Ministry of Land, Water and Resource Stewardship

WSA Objectives Technical Guidance

APPLICATION:	Developing Objectives under section 43 of the *Water Sustainability Act* (WSA)
ISSUANCE:	Executive Director, Watershed Stewardship and Security Branch, Ministry of Water, Land and Resource Stewardship, and Comptroller, Water Management Branch, Ministry of Water, Land and Resource Stewardship
IMPLEMENTATION:	BC Public Service and Partner Governments
LEGISLATIVE REFERENCES:	*Water Sustainability Act* (Ch. 15, S.B.C 2014) Water Sustainability Regulation (B.C. Reg. 36/2016) [WSR]
RELATED POLICIES:	WSA Objectives Interim Policy

CONTENTS

PURPOSE AND USE

This document provides technical guidance to support the *Water Sustainability Act* (WSA) Objectives development process described in the WSA Objectives Interim Policy. As with the policy, this guidance was prepared to support provincial, First Nations, Non-Government Organizations (NGOs), federal and local governments in British Columbia (B.C.) who may be partners in initiating, developing, or implementing WSA Objectives under WSA s.43. **It is recommended that individuals read the Interim WSA Objectives Policy before reading this document.**

This document provides further insight and guidance on how to complete the technical components of the recommended six steps of the WSA Objectives Framework (Figure 1) and allows for flexibility when responding to each WSA Objectives development area's unique biological, chemical, physical, cultural, and economic characteristics. Per the policy, the six steps are recommended where WSA Objectives are developed as a stand-alone project, however their sequence may change where WSA Objectives development is nested within a larger initiative such as a land use plan.

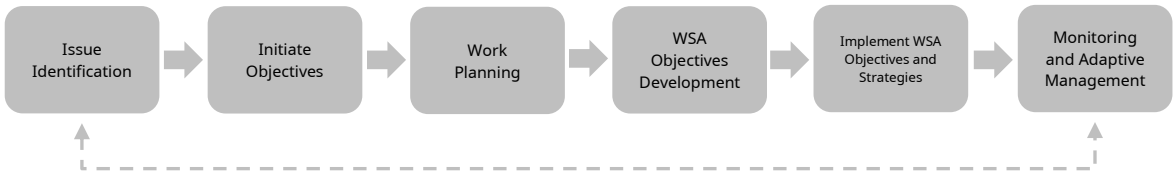

Figure 1: Recommended WSA Objective development framework

The following sections provide guidance when completing the technical components of each phase of the recommended WSA Objectives Development Framework. Refer to the WSA Objectives Interim Policy to learn more about phase objectives and key phase deliverables.

Table 1. Summary of technical analysis and deliverable stages for each recommended WSA Objective development phase.

Phase	Goal	Planning Deliverables	Technical Deliverables*
1) Identify Priorities and Propose Project	Identify watershed-specific issues, priorities and values, and determine if WSA Objectives is appropriate tool	Collaborative/joint Issues, values priorities, Draft proposal to initiate WSA Objectives	Scoping Level Information Review, including: a) Desktop Data Inventory and preliminary review b) Analysis of Aboriginal Rights and Title and Treaty Rights c) Engagement Analysis d) Preliminary Issue, Opportunity, and Priority Identification and Related Statutes e) Rationale for Developing WSA Objectives
2) Initiate WSA Objectives Project	Obtain endorsement of the proposal to initiate and agreement on partnership	Letter(s) of endorsement Statement of intent/agreement	
3) Work Planning	Obtain a clear understanding of the commitments and resourcing in place and begin collaborative work planning	Engagement and collaboration processes Working Group Advisory Group(s) Project Charter Work & Communication plan	Conceptual Model, summarizing: a) local values and goals, b) watershed system profile, c) spatial boundaries of interest, d) issue analysis, and, e) identification of pathways
4) WSA Objectives Development	Develop draft WSA Objectives and submit a WSA Objectives recommendation for approval	Draft WSA Objectives WSA Objectives Recommendations Submission Monitoring and Adaptive Management Plan Possible regulatory development Approval of WSA Objectives	Technical Assessment, following these stages: a) Data Compilation and Review b) State of the Watershed c) Selecting Indicators d) Analysis of Effects Pathways e) Assess Uncertainty f) Recommendations
5) Implement WSA Objectives and Strategies	Communicate and implement the approved WSA Objectives	Outreach and implementation Implementation Strategies	

6)	**Monitoring and Adaptive Management**	Conduct periodic review and evaluation for the new WSA Objectives	Monitoring and Adaptive Management Plan

PHASE 1) AND 2) ISSUE IDENTIFICATION AND INITIATING OBJECTIVES PROJECT

The purposes of Phase 1) and 2) of the recommended WSA Objectives Framework are to identify watershed-specific issues, priorities and values; determine if WSA Objectives is the appropriate tool; and prepare and obtain endorsement to begin the WSA Objectives development project. The technical outcomes of Phase 1) and 2) are to conduct a scoping level information review that will support characterizing the issues, opportunities and/or priorities and inform the proposal to initiate WSA Objectives, including an engagement analysis.

These technical deliverables will inform Phase 3) Work Planning (Figure 2) and will be collaboratively revisited and revised throughout the project as relationships between the initiating entity and partners develop.

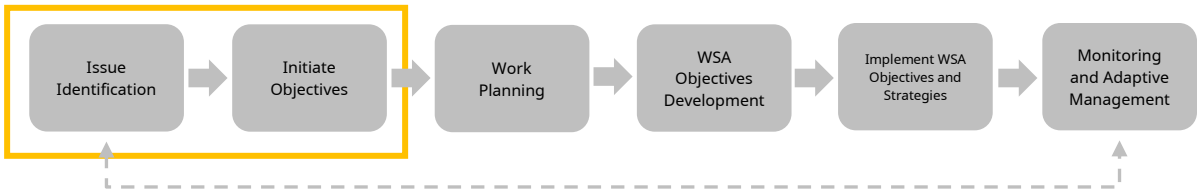

Figure 2: WSA Objectives development framework: Issue Identification and Initiating Objectives

Scoping Level Information Review

The **Scoping Level Information Review** is developed by the initiating entity, either independently or in collaboration with potential partners. The Scoping Level Information Review includes a desktop-based, high-level summary of potential contributors to issue(s), including whether these are naturally occurring contributors or caused by human activity, if known, as well as any observable trends based on readily available information.

The Scoping level Information Review follows five steps:

a) a desktop data inventory and preliminary review;
b) analysis of Aboriginal rights and title and Treaty rights holders;
c) identifying other watershed actors as part of the engagement analysis;
d) preliminary issue, opportunity and priority identification and related statutes for regulated activities, and
e) rationale for developing WSA Objectives.

a) Desktop Data Inventory and Preliminary Review

A desktop data inventory and preliminary review may be carried out as the first step in the **Scoping Level Information Review.** The desktop review should include:

- Identification and/or mapping of readily available data and information, such as previous watershed-scale studies or analysis and relevant information in provincial or federal data catalogues or databases;

- A preliminary inventory of additional relevant data and information sources for inclusion in the full technical assessment stage (Section 4.1); and
- Preliminary identification of data gaps.

In general, this stage of the **Scoping Level Information Review** aims for data needed for conceptual modelling, therefore readily available information about watershed characteristics and context will often suffice. An exhaustive list of information sources is not needed at this stage and further work for a more detailed and/or quantitative understanding can be obtained at the **Technical Assessment Phase** (section 4).

Potential information sources include federal and provincial sources, First Nations, local and regional governments, universities and health authorities. Table 2 identifies potential information sources, however they may not be applicable for many areas of B.C., particularly in the case of monitoring data or other existing initiatives. If information is not readily accessible, the initial inventory of information can be revised or added to later if the proposal is approved.

Table 2. Scoping Level Information Review– Potential Information Sources

Theme	Potential Data Sets and/or Sources
Watershed Physical Characteristics	• Streams, Lakes, Wetlands, Glaciers, Watershed Boundaries, Topography, Land Cover, Flood Plains, Aquifers, Surficial and Bedrock Geology
Jurisdictional Information	• First Nations Reserves and traditional territory, Treaty Areas and Lands, Aboriginal title areas and lands (including asserted), Reconciliation agreements, Government to Government agreement areas • Regional Districts, Municipalities
Water Uses	• Current Uses: Drinking Water Systems, Fish and Aquatic Habitats, Commercial and Recreational Fisheries, Surface water and Groundwater Licenses, Groundwater Wells, Parks and Recreation areas, Wildlife Habitat • Future Uses: Water Reserves
Pressures	• Pike and Wilford (2013) (describes potential data sources and desktop methods for review of watershed physical characteristics, disturbance pressures and water information) • Urban, Agricultural and Industrial Land Use; Oil & Gas Activities, Forestry Impacted areas; Mines; Power; Permitted Waste Discharges; and Surface water and Groundwater Licenses, Climate Change • Regional Cumulative Effects Assessments • Cumulative Effects Framework decision support tools (BC FLNRORD 2020)
Scoping Level State of Water Information	• Water quantity: Water levels and flow characteristics at surface water and groundwater monitoring stations, Climate Station Information • Water quality: Monitoring data from surface and groundwater sampling sites • Aquatic Ecosystems: Monitoring data on benthic macroinvertebrate communities, fish and aquatic habitats

	• Environmental Reporting BC (BC ENV 2023) • Multiple Value Resource Assessments published under the Forest and Range Evaluation Program
Existing Initiatives and Governance	• *Environmental Management Act* and *Ministry of Environment Act* policy and regulatory tools • Water Quality Objectives (BC ENV 2021) • *Forest and Range Practices Act* policy and regulatory tools such as Objectives, Fisheries Sensitive Watersheds, Wildlife Habitat Areas or Temperature Sensitive Streams • WSA Water Allocation Notations, Refused Water License Applications, Water Use Plans, history of Temporary Protection Orders • Environmental Farm Plans, Community or Local Government Monitoring Programs • Official Community Plans, Regional Growth Strategies, Forest Stewardship Plans, Other natural resource planning documents • Well Protection Plans, Water Allocation Plans • Indigenous water laws, declarations, protocols, policies • Indigenous Comprehensive Community Plans and other documents relevant to Indigenous community health and wellbeing (BC FNDGI 2021) • Indigenous Guardian Programs (or other monitoring and data gathering initiatives)

b) Analysis of Aboriginal Rights and Title and Treaty Rights

Whether an Indigenous government or group of Indigenous governments are initiating entity(-ies) or not, the preliminary analysis should identify all Indigenous peoples that hold or assert Aboriginal rights and title or Treaty rights within the area of interest. This information will guide the approach to engagement, consultation, potential collaboration and seeking free, prior and informed consent (FPIC) for the project. Creating opportunities to support self-determination of Indigenous peoples during this early stage is also recommended.

The early analysis may identify additional work needed in order to form the working group, and to determine the level of interest and capacity of different Indigenous governments and communities to participate in a WSA Objectives project. Many First Nations may need to have conversations with their communities to determine consent for the proposal, and further dialogue regarding potential interest to participate and capacity needs. The purpose of these discussions may be to acknowledge and respect the self-determination of Indigenous peoples.

c) Engagement Analysis

The **Scoping Level Information Review** should include the preliminary identification of key watershed actors who have an interest in the future of their watershed and may be affected by the development and implementation of WSA Objectives. Key watershed actors may include provincial, federal or local government participants, interest

organizations (e.g., local ENGO, NGO, charity, or other organization), labour or industry groups, or other community representatives.

The **Engagement Analysis** may be collaboratively revisited and revised during the formation of the working group (Phase 3) and as a relationship(s) between the initiating entity(-ies) and any partners develop. Ultimately, the **Engagement Analysis** will inform the drafting of the engagement plan at Phase 3.

At this stage, the **Engagement Analysis** can be high-level and cursory and content could include:

- Preferred name or name of organization;
- Role (e.g., Sponsor, partner team, manager, organization, external, other);
- Responsibilities of rights and title holders or interest holder or government in relation to project;
- Issues raised by rights holder and interest holder, as applicable;
- Expectations of rights holder and interest holder in relation to the project, as applicable;
- Level of positive or negative impact that the project could have on the rights holder or interest holder;
- A summary of their key interests
- Aboriginal Right and Title or Treaty rights holders or interest holder support for objectives development (e.g., Strongly in favour, weakly in favour, indifferent, weakly opposed, strongly opposed); and
- Engagement approach for project (e.g., monthly meetings, inclusion on periodic status updates, consult before approval of project).

Some key questions to ask and characterize different rights holder and interest holder groups include:

- How should they be prioritized and listened to?
- Which have the ability to partner and collaborate?
- Which need to be monitored?
- Which need to be informed?
- Who might be underrepresented?
- Whose voices may be marginalized?

d) Preliminary Issue, Opportunity, and Priority Identification and Related Statutes for regulated activities

A preliminary issue, opportunity, or priority identification analysis provides the needed background for project initiation approval by the Province. The process of identification may reference information compiled in the desktop information review and issues identified may also reflect other priorities for the area, such as aspirations to restore natural functioning or traditional uses, develop new uses in the future or manage future development in areas which are currently undisturbed. At this stage, description of issues

may be at high-level. The conceptual model development stage (Section 3) will include a more refined analysis of the issues and potentially impacted values.

Once a high-level understanding of the issue, opportunity and/or priority is established, a similar analysis can be undertaken to identify a list of statutes and decision makers that correspond with regulated activities. Identifying these early in the proposal will assist with defining the scope of the WSA Objectives project. Specific decisions can be identified at a later stage, such as during the planning for implementation phase (5).

e) Rationale for Developing WSA Objectives

The proposal for a WSA Objectives project will require a WSA tools options assessment and rationale that demonstrates how WSA Objectives are an appropriate tool to address the issues or priorities for the area. Some components of the rationale may include:

- Planning initiatives within which the WSA Objective could be developed or be developed to support;
- High level identification of the legislation under which statutory decisions could be affected;
- Other plans that could be affected (e.g. Regional District LUP's, Local Government OCP's, etc.);
- The potential limitations of a WSA Objective (e.g. non-point source pollution) to address the issues identified; and
- Other regulatory tools or approaches that may be needed to support a WSA Objective.

PHASE 3) WORK PLANNING

Once Phase 1 and 2 of the recommended WSA Objectives development framework is complete, the project may proceed to Phase 3) Work Planning (Figure 3). The next step in the process is developing a conceptual understanding of the proposed area's watershed characteristics. The technical outcome of this phase is to develop a detailed watershed conceptual model that builds on the initial work undertaken in Phases 1) and 2).

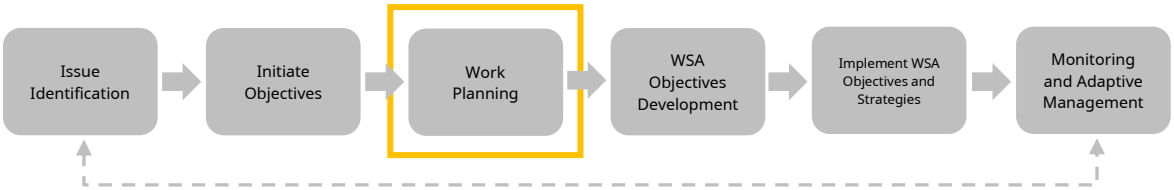

Figure 3. WSA Objectives development framework – Phase 3

What is a Conceptual Model?

A watershed conceptual model is a written and/or visual communication tool that illustrates the watershed system profile, qualitative current state and history, including the

linkages between key components and may highlight technical knowledge gaps if known. A watershed conceptual model is a simplified, easily communicated model that summarizes the complex relationships between the watershed's issues, values, and pathways for environmental change. Conceptual models may include a narrative description of these relationships with accompanying tables and graphical representations for ease of communication.

Developing a conceptual model is a key step in WSA Objectives development work planning as it integrates multiple perspectives to create a common understanding of the watershed system and guides the technical assessment in Phase 4. However, the proposed guide for developing the model included in this document is not meant to be prescriptive, and your approach, process and completed model may vary from what is outlined in this guide. The primary intention is to ensure that a shared understanding in the watershed community has been realized. A common conceptual model will provide an accessible starting point for understanding environmental issues and communicating across diverse groups to promote inclusivity and holistic approaches[1].

Developing a Conceptual Model

The **Conceptual Model** will describe linkages between the values, issues and goals of the watershed system's key components: surface water quantity and quality, groundwater quantity and quality, and aquatic biota and habitat. For example, if characterizing an issue requires an understanding of both surface water quality and aquatic biota, the conceptual model will set a baseline understanding and support analysis of the system's physical, chemical and biological aspects. In addition, non-physical elements of understanding a water system, including social, historical, experiential, and relational should also be included. As new information emerges during the **Technical Assessment** (Phase 4), the conceptual model should be revisited and updated as needed.

While engagement may be built into broader components of a WSA Objectives, building a conceptual model should also include engagement with a wide variety of knowledge holders to create a common understanding of the watershed system. Community members, Indigenous and local knowledge holders, policy makers and scientists will all have valuable perspectives to share and conceptual model development provides an opportunity to engage a diverse range of viewpoints from the outset, resulting in science and policies that are more likely to address management gaps (König et al. 2013).

It is recommended that **Conceptual Model** be developed following a collaborative process including the review of information summarized in the **Scoping Level Information Review**; and undertaking surveys, workshops, field trips or interviews with local

[1] Heemskerk et al. 2003, CEAA, 2018, AquaResource 2013, BC ENV 2018, Wels et al. 2012, Serveiss 2002, EPA 2007

knowledge holders (e.g., local Indigenous communities, local or regional governments, stewardship groups) and government or non-government subject matter specialists (e.g., biologists, agrologists). People/groups engaged with during this phase of the process may be considered for future working/advisory group participants. Tracking interest early in the process will support governance efforts moving forward.

It is recommended that a watershed conceptual model summarize the following information (Figure 4):

a) local values and goals,
b) watershed system profile,
c) spatial boundaries of interest,
d) issue analysis, and,
e) identification of pathways.

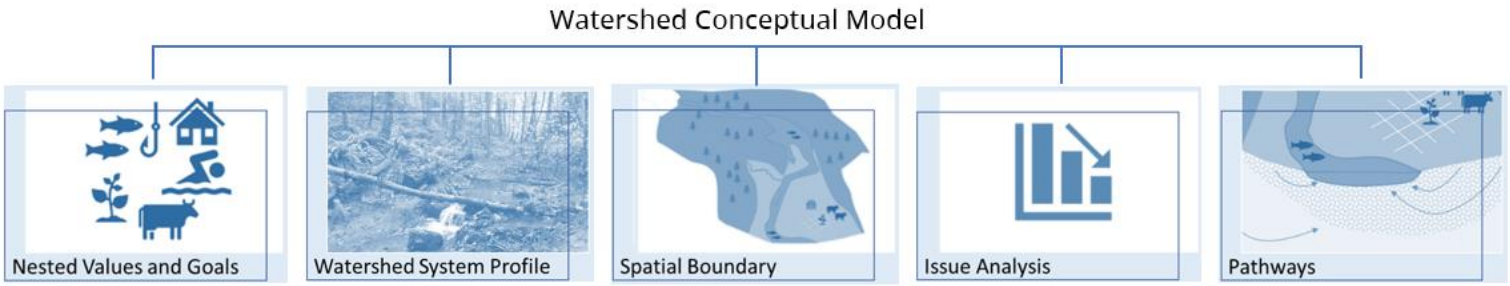

Figure 4. Illustration of Conceptual Model Content

a) Local Values and Goals

Local values are the values people and communities place on the watershed system. They are the translation of broad provincial human health and aquatic ecosystem values into place specific values that a watershed system supports. They are unique to each watershed and should reflect the environment, people and interests that reside within its boundaries.

There are likely many local values for a watershed or area; however, the focus of a WSA Objectives development process will be limited to water quality, water quantity and aquatic ecosystem health to be sustained or protected. The initial set of local values identified at this stage may be changed (expanded or contracted) at a later stage during the WSA Objectives development process, based on engagement and more information from the broader watershed community. Prioritized local values could include, but are not limited to, the following concepts:

- Protection of specific aquatic life and habitat, including fish, amphibians, invertebrates, vertebrates (moose, beaver) and plants,
- Safe drinking water from ground or surface sources,
- Traditional, ceremonial and cultural uses,
- Recreational and social uses,
- Mitigating flood protection or mitigation,

- Climate regulation, and
- Economic uses such as water for agriculture or energy.

Both current and potential future values should be considered in selecting local values. Factors such as climate change and future population growth may affect local values in a watershed system and the related impacts of these factors should be considered. Access to safe drinking water and local food security as local values are fundamental to the broad human health value and should be considered carefully within every conceptual model. Protection of ground or surface water bodies capable of supporting potential future drinking water uses should be part of this evaluation.

Conceptual descriptions should be developed for each of the local values to describe the goals envisioned for the local values when they are sustained or protected. Goals can describe the desired end state for a particular local value in broad narrative terms. Goals will be qualitative, sufficiently general that they apply to the entire area under consideration and are not time bound. **Goals set the foundation for objective setting in the later stages of technical assessment.** Goals defined at the conceptual model stage may be refined as the project evolves and project understanding increases.

Development of a shared conceptual model and identifying values does not require alignment on all values. The full range of values of each of the parties related to sustaining or protecting water quality, water quantity and aquatic ecosystem health may be acknowledged and recorded within the conceptual model. In many cases, WSA objectives required to protect a number of different values will overlap and align. For example, strategies to protect drinking water quality will often align with protection of water quality for spiritual or ceremonial purposes. However, where conflicts are present resolution may be guided by a conflict resolution plan and principles for working together. These would be guided by the proposed WSA Objectives vision and principles described in the WSA Objectives policy. Further guidance on navigating trade-offs during the later stages of objective development is provided in Section 4.2.3.

Table 3 presents an example of a summary table format for conceptual descriptions of some possible local values.

Table 3: Example Value Identification Table

Local Value	Goals
Water availability for agriculture	Optimize agricultural water use to maintain availability and adapt to future changes in climate.
Clean water for drinking	Preserve water quality in aquifers for future drinking water use.

b) Watershed System Profile

The conceptual model's watershed system profile should contain a qualitative overview of the watershed system components' character, interactions and dependencies. Quantitative analysis and refinement of conceptual understanding will occur during the **Technical Assessment** (Phase 4).

The profile should include conceptual descriptions of:

- **watershed climate and surface water quantity:** general characteristics and dynamics of the climate, hydrology, drainage and surface water features, including sources of surface water inflows and outflows
- **surface water quality:** general characteristics of and mechanisms that influence surface water quality and potential anthropogenic influences
- **groundwater quantity and quality:** physiographic and hydrogeologic features, mapped aquifers (if available), conceptual groundwater flow directions, dynamics and potential interaction with surface water
- **aquatic habitat and ecosystems:** general characteristics of the aquatic ecosystem and potential species of concern and their habitat

c) Spatial Boundaries

The spatial boundaries defined in the conceptual model will describe the area under consideration for WSA Objective development. Criteria for selecting an appropriate scale for analysis may include topography and drainage characteristics, the density and diversity of activities contributing to the issues, and availability of information.

Spatial boundaries should align with watershed boundaries as much as feasible[2], however it may somewhat deviate to account for practical considerations, e.g., the opportunity to align with jurisdictional boundaries. For some values, such as wildlife or human health, the watershed boundary approach will have limitations. Expanding boundaries or accepting these limitations are options dependent on the goals and practical constraints.

d) Issue Analysis

A preliminary assessment of the primary issues will already be complete in Phase 1 of the recommended WSA Objective development framework (Section 2.3), however the conceptual model provides an opportunity to refine, expand and adjust the analysis.

Issues analysis flows from the values that have been identified, and should include the related symptoms, potential drivers, relevant legislation and statutory decisions to fully describe the issue and identify potential management options. Further, it is recommended that qualitative goal statements/desired future state of the values also be included in the

[2] EPA, 2007

issue analysis summary. This work is for scoping only, as analysis of how a WSA Objective may apply to specific legislation or statutory decisions will occur in Phase 4. Table 4 presents an example of an issue analysis summary table (declining water quality and habitat).

In identifying issues, consideration should be given to both point source (e.g., waste discharges) and non-point source drivers (e.g., land use changes). The potential for cumulative effects from point and non-point source drivers should also be carefully considered. For example, impacts from residential development on a site-scale may be negligible while on the watershed-scale the cumulative impacts could be substantial.

Table 4: Example of an Issue Analysis Summary Table for Declining Water Quality and Habitat

Term	Definition	Example
Impacted Local Values	Identify the local values that are threatened or have been impacted or why it has been prioritized	• Aquatic life and habitat • Drinking water from ground and surface sources
Issue	Describe the underlying cause for the issue as it affects the local value(s) that have been identified, and resulting problems in the watershed	• Declining water quality in the source aquifer • Declining habitat and water quality decline in stream
Symptom/ Indicator	Symptoms will describe the problems generated by the underlying cause of the issue; multiple symptoms may be related to a single issue	• Increased drinking water treatment costs • Decline in anadromous fish runs
Drivers	Drivers describe the driving forces for the problem; these are human or natural activities within the watershed system that are driving the issue (EEA 1999)	• Residential Development • Industry • Climate Change
Temporal limits	Temporal limits describe the long-term time scales over which the issue should be evaluated	• 1980 to present • Present to 2050
Relevant Legislation	Relevant legislation includes all legislation that directly regulates any of the identified drivers within the watershed; legislation may not be available to address all drivers	• *Local Government Act* (LGA) • *Environmental Management Act* (EMA) • *Water Sustainability Act* (WSA) • *Environmental Assessment Act* (EAA) • *Forest and Range Practices Act (FRPA)*
Preliminary identification of	Relevant statutory decisions under the legislation identified that	• WSA Water Allocations • EMA Permitted Discharges

related statutory decisions	regulate the activities (drivers) in the watershed or area	• LGA Development Permits • EAA Environmental Assessment Certificates

e) Pathways

A pathways mapping analysis is conducted when developing a watershed conceptual model to help understand how issues may impact local values and support impact analysis. In a conceptual model, pathways refer to the cause-effect linkages between watershed system issues, components, and values and describe how environmental change generally occurs through physical or chemical processes (CEAA 2018, BC EAO 2020).

A pathways mapping analysis describes how an issue links to impacted local values, identifies the sources, impact pathways, potential indicators, and the relevant watershed system components. This qualitative pathway description will guide the **Technical Assessment's** (Phase 4) quantitative data gathering and analysis. The pathways mapping analysis may use tables, conceptual diagrams or flow charts to compile and summarize the results (BC EAO 2020). Figure 5 presents an example of pathway analysis for a single issue.

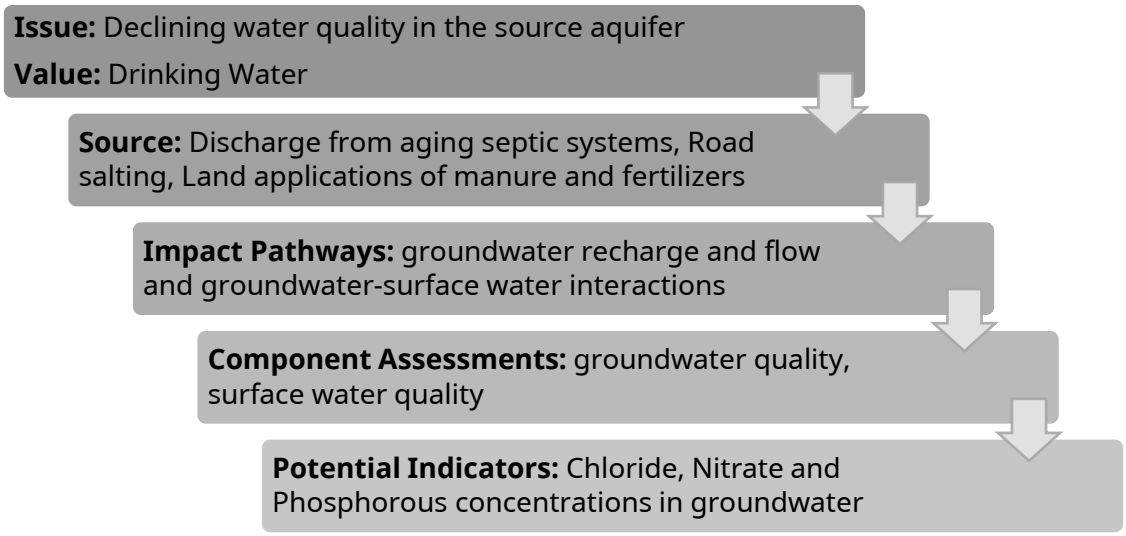

Figure 5. Example of a Conceptual Model's Pathways Mapping Analysis Summary

Communication

The watershed conceptual model should be documented in an accessible report to communicate it to a broader audience within the watershed. The initiating entity is responsible for developing a Communication Plan (Phase 3), which will outline how information is to be shared through the duration of the project. The final conceptual model report should consist of detailed narrative, tabular and mapping information, and simple visual communication materials (e.g., infographics, simplified maps and conceptual

diagrams (Figure 6)). Simple visual communication materials can facilitate communication and engagement within the project participants and across the watershed and provide opportunities to verify understandings and help determine whether further work and perspectives are needed. A summary of a conceptual model and what may be included in it can be found in Appendix A.

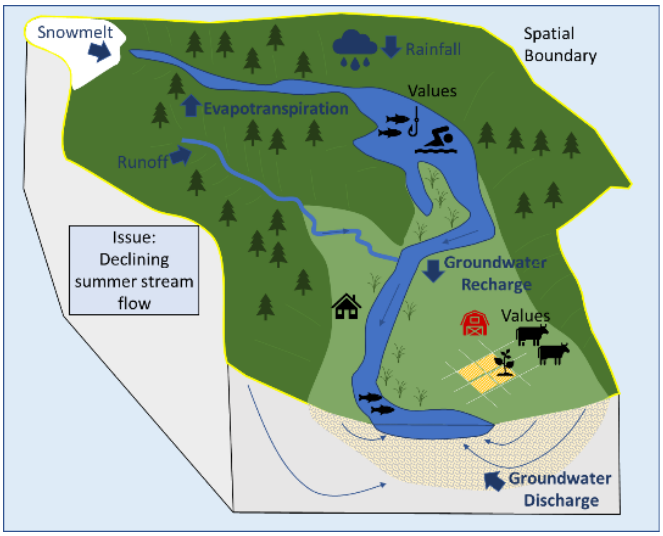

Figure 6. Example of a conceptual model infographic for a hypothetical watershed

PHASE 4) WSA OBJECTIVES DEVELOPMENT

After Phase 3 of the recommended WSA Objectives development framework is complete, the project may proceed to Phase 4) WSA Objectives Development (Figure 7). The technical outcome of this phase is to conduct a **Technical Assessment**.

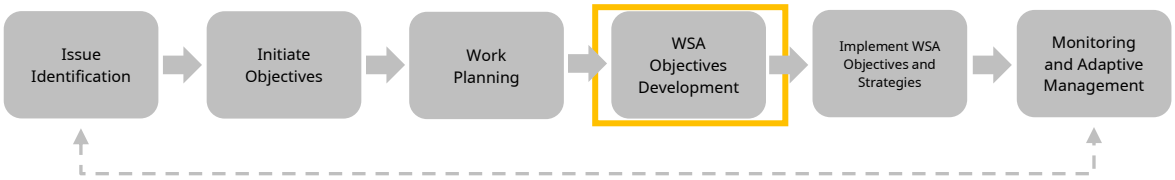

Figure 7. WSA Objectives development framework – Phase 4

Technical Assessment

The **Technical Assessment** will provide the supporting information required to develop WSA Objectives. It builds on the analysis completed in the **Scoping and Data Review** and **Conceptual Model** and develops a thorough quantitative understanding of the watershed system and quantitative evaluation of potential management options or strategies.

The **Technical Assessment** will analyze any or all of the watershed system components, depending on the local conditions: surface water quantity and quality, groundwater

quality and quantity, and aquatic biota and habitat. In some cases not all of the components will be relevant and technical assessment may not be necessary.

The **Conceptual Model** will provide a framework for assessment of each component to ensure that the technical analysis that follows reflects the appropriate issues, values and the impact pathways. The type of data compiled and the methods for analysis will vary for each of the components; however, the conceptual model can identify potential connections between components (e.g. groundwater-surface water interactions) where they exist, and encourage cooperation between subject matter specialists.

Depending on the values identified within the watershed and the complexity of the pathway screening analysis, additional studies may be necessary to understand values such as traditional use, wildlife, human health, socio-economic or others. These studies may support the development of benchmarks for the watershed system components. For example, a human health study may be necessary if there are multiple exposure pathways or contaminants that could be impacting human health and an additional study of the potential for cumulative impacts could be used to understand how to set benchmarks for surface water or groundwater quality.

Each component assessment should follow these assessment stages:

a) **Data Compilation and Review:** what do we know?
b) **State of the Watershed:** how are conditions changing?
c) **Selecting Indicators:** what can we measure to understand the condition?
d) **Analysis of Effects Pathways:** how do the issues interact with the values?
e) **Assess Uncertainty:** how uncertain is our analysis?
f) **Recommendations:** what are the targets for indicators?

a) Data Compilation and Review

The **Technical Assessment** begins with compiling data from the **Scoping Level Information Review** (Phase 1 and 2) and readily available sources. Data sources used in this stage will move beyond those readily available (e.g., in provincial databases) to create a comprehensive compilation to address data gaps. Data sources may include: quantitative scientific data, local and Indigenous knowledge, and historical archival information. Each of these types of information has its own strengths and these information types can complement one another to provide the most fulsome characterization possible.

Where feasible, data collected in support of WSA Objective development should be coordinated with and incorporated into existing provincial or federal monitoring programs, or regional collaborative monitoring initiatives (e.g. Skeena Sustainability Assessment Forum, Environmental Stewardship Initiative). Data collected should also be uploaded to the appropriate provincial databases as much as feasible with consideration for privacy under the *Freedom of Information and Protection of Privacy Act* (FOIPPA) and

Indigenous Knowledge under Article 31 of the United Nations Declaration on the Rights of Indigenous Peoples ("the Declaration").

Quantitative Scientific data

Scientific data compilation will rely on provincial and federal government sources (Section 2.1, Pike and Wilford 2013) compiled in the **Scoping Level Information Review** as a starting point. Additional scientific information will also be available for many watersheds, including data collected for local and regional planning, stewardship, engineering projects, environmental assessments, permit terms and conditions, natural resource exploration or historical watershed assessments. Other quantitative data may be available through other collaborative forums such as stewardship forums with Indigenous governments and citizen science initiatives.

Data collection will ideally follow standard protocols or methods (e.g., BC ENV 2020a and 2020b) and any requirements set under the *Professional Governance Act*. Data that does not meet these standards may inform the qualitative assessment provided that the information is evaluated for potential errors or biases, however, it should be approached with caution.

Local and Indigenous Knowledge

"Local knowledge holders" are people who have a connection with the WSA Objectives area such as through family, residency, culture, environmental livelihood (e.g. fishing and other, wild foods), work, community or recreation. Local knowledge may be shared through community gatherings, workshops, interviews or surveys.

"Indigenous Knowledge" refers to the local knowledge held by Indigenous Peoples. When working with Indigenous Peoples and their knowledge, processes to share information should be reciprocal and not extractive. It is important to ensure communities receive something in return for their participation and sharing of their knowledge, whether it is recognition and validation of their knowledge, or copies of any video or audio recordings and transcripts that they can share with others in their communities.

Indigenous Peoples will often have long-established connections to areas; therefore, Indigenous knowledge can be particularly valuable in describing changes to the state of the watershed system that may have occurred over longer time periods and may pre-date scientific monitoring. Through their long-standing connections with watershed systems, Indigenous peoples have developed stewardship laws, protocols, and/or practices that respond to the needs of the ecosystem. Time may be needed for First Nations to translate their laws, protocols and/or practices into a shareable form – depending on what the community deems appropriate to share.

It is recommended that the WSA Objectives projects advocate for and respect the OCAP™ Principles (FNIGC 2015) that affirm that Indigenous Peoples have the right to ownership,

control, access and possession of their Indigenous Knowledge.[3] The OCAP ™ Principles are general principles that become tailored for a specific community, so learning about and respecting the knowledge protocols within a community is important. The knowledge protocols of one community may not be the same as those in another.

Finding ways to meaningfully include Indigenous Peoples in a WSA Objectives development project, whether as partners, collaborators, or contributors of knowledge and expertise is recommended to ensure adherence to Article 31 of the of the Declaration. The 2021 updates to the Freedom of Information and Protection of Privacy Act that increase protections for Indigenous knowledge and Indigenous Peoples also need to be considered.

It may be necessary to develop specific information or data sharing agreements that respect existing Indigenous information laws, protocols, and principles, and to develop trusting and respectful relationships with Indigenous knowledge holders. Establishing cooperative and respectful working relationships will be vital to the development of WSA Objectives.

Historical Information

Historical archival or archaeological information may inform understanding of changes to the watershed system, values and social context over longer time periods. This could include air photos available through GeoBC or information on extreme events such as floods or drought, fish presence or absence (e.g., harvest records, permits, archaeological sites), and past pressures on the watershed system (Abu et al. 2020, McKechnie et al. 2014, Fraser Basin Council 2020, Szychter 2001).

Incorporation of historical data can improve the understanding of how the current state varies from the pre-disturbance baseline state and provide clues as to potential sources of disturbance due to historical activities (Government of Canada 1999). Previous studies have demonstrated that the consideration of historical knowledge will reduce the tendency to underestimate environmental change in response to previous and current disturbances (McClenachan et al. 2012, McKechnie et al. 2014).

Historical archives may also be a source of Indigenous knowledge, but it is important to respect and uphold (Article 31 of the Declaration) even when the knowledge about and from Indigenous peoples is from historical archives. Respectful discussions with the Indigenous Peoples whose information is in the historical archive should take place to contextualize this information and gain advice on how to proceed.

[3] OCAP™ is a registered trademark of the First Nations Information Governance Centre (www.FNIGC.ca).

Additional Data and Information Collection

Additional data and information may be needed to support watershed characterization. In these cases, the team may plan further data gathering, recognizing that additional time and budget may be required. Multiple data and information gathering projects and programs may be necessary as initial phases may identify additional sources of uncertainty.

Additional data and information gathering projects and programs may seek to:

- Increase the understanding of the issues, values and effects pathways identified in the conceptual model.
- Understand the impacts on the identified values by siting sampling or monitoring both upstream/upgradient and downstream/downgradient of issues.
- Obtain quantitative context in locations where qualitative information indicates that issues may exist.
- Characterize spatial and temporal variations with sampling of the full range of natural conditions in the study area as much as practicable.
- Support development and calibration of analytical or numerical models.
- Utilize stations for long-term monitoring and to assess attainment of WSA Objectives, validation of predictive analysis or effectiveness of mitigation measures.

Data collection guidance and standards should be followed where applicable, e.g., Resource Information Standards Committee (RISC) standards (ENV established in 1991), the BC Field Sampling Manual (BC ENV 2020a) and the BC Environmental Laboratory Manual (BC ENV 2020b). The BC ENV Water and Air Baseline Monitoring Document for Mine Proponents and Operators (BC ENV 2016) provides an additional comprehensive resource on the collection, analysis, interpretation and submission of water data. Novel or emerging characterization and monitoring techniques not encompassed in provincial documents, may also be used. Advice or peer review from a subject matter expert experienced in the relevant techniques can be used where guidance or standards are not available.

b) State of the Watershed

The State of the Watershed provides an understanding of the condition of the WSA Objectives area by evaluating how the state of the watershed system has evolved over time and how it might change in the future. This includes an evaluation of the state of the selected watershed system components: surface water quantity, surface water quality, groundwater quantity and quality and aquatic habitat and ecosystems.

The **State of the Watershed** will ideally include the baseline, current and potential future state of each component, recognizing that the available data will limit the evaluation. The Conceptual Model's outcomes will guide the **State of the Watershed,** e.g., identified values, issues analysis and the potential indicators.

Baseline State

The baseline state analysis will evaluate the historical state of a watershed component. The chronological time that corresponds to this state will depend on the watershed selected, the goals and the values, and information availability. The analysis may include a series of past temporal snapshots or trend analysis (CEAA 2018). The following sources may inform the pre-disturbance baseline assessment:

- Data from historical monitoring or field surveys;
- Trend analysis of information gathered from monitoring stations with sufficient length of record;
- Surrogate reference data from a minimally disturbed area or upstream/upgradient area (CEAA 2018, Yates and Bailey 2010);
- Indigenous and other local knowledge gathered from interviews or historical archives (McClenachan et al. 2012);
- Analytic or numerical models initially calibrated to current conditions and then modified to simulate baseline conditions;
- Inferences based on a body of scientific literature (CEAA 2018); and
- Alternative data sets such as dendrohydrological analysis of tree rings (Coulthard et al. 2016, Welsh et al. 2019) or archeological sites (McKechnie et al. 2014).

In many areas, especially in those with a long history of development, limitations in the scope and precision of historical monitoring data may be present. In these cases, the baseline state analysis may be qualitative with a trend analysis and a quantitative snapshot of time when adequate data became available.

Current State

The current state analysis will assess the state of the watershed system components at the time of evaluation. This assessment is expected to be more detailed and quantitative than baseline and future evaluations due to greater data availability. The current state evaluation should be developed with sufficient resolution to understand the current state of the components, including the full range of temporal and spatial variability. It is recommended that the current state evaluation consider:

- **Temporal variations** in water quantity and quality may be substantial. These variations may occur over several timescales (from diurnal and seasonal variations to inter-annual or inter-decadal.) The potential range of these variations should be considered.
- **Spatial variations** in quantity, quality and aquatic habitat should be assessed, including identification of sensitive areas. Upstream, upgradient or sites information may inform determination of background levels.
- **Past development** that is no longer active may continue to represent a disturbance. The potential for ongoing or residual impacts from past development should be considered in the current and future assessments.

- **Shifts in the hydrologic cycle** that may occur due to climate change or the impacts of development may limit the use of long-term averages (including average trends) (Holding et al. 2017). If possible, interpretation should consider the potential for these shifts.
- **Development of analytical or numerical models** of the watershed system may be considered where there is a benefit. If sufficient information is available for model calibration of a model of the current state, model input parameters may be adjusted to inform the understanding of the baseline and potential future states.

Potential Future State(s)

If sufficient data are available, the component assessment may also include an analysis of potential future state(s), which would include reasonably foreseeable future changes in the state of the watershed component. This may include future changes due to climate change, population growth, planned development, anticipated social or economic drivers, and/or potential management strategies. The future assessment will have considerable uncertainty and may assess several potential options for future scenarios to understand the range of uncertainty and evaluate the benefits of implementation of potential strategies (König et al. 2013, CEAA 2018).

Future state assessments will rely on a set timeframe and assumptions about potential future actions of how the watershed system responds to environmental changes. The timeframe will vary based on the **Conceptual Model** but could be selected to align with the timing of climate adaptation targets, official community plans, land use planning targets or long-term sustainability goals (Gleeson et al, 2012).

Qualitative, analytical or numerical models may be necessary to generate an understanding of future options (CEAA 2018, AquaResource 2013). Model scenarios may explore a variety of policy options and account for the uncertainties in the watershed system understanding. This analysis can assist in estimating potential future impacts to the watershed system and the value of different strategies in supporting goals (WEST and Earthfx 2018). Combining this information with social and economic information can support optimization of potential strategies.

Assessing potential future state scenarios will provide information to support selecting indicators, setting WSA Objectives, selecting implementation strategies. A future state assessment will provide an opportunity to evaluate the magnitude of potential future impacts and the magnitude of benefits associated with proposed strategies to set achievable WSA Objectives.

c) Selecting Indicators

Indicators are the gauges to measure the watershed system's condition. Ideal indicators are simple, measurable criteria that provide surrogates for more complex processes. The

selected indicators should be directly related to one or more of the watershed's values and responsive to changes in the state of the watershed system components (BC EAO 2020).

The **Conceptual Model** and **State of the Watershed** will provide a foundation for indicator selection. Indicators may be selected to provide information on:

- the status of the values and changes in the status over time,
- the extent and significance of specific issues in relation to the values,
- cumulative impacts on the values, and/or
- the effectiveness of the strategies put in place during the monitoring and adaptive management phase (BC MSRM 2004).

There are several types of indicators that may be useful in managing water to support WSA values (CEAA 2018, Song and Frostell 2018). These may include:

- Pressure indicators that quantify information about disturbances related to development such as the indicators identified Cumulative Effects Framework aquatic ecosystem protocol (BC FLNRORD 2020),
- State indicators such as water quality or water levels,
- Management indicators related to water treatment, conservation or compliance and enforcement, and
- Social environmental indicators related to water such as water use efficiency for business sectors.

Engagement and collaboration with Indigenous communities or other local knowledge holders can support indicator selection and determining where they will be monitored in the watershed. Indigenous communities may also develop their own indicators for assessing their values based on Indigenous knowledge. Consideration may be given as to how indicators developed by Indigenous communities can be implemented though WSA Objectives.

d) Analysis of Effects Pathways

Once analysis of state and indicator selection is complete, the effects pathways identified in the **Conceptual Model** should be evaluated to assess the relationships between the issues, watershed system components and the values. This analysis may identify relationship associations (US EPA 2007) between information on the issue within the WSA Objectives area and:

- Data on selected indicators within the WSA Objectives area;
- Surrogate data on selected indicators at analogous reference sites;
- Data on indicators from laboratory, field or literature studies; and/or
- Modelled or projected impacts on values.

Each pathway evaluated should describe the nature of the effect, the significance of the impact on the value, and the level of confidence in the significance. To communicate results to a broader audience, a summary table of evaluation of pathways may be created

and conceptual diagrams may be updated and revisited at this stage. For clarity, summary information may organize information by issue or by value.

Analysis of Effects Pathways will often require integration of analyses for each of the component assessments: surface water quantity, surface water quality, groundwater quantity and quality, aquatic biota and habitat and any other component assessments. Collaboration between subject matter specialists will be necessary in these cases to ensure that the analysis fully integrates the required information.

For some effects pathways, analysis may indicate a negligible impact while for other pathways much more substantial impacts are indicated. A negligible impact may indicate that current strategies are working to mitigate a particular issue. In many cases, development of WSA Objectives and associated Strategies may be targeted to address only the most substantial pathways.

e) Assess Uncertainty

Each component assessment should contain an evaluation of uncertainty both in input parameters and in the overall assessment of state. Uncertainty may be related to data limitations, model limitations, limitations in the understanding of processes or interactions, and/or uncertainty in future events (BC EAO 2020).

The general principles for assessing uncertainty of a component includes (CEAA 1999, CEAA 2018):

- In keeping with the precautionary principle (UNESCO 2005), where assumptions are necessary, make conservative assumptions that are likely to overestimate the impacts on values.
    - If models are used, the impacts of these assumptions on prediction can be explored in a model sensitivity analysis which includes additional model realizations with assumptions varied (Wels et al. 2012).
- Document all assumptions, data gaps and data quality.
    - Discussion and estimates of measured or modelled errors or bias should be provided where possible.
- Identify sources of uncertainty that have the greatest impact on the most sensitive values for potential focus in adaptive management and monitoring.
- Implement mechanisms for re-evaluation and provide for refinement or additional mitigation through adaptive management and monitoring (as discussed in more detail in Section 6).

An assessment of the risks of potential future adverse events (e.g. wildfires or floods) may be helpful for understanding the probability of consequences and the probability of benefits associated with particular strategies (BC EAO 2018). A risk analysis should consider both the consequence of an event and its likelihood in determining overall risk (CCME 2015).

f) Recommendations for Objectives

Progressing from Goals to WSA Objectives

The goals identified at the **Conceptual Model** stage describe the desired end state for each value in broad narrative terms over the area of interest. WSA Objectives will move beyond these broad conceptual goals and describe the specific objectives that will support progress towards meeting these goals. WSA Objectives may be set for specific areas such as watershed, stream, aquifers or other specified area or environmental feature to support the goals (e.g., maintenance of a species population).

WSA Objectives may be determined by working from the goals set for the values to determine the objectives and strategies that connect to the desired future state (Gleeson et al. 2012, Brandes and Brooks 2006). Additional technical analysis may be necessary to align the future analysis with the WSA Objectives under consideration. For example, if additional mitigative approaches that were not initially considered are needed to meet an objective, additional analysis may be needed to determine the effectiveness or degree to which additional mitigation is needed.

Writing WSA Objectives

WSA Objectives may reference specific quantitative benchmarks, if appropriate. However, WSA Objectives may alternatively describe a narrative outcome. If WSA Objectives describe a narrative outcome, the associated management strategies that accompany the objective may or may not include the quantitative benchmarks. As a reminder, WSA Objectives may be defined as a policy or regulation.

The 'SMART' acronym describes the key aspects of a well-written objective (BC MSRM 2004):

- **Specific:** An objective should be geographically specific. Maps may identify the areas where the objective applies.
- **Measurable:** Adequate information sources must be available to measure progress towards the objective. Existing programs and information resources may be relied upon or additional monitoring may be necessary. The monitoring and adaptive management plan (Section 5) should describe how progress will be measured.
- **Achievable:** Analysis should indicate that a planned objective is technically, financially, and administratively achievable. An objective may need to be modified, set at an interim value or additional programs may be necessary if obstacles to achievement are present.
- **Relevant:** Objectives selected should relate to the specific goals and values within the watershed system.

- **Time-bound:** Objectives that relate to restoration should include a planned time frame for achievement.

Key Considerations

Baseline Conditions

WSA Objectives should be realistic; therefore, objectives should generally not aspire to alter the environment to more stringent or beneficial levels than occur under natural background conditions as determined from the baseline assessment. WSA Objectives may be set at more stringent levels than current conditions where the goals indicate that improvements are necessary.

Best achievable technologies should be implemented to avoid degradation of water quantity, water quality and aquatic ecosystems including watershed systems where baseline or current conditions meet general provincial guideline levels.

Cumulative Impacts

Consideration for the cumulative impacts of changes in water quantity, water quality and the aquatic ecosystem on the values is required, and each WSA Objective threshold will consider the potential for accumulation of impacts through multiple pathways. For example, reductions in stream flow and degraded water quality may both have impacts on fish populations. Thresholds for both factors will ideally be set to account for this interaction.

Cumulative impacts on the environment may also impact socio-economic systems. For example, adverse impacts to human environmental health may result in costs within public health or education systems and these impacts may disproportionately affect some populations or communities.

WSA Objectives may address indicators that are directly related to the goals and values and those that are indirectly related through environmental pathways. For example, achievement of goals related to preservation of aquatic biota may require, both a directly related WSA Objective to preserve surface water quality and an indirectly related WSA Objective to manage allocation of hydraulically-connected groundwater.

Sensitive Values

Among a set of prioritized values, WSA Objectives should be set to a level that protects the most sensitive values (i.e. the values that have the lowest tolerance for disturbance). This would help ensure that the WSA Objectives are designed to sustain those values, as well as less sensitive values. For example, WSA Objectives for water quality in an aquifer may need to be set to a stricter level to preserve drinking water uses within the aquifer than for hydraulically connected surface water sources due to attenuation between surface and groundwater.

Values will vary in sensitivity to disturbance for different chemical, physical and biological attributes. Determining the threshold for change for different attributes should take this into account and thresholds should always be set to for the most sensitive value for that particular property.

Navigating Trade-offs

WSA Objectives are fundamentally a water management tool, and priorities for the watershed will flow from the values identified. Progressing from goals towards specific WSA Objectives may require acknowledging the need to strike an acceptable balance between potentially competing social, ecological and economic goals (Rosenfeld and Ptolemy 2016), as they connect to the values identified for the watershed. In keeping with the WSA Objectives principles, identifying feasible, best available practices and technologies is suggested as much as possible to mitigate conflicts and foster collaborative approaches; however, in some cases trade-offs may be necessary. The state of the watershed and indicator selection will lay the foundation for evaluating these trade-offs and identifying options.

Determining how to navigate trade-offs may benefit from additional specialized analyses or expertise. For example, specialized analysis on water treatment options may be needed to identify best available technologies and understand the limits of technical feasibility.

WSA Objectives can be set to preserve cultural values as well as broad provincial human health and aquatic ecosystems values, with additional objectives responding to those identified by the watershed community. Although conflicts in many cases may be minimized through best available technologies, where this is not possible, safe drinking water and food security should be preserved before economic uses. Furthermore, where trade-offs are necessary, WSA Objectives should principally be set such that they prevent harm and support potential future uses.

Engagement and communication with Indigenous peoples and the broader watershed community will be necessary and helpful in many cases where trade-offs are needed.

Where conflicts or disputes in navigating trade-offs are present, resolution may be guided by a conflict resolution plan and principles for working together that should be drafted early in the project. Navigating these issues will also be informed by the WSA Objectives vision and principles described in the WSA Objectives policy.

PHASE 5) PLANNING FOR IMPLEMENTATION OF OBJECTIVES AND STRATEGIES

After approval of the WSA Objectives, the next step is implementing objectives and strategies. (Figure 11). Planning for implementation will be key to success and this plan must be included within the objectives proposal.

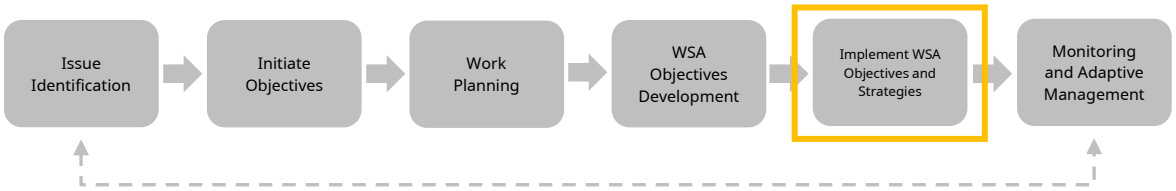

Figure 11 WSA Objectives Framework: Implementing Objectives and Strategies

Strategies are the actions taken to progress towards meeting WSA Objectives. In selecting strategies for implementation of WSA Objectives, consistent with the ENV Environmental Mitigation Policy (BC ENV 2014), strategies that avoid or minimize impacts are preferable to strategies that compensate for impacts by restore or offset in other locations. However, to meet a WSA Objective, strategies that avoid, minimize and restore or offset may all be necessary in some cases.

Strategies may include the implementation of WSA Objectives by impacting statutory decisions and plans through a WSA S. 43 regulation, but decision makers may use their discretion to add terms and conditions through the instruments within their decision purview. While WSA s. 43(3) enables statutory decision makers to impose restrictions under the specified enactment, additional non-statutory actions may be taken to support implementation of the objectives, which may include:

- improving data and methodologies used in decision making to better account for sensitive values,
- adopting programs to implement best achievable land use practices,
- preservation or rehabilitation of natural assets such as wetlands to offset for the impacts of present and future disturbance,
- updates to land use plans,
- further area-based policy and regulatory changes, and/or
- adaptive management should objectives be exceeded.

Section 6 includes further information on adaptive management planning.

Statutory Decisions

A regulation establishing a WSA Objective may:

- specify factors and criteria to apply for evaluating the impacts of a land use or resource use proposal or measures to address impacts of such proposals on the objective (WSA s. 43(1)(b) and (1)(c)) and

- require that selected statutory decisions under specified enactments consider the objective (WSA s. 43(2)(a) with the option to also require terms and conditions be set for the decisions selected (WSA s. 43(2)(b)).

Building on early work done to inform the proposal, that listed relevant statutes and decision makers connected to regulated activities in the watershed, more work will be needed to identify the corresponding statutory decisions that a WSA Objective could potentially apply to. The information identified during issue analysis at the conceptual model stage should also be reviewed with respect to the WSA Objectives that have been developed. Indicator selection and pathway analysis will be key to inform this selection process as these analyses will have quantified the impacts of issues. In determining which statutes and corresponding decisions that will be required to consider a WSA Objective, potential questions to contemplate are as follows:

- Could this decision and other similar decisions substantially contribute to impacts to the values that WSA Objectives have been set to protect?
- Could the combined impacts of this decision and other decisions result in an exceedance of the WSA Objective?

In identifying whether to specify factors, criteria, measures or require specific terms and conditions related to proposals or decisions, consideration should be given to the potential benefit gained in consistency among decisions versus the downside of a lack of flexibility. Consideration should also be given for how any specifications may fit within the adaptive management approach, what level of revision to the regulation may be needed as new information becomes available and the level of discretion of the decision maker under the specified enactment. If there is a high likelihood that revisions to strategies may be needed on a continuous basis or in the nearer term or the protection of the values may be enhanced with greater flexibility for decision makers, then it may be desirable for factors, criteria, measures or terms and conditions to be specified within policy and decision support materials that are easier to revise or adjust rather than directly in the regulation.

Decision Support

To support the successful implementation of WSA Objectives, decision support tools may be developed in consultation and collaboration with decision makers for their respective statute. Developing guidance for decision makers can supplement the regulation developed by improving consistency and efficiency in the consideration of the WSA Objective.

Guidance for statutory decision makers should be specific to the individual statutes and decisions that are affected and should be recognize variations in the constraints and levels of discretion in different types of decisions. Guidance may include examples or suggestions for the recommended terms and conditions such as monitoring or mitigative measures that could allow a permit or authorization to comply with the WSA Objectives or

criteria may be used to evaluate a decision. Guidance may also specify the geographic areas or management units in which different approaches for decision making may apply within the area covered by an WSA Objective. For example, WSA water licensing decisions that should consider the WSA Objective may only include those within upstream areas or hydraulically connected aquifers.

Examples of approaches for implementing an WSA Objective in WSA water licensing decisions could include:

- Operational policy with examples of terms and conditions to attach to a WSA authorization.
    - Guidance on specific considerations for terms and conditions, such as timing of works windows or water withdrawals during water scarce periods of the year.
- Specifications for the WSA Objectives area, where statutory decision makers consider limits on the total water allocation to a specified schedule to meet the WSA Objective.
- Development of a water allocation plan to provide guidance to decision makers.

WSA Objectives in Planning

A WSA Objective regulation may specify application to plans established under other legislation including the *Local Government Act* (LGA) and *Islands Trust Act* (S.43 4 and 5). Therefore, once WSA Objectives are set within a given area, they must be considered in the development of any renewed or new planning initiatives under the statutes identified in the WSA Objective and could also optionally inform planning under other statutes. For this reason, a proactive approach could include the development of WSA Objectives within the planning process.

Benefits to stakeholders, Indigenous and local communities, and the Province may be realized by incorporating or developing WSA Objectives within planning initiatives. These benefits could include optimization of resource use for more equitable distribution of benefits, coordination of land uses to consider areas of natural vulnerability, and implementing best management practices to avoid, minimize, restore or offset impacts.

If the WSA Objectives are set in an area that overlaps with a municipality or regional district, implementation of WSA Objectives could be supported through the LGA and consideration of a WSA Objective may be required when developing, amending or adopting Regional Growth Strategies (LGA Part 13, s. 428) and corresponding Official Community Plans (Part 13 s. 471 of the LGA). This approach is consistent with the intended purpose of regional growth planning under the LGA which should work towards protecting environmentally sensitive areas (LGA s. 428(a), s. 473(d) and s. 474(d)) and protecting the quality and quantity of water (LGA s. 428(j)). Another planning tool under the LGA that could implement WSA Objectives is a regulation assigning Development

Permit Areas (LGA s. 488(a) and (i)) which may be established for the protection of the natural environment, its ecosystems and biological diversity or for water conservation.

If the WSA Objectives are set in an area that overlaps with an existing provincial government Land Use Plan developed under the *Forest and Range Practices Act* (FRPA) (BC Agriculture and Lands 2008) an amendment to the land use plan could be sought when required to implement the strategies selected. The process and advice described in this guidance have been designed to facilitate adoption under amendments to a FRPA Land Use Plan. However, if an amendment is necessary, the policies and procedures set under FRPA guidance (BC Agriculture and Lands 2007) should also be consulted.

If evaluation of implementation strategies determines that additional area-based legislative tools are necessary, additional tools that could be identified include, but would not be limited to, those under the *Water Sustainability Act* (including Water Sustainability Plans, WSA Division 4). Collaboration with other initiatives such as land use planning in implementation may be sought where there is a benefit.

PHASE 6) MONITORING AND ADAPTIVE MANAGEMENT

The final stage in the WSA Objectives evaluation process is evaluation and adaptive management (Figure 12).

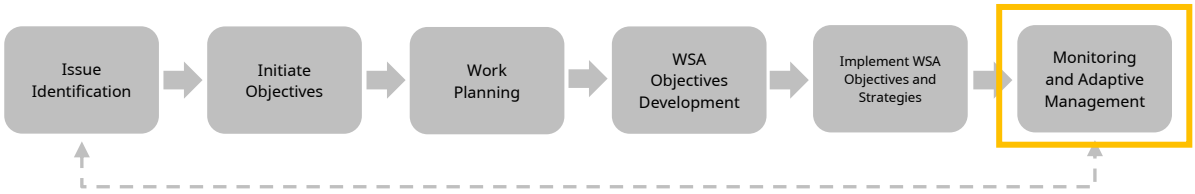

Figure 12 WSA Objectives Framework: Evaluate and Adaptive Management

Monitoring programs are essential to evaluate the validity of assumptions made in the development of the WSA Objectives and to measure attainment or progress towards meeting the WSA Objectives. Adaptive management is a process whereby management actions are adapted as new information becomes available through monitoring programs and other information sources. The recommended approach incorporates both ongoing monitoring and adaptive management once WSA Objectives are in place to ensure that progress is occurring towards the relevant goals.

The monitoring plan should focus on key environmental indicators that relate directly to the WSA Objectives. These key indicators should measure progress towards meeting the WSA Objectives or decrease uncertainty in interpretation of state and the analysis of pathways.

A monitoring plan, with development and drafting of it occurring in Phase 4, should contain the following information: the specific parameters to monitor, data quality

objectives, monitoring protocols, monitoring locations, schedules and methodologies, procedures for quality assurance and control and reporting schedules (CEAA 2009). The monitoring plan should also include allowance for interpretation of monitoring results and, if appropriate, specifications for upload of information to provincial databases.

The monitoring plan may include specification of triggers for adaptive management actions tied to the values of key environmental indicators. These adaptive management actions may include provision for additional studies in areas determined to be sensitive or differentially impacted or for deployment of additional management strategies.

In some cases, monitoring data or other information sources will indicate that revisions to the data analysis or management strategies are necessary. Therefore, the monitoring plan should identify triggers for development of potential adaptive management actions should revisions or changes be required. The timeline for revisiting and if necessary, revising the results of an assessment will depend on the issues, values and results of the assessment.

Management actions that could be considered if trigger levels are reached could include modifying or refining the monitoring plan, improving data systems or assessment, revising or adding to the strategies being implemented through decision support tools, revising or adding to the WSA Objectives regulation or implementing additional decision support or management tools.

APPENDIX A: CONCEPTUAL MODEL EXAMPLE - SUMMARY

Widzin Kwah Conceptual Model: Summary of Values, Issues and Pathways for Change

Conceptual Model

- The Widzin Kwah Conceptual Model is a simplified framework that summarizes complex relationships between **issues, values, and pathways for change** in the watershed system.
- The aim of the Widzin Kwah Conceptual Model is to **integrate multiple perspectives to create a common concept of the watershed system,** with the intention that this concept will guide the scope of new objectives and management direction for the Widzin Kwah.
- The Widzin Kwah Conceptual Model was developed from **February to March 2022**.
    - **Contributors:** Wet'suwet'en and BC technical staff and knowledge keepers contributed expertise and knowledge.
    - **Methods:** Two day-long workshops, a literature review of over 30 reports spanning 20 years, including previous community engagement sessions. Ongoing communication via email, videoconferencing, and iterative reviews of the report.

- **Engagement:** The report does not include broad Wet'suwet'en community representation nor non-Indigenous interest holders in the Widzin Kwah. Broader engagement is planned for this project, and it is expected that elements of the Widzin Kwah Conceptual Model will be shared and expanded upon.

Watershed Goal

The goal of the Widzin Kwah Water Sustainability Project is to **maintain and restore the health (condition) and integrity (function) of the Widzin Kwah watershed** (also known as the Upper Bulkley and Morice River watersheds) through developing and recommending for approval new objectives and management direction.

Core Watershed Values

- **Healthy aquatic ecosystems and habitat:** Aquatic ecosystems and habitats include rivers (kwah), lakes (bin), wetlands, riparian areas, and flood plains. Aquatic ecosystems exemplify the concept of *Yintah Hahktis* – that all things are interconnected.
- **T'oh (water) is sacred:** Water is important for ceremony, spiritual cleansing, and healing; acknowledges the human relationship with water goes beyond the physical. This value emphasizes the findings of the T'oh Dialogue Sessions of 2020.
- **Traditional and cultural relationship with water and water-related species**: People of the Widzin Kwah have traditions of hunting and fishing that are dependent on the waters of the basin. For example, the feast – baht'lat system - is central to Wet'suwet'en culture when nature's gifts, particularly salmon, are gathered from the territories and shared. The baht'lat is one of the ways to validate the rights and responsibilities of Chiefs to steward and harvest within the House territory on behalf of their House.
- **Abundant safe drinking water:** Groundwater and surface waters are relied upon for drinking purposes in the Widzin Kwah, from household water consumption in the District of Houston to direct consumption during ceremony or hunting and trapping.

- **Health, medicine, and food security:** Many people of the Widzin Kwah, both Indigenous and non-Indigenous, access wild foods from the watershed to help sustain themselves (e.g. salmon, moose, berries, cow parsnip, devil's club).
- **Climate change resilience:** Functioning ecosystems in the Widzin Kwah watershed buffer extreme climate events such as flooding and low flows. For example, forest cover regulates runoff and increases groundwater contributions; wetlands store and distribute water; and riparian areas reduce erosion and help keep water temperatures low.

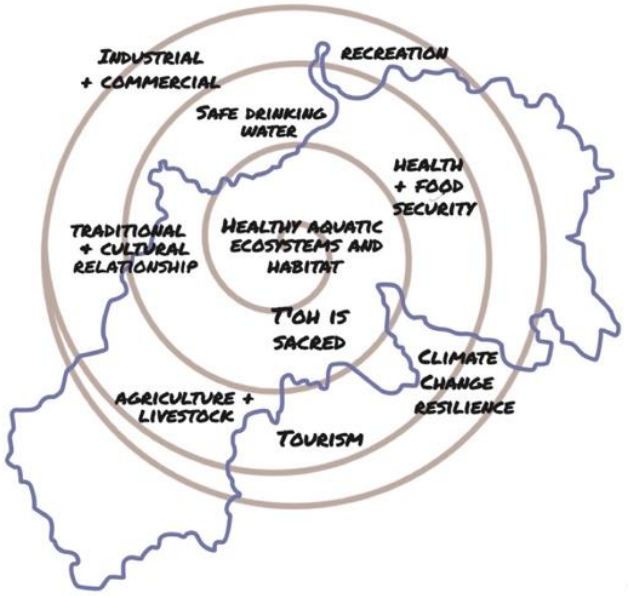

Figure 6 Core values of water in the Widzin Kwah study area

Watershed Uses

- **Agricultural and livestock:** The Widzin Kwah supports agricultural and livestock activities, primarily ranching and foraging in the lower Widzin Kwah and Upper Bulkley – Neexdzii Kwah.
- **Industrial/commercial:** Water in the Widzin Kwah is used by, and supports, mining and mineral exploration, milling, and other industries.
- **Tourism:** Water in the Widzin Kwah is the basis for much of the eco-tourism in the region, including fishing (particularly guiding for salmon and steelhead) and boating. Tourism relies not only on sufficient fish, but also on the experience of natural surroundings, and thus depends on a healthy aquatic ecosystem.
- **Recreation:** The local people in the Widzin Kwah and surrounding region benefit from recreational activities such as boating (motorized and non-motorized), fishing, swimming, and aesthetic aspects associated with the water in the Widzin Kwah (one of the values that surfaced here was peaceful enjoyment).

Watershed Issues

- Issues are the stressors identified as adversely impacting the core values associated with Widzin Kwah watershed health (condition) and integrity (function).
- The diagram below visually summarizes issues impacting the core value of **Healthy Aquatic Ecosystems and Habitat** (figure 9). Moving outward from the inner circle, the value is distilled into three components: Appropriate Water Quality, Appropriate Water Quantity, and Stream and Riparian Function. Each component is then broken out into features, described in the third outer circle. Issues are then captured by the outermost (yellow) circle.
- **Issues:** Road density/stream crossings, linear development (pipeline, rail, Hwy 16), increased peak flows and channel straightening, landscape level disturbance and conversion of land, forestry & recruitment of organic debris, 2nd growth forest & increased water removal, loss of wetlands, shrinking glaciers, extreme weather events, forestry on steep slopes, cattle in streams, riparian disturbance, high temperatures, turbidity and sedimentation, fertilizer and manure runoff, and Equity mine drainage.

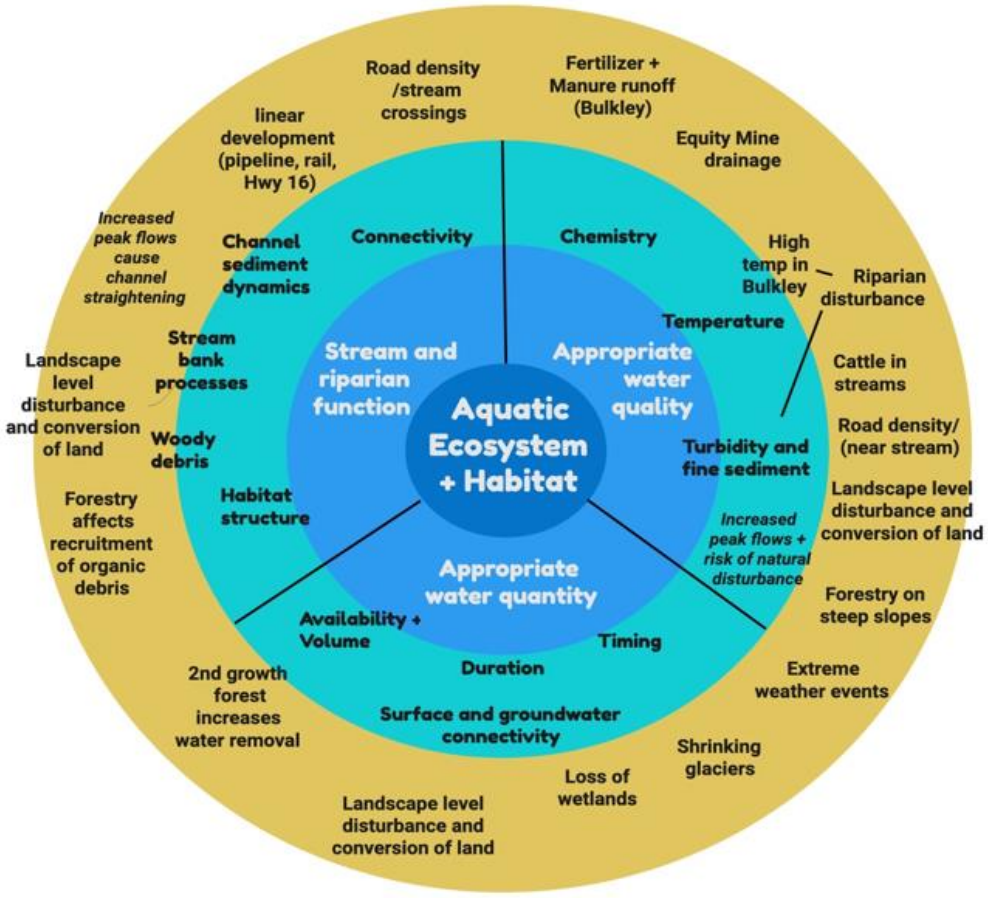

Figure 9: Overview of issues impacting Healthy Aquatic Ecosystems

Watershed Pathways for Change

- Pathways describe the link between the value component and the issues affecting them.
- Pathways are important to understand prior to identifying policy and legislative tools best suited to address priority issues.
- The diagrams below depict issues and pathways affecting stream and riparian function (figure 10), water quantity (figure 11) and water quality (figure 12) in the Widzin Kwah, which comprise the core components of Healthy Aquatic Ecosystems and Habitat.

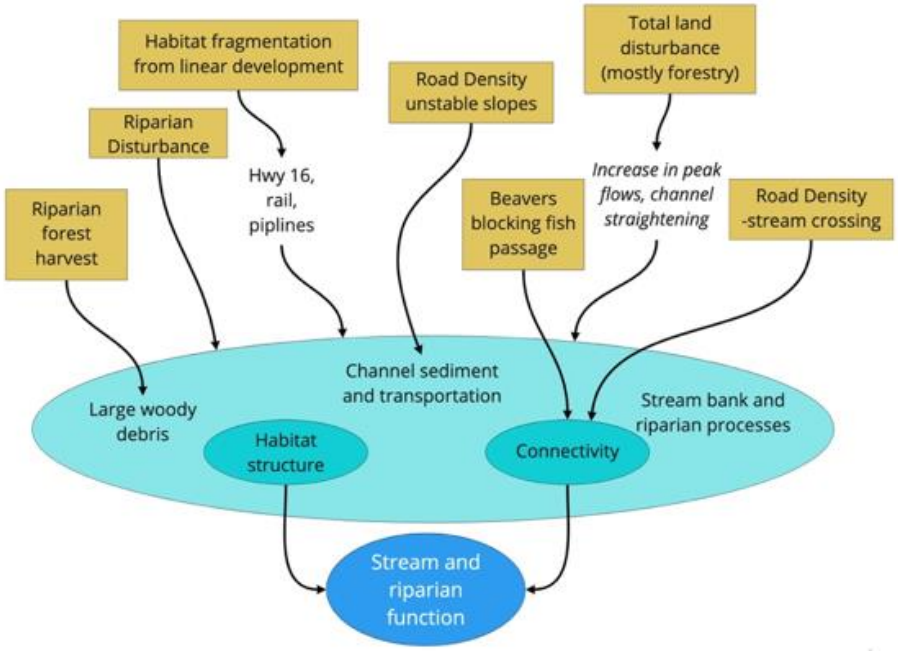

Figure 10: Issues and pathways affecting stream and riparian function in the Widzin Kwah

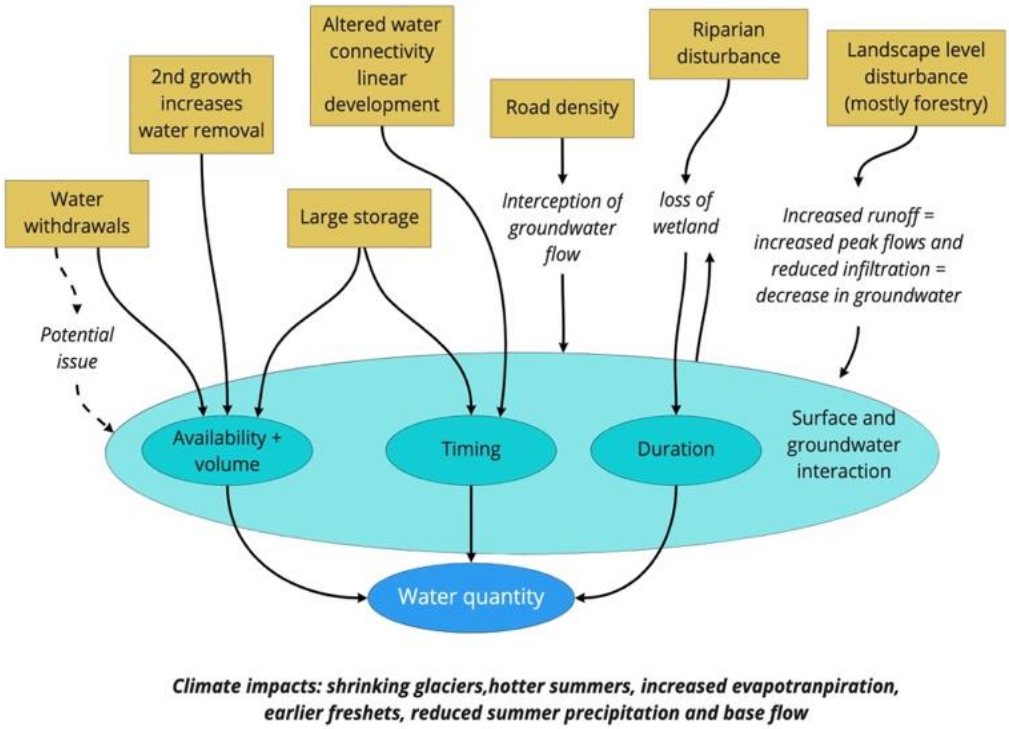

Figure 11: Issues and pathways affecting water quantity in the Widzin Kwah

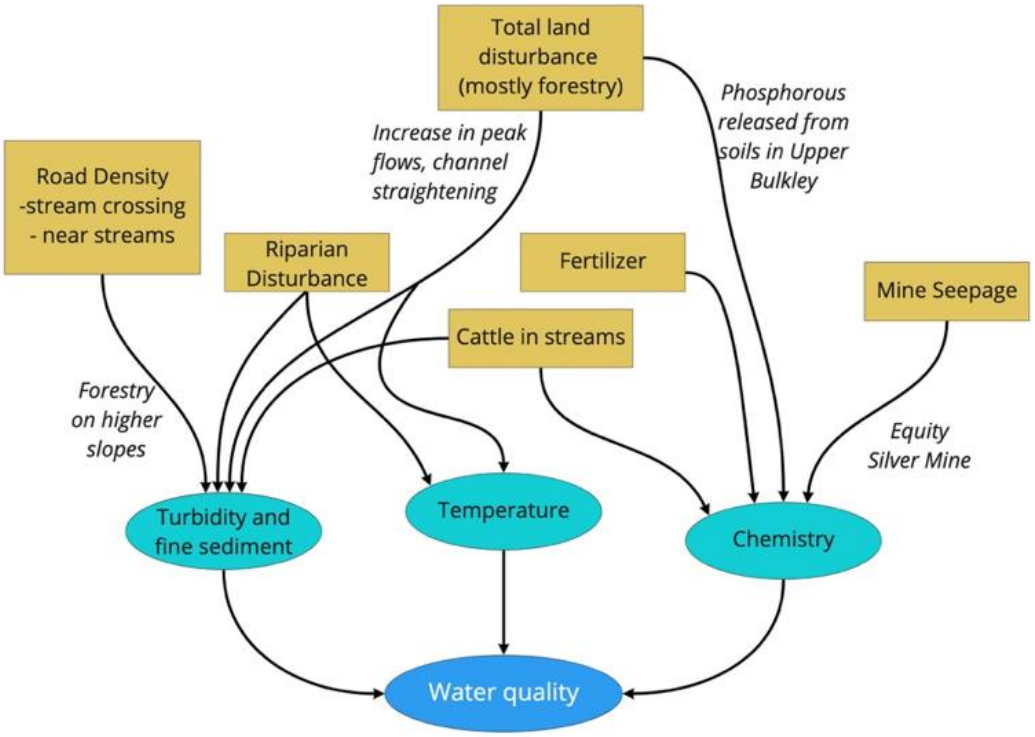

Figure 12: Issues and pathways affecting water quality in the Widzin Kwah

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