

TERMS OF REFERENCE
for the
WAPITI RIVER WATER MANAGEMENT PLAN



Photo Courtesy of Craig Johnson

Prepared March 14, 2013

for the

THE MIGHTY PEACE WATERSHED ALLIANCE

and the

WAPITI RIVER WATER MANAGEMENT PLAN STEERING COMMITTEE

by

CharettePellPoscente Environmental Corp

MEMBERS OF THE STEERING COMMITTEE

The following individuals and organizations comprise the Steering Committee for the Wapiti River Water Management Plan (as of May 27, 2013) and endorse the Terms of Reference for the Wapiti River Water Management Plan. Endorsement indicates support for the intent and the direction of these Terms of Reference.

Organization	Representative(s)
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Department of Fisheries and Oceans	Michael Hunka
County of Grande Prairie	Sharon Nelson Steve Madden
City of Grande Prairie	Michelle Gairdner
Aquaterra	Ashley Parker Michel Savard (alternate)
Weyerhaeuser	Grant Bouree Gregory Pippus
Mighty Peace Watershed Alliance	Bob Cameron Rhonda Clarke-Gauthier Adam Norris

APPROVAL STATEMENT

The attached Terms of Reference for the Wapiti River Water Management Plan outline the goals, objectives, scope, planning process, public consultation strategy and governance structure that will be used in developing the Wapiti River Water Management Plan.

These Terms of Reference meet the criteria outlined for water management planning in the Framework for Water Management Planning as identified under the Water Act. These Terms of Reference are also consistent with the directions set out in the Provincial *Water for Life* Strategy.

This Approval Statement indicates agreement with and support for development of the Wapiti River Water Management Plan as guided by the Terms of Reference.

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List of Abbreviations

AEH	Aquatic Ecosystem Health
ARWQI	Alberta River Water Quality Index
AESRD	Alberta Environment and Sustainable Resource Development
ASWQG	Alberta Surface Water Quality Guideline
EPEA	Environmental Protection and Enhancement Act
GOA	Government of Alberta
MPWA	Mighty Peace Watershed Alliance
NPS	Non-Point Source
NRBS	Northern River Basin Study
PS	Point Source
WCO	Water Conservation Objective
WPAC	Watershed Planning and Advisory Council
WQG	Water Quality Guideline
WRWMP	Wapiti River Water Management Plan
WWTP	Wastewater Treatment Plant

INTRODUCTION

These draft Terms of Reference explain the need for a Water Management Plan for the Wapiti River and outline the goals and objectives for such a plan; describe the scope, and explain the planning process and governance structure; the public consultation strategy including stakeholder roles and responsibilities; and detail the timelines, work plan and information requirements that will guide the development of the Wapiti River Water Management Plan. The final Terms of Reference will be submitted for approval to the Director under the *Water Act*.

These Terms of Reference were prepared in accordance with the *Water Act*, the *Framework for Water Management Planning (The Framework)* and the provincial *Water for Life Strategy* as well as other pertinent legislation and policies relevant to the management of water resources.

This document is organized into seven main sections.

Background: outlines the need for and purpose of a water management plan, the expected outcomes, the goals and objectives to be achieved, as well as the guiding principles and geographic scope.

Current Issues and Concerns: provides a brief overview of the current issues and concerns that will be addressed in the Wapiti River Water Management Plan.

Legislative, Policy and Planning Context: briefly explains the legislative and policy context of the planning process, including requirements under The Framework for Water Management Planning and the Water for Life Strategy.

Project Management Structure: describes the governance structure to be used during development and implementation of a Water Management Plan, and explains the decision-making process and roles and responsibilities of stakeholders.

Planning: provides a brief description of the planning process, the work plan and the anticipated schedule.

Required Information: lists further information that will be required to develop the Wapiti River Water Management Plan

Public Consultation: summarizes the goals and objectives of the public consultation process and describes the consultation and communication strategies that will be used.

1.0 BACKGROUND

1.1 Need for a Wapiti River Water Management Plan

The Wapiti River watershed is home to the City of Grande Prairie, one of the fastest growing communities in Alberta, as well as numerous other smaller population centers and Aboriginal settlements. In addition to the thriving urban growth, this area supports very active forestry and agricultural sectors and a flourishing oil and gas industry. The Wapiti River is an important source of water for all of these uses, and continued population growth and economic development will be highly dependent on reliable quantities and quality of water from this same river.

The Wapiti River receives continuous industrial and municipal effluent discharges as well as other point and non-point source pollution. These, together with water diversions and withdrawals, affect the physical, chemical and biological characteristics of the Wapiti River aquatic ecosystem, especially during periods of low flow. Such changes also affect human use of the aquatic resources.

Balancing consumption and protection presents a management challenge. In response, Alberta Environment and Sustainable Resource Development (AESRD), in collaboration with local key stakeholders, has established the Wapiti River Water Management Plan (WRWMP) Steering Committee, and together they have initiated a Water Management Plan for the Wapiti River system to support present and future economic and social activities while managing and protecting aquatic resources.

The Wapiti River Water Management Plan will provide a regulatory context for balancing the water demands for the growing economic, social and environmental needs. Not only will it present broad guidance for water management, it may also set out clear strategic directions regarding how water should be managed and it may result in specific actions. The Wapiti River Water Management Plan must be approved by the Director under the Water Act and once finalized, it will be considered by AESRD when making day-to-day decisions within the physical area that the plan covers.

1.2 WRWMP Steering Committee

The WRWMP Steering Committee was established to oversee and provide direction for the planning process. The Steering Committee is also responsible to ensure that all stakeholders and the general public have the opportunity to provide input and feedback into the planning process. The current membership of the Steering Committee includes:

- Alberta Environment and Sustainable Resource Development;
- Local municipal governments;
- Mighty Peace Watershed Alliance;
- Industry Stakeholders; and
- Department of Fisheries and Oceans.

1.2.1 First Nations Participation

The Horse Lake First Nation and Sturgeon Lake First Nation have been invited to participate in the development of this plan.

I.3 Purpose of the WRWMP

The WRWMP will help AESRD make water resource decisions under the *Water Act* and where appropriate, the *Environmental Protection and Enhancement Act (EPEA)*. The Plan will provide greater clarity, consistency and transparency regarding water allocation decisions. In essence, the plan will provide guidance on water allocation for direct human consumption and industrial use while ensuring that the requirements for healthy aquatic ecosystems are met.

Since the focus of this Plan is on water allocations, other potential watershed issues such as water quality, point and non-point source pollution, groundwater and land uses are only addressed to the extent necessary for this Plan. It is anticipated that these issues will be addressed in other proposed plans such as the government led Upper Peace Regional Land Use Plan and Peace River Watershed Management Plan, currently under consideration by the Mighty Peace Watershed Alliance (MPWA).

The Plan development will be guided by the *Framework for Water Management Planning*, under the *Water Act* and the *Provincial Water for Life Strategy*. Wherever possible, linkages with other plans and local initiatives will be considered. The resulting Wapiti River Water Management Plan will be a living document and shall be reviewed and revised as new information become available

I.4 Scope of the Plan

The Wapiti River Water Management Plan will focus on balancing water allocations and environmental flow needs on the Alberta portion of the main stem of the Wapiti River and its tributaries. The Plan will provide direction and recommendations for:

- the amount of water available for allocation to human needs
- the amount of water required for protection of the health and integrity of the Wapiti River aquatic ecosystem

The above objectives will be accomplished through recommendations for Water Conservation Objectives (WCOs) as defined in the *Water Act*. WCO's strive to balance water consumption and protection of the aquatic environment. Ecological requirements and social and economic values will be considered in determining these recommendations.

From the *Water Act* – “**Water Conservation Objectives** “ means the amount and the quality of water, established by the Director under part 2, based on available information to the Director, to be necessary for :

- Protection of a natural water body or its aquatic environment, or any part of them,
 - Protection of tourism, recreational, transportation or water assimilation uses of water
 - or management of fish and wildlife
- and may include water necessary of the rate of flow of water or water level requirements.

The WRWMP will include climate change predictions for the watershed when assessing different alternatives and a recommended strategy. The recommended WRWMP should be robust (i.e., account for) these climate predictions.

The WRWMP will account for projected development in BC and their predicted impacts on water quality and quantity in the Wapiti River. Similar to climate change, the recommended WRWMP should be robust

(i.e., account for) these upstream developments. The risk or likelihood of developments exceeding these projections should be identified. The Steering Committee will rely on input from transboundary discussions occurring amongst provinces, territories and the federal government for information.

The geographic scope of the WRWMP will be within Alberta from the BC border to its confluence with the Smoky River including all tributaries (i.e., the entire basin). Emphasis within the WRWMP (including detail and specificity of regulatory recommendations) will focus on areas of highest impact or projected development, in particular the mainstem Wapiti River downstream of the Redwillow River and the northern tributaries (Redwillow, Beaverlodge and Bear rivers). The WRWMP must recognize that if development and impacts in the southern tributaries or BC exceed the Steering Committee's present understanding, the WRWMP will be reviewed.

The WRWMP will make recommendations on water quantity and quality that seek an acceptable balance among environmental, social and economic interests. Water quantity recommendations will consider surface water use, including groundwater that has a direct hydrological connection to the surface. Water quality recommendations will consider impacts caused from both point and non-point source inputs. Recommendations in the WRWMP may include: a) regulatory changes to be enforced through Provincial or Federal legislation; b) site-specific water quality objectives; c) education and voluntary implementation of appropriate land- or water-use practices (e.g., best management practices); and, d) identification of other planning initiatives that address the issue. The WRWMP will be based on best available scientific information and shall transparently present trade-offs amongst competing interests.

Recommendations in the WRWMP will be based on a 25-year time horizon and will consider predicted growth and development given current available information. The WRWMP will be reviewed on a 5-year basis to assess: a) that projected outcomes of the WRWMP are being achieved; b) information used in the WRWMP remains current and applicable; and, c) the WRWMP continues to represent an appropriate balance of environmental, social and economic interests. A more rapid review (<5 years) would be considered should these conditions no longer be valid.

The WRWMP may provide recommendations and direction for future authorizations under the *Water Act*, and where appropriate under the *Environmental Protection and Enhancement Act*. However, both the *Water Act* and *EPEA* allow application of the recommendations to existing authorizations in order to address significant adverse effects on the aquatic environment not reasonably foreseeable at the time the approval was issued. At the discretion of the designated Director, the recommendations of the WRWMP should apply to the following:

- all new applications and renewals under the *Water Act*,
- the recommendations will be retroactive to the recently issued Aquatera water licence,
 - all other existing licences will be grandfathered,
- all new applications and renewals under the *EPEA*, and
- existing authorizations under the *EPEA* where appropriate.

The Plan will also set the stage for future comprehensive watershed management planning, and integrating the management of land, water and living organisms to promote sustainable development of the natural resources within the Wapiti River basin.

I.5 Outcomes, Goals and Objectives

The desired outcome of this plan is to support within the Wapiti River watershed, the three broad goals of the provincial *Water for Life* Strategy:

- Safe, secure drinking water supplies
- Healthy aquatic ecosystems
- Reliable quality water supplies for a sustainable economy

More specifically, the objectives of the Wapiti River Water Management Plan are:

1. ***The development of recommendations for Water Conservation Objectives under the Water Act that best balance water consumption and protection of the aquatic environment, while taking into consideration environmental, social and economic interests***

This will be accomplished by:

- determining the current water allocation, demand and supply on the Wapiti river
- estimating potential future water demand and supply within the Wapiti river basin including an understanding of long-term processes such as climate change and the potential for development in the upper watershed
- developing a science-based environmental flow needs assessment that includes water quantity, water quality, physical habitat and aquatic species necessary for protection of the aquatic resource
- developing water quality recommendations including point source and non-point source inputs

2. ***Creation of a foundation for future integrated watershed management planning by:***

- providing a comprehensive account of the major issues, challenges, priorities and objectives within the watershed
- identification and recommendation of key watershed issues and challenges that should be considered in the Watershed Plan

Consolidation of information is the starting point for the planning process and will be the basis from which recommendations will be made.

I.6 Planning Principles

While pursuing the outcomes, goals and objectives described above, the Wapiti River Water Management Plan Steering Committee will strive to adhere to these guiding principles:

- **Commitment to Shared Governance** – refers to a governance structure in which the provincial government and external parties including other orders of government, industry stakeholders,

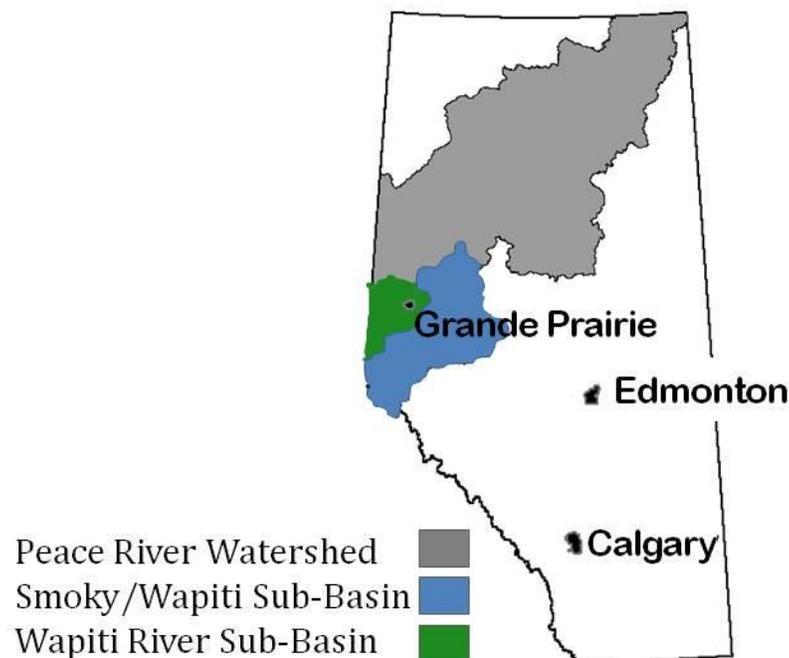
Aboriginal communities, and non-government organizations share responsibility to collaboratively develop the Wapiti River Water Management Plan, while recognizing that the provincial government retains the legislative accountability.

- **Recognition of the Values and the Interests of Multi-Stakeholders** – an acknowledgement that stakeholders have an interest and a shared responsibility in the Wapiti River water management.
- **Commitment to a Fair, Inclusive and Transparent Process** – the Wapiti River Water Management Plan will be developed through a process of public information sharing and engagement.
- **Basing Recommendations On Sound Science** – all recommendations made with respect to the management of water within the Wapiti River watershed will be scientifically defensible.
- **Recognition and Promotion of the Value Of Water** - acknowledges that water is a limited resource and that it is critical for social well-being, economic development and a sustainable environment

I.7 Geographic Area - The Wapiti River Sub-Basin

These Terms of Reference apply only to the Alberta portion of the Wapiti River sub-basin, which lies within the larger Smoky/Wapiti sub-basin of the Peace River watershed.

The PEACE RIVER WATERSHED in ALBERTA



The Peace River Watershed, the largest in the province, covers approximately one-third of Alberta. Within it are 6 major sub-basins. The above map illustrates the relative size and location of the Peace Watershed, within it the Smoky/Wapiti sub-basin and within that, the Wapiti River sub-basin. The geographic scope of the WRWMP will be within Alberta from the British Columbia border to its confluence with the Smoky River including all tributaries (i.e., the entire basin), as the following map illustrates. Emphasis within the WRWMP (including detail and specificity of regulatory recommendations) will focus on areas of highest impact or projected development, in particular the mainstem Wapiti River downstream of the Redwillow and the northern tributaries (Redwillow, Beaverlodge and Bear rivers). The WRWMP must recognize that if development and impacts in the southern tributaries or British Columbia exceed the Steering Committee's present understanding, the WRWMP will be reviewed.

The Wapiti River enters Alberta approximately 90 km southwest of the City of Grande Prairie, where it flows 161 km northeast to its confluence with the Smoky River. Of all the sub-basins within the Peace Watershed, the Smoky/Wapiti sub-basin, and in particular the Wapiti sub-basin portion, has the highest concentration and diversity of human impact from land clearance, municipal and industrial effluent discharges, agriculture, and water withdrawals. In addition to its relatively dense human population, it supports agriculture, coal mining, forestry, oil and gas, and recreation. It is heavily fragmented in terms of road density and cutlines (CharettePellPoscente, Hutchinson, 2012).

The Wapiti River Water Management Plan Area



Map adapted from the following;

WAPITI SUB-WATERSHED					
Projection	10 TM	Datum	NAD 83	Scale	1:625,000
Date	January 2012				
<small>The Minister and the Crown provide this information without warranty or representation as to any matter, including but not limited to whether the data / information is correct, accurate or free from error, defect, danger, or hazard and whether it is otherwise useful or suitable for any use the user may make of it.</small>					
<small>© 2012 Government of Alberta</small>			<small>http://www.environment.alberta.ca/</small>		

2.0 ISSUES AND CONCERNS – AN OVERVIEW

While the focus of this Plan is upon water usage, supply, demand and allocation, additional overlapping factors must be considered during development of this Plan as they are influenced by and/or influence the quantity of water in the Wapiti River. The issues of water quality are especially important because their effects may be amplified during low flow conditions.

Recommendations resulting from a Water Management Plan for the Wapiti River should be based upon knowledge of the following;

- water usage, supply, demand and allocation
- water quality
- aquatic health
- fish communities
- tributaries
- point and non-point-source pollution issues
 - urban development
 - recreation
 - agriculture
 - forestry
 - linear features
 - resource extraction and development
- climate change
- cumulative effects

2.1 Water Supply, Use and Demand

The Wapiti River originates in the Rocky Mountains of British Columbia, and has a mean annual flow of $3.1 \times 10^6 \text{ m}^3$ when it joins the Smoky River east of the City of Grande Prairie (Alberta Environment and Environment Canada 2004). The flow of the Wapiti River is unregulated and the river has an average discharge at Grande Prairie of $88 \text{ m}^3/\text{s}$ (1996- 2010). Discharge in the Wapiti River typically peaks in June, while minimum low flows tend to occur in February.

The current supply of water meets the current demand, but as population and development increase, so too will the demand. Both surface and groundwater are consumed, with highest volumes used for community drinking, livestock operations, irrigation, wetlands, and industrial operations. Water withdrawals are currently managed on a case by case basis by issuing approvals or licenses under the Water Act. Some licenses have minimum instream flow objectives set by Alberta Environment and Water, in order to protect flows required for aquatic life (CPP Environmental Corp., 2012)

The largest individual surface water allocations in the Wapiti River basin occur in the lower Wapiti River (Aquaterra Utilities for supplying drinking water for the region and Weyerhaeuser Company for pulp mill operations). They do, however, return a large volume of water (77% and 90%, respectively) to the river in the form of wastewater effluent (Alberta Environment and Water 2012).

2.2 Water Quality

AESRD monitors water quality in the Wapiti River for approximately 50 important water quality parameters at two sites: at Highway 40 upstream of the Grande Prairie sewage discharge point and near the mouth, just upstream of the confluence with the Smoky River. These and numerous other environmental surveys indicate that the Wapiti River becomes enriched with nutrients as it passes Grande Prairie, collecting storm water runoff as well as discharge from the wastewater treatment plant. Further downstream, effluent from the Weyerhaeuser pulp mill also enters the river, contributing to nutrient enrichment. Agricultural activities in the watershed may also contribute nutrients to the Wapiti River system.

Nutrient enrichment is of concern because it results in increased biomass of algae and invertebrates. Although this may sometimes result in a temporary increase in fish productivity, it has a negative aesthetic impact because of the unsightly thick growths of algae, and if excessive, it can also contribute to odour problems and to oxygen depletion during winter. This can then lead to a negative effect upon fish populations.

The Alberta River Water Quality Index, which is essentially a measurement tool developed to provide a snapshot of annual water quality conditions in major rivers of the province, indicates that bacteria and nutrient assessments can occasionally decline from 'excellent' and 'good' in the upper Wapiti River to 'marginal' and 'fair' in the lower reach. An index developed for non-fish biota components (benthic invertebrates and algae) declines from good to marginal conditions. Sediment quality in the lower reach of the Wapiti River below Grande Prairie is rated as 'fair' due to the presence of relatively elevated levels of some organic contaminants, trace metals and nutrients.

During low water flow conditions, the effects of nutrient enrichment and other anthropogenic impacts are more significant because the dilution capacity of the river is reduced.

2.3 Aquatic Health

Of the entire Peace River watershed, the Smoky/Wapiti sub-basin is by far, the most well-studied and it is clear that this sub-basin has the largest concentration and number of anthropogenic stressors on aquatic ecosystem health. The Wapiti portion of the Smoky/Wapiti sub-basin is especially impacted by human activities as it is within this area that the human population is concentrated. High road density, high nutrient levels in the Wapiti River, in streams and in lakes, as well as impaired or locally extirpated sensitive fish populations are all indicators of compromised aquatic ecosystem health in this region. (CharettePellPoscente, Hutchinson. 2012.)

The effects of point discharges in the lower Wapiti River are well studied. Weyerhaeuser and Aquatera Utilities, in fulfilling Environmental Effects Monitoring requirements have undertaken studies on sediment quality and non-fish biota, and major upgrades have been or are being implemented to improve effluent quality. Non-point sources of nutrients are not well understood however and this is also true of other pollutants to smaller agricultural streams. Likewise, their cumulative downstream effects are not well quantified.

Another uncertainty is the combined effect of forestry, mining and linear features on aquatic ecosystem health in smaller water courses.

2.4 Fish Communities

A large number of the 42 fish species that have been encountered throughout the Peace River Basin have also been recorded in the Wapiti River. Studies have shown that Mountain Whitefish and Arctic Grayling are the most prevalent sport fish species; while Longnose Sucker is the most abundant non-sport fish species in the watershed (Tchir et al. 2004).

Within the Wapiti watershed, the populations of some indicator species of fish are threatened by the impacts of overfishing, agriculture, habitat fragmentation and other land uses on aquatic habitat. In particular, Arctic Grayling and Bull Trout populations are at risk, with local extirpations suspected in the areas adjacent to Grande Prairie, including the Redwillow and Beaverlodge rivers (AECOM 2009).

Reduced stream flow and water quality were identified in a study on fish communities and the factors that impact them (AECOM 2009) as one of the main reasons for declining populations of some fish in the Redwillow River Basin (a sub-basin of the Wapiti River Basin).

2.5 Tributaries

The Wapiti River has seven major tributaries including the Redwillow River (which also drains the Beaverlodge River watershed), and Bear Creek, which flows through Grande Prairie (Chambers and Guy 2004, Golder Associates Ltd. 2004a).

Water use has been identified as a concern in the Redwillow watershed, as reduced flows can decrease the capacity of streams to handle pollutants, which are abundant in this agricultural watershed, and impair fish habitat (AECOM 2009). Registered traditional agricultural users have the most licenses in this watershed, however, Ducks Unlimited Canada has the largest allotted volume of water use (75%) for stabilization and wetlands, with the intent to protect waterfowl habitat, e.g., for Trumpeter Swans. There are also unregistered water users, as license requirements were only introduced in 1999.

2.6 Point and Non-Point Source Pollution

While point-source (PS) pollutants are typically well studied by virtue of the fact that their source is known, understanding and managing non-point source (NPS) pollution is difficult because such pollutants enter the aquatic environment in a variety of ways and from often widely distributed and varied sources. The most common ways in which NPS pollutants reach water bodies include surface runoff, atmospheric deposition, and groundwater – all processes that are difficult to monitor. This, coupled with the size of the Wapiti River basin, and the levels of urban development and industrial activity mean that a number of widespread anthropogenic activities may be contributing NPS pollutants to this watershed (CPP Environmental Corp, 2011).

The most obvious sources of pollutants, both PS and NPS in the Wapiti watershed include;

- urban development
- industry
- recreation
- agriculture
- forestry
- linear features
- resource extraction and development

2.6.1 Urban Development

The development of urban centers has a number of impacts on aquatic ecosystems, the most well-known and well-studied being the discharge of municipal and industrial wastewater effluents (point-source pollution) and storm water (non-point source pollution). These discharges have a direct impact on the receiving surface waters by increasing the load of suspended matter, organic matter, nutrients, bacteria and other substances, thereby potentially decreasing oxygen in the water which can be lethal to fish, increasing algae growth and deteriorating fish habitat.

While waste water treatment plants (WWTPs) discharge within the limits set out in their Water Licenses issued by Alberta Environment and Sustainable Resource Development, not all parameters, and nutrients in particular, are generally regulated. WWTPs, whose operating approvals contain regulatory requirements pertaining to nutrient limits, may be required to undergo upgrades to ensure their treatment facilities meet those requirements. For example, Aquatera Utilities is currently undergoing an upgrade to their WWTP to ensure they meet and exceed current and/or future nutrient limit regulatory requirements. Consequently, WWTP discharges contribute to downstream changes in aquatic ecosystems, such as the enrichment effects observed in the Wapiti River downstream of the Grande Prairie WWTP (Golder Associates Ltd. 2004a, Hatfield Consultants 2007, Hutchinson Environmental Sciences 2012). In exceptional cases, WWTP effluent can cause significant damage to the aquatic ecosystem, if the effluent is toxic, such as the fish kill caused by the Town of Beaverlodge wastewater treatment plant release to the Beaverlodge River in 2006 (Grande Prairie Daily Herald Tribune 2008).

An emerging concern associated with municipal effluents are the remains of cosmetic and pharmaceutical products (“micro constituents”) in municipal effluents, which are not generally removed and have the potential for feminization of fish, conferring antibiotic resistance and other effects that are not yet well understood. Feminization is of concern as it reduces the reproductive capacities of a fish population. Pharmaceuticals and personal care products have not been studied beyond academic research as sample analysis is very costly and to date, there is no guidance or regulation from federal or provincial governments.

As urban areas grow, urban runoff increases. Urban runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent urban runoff from soaking into the ground and the runoff can pick up debris, chemicals, soil and other pollutants and flow into a storm sewer system or directly to a lake, stream, river or wetland. Furthermore, urban storm water tends to gather speed and erosional power as it travels through conduits. At the point of discharge, stream banks can be highly eroded because of the highly energetic force of the water. Anything that enters a storm sewer system is typically discharged untreated. Constituents often associated with storm water include sediment, nutrients, pathogens and hazardous wastes such as pesticides, solvents, motor oil and also higher water temperatures.

Other impacts of population and growth include water withdrawals, landscape conversion to urban or rural residential development, and increased demand for recreational use of near-by surface waters.

Grande Prairie has seen a 61% growth in population from 1994 to 2007 (City of Grande Prairie 2008) and it can be expected that this growth will continue due to further economic activity from increased resource development.

2.6.2 Recreation

The lakes, rivers and streams in the Wapiti River Basin attract recreational users for a variety of activities and access to wilderness areas increases as populations grow. Trail damage can be severe and quite common, which leads to erosion of exposed soil. Also, where trails encounter streams and no crossing structures are present, increased bank erosion and sedimentation of stream beds can occur, which can in turn affect fish populations. The use of ATVs and 4X4s in streams and rivers can disturb and alter aquatic habitat. Lakeshore development also disrupts shoreline habitat and contributes nutrient loading from septic systems or landscape alteration to lakes. Fish can be overharvested through recreational, commercial, and domestic fishing.

As the human population is expected to increase, it should be expected that pressures on the Wapiti River watershed from recreational activities will increase accordingly.

2.6.3 Agriculture

Agriculture is the major land use in the area around the city of Grande Prairie. Environmental risks to the aquatic environment are associated with land disturbance, animal and plant wastes, and substances applied to enhance production, including fertilizers (e.g., manure or chemical fertilizers) and pesticides. Agricultural activities that particularly cause NPS pollution include poorly located or managed animal feeding operations; overgrazing; tilling too often or at the wrong time; and fertilizer application. Pollutants that result from agriculture include sediment, nutrients, pathogens, pesticides, metals and salts.

Fertilizers are a significant source of nutrients (e.g. nitrogen and phosphorus) to surface waters and therefore lead to nutrient enrichment (eutrophication) in lakes and streams. Nutrient enrichment results in increased algae and plant growth, which in turn can lead to nuisance algae blooms, taste and odour in water sources and to oxygen depletion. Low oxygen can occur in rivers and streams when the plants decay at the end of the season or under ice, at night in shallow waters when plants consume, not produce oxygen, or in the deep waters of lakes, where algae that settle to the bottom waters decay and consume essential oxygen for cold-water fish species and benthic organisms.

Pesticides can be toxic to aquatic life, leading to direct mortality in invertebrates and fish, if they accumulate sufficiently or are present in high enough concentrations in surface runoff. Suspended sediments reach surface waters due to agricultural soil disturbance and lead to turbid water and increased sediment deposition, which deteriorates aquatic habitat and has direct negative effects on fish. Pathogens originating from livestock operations pose a risk to drinking water resources.

2.6.4 Forestry

Large scale forestry occurs in the basin and NPS pollution associated with such activity includes increased run-off as a result of land disturbance, increased sedimentation as a result of road construction and use, and the mechanical preparation for the planting of trees, and substances applied to enhance production (pesticides).

Log yards servicing the logging industry in Alberta can be a source of a variety of organic compounds to surface waters. Phenolic compounds, resins and fatty acids, and tannins are common in runoff water from log yards, all of which can be toxic to aquatic life. (CharettePellPoscente, Hutchinson. 2012.)

2.6.5 Linear Features

The main effect of linear features is erosion and discharge of sediments to surface water resulting from land clearing and construction activities. Crossings of small upstream water courses, including fords constructed in agricultural areas, lead to fish habitat fragmentation, destruction and alteration. Habitat fragmentation is the blockage of fish movement by barriers, such as culverts or weirs. Habitat destruction is the removal of stream sections used by fish, such as the loss of a certain stream section due to construction of a crossing. Alteration is a modification of stream habitat, for example due to increased engineering works and channelization, sedimentation or reduced riparian vegetation leading to higher temperatures.

Road density in the Wapiti sub-basin is high enough to potentially impair biological integrity of fish communities, based on the Index of Biological Integrity (Stevens and Council 2009).

2.6.6 Resource Extraction And Development

Environmental concerns related to mining are most often focused on land disturbance and run-off from mine sites. The mines intermittently release water from settling ponds containing groundwater, precipitation, and surface runoff that have passed through mined land and overburden. The water quality parameters of concern can be quite specific to the mine itself, depending on geology, tailings, etc. These can include pH (from acid mine drainage), total suspended solids and associated metals, total dissolved solids from coal preparation and treatment facilities, nitrogen (from explosives), and selenium. Mines of concern in the Wapiti watershed include aggregate and coal.

The Wapiti sub-basin is an active area of oil and gas exploration and extraction. Potential contributions from the oil and gas industry to NPS pollution could result from soil erosion; spills from roads, well sites, and exploration corridors and contamination of groundwater from saltwater injection wells or disposal wells. A by-product of oil and gas exploration is typically an increase in recreational use due to an increase in access routes.

Contamination from spills, leakage or storm water from pipelines, well pads and processing plants are a potential threat to surface waters, as most hydrocarbons, which are the main constituents of oil and gas, are toxic to aquatic life. Another major impact from oil and gas extraction activity is water use. Water withdrawals can potentially reduce the availability of surface and groundwater resources, thereby negatively affecting aquatic habitat and reducing their capacity to assimilate pollution from any human activity.

2.7 Climate Change

It is generally accepted that global climate change will have important consequences for the hydrological cycle and that temperature changes will be most pronounced in high latitudes (IPCC 2007). The climate and runoff in the Peace River Basin, including the Wapiti watershed, will therefore undergo a number of significant changes likely to affect water quantity, seasonal flow patterns and water quality. These should be considered within the context of planning for future water needs.

2.8 Cumulative Effects

Many of the above discussed factors have well-defined, well-studied, individual effects, but their cumulative effect on surface waters depends on local settings and is generally much less well understood. The

combined effects of stressors such as complex industrial effluents, flow regulation, long-range atmospheric transport and changes to climate, though difficult to predict, should be considered in any water management plan.

Examples of the cumulative effects of stressors include;

- A Beaverlodge fish kill was caused by WWTP effluent and an unusually high pH in the river due to an algae bloom (Grande Prairie Daily Herald Tribune 2008), which in turn was promoted by stagnant water due to low flow conditions and possibly excess nutrients from agriculture.
- Multiple stream crossings in headwater streams: one crossing represents a minor impact, but many such crossings on one stream can have a combined significant impact on aquatic habitat.
- Forestry and mining in upstream watersheds in which each operation is assessed individually, but not together with existing or other proposed developments which may produce similar stresses.
- Instream flow objectives for water diversions are established for each new water license in isolation from all other licenses. The cumulative effect of water licensing on instream flow is not tracked (AECOM 2009).

3.0 LEGISLATIVE, POLICY AND PLANNING CONTEXT

The Wapiti River Water Management Plan will be aligned with current legislation, policy, principles, and objectives. The following sections include a listing of these guiding documents.

3.1 Legislative Context

The following are existing legal documents which currently guide water management planning within Alberta and the Wapiti River Water Management Plan will reflect this legislation in its formulation.

- Alberta Water Act
- Alberta Environmental Protection and Enhancement Act (EPEA)
- Alberta Public Health Act
- Alberta Public Lands Act
- Alberta Wildlife Act
- Alberta Land Stewardship Act
- Canada Fisheries Act
- Municipal Government Act
- Species at Risk Act

3.2 Policy Context

The Plan will follow or be influenced by the following current policies:

- Alberta Water for Life Strategy
- Alberta Framework for Water Management Planning
- Guide to Regulatory Requirements for Municipal and Domestic Wastewater
- Alberta Environment's Industrial Release Limits Policy
- Alberta's First Nations Consultation Guidelines on Land Management and Resource Development 2007
- The Government of Alberta's First Nations Consultation Policy on Land Management and Resource Development 2005
- Alberta Wetland Policy*

*The Alberta Government is currently developing the renewed Wetland Policy. Any relevant initiatives or directions outlined in the new policy will be incorporated into the Wapiti River Water Management Plan.

3.3 Planning Context and Linkages with Regional Strategies

Planning for the Wapiti River Water Management Plan will be guided by localized strategies, agreements, and regional plans. The latter provide direction for resource and environmental management over large tracts of land in the area, and will provide a good foundation for the Wapiti River Water Management Plan.

Documents and agreements important to the formulation of the Wapiti River Water Management Plan include:

- The Provincial Land Use Framework-Upper Peace Regional Framework

- Regional Sustainability Plan
- British Columbia – Alberta Transboundary Waters Bilateral Agreement
- Mackenzie River Basin Transboundary Waters Master Agreement

The above legal, policy, and planning materials will be carefully considered and interpreted for the development of the Wapiti River Water Management Plan. The organizations that represent these will be consulted and invited to participate in the planning process. The plan will be consistent with the legal and policy direction stated above.

4.0 PROJECT MANAGEMENT

While the Government of Alberta retains legislative authority for water and water management, the Mighty Peace Watershed Alliance is designated as the official Watershed Planning and Advisory Council (WPAC) responsible for making recommendations with respect to the management of the Peace Watershed, and therefore the Wapiti River Basin in general.

However, AESRD is the project lead and will be responsible together with the Steering Committee for overseeing and providing advice, direction and recommendations to the Wapiti River Management Plan development process. The Steering Committee will also be responsible to ensure that all stakeholders, including Aboriginal Peoples, industry, interest groups and the general public, have the opportunity to provide input into the planning process.

Technical Advisory Committees will be created as required and will guide the scientific planning process.

4.1 Governance Structure

The following governance structure describes the obligations of each party:

- a) Cabinet- Under the *Water Act (11(1))*, Cabinet's authorization is required if the outcome of the proposed plan is an Approved Water Management Plan. An Approved Water Management Plan is required when it involves transfer of applications under sections 82 and 83 of the Water Act or when the Plan has implications for interprovincial or interbasin water management.
- b) AESRD - As identified in the *Water Act* and *The Framework for Water Management Planning*, a Director for the Region will sign off on the Terms of Reference. The Director will determine the most appropriate outcome of the planning process, and the Director is responsible for the final approval of the Water Management Plan and for ensuring its implementation.
- c) The Mighty Peace Watershed Alliance will be responsible for shepherding development of the Terms of Reference. The Wapiti River Water Management Plan Steering Committee will be responsible for the Water Management Plan as it moves forward and will provide feedback throughout the process. This group will also provide direction to the Technical Advisory Committee.
- d) Wapiti River Water Management Plan Steering Committee- The role of the committee is to provide advice on a range of views and values needing consideration when developing the Water Management Plan.
- e) Technical Advisory Committee (TAC) - Technical Advisory Committees will provide scientific expertise, analyze data, and make recommendations based on their findings.
- f) Public Consultation- This critical step will engage the public in order to facilitate awareness and understanding of the proposed Wapiti River Water Management Plan, and to provide opportunities for input and feedback into the draft Terms of Reference for the Water Management Plan. It is intended to be inclusive of all interested organizations, industry groups, affected stakeholders, Aboriginal People, and other interested parties and individuals within the general public.

5.0 PLANNING

The purpose of the planning process is to clarify the steps needed to develop and implement the Wapiti River Water Management Plan. The main steps to the planning process are described below and illustrated in the following figure.

- **Project Initiation.** This sets the stage for developing the Wapiti River Water Management Plan. The *Framework for Water Management Planning* outlines minimum requirements that must be considered in a water management planning process. Plan scope, goals, objectives and deliverables, and organizational structure were identified, and the public consultation process was considered.

This stage of the process was complete once Executive approval and funding had been obtained.

- **Collaboration.** Stakeholders were identified, and partnerships and linkages formed. Partners and collaborators include other industry, organizations, members of the public, Aboriginal Peoples, Federal and Provincial departments and local government.
- **Terms of Reference.** This stage of the process essentially sets out the road map that will guide the Water Management Plan. A first draft was developed by applying knowledge of the Wapiti watershed to a template that incorporated the requirements for a Water Management Plan as set out by the Framework. The draft was reviewed by the Steering Committee and opportunities were made for public involvement as part of the Public Engagement process. Feedback from that process was incorporated into the Terms of Reference, and the result submitted to the Steering Committee for further review. This document constitutes the final Terms of Reference which will be submitted for approval.

The Terms of Reference will be considered to be final once they have been approved by the Director under the Water Act.

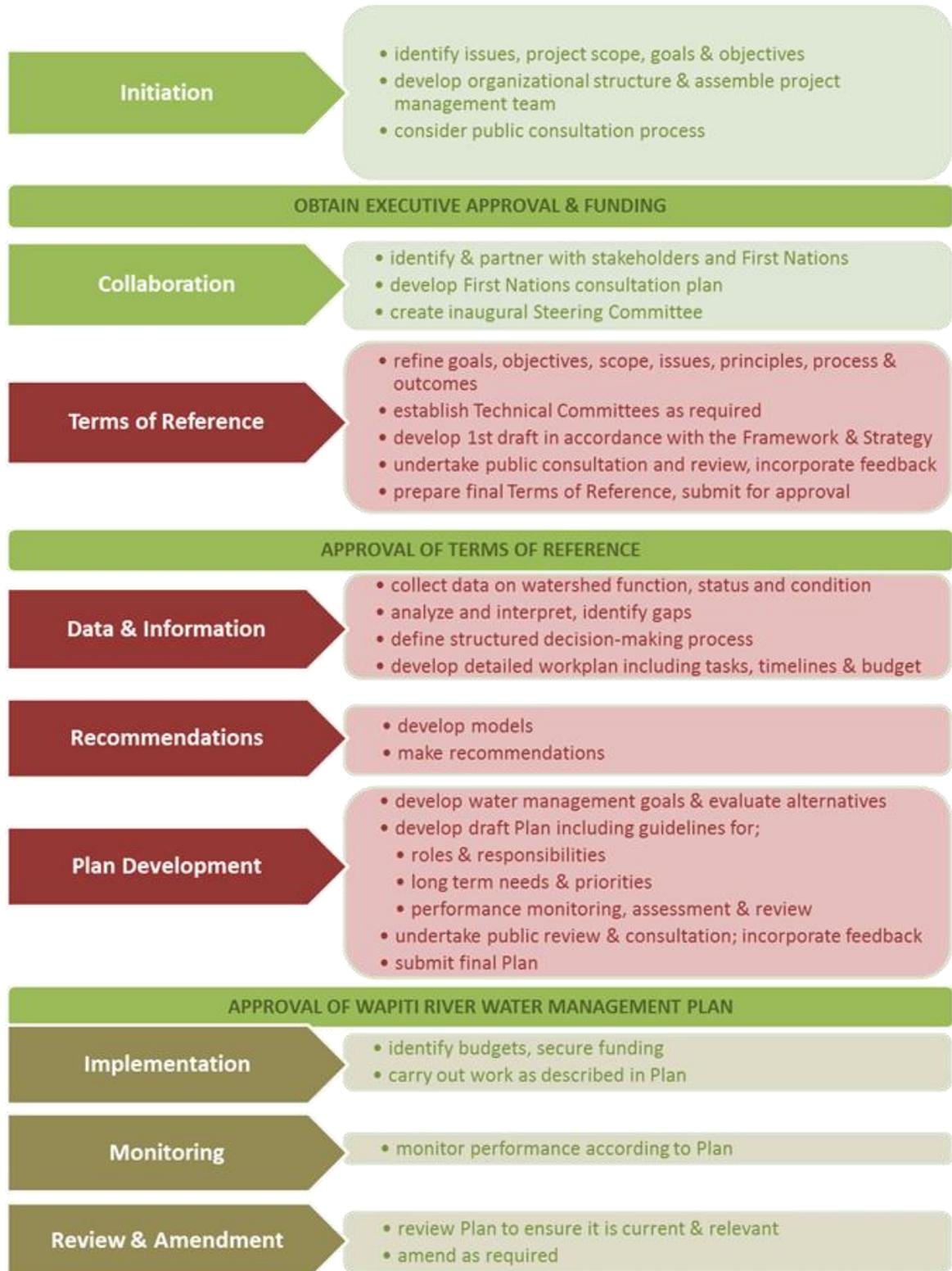
- **Data & Information.** During this stage of the process, data and information will be collected, analyzed and interpreted for the three interests; environmental, economic and social, and to develop models, and evaluate alternatives as required. Data and information gaps will be identified and recommendations made to inform the Management Plan. As management goals and objectives are identified, further data & information requirements may be also be identified.
- **Management Plan Formulation.** This will be informed by the data & information process and as the Management Plan moves forward, it may identify further information requirements. The Plan will focus on creating water management goals and objectives, and identifying and evaluating solutions such as considerations of conservation solutions and incentives, water storage, water licensing changes, enforcement of shoreline and water-body protection strategies, etc. A draft Water Management Plan will be developed. Most decision making will occur at this time. Work

will also include public review of the draft plan with opportunities for input. The final Water Management Plan will then be submitted for approval.

The Wapiti River Water Management Plan will be final once it has been approved by the Director under the Water Act.

- **Plan Implementation and Monitoring** constitutes the final stage of the process. This includes identifying budgets, funding sources, responsibilities, and long-term needs and priorities. Performance monitoring is key when evaluating progress and confirming results. In addition, a schedule for plan review will be implemented, to ensure the information contained remains current.

Overview of the Wapiti River Water Management Planning Process



Responsibility

 Government of Alberta

 Steering Committee

 Joint Government of Alberta & Steering Committee

5.1 Work Plan and Schedule

Tentative Work Plan & Schedule

Milestone	Target Date
Public Review of Draft Terms of Reference	February 2013
Steering Committee Operating Principles and Process	June 14, 2013
Wapiti River Water Management Plan Terms of Reference	June 28, 2013
Public Consultation and Engagement Plan	June 28, 2013
Draft Workplan	June 28, 2013
Complete List of Performance Measures	May 1, 2014
Draft Water Management Plan	November 2014
Public Consultation on Draft Plan	November 2014
Final Draft Plan and Submission to Director	December 2014

6.0 INFORMATION REQUIREMENTS

As described above in Section 1.5, the objectives of the Wapiti River Water Management Plan will be accomplished by

- determining the current water usage, allocation, demand and supply on the Wapiti river
- estimating potential future water demand and supply within the Wapiti river basin
- developing a science-based environmental flow needs assessment that includes water quantity, water quality, physical habitat and aquatic species necessary for protection of the aquatic resource
- providing a comprehensive account of the major issues, challenges, priorities and objectives within the watershed
- identification and recommendation of key watershed issues and challenges that should be considered in the Watershed Plan

This will require information to be collected and reviewed, gaps in data defined, and existing information re-analyzed. Technical teams will be assembled to carry out such work. One component, the environmental flow needs study has already begun and is described below.

6.1 Environmental Flow Needs Scoping Study

Ecofish Research Ltd has been hired to conduct an environmental flow needs scoping study for the Wapiti River. The purpose of this study is to identify and compile existing information on water hydrology, water quality, biology, geomorphology, and connectivity. The study will also provide a gap analysis and develop a strategy to assess the ecological base flow assessment for the Wapiti River. This study was completed on-schedule in March 2013.

6.2 Other Studies

Other studies may be required to capture information with respect to the issues and concerns identified in Section 2.0. Given the rapidly growing population of the area, it may be useful to consider the following as a priority;

6.2.1 Future Water Needs Study

To address the current and future social, economic and environmental water needs of the region, a study of allocations and demands should be conducted. It should be a science-based approach that takes into account projected population and economic growth, climate models and other factors that may influence water needs. This may include assessments of the level of public acceptance and compliance with various conservation measures and their expected impacts upon water needs. Sustainable water allocations in lakes and rivers as well as potential water needs should also be addressed.

7.0 PUBLIC CONSULTATION

Public consultation is an essential part of Water Management Planning. It allows the public and other stakeholders to become educated about their water resources, view the plan as it develops, and to provide feedback throughout the process. Consultation is initiated during the Terms of Reference stage, and continues through to submission of the draft plan.

7.1 Goals and Objectives

The goal of public consultation is to engage the public in order to facilitate awareness and understanding of the proposed Wapiti River Water Management Plan, and to provide opportunities for input and feedback. It is intended to be inclusive of all interested organizations, industry groups, stakeholders, Aboriginal Peoples and other interested parties and individuals within the general public.

In order to have meaningful public consultations, it is important that all participants have an opportunity to increase their level of knowledge about aquatic environments, watersheds, and water management in general, and about these same topics as they apply specifically to the Wapiti River sub-basin.

Objectives of the public consultation component of the Wapiti River Water Management Plan include:

- Public education about regional water resources and issues facing the watershed
- Gathering input, feedback and advice
- Promoting effective communication between planners, stakeholders and the public to ensure all needs and concerns are addressed.
- Incorporating community values into the water management planning process

7.2 Communication Strategy

The communications strategy is designed to transfer information to the public, receive feedback, and allow for identification of community issues and concerns. It relies upon open and transparent communication in order to foster trust, ensure credibility and result in the creation of a legitimate and publicly-valued plan.

The MPWA, AESRD and the members of the Steering Committee, by virtue of their work and through their various affiliations, provide ongoing public engagement and education opportunities with respect to the Wapiti River watershed. This work will continue throughout the development of the WRWMP but should be informed by the findings of the Public Engagement and Consultation that was undertaken during the Terms of Reference phase.

7.3 First Nations Consultation

AESRD staff will work with the SREM Aboriginal Affairs Branch (SAAB) to develop a consultation plan. The consultation plan will be consistent with the *GOA Internal Procedures for Crown-Led Consultation*. First Nations will be consulted at key decision points throughout the development of the Wapiti River Water Management Plan

7.4 Public Consultation and Engagement During Development of the Terms of Reference

CharettePellPoscente Environmental Corp. undertook a program of engagement and consultation in order to inform the public about the developing Terms of Reference for the Wapiti River Water Management Plan, provide educational opportunities and to gather input, feedback and advice with respect to the Terms of Reference.

Information gathered during that process has been used during the development of these draft Terms of Reference. Details of the work and recommendations stemming from it are described in the companion document “Wapiti River Water Management Plan Terms of Reference - Public Engagement and Consultation”.

7.5 Ongoing Public Consultation and Engagement

- Once the Terms of Reference have been approved and work has begun on developing the Wapiti River Water Management Plan, AESRD and the Steering Committee will be responsible for ongoing Public Engagement and Consultation. A strategy will be developed that is in alignment with progress of the Plan.
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