

Appendices

Issues and Policy Recommendations

*Matters and Factors for Consideration
by Alberta Environment in Issuing
Approvals, Preliminary Certificates,
Licences, and Transfers of Licensed Allocations*

Nose Creek Watershed

Prepared for the Nose Creek Watershed Partnership

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Appendix A

Background and Scope of Work

Background

Nose Creek is a tributary to the Bow River, arising just north of Crossfield and flowing into the Bow River just downstream of the Calgary Zoo. The eastern watershed boundary is just to the east of Deerfoot Trail and Highway 2. West Nose Creek is a major tributary that extends the western watershed boundary to about Bearspaw Road (Range Road 30).

The Nose Creek Watershed Partnership (Partnership) was created in 1998 by the City of Calgary, the City of Airdrie and the Municipal District of Rocky View #44. Alberta Environment has been involved with the Partnership to provide technical advice and assistance, including collaboration with water quality monitoring. By 2001 the Partnership broadened its partnership involvement to include the Town of Crossfield, Ducks Unlimited, the Calgary Airport Authority and the Bow River Basin Council.

The goal of the Partnership is to protect the riparian areas and to help improve and restore water quality in Nose Creek to its natural levels. All the partners involved are determined to rise above the differing obstacles affecting water quality and conservation and work together to achieve these important objectives. Its improvement strategy involves: learning about the quality of water throughout the watershed, identifying sources of contamination and initiating clean-up efforts and stewardship measures with all stakeholders, including individuals and community groups residing within the watershed.

In the late 1990s, the provincial government created a comprehensive new statute, the *Water Act*, to ensure sustainable water management and a healthy aquatic environment. Recognizing that effective and efficient water management planning is essential, Alberta Environment developed a document, *The Framework for Water Management Planning (Framework)*, to guide this planning. A major component of the Framework and a requirement of the *Water Act* is the *Strategy for the Protection of the Aquatic Environment (Strategy)*. The Strategy details the provincial government's commitment to maintaining, restoring or enhancing the condition of the aquatic environment.

In 2002, the need for a Nose Creek Water Management Plan (NCWMP) was identified through a consultative process between the Partnership and Alberta Environment. It was determined that, with the cumulative effects of increasing subdivision development, industrial growth, stormwater discharge, agricultural activities and channelization occurring within the Nose Creek Watershed, a water management plan would provide an essential decision-support tool to help ensure sustainable water management and a healthy aquatic environment.

In early 2003, the Partnership and Alberta Environment issued the Terms of Reference for developing the first phase of an authorized multi-phase NCWMP. One of the first steps in creating the NCWMP is the identification of Instream Flow Needs (IFNs) for the water courses in the Nose Creek Basin. An Instream Flow Needs Scoping Study was completed in July 2004, which provides an overview of existing methodologies for developing IFNs for fish habitat, recreation, water quality, riparian vegetation and channel structure, and recommends methods appropriate for the Nose Creek Basin.

It is now anticipated that the Water Management Plan will be completed in early 2006. However, the Nose Creek Partnership identified an urgent need to develop interim policy recommendations to address Objective #2 NOW as a basis to move the planning process forward. The issues and draft policy recommendations from this exercise will be communicated to the Councils of each municipality represented on the Partnership. Recommendations that would address Objective 2 of the Terms of Reference were seen to be of particular importance.

Scope of Work

The information contained in this report will be presented to the respective municipal councils represented on the Nose Creek Watershed Partnership for review and possible adoption. The report will identify specific issues of concern identified to date in the public input process and by the Technical Committee, plus draft policy recommendations addressing Objective #2 for potential inclusion in the completed Water Management Plan.

The following documents should be reviewed:

- *Water Management Plan Terms of Reference*
- *Instream Flow Needs Scoping Study*
- Public input sessions results to date
- *Watershed Health Report*

1. The consultant is expected to review the above and other relevant background material that will be of relevance in preparing the report. These documents could include Municipal, Federal and Provincial legislation, policy and guidelines, Municipal development plans, stormwater management reports and other relevant landuse and planning documents.
2. The consultant will use the above information along with recommendations from the Technical Committee and public input sessions to date to prepare a report that identifies issues and draft policy recommendations to address Objective #2 of the Water Management Plan Terms of Reference:
Objective: Specify the matters or factors that may be considered by Alberta Environment decision makers in deciding whether to issue an approval, preliminary certificate or licence, or approve a transfer of an allocation of water under a licence.

Rationale The NCWMP is a tactical, local-level planning initiative that will provide Alberta Environment decision makers with the relevant, context-specific considerations and information essential for effective water management. For example: issues to be addressed can include channelization of the watercourse, storm water works within the riparian area and the protection of the existing riparian areas.

Recommendations in the NCWMP can be used by any resource decision maker when their decision could impact water quantity and/or quality and the people or ecosystems that rely on water.

3. Included in the report should be an appendix of policies in other jurisdictions (Alberta and others as appropriate) that support the issues and draft policy recommendations identified for Nose Creek.

Appendix B

Alberta Environment's Policies, Principles, and Practice for Decisions on Approvals, Preliminary Certificates, Licences, and Transfers of Licensed Allocation

This appendix contains summaries of laws, regulations, policies, standards, and guidelines. It provides a general description of the decision-making system used and has no legislative sanction. Before taking any action, you should consult the original legislation, regulations, and other documents and seek the advice of legal counsel and, as appropriate, professional engineers and other experts in the management of land and water.

Context

Decisions on approvals, preliminary certificates, licences, and transfers of licensed allocations are governed by general and specific criteria. General principles and objectives are shown in Table B-1. Specific policies and principles are discussed in the sections that follow.

For water bodies in Alberta, withdrawal of water, discharge of wastewater, and activity within a water body are regulated by Alberta Environment. Using two pieces of legislation, the *Environmental Protection and Enhancement Act* (EPEA) and the *Water Act*, Alberta Environment makes decisions on whether or not to issue approvals, preliminary certificates, and licences and approve transfers of licensed allocations. For some activities, Alberta Environment uses codes of practice in lieu of issuing approvals.¹

With an approval under EPEA, Alberta Environment gives its permission for an activity to proceed that could affect, among other things, water quality. With an approval under the *Water Act*, Alberta Environment gives its permission for an activity that could affect a water body and its aquatic environment.²

A licence gives permission to divert or in some other way alter the location or flow of water. A preliminary certificate permits a water diversion project to be built and, if the conditions in the preliminary certificate are fulfilled, requires Alberta Environment to issue a licence. When approving a transfer of a licensed allocation, Alberta Environment gives permission for water to be diverted at a different location than was originally permitted.³

Approvals

Environmental Protection and Enhancement Act Approvals

In making a decision on an application for an EPEA approval, the Director must consider

- whether an environmental impact assessment report is required
- criteria in the regulations
- any applicable decision of the Energy and Utilities Board (EUB) or the Natural Resources Conservation Board (NRCB)

and may consider any evidence that was before the EUB or the NRCB in relation to an applicable decision.⁴

For an EPEA approval, an applicant must, among other things, submit information on:⁵

- the substances, the sources of the substances, and the amount of the substances that will be released into the environment as a result of the activity
- the justification for the release of the substances
- steps taken to reduce the amount of the substances released
- any impact, including surface disturbance, that may or will result from the activity
- confirmation of contingency plans to deal with any unforeseen release of substances to the environment
- the conservation and reclamation plan for "specified land" (which includes wells, industrial or municipal pipelines, telecommunication systems, transmission lines, roads, pits, and borrow excavations, but excludes residential subdivisions and agricultural operations)
- public consultation undertaken or proposed
- any other information required by the Director.

The "Director"

The *Environmental Protection and Enhancement Act* and the *Water Act* create a position of authority called the Director. This designation, though, is different from the way the term is normally used. As set out in those laws, the Director is the person who has been given the power to make a specific type of decision.

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Table B-1 General Provincial Principles and Objectives Relevant to the Nose Creek Watershed and Decisions on Approvals, Preliminary Certificates, Licences, and Transfers of Licensed Allocations	
Principles	<p>Sustainability</p> <ul style="list-style-type: none"> ▪ Renewable resources shall be managed to ensure their long-term viability and future use potential. (C) ▪ Decision-makers must recognize that there are limits to the available water supply. (S) ▪ Water resources must be managed within the capacity of individual watersheds. (S) ▪ Healthy aquatic ecosystems are vital to a high quality of life and must be preserved. (S) ▪ Ground water and surface water quality must be preserved in pursuing economic & community development. (S) ▪ The Alberta Government will continue to be a leader in drinking water quality and standards to ensure Albertans have safe, secure drinking water. (S) ▪ Water resources shall be developed to ensure that the optimum value for the resource is obtained and there will be a fair return to Albertans. (C) ▪ Albertans must become leaders at using water more effectively and efficiently and will use and reuse water wisely and responsibly. (S) <p>Integration and Multiple Benefits</p> <ul style="list-style-type: none"> ▪ Water shall be managed in a manner that addresses its interdependence with resources such as trees, minerals, wildlife, fish, range, public land, and plants and recognizes that the use of one resource can affect other users and resources. (C) ▪ Environmental decisions will take into account economic impacts and economic decisions will reflect environmental impacts. (C) ▪ Management of water resources shall ensure that a range of products and values are provided. (C) ▪ Decision-making will consider the full-range of environmental, social, health, and economic interests and values and integrate their management into an effective whole. (I) ▪ Decision-making will be based on understanding the potential consequences of choices. (I) ▪ The provision of access to water resources shall be ensured, including issuance of authorizations for use as well as physical access to the resource. (C) ▪ The "first-in-time, first-in-right" principle for granting and administering water allocations must be preserved. (S) <p>Effective Decision-Making</p> <ul style="list-style-type: none"> ▪ Decisions will be clear, understandable, fair, timely, based on the best available information, and responsive to changing circumstances. (C) ▪ Decision-making processes will be fair and will provide public access to relevant information. (I) ▪ Management will attempt to anticipate issues and needs and be adaptive, responding to experience, new information, shifts in social preference, technological innovations, and unexpected situations. (I) ▪ Knowledge of water supply and quality is the foundation for effective decision-making. (S) ▪ Decisions should be made after consultation with Albertans, giving particular attention to people and industry that are directly affected by the decision. (C) ▪ Those affected by decisions will be consulted before action is taken. Open communication will be supported. (I) ▪ Decision-making processes will strive for efficient use of time and financial resources. Decisions should contribute to achieving the government's goals and objectives. (I) ▪ All decision-making procedures will provide for the review and the early resolution of conflicts. (C) ▪ There will be more use of proactive analysis, environmental assessment, and audits to identify and remedy problems at the earliest stages. (C) ▪ Decision-makers will be accountable for their decisions. (I) ▪ Products and processes will be straightforward, not open to a wide range of interpretations. (I) <p>Roles and Rules</p> <ul style="list-style-type: none"> ▪ More responsibility will be placed on resource users for the consultation, planning, and monitoring of the management and use of water and other resources. (C) ▪ Citizens, communities, industry, and government must share responsibility for water management and work together to improve conditions within their local watershed. (S) ▪ The positive conduct of companies and organizations with a history of sound environmental compliance will be rewarded. (C) ▪ Penalties for non-compliance will be focused on those who do not meet environmental requirements. (C) ▪ Greater use will be made of clearer and stronger penalties and sanctions. (C) ▪ Compliance standards will be clearly set out and understood. (C)
<p>Sources: (C)= Alberta Government, <i>Alberta's Commitment to Sustainable Resource and Environmental Management</i>, 1999 (http://www3.gov.ab.ca/srd/info/sustainable.pdf), pp. 4-9</p> <p>(I) = Principles of integrated resource management in Alberta Environment, <i>Framework for Water Management Planning</i>, n.d. (http://www3.gov.ab.ca/env/water/Legislation/Framework.pdf), pp. 2-3 (Note: It is unclear if and how the other principles in the Framework influence Alberta Environment's decision-making on approvals, preliminary certificates, licences, and transfers.)</p> <p>(S) = Alberta Government, <i>Water for Life: Alberta's Strategy for Sustainability</i>, 2003 (http://www.waterforlife.gov.ab.ca/docs/strategyNov03.pdf), pp. 6-12, 18-19, & 21-22</p>	

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Table B-1 General Provincial Principles and Objectives Relevant to the Nose Creek Watershed and Decisions on Approvals, Preliminary Certificates, Licences, and Transfers of Licensed Allocations	
Objectives	<p>Within three years: (S)</p> <ul style="list-style-type: none"> ▪ A system to monitor and report actual water use. ▪ A system for monitoring and assessing aquatic ecosystems. ▪ Science-based methods for determining the ecological requirements for a healthy aquatic environment. ▪ Water conservation objectives for the South Saskatchewan River Basin. ▪ A wetland policy and supporting action plan to achieve sustainable wetlands. ▪ Determination of the full cost of providing water through Alberta's water management infrastructure. ▪ Determination of the true value of water in relation to the provincial economy. ▪ Evaluation and recommendations on the merit of economic instruments to meet water conservation and productivity objectives. ▪ A public awareness and education program on water conservation. <p>Within six years: (S)</p> <ul style="list-style-type: none"> ▪ Water management objectives and priorities for sustaining aquatic ecosystems and supporting sustainable economic development established through watershed plans. ▪ All sectors demonstrating best management practices and improving efficiency and productivity associated with water use. ▪ A provincial water information centre. ▪ Updated water quality programs to support watershed protection and planning. ▪ An initial assessment of the status of aquatic ecosystems. ▪ Watershed management plan for the Bow River watershed, including objectives for aquatic ecosystems. ▪ Support to watershed stewardship groups to improve the condition of local watersheds. ▪ Water conservation and productivity plans for all water-using sectors. ▪ Implementation of economic instruments, as necessary, to meet water conservation and productivity objectives. <p>Within ten years: (S)</p> <ul style="list-style-type: none"> ▪ Management and allocation of water to 1) support sustainable economic development and 2) sustain aquatic ecosystems and ensure their contribution to Alberta's natural capital and quality of life are maintained. ▪ Knowledge, tools, and motivation to implement actions to maintain or improve water resources. ▪ Completed flood risk maps. ▪ Understanding of the state of the quality and quantity of all surface water in major basins, ground water supply, and the state of Alberta's aquatic ecosystem. ▪ An adaptive management system for identifying issues, gathering information, developing and implementing action plans, and evaluating management actions. ▪ Implementation of regional water systems. ▪ A plan to manage Alberta's provincial and district water infrastructure for long-term sustainability. ▪ Maintenance and enhancement of aquatic ecosystems to ensure they meet established objectives. ▪ A monitoring program to ensure all sectors are achieving water conservation and productivity objectives. <p><i>Note: These are province-wide objectives. It is not known if Alberta Environment will have the resources, information, and intent to achieve these objectives for the Nose Creek watershed.</i></p>
<p>Sources: (C) = Alberta Government, <i>Alberta's Commitment to Sustainable Resource and Environmental Management</i>, 1999 (http://www3.gov.ab.ca/srd/info/sustainable.pdf), pp. 4-9</p> <p>(I) = Principles of integrated resource management in Alberta Environment, <i>Framework for Water Management Planning</i>, n.d. (http://www3.gov.ab.ca/env/water/Legislation/Framework.pdf), pp. 2-3 (Note: It is unclear if and how the other principles in the Framework influence Alberta Environment's decision-making.)</p> <p>(S) = Alberta Environment, <i>Water for Life: Alberta's Strategy for Sustainability</i>, 2003 (http://www.waterforlife.gov.ab.ca/docs/strategyNov03.pdf), pp. 6-12, 18-19, & 21-22</p>	

Guidelines provide criteria and specific requirements for some activities. Information requirements may be waived if the Director considers a requirement is not relevant or a waiver is appropriate.⁶

The Director's scope in reviewing an application is broad, although not unlimited, and includes:⁷

- proposed methods of minimizing the generation, use and release of substances and any available alternative technologies
- site suitability, including soils, air and water quality, ground water conditions, site drainage, water supply, and wastewater disposal alternatives
- the proposed monitoring programs to determine emissions and their effect on the environment
- proposed methods of management of the storage, treatment, and disposal of substances
- the adequacy of the quality and quantity of the potable water used in or produced by the activity
- proposed plans to complete the conservation and reclamation required
- the past performance of the applicant in ensuring environmental protection in respect of the activity.

Alberta Environment considers the review of an EPEA application to be a determination of whether "the general and overall impact on the environment of the activity is in accordance with the Act and the regulations."⁸

If it is in the public interest that a proposed activity not proceed, the Minister of Environment may order that an approval for the activity not be issued.⁹

Under the Minister of Environment's power to appoint inspectors, investigators, and analysts, inspectors from a local authority can be designated to conduct conservation and reclamation inquiries, issue reclamation certificates, and issue environmental protection orders for off-site adverse effects or substances that have left or escaped from the site.¹⁰

Stormwater

Storm drainage systems are required to be designed, constructed, operated, and maintained "to achieve under all normal and foreseeable operating conditions" substance release requirements. They must meet the standards and design requirements from Alberta Environment's *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems* and any other standards and design requirements specified by the Director. The design must be approved by a professional engineer. Unless the Director requires it, pre-existing systems do not need to meet the standards and design requirements as they change.¹¹

The Director must be informed of any proposed extension or replacement of a portion of a storm drainage collection system. (Changes to the storage and disposal components of the system are not covered by this requirement.) There must be written confirmation from a professional engineer that increased flow associated with the extension or replacement is within the design capacity of both the existing collection system and the system providing treatment of the collected water. A statement must also be provided as to whether or not the design of the extension or replacement meets the standards (but not the design requirements) in the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems*. The Director may ask for any other information.¹²

The Director may allow an extension or replacement of a storm drainage system to proceed if it does not comply with the design standards set out in the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems*.¹³

Construction of an additional storm drainage treatment facility or a modification of a storm drainage treatment facility must be authorized by the Director. The requirements for the application include:¹⁴

- the location of discharge points
- the nature and extent of treatment of the storm drainage before discharge to the environment
- predevelopment and post-development storm drainage flow from the area served by the proposed facility

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- written confirmation from a professional engineer that the increased flow associated with the proposed facility is within the design capacity of the existing system
- any other information required by the Director.

Snow disposal can not occur at a site for more than one year unless the Director has been informed. The information provided to the Director must compare the design of the snow disposal site with the design guidelines in Alberta Environment's *Snow Disposal Guidelines*.¹⁵

Unless authorized by the Director, those responsible for a storm drainage system must not allow a substance to enter the system if it could impair the integrity of the storm drainage collection system, impair the operation or performance of a storm drainage treatment facility, or impair the quality of storm drainage.¹⁶

Stormwater management is required for all new developments and is expected to achieve:¹⁷

- minimization of potential downstream flooding and erosion
- prevention of adverse effects on the hydraulic capacity of watercourses through the development
- location of development above the 1 in 100 year flood level
- use of storage (detention or retention) to control run-off using the criteria of
 - maximum release rate equal to pre-development rate unless the outlet is adequate
 - capacity to handle a 1 in 25 year flood level unless the outlet is adequate and an increased release rate will not do any harm
- acceptable levels of
 - the potential risk of health hazards, loss of life, and property damage from flooding
 - the incidence of inconvenience from surface ponding and flooding
- integration and conformity with approved master drainage plans
- minimization of the impact (especially during construction) on
 - the ground water regime
 - increased erosion
 - increased sediment transport
- maintenance of natural stream geometry.

Water Act Approvals

Approvals are required under the *Water Act* for an activity in a water body. This includes drainage or infilling of a water body, erosion protection, and removal or destruction of trees and other vegetation within the bed and shores of a water body. An approval is not required for such things as:

- floating platforms,
- portable or seasonal boat launches and docks
- fences
- removal of beaver dams on the person's land
- household wells
- dugouts outside a watercourse, lake, or wetland
- filling in depressions that do not support an aquatic environment within a landowner's property if there is no impact on water bodies on the land or the water sources and flooding of neighboring land will not be caused
- landscaping outside a watercourse, lake, or wetland that will not have an adverse effect on the aquatic environment or alter the flow or volume of water on an adjacent parcel of land
- surface water diversion works used in confined feeding operations and manure storage facilities if the works are approved by the Natural Resources Conservation Board under the *Agricultural Operation Practices Act*, do not significantly alter the volume, quality, or rate of water, do not alter or affect a non-flowing water body, are not located on a fish-bearing water body, and are designed, planned, and certified by a professional engineer.¹⁸

A water body is broadly defined in the *Water Act* as "any location where water flows or is present, whether or not the flow or the presence of water is continuous, intermittent or occurs only during a flood, and

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includes but is not limited to wetlands and aquifers.” The more restrictive term watercourse is also used in the regulations. It means the channel and bed of a natural water body.¹⁹

In making a decision on an application for a *Water Act* approval, the Director must consider the relevant matters and factors in an approved water management plan. The Director may also consider

- existing, potential or cumulative
 - effects on the aquatic environment
 - hydraulic, hydrological and hydrogeological effects
 - effects on household users, licensees and traditional agriculture users that result or may result from the activity
- effects on public safety
- any other matters applicable to the approval that are relevant.

The Director may add any appropriate terms and conditions to the approval.²⁰

If a proposed activity is not in the public interest, the Minister of Environment may order that an approval application not be accepted or that an approval not be issued.²¹

Alberta Environment advocates that among the questions that need to be addressed in consideration of approvals are:²²

- Does the water body support a rare and unique ecosystem?
- Is the water body home to endangered species?
- Does the water body provide a range of wildlife habitat in terms of quality, quantity, and/or diversity?
- If the water body is destroyed or altered,
 - What impact will that have on downstream water users, neighboring lands, or the aquatic environment?
 - Will there be potential for flooding or erosion of lands in the future?
- Will the loss of the water body impact
 - Ground water wells or the local aquifer?
 - Operations of the farm or business with regard to possible drought in the future?

Under the *Water Act*, the Minister of Environment may, if there is or may be a risk to human life or property as a result of flooding, designate land as a flood risk area and specify the acceptable land uses in that area. Before making the designation, the Minister must consult with local municipalities and regional services commissions.²³

Codes of Practice

Alberta Environment's codes of practice are based on the following principles:²⁴

- Water must be managed sustainably.
- Water is a vital component of the environment.
- Water plays an essential role in a prosperous economy and balanced economic development.
- Water must be managed using an integrated approach with other natural resources.
- Water must be managed in consultation with the public.
- Water must be managed and conserved in a fair and efficient manner.

The codes of practice relevant to this report are three *Water Act* codes for outfall structures and crossings such as bridges and pipelines that pass over, through, or under a water body and an EPEA code for wastewater systems using lagoons.

The most significant features of these codes of practice are summarized in Table B-2.

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Table B-2

Codes of Practice

New Activity
Under Normal Conditions²⁵

Relevant to Water Management
in Nose Creek Watershed

	Outfall Structures	Pipelines & Telecommunication Lines	Watercourse Crossings	Wastewater Systems Using Lagoon
Law	<i>Water Act</i>	<i>Water Act</i> (This code of practice applies only to lines that go under a water body)	<i>Water Act</i> (This code of practice covers bridges, culverts, overhead pipelines, and telecommunication lines)	<i>Environmental Protection and Enhancement Act</i>
Class of Water Body	<ul style="list-style-type: none"> Two kilometers of Nose Creek upstream of its mouth is a Class C water body. Remainder of watershed is Class D. 	<ul style="list-style-type: none"> Two kilometers of Nose Creek upstream of its mouth is a Class C water body. Remainder of watershed is Class D. 	<ul style="list-style-type: none"> Two kilometers of Nose Creek upstream of its mouth is a Class C water body. Remainder of watershed is Class D. 	<ul style="list-style-type: none"> This code of practice does not use a classification system for water bodies.
Requirements	<ul style="list-style-type: none"> Compliance with code of practice Notification of Director 14 days before construction Compliance with <ul style="list-style-type: none"> construction methods & conditions specifications of engineer or engineering technologist and aquatic environment specialist contingency measures to be taken in the event of conditions that may cause adverse effects monitoring measures before, during, and after construction 	<ul style="list-style-type: none"> Compliance with code of practice Notification of Director 14 days before construction Compliance with <ul style="list-style-type: none"> construction methods & conditions specifications of engineer (pipeline) or owner's specifications (telecommunication line) contingency measures for potential problems resulting from adverse conditions or crossing method failure monitoring measures after construction 	<ul style="list-style-type: none"> Compliance with code of practice Notification of Director 14 days before construction Compliance with <ul style="list-style-type: none"> construction methods & conditions specifications of engineer or engineering technical specialist or (for unmapped water body 2 km upstream of mouth if no documentation of fish presence) owner's specifications, contingency measures for handling potential problems resulting from adverse conditions monitoring measures after construction 	<ul style="list-style-type: none"> Compliance with code of practice without affecting rights or obligations under other authorization(s) of Alberta Environment One-week notice of discharge to downstream landowners interested in the lagoon discharge No flooding of downstream lands or erosion of watercourses or land Operation by certified operator Land reclamation in accordance with standards and guidelines Monitoring <ul style="list-style-type: none"> Samples collected/analyzed using standard methods Monitoring of discharge quality/amount Ground water quality monitoring prior to & 1 year after the start of operation Ground water level monitoring Annual report on monitoring

SOURCES: Code of Practice for Outfall Structures on Water Bodies (http://www.ap.gov.ab.ca/documents/Regs/OUTFALL.cfm?frm_isbn=0779722965), Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body (<http://www.ap.gov.ab.ca/documents/codes/Pipeline.cfm>), Code of Practice for Watercourse Crossings, (<http://www.ap.gov.ab.ca/documents/codes/Crossing.cfm>), Code of Practice for Wastewater Systems Using a Wastewater Lagoon (http://www.ap.gov.ab.ca/documents/Regs/LAGOON.cfm?frm_isbn=0779723007), Guide to the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body, Including Guidelines for Complying with the Code of Practice, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/PipelineGuide.pdf>), Guide to the Code of Practice for Watercourse Crossings, Including Guidelines for Complying with the Code of Practice, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/WatercourseGuide.pdf>), and Calgary Management Area Map (Water Act Codes of Practice), 2000 (<http://www3.gov.ab.ca/env/water/legislation/COP/maps/Calgary.pdf>)

	Outfall Structures	Pipelines & Telecommunication Lines	Watercourse Crossings	Wastewater Systems Using Lagoon
Requirements (continued)	<ul style="list-style-type: none"> •Nose Creek two km upstream of mouth: - no activity from May 1 to July 15 and September 16 to April 5 unless aquatic environment specialist determines that the work can be carried out while ensuring that the quantity and productive capacity of the aquatic environment will be equivalent to what existed before the work occurred 	<ul style="list-style-type: none"> •Nose Creek two km upstream of mouth: <ul style="list-style-type: none"> - specifications and recommendations of aquatic environment specialist <ul style="list-style-type: none"> ▫ are not required if using the trenchless method ▫ are required if using the isolation or open-cut method or if using other methods when those methods are not feasible - no activity from May 1 to July 15 and September 16 to April 5 unless aquatic environment specialist determines that the work can be carried out while ensuring that the quantity and productive capacity of the aquatic environment will be equivalent to what existed before the work occurred 	<ul style="list-style-type: none"> •Nose Creek two km upstream of mouth: <ul style="list-style-type: none"> - specifications and recommendations of an aquatic environment specialist <ul style="list-style-type: none"> ▫ are not required for a single span bridge or similar structure that does not result in a disturbance or alteration to the active channel of the water body ▫ are required if using a multi-span bridge, open bottom culvert or similar structure that does not significantly narrow the width of the active channel and that maintains the natural bed of the water body or, when those are not feasible, using other methods - no activity from May 1 to July 15 and September 16 to April 5 unless aquatic environment specialist determines that the work can be carried out while ensuring that the quantity and productive capacity of the aquatic environment will be equivalent to what existed before the work occurred 	<ul style="list-style-type: none"> •Discharge at designed frequency between April 1 and November 30 for maximum of three consecutive weeks
Director's Discretion	<ul style="list-style-type: none"> •Information requirements for notice •Timing of notice •No public notice of application required 	<ul style="list-style-type: none"> •Information requirements for notice •Timing of notice •No public notice of application required 	<ul style="list-style-type: none"> •Information requirements for notice •Timing of notice •No public notice of application required 	<ul style="list-style-type: none"> •Application requirements •Period of discharge •Methods of collecting/analyzing samples •Deviation from manner of disposal •No public notice of application required
Notice or Application Content	<ul style="list-style-type: none"> •Substances to be discharged •Construction methods and conditions and, where applicable, rationale for proposed method •Whether construction will incorporate specifications of aquatic environment specialist •Whether structures or measures are required to ensure that quantity and productive capacity of aquatic environment will be equivalent to what existed prior to construction 	<ul style="list-style-type: none"> •Construction methods and conditions and, where applicable, rationale for not using preferred method (if available) •Whether the works will incorporate specifications and recommendations of aquatic environment specialist •Whether physical or other measures are required to ensure that quantity and productive capacity of aquatic environment will be equivalent to what existed prior to construction (if available) 	<ul style="list-style-type: none"> •Construction methods and conditions and rationale for crossing method other than standard structure (any information that is available) •Whether works will incorporate specifications/recommendations of aquatic environment specialist •Whether technically feasible measures are required to ensure quantity/ productive capacity of aquatic environment equivalent to pre-construction situation (any information available) 	<ul style="list-style-type: none"> •Justification for cases where design requirements not met •Adequacy of route for transport of wastewater without flooding or erosion •Adequacy of system design

SOURCES: Code of Practice for Outfall Structures on Water Bodies (http://www.ap.gov.ab.ca/documents/Regs/OUTFALL.cfm?frm_isbn=0779722965), Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body (<http://www.ap.gov.ab.ca/documents/codes/Pipeline.cfm>), Code of Practice for Watercourse Crossings (<http://www.ap.gov.ab.ca/documents/codes/Crossing.cfm>), Code of Practice for Wastewater Systems Using a Wastewater Lagoon (http://www.ap.gov.ab.ca/documents/Regs/LAGOON.cfm?frm_isbn=0779723007), Guide to the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body, Including Guidelines for Complying with the Code of Practice, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/PipelineGuide.pdf>), Guide to the Code of Practice for Watercourse Crossings, Including Guidelines for Complying with the Code of Practice, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/WatercourseGuide.pdf>), and Calgary Management Area Map (Water Act Codes of Practice), 2000 (<http://www3.gov.ab.ca/env/water/Legislation/COP/maps/Calgary.pdf>)

Alberta Environment: Policies, Principles, and Practice

	Outfall Structures	Pipelines & Telecommunication Lines	Watercourse Crossings	Wastewater Systems Using Lagoon
Key Standards	<ul style="list-style-type: none"> ▪ Upon completion <ul style="list-style-type: none"> - quantity and productive capacity of aquatic environment at and adjacent to site must be equivalent to what existed prior to construction - hydraulic, hydrologic, and hydrogeological characteristics of water body must be equivalent to what existed prior to construction ▪ Maintenance of flow of water past site ▪ Minimization of duration and amount of disturbance of bed and banks ▪ All measures possible to control erosion or sedimentation <ul style="list-style-type: none"> ▪ No harm to fish or fish eggs, no destruction of fish or fish eggs, and no harmful alteration, disruption or destruction of fish habitat <ul style="list-style-type: none"> ▪ No deposition in water body of substance or material that may have an adverse effect on aquatic environment 	<ul style="list-style-type: none"> ▪ Upon completion <ul style="list-style-type: none"> - quantity and productive capacity of aquatic environment at and adjacent to site must be equivalent to what existed prior to construction - hydraulic, hydrologic, and hydrogeological characteristics of water body must be similar to what existed prior to construction ▪ Maintenance of flow of water through and around crossing ▪ Minimization of duration and amount of disturbance of bed and banks ▪ Minimization of erosion and sedimentation <ul style="list-style-type: none"> ▪ Avoid harm to or destruction of fish or fish eggs and harmful alteration, disruption or destruction of fish habitat ▪ No impediment to fish migration <ul style="list-style-type: none"> ▪ No deposition in water body of deleterious substances and materials toxic to fish and other aquatic organisms 	<ul style="list-style-type: none"> ▪ Upon completion <ul style="list-style-type: none"> - where technically feasible, quantity and productive capacity of aquatic environment at and adjacent to site must be equivalent to what existed prior to construction ▪ No flood damage to property because of increased back-flooding ▪ Site selection must <ul style="list-style-type: none"> - avoid, or if not possible, minimize realignment of water body and disturbance of bed and banks - avoid, if possible, high gradient areas, unstable slopes and actively eroding banks, and bank seeps or springs ▪ No alteration of location of water body because of scour ▪ Maintenance of approximate slope of bed of water body ▪ Maintenance of flow of water at the crossing at all times ▪ Minimization of duration and amount of disturbance of bed and banks ▪ Minimization of erosion and sedimentation into the water body ▪ Avoid, or if not possible, minimize impairment of water body's water quality ▪ Avoid harm to or destruction of fish or fish eggs and harmful alteration, disruption, or destruction of fish habitat ▪ No impediment to upstream and downstream fish migration after construction ▪ Maintenance of fish migration – minimum requirement of ensuring water velocity at the crossing does not create a barrier more than 3 consecutive days at a 1 in 10 year recurrence interval ▪ No deposition of deleterious substances and materials toxic to fish and other aquatic organisms 	<ul style="list-style-type: none"> ▪ For wastewater irrigation, compliance with <i>Guidelines for Municipal Wastewater Irrigation</i> (crops) or authorization from Director (other vegetation) ▪ For sludge application to land, compliance with <i>Guidelines for the Application of Municipal Wastewater Sludges to Agricultural Lands</i> ▪ 30 m setback between land irrigated with wastewater and a watercourse, water well, public road, or railway line ▪ Other requirements regarding landowner and municipality consent, site suitability, application limits, and sampling.

SOURCES: Code of Practice for Outfall Structures on Water Bodies (http://www.ap.gov.ab.ca/documents/Regs/OUTFALL.cfm?frm_isbn=0779722965), Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body (<http://www.ap.gov.ab.ca/documents/codes/Pipeline.cfm>), Code of Practice for Watercourse Crossings, (<http://www.ap.gov.ab.ca/documents/codes/Crossing.cfm>), Code of Practice for Wastewater Systems Using a Wastewater Lagoon (http://www.ap.gov.ab.ca/documents/Regs/LAGOON.cfm?frm_isbn=0779723007), Guide to the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body, Including Guidelines for Complying with the Code of Practice, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/PipelineGuide.pdf>), Guide to the Code of Practice for Watercourse Crossings, Including Guidelines for Complying with the Code of Practice, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/WatercourseGuide.pdf>), and Calgary Management Area Map (Water Act Codes of Practice), 2000 (<http://www3.gov.ab.ca/env/water/legislation/COP/maps/Calgary.pdf>)

	Outfall Structures	Pipelines & Telecommunication Lines	Watercourse Crossings	Wastewater Systems Using Lagoon
Key Standards (continued)	<ul style="list-style-type: none"> •No transfer of non-indigenous biota to the site •Debris disposal, cleanup and initial stabilization •Within one full growing season following completion, stabilization of all areas disturbed by construction that slope to the water body •Incorporation of specifications from aquatic environment specialist in engineer's specifications •Aquatic environment field assessment required when, in the opinion of the aquatic environment specialist, information is inadequate to comply with code of practice or where non-standard construction methods are to be used •Location of the pipe connecting to the outfall structure "shown through the width of the active floodplain of the water body" 	<ul style="list-style-type: none"> • No transfer of non-indigenous biota to the site • Debris disposal, cleanup and initial stabilization • Within one growing season, permanent stabilization of all disturbed areas in the crossing site sloping to the water body • Incorporation of specifications and recommendations of aquatic environment specialist • Incorporation of other specifications of owner or engineer considered appropriate • Aquatic environment field assessment when, in the opinion of the aquatic environment specialist, information does not exist to determine the quantity and productive capacity of aquatic environment at or adjacent to the site • Pipes carrying substance that causes or may cause adverse effect on aquatic environment must be installed below 1 in 100 scour depth. Other pipes below 1 in 50 year scour depth. 	<ul style="list-style-type: none"> •No transfer of non-indigenous biota to the site •Debris disposal, cleanup and initial stabilization •Within one full growing season, permanent stabilization of disturbed areas at the crossing sloping to the water body •Incorporation of specifications and recommendations of aquatic environment specialist •Aquatic environment field assessment when, in the opinion of the aquatic environment specialist, information does not exist to determine the quantity and productive capacity of the aquatic environment at or adjacent to the site and impact to fish, fish eggs, fish habitat, and fish migration •Culverts at or below level of water body 	

SOURCES: Code of Practice for Outfall Structures on Water Bodies (http://www.ap.gov.ab.ca/documents/Regs/OUTFALL.cfm?frm_isbn=0779722965), Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body (<http://www.ap.gov.ab.ca/documents/codes/Pipeline.cfm>), Code of Practice for Watercourse Crossings (<http://www.ap.gov.ab.ca/documents/codes/Crossing.cfm>), Code of Practice for Wastewater Systems Using a Wastewater Lagoon (http://www.ap.gov.ab.ca/documents/Regs/LAGOON.cfm?frm_isbn=0779723007), Guide to the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body, Including Guidelines for Complying with the Code of Practice, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/PipelineGuide.pdf>), Guide to the Code of Practice for Watercourse Crossings, Including Guidelines for Complying with the Code of Practice, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/WatercourseGuide.pdf>), and Calgary Management Area Map (Water Act Codes of Practice), 2000 (<http://www3.gov.ab.ca/env/water/legislation/COP/maps/Calgary.pdf>)

Watercourse Crossings

A code of practice has been developed specifically for watercourse crossings.

A watercourse crossing is "a crossing or temporary crossing and any associated permanent or temporary structures that are or will be constructed to provide access over or through a water body." The code of practice covers structures and measures to isolate the location of the works, erosion protection structures, and sedimentation management structures. It does not cover, among other things:

- pipeline and telecommunication line crossings under the bed of a water body (covered by the *Code of Practice for Pipelines and Telecommunication Lines*)
- realignment of the channel of a water body beyond 20 meters upstream and downstream from the watercourse crossing or the diversion of water from the site of a watercourse crossing (requires an approval or licence under the *Water Act*)
- technically feasible structures outside the right of way of the crossing required to make the quantity and productive capacity of the aquatic environment at the crossing site equivalent to what existed prior to construction (requires an approval under the *Water Act*).

In a code of practice, the definition of a water body is restricted to "a water body with defined bed and banks, whether or not water is continuously present, but does not include fish bearing lakes." A wetland without a defined bed and banks would not be considered a water body under a code of practice.

An approval is not required for an ice bridge or snow fill crossing across streams such as Nose Creek and single-span bridges and other non-bridge crossings where

- the water body is in the White Area of the province and is not frequented by fish
- the hydraulic, hydrologic or hydrogeological characteristics of the water body are not altered at flood events below the 1 in 25 year flood event
- the size of a culvert used in a crossing is 1.5 meters or less in diameter
- there is no diversion of water from the water body and
- the installation of the crossing is not part of a causeway through a lake, slough, wetland or other similar water body.

Other watercourse crossings must meet the requirements of the *Code of Practice for Watercourse Crossings*.

Source: *Code of Practice for Watercourse Crossings* (http://www.ap.gov.ab.ca/documents/Regs/CROSSING.cfm?frm_isbn=0773292594), s. 1(2)(bb)-(cc) & 2, *Water (Ministerial) Regulation*, Alberta Regulation (AR) 205/98 (http://www.ap.gov.ab.ca/Documents/REGS/1998_205.CFM), s. 1(1)(ee), 2, 3(3)-(4), Schedule 1, clauses 1 & 2(c), & Schedule 2, and Alberta Environment, *Guide to the Code of Practice for Pipelines and Telecommunication Lines, Including Guidelines for Complying with the Code of Practice*, 2001 (<http://www3.gov.ab.ca/env/water/Leislation/CoP/PipelineGuide.pdf>), p. 5.

Water Act Codes of Practice

The *Water Act* codes of practice require compliance with construction methods and conditions, engineering specifications, and contingency and monitoring measures for the project. The project must be completed in a way that, in some cases, prevents and, in other cases, limits impacts on the water body. The expectation is that, upon completion, the "quantity and productive capacity" of the aquatic environment will be in a condition that is equivalent to what existed prior to construction.

In the codes of practice, the management of impacts on the aquatic environment is based on fish and fish habitat. The objective is to achieve no net loss of productive fish habitat. According to Alberta Environment, the definition of fish "encompasses the definition of fish under the federal *Fisheries Act*." However, in that law, the term fish does not limit which fish are to be protected whereas, in the codes of practice, fish are defined in a more restrictive way:

fish used for domestic, sport and commercial purposes, and fish of special concern, including but not limited to rare, endangered, threatened or vulnerable species.

The Alberta Government determines which fish are of special concern.²⁶

The degree of protection for a water body under the *Water Act* codes of practice is based on a classification system (Table B-3). The classification system ranks water bodies according to the sensitivity to

¹⁶ This appendix contains summaries of laws, regulations, policies, standards, and guidelines. It provides a general description of the decision-making system used and has no legislative sanction. Before taking any action, you should consult the original legislation, regulations, and other documents and seek the advice of legal counsel and, as appropriate, professional engineers and other experts in the management of land and water.

damage of the fish habitat in the water body. The two kilometer section of Nose Creek upstream of the confluence with the Bow River is in Class C (moderate sensitivity), while the remainder of the Nose Creek watershed is in Class D (low sensitivity).

For Class D water bodies, the level of environmental protection is less stringent. In particular, there are no periods of restricted activity during times when fish habitat is more susceptible to harm and, for watercourse crossings, pipelines, and telecommunication lines, there is no requirement for the involvement of aquatic environment specialists in planning and designing standard projects.

The *Water Act* codes of practice have requirements for:

- incorporating the specifications and (for water crossings) the recommendations of an aquatic environment specialist into the planning and design of a project
- conducting an aquatic environment field assessment when, in the opinion of an aquatic environment specialist, information is inadequate to comply with the code of practice.

An aquatic environment specialist would, of course, need to be consulted for either of these things to happen.

EPEA Code of Practice

The *Code of Practice for Wastewater Systems Using a Wastewater Lagoon* provides requirements for the design, construction, and operation of wastewater lagoons. It includes

- limits on when wastewater can be discharged from the lagoon
- the maximum duration of discharge
- requirements for monitoring of discharges and the local ground water and notice to downstream landowners of when a discharge will occur,
- prohibitions against downstream flooding and erosion
- setbacks for wastewater irrigation.

In the code of practice, specific provisions are not included for protecting the aquatic environment or for consultation with aquatic environment specialists. However, before allowing a lagoon to be constructed, Alberta Environment considers whether treated wastewater from a lagoon could impact the water body receiving the treated wastewater. Any requirements for evaluating the impact on the aquatic environment would be at the discretion of Alberta Environment.

Table B-3

**Classes of Water Bodies
for Codes of Practice**

The class of a water body is based on the "sensitivity" of fish habitats and their known distribution. The sensitivity for the class of water body is as follows:

Class A – highest sensitivity; habitat areas are sensitive enough to be damaged by any type of activity within the water body; known habitats in water body critical to the continued viability of a population of fish species in the area.

Class B – high sensitivity; habitat areas are sensitive enough to be potentially damaged by any type of activity within the water body; habitat areas important to continued viability of a population of fish species in the area.

Class C – moderate sensitivity; habitat areas are sensitive enough to be potentially damaged by unconfined or unrestricted activities within a water body; broadly distributed habitats supporting local fish species populations.

Class D – low sensitivity; fish species as defined under the code of practice not present.

Source: Alberta Environment, *Guide to the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body, Including Guidelines for Complying with the Code of Practice*, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/PipelineGuide.pdf>), p. 8

Licences

Licences are issued under the *Water Act* to allow the diversion and use of water. The term "diversion" covers a variety of activities including impoundment, storage, consumption, and removal of water.²⁷

Some diversions do not require a licence. These are:²⁸

- 6,250 m³/yr. of water (or a maximum specified in an approved water management plan) for "traditional agriculture use" (raising animals or applying pesticides to crops as part of a farm unit) by owners or occupiers of riparian land or land under which ground water exists if the diversion existed prior to January 1, 1999.
Note: Some people have applied for and received registrations that, like licences, provide legal protection within the priority system for traditional agriculture use. The deadline for applying for a registration has passed, but the process of administering registrations continues to be part of Alberta Environment's work. Although registrations are not within the scope of this project, a water management plan can include the matters and factors to be considered "in deciding whether to effect a registration." Whether the effecting of registrations continues has not been examined for this project.
- 1,250 m³/yr. of water for household purposes by owners or occupiers of riparian land or land under which ground water exists
- 1,250 m³/yr. of water for human consumption, sanitation, fire prevention, and other uses related to a camp
- a water well if water is diverted with a manual pump
- a dugout if water is naturally impounded in the dugout from surface water run-off, the dugout is not situated within a watercourse, lake, or wetland, the capacity of the dugout does not exceed 12,500 m³, and total diversion of water from the dugout does not exceed 6,250 m³/yr – unless otherwise specified in an approved water management plan.
- diversion of surface water for the purpose of operating an alternative watering system for livestock that are generally grazed
- diversion of saline groundwater
- diversion of water for the purpose of dewatering a sand and gravel site or construction site if the water is not used, the water is either retained on-site or diverted in its original quality to a water body hydraulically connected to the original source with no adverse effect on the aquatic environment or a household user, licensee or traditional agriculture user, and, for a construction site, there is no adverse effect on any land and the dewatering does not last longer than six months
- diversion of water for fire fighting.

As with decisions on *Water Act* approvals, in making a decision on an application for a licence, the Director must consider the relevant matters and factors in an approved water management plan. The Director may also consider²⁹

- existing, potential or cumulative
 - effects on the aquatic environment
 - hydraulic, hydrological and hydrogeological effects
 - effects on household users, licensees and traditional agriculture usersthat result or may result from the diversion of water, operation of works, and requirements for a rate of flow or water level
- effects on public safety
- the suitability of land for irrigation
- any other matters applicable to the licence that are relevant.

The Director may add any appropriate terms and conditions to the licence as long as they do not take away from any rights established by meeting the requirements of a preliminary certificate. Unlike in western U.S. states and most other western provinces, the Director is not required to protect existing water rights when issuing a licence. There is also no requirement to protect the aquatic environment.³⁰

In the South Saskatchewan River Basin (which includes the Nose Creek watershed), Alberta Environment has defined two levels of instream flow requirements:

18 *This appendix contains summaries of laws, regulations, policies, standards, and guidelines. It provides a general description of the decision-making system used and has no legislative sanction. Before taking any action, you should consult the original legislation, regulations, and other documents and seek the advice of legal counsel and, as appropriate, professional engineers and other experts in the management of land and water.*

- minimum flow to protect basic water quality and instream flow needs
- preferred flow to protect desirable instream flow needs.

During low runoff periods, instream flows “will occasionally drop below the preferred level” and, on regulated streams, “projects will be managed such that the instream flows drop to minimum levels only for short periods of time under drought conditions.”³¹

Licences issued in the South Saskatchewan Basin may contain conditions limiting the amount of water that may be diverted and used when necessary to maintain minimum instream flows.³²

In making licensing decisions on proposed diversions from springs or from sand and gravel deposits adjacent to a water body, Alberta Environment assumes that surface and ground water are connected and the diversion will be treated as a surface water diversion. If the applicant feels this assumption is incorrect, it is the applicant’s responsibility to demonstrate otherwise. For proposed diversions from wells in major water basins where restrictions are in place, Alberta Environment requires that the potential for a direct, short-term hydraulic connection with surface water be reviewed. If such a connection exists, the proposed diversion will be treated as a surface water diversion. In other situations, it is assumed that surface and ground water are not connected unless demonstrated otherwise.³³

If a proposed diversion is not in the public interest, the Minister of Environment may order that a licence application not be accepted or that a licence not be issued. The Director may also “close” an area or water body to further licence applications for a specified time if the Director believes that no further allocation of water should be made.³⁴

The Minister may also reserve unallocated water and can retain the reserved water in the water body and specify how and for what purposes the reserved water can be allocated. Unallocated water in the South Saskatchewan Basin has been reserved.³⁵

Transfers of Licensed Allocations

Applications can be made to transfer an allocation of water under a licence to another location. The Director may only consider a transfer application if the ability to transfer has been authorized and the allocation of water to be transferred is held under a licence in good standing. The ability to transfer has been authorized for the South Saskatchewan Basin.³⁶

If the application is in good order, the Director must conduct a public review of the proposed transfer and, in making a decision on the application, has the same matters and factors that may be considered when reviewing an application for a licence. In addition, the Director may consider the allocation of water that the licensee has historically diverted and the effects of the transfer on water conservation objectives.³⁷

Some Terms Related to Transfers

A **water conservation objective** is the amount and quality of water necessary for

- protection of a natural water body or its aquatic environment
- protection of tourism, recreational, transportation, or waste assimilation uses of water
- management of fish and wildlife.

A **licence in good standing** is not defined in the *Water Act*. A licence which has terms and conditions that have not been complied with is not in good standing. Licences that are suspended or cancelled or should be considered for suspension or cancellation are not considered to be in good standing. In the *Water Act*, there are a variety of reasons why a licence could be suspended or cancelled, including:

- failing or ceasing for three years to exercise the rights granted under the licence and having no reasonable prospect that those rights will be exercised in the future
- causing a significant adverse effect on the aquatic environment that was not reasonably foreseeable at the time the licence was issued.

Alberta Environment has provided some guidance to its decision-makers on factors to consider when determining if a licence is in good standing. This includes lack of use or non-use of water as a consideration in determining whether or not a licence is in good standing.

Source: *Water Act*, Revised Statutes of Alberta 2000, c. W-3 (<http://www.qp.gov.ab.ca/Documents/acts/W03.CFM>), s. 1(1)(hhh) & 55(1)-(2) and Alberta Environment, *Administrative Guideline for Transferring Water Allocations* (http://www3.gov.ab.ca/env/water/legislation/Guidelines/Transfer_Guidelines.pdf), August 26, 2003, pp. 4, 11, & 18-19.

A transfer may only be approved if:³⁸

- the volume of water allocated does not increase
- the transfer
 - does not impair the exercise of rights of other water users who have not agreed that the transfer may take place
 - will not cause a significant adverse effect on the aquatic environment.

The Director may withhold up to 10% of the allocation being transferred if doing so is in the public interest to protect the aquatic environment or to implement a water conservation objective. The withheld water could remain in the water body, be reserved, or be allocated to the Government in a licence that would be used to implement a water conservation objective.³⁹

Public Involvement

Alberta Environment considers the guarantee of public participation in decisions affecting the environment to be a cornerstone of EPEA. The public must be notified of an application under EPEA. The written concerns of those who are directly affected will be considered in a decision and directly affected people can appeal a decision. The public notice requirement can be waived if the Director considers the proposed activity "routine," that is, it "will result in a minimal or no adverse effect on the environment."⁴⁰

Under EPEA, when reviewing an approval application, the Director may ask for additional information from any source considered appropriate and can require the applicant to hold meetings in the area where the proposed activity is or will be carried out so that the public may obtain information from the applicant respecting the application.⁴¹

An EPEA application may be provided to a provincial interdepartmental referral committee for recommendations. The proposed decision may also be circulated to anyone the Director considers appropriate for comment.⁴²

The public notice requirements are similar under the *Water Act*. The applicant notifies the public of the application, the concerns of those who are directly affected must be considered in a decision, and directly affected people can appeal a decision. The public notice requirement can be waived if the Director believes the proposed activity or diversion of water will have "a minimal or no adverse effect" on the aquatic environment or on others with legal rights to use water.⁴³

Public notice of an application for an approval, licence, or transfer is ordinarily published in a local newspaper. The Director may require other forms of notification including providing the notice to local authorities or specific individuals.⁴⁴

In the South Saskatchewan Basin, the Alberta Government "is committed to ensuring that Albertans have every opportunity to understand and provide advice on water management decisions."⁴⁵

In terms of releasing information to the public under EPEA and the *Water Act*, Alberta Environment has requirements that it must meet and also has a fair amount of discretion. Some restrictions have been created that can limit the information available to the public and extend the time it takes to provide information. The Director is not required to apply most restrictions and the Minister of Environment may set aside any restrictions and release information in situations where the information is not related to an investigation or proceeding and would not reveal trade secrets, processes, and techniques that the Director has, upon request, approved as confidential. Alberta Environment can set up a registry for information that has been released to the public. A registry has been created so that documentation for approvals, licences, registrations, and permits issued under EPEA and the *Water Act* can be examined.⁴⁶

Education and Compliance

Alberta Environment has education and compliance programs that are province-wide. Key principles for the programs are:

- clear, enforceable legal requirements that are widely known within the “regulated community” and the public
- lawful, fair, consistent, and timely compliance assurance activity
- firm and fair enforcement using remediation, deterrence, and/or punishment based on a “polluter pays/resource restitution” philosophy
- where appropriate, recovery of Alberta Environment’s costs to bring the situation into compliance.

Priorities for compliance education are based on the need to increase compliance, the significance of the potential impact from non-compliance, and an ability to influence behavior. Performance that exceeds minimum requirements or substantially improves compliance will be acknowledged. The regulated community will be encouraged to develop their own methods, technology, practices, and other initiatives to assure compliance. Compulsory monitoring and reporting will be used when appropriate. An annual compliance assessment plan is prepared and enforcement measures are implemented based on a set of criteria.⁴⁷

Fees

EPEA requires a non-refundable fee for an approval application to be processed. Security or insurance can be required. The application fee is based on “the complexity of the activity and the level of service needed to review and process the application.” The fee is not charged to local authorities, the Government, or government agencies. Security may be required for specified activities to ensure compliance with an approval. The security can be used to fix problems caused by non-compliance with the approval or by adverse impacts on the environment.⁴⁸

Under the *Water Act*, a fee is charged for the issuance of licences. The Minister may also, by order, charge a fee for:

- applications and the issuance of approvals, preliminary certificates, licences, and other documents
- a hearing or review under the Act
- a service with respect to works or undertakings administered by the Minister
- a service, material, function, or thing provided under the Act.

In terms of water use, the Minister may only charge for water used for the production of power by a water power development.⁴⁹

Appendix C

Key Issues Nose Creek Watershed

Key Issues

Through its technical work and consultation with the public, the Nose Creek Watershed Partnership has identified a variety of issues that need to be addressed to ensure sustainable water management and a healthy aquatic environment.¹ These issues are summarized below.

Key Issues	
KNOWLEDGE: What we know	Description
Water quality for irrigation	Based on existing information, bacteria levels in Nose Creek are acceptable for livestock watering, but there may be risks for irrigation in terms of contamination of raw produce because of bacteria levels and damage to soil permeability and sensitive crops (e.g., raspberries) because of salinity. ²
Water quality for recreation	Bacterial levels exceed Alberta's contact recreation guideline posing some health risk for those who swim and play in the water. ²
Water quality for aquatic ecosystems	High phosphorus levels in the water violated freshwater aquatic life guidelines. High phosphorus levels can lead to excessive algae and weed growth which, in turn, can affect oxygen concentrations creating problems for aquatic life and raise social concerns regarding recreational use and aesthetics. ²
Water quantity	As to water quantity, the Nose Creek watershed is a unique system that now sees water flow through more quickly and more intensely.
Riparian health	Along Nose Creek, 65% of selected riparian areas are unhealthy and 23% are healthy but with problems. Along West Nose Creek, 21% of selected riparian areas are unhealthy and 63% are healthy but with problems. ³
Riparian health: positive factors	The positive factors that are contributing the most to the health of riparian areas are 1) low presence of dead woody material, 2) the presence of fine materials (as opposed to gravels, cobbles, and boulders), 3) low rate of active lateral cutting of streambanks, and 4) fairly good vegetative cover in the floodplain.
Riparian health: negative factors	The most important problems in terms of riparian health are 1) exposure of bare soil and the resulting presence of invasive or undesirable plants, 2) altered streambanks, and 3) lack of shrubs and trees.
Riparian health: cause of problems	In terms of riparian health, the most important causes of problems are human activities, especially heavy use of riparian areas for livestock grazing and watering and activities associated with urban development (e.g., roads, paths and trails, recreational activity, stormwater outfalls).
Impacts of urban and industrial activity	Urban and industrial activity has led to increased channelization, dam-building, stormwater/wastewater discharge, and removal or deterioration of vegetation, negatively impacting streamflow, water quality, and riparian habitat in the watershed.
Impervious ground cover	The dominant characteristic of the urban landscape is the high degree of impervious ground cover. This can dramatically increase the rate and volume of runoff from rainfall or snowmelt. The fast moving water can carry more material off the land, increasing the amount of contaminants reaching the creek and downstream.
Agricultural water management	Grazing and agricultural management practices have more to do with water management than anything else.
Impacts of agricultural activities	Detrimental impacts of agriculture and ranching on rural drainage can result from the drainage of wetland areas or the conversion of riparian areas to pasture or cropland. The location of concentrated grazing and watering sites for livestock can contribute to erosion and contaminant loading to water bodies.
Impacts on the Bow River	Nose Creek flows into the Bow River upstream of an important fishery and water withdrawals for the Western Irrigation District (WID). The quantity and quality of flows in Nose Creek impact the Bow River and its uses.

Key Issues	
KNOWLEDGE: What we don't know	Description
Data on flow and water quality	Data on natural streamflow and water quality are of limited reliability because it is not possible to determine to what extent flow and quality conditions are affected by stormwater that is discharged into the creeks.
Data on environmental factors and recreation	The available information related to fisheries, riparian vegetation, recreation, and channel characteristics is very limited.
Instream flow methods	To calculate instream flow needs, the methods used by Alberta Environment (AENV) are designed for streams that, unlike Nose Creek and West Nose Creek, are affected by withdrawal of flow rather than the higher runoff rates and volumes from urban areas. ⁴
Relationship between surface and ground water	How should the relationship between ground water and surface water be managed?
Watershed data collection and analysis	How will a watershed approach to data collection and analysis work, e.g., where are the critical locations for monitoring flow?, what time interval should be used?, what level of accuracy is needed?
Significant human activities	We need to identify significant human activities that affect or in the future could affect flows and water quality in the watershed, e.g., existing approvals and water withdrawal licences, current applications for water withdrawal licences, agricultural activities that affect water flows, population projections, and current and proposed land uses.
Impact of water-related factors vs. "non-flow related issues"	The impact of "non-flow related issues" (e.g., land use, municipal planning) that affect water quality, riparian vegetation, and channel structure should be separated from the impact of flow and other water-related factors. What are the effects of different forms of development and what could be changed to protect or improve watershed health?
Access to water and land	How does the provision of access to water and land increase or reduce the negative consequences for the watershed?
Management practices: effectiveness	How effective are management practices for protecting the watershed?
Management practices: practicality and economics	Are management practices for protecting the watershed practical or economical?
Developability	What is developable land? What does developability mean?
Social and economic value	What is the social and economic value of protecting the watershed?
Acceptable amount of damage	Is there an acceptable amount of damage to the watershed? What are the specific targets?

Key Issues

Key Issues	
GOALS	Description
Support and balance for all aspects of the water system	There needs to be support and balance for all aspects of the water system (including the natural infrastructure of aquatic, riparian, and upland areas) and human use of the environment, taking into account the economic, social, and ecological impacts.
Stewardship and everyday actions	Stewardship and everyday actions need to be broader, e.g., what people pour down storm sewers, incremental and cumulative aspects, how to make urban living less harmful to the water system.
Fair, sustainable water allocation strategy	How can we ensure a fair, sustainable water allocation strategy that will meet water conservation objectives?
Planning	Planning should be collaborative, flexible, fair, and encouraging of innovation.
OPPORTUNITIES AND OBSTACLES	Description
The whole picture	The Nose Creek watershed has already been impacted by the regulatory decisions in place. A lot of the time when making new decisions, it is difficult to take in the whole picture for consideration.
Resources and attention to issues	Resources are tight. The Alberta Government is now working with Codes of Practice. As a result, they are not looking at some issues as closely as they used to.
Appeals and judicial reviews	In its regulatory decision-making, AENV's greatest concern is being brought before the Environmental Appeal Board to justify a decision or brought before a judge for judicial review.
Strong scientific data	AENV needs strong scientific data, very well documented reasons why the development can't go ahead.
The value of science	Science-based answers are needed, but science can be inconclusive and takes time.
Consideration of information	A decision-maker with AENV will use all information available to make a decision. Anyone could influence a decision on an application by submitting their own information. The Director would have to consider it the same as any other information.
Matters and factors to consider	What matters or factors should be considered by AENV decision makers in deciding whether to issue an approval, preliminary certificate or licence, or approve a transfer of an allocation of water under a licence?
Common understanding	How do we ensure elected officials, administrators, land and water managers, the scientific community, and the general public have a common understanding of the problems and the available information?
Effective communication	How should effective communication be promoted among agencies responsible for water management, stakeholders, and the residents of the watershed in order to maximize the opportunity for mutually acceptable solutions?
Public involvement	One of AENV's most important principles of effective water management planning is the involvement of all stakeholders. It is critical that all parties are at the table and buy-in to the final recommendations.
Consensus and diversity	How should the people of the Nose Creek watershed develop consensus while enabling a diversity of knowledge, interests, and values to be considered and addressed?
Disagreeing with a decision	How can local jurisdictions have recourse and a fair hearing if they do not concur with a decision?

Key Issues	
OPPORTUNITIES AND OBSTACLES (continued)	Description
Adequacy of existing laws	Are existing laws (e.g., <i>Water Act</i> , <i>Environmental Protection and Enhancement Act</i> , <i>Municipal Government Act</i> , <i>local by-laws</i>) adequate to ensure protection for water users, landowners, and the environment?
Consistency among governments	The governments involved have not all been speaking from the same page. Consistency between governments – each one is dealing with different requirements. Performance expectations vary between government, private sector, and different industries.
Municipal regulation	Should municipalities develop their own regulations or rely on provincial and federal standards?
Timing of plans and decisions	Plans and decisions are made years before other stakeholders are involved.
Future demand	While Nose Creek is currently subjected to a number of uses, it is anticipated that future development will increase demands. Allocations will need to be closely monitored and it is expected that licence transfers may be necessitated by limited supply.
Alberta Environment's role in planning	If within a Region, AENV is having difficulty with particular decisions and believes advice from a plan would assist with those decisions then they may be a significant player in a plan.
Voluntary vs. mandatory practices	Should management practices for protecting the watershed be voluntary or mandatory?
Role of education	What is the role of education in encouraging people to do the right thing?.
Rewarding doing the right thing	How do you acknowledge and reward people for doing the right thing, including those who have already been contributing to ecologically sound management?
When people don't follow the rules	What should be done when people won't follow the rules?
Who should pay?	Who should pay for improvements to protection of the watershed?

Appendix D

Assessment of Issues and Evaluation of Options

Assessment of Issues

The issues described in Appendix C were assessed to determine:

1. Is the issue relevant to the matters and factors Alberta Environment decision-makers could consider in deciding whether to issue an approval, preliminary certificate, or licence or approve a transfer of an allocation of water under a licence?
2. To which type of decision (e.g., approval, licence) is the issue relevant?
3. Can the issue currently be managed in a routine manner or would additional data or policy measures be needed to incorporate the issue into normal decision-making?

The results of the assessment are shown in Table D-1.

Virtually all issues affecting the Nose Creek watershed are relevant to Alberta Environment's decision-making on approvals, preliminary certificates, licences, and transfers of licensed allocations. More than 80% of the issues could be routinely handled, at least partially, by Alberta Environment using the policy measures it already has available.

Although Alberta Environment could make progress on the issues in the watershed by relying on what it is doing or is allowed to do, there are limits to its ability to effectively deal with the issues. For all but three of the 53 issues in the watershed, data gaps should be filled and/or additional policy measures implemented to complete the task of issue resolution.

Evaluation of Options

A variety of policy options were identified that could enhance the decision-making of Alberta Environment and others involved in water management in the Nose Creek watershed (Tables D-2 to D-4). These options were consolidated (Table D-5) and screened to identify their strengths and weaknesses. This screening was based on several perspectives including:

- feasibility
- current policy (e.g., *Water for Life* strategy, *South Saskatchewan River Basin Water Management Plan*, *Framework for Water Management*, municipal and intermunicipal plans)
- components of a watershed approach (Table D-6)
- criteria for good planning (Table D-7)
- good practice in water management decisions (Table D-8).

The results are shown in Tables D-9 to D-15.

All the options considered could make a positive contribution to managing the Nose Creek watershed and improving its condition. Only eight of the 103 options have a limitation that would potentially make them inappropriate. These limitations are incompatibility with current provincial policy, potential lack of support for compromise and consensus, and an inability to assist with target-setting and improving people's awareness.

**Table D-1
Assessment of Issues**

Key Issues	Relevant to Decision-Making?	Relevant Decision				Regulatory Decision-Making			Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures

KNOWLEDGE: What we know

Water quality for irrigation	Y	■	■	■	■	▲	○	●	AENV can advise licence or transfer applicants of risks, include conditions in approvals to reduce bacterial contamination to acceptable levels, and refer matter to regional health authority.	Potential salinity problems would require more research and analysis.	Elimination of risks from bacteria could be adopted as an objective for regulatory decisions.
Water quality for recreation	Y	■	■	■	■	▲	○	○	AENV can include conditions in approvals to reduce bacterial contamination to acceptable levels and refer matter to regional health authority.		Elimination of risks from bacteria could be adopted as an objective for regulatory decisions.
Water quality for aquatic ecosystems	Y	■	■	■	■	▲	○	○	AENV can include conditions in approvals to reduce phosphorus contamination to acceptable levels.		Reduction of phosphorus levels to natural or acceptable levels could be adopted as an objective for regulatory decisions.
Water quantity	Y	■	■	■	■	▲	○	●	AENV can require existing stormwater drainage systems to meet the requirements for new developments.	It is not clear to what extent stormwater affects flow. AENV can calculate predevelopment storm drainage for the watershed and adverse effects on the watershed's hydraulic capacity.	AENV could require the impacts of new and/or old stormwater discharge to be equivalent to natural or acceptable conditions.
Riparian health	Y	■	■	■	■	▲	○	●	AENV can add riparian health to its classification of water bodies, expand definition of aquatic habitat to include riparian areas, expand definition of fish to include all species, and reclassify water bodies in the watershed to, for example, Class B: sensitive enough to be potentially damaged by activity in floodplain.	AENV could conduct an aquatic environment field assessment of the watershed to establish the data base necessary to ensure compliance with approvals and codes of practice.	Direction would be needed if health of riparian areas is to be adequately considered in making decisions on applications. Current AENV regulatory decision-making system may require upgrading to handle.

**Table D-1
Assessment of Issues**

Key Issues	Relevant to Decision-Making?	Relevant Decision						Regulatory Decision-Making			Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures		
Riparian health: positive factors	Y	■	■	■	■	▲	○	●	AENV can develop criteria for approvals, licences, and codes of practice that will maintain and improve vegetative cover, "recycling" of woody materials, the presence of fine materials, and low lateral cutting of streambanks.		Direction would be needed if health of riparian areas is to be considered in making decisions on applications. Current AENV regulatory decision-making system may require upgrading to handle. AENV could, in cooperation with other provincial agencies, municipalities, and others, develop an action plan to ensure that the issuing of approvals and licences and implementation of codes of practice maintain and improve the quality of the riparian environment within floodplains in the watershed. Expansion of such an effort beyond the floodplain would require the consent and cooperation of others.		
Riparian health: negative factors	Y	■	■	■	■	▲	○	●	Effects on stream banks are considered and AENV can seek cooperation of other agencies and levels of government to equalize and reduce the regulatory burden on those required to comply with approvals, licences, and codes of practice. AENV can develop criteria for approvals and codes of practice that will increase tree and shrub coverage and reduce stream bank alterations, exposed soil, and the presence of undesirable vegetation.		Same as preceding.		

**Table D-1
Assessment of Issues**

Key Issues	Relevant to Decision-Making?	Relevant Decision						Regulatory Decision-Making			Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures		
Riparian health: cause of problems	Y	■	■	■	■	▲	○	●	See preceding entries.		See preceding entries.		
Impacts of urban and industrial activity	Y	■	■	■	■	▲	●	●	AENV can calculate predevelopment storm drainage for the watershed, define adverse effects on the watershed's hydraulic capacity, and require existing works (e.g., channel realignments, bridges, dams, stormwater drainage systems) to meet the requirements for new developments.	More information and better agreement on the effects of specific activities is needed. AENV could conduct an aquatic environment field assessment of the watershed to establish the data base necessary to ensure compliance with approvals and codes of practice.	AENV could require the impacts of new and/or old works to be equivalent to natural or acceptable conditions. Direction needed if a watershed approach is to be considered in approvals and licensing. Current AENV regulatory decision-making system may require upgrading to handle.		
Impervious ground cover	Y	■	■	■	■	▲	●	●	AENV can strengthen engineering specifications for approvals and codes of practice to relate degree of impervious ground cover to requirements for control of flow and discharge.	It is not clear to what extent stormwater affects flow and pollution.	Direction would be needed if the degree of impervious ground cover is to be considered in approvals and licensing. Current AENV regulatory decision-making system may require upgrading to handle.		
Agricultural water management	Y		■	■	■			●		AENV in cooperation with Alberta Agriculture, Food and Rural Development, municipalities, agricultural producers, and others could assess the performance of agricultural practices in relation to flow/water quality in the watershed.	Where necessary, adjust the procedures for approvals and other decisions.		
Impacts of agricultural activities	Y	■	■	■	■	▲	●	●	Drainage of wetlands can be handled in a routine manner.	Better information would be desirable on the significance of wetlands. More information and better agreement on the effects of specific activities is needed.	Direction needed if health of riparian areas is to be considered in making decisions on applications.		

**Table D-1
Assessment of Issues**

Key Issues	Relevant to Decision-Making?	Relevant Decision						Regulatory Decision-Making			Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures		
Impacts on the Bow River	Y	■	■	■	■	▲	○	●	2 km of Nose Creek upstream of mouth is Class B for codes of practice and has more stringent requirements than remainder of watershed. AENV could reclassify the remainder of watershed as Class B because of its importance to the Bow River.	Better information is desirable on the positive and negative effects of Nose Creek flow and quality on the Bow River and the WID.	Better direction is needed on the importance of protecting Nose Creek flow and quality for the Bow River and the WID.		

KNOWLEDGE: What we don't know

Data on flow and water quality	Y	■	■	■	■	▲	●	○	AENV can establish performance measures specific to the watershed for storm drainage.	AENV can calculate predevelopment flow and quality of storm drainage for the watershed and define adverse effects on the watershed's hydraulic capacity and assimilative capacity.	Direction desirable on how decision-makers will use the information.
Data on environmental factors and recreation	Y	■	■	■	■	▲	●	○	AENV can establish performance measures specific to the watershed for assessing impacts on fisheries, riparian vegetation, recreation, and channel characteristics.	AENV can review its Nose Creek approvals and licensing files to consolidate the information it has prepared or been provided with.	Direction desirable on how decision-makers will use the information.
Instream flow methods	Y	■	■	■	■	▲	○	○	AENV can develop an appropriate methodology for determining how the impact of stormwater flows can be incorporated into decisions.		Direction desirable on how decision-makers will use the information.
Relationship between surface and ground water	Y	■	■	■	■	▲	●	●	AENV can adopt the principle that surface and ground water are linked until demonstrated otherwise.	Better information needed.	Direction needed.
Watershed data collection and analysis	Y	■	■	■	■	▲	●	●	AENV can establish priorities and performance measures for the watershed.	AENV can conduct an environmental audit of the watershed.	Direction needed on how decision-makers will use the information.

**Table D-1
Assessment of Issues**

Key Issues	Relevant to Decision-Making?	Relevant Decision						Regulatory Decision-Making			Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures		
Significant human activities	Y	■	■	■	■	▲	●	●	Much of the information is available. Information on future demands, populations, and land uses is available in a general way. AENV can establish a water management information system for the watershed.	AENV can develop a method for more accurately estimating water use, flows, and water quality in the absence of official records.	Current AENV regulatory decision-making system would require upgrading to handle completely/ effectively.		
Impact of water-related factors vs. "non-flow related issues"	Y	■	■	■	■	▲	●	●	Issue can be incorporated into AENV decision-making where effects on flow and water quality can be identified.	AENV can collect information for distinguishing between different types of impacts and different types of developments.	Direction needed for decision-makers to consider non-flow related issues. Current AENV regulatory decision-making system would require upgrading to handle.		
Access to water and land	Y	■	■	■	■	▲	●		Issue can be incorporated into AENV decision-making where effects on flow and water quality can be identified.	AENV can conduct the necessary analysis.			
Management practices: effectiveness	Y	■	■	■	■	▲	●		Issue can be incorporated into AENV decision-making where effects on flow and water quality can be identified.	AENV can conduct the necessary analysis.			
Management practices: practicality and economics	Y	■	■	■	■	▲	●	○	Issue can be incorporated into AENV decision-making where effects on flow and water quality can be identified.	AENV can conduct the necessary analysis.	Current AENV regulatory decision-making system might require upgrading to handle.		
Developability	Y	■	■	■	■	▲	●	●	Issue can be incorporated into AENV decision-making where effects on flow and water quality can be identified.	AENV can conduct the necessary analysis.	AENV, in consultation with others, can develop a common understanding and consensus on development.		

**Table D-1
Assessment of Issues**

Key Issues	Relevant to Decision-Making?	Relevant Decision						Regulatory Decision-Making			Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures		
Social and economic value	Y	■	■	■	■			●	●	AENV can conduct the necessary analysis.	Current AENV system would require upgrading to include social/economic factors in decisions. This would include value of riparian areas and assimilative capacity.		
Acceptable amount of damage	Y	■	■	■	■	▲		●	○	AENV can establish performance measures for determining acceptable level of damage.	Direction desirable on how decision-makers will use information. AENV would need to incorporate riparian health into codes of practice and approval/licensing decision-making.		
GOALS													
Support and balance for all aspects of the water system	Y	■	■	■	■					●		Current AENV regulatory decision-making system would require upgrading to incorporate social/economic factors, riparian health, assimilative capacity, and additional aspects of aquatic environment.	
Stewardship and everyday actions	Y	■	■	■	■	▲		●		The educational aspects of stewardship can be handled by AENV. Engineering specifications provide stewardship direction for specific projects.	Current AENV regulatory decision-making system would require upgrading to incorporate the impact of everyday actions.		
Fair, sustainable water allocation strategy	Y	■	■	■	■	▲		●		AENV supports water sustainability and can become a partner in watershed planning and active participant in municipal referral processes.	Current AENV system would require upgrading to make watershed sustainability a required element of decisions on approvals, licences, and transfers.		
Planning	Y	■	■	■	■	▲		●		AENV can become a partner in planning and active participant in municipal referral process.	Current AENV system would need upgrading to ensure collaboration, flexibility, fairness, and innovation.		

Table D-1
Assessment of Issues

Key Issues	Relevant to Decision-Making?	Relevant Decision				Regulatory Decision-Making			Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures

OPPORTUNITIES AND OBSTACLES

The whole picture	Y	■	■	■	■		○	●		More data and analysis on watershed conditions would be useful.	AENV's decision-making focuses on maintaining existing conditions. Codes of practice and performance measures would need upgrading to incorporate objectives for returning watershed to more natural or acceptable conditions. The regulatory framework focuses on sport fisheries/fish of special concern and would need to broaden to encompass factors such as riparian health and assimilative capacity.	
Resources and attention to issues	Y	■	■	■	■			●			AENV would need to review approval/licensing decisions and code of practice activities to set priorities for examining issues more closely.	
Appeals and judicial reviews	Y	■	■	■	■	▲	●	●	AENV has considerable discretion to build stronger, more sustainable decisions.	AENV would need to conduct more and better data collection and analysis.	AENV would need better methods of avoiding or pre-empting challenges to its decisions.	
Strong scientific data	Y	■	■	■	■			●	●	AENV would need to conduct more and better data collection and analysis.	Sometimes AENV would need to adopt precautionary approaches to decisions.	
The value of science	Y	■	■	■	■			●	●	AENV would need to conduct more and better data collection and analysis.	AENV would need improved methods of making decisions in the face of uncertainty.	
Consideration of information	Y	■	■	■	■	▲		●	●	AENV has discretion to set priorities and performance measures for its decisions and to establish a level playing field.	AENV would need to conduct and be provided with more and better data collection and analysis.	AENV would need better performance measures and improved consultation with others.

**Table D-1
Assessment of Issues**

Key Issues	Relevant to Decision-Making?	Relevant Decision						Regulatory Decision-Making		Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures	
Matters and factors to consider	Y	■	■	■	■	▲		●	AENV has discretion to establish which elective matters and factors must be considered and which performance measures will be used in decisions.		AENV needs to more clearly define what information, aside from regulatory requirements, it actually considers to be essential to a decision and the performance measures it uses.	
Common understanding	Y	■	■	■	■	▲		●	AENV has considerable discretion to build common understanding.	AENV would need to conduct and be provided with more and better data collection and analysis.	AENV would need improved methods of consultation & creating awareness.	
Effective communication	Y	■	■	■	■	▲		●	AENV has considerable discretion to establish more effective communication to promote mutually acceptable solutions.	AENV would need to conduct and be provided with more and better data collection and analysis.	AENV would need improved methods of consultation and creating awareness, including greater awareness of how its regulatory framework could improve to increase the quality of decision-making.	
Public involvement	Y	■	■	■	■	▲		●	AENV has considerable discretion to involve all stakeholders and ensure buy-in.		AENV would need improved consultation and awareness to meet objective for public consultation.	
Consensus and diversity	Y	■	■	■	■	▲		●	AENV has considerable discretion to develop consensus and consider and address diversity.	AENV would need to conduct and be provided with more and better data collection and analysis.	AENV would need improved methods of consultation and creating awareness, including greater awareness of how its regulatory framework could improve to increase the quality of decision-making.	
Disagreeing with a decision	Y	■	■	■	■	▲		●	Post-decision appeal process has been defined.		Other methods of consultation may be needed, e.g., pre-decision methods for concurrence with decision.	

**Table D-1
Assessment of Issues**

Key Issues	Relevant to Decision-Making?	Relevant Decision				Regulatory Decision-Making			Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures
Adequacy of existing laws	Y	■	■	■	■		●			AENV would need to conduct and be provided with more and better data collection and analysis.	AENV needs to clearly define what, aside from regulatory requirements, it considers essential to a decision and performance measures it uses. AENV would need improved methods of consultation and creating awareness, including greater awareness of how its regulatory framework could improve to increase the quality of decision-making.
Consistency among governments	Y	■	■	■	■	▲	●		AENV has considerable discretion to encourage and develop consistency among governments and participate in planning and municipal referral processes.		AENV needs to clearly define what information, aside from regulatory requirements, it considers essential to a decision and the performance measures it uses. AENV would need improved methods of consultation and creating awareness, including greater awareness of how its regulatory framework could improve to increase the quality of decision-making.
Municipal regulation	Y	■	■	■	■		●			AENV would need to conduct and be provided with more and better data collection and analysis.	
Timing of plans and decisions	Y	■	■	■	■	▲	●	●	AENV has considerable discretion to participate in planning and municipal referral processes.		Better information exchange on future directions needed. Mechanisms needed for incorporating proposals, issues, trends, and uncertainty into decision-making.
Future demand	Y		■	■	■	▲	●	●	Monitoring system exists and transfer authority initiated.	AENV would need to conduct and be provided with more and better data collection and analysis.	Close monitoring would require higher priority.

**Table D-1
Assessment of Issues**

Key Issues	Relevant to Decision-Making?	Relevant Decision						Regulatory Decision-Making		Rationale		
		Approval	Preliminary Certificate	Licence	Licensed Allocation Transfer	Routine	Additional Data	Additional Policy Measures	Routine Matters	Potential Data Collection and Analysis	Potential Additional Policy Measures	
Alberta Environment's role in planning	Y	■	■	■	■	▲		●	AENV has the authority to assess whether the degree of difficulty in making decisions for the watershed is sufficiently high to improve its participation in planning.		Within watershed, decisions are difficult since data are limited and significant conflicts exist due to past decisions. AENV would need to recognize it is having difficulty with decision-making. This may require an improved decision-making system and more pertinent expertise.	
Voluntary vs. mandatory practices	Y	■	■	■	■	▲		●	AENV has the discretion to build consensus on voluntary vs. mandatory practices.	AENV would need to conduct and be provided with more and better data collection and analysis.	AENV would need improved consultation methods.	
Role of education	Y	■	■	■	■	▲		●	Formal and informal educational activities and initiatives are occurring or available. Effectiveness is anecdotal.	AENV would need to conduct and be provided with more and better data collection and analysis on the effectiveness of educational efforts.		
Rewarding doing the right thing	N					▲		●	AENV has discretion to acknowledge and reward people for good performance.		Although some formal programs exist, appropriate mechanisms for the watershed have not been identified. AENV would need strengthened performance measures for ecologically sound management.	
When people don't follow the rules	Y	■	■	■	■	▲		●	Compliance programs exist at federal, provincial, and municipal levels.	Need for and effectiveness of compliance for the watershed have not been determined.	AENV would need its requirements for approvals, codes of practice, and licensing to be more relevant to people's needs for using and protecting the environment.	
Who should pay?	Y	■	■	■	■	▲		●	AENV has, directly or indirectly with its regulatory framework and exercise of discretion, made decisions about who should pay for improvements to protection of the watershed.	Funding rationale for who has been paying and who should not pay has not been evaluated.	AENV might need to consider different approaches to regulation and funding because of fairness and adequacy of who pays what for watershed protection.	

Table D-2 Options Available to Alberta Environment Within Existing Decision-Making System	
<p>Existing Conditions</p> <ul style="list-style-type: none"> ▪ Determine predevelopment storm drainage/natural flow and natural water quality conditions for the watershed. ▪ Identify the impact of specific activities on flow and water quality in the watershed. ▪ Document the effectiveness, practicality, and economics of management practices for improving flow, water quality, and floodplain conditions in the watershed. <p>Objectives</p> <ul style="list-style-type: none"> ▪ Expand the definition of aquatic habitat to include the riparian areas within the watershed's floodplains. ▪ Expand the definition of fish to include species in the watershed that are good indicators of ecosystem health. ▪ Add riparian health criteria to the classification system for water bodies. ▪ Upgrade the classification of water bodies in Nose Creek so that aquatic environment specialists are involved in the design and construction of activities requiring approvals or compliance with codes of practice. ▪ Adopt the principle that surface and ground water are linked unless demonstrated otherwise. ▪ Establish priorities for data collection/analysis in the watershed. ▪ Define the public interest. <p>Performance Measures</p> <ul style="list-style-type: none"> ▪ Document or develop performance measures specific to the watershed that must be met for decisions. Factors the performance measures could cover are: <ul style="list-style-type: none"> - data collection and analysis - impact of storm drainage, construction activity, and water withdrawals on people and the environment - healthy aquatic and riparian ecosystem - the acceptable level of damage to the aquatic and riparian ecosystem - which wetlands may be drained, which must remain in a natural state, and which can be modified to be used as constructed wetlands - assessing impacts on fisheries, riparian vegetation, recreation, and channel maintenance - reducing adverse effects on the watershed's hydraulic capacity - cost-sharing - "developability" of the floodplain - sustainability of water management - the degree of difficulty in making decisions - avoiding and pre-empting challenges (e.g., appeals, judicial review) to decisions. ▪ Develop interim water conservation objectives for the aquatic and riparian ecosystem. ▪ Develop a methodology for determining instream flow needs that takes into account the impact of storm drainage in the watershed. <p>Communication and Consultation</p> <ul style="list-style-type: none"> ▪ In consultation with municipalities, water users, landowners, and others, develop a communication and consultation plan for reviewing applications that will <ul style="list-style-type: none"> - promote effective communication among regulatory agencies, stakeholders, and residents - ensure common understanding of problems - promote timely and informative identification and consideration of projects and concerns - promote consistency among governments 	<ul style="list-style-type: none"> - ensure that Albertans have every opportunity to understand and provide advice on water management decisions in the watershed - ensure the proper balance between consensus and diversity, including voluntary vs. mandatory action. ▪ Join the Nose Creek Watershed Partnership and become an active participant in the water management plan. ▪ Become an active participant in the referral and consultation process for municipal regulatory decisions. ▪ Develop a "code of practice" for stewardship and everyday actions. ▪ Refer the issue of bacterial contamination to the regional health authority. ▪ Establish an information management system for the watershed that includes <ul style="list-style-type: none"> - existing and future projections of population, land use, water demand, and demand on assimilative capacity - a registry of documents and information received or created by Alberta Environment in the administration of the <i>Environmental Protection and Enhancement Act</i> and <i>Water Act</i>. ▪ Review educational initiatives and, where necessary, modify to increase awareness and acknowledgement and rewarding of those who are doing the right thing. <p>Design and Construction</p> <ul style="list-style-type: none"> ▪ Improve design and construction standards to restore hydrology to acceptable conditions.¹ ▪ Develop standards and guidelines for approvals and codes of practice that will protect riparian areas by <ul style="list-style-type: none"> - maintaining and improving vegetative cover, "recycling" of woody materials, the presence of fine materials, and low lateral cutting of streambanks - increase tree and shrub cover - reduce streambank alterations, exposed soil, and the presence of undesirable vegetation. ▪ Include conditions in approvals that would reduce contamination from bacteria, salinity, and phosphorus to acceptable levels. ▪ Based on performance measures, review and, where necessary, revise information requirements for applicants, impact assessment procedures, and conditions for approvals, codes of practice, licences, and transfers. ▪ In consultation with agricultural producers, develop a program for reducing stockwatering and grazing along watercourses and in riparian areas. ▪ Require existing works (e.g., stormwater drainage systems, channel realignments, bridges, dams) to meet the requirements for new developments. <p>Compliance</p> <ul style="list-style-type: none"> ▪ Review compliance programs for watershed and, where necessary, modify to ensure that unauthorized activities do not adversely affect people and the environment. ▪ Develop an annual compliance plan for watershed. ▪ In cooperation with other agencies, equalize and continue to reduce the regulatory burden on those required to comply with approvals, codes of practice, and licensing. <p>Financial Considerations</p> <ul style="list-style-type: none"> ▪ Review approval requirements and fees and, where necessary, modify to ensure that the financial obligations imposed on people are fair, yet adequate to ensure protection of people and the environment. ▪ Develop a cost-sharing program for managing and improving the condition of the watershed.

Table D-3 Options Available to Alberta Environment to Enhance the Decision-Making System	
<p>Existing Conditions</p> <ul style="list-style-type: none"> ▪ Conduct an aquatic environment field assessment of the watershed and, where necessary, adjust procedures for approvals and other decisions. ▪ Taking into account people's needs for using and protecting the environment, review the regulatory requirements and expertise for the decision-making system and, where necessary, make changes to strengthen the system's performance. ▪ Assess the performance of agricultural practices in relation to flow and water quality in the watershed and adjust procedures for approvals and other decisions. ▪ Review existing legislation (e.g., <i>Water Act</i>, <i>Environmental Protection and Enhancement Act</i>, <i>Public Lands Act</i>, <i>Municipal Government Act</i>) to determine compatibility and effectiveness in maintaining and improving aquatic and riparian ecosystems. <p>Objectives</p> <ul style="list-style-type: none"> ▪ Adopt the goal of returning the watershed to more natural conditions rather than maintaining existing conditions. ▪ Upgrade the decision-making system to ensure that it is collaborative, flexible, fair, and innovative. ▪ Apply codes of practice to water bodies without defined bed and banks. ▪ Use adaptive management. <p>Performance Measures</p> <ul style="list-style-type: none"> ▪ Document or develop performance measures specific to the watershed that must be met for decisions. Factors the performance measures could cover are: <ul style="list-style-type: none"> - degree of impervious ground cover - protection of the Bow River and water use within the Western Irrigation District and its service area - how decision-makers consider the available information and incorporate into decisions, including the "attention to detail" required for decisions - where "precautionary" approaches will be used in making decisions - rewarding good behavior and eliminating bad behavior - the conditions under which unallocated water will be reserved or applications no longer accepted - incorporation of social and economic factors into decisions, including the value of riparian areas and assimilative capacity - alternatives to the first in time, first in right principle - design of a viable ecosystem based on flows and water quality that are not natural. 	<p>Communication and Consultation</p> <ul style="list-style-type: none"> ▪ In cooperation with other provincial agencies, municipalities and others, develop an action plan to ensure that the issuing of approvals and licences and implementation of codes of practice improve the health of riparian areas within or beyond the floodplain. ▪ Develop improved methods of consultation and creating awareness, including pre-decision mechanisms for concurrence with a decision. ▪ Develop improved methods of avoiding or pre-empting appeals or judicial review. ▪ Develop improved methods for incorporating proposals, issues, and trends into decision-making. ▪ Develop improved methods of making decisions in the face of uncertainty. ▪ Delegate decision-making to local authorities. <p>Design and Construction</p> <ul style="list-style-type: none"> ▪ Include conditions in approvals that would <ul style="list-style-type: none"> - eliminate risks of contamination from bacteria - reduce salinity and phosphorus to natural levels - ensure that riparian areas are left in or upgraded to healthy conditions. ▪ Require effects of new and/or existing works (e.g., stormwater drainage systems, channel realignments, bridges, dams) to be equivalent to natural conditions, including returning flow and water quality in the watershed to natural conditions. ▪ Require activities that affect the watershed to achieve sustainable water management. <p>Compliance</p> <ul style="list-style-type: none"> ▪ For diversion and discharge facilities, develop a system of compliance regarding stewardship and everyday actions that rewards good behavior and eliminates bad behavior. ▪ Increase, improve, and broaden the scope of monitoring, education, and enforcement activities. ▪ Make the decision-maker responsible for non-compliance. ▪ Prohibit unauthorized projects from proceeding. ▪ Prohibit development of environmentally significant areas. ▪ Require decisions to comply with municipal plans and water management plans. ▪ Water quality permit trading. <p>Financial Considerations</p> <ul style="list-style-type: none"> ▪ Allow fees to be charged for non-water power uses including use of assimilative capacity and flood control. ▪ Purchase environmentally significant areas or areas or works causing problems.

Table D-4 Additional Options for Municipalities and Others to Consider
<ul style="list-style-type: none"> ▪ Make aquatic and riparian health a condition of subdivision approval. ▪ Develop a program of development credit trading to encourage the donation of land that will help maintain or improve the flow and quality of water. ▪ Encourage the use of conservation easements and landowner-initiated zoning modifications that will help maintain or improve the flow and quality of water. ▪ Develop a system of wastewater fees, surcharges, and/or rebates for stormwater discharges. ▪ Coordinate and strengthen programs that encourage landowners (public and private) to maintain healthy aquatic and riparian ecosystems and restore damaged ones, e.g., <ul style="list-style-type: none"> - riparian demonstration and profile sites - riparian buffers - natural species planting or stocking - riparian health assessments - recreational use management - off-stream or hardened/fenced livestock watering sites - fertilizer and manure management - weed control - integrated pest management - farm management planning - land use guidelines. ▪ Prioritize the riparian areas for protection, i.e., which are essential to protect, which are desirable, and which are not significant. ▪ Adopt standards and guidelines that support, supplement, strengthen, or exceed Alberta Environment's requirements.

**Table D-5
Consolidated Options**

1. Establishing a Baseline

Continuation of current management

- A. Determine predevelopment storm drainage/natural flow and natural water quality conditions for the watershed.
- B. Identify the impact of specific activities on flow and water quality in the watershed.
- C. Document the effectiveness, practicality, and economics of management practices for improving flow, water quality, and floodplain conditions in the watershed.

New directions

- D. Conduct an aquatic environment field assessment of the watershed and, where necessary, adjust procedures for approvals and other decisions.
- E. Taking into account people's needs for using and protecting the environment, review the regulatory requirements and expertise for the decision-making system and, where necessary, make changes to strengthen the system's performance.
- F. Assess the performance of agricultural practices in relation to flow and water quality in the watershed and adjust procedures for approvals and other decisions.
- G. Review existing legislation (e.g., *Water Act, Environmental Protection and Enhancement Act, Public Lands Act, Municipal Government Act*) to determine compatibility with and effectiveness in maintaining and improving aquatic and riparian ecosystems.

2. Strengthening Objectives

Continuation of current management

- A. Expand the definition of aquatic habitat to include the riparian areas within the watershed's floodplains.
- B. Expand the definition of fish to include species in the watershed that are good indicators of ecosystem health.
- C. Add riparian health criteria to the classification system for water bodies.
- D. Upgrade the classification of water bodies in Nose Creek so that aquatic environment specialists are involved in the design and construction of activities requiring approvals or compliance with codes of practice.
- E. Adopt the principle that surface and ground water are linked unless demonstrated otherwise.
- F. Establish priorities for data collection/analysis in the watershed.
- G. Define the public interest.

New directions

- H. Adopt the goal of returning the watershed to more natural conditions rather than maintaining existing conditions.
- I. Upgrade the decision-making system to ensure that it is collaborative, flexible, fair, and innovative.
- J. Apply codes of practice to water bodies without defined bed and banks.
- K. Use adaptive management.

3. Measuring Success

Continuation of current management

- A. Document or develop performance measures specific to the watershed that must be met for decisions. Factors the performance measures could cover are:
 - 1) data collection and analysis
 - 2) impact of storm drainage, construction activity, and water withdrawals on people and the environment
 - 3) healthy aquatic and riparian ecosystem
 - 4) the acceptable level of damage to the aquatic and riparian ecosystem
 - 5) which wetlands may be drained, which must remain in a natural state, and which can be modified to be used as constructed wetlands
 - 6) assessing impacts on fisheries, riparian vegetation, recreation, and channel maintenance
 - 7) reducing adverse effects on the watershed's hydraulic capacity
 - 8) cost-sharing
 - 9) "developability" of the floodplain
 - 10) sustainability of water management
 - 11) the degree of difficulty in making decisions
 - 12) avoiding and pre-empting challenges to decisions (e.g., appeals, judicial review).
- B. Develop interim water conservation objectives (WCOs) for the aquatic and riparian ecosystem.
- C. Develop a methodology for determining instream flow needs that takes into account the impact of storm drainage in the watershed.
- D. Prioritize the riparian areas for protection, i.e., which are essential to protect, which are desirable, and which are not significant.

New directions

- E. Document or develop performance measures specific to the watershed that must be met for decisions. Factors the performance measures could cover are:
 - 1) degree of impervious ground cover
 - 2) protection of the Bow River and water use within the Western Irrigation District and its service area

**Table D-5
Consolidated Options**

- 3) how decision-makers consider the available information and incorporate into decisions, including the "attention to detail" required for decisions
 - 4) where "precautionary" approaches will be used in making decisions
 - 5) rewarding good behavior and eliminating bad behavior
 - 6) the conditions under which unallocated water will be reserved or applications no longer accepted
 - 7) incorporation of social and economic factors into decisions, including the value of riparian areas and assimilative capacity
 - 8) alternatives to the first in time, first in right principle
- F. Design of a viable ecosystem based on flows and water quality that are not natural.

4. Improving Communication and Consultation

Continuation of current management

- A. In consultation with municipalities, water users, landowners, and others, develop a communication and consultation plan for reviewing applications that will
- 1) promote effective communication among regulatory agencies, stakeholders, and residents
 - 2) ensure common understanding of problems
 - 3) promote timely and informative identification and consideration of projects and concerns
 - 4) promote consistency among governments
 - 5) ensure that Albertans have every opportunity to understand and provide advice on water management decisions in the watershed
 - 6) ensure the proper balance between consensus and diversity, including voluntary vs. mandatory action.
- B. Join the Nose Creek Watershed Partnership and become an active participant in the water management plan.
- C. Become an active participant in the referral and consultation process for municipal regulatory decisions.
- D. Develop a "code of practice" for stewardship and everyday actions.
- E. Refer the issue of bacterial contamination to the regional health authority.
- F. Establish an information management system for the watershed that includes
- 1) existing and future projections of population, land use, water demand, and demand on assimilative capacity
 - 2) a registry of documents and information received or created by Alberta Environment in the administration of the *Environmental Protection and Enhancement Act* and *Water Act*.
- G. Review educational initiatives and, where necessary, modify to increase awareness and acknowledgement and rewarding of those who are doing the right thing.

New directions

- H. In cooperation with other provincial agencies, municipalities and others, develop an action plan to ensure that the issuing of approvals and licences and implementation of codes of practice improve the health of riparian areas within and beyond the floodplain.
- I. Develop improved methods of avoiding or pre-empting appeals or judicial review.
- J. Develop improved methods for incorporating proposals, issues, and trends into decision-making.
- K. Develop improved methods of making decisions in the face of uncertainty.
- L. Delegate decision-making to local authorities.

5. Upgrading Design and Construction

Continuation of current management

- A. Improve design and construction standards to restore hydrology to natural conditions.
- B. Develop standards and guidelines for approvals and codes of practice that will protect riparian areas by
- 1) maintaining and improving vegetative cover, "recycling" of woody materials, the presence of fine materials, and low lateral cutting of streambanks
 - 2) increase tree and shrub cover
 - 3) reduce streambank alterations, exposed soil, and the presence of undesirable vegetation.
- C. Include conditions in approvals that would reduce contamination from bacteria, salinity, and phosphorus to acceptable levels.
- D. Based on performance measures, review and, where necessary, revise information requirements for applicants, impact assessment procedures, and conditions for approvals, codes of practice, licences, and transfers.
- E. In consultation with agricultural producers, develop a program for reducing stockwatering and grazing along watercourses and in riparian areas.
- F. Require existing works (e.g., stormwater drainage systems, channel realignments, bridges, dams) to meet the requirements for new developments.
- G. Encourage the use of conservation easements and landowner-initiated zoning modifications that will help maintain or improve the flow and quality of water.
- H. Adopt municipal standards and guidelines that support, supplement, strengthen, or exceed Alberta Environment's requirements.
- I. Coordinate and strengthen programs that encourage landowners (public and private) to maintain healthy aquatic and riparian ecosystems and restore damaged ones, e.g.,
- 1) riparian demonstration and profile sites
 - 2) riparian buffers

**Table D-5
Consolidated Options**

- 3) natural species planting or stocking
- 4) riparian health assessments
- 5) recreational use management
- 6) off-stream or hardened/fenced livestock watering sites
- 7) fertilizer and manure management
- 8) weed control
- 9) integrated pest management
- 10) farm management planning
- 11) land use guidelines.

New directions

- J. Include conditions in approvals that would
 - 1) eliminate risks of contamination from bacteria
 - 2) reduce salinity and phosphorus to natural levels
 - 3) ensure that riparian areas are left in or upgraded to healthy conditions.
- K. Require effects of new and/or existing works (e.g., stormwater drainage systems, channel realignments, bridges, dams) to be equivalent to natural conditions, including returning flow and water quality in the watershed to natural conditions.
- L. Require activities that affect the watershed to achieve sustainable water management.
- M. Make aquatic and riparian health a condition of subdivision approval.

6. Achieving Compliance

Continuation of current management

- A. Review compliance programs for watershed and, where necessary, modify to ensure that unauthorized activities do not adversely affect people and the environment.
- B. Develop an annual compliance plan for watershed.
- C. In cooperation with other agencies, equalize and continue to reduce the regulatory burden on those required to comply with approvals, codes of practice, and licensing.

New directions

- D. For diversion and discharge facilities, develop a system of compliance regarding stewardship and everyday actions that rewards good behavior and eliminates bad behavior.
- E. Increase, improve, and broaden the scope of monitoring, education, and enforcement activities.
- F. Make the decision-maker responsible for non-compliance.
- G. Prohibit unauthorized projects from proceeding.
- H. Prohibit development of environmentally significant areas.
- I. Require decisions to comply with municipal plans and water management plans.
- J. Water quality permit trading.

7. Ensuring Financial Sustainability

Continuation of current management

- A. Review approval requirements and fees and, where necessary, modify to ensure that the financial obligations imposed on people are fair, yet adequate to ensure protection of people and the environment.
- B. Develop a cost-sharing program for managing and improving the condition of the watershed.
- C. Develop a system of wastewater fees, surcharges, and/or rebates for stormwater discharges.

New directions

- D. Allow fees to be charged for non-water power uses including use of assimilative capacity and flood control.
- E. Purchase environmentally significant areas or areas or works causing problems.
- F. Develop a program of development credit trading to encourage the donation of land that will help maintain or improve the flow and quality of water.

Table D-6 Components of a Watershed Approach	
• Coordinating framework	
• Public & private efforts	
• Address highest priority problems	
• Hydrologically-defined geographic areas	
• Consider both surface & ground water	
• Those most affected by decisions are involved throughout	
• Environmental, economic, & social/cultural goals well-integrated	
• People well-informed	
• People participate in planning & implementation	
• Sound scientific data, tools, & techniques	
• Iterative decision-making, incl. evaluation of effectiveness	
• Shared information	
• Common understanding of roles, priorities, & responsibilities	
• Development of management options & action plans	
• Environmental justice* addressed	
• Goal & target setting	
• Make progress based on available information while continuing analysis & verification	
* Environmental justice is "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or a socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. Meaningful involvement means that: (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's decision; (3) the concerns of all participants involved will be considered in the decision making process; and (4) the decision makers seek out and facilitate the involvement of those potentially affected." (U.S. Environmental Protection Agency <i>Environmental Justice</i> , 2004 (http://www.epa.gov/compliance/environmentaljustice/index.html))	
Source:	U.S. Environmental Protection Agency (http://www.epa.gov/owow/watershed/framework.html).

Table D-7 Criteria for Good Planning – Policy Option Evaluation	
• Is the problem fully and realistically defined?	
• Are the objectives of all participants and potentially affected parties considered?	
• Are objectives clearly defined?	
• Would the process for implementing the option be fair and open?	
• Is information well-understood and scientifically-credible?	
• Have assumptions and uncertainties been defined and evaluated?	
• Will there be sufficient money, time, and other resources to implement the option?	
• Would the money, time, and other resources be used efficiently and effectively?	
• Will the option solve the problem?	
• Is there consensus in support of the option?	
• Is the option in the public interest?	
• Will proposed follow-up be sufficient to resolve outstanding issues and assess performance?	
Source:	Bob Morrison, "What Is Planning All About Anyway?" <i>Moving Beyond Now</i> , v.1, no. 1 (August, 2002), pp. 37-39.

Assessment of Issues and Evaluation of Options

Table D-8 Good Practice in Water Management Decisions ¹			
Barriers to More Effective and Sustainable Water Management	Strategic Priority	Key Principles	Key Decision Points
<ul style="list-style-type: none"> Limited, superficial, belated public involvement Lack of recognition and empowerment of negatively affected people Lack of transparency Political interference 	Public Acceptance	<ul style="list-style-type: none"> Recognition of rights & assessment of risks Safeguarding of entitlements of all affected people Access to information & availability of legal and other support for all stakeholders Informed participation by all groups of people Demonstrated public acceptance of key decisions achieved through agreements negotiated in an open & transparent process conducted in good faith Free, prior, informed consent through formal & informal representative bodies² 	<p>Needs Assessment</p> <p>Clear needs, objectives, & priorities developed through an open, inclusive, decentralized, independently-facilitated, & publicly-validated process</p>
<ul style="list-style-type: none"> Overestimation of demand Narrow range of alternatives Limited expertise of personnel 	Comprehensive Options Assessment	<ul style="list-style-type: none"> Clear definition of needs & objectives prior to identification & assessment of options Comprehensive, participatory assessment of full range of policy, institutional, management, & technical options Same significance given to social, environmental, economic, & financial factors Priority given to increasing the effectiveness & sustainability of existing water, irrigation, & energy systems Continuation of options assessment through all stages of planning, project development, & operations 	<p>Selecting Alternatives</p> <p>Acceptance of project by those affected through a participatory assessment of all options that is based on rigorous analysis of costs, avoidance of adverse effects, & precautionary approach</p>
<ul style="list-style-type: none"> Narrow range of alternatives Lack of monitoring and evaluation of project performance Preference for large projects Influence of vested interests 	Addressing Existing Management³	<ul style="list-style-type: none"> Optimization of benefits from existing infrastructure, operations, monitoring, technology, land use, regulatory tools, priorities, & initiatives Addressing outstanding social, economic, & environmental issues⁴ Formalized operating agreements with time-bound licence periods Comprehensive post-project monitoring, evaluation, & review of performance, benefits, & impacts 	<p>Project Preparation</p> <p>Time-bound licences & signed contracts setting out clear responsibilities & requirements derived from good-faith negotiations with all those affected and, if necessary, independent dispute resolution</p>
<ul style="list-style-type: none"> Limited expertise of personnel Rudimentary economic analysis Cosmetic, poorly informed consideration of social and environmental concerns 	Sustaining Ecosystems⁵ and Livelihoods	<ul style="list-style-type: none"> Understanding, protection, & restoration of ecosystems Understanding how community livelihoods depend on & influence ecosystems Minimization & mitigation of harm to the health & integrity of ecosystems Priority given to avoidance of impacts in accordance with a precautionary approach National policy for maintaining selected rivers with high ecosystem functions & values in their natural state Avoidance of significant impacts on threatened & endangered species. When impacts cannot be avoided, provide viable compensation measures resulting in a net gain for the species within the region Environmental flows to help maintain downstream ecosystem integrity & community livelihoods 	<p>Project Implementation</p> <p>Licence to operate issued after full compliance with social, environmental, & technical requirements & designed to provide balance between certainty & open, transparent, adaptive management</p>
<ul style="list-style-type: none"> Control of decision-making by centralized government agencies Government collaboration with, subsidies for, and legal and procedural decisions that favor certain interests 	Recognizing Entitlements and Sharing Benefits	<ul style="list-style-type: none"> Mutually agreed & legally enforceable mitigation, resettlement, & development provisions Recognition of entitlements that improve livelihoods & quality of life Successful mitigation, resettlement, & development are fundamental responsibility of State & developer Impact assessment includes all people upstream, downstream, & in catchment areas whose properties, livelihoods, & non-material resources are affected Recognition of adversely affected people as first among the beneficiaries of the project 	<p>Project Operation</p> <p>Fulfillment of operating conditions through comprehensive, transparent monitoring & project evaluation with adaptation made in close consultation with those affected</p>
<ul style="list-style-type: none"> Financing with minimal oversight, disclosure of information, and penalties for non-compliance⁶ Failure to meet commitments and legal/policy requirements Burden of ineffective projects on government treasuries 	Ensuring Compliance	<ul style="list-style-type: none"> Adoption by sponsoring, contracting, & financing institutions of clear, consistent, common criteria & guidelines Compliance with all commitments & regulatory/non-regulatory measures for planning, implementation, & operation Mutually reinforcing incentives, sanctions, & mechanisms for social, environmental, & technical measures Compliance subject to independent & transparent review Flexibility when needed to accommodate changing circumstances Preparation of compliance plan Cost of compliance built into project budget 	
<ul style="list-style-type: none"> Lack of watershed context Unilateral rather than cooperative action Rigid rather than flexible arrangements Lack of sanctions for non-compliance 	Sharing Rivers for Peace, Development, and Security⁷	<ul style="list-style-type: none"> Constructive co-operation Basin agreements in shared river basins based on principles of equitable & reasonable utilization, no significant harm, prior information, & these strategic priorities Intractable disputes resolved through dispute resolution 	

48 1. Source: Bob Morrison, "Good Practice for Water Management Decision-Making," *Moving Beyond Now*, v.1, no. 3 (July, 2004), pp. 17-19. Based on World Commission on Dams, *Dams and Development: A New Framework for Decision-Making*, Earthscan Publications, 2000, (www.dams.org) pp. 74, 91, 167-194, 199-211, & 213-257. 2. The Commission limited this principle to indigenous and tribal people. 3. The Commission called this priority "Addressing Existing Dams." 4. The Commission's recommendation was to address "outstanding social issues" and strengthen "environmental mitigation and restoration measures." 5. The Commission used the word "rivers," but clarified this as "rivers, watersheds and ecosystems." 6. The Commission focused on the role of foreign financial assistance to developing countries. 7. The Commission discussed this priority primarily in terms of international rivers.

Table D-9 Screening of Options		1. Establishing a Baseline							Rationale
Evaluation Criteria	Policy Options								
	Current Management			New Directions					
	A	B	C	D	E	F	G		
Is the option feasible?	★	★	★	★	★★	★	★★	Risk: conditions, impacts, etc. may not be definable.	
Is the option compatible with current policy??	★★	★★	★★	★★	★★	★★	★★	No known incompatibilities.	
Objectives									
Would the highest priority problems be addressed?	★★	★★	★★	★	★★	★	★	Constraint: definition of "aquatic environment." Ag. practices & laws may not be highest priority.	
Would environmental, economic, & social/cultural goals be better integrated?	★★	★★	★★	★★	★★	★★	★	A thru F would strengthen linkages and integration. G depends on what changes result.	
Would there be better consideration of environmental justice?	★★	★★	★★	★★	★★	★★	★★	Each would create options &/or changes that would enhance fairness & meaningful involvement.	
Would goal & target-setting be improved?	★	★	★	★★	★★	★★	★	D, E, &-F would improve target-setting. Others might.	
Would problem(s) be more fully and realistically defined?	★	★	★	★	★★	★	★	E realistic – tied to people's needs. G depends on changes. Others have significant unknowns.	
Would there be clearer definition of objectives?	★	★	★	★	★★	★	★	E tied to people's needs. Others might clarify goals.	
Would there be better opportunity to achieve the public interest?	★★	★★	★★	★★	★★	★★	★★	Each option improves the opportunity to define and achieve the public interest.	
Would the objective of greater benefits for the watershed be enhanced?	★	★	★	★	★★	★	★	E tied to people's needs. Benefits of others depend on results and/or changes proposed.	
Knowledge									
Would consideration of hydrological interactions be enhanced?	★★	★★	★★	★★	★	★★	★	E & G not tied directly to flow, but could provide benefits.	
Would there be more sound scientific data, tools, & techniques?	★	★	★	★	★	★	★	Each option offers the potential for more sound data, tools, or techniques.	
Would there be greater common understanding of roles, priorities, & responsibilities?	★	★	★	★	★★	★	★	E tied to people's needs & system performance. Others have good potential to increase awareness.	
Would information be better understood and more scientifically credible?	★★	★★	★★	★★	★★	★★	✘	Questionable if G can contribute to better understanding & credibility.	
Resources									
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.	
Would money, time, and other resources be used more efficiently and effectively?	★	★	★	★	★	★	★	Each option has good potential to increase efficiency & effectiveness of money, time, etc.	
Communication and Consultation									
Would the effectiveness of the coordinating framework be increased?	★	★	★	★	★★	★	★	E tied to people's needs & system performance. Others offer good potential.	
Would there be better involvement of those most affected throughout the process?	★	★	★	★	★★	★	★	E tied to people's needs. Others could provide opportunities to enhance involvement.	
Would people be better informed?	★★	★★	★★	★★	★★	★★	★	Each option except G will create better information.	
Would there be more effective participation in planning & implementation?	★	★	★	★	★	★	★	Good potential for better planning & implementation.	
Would there be better sharing of information?	★	★	★	★	★	★	★	Each option depends on openness & clarity.	
Would there be increased opportunities for compromise and consensus?	★	★	★	★	★	★	★	Better knowledge & definition of choices will expand opportunities for compromise/consensus.	
Would there be better chances of consensus developing?	★	★	★	★	★★	★	★	E tied to people's needs. Success of others depends on quality & relevance of information.	
Would there be greater disclosure of information?	★	★	★	★	★	★	★	Options depend on willingness to disclose.	

★★=Yes

★=Yes, either partially or potentially with risks or constraints

✘=No

Assessment of Issues and Evaluation of Options

Table D-9 Screening of Options		1. Establishing a Baseline						Rationale
Evaluation Criteria	Policy Options							
	Current Management			New Directions				
	A	B	C	D	E	F	G	
Would there be greater opportunity to demonstrate public acceptance?	★	★	★	★	★	★	★	Potential high to show public acceptance, particularly acceptance of results.
Process								
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★	★	★	★	★	★	★	Each option has excellent potential for objectives to be more effectively considered.
Would there be more effective development of management options & action plans?	★	★	★	★	★	★	★	Good potential for more effective options/plans. Depends on quality/relevance of information.
Would there be more effective definition and evaluation of assumptions and uncertainties?	★	★	★	★	★	★	★	Each option will challenge assumptions & address uncertainties. Effectiveness depends on results.
Would there be more effective resolution of outstanding issues and assessment of performance?	★	★	★	★	★	★	★	Good potential for more effective resolution of issues and assessment of performance.
Would solutions be more equitable and reasonable?	★	★	★	★	★	★	★	Equity and reasonableness are subjective. Each option offers good potential.
Would there be more comprehensive and public assessment?	★	★	★	★	★	★	★	Useful information would be generated. Depends on if and how it is used.
Would there be more effective use of the precautionary approach?	★	★	★	★	★	★	★	Each option offers good prospects for helping determine where greater caution needed.
Implementation								
Would public & private efforts be strengthened?	★	★	★	★	★	★	★	Each option has the capacity to strengthen efforts.
Would integrated management of surface and ground water be enhanced?	★	★	★	★	★	★	★	Potential exists for better integration, especially for flow-related options (A, B, C, D, & F)
Would there be more effective iterative decision-making?	★	★	★	★	★	★	★	Each option is promising, particularly in terms of reducing the issues requiring iterative decisions.
Would there be improvements in making progress while continuing analysis and verification?	★	★	★	★	★	★	★	Each option should at least clarify the data gaps and risks.
Would the implementation process be more fair and open?	★	★	★	★	★	★	★	Each option depends on data quality/relevance & the willingness to apply results to implementation.
Would there be better solutions?	★	★	★	★	★	★	★	The likelihood of better solutions is good.
Would there be greater optimization of existing conditions?	★	★	★	★	★	★	★	Each option helps define existing conditions & the areas where management needs optimization.
Compliance								
Would the protection of people's rights be promoted and enhanced?	★	★	★	★	★	★	★	Good potential for better protection of people's rights, especially E & G.
Would the use of rules to control behavior be enhanced?	★	★	★	★	★	★	★	Each option, particularly D, E, F, & G, has good potential to improve the rules.
Would accountability for decisions be improved?	★	★	★	★	★★	★	★	E tied to people's needs. Potential for others good.
Would there be greater protection of people's entitlements?	★	★	★	★	★	★	★	Good potential for better protection of people's entitlements, especially E & G.
Would legally enforceable provisions be strengthened?	★	★	★	★	★	★	★	G offers best potential. D, E, & F have potential for legally enforceable provisions. Others could help.
Would there be more effective regulatory enforcement of undesirable activity?	★	★	★	★	★	★	★	Good potential for each option to help reduce undesirable activity through enforcement.

Table D-10 Screening of Options		2. Strengthening Objectives										Rationale	
Evaluation Criteria	Policy Options												
	Current Management							New Directions					
	A	B	C	D	E	F	G	H	I	J	K		
Is the option feasible?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Is adaptive management different from or better than past decision-making?
Is the option compatible with current policy??	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	
Objectives													
Would the highest priority problems be addressed?	★★	★★	★★	★	★	★★	★	★★	★★	★★	★	★	Options D, E, G, J, & K depend on how they are applied.
Would environmental, economic, & social/cultural goals be better integrated?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	A thru J will strengthen linkages/integration. Adaptive mgt. is vague concept.
Would there be better consideration of environmental justice?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except for K, options would enhance fairness & meaningful involvement.
Would goal & target-setting be improved?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	✘	★	Value of undefined wetlands unclear.
Would problem(s) be more fully and realistically defined?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except K, each option helps define issues.
Would there be clearer definition of objectives?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except K, each option helps define issues.
Would there be better opportunity to achieve the public interest?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Risk that consensus may not be reached on the public interest.
Would the objective of greater benefits for the watershed be enhanced?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except K, each option helps enhance watershed objectives.
Knowledge													
Would consideration of hydrological interactions be enhanced?	★★	★★	★★	★★	★★	★★	★	★★	★	★★	★	★	Not certain what the public interest is. Adaptive management is nebulous.
Would there be more sound scientific data, tools, & techniques?	★★	★★	★★	★★	★★	★★	★	★★	★	★★	★	★	No guarantee public interest, collaboration, adaptive mgt., etc. will be more "scientific."
Would there be greater common understanding of roles, priorities, & responsibilities?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except K, each option leads to greater understanding of priorities.
Would information be better understood and more scientifically credible?	★	★	★	★	★	★	★	★	★	★	★	★	Strengthened objectives does not necessarily mean greater understanding or credibility.
Resources													
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.
Would money, time, and other resources be used more efficiently and effectively?	★	★	★	★	★	★	★	★	★	★	★	★	Except K, options have good potential to boost efficiency/effectiveness of money, etc.
Communication and Consultation													
Would the effectiveness of the coordinating framework be increased?	★★	★★	★★	★★	★★	★★	★	★★	★★	★★	★★	★	Concerns about vagueness for G & K. Other options will strengthen focus of coordination.
Would there be better involvement of those most affected throughout the process?	★★	★★	★★	★★	★★	★★	★	★★	★★	★★	★★	★	Concerns about vagueness for G & K. Other options will level playing field.
Would people be better informed?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except K, options will improve information.
Would there be more effective participation in planning & implementation?	★	★	★	★	★	★★	★	★	★★	★	★	★	F enhances focus. I strengthens decision-making. Others have potential.
Would there be better sharing of information?	★	★	★	★	★	★	★	★	★★	★	★	★	I is strong. Others need openness/clarity.
Would there be increased opportunities for compromise and consensus?	★	★	★	★	★	★★	★	★	★★	★	★	★	F & I promote compromise & consensus. Others have potential.
Would there be better chances of consensus developing?	★	★	★	★	★	★★	★	★	★★	★	★	★	F & I promote compromise & consensus. Others have potential.
Would there be greater disclosure of information?	★	★	★	★	★	★★	★	★	★★	★	★	★	F & I based on disclosure. Others could be.

★★=Yes

★=Yes, either partially or potentially with risks or constraints

✘=No

Assessment of Issues and Evaluation of Options

Table D-10 Screening of Options		2. Strengthening Objectives											
Evaluation Criteria	Policy Options											Rationale	
	Current Management							New Directions					
	A	B	C	D	E	F	G	H	I	J	K		
Would there be greater opportunity to demonstrate public acceptance?	★	★	★	★	★	★★	★	★	★★	★	★	★	The performance of F & I rely on acceptance from "outside." Others could as well.
Process													
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except for K, each option will add to more effective consideration of objectives.
Would there be more effective development of management options & action plans?	★	★	★	★	★	★★	★	★	★★	★	★	★	F & I will contribute to better options and plans. Others have good potential.
Would there be more effective definition and evaluation of assumptions and uncertainties?	★	★	★	★	★	★★	★	★★	★★	★	★	★	H, in particular, would challenge assumptions & address uncertainty.
Would there be more effective resolution of outstanding issues and assessment of performance?	★★	★	★	★	★	★★	★	★★	★★	★	★	★	Expansion of the definition of aquatic habitat and definition of natural conditions would be especially helpful.
Would solutions be more equitable and reasonable?	★	★	★	★	★	★★	★	★	★★	★	★	★	F & I are based on addressing equity and reasonableness. Others have potential.
Would there be more comprehensive and public assessment?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except K, each option provides for more comprehensive assessment.
Would there be more effective use of the precautionary approach?	★★	★★	★★	★★	★★	★	★	★★	★★	★★	★★	★	F, G, & K do not necessarily cover issue of taking precautions. Others cover that issue.
Implementation													
Would public & private efforts be strengthened?	★	★	★	★	★	★	★	★	★	★	★	★	Each option could strengthen efforts.
Would integrated management of surface and ground water be enhanced?	★★	★	★★	★	★★	★	★	★	★	★	★	★	A, C, & E are vital to integration. Other options have potential for better integration.
Would there be more effective iterative decision-making?	★★	★★	★★	★★	★★	★★	★	★★	★★	★★	★★	★	Except for vagueness in G & K, options will reduce issues requiring iterative decisions.
Would there be improvements in making progress while continuing analysis and verification?	★	★	★	★	★	★	★	★	★	★	★	★	Each option should at least clarify the data gaps and risks.
Would the implementation process be more fair and open?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except for K, options will help level the playing field.
Would there be better solutions?	★	★	★	★	★	★	★	★	★	★	★	★	Better objectives should improve solutions.
Would there be greater optimization of existing conditions?	★★	★★	★★	★★	★★	★★	★★	★	★★	★★	★★	★	Most options will help optimize existing conditions, particularly if natural conditions can be defined for comparison.
Compliance													
Would the protection of people's rights be promoted and enhanced?	★★	★★	★★	★★	★★	★★	★★	★	★★	★★	★★	★	Expanding and clarifying objectives will promote & better define people's rights.
Would the use of rules to control behavior be enhanced?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except for K, options will lead to better rules.
Would accountability for decisions be improved?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except for K, options expand accountability.
Would there be greater protection of people's entitlements?	★★	★★	★★	★★	★★	★★	★★	★	★★	★★	★★	★	Expanding/clarifying objectives will promote & better define people's entitlements.
Would legally enforceable provisions be strengthened?	★	★	★	★	★	★	★	★	★	★	★	★	E, F, & G, should simplify administration. Others could be helpful as well.
Would there be more effective regulatory enforcement of undesirable activity?	★	★	★	★	★	★	★	★	★	★	★	★	Each option could potentially help reduce undesirable activity through enforcement.

Table D-11 Screening Options		3. Measuring Success												Rationale
Evaluation Criteria	Policy Options													
	Current Management													
	A.1	A.2	A.3	A.4	A.5	A.6	A.7	A.8	A.9	A.10	A.11	A.12		
Is the option feasible?	★★	★	★	★	★★	★	★★	★★	★★	★	★	★★	Conditions & impacts hard to define.	
Is the option compatible with current policy??	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	★	★	Lack of clarity on A.10, A.11, & A.12.	
Objectives														
Would the highest priority problems be addressed?	★	★★	★★	★★	★★	★★	★★	★	★★	★★	★	★	A.1, A.8, A.11, & A.12 depend on what is included.	
Would environmental, economic, & social/cultural goals be better integrated?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option would strengthen linkages and integration.	
Would there be better consideration of environmental justice?	★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Except for A.1, options enhance fairness & meaningful involvement.	
Would goal & target-setting be improved?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option would improve targets.	
Would problem(s) be more fully and realistically defined?	★	★	★	★	★	★	★	★	★	★	★	★	Excellent opportunities to more fully & realistically define problems.	
Would there be clearer definition of objectives?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options will better define objectives.	
Would there be better opportunity to achieve the public interest?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options improve the opportunity to define and achieve the public interest.	
Would the objective of greater benefits for the watershed be enhanced?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options will provide better focus.	
Knowledge														
Would consideration of hydrological interactions be enhanced?	★	★★	★★	★★	★★	★★	★★	★	★★	★★	★	★	A.1, A.8, A.11, & A.12 offer potential. Others will enhance consideration.	
Would there be more sound scientific data, tools, & techniques?	★★	★★	★★	★★	★	★★	★★	★	★	★	★	★	A.1 thru A.4, A.6, & A.7 are science-based. Others could be.	
Would there be greater common understanding of roles, priorities, & responsibilities?	★	★★	★	★★	★★	★★	★★	★★	★★	★★	★★	★★	A.1 & A.3 might better define roles, priorities, responsibilities.	
Would information be better understood and more scientifically credible?	★	★	★	★	★	★	★	★	★	★	★	★	Performance measures can lead to better understanding & credibility.	
Resources														
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.	
Would money, time, and other resources be used more efficiently and effectively?	★	★	★	★	★	★	★	★	★★	★★	★★	★★	A.9 thru A.12 will provide better focus and greater efficiency/effectiveness.	
Communication and Consultation														
Would the effectiveness of the coordinating framework be increased?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option would provide greater clarity & focus.	
Would there be better involvement of those most affected throughout the process?	★	★	★	★	★	★	★	★	★	★	★	★★	Options depend on people's ability to deal with uncertainty/complexity.	
Would people be better informed?	★	★	★	★	★	★	★	★	★	★	★	★	Same as above.	
Would there be more effective participation in planning & implementation?	★	★	★	★	★	★	★	★	★	★	★	★	Options depend on willingness to commit to and implement criteria.	
Would there be better sharing of information?	★	★	★	★	★	★	★	★	★	★	★	★	Options depend on openness/clarity.	
Would there be increased opportunities for compromise and consensus?	★	★	★	★	★★	★	★	★	★★	★★	★	★★	Performance measures are openings for compromise/consensus.	
Would there be better chances of consensus developing?	★	★	★	★	★	★	★	★	★	★	★	★	Options depend, in part, on success in applying scientific findings.	
Would there be greater disclosure of information?	★	★	★	★	★	★	★	★	★	★	★	★	Depends on willingness to disclose.	

★★=Yes

★=Yes, either partially or potentially with risks or constraints

×=No

Assessment of Issues and Evaluation of Options

Table D-11 Screening Options		3. Measuring Success											Rationale
Evaluation Criteria	Policy Options												
	Current Management												
	A.1	A.2	A.3	A.4	A.5	A.6	A.7	A.8	A.9	A.10	A.11	A.12	
Would there be greater opportunity to demonstrate public acceptance?	★	★	★	★	★★	★	★	★	★★	★★	★	★★	Options depend on better definition of existing and natural conditions.
Process													
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★	★	★	★	★	★	★	★	★	★	★	★★	A.12 will open up new avenues for consultation. Others provide excellent potential for considering objectives.
Would there be more effective development of management options & action plans?	★	★★	★★	★★	★★	★★	★★	★	★★	★★	★	★★	Most options would strengthen options and plans, especially A.9 & A.10.
Would there be more effective definition and evaluation of assumptions and uncertainties?	★★	★★	★★	★★	★	★★	★★	★	★★	★★	★★	★★	Except A.5 & A.8, options will challenge assumptions/uncertainties.
Would there be more effective resolution of outstanding issues and assessment of performance?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Performance measures are essential to assessing performance.
Would solutions be more equitable and reasonable?	★	★	★	★	★	★	★	★	★	★	★	★	Equity/reasonableness are subjective. Each option offers good potential.
Would there be more comprehensive and public assessment?	★	★★	★★	★★	★	★★	★★	★	★★	★★	★	★★	Most options will increase comprehensiveness.
Would there be more effective use of the precautionary approach?	★	★★	★★	★★	★★	★★	★★	★	★★	★★	★	★★	Most options will need to consider when to use more or less caution.
Implementation													
Would public & private efforts be strengthened?	★	★	★	★	★★	★	★	★★	★★	★★	★	★★	Better direction from several options.
Would integrated management of surface and ground water be enhanced?	★	★	★	★	★	★	★★	★	★	★	★	★	The ground and surface water linkage will be key to A.7.
Would there be more effective iterative decision-making?	★	★★	★★	★★	★★	★★	★★	★	★★	★★	★	★★	Most options will reduce the need for & pitfalls of iterative decision-making.
Would there be improvements in making progress while continuing analysis and verification?	★	★★	★★	★★	★★	★★	★★	★	★★	★★	★	★★	Most options will clarify if progress is occurring & define work needed.
Would the implementation process be more fair and open?	★	★	★	★	★	★	★	★	★	★	★	★★	A.12 will provide outlets for dissent. Others depend on data quality.
Would there be better solutions?	★	★	★	★	★	★	★	★	★	★	★	★	Likelihood of better solutions is good.
Would there be greater optimization of existing conditions?	★	★★	★★	★★	★★	★★	★★	★	★★	★★	★	★	All options could contribute to better conditions.
Compliance													
Would the protection of people's rights be promoted and enhanced?	★	★★	★★	★★	★★	★★	★	★	★★	★★	★	★★	Most performance measures will provide definition of rights.
Would the use of rules to control behavior be enhanced?	★	★★	★★	★★	★★	★★	★★	★	★★	★★	★	★★	Most performance measures will strengthen the role of rules.
Would accountability for decisions be improved?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options strengthen accountability.
Would there be greater protection of people's entitlements?	★	★	★	★	★	★	★	★	★★	★★	★	★★	Most performance measures could provide definition of entitlements.
Would legally enforceable provisions be strengthened?	★	★	★	★	★	★	★	★	★	★	★	★★	A.12 will strengthen well-conceived authorizations. Others may be of help.
Would there be more effective regulatory enforcement of undesirable activity?	★	★★	★★	★★	★★	★★	★★	★	★★	★★	★	★★	Most performance measures will strengthen enforcement.

Table D-11 Screening Options		3. Measuring Success											Rationale
Evaluation Criteria	Policy Options												
	Current Management			New Directions									
	B	C	D	E.1	E.2	E.3	E.4	E.5	E.6	E.7	E.8	F	
Is the option feasible?	★★	★	★★	★	★★	★★	★★	★	★★	★	★★	★	Needs, impacts, values hard to define.
Is the option compatible with current policy??	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	✘	E.8 not compatible with prov. policy.
Objectives													
Would the highest priority problems be addressed?	★	★★	★★	★	★	★	★	★★	★★	★★	★	★	WCOs have limited value. Bow & WID issues could gain in prominence.
Would environmental, economic, & social/cultural goals be better integrated?	★★	★★	★★	★★	★★	★	★★	★★	★★	★★	★★	★★	E.3 has considerable potential. Others would strengthen linkages/integration.
Would there be better consideration of environmental justice?	★★	★★	★★	★	★★	★★	★★	★★	★★	★★	★★	★	Most options have direct benefit to fairness & meaningful involvement.
Would goal & target-setting be improved?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	If successful, F could improve targets.
Would problem(s) be more fully and realistically defined?	★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Value of WCOs questionable.
Would there be clearer definition of objectives?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option will help provide clarity.
Would there be better opportunity to achieve the public interest?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options improve the opportunity to define and achieve the public interest.
Would the objective of greater benefits for the watershed be enhanced?	★★	★★	★★	★★	★	★★	★★	★	★★	★★	★★	★	Benefits to Bow & WID might be indirect. Unclear if E.5 & F will work.
Knowledge													
Would consideration of hydrological interactions be enhanced?	★★	★★	★★	★★	★★	★	★	★	★★	★	★	★★	Most options will contribute to understanding hydrology.
Would there be more sound scientific data, tools, & techniques?	★★	★★	★	★★	★★	★	★	★	★★	★★	★	★★	Most options are science-based. Others could spin off useful data.
Would there be greater common understanding of roles, priorities, & responsibilities?	★	★	★★	★	★★	★★	★★	★★	★★	★	★★	★	Most options will lead to greater shared understanding of issues.
Would information be better understood and more scientifically credible?	★	★	★	★★	★★	★	★	★	★★	★★	★	★★	Some options are science-based. Others could spin-off useful data.
Resources													
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.
Would money, time, and other resources be used more efficiently and effectively?	★	★★	★★	★	★★	★★	★★	★	★★	★	★	★	Some options would enhance efficiency & effectiveness.
Communication and Consultation													
Would the effectiveness of the coordinating framework be increased?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Uncertain if F can be determined.
Would there be better involvement of those most affected throughout the process?	★	★	★	★	★★	★	★	★★	★	★	★	★	E.2 & E.5 will enhance implementation. Other options have potential.
Would people be better informed?	★	★	★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Significant complexity limit B, C, & D.
Would there be more effective participation in planning & implementation?	★	★	★	★	★	★★	★	★	★★	★	★	★	E.3 would greatly enhance people's understanding of decision process.
Would there be better sharing of information?	★	★	★	★	★★	★★	★	★	★	★	★	★	Options depend on openness/clarity.
Would there be increased opportunities for compromise and consensus?	★★	★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	C may not be achievable as a methodology that reduces anxiety.
Would there be better chances of consensus developing?	★	★	★	★	★★	★★	★★	★★	★★	★★	★★	★★	B, C, D, & E.1 potentially contentious & may not improve chances.
Would there be greater disclosure of information?	★	★	★	★	★★	★★	★★	★	★★	★	★	★	Depends on willingness to disclose.

★★=Yes

★=Yes, either partially or potentially with risks or constraints

✘=No

Assessment of Issues and Evaluation of Options

Table D-11 Screening Options		3. Measuring Success											Rationale
Evaluation Criteria	Current Management			Policy Options									
				New Directions									
	B	C	D	E.1	E.2	E.3	E.4	E.5	E.6	E.7	E.8	F	
demonstrate public acceptance?	★★	★	★★	★	★	★★	★	★	★★	★★	★	★	B, D, E.3, E.6, & E.7 provide excellent opportunities to build acceptance.
Process													
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★	★	★	★	★★	★★	★★	★★	★★	★★	★★	★★	E.2 thru E.8 would greatly enhance consideration of objectives of all. Other options offer good potential.
Would there be more effective development of management options & action plans?	★★	★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Except for uncertainty surrounding C, good ways of building options/plans.
Would there be more effective definition and evaluation of assumptions and uncertainties?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options will challenge assumptions/uncertainties.
Would there be more effective resolution of outstanding issues and assessment of performance?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options would improve resolution of issues and assessment of performance.
Would solutions be more equitable and reasonable?	★	★	★	★	★★	★	★	★	★★	★	★★	★	E.2, E.6, and E.8 deal directly with equity. Others have good potential.
Would there be more comprehensive and public assessment?	★★	★★	★	★	★★	★	★	★	★★	★	★★	★	B, C, E.2, E.6, & E.8 will create demand for comprehensive/public assessment.
Would there be more effective use of the precautionary approach?	★★	★★	★★	★	★	★	★★	★	★★	★	★	★	Each option can aid in determining role of caution in decisions.
Implementation													
Would public & private efforts be strengthened?	★	★	★★	★	★★	★	★	★★	★	★	★★	★	Good potential for each option.
Would integrated management of surface and ground water be enhanced?	★	★	★	★★	★	★	★★	★	★	★	★	★	E.1 directly related to ground water recharge. E.4 leads to integration.
Would there be more effective iterative decision-making?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options will reduce the need for & pitfalls of iterative decision-making.
Would there be improvements in making progress while continuing analysis and verification?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options will clarify if progress is occurring & define work needed.
Would the implementation process be more fair and open?	★	★	★	★	★★	★★	★★	★★	★★	★★	★★	★★	All options could be fair & open. For some, it's inevitable.
Would there be better solutions?	★	★	★	★	★	★	★★	★	★★	★	★	★	E.4 & E.6 provide needed clarity.
Would there be greater optimization of existing conditions?	★★	★★	★★	★★	★★	★	★	★	★★	★	★★	★	Some options limited by uncertainty about if and how they can be used.
Compliance													
Would the protection of people's rights be promoted and enhanced?	★	★★	★★	★	★★	★	★	★	★★	★	★★	★	All options have the potential to protect people's rights.
Would the use of rules to control behavior be enhanced?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Uncertainty if F can work. Others should enhance rules.
Would accountability for decisions be improved?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Options would improve accountability.
Would there be greater protection of people's entitlements?	★	★	★	★	★★	★	★	★	★★	★	★★	★	All options have the potential to protect people's rights.
Would legally enforceable provisions be strengthened?	★	★	★	★	★★	★	★	★	★★	★	★★	★	E.2, E.6, & E.8 would directly strengthen solutions to legal issues.
Would there be more effective regulatory enforcement of undesirable activity?	★★	★★	★★	★	★★	★	★	★	★★	★	★★	★	All options have potential to make enforcement more effective.

Table D-12 Screening Options		4. Improving Communication and Consultation								Rationale
Evaluation Criteria	Policy Options									
	Current Management									
	A.1	A.2	A.3	A.4	A.5	A.6	B	C	D	
Is the option feasible?	★★	★	★★	★★	★	★	★★	★★	★★	A.2, A.5, & A.6 present considerable challenges.
Is the option compatible with current policy??	★★	★★	★★	★★	★★	★★	★★	★★	★★	No known incompatibilities.
Objectives										
Would the highest priority problems be addressed?	★	★	★	★	★	★	★	★	★	Each option would be helpful in addressing highest priority problems. Leadership required.
Would environmental, economic, & social/cultural goals be better integrated?	★	★★	★	★	★	★★	★	★	★	A.2 & A.6 are based on integrated awareness. Others offer potential. Leadership required.
Would there be better consideration of environmental justice?	★	★	★★	★	★★	★★	★	★	★	A.3, A.5, & A.6 will increase fairness and meaningful involvement. Others offer good potential.
Would goal & target-setting be improved?	★	★	★	★	★	★★	★	★	★★	A.6 & D are goal-based options. Others could work.
Would problem(s) be more fully and realistically defined?	★	★★	★	★	★	★★	★	★	★	A.2 & A.6 promote resolution-driven consultation. Others offer excellent potential.
Would there be clearer definition of objectives?	★	★★	★	★★	★★	★	★★	★★	★	Clearer objectives is precondition to most options.
Would there be better opportunity to achieve the public interest?	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option is better opportunity to achieve public interest. Public interest requires definition.
Would the objective of greater benefits for the watershed be enhanced?	★	★★	★	★★	★★	★	★	★	★★	All options are worthwhile. Some are stronger on resolution-based consultation.
Knowledge										
Would consideration of hydrological interactions be enhanced?	★	★★	★	★	★	★	★	★	★★	A.2 & D would have to deal with hydrology. Others offer good potential.
Would there be more sound scientific data, tools, & techniques?	★	★	★	★	★	★	★	★	★★	D would need a sound scientific base to be a defensible tool. Others should need science input.
Would there be greater common understanding of roles, priorities, & responsibilities?	★	★★	★	★★	★★	★★	★	★	★★	All options have potential to increase understanding of roles, priorities, & responsibilities.
Would information be better understood and more scientifically credible?	★	★★	★	★	★★	★	★	★	★★	Options likely to increase understanding/credibility. A.2, A.5, & D are based on that approach.
Resources										
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.
Would money, time, and other resources be used more efficiently and effectively?	★★	★	★★	★★	★	★	★	★	★	A.1, A.3, & A.4 reduce key barriers to greater efficiency & effectiveness. Others have potential.
Communication and Consultation										
Would the effectiveness of the coordinating framework be increased?	★★	★★	★★	★★	★★	★★	★★	★★	★	D does not necessarily increase effectiveness of coordination. Others do.
Would there be better involvement of those most affected throughout the process?	★★	★★	★★	★	★★	★★	★★	★★	★★	In A.4, consistency does not require better involvement of affected parties. Others are good.
Would people be better informed?	★★	★★	★★	★	★★	★★	★★	★★	★★	Better-informed people key to most options.
Would there be more effective participation in planning & implementation?	★★	★★	★★	★	★★	★★	★	★	★	A.1, A.2, A.3, A.5, & A.6 require more effective participation. Others have good potential.
Would there be better sharing of information?	★★	★★	★★	★	★★	★	★★	★★	★★	Most options require better information-sharing.
Would there be increased opportunities for compromise and consensus?	★★	★★	★★	★★	★★	★★	★★	★★	★★	All options increase opportunities for compromise/consensus.
Would there be better chances of consensus developing?	★	★★	★	★★	★★	★★	★	★	★	Some options better because they promote understanding, consistency, & balance.
Would there be greater disclosure of information?	★	★	★★	★	★★	★	★	★★	★★	A.3, A.5, C, & D based on greater disclosure.

★★=Yes

★=Yes, either partially or potentially with risks or constraints

×=No

Assessment of Issues and Evaluation of Options

Table D-12 Screening Options		4. Improving Communication and Consultation								
Evaluation Criteria	Policy Options									Rationale
	Current Management									
	A.1	A.2	A.3	A.4	A.5	A.6	B	C	D	
Would there be greater opportunity to demonstrate public acceptance?	★★	★★	★★	★★	★★	★★	★★	★★	★	D would require follow-up and monitoring to demonstrate public acceptance. Others are good.
Process										
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★★	★★	★★	★★	★★	★★	★★	★★	★★	All options provide more effective consideration of objectives from a broad range of people.
Would there be more effective development of management options & action plans?	★★	★★	★★	★★	★★	★★	★	★	★★	B & C depend on the willingness, capability, & objectivity of participants in planning & referrals.
Would there be more effective definition and evaluation of assumptions and uncertainties?	★★	★★	★★	★★	★★	★★	★	★	★	Each option has the potential to challenge assumptions and identify uncertainties.
Would there be more effective resolution of outstanding issues and assessment of performance?	★	★★	★★	★	★★	★★	★	★	★	Resolution of issues and assessment of performance depends on commitment & skills of participants.
Would solutions be more equitable and reasonable?	★	★	★	★	★	★★	★	★	★★	D would increase fairness by identifying responsibilities & capability of individuals.
Would there be more comprehensive and public assessment?	★★	★★	★★	★	★★	★★	★★	★★	★	A.4 & D have potential, but do not require comprehensive, public assessment.
Would there be more effective use of the precautionary approach?	★	★	★★	★	★★	★	★★	★★	★★	Most options have elements that promote more effective use of caution. Others have potential.
Implementation										
Would public & private efforts be strengthened?	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option strengthens public & private efforts.
Would integrated management of surface and ground water be enhanced?	★	★	★	★	★	★	★	★	★	Each option could strengthen integration of surface & ground water.
Would there be more effective iterative decision-making?	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option would reduce the need for iterative decisions &/or strengthen iterative decision-making.
Would there be improvements in making progress while continuing analysis and verification?	★★	★★	★★	★★	★★	★★	★★	★★	★	D might contribute, but may not be flexible enough.
Would the implementation process be more fair and open?	★★	★★	★★	★	★★	★★	★★	★★	★★	In A.4, consistency does not necessarily mean a more fair & open process.
Would there be better solutions?	★	★	★	★	★	★★	★	★	★★	A.6 & D provide necessary balance or awareness.
Would there be greater optimization of existing conditions?	★	★★	★	★	★	★★	★	★	★★	A.2, A.6, & D contain key elements for optimizing existing conditions.
Compliance										
Would the protection of people's rights be promoted and enhanced?	★	★★	★★	★	★★	★★	★	★	★	A.2, A.3, A.5, & A.6 provide excellent opportunities for people to advocate for their rights.
Would the use of rules to control behavior be enhanced?	★	★	★	★	★★	★★	★	★	★★	A.5, A.6, & D are rules or lead to rules to control behavior. Other options have good potential.
Would accountability for decisions be improved?	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option provides greater accountability.
Would there be greater protection of people's entitlements?	★	★★	★★	★	★★	★★	★	★	★★	A.2, A.3, A.5, & A.6 are opportunities for people to advocate entitlements. D increases understanding.
Would legally enforceable provisions be strengthened?	★	★	★	★	★	★★	★	★★	★★	All options offer good potential to strengthen legally enforceable provisions.
Would there be more effective regulatory enforcement of undesirable activity?	★	★	★	★	★	★★	★	★	★★	All options offer good potential for more effective enforcement of undesirable activity.

Table D-12 Screening Options		4. Improving Communication and Consultation								
Evaluation Criteria	Policy Options									Rationale
	Current Management				New Directions					
	E	F.1	F.2	G	H	I	J	K	L	
Is the option feasible?	★★	★	★★	★★	★	★★	★★	★	★	Complexity may limit F.1, H, & K. Data needed on L.
Is the option compatible with current policy??	★★	★★	★★	★★	★★	★★	★★	★★	★★	No known incompatibilities.
Objectives										
Would the highest priority problems be addressed?	★	★	★	★	★★	★	★	★	★	Each option could be helpful in addressing highest priority problems. Leadership required.
Would environmental, economic, & social/cultural goals be better integrated?	★	★	★	★	★★	★★	★★	★★	★	H thru K would enhance integration of issues. Others could encourage or lead to greater integration.
Would there be better consideration of environmental justice?	★	★★	★★	★★	★	★★	★	★	★	F.1, F.2, G, & I would greatly enhance fairness and meaningful involvement.
Would goal & target-setting be improved?	★	★	★	★	★★	★	★★	★★	★	All options could enhance target-setting.
Would problem(s) be more fully and realistically defined?	★	★	★	★★	★★	★★	★★	★★	★	G thru K are strongly oriented to better problem definition.
Would there be clearer definition of objectives?	★★	★★	★★	★★	★★	★★	★★	★★	★	Except L, options improve definition of objectives.
Would there be better opportunity to achieve the public interest?	★	★	★	★★	★★	★★	★★	★★	★	G thru K provide building blocks for defining the public interest.
Would the objective of greater benefits for the watershed be enhanced?	★	★	★	★★	★★	★	★★	★★	★	G, H, J, & K would directly benefit the watershed.
Knowledge										
Would consideration of hydrological interactions be enhanced?	★	★	★	★	★★	★	★	★★	★	Hydrology is one of the greatest uncertainties for the watershed in general & riparian health specifically.
Would there be more sound scientific data, tools, & techniques?	★	★★	★★	★★	★★	★	★	★★	★	Most options will strengthen the data, tools, & techniques. Others could.
Would there be greater common understanding of roles, priorities, & responsibilities?	★	★	★	★★	★	★★	★	★	★★	G, I, & L would lead to better common understanding of roles, priorities, &/or responsibilities.
Would information be better understood and more scientifically credible?	★	★	★	★★	★★	★	★	★	★	Credible information and better understanding are key to G & H. Should be key to other options as well.
Resources										
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.
Would money, time, and other resources be used more efficiently and effectively?	★	★	★	★	★	★★	★★	★★	★	I thru K reduce key barriers to greater efficiency & effectiveness. Others have potential.
Communication and Consultation										
Would the effectiveness of the coordinating framework be increased?	★	★	★	★★	★★	★★	★★	★★	★	All options could increase effectiveness of coordination.
Would there be better involvement of those most affected throughout the process?	★	★	★	★	★	★★	★★	★	★	I & J would be particularly strong in involving affected parties. Others have good potential.
Would people be better informed?	★★	★★	★★	★★	★	★★	★★	★★	★	H & L do not necessarily increase awareness.
Would there be more effective participation in planning & implementation?	★	★	★	★	★★	★★	★★	★★	★	All options could enhance participation in planning & awareness.
Would there be better sharing of information?	★★	★★	★★	★★	★	★★	★★	★★	★	H & L do not necessarily increase sharing.
Would there be increased opportunities for compromise and consensus?	★	★★	★★	★★	★★	★★	★★	★★	★	F.1 thru K each would open up opportunities for compromise & consensus.
Would there be better chances of consensus developing?	★	★	★	★	★★	★	★	★	★	Although other options have good potential, H is the only one that actively promotes consensus.
Would there be greater disclosure of information?	★★	★★	★★	★★	★	★	★★	★	★	Greater disclosure is key to E, F.1, F.2, G, & J.
Would there be greater opportunity to demonstrate public acceptance?	★	★	★	★★	★★	★★	★★	★★	★	G thru K increase the opportunity to achieve and demonstrate public acceptance.

★★=Yes

★=Yes, either partially or potentially with risks or constraints

×=No

Assessment of Issues and Evaluation of Options

Table D-12 Screening Options		4. Improving Communication and Consultation								
Evaluation Criteria	Policy Options									Rationale
	Current Management				New Directions					
	E	F.1	F.2	G	H	I	J	K	L	
Process										
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★★	★	★	★★	★	★★	★★	★★	★	All options could provide more effective consideration of objectives from a broad range of people.
Would there be more effective development of management options & action plans?	★	★	★	★	★★	★★	★★	★★	★	Though not directly creating greater effectiveness, F.1, F.2, & G are necessary for a strong foundation.
Would there be more effective definition and evaluation of assumptions and uncertainties?	★	★	★	★★	★★	★★	★★	★★	★	Each option could lead to challenges of assumptions and identification of uncertainties.
Would there be more effective resolution of outstanding issues and assessment of performance?	★	★	★	★★	★★	★★	★★	★	★	G thru J would be very good for issue resolution & performance assessment.
Would solutions be more equitable and reasonable?	★	★	★	★	★★	★	★	★	★	All options have good potential to increase fairness and rationality.
Would there be more comprehensive and public assessment?	★	★	★	★	★	★★	★★	★	★	More comprehensive & public assessment is fundamental to I & J.
Would there be more effective use of the precautionary approach?	★★	★★	★★	★★	★★	★★	★★	★★	★	Except L, each option would lead to more effective use of caution.
Implementation										
Would public & private efforts be strengthened?	★	★	★	★★	★	★	★★	★	★	Each option could strengthen public & private efforts.
Would integrated management of surface and ground water be enhanced?	★	★	★	★	★	★	★	★	★	Each option could strengthen integration of surface & ground water.
Would there be more effective iterative decision-making?	★	★★	★★	★★	★★	★★	★★	★★	★	Most options would reduce the need for iterative decisions &/or strengthen iterative decision-making.
Would there be improvements in making progress while continuing analysis and verification?	★	★★	★★	★★	★★	★★	★★	★★	★	All options could contribute to progress and analysis/verification.
Would the implementation process be more fair and open?	★	★★	★★	★★	★	★★	★★	★★	★	E, H, & L do not necessarily lead to greater openness & fairness.
Would there be better solutions?	★	★	★	★★	★★	★	★	★	★	G & H are strong on awareness & resolution.
Would there be greater optimization of existing conditions?	★	★	★	★★	★★	★	★	★	★	All options could assist in optimizing existing conditions.
Compliance										
Would the protection of people's rights be promoted and enhanced?	★	★★	★★	★★	★	★	★★	★	★	F.1 thru G & J create the awareness that people need to protect their rights.
Would the use of rules to control behavior be enhanced?	★	★	★	★	★★	★	★	★	★	H leads to improved rules. Others could do so.
Would accountability for decisions be improved?	★	★	★★	★★	★★	★★	★★	★★	★	F.2 thru K enhance accountability.
Would there be greater protection of people's entitlements?	★	★★	★★	★★	★	★	★★	★	★	F.1 thru G & J create the awareness that people need to protect their entitlements.
Would legally enforceable provisions be strengthened?	★	★	★	★	★★	★★	★	★	★	All options offer good potential to strengthen legally enforceable provisions.
Would there be more effective regulatory enforcement of undesirable activity?	★	★	★	★	★★	★★	★	★	★	All options offer good potential for more effective enforcement of undesirable activity.

Table D-13 Screening Options		5. Upgrading Design and Construction									
Evaluation Criteria	Policy Options										Rationale
	Current Management										
	A	B.1	B.2	B.3	C	D	E	F	G	H	
Is the option feasible?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Uncertainty over municipal powers.
Is the option compatible with current policy??	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Uncertainty over prov. flexibility re: municipal powers.
Objectives											
Would the highest priority problems be addressed?	★★	★★	★★	★★	★★	★	★★	★	★★	★	D is general in nature, but would be useful if applied to highest priority issues. Uncertainty over H.
Would environmental, economic, & social/cultural goals be better integrated?	★	★★	★★	★★	★★	★	★★	★★	★★	★	Most options provide better integration. Economic & social/cultural benefits of A could be important.
Would there be better consideration of environmental justice?	★	★	★	★	★	★	★	★	★	★	Options could improve fairness and meaningful involvement.
Would goal & target-setting be improved?	★★	★★	★★	★★	★★	★★	★	★	★	★★	Better standards, etc. mean better targets.
Would problem(s) be more fully and realistically defined?	★★	★★	★★	★★	★★	★★	★★	★★	★	★★	G has good potential, but needs a scientific basis to result in fuller, more realistic problem definition.
Would there be clearer definition of objectives?	★★	★★	★★	★★	★★	★★	★★	★★	★	★★	All options offer good potential to clarify objectives.
Would there be better opportunity to achieve the public interest?	★	★	★	★	★	★	★★	★	★	★	All options have potential to achieve public interest. E is superior because it includes public consultation.
Would the objective of greater benefits for the watershed be enhanced?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option would produce benefits to watershed, if only to clarify current situation.
Knowledge											
Would consideration of hydrological interactions be enhanced?	★★	★★	★	★★	★	★	★★	★★	★	★	All options could enhance consideration of hydrological interactions, some directly.
Would there be more sound scientific data, tools, & techniques?	★	★★	★★	★★	★★	★	★★	★★	★★	★	All options would require scientific input and could produce scientifically defensible tools.
Would there be greater common understanding of roles, priorities, & responsibilities?	★★	★	★	★	★	★★	★★	★	★★	★	A, D, E, & G are based directly on better understanding of roles, priorities, & responsibilities.
Would information be better understood and more scientifically credible?	★	★	★	★	★	★	★	★	★	★	All options provide the potential to enhance understanding & credibility.
Resources											
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.
Would money, time, and other resources be used more efficiently and effectively?	★	★	★	★	★	★	★	★	★	★	Each option could improve efficiency & effectiveness.
Communication and Consultation											
Would the effectiveness of the coordinating framework be increased?	★	★	★	★	★	★	★★	★	★	★	The consultative nature of E would resolve issues and lead to better coordination of efforts.
Would there be better involvement of those most affected throughout the process?	★	★	★	★	★	★	★★	★	★★	★	E & G provide for the involvement of those potentially affected by decisions.
Would people be better informed?	★★	★★	★★	★★	★	★★	★★	★	★★	★	Standards, etc. & consultation are effective tools.
Would there be more effective participation in planning & implementation?	★	★	★	★	★	★	★★	★	★★	★	E & G provide good opportunities for involving those potentially affected by decisions.
Would there be better sharing of information?	★	★	★	★	★	★	★★	★	★★	★	E & G provide for better sharing of information.
Would there be increased opportunities for compromise and consensus?	★	★	★	★	★	★	★★	★	★★	★	All options provide good opportunities for compromise & consensus.
Would there be better chances of consensus developing?	★	★	★	★	★	★	★★	★	★★	★	Each option has potential. E & G would encourage consensus.
Would there be greater disclosure of information?	★★	★★	★★	★★	★	★★	★★	★	★★	★	Standards, etc. & consultation encourage disclosure

★★=Yes

★=Yes, either partially or potentially with risks or constraints

×=No

Assessment of Issues and Evaluation of Options

Table D-13 Screening Options		5. Upgrading Design and Construction									
Evaluation Criteria	Policy Options										Rationale
	Current Management										
	A	B.1	B.2	B.3	C	D	E	F	G	H	
Would there be greater opportunity to demonstrate public acceptance?	★	★	★	★	★	★	★★	★	★★	★	E & G will require public acceptance. Other options could include public acceptance requirement.
Process											
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★	★	★	★	★	★	★★	★	★★	★	Consultation is key to E & G and would make other options more effective.
Would there be more effective development of management options & action plans?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	All options would contribute to the development of management options & action plans.
Would there be more effective definition and evaluation of assumptions and uncertainties?	★	★	★	★	★	★	★	★	★	★	Each option has the potential to challenge assumptions & clarify uncertainties.
Would there be more effective resolution of outstanding issues and assessment of performance?	★	★	★	★	★	★	★	★	★	★	All options could contribute to the effectiveness of issue resolution & performance assessment.
Would solutions be more equitable and reasonable?	★	★	★	★	★	★	★	★	★★	★	From the standpoint of the landowner, G enhances equity and reasonableness.
Would there be more comprehensive and public assessment?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option will provide more comprehensive and public assessment.
Would there be more effective use of the precautionary approach?	★★	★★	★★	★★	★	★	★★	★★	★	★	C, D, G, & H do not require more effective use of caution, but could be based on that approach.
Implementation											
Would public & private efforts be strengthened?	★	★	★	★	★	★	★★	★	★★	★	Each option has good potential to strengthen public & private efforts.
Would integrated management of surface and ground water be enhanced?	★	★	★	★	★	★	★	★	★	★	Each option has potential to improve integration of surface and ground water, especially A.
Would there be more effective iterative decision-making?	★	★	★	★	★	★	★	★	★	★	Options could reduce need for iterative decision & lead to better iterative decision-making in future.
Would there be improvements in making progress while continuing analysis and verification?	★	★	★	★	★	★	★	★	★★	★	G offers the opportunity to protect areas while more precisely determining land-water relationship.
Would the implementation process be more fair and open?	★	★	★	★	★	★	★★	★	★★	★	E & G open up decision-making to those who are potentially affected.
Would there be better solutions?	★	★	★	★	★	★	★	★	★	★	Each option has good potential for better solutions.
Would there be greater optimization of existing conditions?	★	★	★	★	★	★	★	★★	★	★	F provides the opportunity to improve the effectiveness of existing infrastructure.
Compliance											
Would the protection of people's rights be promoted and enhanced?	★	★	★	★	★	★	★	★	★★	★	G protects rights by encouraging voluntary action.
Would the use of rules to control behavior be enhanced?	★★	★★	★★	★★	★★	★★	★	★★	★	★★	Most options would enhance rule-based behavior.
Would accountability for decisions be improved?	★	★	★	★	★	★	★★	★	★	★	E has greater opportunity for accountability.
Would there be greater protection of people's entitlements?	★	★	★	★	★	★	★	★	★★	★	All options could be used to provide greater protection for people's entitlements.
Would legally enforceable provisions be strengthened?	★★	★★	★★	★★	★★	★★	★★	★	★	★★	F could be less enforceable if it relied on change in behavior rather than infrastructure.
Would there be more effective regulatory enforcement of undesirable activity?	★	★	★	★	★	★	★	★	★	★	Each option could provide more effective regulation. Depends on which measures adopted.

Table D-13 Screening Options		5. Upgrading Design and Construction										Rationale
Evaluation Criteria	Policy Options											
	Current Management											
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	
Is the option feasible?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option is implementable & not in conflict with existing policy.
Is the option compatible with current policy??	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	
Objectives												
Would the highest priority problems be addressed?	★★	★★	★	★★	★★	★★	★★	★★	★★	★★	★★	1.3 may not be perceived as compatible with goal of more natural sustainable conditions.
Would environmental, economic, & social/cultural goals be better integrated?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option enhances links between economic/environmental/social goals.
Would there be better consideration of environmental justice?	★	★	★	★	★	★	★	★	★	★	★	All options could increase fairness & meaningful involvement.
Would goal & target-setting be improved?	★	★	★	★	★	★	★	★	★	★	★	Each could improve goal/target-setting.
Would problem(s) be more fully and realistically defined?	★	★	★	★	★	★	★	★	★	★	★	All options could generate fuller & more realistic problem definition.
Would there be clearer definition of objectives?	★	★	★	★	★	★	★	★	★	★	★	All options could result in clearer objectives
Would there be better opportunity to achieve the public interest?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	All options deal with the conflicts affecting the public interest.
Would the objective of greater benefits for the watershed be enhanced?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option would increase the health of aquatic & riparian ecosystems.
Knowledge												
Would consideration of hydrological interactions be enhanced?	★	★★	★	★★	★	★★	★	★	★	★	★	1.2, 1.4, & 1.6 would directly affect consideration of hydrological situation.
Would there be more sound scientific data, tools, & techniques?	★	★	★	★	★	★	★	★	★	★	★	Each option would benefit from monitoring & evaluation.
Would there be greater common understanding of roles, priorities, & responsibilities?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option has value in creating awareness of roles, etc.
Would information be better understood and more scientifically credible?	★	★	★	★	★	★	★	★	★	★	★	With strong educational component, each could improve understanding & credibility.
Resources												
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.
Would money, time, and other resources be used more efficiently and effectively?	★	★	★	★	★	★	★	★	★	★	★	Each option could improve efficiency & effectiveness.
Communication and Consultation												
Would the effectiveness of the coordinating framework be increased?	★	★	★	★	★	★	★	★	★	★	★	Each option has potential, especially in grassroots, word-of-mouth coordination.
Would there be better involvement of those most affected throughout the process?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option is directed at landowners who have biggest stake in riparian management.
Would people be better informed?	★	★	★	★	★	★	★	★	★	★	★	Strong educational component is needed.
Would there be more effective participation in planning & implementation?	★	★	★	★	★	★	★	★	★	★	★	Each option has excellent potential for more effective action.
Would there be better sharing of information?	★	★	★	★	★	★	★	★	★	★	★	Good opportunities for information-sharing.
Would there be increased opportunities for compromise and consensus?	★	★	★	★	★	★	★	★	★	★	★	Each option could provide opportunities for better give and take.
Would there be better chances of consensus developing?	★	★	★	★	★	★	★	★	★	★	★	Chances for consensus on good riparian management could be strengthened.
Would there be greater disclosure of information?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each is good information dissemination tool.

★★=Yes

★=Yes, either partially or potentially with risks or constraints

×=No

Assessment of Issues and Evaluation of Options

Table D-13 Screening Options		5. Upgrading Design and Construction											Rationale
Evaluation Criteria	Policy Options												
	Current Management												
	I.1	I.2	I.3	I.4	I.5	I.6	I.7	I.8	I.9	I.10	I.11		
Would there be greater opportunity to demonstrate public acceptance?	★	★	★	★	★	★	★	★	★	★	★	Monitoring & evaluation needed.	
Process													
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option would be oriented to the needs of landowners to be successful.	
Would there be more effective development of management options & action plans?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option leads to better options & plans.	
Would there be more effective definition and evaluation of assumptions and uncertainties?	★	★	★	★	★	★	★	★	★	★	★	Each option deals with assumptions and uncertainties behind existing management.	
Would there be more effective resolution of outstanding issues and assessment of performance?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option would provide landowners with better ways of resolving issues & assessing performance.	
Would solutions be more equitable and reasonable?	★	★	★	★	★	★	★	★	★	★	★	Options depend on landowner acceptance.	
Would there be more comprehensive and public assessment?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option provides its own opportunity for consideration of scope & effectiveness.	
Would there be more effective use of the precautionary approach?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option provides an element of effective precaution.	
Implementation													
Would public & private efforts be strengthened?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each strengthens public/private efforts.	
Would integrated management of surface and ground water be enhanced?	★	★	★	★	★	★	★	★	★	★	★	Each option has the potential to better integrate surface & ground water.	
Would there be more effective iterative decision-making?	★	★	★	★	★	★	★	★	★	★	★	Iterative decision-making could improve, depends on landowner acceptance.	
Would there be improvements in making progress while continuing analysis and verification?	★	★	★	★	★	★	★	★	★	★	★	Depends on landowner acceptance.	
Would the implementation process be more fair and open?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	The encouragement provided through each option would require fairness & openness.	
Would there be better solutions?	★	★	★	★	★	★	★	★	★	★	★	Depends on landowner acceptance.	
Would there be greater optimization of existing conditions?	★	★	★	★	★	★	★	★	★	★	★	Good potential from each option.	
Compliance													
Would the protection of people's rights be promoted and enhanced?	★	★	★	★	★	★	★	★	★	★	★	Voluntary nature of programs would encourage protection of rights.	
Would the use of rules to control behavior be enhanced?	★	★	★	★	★	★	★	★	★	★	★	Common sense or community rules instead of regulation would result from these options.	
Would accountability for decisions be improved?	★	★	★	★	★	★	★	★	★	★	★	Each option could increase landowner accountability.	
Would there be greater protection of people's entitlements?	★	★	★	★	★	★	★	★	★	★	★	Voluntary nature of programs would encourage protection of entitlements.	
Would legally enforceable provisions be strengthened?	★	★	★	★	★	★	★	★	★	★	★	Each option could reduce enforcement burden & improve overall effectiveness.	
Would there be more effective regulatory enforcement of undesirable activity?	★	★	★	★	★	★	★	★	★	★	★	Peer influence, in particular, could reduce enforcement need and focus activity.	

Table D-13 Screening Options		5. Upgrading Design and Construction					Rationale
Evaluation Criteria	Policy Options						
	New Directions						
	J.1	J.2	J.3	K	L	M	
Is the option feasible?	★	★	★★	★	★★	★★	Uncertain if J.1, J.2, & K are achievable.
Is the option compatible with current policy??	★★	★★	★★	★★	★★	★★	No known incompatibilities.
Objectives							
Would the highest priority problems be addressed?	★★	★	★★	★★	★★	★★	Salinity & phosphorus may not be the highest priority issues at this time.
Would environmental, economic, & social/cultural goals be better integrated?	★★	★★	★★	★★	★★	★★	Each option strengthens integration of different goals.
Would there be better consideration of environmental justice?	★	★	★	★	★	★	Each option could improve fairness & meaningful involvement, but some might consider them unfair.
Would goal & target-setting be improved?	★★	★★	★★	★★	★★	★★	Each option improves target-setting.
Would problem(s) be more fully and realistically defined?	★	★	★	★	★	★	Good potential for fuller, more realistic problem-definition even if options are eventually rejected.
Would there be clearer definition of objectives?	★★	★★	★★	★★	★★	★★	Each option would clarify objectives.
Would there be better opportunity to achieve the public interest?	★★	★★	★★	★★	★★	★★	Each option depends greatly on what the public interest is.
Would the objective of greater benefits for the watershed be enhanced?	★	★	★	★	★	★	Each option requires determination of whether it is beneficial.
Knowledge							
Would consideration of hydrological interactions be enhanced?	★	★★	★★	★★	★★	★★	Except J.1, each option requires enhanced consideration of hydrological interactions.
Would there be more sound scientific data, tools, & techniques?	★★	★★	★★	★★	★★	★★	Each option requires sound science.
Would there be greater common understanding of roles, priorities, & responsibilities?	★	★	★	★	★	★	Each option has potential to create misunderstandings.
Would information be better understood and more scientifically credible?	★	★	★	★	★	★	Each option has potential to create misunderstandings.
Resources							
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.
Would money, time, and other resources be used more efficiently and effectively?	★	★	★	★	★	★	Each option could improve efficiency & effectiveness.
Communication and Consultation							
Would the effectiveness of the coordinating framework be increased?	★	★	★	★	★	★	Each option is potentially controversial.
Would there be better involvement of those most affected throughout the process?	★	★	★	★	★	★	Each option might simply generate opposition, not better involvement.
Would people be better informed?	★	★	★	★	★	★	Each option could create overload or denial.
Would there be more effective participation in planning & implementation?	★	★	★	★	★	★	Each option, for better or worse, could become a lightning rod.
Would there be better sharing of information?	★	★	★	★	★	★	Sharing information will occur, might not be better.
Would there be increased opportunities for compromise and consensus?	★	★	★	★	★	★	Good potential for compromise/consensus, but also for conflict.
Would there be better chances of consensus developing?	★	★	★	★	★	★	Achieving consensus could be challenging.
Would there be greater disclosure of information?	★	★	★	★	★	★	For options to work, disclosure essential.

★★=Yes

★=Yes, either partially or potentially with risks or constraints

×=No

Assessment of Issues and Evaluation of Options

Table D-13 Screening Options		5. Upgrading Design and Construction						Rationale
Evaluation Criteria	Policy Options							
	New Directions							
	J.1	J.2	J.3	K	L	M		
Would there be greater opportunity to demonstrate public acceptance?	★	★	★	★	★	★	Options could just as easily demonstrate public disapproval.	
Process								
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★	★	★	★	★	★	Effectiveness of options in creating consideration of objectives is uncertain.	
Would there be more effective development of management options & action plans?	★	★	★	★	★	★	Depends if opposition to options can be turned into acceptance.	
Would there be more effective definition and evaluation of assumptions and uncertainties?	★	★	★	★	★	★	Assumptions would be challenged & uncertainties raised. Effectiveness of that uncertain.	
Would there be more effective resolution of outstanding issues and assessment of performance?	★	★	★	★	★	★	Depends if opposition to options can be turned into acceptance.	
Would solutions be more equitable and reasonable?	★	★	★	★	★	★	If options are accepted by public, they would be equitable & fair.	
Would there be more comprehensive and public assessment?	★★	★★	★★	★★	★★	★★	By their controversial nature, these options would generate more comprehensive, public assessment.	
Would there be more effective use of the precautionary approach?	★★	★★	★★	★★	★★	★★	Each option would have a strong element o precaution in it if accepted.	
Implementation								
Would public & private efforts be strengthened?	★	★	★	★	★	★	Effectiveness of options uncertain.	
Would integrated management of surface and ground water be enhanced?	★	★	★	★	★	★	Each option potentially could enhance integration of surface & ground water.	
Would there be more effective iterative decision-making?	★	★	★	★	★	★	Uncertain if options would increase effectiveness of iterative decision-making.	
Would there be improvements in making progress while continuing analysis and verification?	★	★	★	★	★	★	Uncertain if options would improve situation.	
Would the implementation process be more fair and open?	★	★	★	★	★	★	Options would have to be fair & open to succeed.	
Would there be better solutions?	★	★	★	★	★	★	Uncertain if better solutions would result.	
Would there be greater optimization of existing conditions?	★	★	★★	★★	★	★	J.3 & K would aid in optimizing existing conditions.	
Compliance								
Would the protection of people's rights be promoted and enhanced?	★	★	★	★	★	★	Depends how options are implemented.	
Would the use of rules to control behavior be enhanced?	★★	★★	★★	★★	★★	★★	Each option leads to rule-based behavior.	
Would accountability for decisions be improved?	★	★	★	★	★	★	Depends on fairness & openness of process.	
Would there be greater protection of people's entitlements?	★	★	★	★	★	★	Depends how options are implemented.	
Would legally enforceable provisions be strengthened?	★★	★★	★★	★★	★★	★★	If desirable, options would strengthen legally enforceable provisions.	
Would there be more effective regulatory enforcement of undesirable activity?	★	★	★	★	★	★	Depends on public acceptance.	

Evaluation Criteria	Policy Options										Rationale	
	Current Management			New Directions								
	A	B	C	D	E	F	G	H	I	J		
Is the option feasible?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	Each option could be implemented.
Is the option compatible with current policy??	★★	★★	★★	★★	★★	✗	★★	★★	✗	★	F & I are incompatible with provincial policy.	
Objectives												
Would the highest priority problems be addressed?	★	★	★	★	★	★	★	★	★	★	★	Depends on how options are implemented.
Would environmental, economic, & social/cultural goals be better integrated?	★★	★★	★★	★★	★★	★★	★	★	★★	★	Not known if G, H, & J would improve integration of goals.	
Would there be better consideration of environmental justice?	★★	★★	★★	★★	★★	★★	★★	★	★	★	Fairness & meaningful involvement for H, I, & J depends on how they are implemented.	
Would goal & target-setting be improved?	★★	★★	★★	★★	★★	★★	★	★	★★	★	Most options strengthen goal & target-setting.	
Would problem(s) be more fully and realistically defined?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Uncertain if a full & realistic problem definition could be established for J.	
Would there be clearer definition of objectives?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Uncertain if J can be clearly linked to objectives.	
Would there be better opportunity to achieve the public interest?	★★	★★	★★	★★	★★	★★	★	★	★★	★	Each option requires definition of public interest. Uncertain if G, H, & J would serve the purpose.	
Would the objective of greater benefits for the watershed be enhanced?	★★	★★	★	★★	★★	★	★	★	★	★	A, B, D, & E offer good methods of improving benefits to watershed. Others have potential.	
Knowledge												
Would consideration of hydrological interactions be enhanced?	★	★	★	★★	★★	★★	★	★	★	★	D, E, & F would improve consideration of hydrology, especially for decision-makers.	
Would there be more sound scientific data, tools, & techniques?	★★	★★	★	★★	★★	★★	★	★	★	★	A, B, D, E, & F would result in better scientific data and lead to better tools & techniques.	
Would there be greater common understanding of roles, priorities, & responsibilities?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	J does not necessarily lead to greater common understanding.	
Would information be better understood and more scientifically credible?	★★	★	★	★★	★★	★★	★	★	★	★	A, D, E, & F would lead decision-makers, if not public, to better understanding & more credible data.	
Resources												
Would there be sufficient money, time, and other resources for implementation?	★	★	★	★	★	★	★	★	★	★	★	Each option requires money and effort. Resource availability unclear.
Would money, time, and other resources be used more efficiently and effectively?	★	★	★★	★	★	★	★	★	★	★	★	Each option could improve efficiency & effectiveness. C would rationalize regulation.
Communication and Consultation												
Would the effectiveness of the coordinating framework be increased?	★★	★★	★★	★	★★	★	★	★	★★	★	A thru C, E, & I would increase coordination and strengthen the framework.	
Would there be better involvement of those most affected throughout the process?	★	★	★	★	★	★	★	★	★	★	★	Each option has the potential to improve involvement of affected parties.
Would people be better informed?	★	★	★	★	★★	★★	★	★	★★	★	★	E, F, & I lead to greater awareness.
Would there be more effective participation in planning & implementation?	★	★	★★	★★	★★	★★	★★	★	★★	★	★	Foundation of most options is more effective participation
Would there be better sharing of information?	★	★	★★	★★	★★	★	★★	★	★★	★	★	F & J might lead to greater secrecy.
Would there be increased opportunities for compromise and consensus?	★★	★	★★	★	★	★	✗	✗	✗	★	★	G, H, & I reduce flexibility.
Would there be better chances of consensus developing?	★	★★	★★	★★	★★	★	★	★	★	★	★	More stringent compliance and prohibitions could reduce willingness to cooperate.

★★=Yes

★=Yes, either partially or potentially with risks or constraints

✗=No

Assessment of Issues and Evaluation of Options

Table D-14 Screening Options		6. Achieving Compliance										
Evaluation Criteria	Policy Options										Rationale	
	Current Management			New Directions								
	A	B	C	D	E	F	G	H	I	J		
Would there be greater disclosure of information?	★	★★	★	★★	★★	★	★	★	★	★	★	F & J might lead to greater secrecy.
Would there be greater opportunity to demonstrate public acceptance?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Except J, each option would require demonstrated public acceptance.
Process												
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★★	★	★★	★	★	★★	★★	★	★★	★	★	A & C in particular depend on expanding consideration of people's objectives.
Would there be more effective development of management options & action plans?	★★	★	★★	★★	★★	★★	★	★	★★	★	★	F & I would especially encourage more serious consideration of options & plans.
Would there be more effective definition and evaluation of assumptions and uncertainties?	★★	★★	★★	★★	★★	★★	★	★	★★	★	★	Most options would challenge assumptions & reveal uncertainties.
Would there be more effective resolution of outstanding issues and assessment of performance?	★★	★	★★	★★	★★	★★	★	★	★★	★	★	Most options provide better ways to resolve issues &/or assess performance.
Would solutions be more equitable and reasonable?	★	★	★	★	★	★	★	★	★	★	★	Each option could improve fairness & reasonableness.
Would there be more comprehensive and public assessment?	★	★	★	★	★	★	★	★	★	★	★	All options have good potential for generating more comprehensive, public assessment.
Would there be more effective use of the precautionary approach?	★★	★	★	★★	★	★★	★★	★★	★★	★★	★	More effective use of precaution could be a key element of each option.
Implementation												
Would public & private efforts be strengthened?	★★	★★	★★	★★	★	★★	★★	★	★	★	★	A thru D, F, & G would make compliance fairer.
Would integrated management of surface and ground water be enhanced?	★	★	★	★	★	★	★	★	★	★	★	Each option could enhance integration of surface & ground water.
Would there be more effective iterative decision-making?	★★	★★	★★	★★	★★	★★	★	★	★★	★	★	A thru F & I would reduce need for iterative decision-making.
Would there be improvements in making progress while continuing analysis and verification?	★★	★★	★★	★★	★★	★★	★	★	★★	★	★	Most options encourage innovation & greater understanding.
Would the implementation process be more fair and open?	★	★	★	★	★	★	★	★	★	★	★	Each option has the potential to increase fairness & openness.
Would there be better solutions?	★★	★	★★	★	★	★	★	★	★	★	★	A & C reduce & focus compliance activities.
Would there be greater optimization of existing conditions?	★★	★	★★	★	★★	★	★	★	★	★	★	Each option has potential to optimize existing conditions.
Compliance												
Would the protection of people's rights be promoted and enhanced?	★★	★	★★	★★	★	★★	★★	★	★	★	★	A, C, D, F, & G would increase the fairness of compliance.
Would the use of rules to control behavior be enhanced?	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★	Uncertain if J would enhance control of behavior.
Would accountability for decisions be improved?	★★	★★	★	★	★	★★	★★	★	★★	★	★	All options could improve accountability.
Would there be greater protection of people's entitlements?	★★	★	★★	★★	★	★★	★★	★	★	★	★	A, C, D, F, & G would increase the fairness of compliance.
Would legally enforceable provisions be strengthened?	★★	★	★★	★★	★★	★★	★★	★★	★★	★★	★	Most options would strengthen compliance.
Would there be more effective regulatory enforcement of undesirable activity?	★★	★	★	★★	★★	★★	★★	★★	★★	★★	★	Most options would make compliance more effective.

Table D-15 Screening Options		7. Ensuring Financial Sustainability						Rationale
Evaluation Criteria	Policy Options							
	Current Management			New Directions				
	A	B	C	D	E	F		
Is the option feasible?	★★	★★	★★	★★	★★	★	Uncertain about feasibility of F.	
Is the option compatible with current policy??	★★	★★	★★	✘	★★	★★	Province does not support fees for non-hydro uses.	
Objectives								
Would the highest priority problems be addressed?	★★	★★	★★	★★	★★	★★	Each option would deal with key issue: lack of funding.	
Would environmental, economic, & social/cultural goals be better integrated?	★★	★	★	★	★★	★	B, C, & D would need to be linked to specific targets. Uncertain about integration potential of F.	
Would there be better consideration of environmental justice?	★★	★	★	★	★	★	A would ensure fairness & provide more meaningful involvement in protection of people/environment.	
Would goal & target-setting be improved?	★★	★★	★★	★★	★★	★★	All options would improve goal & target-setting.	
Would problem(s) be more fully and realistically defined?	★★	★	★	★	★★	★	Key constraint is what additional money would be used for.	
Would there be clearer definition of objectives?	★★	★	★	★	★★	★	B, C, D, & F would need more specific purposes.	
Would there be better opportunity to achieve the public interest?	★★	★	★★	★★	★★	★	The goals of cost-sharing and trading of development credits would need clarification.	
Would the objective of greater benefits for the watershed be enhanced?	★★	★	★	★	★★	★	Each option has good potential for achieving greater benefits.	
Knowledge								
Would consideration of hydrological interactions be enhanced?	★	★	★	★	★	★	Additional funding could lead to better understanding & consideration of hydrology.	
Would there be more sound scientific data, tools, & techniques?	★★	★	★	★	★	★	Each option has the potential to enhance scientific credibility.	
Would there be greater common understanding of roles, priorities, & responsibilities?	★★	★	★	★	★★	★	B, C, D, & F would need clarity on roles, priorities, & responsibilities.	
Would information be better understood and more scientifically credible?	★★	★	★	★	★	★	Each option has the potential to enhance scientific credibility.	
Resources								
Would there be sufficient money, time, and other resources for implementation?	★★	★	★	★	★	★	A would provide sufficient funding. Others would enhance resources & could be tied to targets.	
Would money, time, and other resources be used more efficiently and effectively?	★★	★	★	★	★	★	A leads to greater efficiency & effectiveness. Others need specifics as to what would be accomplished.	
Communication and Consultation								
Would the effectiveness of the coordinating framework be increased?	★★	★	★	★	★	★	All options have good potential for improving effectiveness of coordination.	
Would there be better involvement of those most affected throughout the process?	★★	★	★	★	★	★	A is tied directly to needs of people & their financial capacity. Others need participation component.	
Would people be better informed?	★★	★	★	★	★	★	Each option could better inform people.	
Would there be more effective participation in planning & implementation?	★	★	★	★	★	★	All options have good potential to improve effectiveness of participation.	
Would there be better sharing of information?	★	★	★	★	★	★	Each would need guarantee of more info. sharing.	
Would there be increased opportunities for compromise and consensus?	★	★	★	★	✘	★	E precludes compromise & consensus without participation component.	
Would there be better chances of consensus developing?	★	★	★	★	★	★	Each option has good potential to encourage consensus. Would need participation component.	
Would there be greater disclosure of information?	★★	★	★	★	★	★	A requires better disclosure. Others could.	

★★=Yes

★=Yes, either partially or potentially with risks or constraints

✘=No

Assessment of Issues and Evaluation of Options

Table D-15 Screening Options		7. Ensuring Financial Sustainability						Rationale
Evaluation Criteria	Policy Options							
	Current Management			New Directions				
	A	B	C	D	E	F		
Would there be greater opportunity to demonstrate public acceptance?	★★	★	★	★	★	★	A would be based on public's assessment of fairness & adequacy.	
Process								
Would there be more effective consideration of the objectives of all participants and potentially affected parties?	★★	★	★	★	★	★	Each option has the potential for better consideration of people's objectives. Most need mechanisms for identifying & assessing objectives.	
Would there be more effective development of management options & action plans?	★	★	★	★	★	★	Each option has the potential to make option/plan development more effective.	
Would there be more effective definition and evaluation of assumptions and uncertainties?	★★	★	★	★	★	★	A would allow assumptions to be challenged & uncertainties clarified.	
Would there be more effective resolution of outstanding issues and assessment of performance?	★★	★	★	★	★	★	Effective resolution & assessment depends on criteria and consultation.	
Would solutions be more equitable and reasonable?	★★	★	★	★	★	★	A is based on finding more equitable & reasonable solutions.	
Would there be more comprehensive and public assessment?	★	★	★	★	★	★	Each option needs techniques for more comprehensive, public assessment.	
Would there be more effective use of the precautionary approach?	★★	★	★	★	★★	★	A & E are based on using precaution more effectively.	
Implementation								
Would public & private efforts be strengthened?	★★	★★	★	★	★★	★★	B especially & maybe F will strengthen private efforts.	
Would integrated management of surface and ground water be enhanced?	★	★	★	★	★	★	Each option could improve surface & ground water integration.	
Would there be more effective iterative decision-making?	★	★	★	★	★	★	Each option could reduce need for iterative decision-making or improve it.	
Would there be improvements in making progress while continuing analysis and verification?	★	★	★	★	★	★	More & better funding could reduce anxiety about making decisions now.	
Would the implementation process be more fair and open?	★★	★	★	★	★	★	A is fair & open. Other options could be as well with requirements for consultation & transparency.	
Would there be better solutions?	★★	★	★	★	★	★	Each option could lead to better solutions.	
Would there be greater optimization of existing conditions?	★	★	★	★	★★	★	Focus of E would be to protect what is already there & reduce impacts of current situation.	
Compliance								
Would the protection of people's rights be promoted and enhanced?	★★	★	★	★	★	★	A is a rights-based (and responsibility-based) approach.	
Would the use of rules to control behavior be enhanced?	★★	★★	★★	★★	★★	★★	Each option would lead to changes in funding rules to meet objectives.	
Would accountability for decisions be improved?	★★	★	★	★	★	★	A is based on accountability. Others could be.	
Would there be greater protection of people's entitlements?	★★	★	★	★	★	★	Each option has the potential to strengthen protection of entitlements.	
Would legally enforceable provisions be strengthened?	★★	★	★	★	★	★	A would improve legally enforceable provisions if required. Others could be directed that way.	
Would there be more effective regulatory enforcement of undesirable activity?	★	★	★	★	★	★	Each option needs more clarity concerning impact on undesirable activity.	

Appendix E

Examples of Riparian Buffer Widths

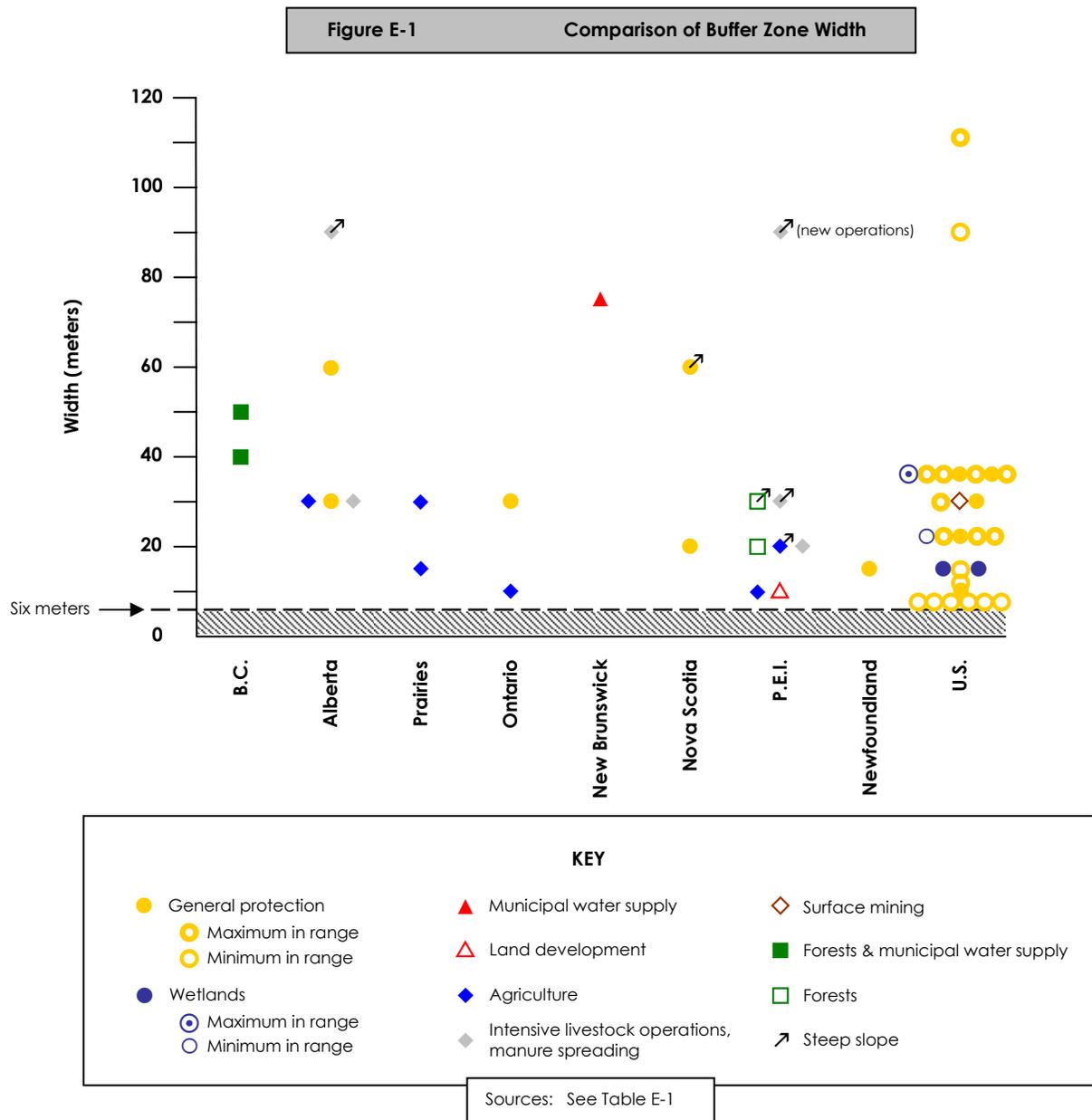


Table E-1 Examples of Buffer Zones					
Organization	Type of Buffer	Width of Buffer			Specifics
Alberta Agriculture, Food and Rural Development ¹	Protect water quality & wildlife habitat	At least 30 m			
Alberta Natural Resources Conservation Board ²	Control of surface application of livestock manure	Slope of Land	Distance from a common water body (m)		
		<4%	>30		
		4-6%	>60		
		6-12%	>90		
		>12%	No application of manure allowed		
British Columbia Ministry of Forests ³	Riparian management area to protect fish-bearing streams and community watersheds	Avg. Channel Width (m)	Reserve Zone Width (m)	Management Zone Width (m)	Reserve Zone: harvesting not permitted
		5-20	30	20	Management Zone: constraints to harvesting apply.
		1.5-5	20	20	
Carolinian Canada ⁴	Protection of natural heritage features and ecological features	<ul style="list-style-type: none"> ▪ 30 m ▪ 50 m + 0.5 m per 1% of slope for cold water streams 			Draft recommendation of watershed partnership
Chagrin River Watershed Partners ⁵ (adopted buffers)	General	Aurora, Ohio: 25' to 75' (7.5m to 22.5 m) Baltimore Cty., Md.: 25' to 100' (7.5 m to 30 m) Bath Twp., Ohio: 40' to 75' (12 m to 22.5 m) Chagrin Falls, Ohio: 120' (36 m) Hudson, Ohio: 100' (30 m) Hunting Valley, Ohio: 300' to 375' (90 m to 112.5) Kennett Twp., Pa.: 75' (22.5 m) Kirtland, Ohio: 25' to 120' (7.5 m to 36 m) Lake Cty., Ohio: 25' to 120' (7.5 m to 36 m) Montgomery Cty., Pa.: 25' to 75' (7.5m to 22.5 m) Prairie Twp., Ohio: 120' (36 m) Russell Twp., Ohio: 30' (9 m) Summit Cty., Ohio: 25' to 120' (7.5 m to 36 m) Twinsburg, Ohio: 50' to 120' (15 m to 36 m)			Range 7.5 m to 112.5 m
	Scenery	Loudon Cty., Va.: 150' to 250' (45 m to 75 m) Madison Cty., Ohio: 120' (36 m)			Range 36 m to 75 m
	Wetlands	Aurora, Ohio: 75' or 120' (22.5 or 36 m) Hudson, Ohio: 50' (15 m) Summit Cty., Ohio: 50' (15 m)			Range 15 m to 36 m

Table E-1 Examples of Buffer Zones			
Organization	Type of Buffer	Width of Buffer	Specifics
City of Calgary ⁶	General	<p>The greater of:</p> <ul style="list-style-type: none"> ▪ 60 m from edge of Bow River ▪ 30 m from edge of Elbow River and Nose and West Nose Creeks ▪ 6 m from edge of the floodway <p>Applies to buildings in undeveloped areas and redevelopment of single-detached, semi-detached, or duplex dwellings for use other than those purposes.</p> <p>Other situations require a 6 m setback from the edge of the floodway.</p>	"No alterations shall be made to a floodway and no structures including, but not limited to, rip-rap, berms, fences, walls, gates, patios, docks or decks shall be constructed on, in or under a floodway unless in the opinion of the Approving Authority there will be no obstruction to floodwaters and no detrimental effect on the hydrological system or water quality, including the natural interface of the riparian and aquatic habitats."
County of Peterborough, Ontario ⁷	Water quality & vegetation improvement related to pasture or crop land	10 m minimum. Wider widths encouraged.	Cost-sharing program
Dillon Consulting Inc. ⁸	Protect land, water quality, habitat, etc. and prohibit infilling and channelization	<ul style="list-style-type: none"> ▪ Minimum 20 m ▪ Slopes greater than 20%: 1 m extension of buffer for each additional 2% of slope to maximum of 60 m 	Recommendations to Halifax Regional Municipality
New Brunswick Watershed Protection Program ⁹	Protection of watersheds that supply municipal drinking water	75 m buffer zone	
Newfoundland and Labrador Department of Environment ¹⁰	Basic protection of water resources	15 m from the 1 in 100 year high water mark	Establishes list of preferential uses within the floodplain and buffer zone
Province of Prince Edward Island ¹¹	Protect watercourses and wetlands	<ul style="list-style-type: none"> ▪ Land development: 10 m ▪ Agriculture [slope >5% with fall tillage or without winter cover]: 20 m ▪ Other agriculture: 10 m ▪ Forests [slope ≤9%]: 20 m ▪ Forests [slope >9%]: 30 m ▪ Intensive livestock operations (ILOs) [new]: 90 m ▪ ILOs [existing – slope ≤9%]: 20 m ▪ ILOs [existing – slope >9%]: 30 m 	
Prairie Farm Rehabilitation Administration ¹²	Protect land, water supply, water quality, and fish and wildlife habitat	<ul style="list-style-type: none"> ▪ 15 m minimum ▪ 30 m ideal for protecting most critical area 	
U.S. Surface Mining Act ¹³	Protect water quality	30 m (100 feet)	

NOTES
Appendix B

- ¹ *Water (Ministerial) Regulation*, Alberta Regulation (AR) 205/98 (http://www.ap.gov.ab.ca/Documents/REGS/1998_205.CFM), s. 2 & 3.
- ² Alberta Environment, "Environmental Protection and Enhancement Act" (fact sheet) (<http://www3.gov.ab.ca/env/protenf/approvals/factsheets/enhanact.html>) and *Water Act*, Revised Statutes of Alberta (RSA) 2000, c. W-3 (<http://www.ap.gov.ab.ca/Documents/acts/W03.CFM>), s. 1(1)(b), 36, & 38.
- ³ *Water Act*, s. 1(1)(b), 49, 51, 68, & 82 and Alberta Environment, "Approvals and Licences," (fact sheet) (<http://www3.gov.ab.ca/env/water/Legislation/FactSheets/GeneralInfo.pdf>).
- ⁴ *Environmental Protection and Enhancement Act*, RSA 2000, c. E-12 (http://www.ap.gov.ab.ca/documents/Acts/E12.cfm?fm_isbn=0779718771), s. 43-45 & 68(4) and *Agricultural Operation Practices Act*, RSA 2000, c. A-7 ([http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/acts8699?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/acts8699?opendocument)), s. 1(b.5).
- ⁵ *Approvals and Registrations Procedure Regulation* (http://www.ap.gov.ab.ca/Documents/REGS/1993_113.CFM), AR 113/93, s. 3(1), *Environmental Protection and Enhancement Act*, s. 134(f), and *Conservation and Reclamation Regulation*, AR 115/93 (http://www.ap.gov.ab.ca/documents/Regs/1993_115.cfm?fm_isbn=077972707X), s. 1(t) & 2.
- ⁶ *Approvals and Registrations Procedure Regulation*, s. 3(2) and Alberta Environment, "Approval Process" (fact sheet) (<http://www3.gov.ab.ca/env/protenf/approvals/factsheets/approv.html>). One of the guidelines that provide criteria to aid decision-making is the *Surface Water Quality Guidelines for Use in Alberta* (Alberta Environment, Environmental Assurance Division, Science and Standards Branch, 1999 (<http://www3.gov.ab.ca/env/protenf/publications/SurfWtrQual-Nov99.pdf>)).
- ⁷ *Approvals and Registrations Procedure Regulation*, s. 6.
- ⁸ "Approval Process" (fact sheet).
- ⁹ *Environmental Protection and Enhancement Act*, s. 64(1).
- ¹⁰ *Environmental Protection and Enhancement Act*, s. 25(3), 136, 138, and 141, and *Conservation and Reclamation Regulation*, s. 4(1).
- ¹¹ *Wastewater and Storm Drainage Regulation*, AR 119/93 (http://www.ap.gov.ab.ca/documents/Regs/1993_119.cfm?fm_isbn=0779727231), s. 4, 5, & 5.1.
- ¹² *Environmental Protection and Enhancement Act*, s. 1(III) and *Wastewater and Storm Drainage Regulation*, s. 1(o)-(q), 4, 5, 5.1, & 6.
- ¹³ *Wastewater and Storm Drainage Regulation*, s. 6(3).
- ¹⁴ *Wastewater and Storm Drainage Regulation*, s. 6.1. A storm drainage treatment facility is "any structure or thing used for the physical, chemical or biological treatment of storm drainage, and includes any of the storage or management facilities which buffer the effects of the peak runoff" (s. 1(a)).
- ¹⁵ *Ibid.*, s. 6.2.
- ¹⁶ *Ibid.*, s. 7(1).
- ¹⁷ Alberta Environment, "Additional Information on Approvals and Licences" (fact sheet) (<http://www3.gov.ab.ca/env/water/Legislation/FactSheets/AdditionalInfo.pdf>), p. 7.
- ¹⁸ "Approvals and Licences" (fact sheet), *Agricultural Operation Practices Act*, s. 1(b), (b.52), & (b.6) & 13-15, Alberta Environment, *Administrative Guide for Approvals to Protect Surface Water Bodies Under the Water Act*, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/ApprovalsLicences/ApprovalsAdminGuide.pdf>), p. 7, and *Water (Ministerial) Regulation*, Schedule 1.
- ¹⁹ *Water Act*, s. 1(1)(ggg). Some licensed irrigation works are not considered water bodies under the *Act*. Under the *Water (Ministerial) Regulation*, a watercourse is defined as "a river, brook, stream or other natural water channel and the bed along which this flows." (s. 1(1)(dd)) There are additional variations in terminology used for other situations. In the *Water Act* codes of practice, a water body is defined as "a water body with defined bed and banks, whether or not water is continuously present, but does not include fish bearing lakes." (See, for example, *Code of Practice for Watercourse Crossings* (http://www.ap.gov.ab.ca/documents/Regs/CROSSING.cfm?fm_isbn=0773292594), s. 1(2)(bb)) For EPEA, the definition of watercourse is, for a natural watercourse, restricted to the bed and shore, but also includes "a canal, ditch, reservoir or other man-made surface feature." (*Environmental Protection and Enhancement Act*, s. 1(yyy)).
- ²⁰ *Water Act*, s. 38(2)-(3).
- ²¹ *Ibid.*, s. 34(1)-(2).
- ²² *Administrative Guide for Approvals to Protect Surface Water Bodies Under the Water Act*, p. 6.
- ²³ *Water Act*, s. 1(1)(ee) & 96.
- ²⁴ Alberta Environment, *Guide to the Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body, Including Guidelines for Complying with the Code of Practice*, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/PipelineGuide.pdf>), p. 3.
- ²⁵ "Normal conditions" means a situation that is not an emergency. During an emergency, most requirements and standards are suspended until the emergency is over. In the codes of practice described here, an emergency, when

defined, is “a situation where there is an imminent risk to the aquatic environment, public health or safety, or an imminent risk of structural failure.” (*Code of Practice for Watercourse Crossings*, s. 1(2)(g)) This definition of an emergency is different from the generally more reactive and restrictive descriptions of an emergency in the legislation which are:

- “an immediate and significant adverse effect on the aquatic environment, human health, property or public safety” (*Water Act*, s. 105(1)(b))
- “an immediate and significant [impairment of or damage to the environment, human health or safety or property]” (*Environmental Protection and Enhancement Act*, s. 1(b) and, for example, 114(1)(b) and s. 151).

In its guidance to those who would construct works, Alberta Environment has broadened the meaning of emergency, describing it as “equipment failures, adverse weather, flooding, spills, etc.” (See for example *Guide to the Code of Practice for Watercourse Crossings*, p. 26)

- ²⁶ *Guide to the Code of Practice for Pipelines and Telecommunication Lines*, p. 4, *Fisheries Act, Revised Statutes of Canada* (RSC) 1985, c. F-14 (<http://laws.justice.gc.ca/en/F-14/text.html>), s. 2, Alberta Environment, *Guide to the Code of Practice for Watercourse Crossings, Including Guidelines for Complying with the Code of Practice*, 2001 (<http://www3.gov.ab.ca/env/water/Legislation/CoP/WatercourseGuide.pdf>), p.5, and *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* (<http://www.ap.gov.ab.ca/documents/codes/Pipeline.cfm>), s. 1(2)(f). The same definition of fish is used in other *Water Act* codes of practice (*Code of Practice for Watercourse Crossings*, s. 1(2)(i) and *Code of Practice for Outfall Structures on Water Bodies* (http://www.ap.gov.ab.ca/documents/Regs/OUTFALL.cfm?fm_isbn=0779722965), s. 1(2)(e)). The guides to the codes of practice substitute the terms “sustenance” and “recreational” for “domestic” and “sport.” For a list of fish of special concern, see <http://www3.gov.ab.ca/srd/fw/fishing/fishstat.html>.
- ²⁷ *Water Act*, s. 1(1)(m).
- ²⁸ *Ibid.*, s. 1(1)(x), 11(3)(iv), 19(1), 21, & 73, “Water Allocation” (fact sheet) (<http://www3.gov.ab.ca/env/water/Legislation/FactSheets/WaterAllocation.html>), and *Water (Ministerial) Regulation*, Schedule 3, s. 1.
- ²⁹ *Water Act*, s. 51(4).
- ³⁰ *Ibid.*, s. 51(1) & (3) & 68 and Bob Morrison, “What Really Matters – Part 2: Long-Term, Short-Term, and Changed Water Rights,” *Moving Beyond Now*, v. 1, no. 2 (May, 2003), pp. 1-11.
- ³¹ Alberta Environment, *Water Management Policy for the South Saskatchewan River Basin*, 1990, pp. 1-2.
- ³² *South Saskatchewan Basin Water Allocation Regulation*, AR 307/91 (http://www.ap.gov.ab.ca/documents/Regs/1991_307.cfm?fm_isbn=077326258X), s. 7(1). This regulation also *limits the purposes for which water may be allocated*, in particular, prohibiting licences for water in its natural state for uses such as conservation, recreation, fish and wildlife, tourism, waste assimilation, and protection of a water body and its aquatic environment (s. 3-6 and *Water Resources Act*, RSA 1980, s. 11(1)(b) & (d)). Except for restrictions on the amount of water that can be licensed for irrigation, these limitations have been nullified (*Water Act*, s. 172(3)).
- ³³ Alberta Environment, “Policy on Water Diversions from Sands and Gravels Adjacent to a Water Body, and from Springs,” November 16, 1995 and Alberta Environment, “Administrative Policy on Water Diversions from Wells Located in Restricted Water Basins,” November 4, 1997.
- ³⁴ *Water Act*, s. 34(1) & 53.
- ³⁵ *Ibid.*, s. 35(1)-(3) and *South Saskatchewan Basin Water Allocation Regulation*, s. 2.
- ³⁶ *Water Act*, s. 81(7) and Alberta Environment, *Phase One: Water Allocation Transfers*, South Saskatchewan River Basin Water Management Plan, 2002, p. 8.
- ³⁷ *Water Act*, s. 81(6) & 82(5).
- ³⁸ *Water Act*, s. 82(3).
- ³⁹ *Ibid.*, s. 51(2) & 83.
- ⁴⁰ *Environmental Protection and Enhancement Act*, s. 72(1) & (3)(b), 73(1), & 91, *Environmental Protection and Enhancement (Miscellaneous) Regulation*, AR 118/93 (http://www.ap.gov.ab.ca/documents/Regs/1993_118.cfm?fm_isbn=0779723309), s. 1(1)(a), “Environmental Protection and Enhancement Act” (fact sheet), and “Approval Process” (fact sheet).
- ⁴¹ *Approvals and Registrations Procedure Regulation*, s. 5.
- ⁴² *Ibid.*, s. 1(e), 7, and 8 and *Environmental Protection and Enhancement Act*, s. 10(2).
- ⁴³ *Water Act*, s. 108, 109, & 115.
- ⁴⁴ *Water (Ministerial) Regulation*, s. 13(1) and *Environmental Protection and Enhancement (Miscellaneous) Regulation*, s. 2(1).
- ⁴⁵ *Water Management Policy for the South Saskatchewan River Basin*, p. 3.
- ⁴⁶ *Environmental Protection and Enhancement Act*, s. 35 and *Water (Ministerial) Regulation*, s. 15-17. The registry mentioned is the “Authorization / Approval Viewer” (<http://www3.gov.ab.ca/env/water/ApprovalViewer.html>).
- ⁴⁷ Alberta Environment, *Compliance Assurance Principles*, 2000 (http://www3.gov.ab.ca/env/protenf/documents/CAP_Final_2000.pdf), pp. 5, 7-9, & 11-19.
- ⁴⁸ “Approval Process” (fact sheet).
- ⁴⁹ *Water Act*, s. 168 and “Approvals and Licences” (fact sheet).

Appendix C

- ¹ Over 350 issue statements were identified. The documents reviewed in identifying these issues were:
- Cows and Fish (Alberta Riparian Habitat Management Program), *Riparian Health Assessment Community Report* [Nose Creek Watershed], Municipal District of Rocky View, 2001
 - Letter, Judy A. Ferguson, President, Urban Development Institute, to Tim Dietzler, M.D. of Rocky View No. 44, August 11, 2004
 - Madawaska Consulting, *Watershed Health Report: Health of the Nose Creek Watershed*, 2003
 - Nose Creek Watershed Partnership, Focus group questions, 2004
 - _____, "Focus Group Session #1, Regulatory Stakeholders," 2003
 - _____, "Focus Group Session #2, Environmental Group Stakeholders," 2004
 - _____, "Focus Group Session #3, Agricultural Producers," 2004
 - _____, "Focus Group Session #5, General Public," 2004
 - _____, "Objectives of public consultation," n.d.
 - _____ (& Alberta Environment), *Questions [for Alberta Environment] Regarding the Development of Water Management Plans*, 2003
 - "The Rationale for an Approved Water Management Plan For the Nose Creek Watershed" (draft), n.d.
 - Technical Committee, Nose Creek Watershed Partnership, *Nose Creek Water Management Plan, Phase 1: Draft Terms of Reference*, September, 2003
 - Urban Development Institute, *Nose Creek Water Management Plan: Public Consultation Process – Development Industry*, 2004
 - Westhoff Engineering Resources, Inc., *Nose Creek Basin Instream Flow Needs Scoping Study* (draft), Alberta Environment and the Nose Creek Watershed Partnership, 2004
 - _____, "Replies to Comment Sheets: *Nose Creek Basin Instream Flow Needs Scoping Study* (draft)," 2003
- ² The water quality results are from *Watershed Health Report: Health of the Nose Creek Watershed*.
- ³ *Riparian Health Assessment Community Report* p. 3. The *Riparian Health Assessment* was based on site evaluation of a self-selected sample of land representing 24% of the length of Nose Creek and 21% of the length of West Nose Creek.
- ⁴ *Nose Creek Basin Instream Flow Needs Scoping Study* (draft), p. 10.

Appendix D

- ¹ For example, see Kim Stephens and Tim Pringle, "Sustainable Community Design: A New Approach to Rain Water Management," *Innovation*, Association of Professional Engineers and Geoscientists of British Columbia, June, 2004, pp. 18-21 and "Water Balance Model for British Columbia" (<http://www.waterbalance.ca/sal/home/index.asp>). Restoring to acceptable conditions could mean trying to achieve more natural conditions.

Appendix E

- ¹ Alberta Agriculture, Food and Rural Development, "Tips for Helping Ensure Water Quality," 2001 (<http://www.agric.gov.ab.ca/sustain/water/waterways/cen97-2.html>)
- ² Alberta Natural Resources Conservation Board, "What are manure setback requirements," 2002 (<http://www.nrcb.gov.ab.ca/web/faq/feeding.cfm?id=164>)
- ³ British Columbia Ministry of Forests, *Riparian Management Area Guidebook*, British Columbia Forest Practices Code, 1995 (<http://www.for.gov.bc.ca/tasb/legaregs/fpc/fpcguide/riparian/Ripar2.htm> & <http://www.for.gov.bc.ca/tasb/legaregs/fpc/fpcguide/riparian/Ripar1.htm#link40>) and *Forest Practices Code of British Columbia Act*, Revised Statutes of British Columbia 1996, c.159 (http://www.qp.gov.bc.ca/statreg/stat/F/96159_00.htm), s. 41(8). A "community watershed" means
 - the drainage area above the downstream point of diversion on a stream for a water use that is for human consumption and that is licensed under the *Water Act* for
 - a waterworks purpose, or
 - a domestic purpose if the licence is held by or is subject to the control of a water users' community incorporated under the *Water Act*
 if the drainage area is not more than 500 km² and the water licence was issued before June 15, 1995, or
 - an area that is designated as a community watershed.
- ⁴ Carolinian Canada, *Taking Carolinian Canada to the Limit: Environmental Impact Statement Conference* (draft) "Guidelines for Determining Setbacks and Buffers," Grand River Conservation Authority, 2003 (http://www.carolinian.org/Publications/eis_E.pdf), pp. 27-28. Carolinian Canada is a non-profit coalition of groups and individuals working to conserve ecological diversity.
- ⁵ Chagrin River Watershed Partners, "Summary of Riparian Setbacks in Ohio and Nationwide," 2003 (<http://www.crwpa.org/>)
- ⁶ City of Calgary, *The Calgary Land Use By-Law*, "Floodway, Floodplain and Overland Flow Area Special Regulations" (http://www.calgary.ca/DocGallery/BU/planning/pdf/land_use_bylaw2p80/bylaw.pdf), s. 19.1(2)(d) & 19.1(3)(c)
- ⁷ County of Peterborough (Ontario), "Buffer Zone Establishment" (fact sheet), n.d. (<http://www.county.peterborough.on.ca/hi/7buffer.html>)
- ⁸ Dillon Consulting Inc., *HRM Water Resource Management Study*, Recommendations, 2003 (http://www.region.halifax.ns.ca/environment/wrms_report.pdf) The study provides a range of minimum riparian buffer widths (pp. 5-3 to 5-4) based on Andy Cotugno, *Functional Criteria for Determining Goal 5 Significance*, Presentation to the Natural Resources Committee, June 6, 2001, Metro S, Portland, Oregon.
- ⁹ New Brunswick Department of the Environment and Local Government, *A Guide to New Brunswick's Watershed Protected Area Designation Order*, n.d., pp. 1-2 (<http://www.qnb.ca/0009/0371/0004/watershed-e.pdf>)
- ¹⁰ Newfoundland and Labrador Department of Environment, *Policy Directive: Flood Plain Management*, 1996 (<http://www.neia.org/policies/wat9601.htm>)
- ¹¹ Prince Edward Island Ministry of Environment and Energy, "Buffer Zone Decision Tree" (http://www.gov.pe.ca/photos/original/faq_buffer_tree.pdf). Based on *Environmental Protection Act*, Revised Statutes of Prince Edward Island 1988, c. E-9 (<http://www.gov.pe.ca/law/statutes/pdf/e-09.pdf?PHPSESSID=44e15eb4e8529a6afb670cc56364e55>), s. 11.1-11.3
- ¹² Prairie Farm Rehabilitation Administration, "Protecting Your Shorelands for Better Farming and Ranching, and Healthier Fish Habitat," 2003 (<http://www.agr.gc.ca/pfra/land/shorelds.htm>) and Prairie Farm Rehabilitation Administration, "Managing Livestock in the Riparian Zone," 2003 (<http://www.agr.gc.ca/pfra/land/gft14.htm>)
- ¹³ Appalachian Center for the Economy and the Environment, "Proposed Federal Changes to the Buffer Zone Rule" (<http://www.agric.gov.ab.ca/sustain/water/waterways/cen97-2.html>)