

EXECUTIVE SUMMARY

A Water Use Plan (WUP) is a technical document that, once reviewed by provincial and federal agencies and accepted by the provincial Comptroller of Water Rights, defines how water control facilities will be operated. The purpose of a water use planning process is to develop recommendations defining a preferred operating strategy using a multi-interest consultative process.

The Peace water use planning Committee process was initiated in February 2001 and completed in May 2003. The consultative process followed the steps outlined in the 1998 Provincial government's *Water Use Plan Guidelines*.

This report summarizes the consultative process and records the areas of agreement and disagreement arrived at by the Peace Water Use Plan Committee. Both the Peace Committee Report and BC Hydro's draft Water Use Plan for the Peace facilities will be submitted to the Comptroller of Water Rights and the Provincial Cabinet for approval as stipulated in the *Provincial Energy Plan (Province of British Columbia, 2002)*.

Peace Hydroelectric Facilities

The Peace hydroelectric system includes the W.A.C. Bennett Dam and G.M. Shrum Generating Station on Williston Reservoir and the Peace Canyon Dam and Peace Canyon Generating Station on Dinosaur Reservoir. The W.A.C. Bennett Dam, completed in 1968, is located in north-eastern British Columbia about 21 kilometres west of Hudson's Hope and about 160 river-kilometres upstream from the British Columbia–Alberta border. The underground powerhouse at G.M. Shrum Generation Station has 10 generating units providing a total combined rated capacity of 2730 megawatts. The Peace Canyon Dam, completed in 1980, is located 23 kilometres downstream from the Bennett Dam. Total rated generation capacity at Peace Canyon Generating Station is 694 megawatts from four generating units. The Peace system plays a key role in British Columbia's integrated electrical system, providing approximately one-third of BC Hydro's annual energy production.

Williston Reservoir receives an average annual inflow of 38 140 cubic feet per second or cfs (1080 cubic metres per second or m³/s) from a drainage area 26 600 square miles (68 900 km²). Williston Reservoir is the largest of the province's two multi-year storage reservoirs, characterized by a storage capacity greater than its average annual water inflow volume. Williston Reservoir is approximately T-shaped with the Finlay Reach to the north, the Parsnip Reach to the south (both within the Rocky Mountain Trench) and the Peace Reach extending east through the Rocky Mountains to the dam site.

At full pool, Williston Reservoir inundates an area of approximately 695 square miles (1773 km²). Maximum normal is elevation for Williston is 2205' (672.08 m) and the minimum normal is 2106.3' (642.1 m) providing a storage

potential of 32 million acre-ft (39 471 millions of cubic metres). The historic operating range has been between 2147' and 2205' (654.41 and 672.08 m). The reservoir reaches its lowest elevation in late April or early May and recharges with the spring/summer freshet and rain, reaching peak elevations between September and October.

Dinosaur Reservoir, impounded by Peace Canyon Dam, inundates 3.5 square miles (9 km²) and is located immediately downstream of the W.A.C. Bennett Dam. Dinosaur Reservoir is normally operated between elevations 1650' and 1640.4' (502.92 and 500 m). G.M. Shrum and Peace Canyon Generating Stations typically operate in a daily hydraulic balance: total daily discharge from both facilities is approximately the same. Within-day elevation fluctuations on Dinosaur Reservoir result from load factoring at G.M. Shrum and/or Peace Canyon Generating Stations to accommodate peak demand and generation unit imbalances between projects. A controlled flow is maintained during the winter to manage ice conditions downstream on the Peace River.

Prior to regulation, mean monthly flows in the Peace River (measured at Hudson's Hope) ranged from 7000–71 000 cfs (198.2–2010.5 m³/s), with peak flows capable of exceeding 311 000 cfs (8806.5 m³/s) during freshet. The river channel from Peace Canyon Dam to the British Columbia–Alberta border is now generally confined at normal flow levels less than 70 000 cfs (1982.2 m³/s), with numerous islands and side channels throughout. Minimum flow under the current water license is 1000 cfs (28.3 m³/s). In 1994, a voluntary minimum flow of 10 000 cfs (283.2 m³/s) was implemented by BC Hydro to address the effects of de-watering shallow side channel areas between Peace Canyon and Taylor at flows between 5000 and 10 000 cfs (141.6 and 238.2 m³/s). Within-day flows may range from 10 000 to 70 000 cfs (283.2 to 1982.2 m³/s).

Committee Process

The Peace Water Use Plan process was designed to include all parties whose interests may be affected by operation of the Peace hydroelectric facilities. The Committee included representatives from First Nations, municipal, regional, provincial and federal governments, BC Hydro and public participants.

In support of the Peace Water Use Plan Committee, several subgroups were formed, consisting of Committee members, experts and technical support as required, to assist with the more detailed work relating to development of objectives and performance measures and to provide input into Water Use Plan alternatives.

Issues, Objectives and Performance Measures

During the initial stages of preparing for the Peace Water Use Plan a series of information meetings and open houses were held to identify key issues relating to the operation of the Peace system.

The issues were reviewed by the Water Use Plan Committee and sorted into key resource interest categories including:

- Air quality and community health (dust impacts);
- Erosion, sloughing and land stability;
- First Nations, heritage and traditional use;
- Fish;
- Industrial uses, water and effluent;
- Power generation;
- Public safety, flooding and ice management;
- Recreation and tourism;
- Transportation;
- Water supply and quality; and
- Wildlife.

For each category, an impact hypothesis diagram was developed to engage the Committee in a thorough discussion of the issues and to clarify the causal linkage between system operations, potential impacts and endpoint objectives. A set of objectives and related performance measures were then developed for each interest category. A compilation of all objectives and performance measures is provided in Summary Table A.

Operating Alternatives

Following the development of objectives and performance measures, the Peace Water Use Plan Committee developed operating alternatives they felt would best meet the various interests and objectives for each of the three components of the Peace system: Williston Reservoir, Dinosaur Reservoir and the Peace River. These alternatives specified detailed constraints for each component of the system (e.g., maintain a minimum flow rate in the Peace River of 20,000 cfs year-round) and the underlying rationale for the alternative (e.g., to improve fish habitat and recreation opportunities). The alternatives also specified the duration (e.g., during the peak season only) and frequency (e.g., one year in ten) of the proposed operating constraints.

The initial set of operating alternatives were developed and modelled to assess consequences relative to the performance measures for each interest category. Following the initial review of the modelling results, ten additional alternatives were developed for the Williston Reservoir based on a variable operating rule to determine a minimum Williston elevation on a year-by-year basis. Of all of the trial alternatives developed and modelled throughout the process, the Committee considered 15 during their final trade-off discussions.

Summary Table A: Peace Water Use Plan Objectives and Performance Measures

Interest	Objective	Performance Measures
Power & Financial	Maximize power benefits produced by the combined operation of G.M. Shrum and Peace Canyon generating stations.	Lost Annual Revenue – \$ million/year
	Maximize quality and value of ancillary services.	Services Available? – Yes or No
GHG	Minimize green house gas emissions.	Net Change in Emissions – kilotonnes of CO ₂ e/ year
Recreation	Maintain and enhance the quality of the recreation experience in the Peace system.	Weighted Recreation-Days/year
		<ul style="list-style-type: none"> • Williston • Dinosaur • Peace River
Water Supply	Maximize the ability of Peace River discharge to support 100% of the water supply capacity requirements.	Weighted Water Supply-Days/year <ul style="list-style-type: none"> • Fort St. John • Taylor
Flooding & Ice Management	Minimize the likelihood and magnitude of flood damage to people and property.	Total Days when Flow is greater than critical levels (137 000 cfs at Taylor and 230 000 cfs at Clayhurst).
	Minimize the likelihood and magnitude of ice and flood damage to people and property.	Compliance With Ice Management Protocols? Yes or No
Industry	Minimize costs and disruptions to industry and its employees.	<ul style="list-style-type: none"> • Weighted Impact-Days/year • Log Volumes Affected – m³/year • Lost Employment–Person-years in Mackenzie
Heritage & Culture	Protect heritage values and access to known sites, and maintain and enhance opportunities for community resource use activities and spiritual and ceremonial use.	Number of Sites Exposed/Day/year
Community	Minimize local air quality impacts (due to dust storms) on Williston Reservoir.	Dust-Days/year
	Minimize local erosion impacts on Williston Reservoir.	Weighted Impact-Days/year
Fish	Maximize abundance and diversity of native fish populations.	Qualitative Rank (+/-)
		<ul style="list-style-type: none"> • Williston • Dinosaur • Peace River
Wildlife	Maximize the abundance and diversity of wildlife in riparian and wetland areas.	Qualitative Rank (+/-)
		<ul style="list-style-type: none"> • Williston • Dinosaur • Peace River

Non-operating Alternatives

Informed decision-making in a water use planning process requires enough information to define scope and develop performance measures that weigh the costs and benefits of operational changes. The Peace Committee process did not have sufficient resources (including time) to extensively investigate many of the water-use issues on the Peace River, Dinosaur Reservoir and Williston Reservoir. Also, the information gaps were significant given the large geographic boundaries of the project and complexity of the issues. These gaps could not be properly addressed during the two years allocated for the process.

It became clear to many Committee members that the resulting uncertainty was interfering with their ability to make informed and good decisions. The Committee also recognized there would be competing trade-offs among the objectives and, in some cases, evaluation of such trade-offs would be hampered by the lack of data used to develop performance measure (e.g., the qualitative ranking of fish and wildlife impacts). Moreover, in some cases there were clear opportunities to implement non-operating (e.g., physical works) alternatives to address planning objectives in a technically feasible and cost effective manner. The Committee adopted two strategies to deal with their situation:

- Acknowledge the area of uncertainty and table a plan to collect sufficient information in a timely fashion to assist with future decisions (e.g., next review of the Peace Water Use Plan). The resulting proposals were called Information Plans.
- Integrate the necessary information collection (such as inventories and studies) with the implementation of conditional non-operating solutions (active management measures such as physical works) and monitoring programs to audit the effectiveness of those non-operating solutions. The resulting proposals were called Management Plans.

The Peace Water Use Plan Committee and the project team developed a range of proposals for consideration in the final trade-off analysis, each of which met two important principles:

- There exists an operating alternative that could address the underlying water use issue; and
- Consideration of non-operating alternatives, in lieu of a specified operating alternative, would consider the full range of costs, benefits and risks associated with recommended actions.

The non-operating proposals developed fell into two broad categories:

- Information Plans proposed when there was no quantitative data available to make informed decisions and in scenarios where existing data demonstrated a need for further study.
- Management Plans were proposed when there was some but not enough information available to make informed decisions and/or when the costs associated with proposed operational changes exceeded the financial boundaries set for the Peace Water Use Plan.

During their final trade-off discussions the Committee evaluated the full set of non-operating proposals. In addition to the monitoring required to successfully implement the non-operating alternatives, the Committee also considered a number of stand-alone monitoring programs to address the uncertainties and

remaining data gaps not addressed during this process that would assist in the next Peace Water Use Plan review.

Trade-off Process

As required under Step 7 of the Water Use Plan process, the Committee conducted a formal examination of the trade-offs associated with the operating and non-operating alternatives described above. The intent of the trade-off analysis was to seek the combination of operating and non-operating alternatives that provided the best balance among the Water Use Plan objectives.

During the trade-off process the initial focus was on understanding the consequences associated with each of the proposed operating alternatives. Consequence tables displayed the impact of each alternative on the objectives and performance measures identified by the Committee. Next, the costs, benefits and potential risks associated with each non-operating alternative were reviewed in detail. Once the operating and non-operating proposals had been reviewed in detail, the following process was used to evaluate trade-offs, document group preferences and develop final agreements for each part of the operating system:

- Examine the trade-offs associated with proposed operating alternatives¹;
- Undertake a screening exercise to uncover group preferences across the range of possible operating and non-operating proposals;
- Using the results of the screening exercise, discuss the costs, benefits and potential risks associated with each proposed operating and non-operating alternative;
- Revise proposals as necessary and negotiate terms of an acceptable agreement; and
- Formally call for Committee consensus statements on all agreements.

Consensus on a Recommendation Package

Following the trade-off process described above, the Committee reviewed the alternatives and reached consensus on the following package of recommended operating and non-operating alternatives to manage operations and impacts throughout the Peace system (Summary Table B). In relation to the non-operating projects and monitoring studies, there was a request to look for opportunities to hire local people or contractors to carry out the work whenever possible. All Committee members supported this recommendation.

Some participants expressed intent to begin implementing non-operating projects recommended by the Committee before the government's review of the Draft Water Use Plan is complete. In so doing, these parties would be proceeding on

¹ Summary consequence tables were developed to evaluate each system component or operational aspect independently as shown in the following sub-sections. For these trade-off analysis discussions, performance measure results that varied less than 10 per cent were generally excluded as being insensitive to the proposed operating change. In some cases, however, performance measure results with very little variance were carried into the discussion due to significant uncertainties.

the assumption government will approve those projects, and that they would later be reimbursed by the System Operating Fund² mechanism. The Peace Water Use Plan Facilitators, Project Team and Provincial representative cautioned the members of the Peace Water Use Plan Committee that there is no guarantee that the Comptroller of Water Rights will approve the entire package recommended by the Committee. ***Any parties proceeding with implementation prior to review and approval therefore do so at their own risk.***

² Refer to Financing Water Use Plans – Background Paper for a description of the System Operating Fund.

Summary Table B: Peace Water Use Plan Consensus Package of Committee Recommendations

System	Recommended Operating Alternatives	Recommended Non-Operating Alternatives
Dinosaur	<p><i>Continue with current operations.</i></p> <ul style="list-style-type: none"> • Normal daily reservoir fluctuation 10' (3.05 m) between elevation 1650' and 1640' (502.92–500 m) 	<p><i>Dinosaur Tributary Management Plan.</i></p> <p><i>Recreation Boat Access Improvements</i></p>
Peace River	<p><i>Continue with current operations.</i></p> <ul style="list-style-type: none"> • Minimum instantaneous discharge from Peace Canyon Dam of 10 000 cfs (283.2 m³/s) year round incorporated into water licence. • No annual flushing flows except those associated with unplanned spill events. 	<p><i>Peace River Management Plans (MP)</i></p> <ul style="list-style-type: none"> • Side Channel MP • Ramping MP • Flood Pulse MP <p><i>Recreation Boat Access Improvements</i></p> <p><i>Fort St. John Water Supply Improvements (50/50 cost share)</i></p> <p><i>Peace River Industry Water Quality Information Plan</i></p>
Spill Management	<p><i>Continue with current operations.</i></p> <ul style="list-style-type: none"> • Manage to normal spill probability 	<p><i>Peace River Spill Protocol</i></p>
Williston	<p><i>2150' Management Plan (Years 1 to 5)</i></p> <ul style="list-style-type: none"> • <i>Maximum elevation in Water Licence - 2205.0' (672.08 m) no change from current licence.</i> • <i>Minimum elevation in Water Licence = 2106.3' (642.15 m); no change from current licence.</i> • <i>Minimum elevation for “normal” conditions = 2147' (654.41 m). “Normal” means the BC Hydro system is not under drought (low inflow) or system emergency conditions as defined in the accompanying protocols (Appendix I).</i> • <i>Minimum elevation for BC Hydro operations planning = 2140' (652.27 m).</i> • <i>Minimum elevation for drought or system emergency conditions: as low as 2106.3' (642.15 m) with permission of, and as directed by, the Comptroller of Water Rights.</i> <p><i>2150' Management Plan (Year 5)</i></p> <ul style="list-style-type: none"> • A five-year review for Williston Reservoir operations to commence not later than four years and six months after the implementation of this Water Use Plan, will be convened by BC Hydro. The Peace Water Use Plan Committee will consider the results of the engineering feasibility and design study, any necessary physical works constructed³ and any learning during the years leading up to the review. The purpose is to reconsider the operating constraints for Williston Reservoir, and possibly replace those in effect for the first five years. 	<p><i>2150' Management Plan (Years 1 to 5)</i></p> <p>Conduct engineering feasibility/design study of options for providing the following for Industry at elevations lower than 2147':</p> <ul style="list-style-type: none"> • Secure water supply to the Abitibi and Pope & Talbot mills. • Assured effluent disposal for both mills and the District of Mackenzie. • Assured log transportation for the mills. <p><i>Williston Reservoir integrated Management Plans (MPs):</i></p> <ul style="list-style-type: none"> • Riparian and Wetland Habitat MP • Tributary Habitat MP • Dust Control MP • Erosion Control MP • Boat Access Improvement MP <p><i>Finlay River Access Information Plan</i></p>

³ The Committee recommended that the Province assume the costs for making the industry infrastructure upgrades.

System	Recommended Operating Alternatives	Recommended Non-Operating Alternatives
Williston (cont'd)	<p>2150' Management Plan Long Term Target Operations (to be determined at 5-year review):</p> <ul style="list-style-type: none"> • <i>Maximum elevation in Water Licence - 2205.0'</i> (672.08 m) no change from current licence. • <i>Minimum Water Licence elevation = 2106.3'</i> (642.15 m) no change from current licence. • <i>Planning minimum elevation.</i> • <i>Minimum elevation for drought or system emergency conditions = as low as 2106.3' (642.1 m)</i> with permission of, and as directed by, the Comptroller of Water Rights. • Revise accompanying protocols (operating rule) as agreed at 5-year mid-term review. 	
System-Wide	n/a	<p>Recreation Communication & Safety Improvements (Management Plan) Heritage & Culture Information Plan</p>

Consequences of the Consensus Package of Recommendations

The expected outcomes of the final recommended package of operating and non-operating alternatives are summarized in Summary Table C.

Summary Table C: Expected Consequences of Recommended Operating and Non-Operating Alternatives Relative to Current Permitted Operations

Note that all consequences described here are expected to occur until the 2150' Management Plan implementation.

<i>Water Use Interest</i>	<i>Part of System</i>	<i>Consequences</i>
Power	Whole System	<ul style="list-style-type: none"> - Increase in Financial Operating Costs. Estimated average annual expected costs are \$14.9 million until physical works installed and management plans implemented.⁴ ∅ Neutral – Availability of ancillary services not impacted.
Greenhouse Gas Emissions	Whole	+ Decrease in Greenhouse Gas Emissions by 9 kilo-tonnes of carbon dioxide equivalent per year (kt CO ₂ e/yr)
Recreation	Williston, Dinosaur & Peace River	<ul style="list-style-type: none"> + Improved access to existing sites through replacement or extension of physical structures and construction of new boat ramps. + Improved navigational safety with installation of 1) electronic signage for expected reservoir fluctuations on Dinosaur, and 2) marine radio transmission towers for system-wide communications.
Water Supply	Fort St. John	+ Improved reliability of community water supply at full range of permitted operations with installation of new well.
	Taylor	∅ No significant change in impacts on Taylor community water supply.

⁴ The 2147' operating constraint for Williston Reservoir accounts for \$13.4 million/year. Making the 10 000 cfs minimum flow release a formal licence constraint accounts for \$1.5 million annually.

<i>Water Use Interest</i>	<i>Part of System</i>	<i>Consequences</i>
Flooding	Peace River	∅ No significant change in flood risk on the Peace River (Taylor & Clayhurst).
Industry	Williston	+ Significantly reduced potential for: 1) disruptions to Industry operations, 2) impacts on log transportation and 3) lost employment for the first 5 years of operations.
Heritage	Williston	∅ No change in exposure risk for heritage sites around the reservoir.
Dust	Williston	+ Decrease in dust if management plan successful.
Erosion	Williston	+/∅ Shoreline erosion works at Tsay Keh Beach.
Fish	Williston	+ Management plans expected to provide fish benefits.
	Dinosaur	∅ No significant changes from current conditions.
	Peace River	∅ No change to operations, Spill Protocols clarify impact assessment.
Wildlife	Williston	+/∅ Management plans expected to provide benefits for some species.
	Dinosaur	∅ No change to current operations.
	Peace River	-/+ Proposed management plans may create positive or negative impacts depending on the species and location.

Monitoring Programs

The Committee considered and recommended two types of monitoring proposals⁵:

- Those effectiveness monitoring programs (auditing) which are built-in components of the management plans described in the “Non-Operating Alternatives” section earlier in this summary. This monitoring is required to measure the success of the implementation of management plan projects.
- The information plans designed as stand-alone programs to address the uncertainties and information gaps not addressed during the Peace Water Use Plan consultative process. These are intended to collect information that will assist future decision-makers at the next full review of the Peace Water Use Plan.

Once the implementation of the operational changes approved under the final Peace Water Use Plan has begun, then BC Hydro will develop detailed terms of reference for all monitoring programs and initiate studies, data collection, analysis and audit reporting. The Committee recommended that the detailed terms of reference be developed in consultation with appropriate government agencies, First Nations, and interested parties. The results of approved monitoring programs will be reported on annually.

⁵ In addition to the two types of monitoring proposals described here, there is also specific conditional monitoring recommended for impacts on Williston Reservoir interests in the event of drawdowns below reservoir elevations of 2150'. In addition to the effectiveness monitoring activities specified in the Williston Reservoir Integrated Management Plans (Appendix K), both the Peace Water Use Plan and the Williston Variable Minimum Elevation Operating Rule (Appendix I) direct BC Hydro to monitor impacts associated with drawdown events below 2150'. This will involve monitoring low reservoir impacts on social issues in communities, water supply in Mackenzie, dust source areas (beaches), reservoir boating access sites, heritage and culture sites and fish and wildlife.

Cost of the Consensus Package of Committee Recommendations

By the end of the deliberations over Williston Reservoir, Committee members had reached consensus agreements for all components of the Peace System operations. A summary of all final recommendations and estimated costs is provided in Summary Tables D and E, with further detail on project implementation provided in Summary Tables F, G and H.

Some participants indicated a desire to proceed immediately with the design and construction of their non-operating projects. It was noted that this precedent has been set within the water use planning program already as some environmental monitoring studies that were deemed crucial on other Water Use Plans were started prior to the formal government approval of the plan. Nonetheless, the process facilitators reminded the group that there is no guarantee that the Peace Water Use Plan package will be approved as recommended in its entirety. ***Any organization that begins implementation of any of the recommended Management Plans, mitigative works, or monitoring proposals in advance of Peace Water Use Plan approval does so at its own financial risk.***

Summary Table D: Summary of Peace Water Use Plan Committee’s Recommended Package of Peace System Operations

System Component	Summary Description of Key Operations	Estimated Cost \$million/Yr
Williston Reservoir	Initial Minimum Elevation for “normal” conditions is 2147’ until physical works installed and management plans implemented. Ability to go below Initial Minimum Elevation during first 5 years, only with permission of Water Comptroller Minimum Elevation for “normal” conditions targeted lower than 2147’ in the longer term, contingent on development of feasible mitigative measures to address Industry impacts	13.40 ¹
Dinosaur Reservoir	Allowable Daily Operating Fluctuation, no change from current operations	\$ 0
Peace River	Minimum Flow 10 000 cfs (no change from current operations, but current voluntary minimum flow will be formalized in the Water Licence)	\$ 1.5 ²
Spill Management	Maintain Current Level of Spill Probability (no change from current operations)	\$ 0
TOTAL COST		\$14.90

¹ The estimated cost is shown for 2147’. Should physical works be constructed and management plans be implemented, a lower elevation could be established that would reduce the cost.

² BC Hydro has provided the 10 000 cfs flow voluntarily since 1994. Approval of the Peace Water Use Plan Committee’s recommendation to formalize this requirement would result in a change in the Water Licence. The current estimated cost of meeting this requirement versus fulfilling the minimum requirements currently outlined in the Water Licence is \$1.5 million/yr.

Summary Table E: Summary of Peace Water Use Plan Committee’s Recommended Package of Non-Operating Alternatives

System Component	Summary of Recommended Management Plans and Information Plans	Estimated Cost \$/Yr ¹
Williston Reservoir	2150' Industry Management Plan (Non-Operating Components) <i>(Water Supply, Effluent Disposal, Log Supply Feasibility Studies)</i>	\$ 191 000
	Williston Reservoir Management Plans <i>Riparian/Wetland Habitat MP, Tributary Habitat MP, Dust Control MP, Erosion Control MP, Access Navigation & Safety MP</i>	\$ 1 605 000
	Finlay River Access Information Plan	\$ 3 000
Dinosaur Reservoir	Tributary Habitat Management Plan	\$ 28 000
	Boat Launch Improvement Projects	\$ 28 000
Peace River & Spill Management	Peace River Management Plans and Spill Protocol: <i>Peace Side Channel MP, Peace Ramping MP, Peace Flood Pulse MP and Spill Protocol</i>	\$ 335 000
	Boat Launch Improvement Management Plan	\$ 133 000
	Fort St. John Water Supply Management Plan	\$ 7 500 ¹
	Peace River Industry Water Quality Information Plan	\$ 11 000 ²
System-Wide	Heritage & Culture Information Plan	\$ 32 000
	Recreation Communications & Safety <i>(marine radio & signage)</i>	\$ 31 000
TOTAL COST	Maximum subject to confirmation of cost-sharing	\$ 2 404 500

¹ The estimated cost per year is the 20 year levelized annual cost used for decision-making in order to make trade-offs with long term operating costs. The actual implementation schedule of many projects places higher costs in a shorter time frame (see Summary Tables F, G and H).

² The Fort St. John water supply plan is recommended on a 50/50 cost-sharing basis, funded half by Fort St. John and half through the Water Use Plan. The 20-year levelized annual cost of the project is \$15,000/year and the Committee recommends \$7,500/year of this be funded under the Water Use Plan. The Provincial Representative cautioned that the Fort St. John water supply proposal might not be eligible for a draw on the System Operating Fund.

³ Representatives of Taylor industries were willing to discuss cost sharing for the Peace River Industry Water Quality Information Plan but the cost-sharing ratio remains to be determined.

Review Period

A five-year review for Williston Reservoir operations to commence not later than four years and six months after the implementation of this Water Use Plan, will be convened by BC Hydro. The Peace Water Use Plan Committee will consider the results of the engineering feasibility and design study, any physical works constructed and any learning during the years leading up to the review. The purpose is to reconsider the operating constraints for Williston Reservoir and possibly replace those in effect for the first five years.

The Committee will also interpret the results of the management plans and information plans and decide how to proceed with the subsequent implementation of projects for years 6–10;

The full review of the Peace Water Use Plan will be conducted ten years after the implementation of the Peace Water Use Plan.

Summary Tables F, G and H outline the 10-Year implementation schedule for the various projects and monitoring programs agreed to during the final Peace Water Use Plan Committee meeting. Please refer to the study and project outlines in the Appendices of this document for further detail.

Summary Table F: Ten-Year Implementation Schedule of the Peace Water Use Plan Committee’s Recommended Package of Peace River/Dinosaur Non-Operating Alternatives

PCR Implementation Projects	ID	10 Yr Total \$000s	20Yr LAC \$000s /Yr	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
PCR Aerial Photos	i	230	17	63	13	65	0	0	0	0	13	78	
PCR Baseline TGP/Temp	v	115	10	70	5	5	5	5	5	5	5	5	
PCR Trial Side Channels	vi	640	51	50	160	160	10	10	110	110	10	10	
PCR Hydraulic Habitat	viii	75	6	0	50	25	0	0	0	0	0	0	
PCR Hydraulic Model	ix	200	17	0	100	50	50	0	0	0	0	0	
PCR Mainstem Stage Discharge	x	225	18	18	93	80	5	5	5	5	5	5	
PCR Riparian Habitat Assessment	xi	150	13	50	50	50	0	0	0	0	0	0	
DNR Demonstration Tributary	xii	225	20	55	55	5	5	5	35	35	10	10	
DNR Tributary Inventory	xiii	50	5	50	0	0	0	0	0	0	0	0	
PCR Industry & Taylor Water Quality Assessment	-	131	11	27	26	26	26	26	0	0	0	0	
FSJ Water Supply well	-	100	8	100	0	0	0	0	0	0	0	0	
DNR Recreation Access	-	285	28	150	15	15	15	15	15	15	15	15	
PCR Recreation Access	-	1390	133	490	340	70	70	70	70	70	70	70	
sub-total		3816	337	1122	906	551	186	136	240	240	115	128	193
PCR Effectiveness Monitoring	ID	10 Yr Total	20Yr LAC	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
PCR Creel Survey	a	150	10	0	30	0	30	0	30	0	30	0	30
PCR Fish Index	b	1000	68	100	100	100	100	100	100	100	100	100	100
PCR Fish Stranding	d	100	7	0	0	0	0	100	0	0	0	0	0
GMS Entrainment	e	100	7	0	0	0	0	100	0	0	0	0	0
PCR Productivity	g	750	51	75	75	75	75	75	75	75	75	75	75
PCR Riparian Flooding	h	150	7	0	0	0	0	0	0	0	0	50	100
PCR Side Channel Fisheries	i	355	26	30	125	25	25	25	25	25	25	25	25
PCR Side Channel Response	j	40	3	0	0	0	0	40	0	0	0	0	0
Spill Hydrology	k	50	3	0	0	0	0	50	0	0	0	0	0
PCR Spill Photos	l	85	6	0	0	0	0	20	65	0	0	0	0
PCR Spill TGP/Temp	m	20	1	0	0	0	0	20	0	0	0	0	0
PCR Wildlife Survey	n	100	7	0	0	0	0	100	0	0	0	0	0
DNR Tributary Habitat	q	50	3	0	10	0	10	0	10	0	10	0	10
sub-total		2950	200	205	340	200	240	630	305	200	240	250	340
Peace R./Dinosaur Total		6766	537	1327	1246	751	426	766	545	440	355	378	533

Summary Table G: Ten-Year Implementation Schedule of the Peace Water Use Plan Committee's Recommended Package of Williston Reservoir Non-Operating Alternatives

Williston Implementation Projects	ID	10 Yr Total \$000s	20Yr LAC \$000s /Yr	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Air Photos	I	950	68	350	0	0	0	300	0	0	0	0	300
DEM	III	900	76	150	300	300	150	0	0	0	0	0	0
Wetland Inventory	III	25	2	25	0	0	0	0	0	0	0	0	0
Trial Wetlands	IV	830	68	200	160	10	10	10	210	170	20	20	20
Debris Field Survey	V	200	18	75	125	0	0	0	0	0	0	0	0
Trial Tributary(s)	VI	700	60	310	10	10	10	10	270	20	20	20	20
Dust Source Survey	VII	225	21	225	0	0	0	0	0	0	0	0	0
Dust Control Trial	VIII	1165	94	550	5	5	5	5	555	10	10	10	10
Debris Removal	IX	5000	500	500	500	500	500	500	500	500	500	500	500
Erosion Control Trial	X	3775	331	200	3500	25	0	0	25	0	0	0	25
Boat Access	XI	2375	216	600	45	45	345	90	90	90	740	165	165
<i>Boat launches – Top priority</i>	-	1005	97	600	45	45	45	45	45	45	45	45	45
<i>Boat Launches – Medium</i>	-	570	52	0	0	0	300	45	45	45	45	45	45
<i>Boat Launches - Lower</i>	-	800	67	0	0	0	0	0	0	0	650	75	75
Bathymetric Mapping	XII	375	32	100	125	150	0	0	0	0	0	0	0
Communications/Safety ¹	-	318	31	120	62	17	17	17	17	17	17	17	17
Finlay River Access Information Plan	-	33	3	0	33	0	0	0	0	0	0	0	0
Industry Feasibility and Design Study	-	2105	191	1005	1100	0	0	0	0	0	0	0	0
sub-total		18 976	1713	4410	5965	1062	1037	932	1667	807	1307	732	1057
Williston Effectiveness Monitoring	ID	10 Yr Total \$000s	20Yr LAC \$000s /Yr	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Wetland Habitat	(a)	500	34	50	50	50	50	50	50	50	50	50	50
Debris Trends	(b)	75	5	0	0	25	0	0	25	0	0	0	25
Tributary Habitat	(c)	900	62	90	90	90	90	90	90	90	90	90	90
Dust Control	(e)	100	7	10	10	10	10	10	10	10	10	10	10
Erosion Control	(f)	50	3	0	10	0	10	0	10	0	10	0	10
Recreation Use	(g)	100	7	10	10	10	10	10	10	10	10	10	10
sub-total		1725	117	160	170	185	170	160	195	160	170	160	195
Williston Total		20 701	1830	4570	6135	1247	1207	1092	1862	967	1477	892	1252

¹ Communications/Safety is a system-wide program

Summary Table H: Ten-Year Implementation Schedule of the Peace Water Use Plan Committee's Recommended Package of Non-Operating Alternatives

Study Area	10 Yr Total \$000s	20Yr LAC \$000s /Yr	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Heritage and Culture Information Plan ¹	420	32	150	30	30	30	30	30	30	30	30	30
Peace River/Dinosaur Total	6 766	537	1 327	1 246	751	426	766	545	440	355	378	533
Williston Total	20 701	1 830	4 570	6 135	1 247	1 207	1 092	1 862	967	1 477	892	1 252
TOTAL	27 887	2 399	6 047	7 411	2 028	1 663	1 888	2 437	1 437	1 862	1 300	1 815

¹ Heritage and Culture Information Plan is a system-wide program