

Nechako Watershed Council
 Box 1078
 Vanderhoof, BC
 V0J 3A0



CABINET DU MINISTRE
 OFFICE OF MINISTER

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Honourable Gail Shea
 Minister of Fisheries and Oceans
 Centennial Towers
 200 Kent Street, Mail Stop: 15N
 OTTAWA, ON K1A 0E6

December 3, 2009

Dear Minister Shea:

Re: Nechako Watershed Council Report on a Water Release Facility at Kenney Dam

As you know construction of a water release facility at Kenney Dam on the Nechako River, British Columbia, has been the subject of much discussion and study over the past fifty years. Perhaps most importantly, in 2001 the Nechako Environmental Enhancement Fund Management Committee consulted with a large number of stakeholders (as mandated by the 1997 BC/Alcan Agreement) and reached the legally binding decision that the best use of the Nechako Environmental Enhancement Fund would be to construct a Cold Water Release Facility at Kenney Dam.

In 2008, after seven years of work to address technical issues, and to determine the benefits, risks and costs of a Cold Water Release Facility, the Nechako Watershed Council (NWC) recommended that a simplified Surface Water Release Facility be considered, and commissioned a detailed cost estimate for a Surface Water Release Facility at Kenney Dam. The results of that work determined that the current cost to build a Surface Water Release Facility would be approximately \$223.6M, plus an estimated \$35.8M needed for works associated with commissioning of a water release facility, for a total of \$259.4M. We are pleased to enclose a package of information describing these efforts.

It is the NWC's belief that construction of a water release facility at Kenney Dam would create downstream enhancement benefits in the Nechako Watershed area, including benefits in the Cheslatta Watershed, which cannot be achieved by any other means. We are pleased to acknowledge the important research work conducted by the Department of Fisheries and Oceans in connection with the proposed release facility as well as the endangered Nechako River white sturgeon and to invite your support for moving the project to completion. Best wishes for the coming Holiday Season.

Regards,

A handwritten signature in black ink, appearing to read "Henry Klassen".

Henry Klassen
 Chair, Nechako Watershed Council

cc: Paul Sprout, Western Regional Director
 Rebecca Reid, Regional Director
 Jason Hwang, Area Chief

Kenney Dam Cold Water Release Facility

Interim Report

(2002-2007)

Canadian Enhancement
Society

PREFACE

This report summarizes the work undertaken by the Nechako Watershed Council and the Nechako Enhancement Society since 2002, towards construction of a Cold Water Release Facility at Kenney Dam.

Schedule 4 of the BC/Alcan 1997 Agreement and decisions made in 2001 by the Nechako Environmental Enhancement Fund Management Committee provide a unique opportunity to potentially enhance the downstream Nechako watershed area.

In response to this opportunity and at the request of the Province, the Nechako Watershed Council developed a "Work Plan for the Cold Water Release Facility at Kenney Dam", (March 2002). Subsequently, the Nechako Enhancement Society was formed to implement the Work Plan with funding from the Province and Rio Tinto Alcan.

This Interim Report summarizes, in one document, the 6 years of work costing \$1.3M completed to date, addressing technical issues and documenting the remaining information requirements that must be resolved in order to develop the criteria necessary to design, construct commission and operate a CWRF at Kenney Dam.

The next phase in the Work Plan initiates preliminary engineering and environmental assessment related activities that may involve significant expenditures. In addition to supporting these activities, the Interim Report contains key technical information and updated cost estimates that can be used to assess the feasibility of constructing a CWRF and its potential to enhance the downstream Nechako watershed area.

As Directors of the Nechako Enhancement Society, we respectfully submit the Interim Report to the Nechako Watershed Council, partner agencies and stakeholders for consideration prior to embarking on the next phase of this project.

Sincerely,

Don Timlick, Chair
Nechako Enhancement Society

Don Cadden, Director
Nechako Enhancement Society

Justus Benckhuysen, Director
Nechako Enhancement Society

Wenda Mason, Director
Nechako Enhancement Society

Mathieu Bergeron, Director
Nechako Enhancement Society

April 9, 2008

Executive Summary

Planning for a Cold Water Release Facility has been underway since the Nechako Environmental Enhancement Fund (NEEF) Management Committee, in its 2001 final report, determined that a release facility is the best option for enhancing the Nechako watershed.

In 2002, in direct response to a NEEF Management Committee recommendation, the Nechako Watershed Council (NWC) prepared a Work Plan to investigate the feasibility of, and address the planning needs, for the project. The Nechako Enhancement Society (NES) was subsequently formed to implement the Work Plan.

Between 2002 and 2008 the NES and the NWC have implemented the first six years of activities identified in the Work Plan by directing a series of studies and consultation initiatives on the costs, benefits and technical considerations of a CWRP.

Year seven of the Work Plan may involve significant expenditures for preliminary engineering and environmental assessment related activities. Prior to initiating these activities, the NES prepared this Interim Report to summarize, in one document, the work completed to date related to the issues that must be considered in the design, construction and commissioning of a CWRP at Kenney Dam. Any data gaps that exist have also been identified.

In addition to completing additional work on technical issues where data gaps exist, the question of ownership must be resolved in order that a proponent can undertake the necessary steps to complete a CWRP design prepare and submit the necessary environmental assessment report and assume both the risks and responsibilities associated with construction and operation of a CWRP.

The following table provides a brief summary of the current state of knowledge for nine technical issues.

Table: Current State of Knowledge for Technical Issues

Technical Issue

State of Knowledge

Summer temperature criteria for the Nechako River were determined following the 1987 Settlement Agreement between Alcan, the Province of British Columbia and the Government of Canada. The Nechako Fisheries Conservation Plan (NFCP) and Fisheries and Oceans Canada (DFO) independently concluded that current flows management has effectively maintained recommended temperatures upstream of the Stuart River and have also mitigated temperatures between Stuart River and Prince George. DFO also concluded that if a Cold Water Release Facility (CWRFF) is constructed, temperatures in the Nechako below the Stuart River confluence may rise above the critical temperature threshold. Additional work is ongoing to clarify temperature and flow criteria for a CWRFF.

Assuming that both the location for measuring and the Nechako River temperature target itself remain unchanged a CWRFF could potentially achieve the temperature objective with less water. As a consequence this could free up water for other purposes, potentially benefiting downstream interests. However, DFO has indicated that if this project goes ahead temperature targets may need to be changed and this will influence how much, if any, freed-up flow is available. Work is ongoing to determine how much freed-up flow could be available.

Modelling indicates the reservoir will be able to provide sufficient cold water to address existing temperature targets in the Nechako River in most years. However, in some years, the occurrence of unique wind conditions in July could reduce the available volume of cold water. Under these conditions, there would not be enough cold water to achieve the downstream temperature targets during the Summer Temperature Management Program (STMP). It should be noted that to-date these wind conditions have not been recorded during the STMP period but have been observed in early spring.

Water released from a CWRFF may acquire an elevated total gas pressure (TGP), which can negatively impact fish. The proposed CWRFF has two features to reduce dissolved gas:

- 1) Flip Bucket Spillway – It has not been confirmed if the flip bucket spillway can deliver water that meets government guidelines.
- 2) Hollow Cone Valves – Hollow cone valves tested at other facilities were capable of releasing water with acceptable TGP levels.

Temperature

Page 6

Flow

Page 12

Reservoir Hydrothermal

Page 17

Total Gas Pressure

Page 21

Technical Issue

State of Knowledge

Fish Entrainment
Page 27

Fish, particularly juveniles, can become entrained and pass through water release facilities. The risk of fish entrainment at a CWRP is low to moderate, depending on time of year. There are no government guidelines by which to assess the acceptability of these risks.

Sediment
Page 30

Large volumes of sediment have been deposited in the Nechako Canyon and within the Cheslatta Fan since the construction of the Kenney Dam. Discharge from a CWRP will mobilize some of the sediment deposited in the Nechako Canyon and the Cheslatta Fan. Likely erosion and deposition zones have been identified in and downstream of the Nechako Canyon but the short and long - term impacts to fish populations, including sturgeon and salmon, are unknown at this time. Additional modelling work has been initiated.

Cheslatta River and Lake System Rehabilitation
Page 36

Significantly lower flows and a more natural flow regime in the Cheslatta River and Lake are prerequisites for the rehabilitation of fisheries productivity in Murray and Cheslatta Lakes. They are also important for the rehabilitation of river and stream habitat within the system. An optimal flow regime for the Cheslatta River and Lake system has not been identified to-date.

Benefits
Page 41

Many of the issues that benefit from the construction of a CWRP are flow dependent. They will be affected by Nechako River temperature criteria and how much freed-up flow is available, neither of which are known at this time. Rehabilitation of the Cheslatta River and Lake system and generation of hydroelectricity at Kenney Dam are the two primary benefits of a CWRP that are not directly dependent on flow and temperature criteria. Twenty-two additional flow-related interests (such as canoeing, flood control, and fish) identified by the NWC depend on the amount of freed-up flow available; which, if any, of these interests could not be met cannot be determined at this time.

Design and Cost
Page 44

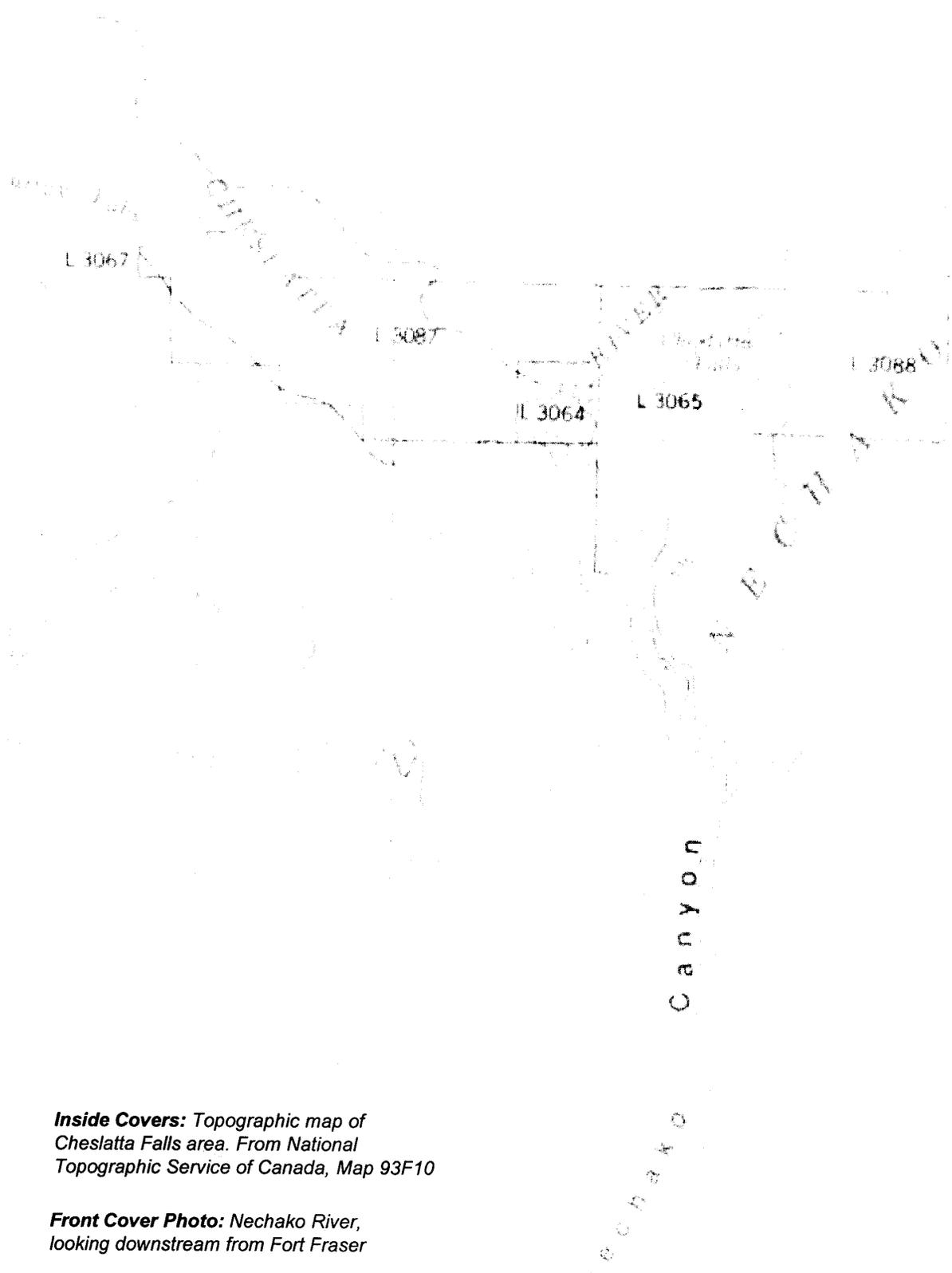
The costs for constructing a CWRP are estimated in 2008 to be in the order of \$184M to \$197M. Costs of constructing a 20MW hydroelectric generating station are estimated at \$46M to \$55M and the costs of constructing a transmission line are estimated to be \$10M. Owner's costs, environmental assessment and other project costs such as the cost of commissioning flows and construction of a Cheslatta Fan channel are not included in the above noted costs.

All CWRP cost estimates to-date are based on conceptual level engineering developed in 2001. Further engineering is required to establish that the concept is technically feasible and that the facility will perform as required by the design criteria before an accurate cost estimate can be completed.

Kenney Dam Cold Water Release Facility

Addendum to April 2008 Interim Report (2008-2009)

Nechako Enhancement
Society



Inside Covers: Topographic map of Cheslatta Falls area. From National Topographic Service of Canada, Map 93F10

Front Cover Photo: Nechako River, looking downstream from Fort Fraser

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Kenney Dam

Cold Water Release Facility

Addendum to April 2008

Interim Report

(2008-2009)

Nechako Enhancement Society

November 2009

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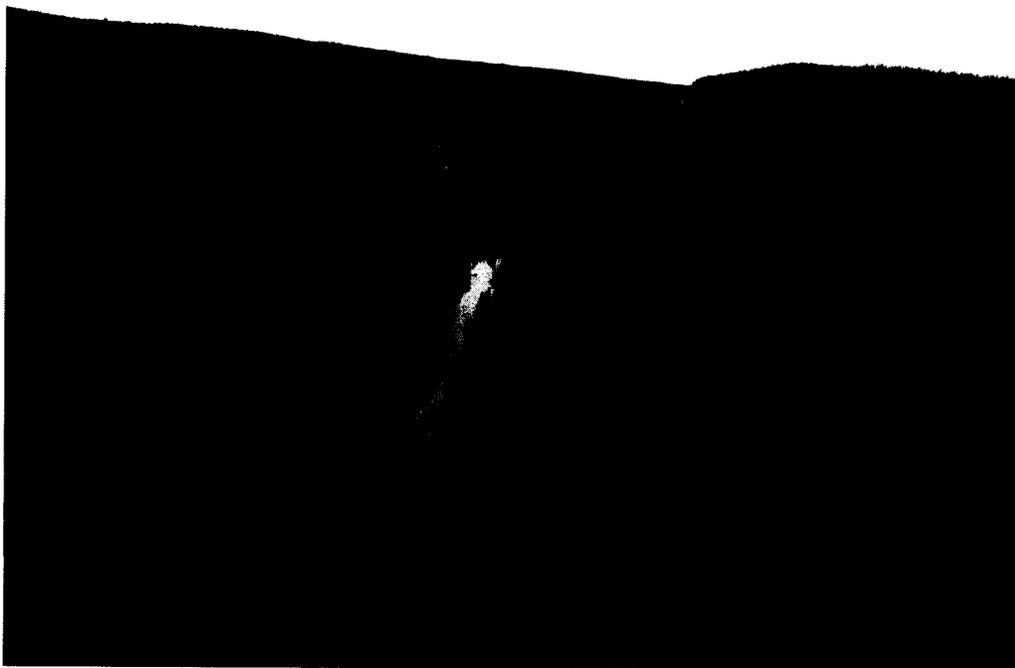


Photo: Nechako Canyon and Scour Hole Lake

1 INTRODUCTION

In April of 2008 the Nechako Enhancement Society (NES), on behalf of the Nechako Watershed Council (NWC), prepared an Interim Report¹ which summarized in one document the work completed during the first six years of the NWC work plan, the gaps identified and progress made to date in addressing the technical issues that must be considered in relation to the design, construction and commissioning of a CWR^F at Kenney Dam.

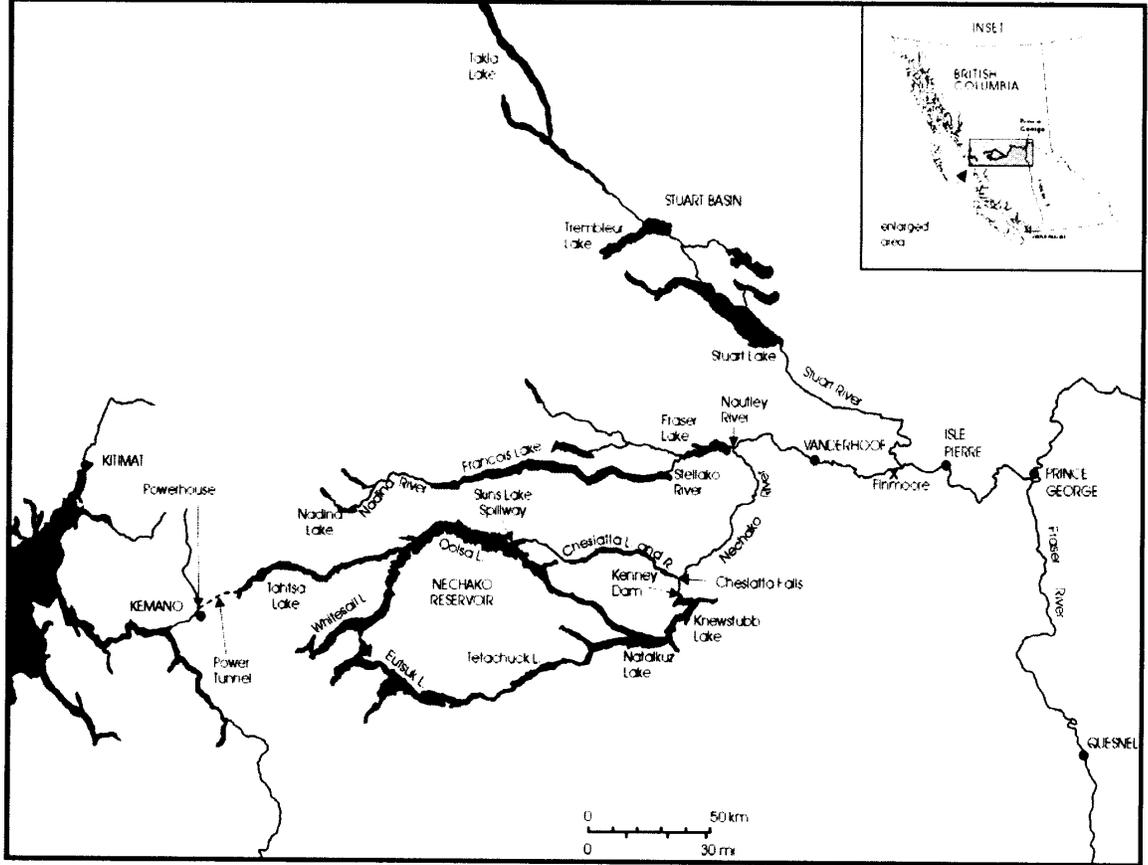
Included in the Interim Report was a discussion of the fact that ongoing work by DFO suggests that there may be a requirement to define new temperature criteria for that portion of the Nechako

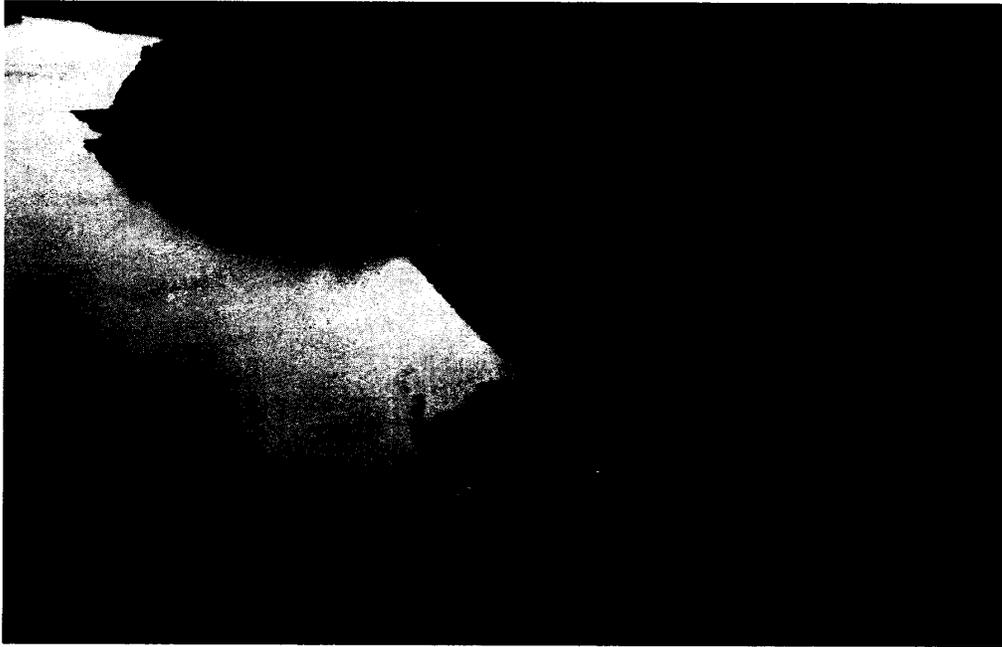
¹ Kenny Dam CWR^F Interim Report 2002-2007, April 2008

River downstream of the Stuart River confluence and that this in turn may result in little or no freed up water being available for downstream enhancement. Also discussed were the results of an updated cost estimate which showed that the costs of construction had almost doubled compared to the 2001 NEEF Management Committee estimate.

At a subsequent, June 2008 NWC meeting, the NWC concluded that because of the engineering risks, lack of "freed-up" flows and escalating cost, a CWRF was no longer the preferred option. A surface WRF would result in similar flow releases, fewer engineering risks and lower costs and would still allow the primary benefit of rehabilitation of the Cheslatta River and Lake System, but "freed-up" flows for downstream environmental enhancement of the Nechako River would be minimal, if any. Therefore, the NWC directed the NES to obtain a detailed cost estimate for a simplified surface Water Release Facility (WRF) at Kenny Dam.

Figure 1-1: Map of Nechako River Watershed





*Photo: Kenney Dam.
Photo provided by Alcan.*

2 WATER RELEASE FACILITY

In January 2009 the NES issued a contract to SNC Lavalin to prepare a report and cost estimate for a surface water release facility (WRF) at Kenney Dam. The NES requested that the design of the WRF be based on the work previously commissioned by the Management Committee of the Nechako Environmental Enhancement Fund (NEEF) as well as Rio Tinto Alcan (RTA) information that was used to design the cold water release facility at Kenney Dam.

The scope of work included a cost estimate, construction schedule, construction strategy, and facility description including conceptual design drawings for each of the following items:

- a surface water release facility (WRF) at Kenney Dam;

- modification to Skins Lake Spillway (SLS), (once completed this will be the subject of a separate report.)

Once the contract was underway the scope of work was expanded to include:

- The digitization of the topographic and geological information based on previous surveys and geotechnical studies in order to establish ground and rock surfaces at the location of the proposed WRF at Kenney Dam; and
- Development of an alternate design of WRF at Kenney Dam.

The cost estimate was requested to be accurate to 30% and based on an EPCM (Engineering, Procurement and Construction Management) type of contract. During development of most infrastructure projects, the facilities are designed and defined in more detail with the result that costs are more likely to increase than decrease. Such estimates therefore probably have a range of accuracy of 0% to +30%.

SNC Lavalin was provided with the following design criteria:

- the WRF at Kenney Dam must be capable of operating all year around, releasing flow of 5 m³/s to 45 m³/s through the low-level outlet during the winter, and flows of 45 m³/s to 450 m³/s through a surface spillway in summer.

Operational parameters were specified as follows:

Reservoir Elevations:

- Probable Maximum Flood Level (PMF)
857.11 m

- Maximum Normal Operation Reservoir Level 853.44 m
- Minimum Operation Reservoir Level (MOL) 844.30 m
- Controlled Reservoir Level at 450 m³/s discharge 851.00 m

Surface Spillway Discharge:

- Maximum spillway discharge 450 m³/s
- Maximum spillway discharge at MOL (el.844.30) 283 m³/s

Low Level Outlet Discharge:

- Maximum discharge 45 m³/s
- Minimum discharge 5 m³/s
- Maximum invert elevation of intake channel, or lower 832.00 m
- Top of WRF spillway control structure, or higher 859.50 m

Tailwater Elevations:

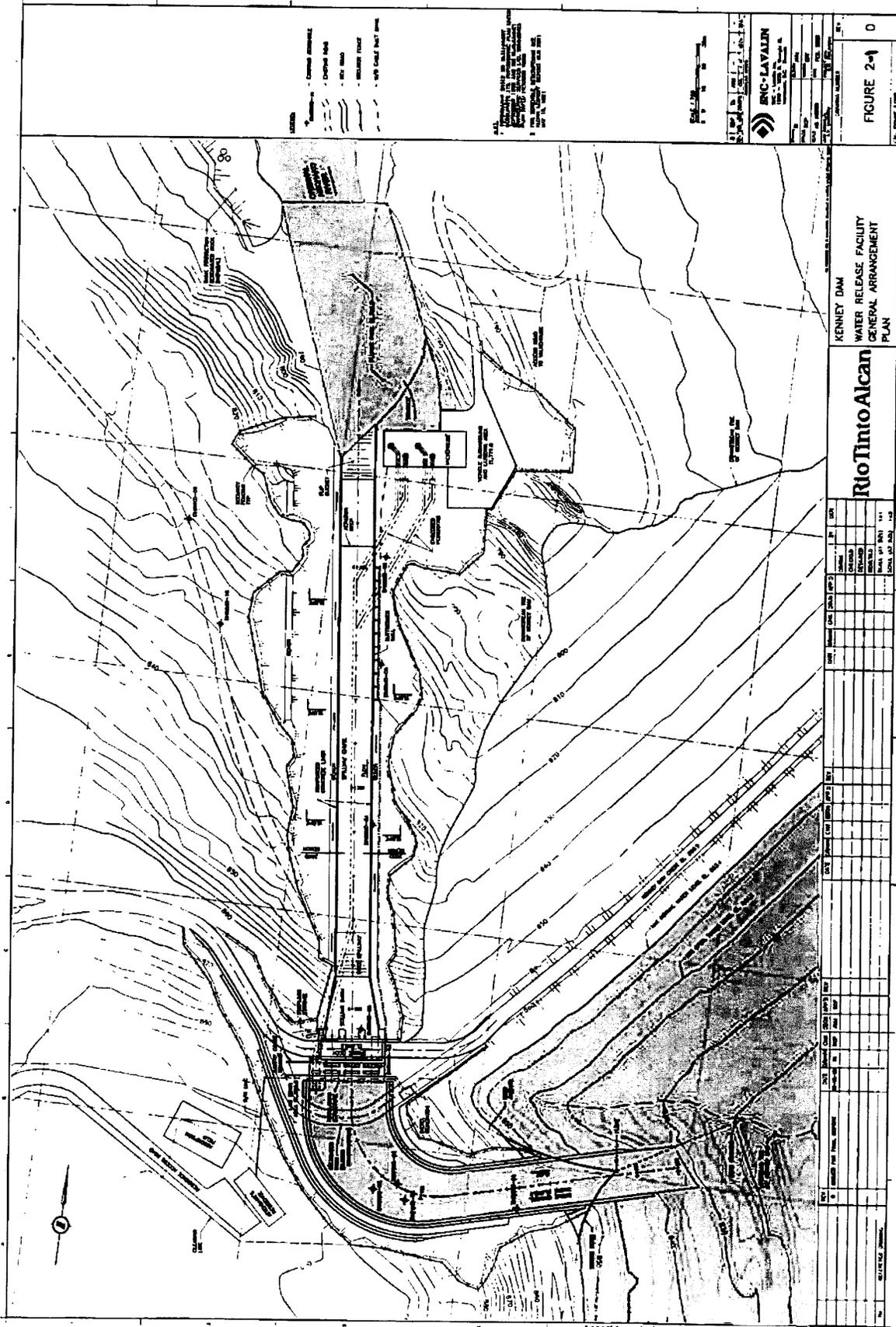
- Maximum Tailwater Level at 450 m³/s discharge 769.90 m
- Maximum Winter Tailwater Level at 45 m³/s discharge 766.74 m
- Tailwater under no-flow condition 764.50 m

2.1 INFORMATION STATUS

In their May 2009 report SNC Lavalin provided an alternative concept layout, construction planning details and a cost estimate for a WRF at Kenny Dam.²

The SNC Report describes a facility as shown in Figure 2-1.

² SNC, 2009



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The facility shown in Figure 2-1 consists of the following:

- A surface water intake channel in the left abutment of Kenney Dam;
- A release structure equipped with regulating gates and maintenance bulkheads, incorporating a bridge to maintain road access across the dam;
- A chute spillway with flip bucket energy dissipater;
- A pre-excavated plunge pool;
- Downstream left bank protection;
- A low-level outlet;
- Diesel generator power supply;
- Electrical distribution system, lighting, HVAC equipment, local and remote controls and instrumentation, and security monitoring system; and
- Accommodation for a permanent operator, with facilities for temporary accommodation of maintenance personnel situated on the left abutment, above the facility.

Using a proposed basic configuration developed in 2001 but excluding both the deep-water intakes and pipeline components, SNC Lavalin developed an alternative layout for the WRF. The alternative layout comprises three (3) surface water outlets and a low-level water outlet releasing water through a combined penstock and spillway chute. The chute will discharge via a flip bucket and the penstock via an energy-dissipating valve house, designed for future conversion into a power generating facility.

The layout, described more fully in their report includes the following components:

- An intake channel conveying water from the reservoir to the regulating structure;
- A high level outlet regulating structure with the capacity to pass 450 m³/s;

- A low-level outlet with the capacity to pass 45 m³/s via a 3 m-diameter penstock embedded below the spillway chute and leading to the valve house;
- A flip-bucket spillway designed to discharge flows greater than 45 m³/sec;
- A valve house designed to accommodate 4 energy-dissipating valves with provision to replace two valves with two horizontal axis turbine-generator units, if required in the future.

For the purposes of construction planning, the project was divided into five major areas of activity:

- Surface Water Intake Channel
- Regulating Structure
- Spillway, Flip Bucket, Plunge Pool
- Low Level Outlet
- Valve House

Construction was planned and scheduled in stages designed to maintain uninterrupted traffic to and from the dam crest as this "restriction" and the "freshet fisheries window" were both found to create the critical path for the Project.

A number of construction methodology assumptions were identified and should any of these assumptions not be accurate there could be significant implications to both the schedule and costs for the Project.

A schedule showing it would take a total of 52 months to build and commission the WRF was developed. Preliminary design (including Computational Fluid Dynamics Studies and Physical Modelling) and Regulatory approvals are shown to precede the tender and award process. The duration

of the actual construction job is 37 months from the date of award of the construction contract shown at month 15 on the overall schedule.

An estimate of costs was prepared using Heavybid (HCSS) Estimating and Bidding Software. This cost estimate did not include PST or GST, escalation costs for material and wages during the Project or annual operating and maintenance costs.

The estimated cost for construction of the WRF was determined to be \$150,583,955. This cost estimate included a 5% contingency and was reported to be accurate only to +30% due to the preliminary (pre-feasibility) level of design.

At a July 2009 NWC meeting the NES tabled and discussed the results of the completed SNC Lavalin Report. In preparation for that meeting the NES developed a Table wherein the costs estimated by SNC Lavalin were broken out by year and assigned to the activities detailed in the construction schedule. Estimates for additional items such as additional works associated with commissioning, preliminary engineering and costing, contingencies and the environmental assessment process and permitting were included. Since July, the costs associated with modifications required to the Skins Lake Spillway to accommodate the lower flows into the Cheslatta River and Lake system have been completed and the work plan and budget have been updated (Table 2.1).

The October 2009 SNC Skins Lake Spillway Water Release Facility Report presents a conceptual design and cost estimate for a water release facility at Skins Lake Spillway. The design of the facility was based on the work previously completed and in accordance with RTA design criteria. The layout developed relied

heavily upon sparse contour information and assumptions about bathymetry. For the next stage of engineering, a number of additional studies will be required.

An estimate of costs was prepared using Heavybid (HCSS) Estimating and Bidding Software. The estimated cost for construction of the facility was determined to be \$22,066,059. This cost estimate was reported to be accurate only to +30% and excludes escalation, GST and owners costs. Annual operating and maintenance costs of the facility were excluded from this estimate.

To proceed with further engineering, the environmental assessment and construction of a both a WRF at Kenny Dam and a facility at Skins Lake, the total estimated cost is \$259.4M. This estimate does not include the unknown costs for: water for commissioning the WRF, commissioning and post-commissioning environmental monitoring and Cheslatta River and Lake system rehabilitation costs.

2.2 INFORMATION GAPS

The SNC Lavalin Report identified that hydraulic model studies will be required to evaluate the proposed geometry and alignment of WRF structures for Kenney Dam WRF. These studies will comprise both, Computational Fluid Dynamic (CFD) and subsequent Physical Modelling. The computational modelling will provide valuable insight and allow improvements to be made and tested at low cost. The physical hydraulic model will provide a valuable performance check of the proposed layout.

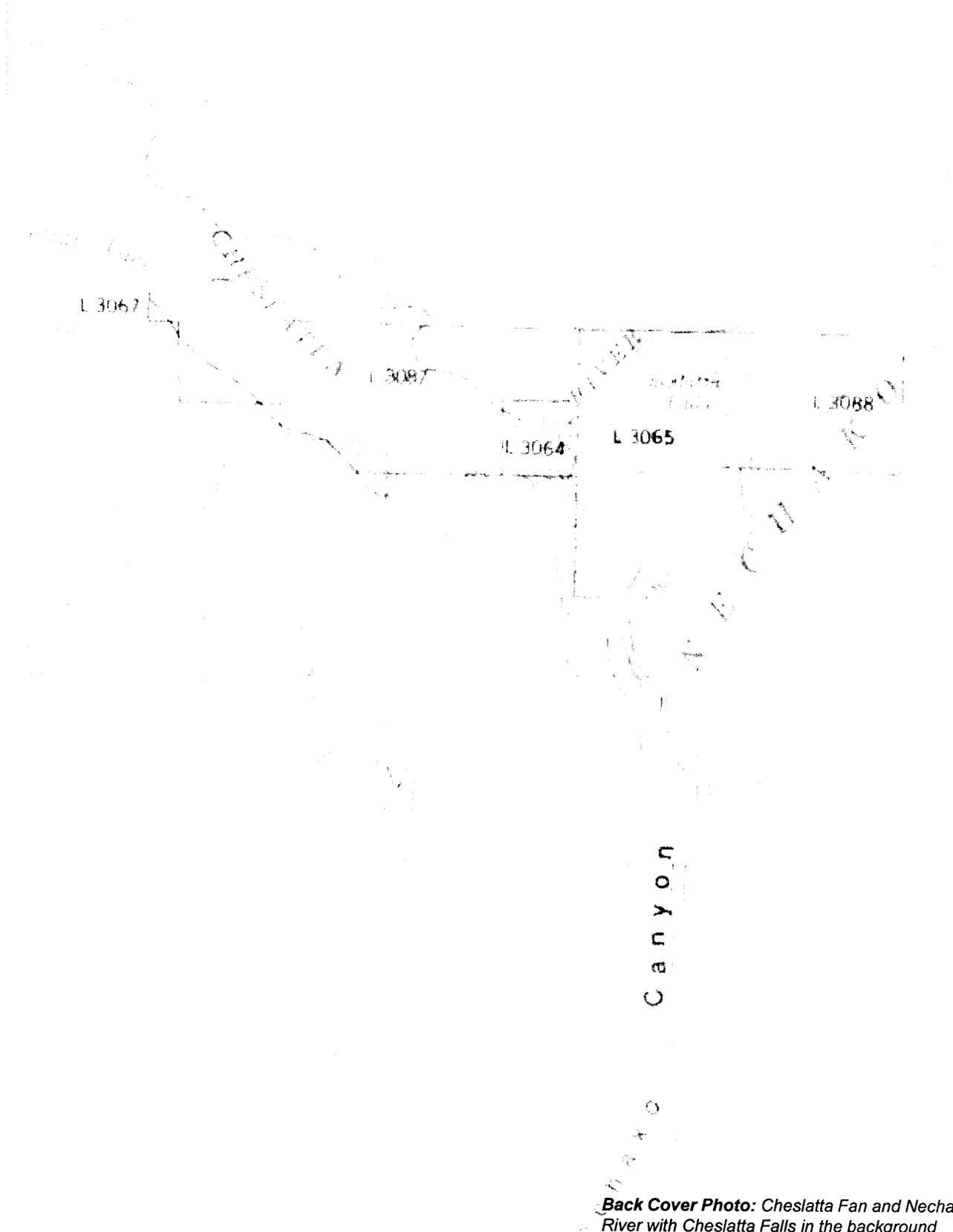
The October 2009 SNC Lavalin Report on the Skins Lake Spillway identified that topographic and bathymetric field surveys will be required. Hydraulic model studies to evaluate the proposed geometry and alignment may also be required. The feasibility of winter operations will need to be proven and all of the aforementioned studies will need to be completed before construction can proceed.

3 REFERENCES

Nechako Enhancement Society (NES). April 2008. Kenny Dam Cold Water Release Facility Interim Report (2002 – 2007).

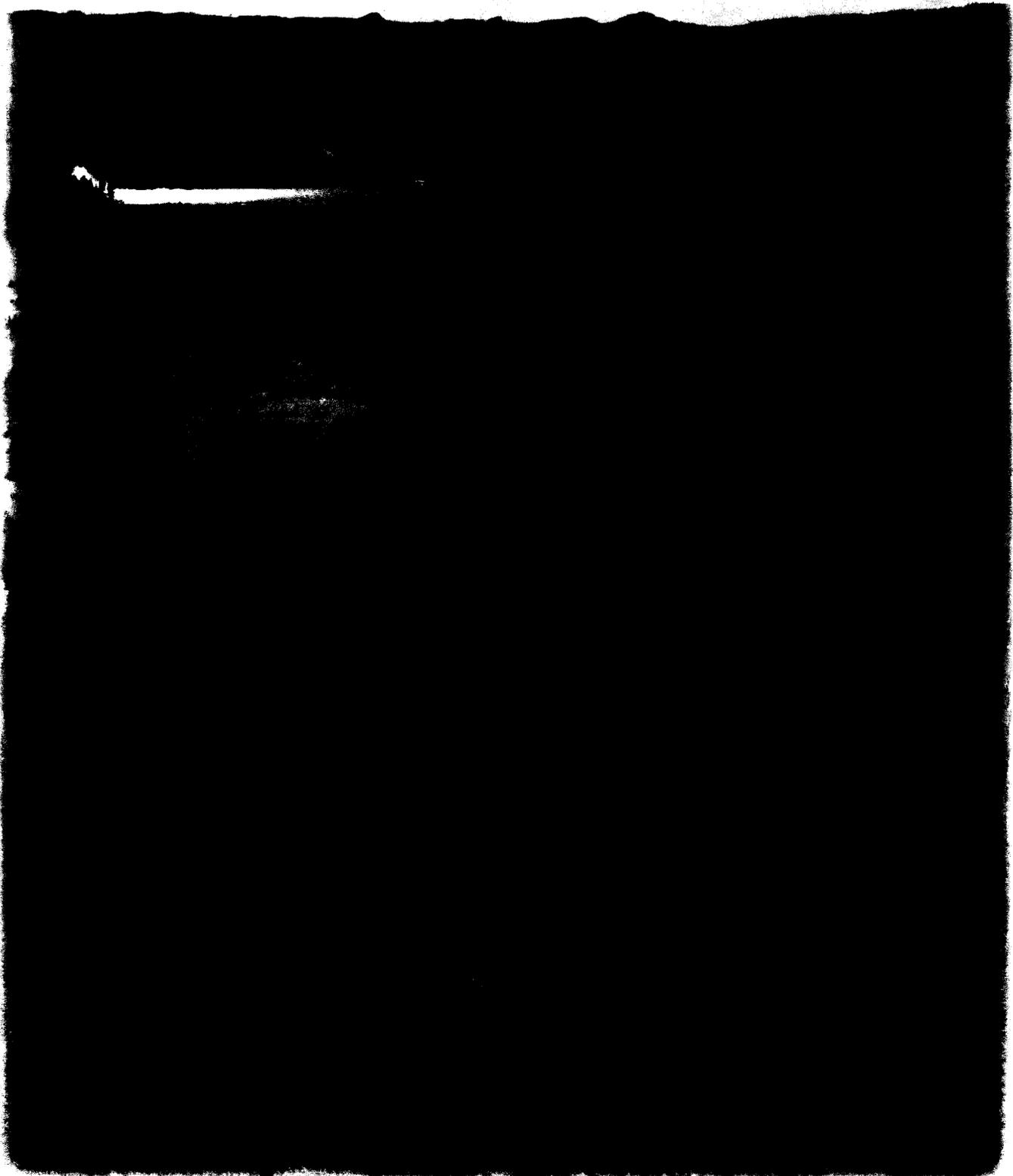
SNC Lavalin (SNC). May 2009. Water Release Facility at Kenny Dam. Alternative Concept Layout, Construction Planning and Cost, prepared for Nechako Enhancement Society.

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Back Cover Photo: Cheslatta Fan and Nechako River with Cheslatta Falls in the background

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Table 2-1 Work Plan and Budget

Kenney Dam Water Release Facility and Associated Works

	Activity	Revised Budget Estimate (\$M)
Year 9 (SNC Year 1) - WRF Preliminary Engineering and Costing		
	NEEF Management Committee Operating Fund	\$0.250
	Complete joint venture agreement between Province and RTA	\$0.250
	Develop a Nechako Environmental Conservation Program management structure	\$0.250
SNC	Preliminary Engineering of WRF, SLS & costing & construction plan including verification of flip bucket spillway design for TGP criteria (20 months)	\$3.899
SNC(p 1-1)	Contingency (30%)	\$1.170
	Geotechnical Drilling in the Cheslatta Fan	\$0.076
	Re-run sediment model with geotech data	\$0.060
	Cheslatta Fan Preliminary Engineering and Costing	\$0.250
	Cheslatta Lake & River System Flow Regimes	\$0.150
	Develop consultation plan for EA process	\$0.500
	Complete temperature and flow modelling for WRF releases - DFO and Triton	\$0.010
	Complete package in preparation for entry to EA process	\$0.040
	Project Manager	\$0.125
	Sub-Total (Cash)	\$7.030
	Provincial and RTA in-kind contributions (1 FTE each)	\$0.300
Total Year - WRF Preliminary Engineering & Costing & in-kind staff support		\$7.330
Year 10 (SNC Year 2) - Environmental Assessment Process & Permitting & Mobilization		
	Enter EA Process including consultation (18 months)	\$2.500
	Project Manager	\$0.250
	Project Office	\$0.150
	Office Operating Expenses	\$0.020
SNC	Start-up (camp establishment & start-up)	\$16.600
SNC	Contingency (30%)	\$4.980
SNC memo	Detailed Engineering	\$6.880
	Sub-Total (Cash)	\$31.380
	Provincial and RTA in-kind contributions (equivalent to 1FTE each)	\$0.300
Total Year 10 - WRF Environmental Assessment Process & Permitting & in-kind staff contribution		\$31.680
Year 11 (SNC Year 3) - Complete EA Process & Permitting & Commence Construction		
	Complete EA process including consultation	\$1.000
	Project Manager	\$0.250
SNC	Civil works	\$55.000
SNC	Contingency (30%)	\$16.500
	Sub-Total (Cash)	\$72.750
	Provincial and RTA in-kind contributions (equivalent to 1FTE each)	\$0.300
Total Year 11 - WRF Complete Environmental Assessment process & in-kind staff contribution		\$73.050
Year 12 (SNC Year 4) - WRF Construction		
SNC	Structures (bridge, spillway, flipbucket, powerhouse shell, liner, valves etc)	\$65.000
SNC	Contingency (30%)	\$19.500
	Sub-Total (Cash)	\$84.500
	Provincial and RTA in-kind contributions (equivalent to 1FTE each)	\$0.300
Total Year 12 - WRF Construction		\$84.800
Year 13 (SNC Year 5) - WRF Mechanical & Electrical, SLS Modifications, Cheslatta Fan Channel		
SNC	Mechanical & electrical	\$10.000
SNC	Contingency (30%)	\$3.000
SNC	Skins Lake Spillway Modification	\$22.066
	Cheslatta Fan - armoured channel	\$10.000
RTA	Owners Costs: Commissioning/Start-up (5% of \$172M)	\$8.600
	Sub-Total (Cash)	\$53.666
	Provincial and RTA in-kind contributions (equivalent to 1FTE each)	\$0.300
Total Year 13 - Mechanical & Electrical, SLS Modifications, Cheslatta Fan Channel		\$53.966
WRF Total Cash		\$249.326
WRF Total In-Kind support (RTA and BC Government)		\$1.500
Total Year 9 - 13 (Cash + In-Kind)		\$250.826
WRF Scope Change Contingency		
SNC	Scope Change (5% contingency on \$172M)	\$8.600
Total - Scope Change Contingency		\$8.600
TOTAL (WRF & ASSOCIATED WORKS)		\$259.426
Reference:		
SNC Lavalin, May 2009. Water Release Facility At Kenney Dam: Alternative Concept Layout, Construction Planning and Cost. Prepared For: Nechako Enhancement Society.		

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Kenney Dam Water Release Facility and Associated Works

SUMMARY:

Year	Activities	Budget Estimate (\$M)
1	WRF & SLS Preliminary Engineering and Costing, Complete Preparation for Environmental Assessment Review	\$7.330
2	Environmental Assessment and Permitting & Mobilization	\$31.680
3	Complete Environmental Assessment and Permitting & Commence Construction	\$73.050
4	Water Release Facility Construction	\$84.800
5	Water Release Facility Mechanical and Electrical, SLS Modifications, Cheslatta Fan Channel	\$53.966
	Scope Change Contingency	\$8.600
TOTAL For WRF & Associated Works		\$259.426



Executive Summary
Work Completed Towards a Water Release Facility at Kenney Dam
2001 - 2009

November 24, 2009

Construction of a Water Release Facility at Kenney Dam has been the subject of much discussion, investigation and study since it was first put forward by the International Pacific Salmon Fisheries Commission in the early 1950s.

In 1997 an agreement was reached between Alcan and the Province of British Columbia on the establishment and administration of the Nechako Environmental Enhancement Fund. The 1997 Alcan/BC Settlement Agreement (the Agreement) established that funding contributed "by another person" into the Nechako Environmental Enhancement Fund (NEEF) requires Rio Tinto Alcan (formerly Alcan) to match the contribution within 7 days. The aggregate and cumulative maximum of Rio Tinto Alcan's contribution to the Fund is CAD\$50,000,000 including eligible NEEF Management Committee contributions.

As an outcome of the Agreement, the tripartite Nechako Environmental Enhancement Fund Management Committee (NEEF-MC) was

formed and mandated to "...review, assess and report on options that may be available for the downstream enhancement of the Nechako watershed area." Between 1997 and the submission of its final report in 2001 the NEEF-MC consulted with a large number of stakeholders and considered a number of options for downstream enhancement before reaching their decision that the best use of NEEF would be to construct a Cold Water Release Facility (CWRF) at Kenney Dam. This was based on the assumption that the colder water released from Kenney Dam would result in "freed-up" flows; that is, water previously required to meet temperature requirements for migrating salmon in July and August would no longer be needed because the CWRF would release colder water. That excess water would therefore be available for re-distribution to other times of the year to create a more natural flow regime in the Nechako River.

In August 2001, a delegation from the Nechako Watershed Council (NWC)¹ met with provincial ministers, Members of the Legislative Assembly and senior provincial staff, to commend the NEEF MC's decision to build a Cold Water Release Facility (CWRf) at Kenney Dam, and offer support and assistance to implement that decision. One outcome of these meetings was a request that the NWC draft a work plan outlining the activities and costs required for construction of the CWRf. In 2002 the work plan, prepared cooperatively by the NWC, the Province of British Columbia and Alcan, was submitted by the NWC to Alcan and the BC Government. The work plan describes the activities required to culminate in construction and commissioning of a CWRf at Kenney Dam. The government and Alcan agreed to implement the work plan and in the spring of 2002, the Nechako Enhancement Society (NES), a not for profit society with members from the Province of British Columbia and Rio Tinto Alcan, was established to serve as a vehicle for funding and implementing work plan activities.

By 2008, seven years of work outlined in the NWC work plan had been undertaken, at a cost of \$1.48M, to address technical issues of uncertainty, identify regulatory criteria for permitting and to determine the benefits, risks and costs of a Cold Water Release Facility. Much of this work, involved close collaboration with both federal (DFO) and provincial (MOE) regulators, and has removed previous uncertainties on a number of technical matters and clarified regulatory criteria that would need to be met if construction and operation of a CWRf were to proceed. The rehabilitation of the Murray Cheslatta Lake and River system was confirmed as the most significant benefit to be realized with the construction of a CWRf at Kenney Dam. Rehabilitation is contingent on a water release facility at Kenney Dam to re-route the large summer temperature management flows, and flood flows, and re-profiling of the hydrograph in the Cheslatta system. Some additional Nechako River downstream benefits have been identified. However most of the Nechako River downstream benefits are flow dependent and thus will be affected by temperature criteria and how much "freed up" flow is subsequently available.

¹ The 1997 BC/Alcan Agreement specified that the Nechako Watershed Council be formed "in order to provide advice to the Management Committee on the uses and priorities of the Nechako Environmental Enhancement Fund". Formed in June 1998, the Nechako Watershed Council's (NWC) purpose is to "enhance the long-term health and viability of the Nechako Watershed with consideration for all interests, and to provide a forum to address water management and related issues in the Watershed and to work toward cooperative resolution of these issues". The NWC consists of 26 groups, including industry, community, business, First Nations, local government, non-government and government representatives.

In April 2008, the NES presented to the NWC, a factual summary of all the technical issues, risks and uncertainties (construction of deep water intake and Cheslatta Fan sediment transport) that remain for a CWRf.² Included was a

² Kenney Dam Cold Water Release Facility. Interim Report (2002 – 2007). Nechako Enhancement Society. April 2008.

discussion of the fact that ongoing work by DFO suggests that there may be a requirement to define new temperature criteria for that portion of the Nechako River downstream of the Stuart River confluence and that this in turn may result in little or no freed up water being available for downstream enhancement. Also discussed were the results of an updated cost estimate which showed that the estimated costs of construction had almost doubled compared to the 2001 NEEF Management Committee estimate. At a subsequent, June 2008 NWC meeting, the NWC concluded that because of the engineering risks, lack of "freed-up" flows and escalating cost, a CWRF was no longer the preferred option. A surface WRF would result in similar flow releases, fewer engineering risks and lower costs and would allow the primary benefit of rehabilitation of the Cheslatta River and Lake System, but "freed-up" flows for downstream environmental enhancement would be minimal, if any. Therefore, the NWC directed the NES to obtain a detailed cost estimate for a simplified surface Water Release Facility (WRF) at Kenny Dam.

At a July 2009 NWC meeting the NES tabled and discussed the results of the completed SNC Lavalin Report which provided a modified surface WRF design, detailed cost estimate (including 30% contingency) and construction schedule for a WRF at Kenny Dam. To proceed with further engineering, the environmental assessment and construction of a WRF, the estimated cost is \$223.6M plus an estimated \$35.8M for a partially armoured channel

through the Cheslatta Fan and modifications required to the Skins Lake Spillway to accommodate the lower flows into the Cheslatta River and Lake system. The project spans a 5-year period (see Table 1). This \$259.4M estimate does not include the unknown costs for: Water for commissioning the WRF; commissioning and post-commissioning environmental monitoring and Cheslatta River and Lake System rehabilitation.

The NWC has completed all of the activities in the 2002 NWC Work Plan to the point where key decisions must be made before additional work proceeds. Those decisions include:

1. The NEEF Management Committee decision is "binding on the parties", subject to the financial arrangements and other terms described in the 1997 Agreement. Their decision in 2001 was a Cold Water Release Facility. To change the decision, the NEEF Management Committee must be reconvened.

If the NEEF Management Committee decision is a Water Release Facility then,

2. A project proponent is required.
3. Funding must be secured. According to the 1997 BC/Alcan Agreement, RTA's commitment is up to \$50M (minus eligible expenses already expended as detailed in Schedule 4 of the 1997 Agreement) in matching funds contributed to NEEF by "another person".

**Nechako Watershed Council
Executive Summary**

Table 1. Summary of activities and budget required over 5 years to construct and commission a water release facility at Kenney Dam.

Year	Activities	Budget Estimate (\$M)
1	WRF Preliminary Engineering and Costing and Complete Preparation for Environmental Assessment Review	\$7.330
2	Environmental Assessment Process and Permitting	\$31.680
3	Complete Environmental Assessment and Permitting	\$73.050
4	Water Release Facility Construction	\$84.800
5	Water Release Facility Mechanical and Electrical, Cheslatta Fan Channel, Skins Lake Spillway Modifications	\$53.966
	Scope Change Contingency	\$8.600
TOTAL		\$259.426

NWC Work Plan Tracking Record

24 November 2009

	STATUS	ACTIVITY	
Year One 2002 \$100K - Province \$100K - Alcan	█	Establish Implementation Process - NES	NWC WORKPLAN PHASES LEGEND █ Activities Completed ▨ Activities Underway □ Activities Planned PHASE 1 - Planning - PHASE 2 - Pre-Engineering & Environmental Review Total Budget to end Yr. 8: \$740K - Province \$831K - Rio Tinto Alcan PHASE 3 - Implementation -
	█	Fund NWC for related discussions	
	█	Information & Communication Program	
	█	Compile Background Information	
	█	Assess Public Interest re: "Flows"	
	█	Cheslatta Fan Study	
	█	Nechako Canyon Debris Study	
Year Two 2003 \$100K - Province \$100K - Alcan	█	Fund NWC for related discussions	
	█	Fish Entrainment at CWRF	
	█	Release Water Temperature Studies	
	█	Total Gas Pressure Study	
Year Three 2004 \$100K - Province \$100K - Alcan	█	Fund NWC for related discussions	
	█	Summary Report on Flow Discussion	
	█	Reservoir Hydrothermal preliminary study	
	█	Sedimentation Requirements - follow up to EDI study (TOR)	
Year Four 2005 \$100K - Province \$100K - Alcan	█	Contract a Technical Advisor	
	█	Murray Cheslatta System Literature Review	
	█	Reservoir Hydrothermal Study - Year 1	
	█	Total Gas Pressure Technical Workshop	
	█	Cheslatta Fan Sedimentation Technical Workshop	
	█	Benefits Assessment	
	█	Murray Cheslatta Habitat Assessment Report	
Year Five 2006 \$120K - Province \$120K - Alcan	█	Fund NWC for related discussions	
	█	Contract with Technical Advisor	
	█	Murray-Cheslatta Rehabilitation Technical Workshop	
	█	Temperature Workshop with DFO	
	█	Reservoir Hydrothermal Study - Year 2	
	█	Cheslatta Fan Sediment Studies	
Year Six 2007 \$120K - Province \$120K - RioTintoAlcan	█	Summary Report of Technical Workshops	
	█	Second Temperature Workshop with DFO	
	█	Fund NWC for related discussions	
	█	Contract with Technical Advisor	
	█	Cheslatta Fan Sediment Study	
	█	Viability of Pilot Channel	
	█	Cheslatta Lake Core Sampling	
	█	Additional Temperature/Flows work with DFO	
	█	Costing CWRF	
█	Interim Evaluation of CWRF Option		
Year Seven 2008 \$100K - Province \$100K - RioTintoAlcan	█	Temperature/Flow scenarios and risk assessment for Nechako R.	
	█	Cheslatta Fan - sediment and commissioning investigations	
	█	Rehabilitation Opportunities - Murray-Cheslatta	
	█	Temperature/Flows - Nechako River	
	█	Costing of WRF	
Year Eight 2009 \$91K - RioTintoAlcan	█	Technical Manager (Reports, Meetings, Workshops, EA Strategy)	
	█	Costing of WRF	
	█	Technical Manager (Reports, Meetings, Workshops)	
Years 9 - 13	█ RTA/Province of BC - Decision on Next Steps	SEE OVER	

...see over for PHASE 3

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Years 9 - 13

	STATUS	ACTIVITY
Year Nine Budget Estimate \$7.330M	PRELIMINARY ENGINEERING & COSTING	
	<input type="checkbox"/>	Identify Project Proponent
	<input type="checkbox"/>	WRF & SLS Preliminary Engineering and Costing
	<input type="checkbox"/>	Cheslatta Fan Preliminary Engineering and Costing
	<input type="checkbox"/>	Cheslatta Lake and River System Flow Regimes
	<input type="checkbox"/>	Prepare Package for Entry to Environmental Assessment Process
Year Ten Budget Estimate \$31.680M	ENVIRONMENTAL ASSESSMENT PROCESS, PERMITTING & MOBILIZATION	
	<input type="checkbox"/>	Enter Environmental Assessment Process, including consultation (18 months)
	<input type="checkbox"/>	Detailed Engineering
	<input type="checkbox"/>	Construction camp establishment
Year Eleven Budget Estimate \$73.050M	COMPLETE ENVIRONMENTAL ASSESSMENT, PERMITTING & COMMENCE CONSTRUCTION	
	<input type="checkbox"/>	Complete EA process, including consultation
	<input type="checkbox"/>	Begin Civil Works
Year Twelve Budget Estimate \$84.800M	WRF CONSTRUCTION	
<input type="checkbox"/>	Structures (bridge, spillway, flipbucket, powerhouse shell, liner, valves, etc)	
Year Thirteen Budget Estimate \$53.966M	WRF MECHANICAL AND ELECTRICAL, SLS, CHESLATTA FAN	
	<input type="checkbox"/>	Mechanical and electrical installations
	<input type="checkbox"/>	Skins Lake Spillway modifications
	<input type="checkbox"/>	Cheslatta Fan Pilot Channel with Selected Armouring
	<input type="checkbox"/>	Commissioning
Budget Estimate \$8.600M	OTHER COSTS	
<input type="checkbox"/>	Scope Change WRF & SLS (5% contingency on \$172M)	
Total Year 9 - 13 Budget Estimate \$259.426M		

NWC WORKPLAN PHASES

PHASE 3
Implementation

November 27, 2009

FREQUENTLY ASKED QUESTIONS

1. Who is the Nechako Watershed Council and what does it do?

The NWC is a diverse, multi-stakeholder group comprised of governments, First Nations, communities, environmental and business interests. The Nechako Watershed Council mission statement is "To enhance the long-term health and viability of the Nechako Watershed with consideration for all interests, and to provide a forum to address water management and related issues in the Watershed and to work toward cooperative resolution of these issues."

2. Who established the Nechako Watershed Council and why?

The Nechako Watershed Council was formed voluntarily by diverse groups with interests in the watershed. These parties came together following the signing of the 1997 BC/Alcan Settlement Agreement "in order to provide advice to the (Nechako Environmental Enhancement Fund) Management Committee on the uses and priorities of the Nechako Environmental Enhancement Fund".

3. Why does the Nechako Watershed Council support construction of a Water Release Facility at Kenney Dam?

The Nechako Watershed Council undertook a thorough and comprehensive process to identify the critical issues facing the Nechako watershed. Twenty six issues were identified and after much discussion, debate and studies, the Nechako Watershed Council has concluded that the only option that allows rehabilitation of the Cheslatta River and Lake System while also meeting other interests is a Water Release Facility at Kenney Dam.

4. Are First Nations involved?

Yes. The Cheslatta Carrier Nation, which would benefit most directly from a Water Release Facility has participated in discussions since 1996 and is an active member of the Nechako Watershed Council. The Lheidli T'enneh First Nation is a founding member of the Council and the Carrier Sekani Tribal Council, which was actively involved in forming the Nechako Watershed Council, continues to be kept fully informed. A 1998 general assembly resolution of the BC Aboriginal Fisheries Commission supported construction of "a multi-level water release facility at the Kenney Dam to facilitate water management to support wild salmon recovery".

5. Why is the Nechako Watershed Council recommending a surface Water Release Facility instead of the Cold Water Release Facility?

Initially the Nechako Watershed Council recommended a Cold Water Release Facility however such a structure requires a deep water intake that is expensive and has some potential engineering challenges. In addition, work by DFO showed that the anticipated benefit of being able to release smaller volumes of colder water so as to redistribute water releases for the benefit of other users could not be realized because the smaller volumes of water would warm up faster, putting fish at risk. Therefore a Cold Water Release Facility was not worth the cost and risk.

November 27, 2009

6. What are the benefits of a Water Release Facility at Kenney Dam?

The main benefits of the water release facility include:

- Rehabilitation of Cheslatta Watershed. A WRF is the only opportunity to reduce the high summer flows and flood flows that currently go through the Cheslatta River and Lake System, allowing rehabilitation of that watershed and an opportunity for economic development by the Cheslatta Carrier Nation and others.
- Increased efficiency of Cooling Flows. As flows will be released from the reservoir directly into the Nechako River, in the summer when cooling flows are needed for salmon, the water will have less time to warm up so there should be more efficient use of flows.
- Creation of fish habitat in the Nechako Canyon. Nine kilometres of habitat will be restored with the return of flows from the reservoir directly into the Nechako River at Kenney Dam.

7. Why is the Nechako Watershed Council concerned about sturgeon?

The Nechako White Sturgeon population plays a key role in the ecology of the Nechako River and has contributed to human communities in the watershed for thousands of years. This important fish stock is now at serious risk of extinction and has international significance under the Canadian Species at Risk Act. The Nechako Watershed Council is supportive of, and advocates for, sturgeon population recovery. The Nechako Watershed Council mission statement is "To enhance the long-term health and viability of the Nechako Watershed with consideration for all interests, and to provide a forum to address water management and related issues in the Watershed and to work toward cooperative resolution of these issues."

8. Will a Water Release Facility help with the sturgeon issue?

It is unknown whether a water release facility would have any influence on sturgeon survival or recovery. The cause of the sturgeon population decline is believed to be that the young are not surviving to adulthood. The Nechako White Sturgeon Recovery Initiative is responsible for implementation of the recovery strategy which includes habitat protection, restoration and management options. The most time sensitive initiative is a white sturgeon hatchery of which the Nechako Watershed Council is fully supportive.

9. What other options for downstream environmental enhancement has the Nechako Watershed Council considered?

Options that have been suggested include in-stream works to improve fish habitat and spawning beds, creation of a long-term fund to support conservation and stewardship activities, improved cattle fencing, a fish hatchery, and vegetation work to improve habitat for birds (NEEF MC Report, 2001, page 6). However the Nechako Watershed Council recommends a Water Release Facility because none of these other options provide the benefit of rehabilitation of the Cheslatta Watershed and creation of nine kilometres of habitat in the Nechako Canyon.

10. How much will it cost to build the Water Release Facility and who will pay for it?

The water release facility and associated works are estimated to cost \$259.4M. The Nechako Watershed Council recommends that the Nechako Environmental Enhancement Fund be used to pay for this project. The Fund is part of the 1997 BC/Alcan Agreement in which Rio Tinto Alcan committed to contribute up to \$50M in matching funds once a contribution is made into the Nechako Environmental Enhancement Fund by another "person". That other 'person' is not defined in the Agreement.

NWC Frequently Asked Questions on a Water Release Facility

November 27, 2009

11. How would the Water Release Facility be funded?

The Nechako Watershed Council has developed a work plan that spreads the work and the costs over 5 years. The Nechako Watershed Council recommends that the Nechako Environmental Enhancement Fund be a source of the funds and that the BC Government has the primary responsibility to provide the balance of the money required to construct a water release facility at Kenney Dam.

12. Given the current economic climate, is a Water Release Facility really the best use of \$259M?

The water release facility is, in the opinion of the Nechako Watershed Council, the best solution for environmental enhancement of the downstream Nechako Watershed. So although it is a lot of money, there are significant benefits that cannot be achieved in any other way, such as rehabilitation of the Cheslatta Watershed.

13. How do you know that a Water Release Facility will enhance the downstream environment?

A water release facility would provide rehabilitation opportunities in the Cheslatta River and Lake System that cannot be achieved by any other means and there will be other benefits to the Nechako Watershed including rehabilitation of the Nechako Canyon and more efficient cooling of summer flows for salmon.

14. What will be the impact on the fish and other species within the system?

Redirecting reservoir discharge from the Cheslatta Watershed to Kenney Dam will provide fisheries and environmental enhancement opportunities in the Cheslatta Watershed that cannot be achieved by any other means. The Cheslatta Fan in the Nechako River has a lot of sediment that could be released when the water release facility is commissioned. Mitigation measures will have to be implemented to ensure that the sediment does not deposit on sensitive habitat for salmon, sturgeon or other species.

15. How will climate change affect this project?

The exact impacts of climate change are unknown, however having a water release facility at Kenney Dam would allow for greater flexibility for releasing water from the reservoir. Also, with water from the reservoir being released at Kenney Dam straight into the Nechako River in the summer, there will be more efficient use of the flows to meet the temperature targets for salmon.