains and gain support for voluntary adoption of best management practices.

Agricultural producers are best positioned to identify potential opportunities for more efficient water use, or the best practices already in use that could be shared across producers within the watershed.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 1 to 3 years, with moderate-level benefits such as increased innovation, and greater water security and climate resilience.

OBJECTIVE #3

Support the Development and Implementation of Water Reuse Projects in Collaboration with Industry and Municipalities

Description:

Water reuse is the practice of treating and repurposing wastewater or process water for other beneficial uses. It offers a significant opportunity to reduce pressure on the North Saskatchewan River (NSR) and its tributaries. By reusing water within industrial or municipal systems, total withdrawals from the river can be reduced while still supporting economic activity and community needs. Where needed, water reuse and conservation can help drive reductions in water withdrawals.

This objective seeks to facilitate the planning and implementation of water reuse projects in partnership with industry and municipalities. The focus is on identifying and overcoming barriers to reuse, advancing supportive policy frameworks, and ensuring that efficiency gains can directly benefit river flows.

A basin-wide approach to water reuse can help shift the region toward a more circular and resilient water economy, while safeguarding long-term water availability.

Rationale:

As demand for water increases and climate variability intensifies; water reuse presents an untapped opportunity to improve basin resilience. However, uptake of reuse projects in Alberta has been limited due to regulatory uncertainty, licensing concerns, infrastructure costs, and the absence of clear incentives. The reliability of available volumes from water reuse has also been a limiting factor.

Supporting water reuse would:

- Reduce demand on surface water withdrawals from the NSR and its tributaries.
- Improve drought resilience for industry and municipalities.
- Support innovation in water technology and infrastructure.
- Align with *Water for Life* goals on water use efficiency and healthy aquatic ecosystems.
- Advance conservation outcomes by ensuring saved water supports environmental flows.

Key First Actions:

- 1. Identify policy and regulatory barriers and opportunities for water reuse in the NSRB, and provide recommendations for needed adjustments.**

A review of Alberta's regulatory environment, including licensing rules, wastewater standards, and reuse definitions, can clarify what changes are needed to support and scale reuse projects. The identification of barriers and opportunities is a necessary precursor to developing efficiency and reuse plans.

- 2. Develop and implement efficiency and reuse plans that support river flows.**

Strategic planning is needed to ensure that water reuse and conservation initiatives result in maintaining adequate flows and ecosystem health in the river and other waterbodies. Where needed, water reuse and conservation can help drive reductions in water withdrawals.

3. Consult with industry to explore technological alternatives that reduce water use and increase efficiency.

Engaging with industrial water users will help identify practical reuse options, technology readiness, and cost-sharing models for implementation.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 1 to 3 years, with moderate-level benefits such as reduced surface water withdrawals, improved drought resiliency, and increased innovation in water technology and infrastructure.

OBJECTIVE #4

Improve Access to and Use of Alternative Water Sources for Consumptive Operations, Including Improved Availability of Supporting Data

Description:

Reducing reliance on freshwater from the NSR and its tributaries is critical to ensuring long-term water availability and ecosystem health. This objective aims to increase the use of alternative water sources, such as municipal wastewater, saline groundwater, recycled process water, and stormwater, for industrial and other consumptive operations.

To support this shift, stakeholders must address the full range of factors that influence water source decisions: availability of data, regulatory flexibility, financial feasibility, and public acceptance. By better understanding and addressing these drivers, and by showcasing successful examples, the basin can accelerate the adoption of alternative water sources where appropriate.

This approach helps diversify the region's water supply portfolio, easing pressure on the river while maintaining economic productivity.

Rationale:

Many industrial and commercial operations do not require high-quality fresh water for all processes, yet freshwater remains the default source due to convenience, cost, or lack of alternatives. Encouraging the use of non-freshwater sources for non-potable applications can result in significant water savings.

However, uptake of alternative sources is limited by a lack of awareness, uncertainty in regulations, insufficient data on availability and quality, and potential public or stakeholder concerns. By identifying and removing these barriers, and promoting real-world examples, this objective supports a more sustainable and adaptive water management approach.

Improving access to and use of alternative water sources would:

- Reduce stress on surface water systems, particularly during low-flow or drought periods.
- Enhance industrial and municipal resilience through diversified water supplies.
- Promote innovation and water recycling technologies.
- Align with goals in *Water for Life* and regional water conservation strategies.
- Support long-term water security and ecological protection in the basin.

Key First Actions:

- 1. Explore and showcase existing operations that have reduced or eliminated their use of freshwater.**

Case studies from operators, such as those in the Industrial Heartland, demonstrate feasibility and benefits, helping to build confidence and interest among other operators and decision-makers.

2. Identify policy, financial, regulatory, and social barriers to using alternative water sources.

Understanding the full range of constraints, such as permitting challenges, infrastructure costs, data gaps, or community perceptions, will inform strategies to remove obstacles and scale up adoption across sectors.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 1 to 3 years, with moderate-level benefits such as enhanced industrial and municipal resiliency, innovative water recycling technology applications, and long-term water security.

OBJECTIVE #5

Develop Aquifer Management Plans Informed by Alberta Energy Regulator (AER) and Government of Alberta Objectives

Description:

Groundwater is a vital but often under-monitored component of the NSRB's water supply. Aquifer management plans provide a structured approach to understanding, protecting, and sustainably using groundwater resources. This objective supports the development of such plans, aligned with the mandates and guidance of the AER and the Government of Alberta.

Effective aquifer management requires reliable data on the quantity, quality, recharge capacity, and usage of groundwater sources, as well as how these variables interact with surface water and stormwater systems. Management plans would help define sustainable use thresholds by aquifer, and ensure groundwater is considered alongside surface water in regional planning and drought preparedness.

Rationale:

Groundwater plays an increasingly important role in supplying water to communities, industries, and ecosystems, particularly during dry periods when surface flows are low. Yet, in many parts of the NSRB, data on aquifer characteristics, usage, and long-term trends remains incomplete or fragmented.

Without this information, there is a risk of over-extraction, degraded water quality, or missed opportunities to integrate groundwater into broader water management strategies. Developing aquifer-specific plans will help ensure that groundwater use is sustainable, coordinated with surface water management, and resilient in the face of climate variability and land use change.

Advancing aquifer management would:

- Improve understanding of groundwater-surface water interactions.
 - Inform drought management and long-term water security.
 - Support integrated watershed management goals.
 - Provide clarity and guidance to users and regulators.
 - Align with Alberta's broader objectives for sustainable groundwater use.
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Key First Actions:

- 1. Complete an inventory of groundwater resources, including source, supply, recharge capacity, and interactions with surface and stormwater.**
A comprehensive inventory will provide the foundational science needed to guide management decisions and support aquifer-specific planning.
- 2. Assess gaps in groundwater data and increase reporting on groundwater use across all sectors.**
Expanding data collection and transparency will help identify pressure points, better quantify total water use, and improve understanding of groundwater availability over time.
- 3. Set groundwater use objectives by aquifer.**

These objectives will define sustainable use thresholds, inform licensing and allocation decisions, and ensure aquifer health is protected over the long term.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of more than 6 years, with moderate-level benefits such as an improved understanding of groundwater, better informed drought management practices, and enhanced transparency and guidance for users.

OBJECTIVE #6

Develop Natural Asset Programs and Tools to Support Ecosystem Services and Fill Key Information Gaps

Description:

Natural assets, such as wetlands, floodplains, riparian buffers, and beaver-modified landscapes, deliver critical ecosystem services that support watershed health, biodiversity, water quality, and climate resilience. This objective supports the development of programs, tools, and data frameworks to recognize, assess, and enhance the value of natural assets across the NSRB.

By improving the knowledge base on wetlands, natural infrastructure, and hydrologic functions, and by exploring tools such as Payment for Ecosystem Services (PES) programs, the basin can better manage land and water in ways that are both sustainable and cost-effective.

Rationale:

Natural assets often provide water storage, filtration, erosion control, and flow regulation—benefits that reduce infrastructure costs and support climate adaptation. However, these assets are frequently undervalued in decision-making, and information gaps persist around their extent, condition, and function.

Building capacity to manage natural assets would:

- Support implementation of the NSWA's IWMP and NSR Wetland Strategy.
- Enable municipalities and landowners to integrate nature-based solutions into planning and operations.
- Advance watershed restoration priorities in a coordinated, cost-effective way.
- Improve co-existence with keystone species like beavers that contribute to ecosystem resilience.

Key First Actions:

- 1. Review existing data on wetlands, natural infrastructure, and groundwater recharge, and initiate studies to fill information gaps.**
Prioritize improved data on wetland classification, function, and hydrologic contributions.
- 2. Explore and potentially develop PES programs with agricultural landowners.**
Incentivize stewardship of wetlands, riparian areas, and recharge zones through financial or programmatic support.
- 3. Assess hydrologic factors such as floodplain connection, stream restoration, and wetland hydrology to guide future restoration.**
Use these assessments to identify priority areas for investment in natural infrastructure.

- 4. Improve beaver co-existence by assessing and addressing barriers and conducting demonstration projects in both the mainstem and tributaries.**

Show practical examples of flow devices, infrastructure protection, and the hydrologic benefits of beaver-modified systems.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of over 6 years, with high-level benefits such as advancing watershed restoration, improved co-existence with other species, and enhanced integration of nature-based solutions for cost-effective water management.

OBJECTIVE #7

Implement the North Saskatchewan River (NSR) Wetland Strategy

Description:

The NSR Wetland Strategy, developed by the NSWA, outlines a framework for protecting, restoring, and enhancing wetlands as part of a healthy and functioning watershed. This objective focuses on advancing the implementation phase of the strategy by identifying and acting on priority areas for restoration, enhancement, or conservation.

Wetlands provide critical services for flood mitigation, drought resilience, water quality improvement, and biodiversity. By aligning wetland strategy implementation with land-use planning and conservation investments, this initiative strengthens ecological infrastructure across the basin.

Rationale:

Wetlands have been significantly reduced in many parts of the NSRB due to agriculture, development, and drainage. Implementing the NSR Wetland Strategy supports regional and provincial commitments under Alberta's Wetland Policy, advances the goals of the IWMP, and improves watershed resilience to a changing climate.

Benefits of this implementation include:

- Protection of remaining high-value wetlands and their ecosystem services.
 - Strategic restoration in areas where wetland functions have been lost.
 - Targeted investments in wetland construction or enhancement to improve water quality, flood storage, and wildlife habitat.
 - Long-term cost savings through nature-based infrastructure solutions.
-

Key First Actions:

- 1. Identify priority catchments for wetland ecosystem restoration or construction opportunities.**
Use watershed and land-use data to guide targeted action in degraded or flood-prone areas.
 - 2. Review data to identify 'Highest Value' wetlands, establishing clear criteria and potential protective measures.**
Develop a framework for protecting ecologically significant wetlands through planning and policy tools.
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Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 4 to 6 years, with moderate-level benefits such as protecting high-value wetlands, restoring and investing in existing wetlands, and improved natural assets.

OBJECTIVE #8

Improve Water Quality in Non-Mainstem Drinking Water Sources, Including Lakes and Tributaries

Description:

While much attention is paid to the NSR mainstem, many rural communities rely on tributaries, lakes, and other non-mainstem sources for their drinking water. These sources are often more vulnerable to contamination due to limited flow, smaller catchment areas, and fewer treatment barriers.

This objective focuses on protecting and improving water quality in these critical but sometimes overlooked sources. It emphasizes enhanced monitoring and assessment, and implementing targeted infrastructure upgrades, particularly in communities with aging or insufficient wastewater systems. A strong foundation of data and local prioritization will support cost-effective and equitable solutions to ensure safe, reliable drinking water for all.

Rationale:

Tributaries and lakes serve as essential water sources for some communities in the NSRB, especially outside of major urban centers. These systems are often more sensitive to nutrient loading, bacteria, and other pollutants that can stem from outdated wastewater infrastructure, stormwater runoff, or land use impacts.

Current monitoring in many of these areas is limited or inconsistent, making it difficult to assess trends, identify risks, or target mitigation. Addressing these gaps and upgrading infrastructure where needed will not only improve drinking water quality but also support ecosystem health and long-term community resilience.

Improving water quality in non-mainstem sources would:

- Support the health and safety of rural and smaller communities.
 - Protect vulnerable aquatic ecosystems.
 - Enhance long-term source water security in the face of climate variability.
 - Align with regional water quality objectives and Alberta's *Water for Life* goals.
 - Reduce future treatment costs and public health risks.
-

Key First Actions:

- 1. Identify water quality and quantity data gaps, especially in under-monitored areas such as the eastern portion of the watershed.**

Filling these data gaps will allow for better tracking of conditions, identification of risks, and informed decision-making.

- 2. Improve monitoring, assessment, and reporting for non-mainstem drinking water sources.**

Enhanced and consistent monitoring across priority water bodies will help establish baselines, detect issues early, and support community planning.

- 3. Identify monitoring criteria and determine priority areas for assessing impacts from wastewater lagoons.**

Criteria may include proximity to drinking water intakes, known nutrient issues, or lagoon system age and condition.

- 4. Pursue enhanced wastewater treatment solutions for prioritized smaller communities that discharge into tributaries considering economic viability and local need.**

Tailored, cost-effective upgrades (e.g., lagoon retrofits, decentralized treatment) can yield high environmental and public health returns while acknowledging the financial capacity of small communities.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 4 to 6 years, with high-level benefits such as improved health and safety of rural and small communities, long-term water security, and reduced water treatment costs.

OBJECTIVE #9

Improve Water Security for Indigenous Communities, Ensuring Adequate and Safe Water is Available for Drinking, Household, Community Needs, and Emergency Services

Description:

Water security is foundational to community health, resilience, and cultural continuity. This objective seeks to strengthen water security for Indigenous communities in the NSRB by supporting access to safe, sufficient water for all essential uses, including drinking water, household needs, cultural practices, and emergency services.

Improving water security requires a collaborative approach that respects Indigenous leadership, knowledge, and priorities. Supporting Indigenous-led monitoring, reporting, education, and training builds long-term capacity and empowers communities to manage water in ways that align with their own values, governance systems, and lived experience.

Rationale:

Many Indigenous communities continue to face water insecurity, including boil water advisories, infrastructure gaps, or insufficient access to emergency water supplies. Addressing these challenges is not only a matter of public health but of reconciliation, equity, and respect for Indigenous rights and responsibilities as stewards of the land and water.

Supporting Indigenous-led approaches ensures that water monitoring, assessment, and education are responsive to community-identified concerns and grounded in traditional knowledge. Collaborative, capacity-building efforts also foster shared understanding and advance more inclusive and effective watershed management.

Improving water security for Indigenous communities would:

- Address longstanding disparities in access to clean and reliable water.
 - Support self-determination in water governance and monitoring.
 - Incorporate Indigenous knowledge into broader watershed planning.
 - Strengthen community resilience to emergencies and climate change.
 - Fulfill principles of partnership and reconciliation embedded in Alberta's *Water for Life* strategy and national commitments.
-

Key First Actions:

- 1. Collaborate with First Nations and Métis communities to develop or enhance Indigenous-led monitoring and reporting of water and ecosystems, in accordance with community needs.**

This could include training, equipment support, data-sharing protocols, and ensuring Indigenous knowledge is meaningfully incorporated into monitoring frameworks.

- 2. Assist with education and training on water health and water use, in collaboration with First Nations leaders and Elders.**

Programs may focus on youth engagement, household water use, climate impacts, or source water protection that are guided by community priorities and traditional teachings.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 4 to 6 years, with high-level benefits such as reducing disparities in access to clean and reliable water, improved community resilience, supporting self-sufficiency in water governance, and incorporating and learning from the breadth of Indigenous knowledge into watershed planning.

OBJECTIVE #10

Create an Indigenous-Guided Future Roadmap for Water in the North Saskatchewan River Basin

Description:

This objective supports the development of a forward-looking, Indigenous-guided roadmap for water in the NSRB. The roadmap would articulate shared priorities, responsibilities, and visions for water protection, governance, and use that is centered on Indigenous rights, knowledge systems, and leadership.

Creating such a roadmap requires respectful, sustained engagement with First Nations and Métis communities to co-develop a process that reflects their values, histories, and relationships with water. It also includes identifying opportunities to incorporate Indigenous considerations into existing water models and decision-support tools, such as the NSR Hydrologic Model.

Rationale:

Indigenous Peoples in the NSRB have stewarded the land and water since time immemorial. Their traditional knowledge, spiritual relationships with water, and lived experience offer essential insights for sustainable water management, particularly in the face of climate change, increasing land use pressures, and water scarcity.

Yet, many existing water governance frameworks have not meaningfully included Indigenous perspectives or decision-making. An Indigenous-guided roadmap would help reframe water planning to reflect Indigenous laws, protocols, and aspirations, while fostering collaboration with non-Indigenous governments and institutions.

Creating this roadmap would:

- Honour Indigenous rights and responsibilities related to water.
- Support self-determination in water governance.
- Build long-term, trust-based relationships between Indigenous and non-Indigenous partners.
- Enhance the cultural, ecological, and technical foundations of water planning in the basin.
- Align with reconciliation commitments and policy frameworks such as Alberta's *Water for Life* strategy and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

Key First Actions:

- 1. Pursue opportunities to engage with First Nations and Métis communities and explore the potential for an Indigenous-guided water management roadmap in the NSRB.**

Engagement would be based on respectful dialogue, listening, and co-creation of process. Early discussions would clarify community interest, desired outcomes, and culturally appropriate approaches to collaboration.

2. Explore with First Nations and Métis communities the potential to update the NSR Hydrologic Model with Indigenous considerations.

This may include identifying areas where traditional knowledge can inform model assumptions, inputs, or interpretation—ensuring the model better reflects the holistic and place-based understanding of water systems held by Indigenous communities.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 1 to 3 years, with high-level benefits such as building long-term and trust-based relationships between Indigenous and non-Indigenous partners, furthering reconciliation commitments, and supporting self-determination in water governance.

OBJECTIVE #11

Enhance Connection with Alberta's Land-use Framework and Other Existing Regulatory Frameworks

Description:

Effective water management in the NSRB requires strong alignment between watershed planning and Alberta's land-use and regulatory systems. This objective supports better integration of the NSWA's IWMP with Alberta's Land-use Framework, regional and sub-regional plans, municipal development strategies, and related regulatory tools.

The IWMP, developed by the NSWA in collaboration with stakeholders, provides a science-based, consensus-driven roadmap for protecting water quality and quantity, aquatic ecosystem health, and sustainable land and water use. Embedding the IWMP more deeply into land-use and regulatory frameworks will improve consistency, coordination, and effectiveness of water management actions across the basin.

Rationale:

Land use is one of the most significant drivers of watershed health. However, decisions around urban growth, industrial development, agriculture, and infrastructure are often made with limited integration of watershed-scale planning or hydrologic science.

Stronger connections between land-use and water management planning will support cumulative effects management, ensure long-term water security, and prevent unintended degradation of water resources. The IWMP provides a critical foundation for this work, aligning well with provincial strategies like *Water for Life* and offering practical recommendations that can inform regional plans under the Land-use Framework.

Enhancing integration with existing plans and frameworks would:

- Operationalize key actions in the NSWA IWMP across land-use and regulatory decisions.
 - Ensure that regional planning incorporates water quality, surface water, and groundwater objectives.
 - Support cross-jurisdictional coordination and reduce duplication.
 - Advance cumulative effects management and improve source water protection.
 - Promote more resilient and sustainable watershed outcomes.
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Key First Actions:

- 1. Connect the regulatory tools and approaches of the Land-use Framework, alongside regional, sub-regional, provincial, and municipal plans and align with the NSWA IWMP to enhance basin water management.**

Identify opportunities to align water-related goals and implementation mechanisms across planning systems to support coordinated, basin-wide outcomes.

2. Support ongoing implementation of the NSR Surface Water Quality Management Framework and regional Cumulative Effects Management efforts.

Ensure these frameworks inform land-use and water allocation decisions and are integrated with broader watershed management activities.

3. Incorporate groundwater use guidelines into land-use planning.

Ensure that groundwater considerations, such as aquifer recharge, connectivity to surface water, and sustainable withdrawal, are reflected in zoning, permitting, and development planning.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 4 to 6 years, with moderate-level benefits such as improved regional planning, enhanced cross-jurisdictional cooperation, and increased resilience and sustainability in the watershed.

OBJECTIVE #12

Explore Establishing a Collaborative Relationship with Hydro Facilities, in Support of Shared Understanding

Description:

Hydroelectric facilities in the NSRB play a significant role in shaping river flow patterns and seasonal water availability. This objective seeks to explore the potential for a water management operating agreement with hydro operators, most notably TransAlta, which manages major infrastructure in the basin, to align operations with broader watershed goals related to water supply, ecosystem health, and community needs.

Such an agreement would build on existing water management practices by encouraging coordinated operations that support both hydropower production and basin-wide water security, particularly in light of growing climate variability and demand pressures. It would also strengthen transparency and collaboration between the hydropower industry, the Government of Alberta, municipalities, and stakeholders, ensuring operational decisions consider multiple values and risks.

Rationale:

As climate change alters flow regimes and intensifies drought conditions, understanding and managing the relationship between hydroelectric operations and river flows is increasingly critical. Reservoir management and flow regulation by hydro operators have downstream implications for water availability, ecosystem resilience, flood and drought preparedness, and other water users.

A cooperative water management operating agreement would:

- Improve transparency and shared understanding of operational constraints and opportunities.
- Support more predictable and optimized water flows to meet ecological, municipal, agricultural, and industrial needs.
- Align hydropower operations with Alberta's *Water for Life* goals and the NSWA IWMP.
- Strengthen adaptive capacity in the face of climate change.

This objective is not meant to override the mandates of hydroelectric facilities, but about working collaboratively to find operational alignments that benefit the whole basin.

Key First Actions:

- 1. Collaborate with TransAlta, the Government of Alberta, and municipalities to understand their operations and support overall basin water security.**
Build shared knowledge of flow management practices, licensing conditions, and reservoir operations to identify synergies and trade-offs in water use and timing.
- 2. Collaborate with TransAlta to understand electrical demand patterns and the impacts of climate change on hydropower generation.**

Explore opportunities to adapt operations where possible to enhance flow stability and support downstream needs, while maintaining energy reliability.

Implementation Considerations:

The implementation of this objective is anticipated to take place over a period of 4 to 6 years, with high-level benefits such as increased adaptive capacity towards climate change, improved ability to meet water needs, and greater transparency in hydro operations.

Complementary Actions Supporting Water Management

In addition to the strategic objectives outlined in this roadmap, several important actions are already underway across the NSRB that contribute significantly to sustainable water management. These complementary actions have not been included as core roadmap objectives because they are progressing through existing policies, infrastructure projects, and collaborative initiatives. However, they remain essential components of a functioning and resilient water management system.

Many of these efforts are particularly evident within the Edmonton Metropolitan Region and serve as models that can inform and support basin-wide progress:

- **Refining and ensuring usage of the collaborative decision-support model and toolkit**
The hydrologic model built as part of the Roadmap project should continue to be a tool used by water users and partners across the NSRB. The model will require periodic updates and improvements to meet the needs of users and to reflect new conditions in the basin.
- **Continue to build flood-resilient infrastructure to reduce potential flood impacts.**
The need for flood-resilient infrastructure is a recognized and ongoing need that is being addressed by municipalities, utilities, and industry as part of standard infrastructure planning and asset management.

In the Edmonton region, for example, municipalities have incorporated flood risk assessments into their capital planning cycles, leading to the construction of protective berms around essential facilities and floodplain setback policies for new developments. These efforts, often embedded in regular operations, reflect a growing emphasis on climate risk reduction and service continuity.
- **Implement effective stormwater retention plans and erosion control measures, incorporating wetlands and green infrastructure to maintain water quality.**
These practices are increasingly embedded in municipal and industrial planning frameworks as a standard approach to managing runoff and protecting aquatic health.

The City of Edmonton has prioritized low-impact development and constructed stormwater wetlands to manage peak flows and improve water quality. Surrounding municipalities are using erosion control measures and vegetated buffers to protect tributaries and riparian zones as part of land development and agricultural drainage improvements.
- **Supporting flood and drought mitigation planning with municipalities, First Nations, Métis communities, agriculture, the Government of Alberta, and industry**
Ongoing work through regional partnerships—such as the Edmonton Metropolitan Region Board (EMRB), NSWA, and Alberta Environment and Protected Areas (AEPA)—supports coordinated drought and flood preparedness planning. This includes scenario planning, public education, and resource-sharing across jurisdictions and sectors.

These initiatives, while not new, are critical enablers of long-term watershed health and resilience. Their continued advancement complements and reinforces the roadmap's strategic objectives, ensuring that emerging priorities are built on a strong foundation of coordinated, proactive water management.

Future Considerations

In addition to the strategic objectives outlined in this roadmap, several actions were considered for potential future implementation, but ultimately not included as core objectives in the current *Roadmap*. However, as these items could be actioned in the future, they were retained as important outcomes from working group discussions.

Potential Action 1: Re-Operationalize Sundance Pond Storage

Description:

Consideration was given to exploring the feasibility of re-operationalizing water storage options within the NSRB to increase water availability and security and conducting a cost-benefit analysis of doing so. A key location considered was the Sundance Pond, located adjacent to Wabamun Lake.

Rationale Regarding Inclusion:

The working group felt that there was no pressing need for additional built water storage on the North Saskatchewan River. The results from the hydrological model supported the working groups conclusions, showing apparent marginal benefit to additional storage in time of low flow.

Potential Action 2: Initiate Intra-Basin Water Transfers from the Mainstem to the Vermilion River

Description:

While the hydrological model indicates that the mainstem of the NSR will contain enough water for growth and climate adaptation, tributaries such as the Vermilion River are anticipated to experience water shortages. The working group briefly considered the possibility of augmenting water levels in the Vermilion River by using an intra-basin water transfers from the mainstem North Saskatchewan River to the Vermilion River.

Rationale Regarding Inclusion:

Intra-basin water transfers are costly and introduce a variety of environmental and sustainability risks that significantly reduce the potential benefits as a water shortage response.

*Potential Action 3:
Construct Off-Stream Storage Upstream of the City of Edmonton*

Description:

The working group considered the potential benefits to basin hydrology of constructing off-stream storage upstream of the City of Edmonton, such as one of the sites mentioned in the ‘*Provincial Inventory of Potential Water Storage Sites and Diversion Scenarios*’ published in September 2005, as a component of the *Water for Life* strategy.

Rationale Regarding Inclusion:

Similar to other working group discussions relating to additional built storage, there appears no pressing need to augment storage in the North Saskatchewan River basin. The working group stated a strong preference for the sustainable use of existing resources rather than resorting to construction of additional infrastructure. Additionally, results from the hydrological model show relatively little benefit to off-stream storage in time of low flow.

*Potential Action 4:
Design a Hydrologic Model in Collaboration with Indigenous
Communities*

Description:

The current NSRB Roadmap is constructed within the framework of Western science and culture, and is not well informed by the knowledge, traditions, and expertise of the Indigenous people whose traditional territories and gathering places are located within the NSRB. To create a hydrologic model which would incorporate and reflect this knowledge and culture, consideration was given to conducting a literature review of Indigenous hydrological knowledge, co-designing a process to include Indigenous data layers within the existing hydrologic model, and retaining an Indigenous hydrologist or modeller to support model adjustments.

Rationale Regarding Inclusion:

While the working group had some limited involvement from a few Indigenous people, it was felt overall that identifying specific adaptations and actions in the absence of meaningful engagement with First Nations and Métis peoples was not an appropriate way to respect and involve Indigenous people. The ideas from the working group could be used in future work with First Nations and Métis people, ideally in projects that are led, shaped, and informed by Indigenous and Métis people.