

April 26, 2013

City of Nanaimo 455 Wallace Street Nanaimo, BC V9R 5J6

Bill Sims, AScT Manager, Water Resources

Dear Mr. Sims:

Removal of Middle and Lower Chase Dams

1 INTRODUCTION

Klohn Crippen Berger (KCB) is pleased to submit to the City of Nanaimo (the City) the a 90% complete submission for the consulting services we have provided towards the removal of the Middle and Lower Chase Dams and renaturalization of the exposed reservoir bottoms. The work conducted by KCB on this project has been conducted under a City contract signed on December 14, 2012.

The documents submitted at this juncture include the following:

- 90% complete drawings for dam removal and reservoir bottom renaturalization;
- A construction cost estimate for completion of these works. Tables R1 to R5 are directly comparable to the cost estimate summaries for all options developed for the Options Costing Report.
- A draft tender Schedule of Quantities.

It is understood that this submission will be reviewed by City Council in conjunction with another report submitted by KCB under a separate cover for conceptual cost estimates for dam rehabilitation and reconstruction options. The purpose of City Council's review of these documents is to re-assess the October 2012 decision to removal the subject dams.

2 SCOPE OF WORK

KCB's scope of work for this project has to date included the following phases:

- Phase 01 Scope development and attendance at November 8, 2012 Open House;
- Phase 02 Project Management;

130426 90 Percent Design Submission.docx

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- Phase 03 Initial Support to the City;
- Phase 04 Snuneymuxw First Nation Engagement;
- Phase 05 Public Consultation;
- Phase 06 Biophysical Assessments (in three stages: Overall habitat, Terrestrial and Aquatic/Fisheries);
- Phase 07 Permitting/Regulatory review;
- Phase 08 Archaeological Assessment(s);;
- Phase 09 –Other studies (not required to date);
- Phase 10 Preliminary Engineering;
- Phase 11 Support to City during contractor Procurement Process;
- Phase 12 Detailed Engineering;
- Phase 13 Renaturalization Design;
- Phase 14 Dam removal monitoring (scope not prepared nor approved); and
- Phase 15 Monitoring of renaturalization efforts.

KCB's scope of work for each phase of this assignment were presented to the City in the following proposal submissions:

- Phase 09 Archaeological Assessments All archaeology work was completed by Madrone Environmental Services Ltd. of Duncan, BC;
- Phase 12 Detailed Engineering Sampling GPR scanning and related field work and laboratory testing were completed by Lewkowich Engineering Associates Ltd. of Nanaimo, BC.; and
- Phase 13 Renaturalization Design Landscape architecture services were provided by Gemella Design Ltd. (Gemella) of Nanaimo, BC.

3 PROGRESS OF KCB SCOPE OF WORK

At this time, the following phases of work are active with deliverables that will be submitted between now and mid-summer 2013 (just before tentatively scheduled dam removal works will begin):

- Phase 04 Snuneymuxw First Nation Engagement Communications and information exchange to assist the Snuneymuxw in assessing this project are underway;
- Phase 5 Public Consultation This phase will ramp up if Council affirms their October 2012 decision to removal the dams and renaturalize the Chase River valley;

- Phase 06 Biophysical Assessments specifically the terrestrial and aquatic/fisheries components which, due to the seasonality of such work, will continue until mid-summer;
- Phase 07 Regulatory Permitting Permits for dam removal and fisheries authorization are being submitted for the dam removal option;
- Phase 09 Archaeological Assessments At this time an Archaeological Overview has been completed that has made recommendations for further archaeological work to be completed;
- Phase 12 Detailed Engineering specifically completion of specifications and tender documents, as well as refinement of the 90% complete drawings and cost estimate; and
- Phase 13 Renaturalization design The renaturalization design has been completed as much as possible at this time. Further information from public consultation meetings as well as information gleaned from reservoir bottom inspection and sediment removal will result in revisions to the renaturalization concepts and layout presented on the attached drawings.

4 90% COMPLETE DRAWINGS

KCB has prepared 90% complete drawings that will be used to guide the removal of the subject dams and renaturalize the exposed reservoir bottoms. The content of the drawings is based on a Design Basis Memorandum dated February 22, 2012 (REV. 1) that was prepared based on the results of KCB's initial studies and City input from their Parks and Recreation and Engineering departments.

The drawings consist of three groups of drawings that pertain to the following general tasks associated with the removal of the subject dams and renaturalization of their reservoir bottoms:

- Removal of dam structures and decommissioning of spillways (C001 to C007);
- Renaturalization of the reservoir bottoms (L001 to L004); and
- Construction of bridges to maintain the continuity of the park trails (S001 to S004).

The 90% complete drawings are attached to this letter. Note that reduction in renaturalization extents due to the recent decision to preservation the Lower Dam Spillway concrete has not yet been modified on drawing L003.

5 COST ESTIMATE FOR REMOVAL AND RENATURALIZATION

In order to ensure consistency, the cost estimating for dam removal and renaturalization was conducted in conjunction with the cost estimating for the conceptual options for rehabilitation and replacement. Review of the various options that KCB was requested to consider by the City (in response to options presented by the Colliery Dam Preservation Society, a local citizen's group lobbying for saving the dams) indicated that the dam reconstruction and dam replacement options included removal of one or both dams and possible renaturalization of one of the reservoirs. As such,

it made sense to group the cost estimating for all removal/renaturalization, rehabilitation and replacement in one consistent cost estimating effort.

The attached 90% complete drawings were used for quantity take offs which were in the basis of the estimation of costs for removal and renaturalization. The unit costs for the tasks involved in removing the dams and renaturalization efforts were derived from the following sources:

- KCB's experience on dam engineering and construction projects in British Columbia;
- City experience with cost estimates for materials and similar construction works;
- KCB experience with renaturalization and restoration works as well as erosion and sedimentation control in western Canada.

Tables R1 to R5 presenting KCB's cost estimate for dam removal and renaturalization works are attached to this letter. The estimated cost construction for dam removal and renaturalization is \$4,500,000 excluding GST and PST. Including engineering and other City costs, the total project cost is estimated at \$5,500,000. These estimates are considered accurate to within 20%.

6 CLOSURE

Please do not hesitate to contact the undersigned if you have any questions or comments regarding this submission.

Yours truly, KLOHN CRIPPEN BERGER LTD.

Chris K. Grapel Manager – Civil Projects

Reviewed by: Robin J. FitzGerald

CKG/RJF:md



90% Design Submission



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C-001	GENERAL SITE LOCATION PLAN AND DRAWING LIST
C-002	EXISTING PLAN AND PROFILE
C-003	CONSTRUCTION AREA PLAN
C-004	RIVER DIVERSION PIPELINE PROFILE
C-005	MIDDLE DAM EXCAVATION PLAN AND SECTIONS
C-006	LOWER DAM EXCAVATION PLAN
C-007	LOWER DAM EXCAVATION SECTIONS
L-001	MIDDLE DAM AREA LANDSCAPING PLAN
L-002	MIDDLE DAM AREA LANDSCAPING SECTIONS
L-003	LOWER DAM AREA LANDSCAPING PLAN
L-004	LOWER DAM AREA LANDSCAPING SECTIONS
L-005	LANDSCAPING DETAILS
S-001	MIDDLE DAM BRIDGE PLAN AND ELEVATION
S-002	MIDDLE DAM BRIDGE SECTIONS AND DETAILS
S-003	LOWER DAM BRIDGE PLAN AND ELEVATION
S-004	LOWER DAM BRIDGE SECTIONS AND DETAILS
S-005	STRUCTURAL SPECIFICATIONS

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Tables R1 to R5

City of Nanaimo CHASE RIVER DAMS - REHABILITATION/REPLACEMENT CONCEPTUAL COST ESTIMATES

Cost Code			Risk Contingency		
(see tables R2 to			allowance added		
R5)	Cost Component	Remarks	to base estimate	cos	T ESTIMATE
	MIDDLE DAM				
		clean material to lakebed,			
RM1-M + RM2-M	Remove Middle Dam	concrete offsite	10%	\$	426,800
		Establish river channel and			
RN1-M	Renaturalise Lakebed and dam areas	landscape	10%	\$	911,900
NS2-M	New Footbridge (Middle)	incl. abutments	20%	\$	217,200
	LOWER DAM				
		clean material to lakebed,			
RM1-L + RM2-L	Remove Lower Dam	concrete offsite	10%	\$	1,025,200
		establish river channel and			
RN1-L	Renaturalise Lower Lake and dam area	landscape	10%	\$	957,000
NS2-L	New Footbridge (Lower)	incl. abutments	20%	\$	213,600
	COMMON				
	Drain Lakes			\$	50,000
OH1	River Flow Diversion		20%	\$	208,000
	Mob/demob/General Conditions	10% of above total		\$	400,970
RN3	Restore and Landscape Laydown Areas		20%	\$	45,000
OH2	Engineering	Design and Construction Phases	20%	\$	538,400
OH4	City Admin Costs	10% of above total		\$	499,407
		TOTAL PROJECT ESTIMATE		\$	5,493,477

Project Cost Estimate Breakdown

General Requirements (incl. Diversion)	\$	703,970
Remove Both Dams	\$	1,452,000
New Footbridges (2)	\$	430,800
Renaturalize both lake and dam areas	\$	1,868,900
Total Construction Contract Estimate	\$	4,455,670
Total Construction Contract Estimate Engineering	\$ \$	4,455,670 538,400
Total Construction Contract Estimate Engineering City Administration Costs	\$ ፡ኁ	4,455,670 538,400 499,407

City of Nanaimo MIDDLE AND LOWER CHASE RIVER DAMS DAM REMOVAL AND RENATURALIZATION

CONCEPTUAL COST ESTIMATES

					MIDD	LE D	AM	LOW	RD	AM	
ITEM NO.	DESCRIPTION	UNIT OF MEASURE	UN	NIT RATE	ESTIMATED QUANTITY	то	TAL PRICE	ESTIMATED QUANTITY	то	TAL PRICE	
RM1	Demolish Dam										
RM1.1	Misc. items within Dam extents (Demolish and Dispose off-site)										
	Existing Asphalt Surfaced Trail on Dam	sq.m.	\$	20	200	\$	4,000				
	Catchbasin	LS	\$	1,000	1	\$	1,000				
	V-Notch Seepage Monitoring Weir and Structure	LS	\$	5,000	1	\$	5,000				
	Wooden Fence	lin.m.	\$	20	42	\$	840				
	Chain Link Fence	lin.m.	\$	20				75	\$	1,500	
	Metal Railing and concrete bags	LS	\$	1,000	1	\$	1,000	1	\$	1,000	
	100 dia PVC drain	LS	\$	500	1	\$	500	1	\$	500	
	Park Benches	each	\$	500				3	\$	1,500	
	Signs	each	\$	100				1	\$	100	
	Concrete Picnic tables	each	\$	500				1	\$	500	
	SCADA pole	LS	\$	2,000	1	\$	2,000	1	\$	2,000	
	RM1.1 Subtotal					\$	14,000		\$	7,000	
RM1.2	Remove and Dispose of Dam Fill Materials (*in-lake, on-site)										
	Clear and Grub, topsoil removal , stockpile	sq.m.	\$	10	1800	\$	18,000	4,120	\$	41,200	
	Demolish and Dispose of Concrete Dam Face and walls*	cu.m.	\$	200	130	\$	26,000	340	\$	68,000	incl intake tower
	Excavate and dispose of Original Rockfill *	cu.m.	\$	50	2720	\$	136,000	6720	\$	336,000	
	Excavate and dispose of Compacted Sand and Gravel *	cu.m.	\$	50	2280	\$	114,000	1800	\$	90,000	
	Remove Coal Waste (Circa 1918) offsite	cu.m.	\$	50				3480	\$	174,000	
	Existing Woodstave Offtake Pipe	lin.m.	\$	500	33	\$	16,500	90	\$	45,000	
	RM1.2 Subtotal					\$	311,000		\$	754,000	
RM1.3	Demolish Spillway/Bridge concrete	cub. metre	\$	300	100	\$	30,000	300	\$	90,000	
RM1	TOTALS (ROUNDED)					\$	355,000		\$	851,000	
							,		┢	,	
RM2	Offsite Disposal								\vdash		
	Concrete	cub. metre	\$	100	230	\$	23.000	640	Ś	64.000	
	"Clean" material - gravel, sediment (assume 10% of exc.)	cub. metre	\$	20	500	\$	10,000	852	\$	17,040	
RM2	TOTALS (ROUNDED)		† ·		1	Ś	33.000	1	Ś	81.000	

Total carried to Table R1

City of Nanaimo MIDDLE AND LOWER CHASE RIVER DAMS DAM REMOVAL AND RENATURALIZATION CONCEPTUAL COST ESTIMATES

				MIDD	LE DAM		LOWE	LOWER DAM	
ITEM NO.	DESCRIPTION	UNIT OF MEASURE	UNIT RATE	ESTIMATED QUANTITY	TOTAL PRIC		ESTIMATED QUANTITY	тот	AL PRICE
RN1	Renaturalization of Lake and Dam area								
RN1.1	Within former dam footprint								
	River Channel Treatment	lin.m.	\$ 2,000	70	\$ 140,000)	100	\$	200,000
	Prepare and landscape excavated slopes	sq.m.	\$ 10	1400	\$ 14,000)	500	\$	5,000
RN1.2	Exposed Lake Bottom								
	Remove sediment within channel extents	cu.m.	\$ 50	210	\$ 10,500)	300	\$	15,000
	Wood-chip Pathways	lin.m.	\$ 20	200	\$ 4,000)	200	\$	4,000
	Topsoil and hydroseed above 1:100 year flood limit	sq.m.	\$ 15	3000	\$ 45,000)	3000	\$	45,000
	Plantings (50% area)	sq.m.	\$ 20	6900	\$ 138,000)	7550	\$	151,000
	River Channel Treatment	lin.m.	\$ 2,000	230	\$ 460,000)	220	\$	440,000
RN1.3	Re-Landscape Removed Spillways								
	Place excavated fill on exposed bedrock	cu.m.	\$ 25	600	\$ 15,000)	100	\$	2,500
	Topsoil and hydroseed	sq.m.	\$ 15	180	\$ 2,700)	200	\$	3,000
	Reinstate asphalt pathways	sq.m.	\$ 30				150	\$	4,500
RN1	TOTALS (ROUNDED)				\$ 829,000			\$	870,000

RN3	Restore and Re-landscape Laydown areas				
RN3.2 For removal and renaturalization project requirements		sq.m.	\$ 15	3000	\$ 45,000

Totals carried to Table R1

City of Nanaimo CHASE RIVER DAMS DAM REMOVAL AND RENATURALIZATION CONCEPTUAL COST ESTIMATES

					MIDDLE DAM			LOWER DAN		M												
ITEM NO.	DESCRIPTION	UNIT OF MEASURE	UNIT	RATE	ESTIMATED QUANTITY	TOTAL PRICE		TOTAL PRICE		TOTAL PRICE		TOTAL PRICE		TOTAL PRICE		TOTAL PRICE		TOTAL PRICE		ESTIMATED QUANTITY	то	TAL PRICE
NS2	Construct Pathway Bridge																					
	Cast-in-Place Concrete Abutments	cu.m.	\$	2,000	32	\$	64,000	20	\$	40,000												
	Precast Prestressed Concrete, 2.0m wide	lin.m.	\$	1,600	32	\$	51,200															
	Precast Prestressed Concrete, 3.0m wide	lin.m.	\$	1,700				40	\$	68,000												
	MOT Standard Bicycle Railing	lin.m.	\$	250	64	\$	16,000	80	\$	20,000												
	Shipping and installation	LS	\$ 9	0,000		\$	50,000		\$	50,000												
NS2	TOTAL					\$	181,000		\$	178,000												

Total carried to Table R1

City of Nanaimo MIDDLE AND LOWER CHASE RIVER DAMS DAM REMOVAL AND RENATURALIZATION CONCEPTUAL COST ESTIMATES

ITEM NO.	DESCRIPTION	UNIT OF MEASURE	UNIT RATE		ESTIMATED QUANTITY	то	TAL PRICE
OH1	Water Diversion						
	Prepare diversion route	LS	\$	20	400	\$	8,000
	Coffer Dam	cu.m.	\$	50	1000	\$	50,000
	900mm HDPE PIPE, surface	lin.m.	\$	200	750	\$	150,000
	TOTAL					\$	208,000
OH2	Engineering Costs - Removal - per dam						
	Geotech					\$	-
	Design-Tender					\$	50,000
	Construction Phase	man-month	\$	7,000	8	\$	56,000
	TOTAL - per dam					\$	106,000
ОН2	Engineering Costs -Renaturalise - per lake						
	Additional Geotechnical Investigations					\$	-
	Design-Tender					\$	70,000
	Construction Phase	man-month	\$	6,000	12	\$	72,000
	TOTAL - per lake					\$	142,000

Total carried to Table R1

Klohn Crippen Berger Ltd. Project A05130A01 Date: 4/26/2013 Draft Tender Schedule of Quantities

SPQ 1 - 5

ITEM	MOESS SECTION	DESCRIPTION	UNITS	QTY	RATE	AMOUNT
А		Common Requirements				
A1.0	3 9	Mobilisation and Demobilisation	L.S.	1		
A2.0	2 3	General Conditions and Requirements (including but not limited to: temporary facilites, environmental protection and site health and safety)	L.S.	1		
A3.0	4	Dewater Both Lakes	L.S.	1		
A4.0		Water Diversion System				
A4.1		Prepare Route	lin.m.	750		
A4.2		Construct Coffer Dam	cu.m.	1000		
A4.3		Supply, Place and Maintain 900mm HDPE Pipe on Ground Surface	lin.m.	750		
A5.0	3 9	Restore Laydown Areas	L.S.	1		
			Part A carried f Tender Su	Sub-Total Forward to mmary	\$	

SCHEDULE OF PRICES AND ESTIMATED QUANTITIES

SPQ 2 - 5

ITEM	MOESS SECTION	DESCRIPTION	UNITS	QTY	RATE	AMOUNT
В		Middle Chase Dam				
B1.0		Demolish Misc. Items Within Dam Extents and Dispose Off-Site				
B1.1	4.04	Remove Existing Asphalt Surfaced Trail on Dam and Dispose Off-Site	sq.m.	200		
B1.2		Catchbasin	L.S.	1		
В1.3		Concrete V-Notch Seepage Monitoring Weir and Structure	L.S.	1		
B1.4		Wooden Fence	lin.m.	42		
B1.5		Metal Railing and concrete bags	L.S.	1		
B1.6	4	100 dia PVC drain	L.S.	1		
B1.7		SCADA pole	L.S.	1		
B2.0		Remove and Dispose of Dam Materials				
B2.1	3 4	Clearing and Grubbing	sq.m.	1800		
В2.2	4 9	Strip Topsoil and Stockpile for Re-Use On- Site	sq.m.	1800		
B2.3		Remove Spillway/Bridge Concrete and Dispose Off-site	cu.m.	100		
B2.4		Demolish Concrete Dam Face and Walls and Dispose Off-site	cu.m.	130		
В2.5	4 9	Excavate Compacted Sand and Gravel and Place In-Lake, On-Site	cu.m.	2280		
B2.6	4 9	Excavate Original Rockfill and Place In- Lake, On-Site	cu.m.	2720		
B2.7	4	Remove Existing Woodstave Offtake Pipe and Dispose Off-Site	lin.m.	33		

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SPQ 3 - 5

ITEM	MOESS SECTION	DESCRIPTION	UNITS	QTY	RATE	AMOUNT
B3.0		Renaturalise Dam Footprint and Spillways				
B3.1	4	Clean River Channel to Bedrock	lin.m.	70		
ВЗ.2	4	Place and Compact Two (2) Metres of Excavated Fill on Exposed Bedrock	cu.m.	600		
ВЗ.3	4 9 14	Place Topsoil and Hydroseed Excavated Slopes	sq.m.	1580		
B4.0		Renaturalise Exposed Lake Bottom				
B4.1	4 9 14	Remove Sediment Within Channel Extents	cu.m.	210		
B4.2	4 9 14	Place Topsoil and Hydroseed Above 1:100 year Flood Limit	sq.m.	3000		
В4.3	9	Construct Two (2) metre Wide Wood-Chip Pathways on Compacted Subgrade	lin.m.	200		
B4.4	14	Plantings	sq.m.	6900		
B4.5	4 9 14	River Channel Treatment	lin.m.	230		
B5.0		Construct Pathway Bridge				
B5.1		Cast-in-Place Concrete Abutments	cu.m.	32		
В5.2		Precast Concrete Footbridge, 2.0m wide	lin.m.	32		
В5.3		MOT Standard Bicycle Railing	lin.m.	64		
В5.4		Shipping and Installation Costs	L.S.	1		
			Part B carried f Tender Su	Sub-Total orward to mmary	\$	

SPQ 4 - 5

ITEM	MOESS SECTION	DESCRIPTION	UNITS	QTY	RATE	AMOUNT
С		Lower Chase Dam				
C1.0		Demolish Misc. Items Within Dam Extents and Dispose Off-Site				
C1.1		Chain Link Fence	lin.m.	75		
C1.2		Metal Railing and concrete bags	L.S.	1		
C1.3		100 dia PVC drain	L.S.	1		
C1.4		Park Benches	each	3		
C1.5		Signs	each	1		
C1.6		Concrete Picnic Table	each	1		
C1.7		SCADA Pole	each	1		
C2.0		Remove and Dispose of Dam Materials				
C2.1	3 4	Clearing and Grubbing	sq.m.	4120		
C2.2	4 9	Strip Topsoil and Stockpile for Re-Use On- Site	sq.m.	4120		
C2.3		Remove and Dispose of Spillway/Bridge Concrete Off-Site	cu.m.	300		
C2.4		Demolish and Dispose of Concrete Dam Face and Walls Off-Site	cu.m.	340		
C2.5	4	Remove Coal Waste, Sand and Gravel (Circa 1918) and Dispose Off-Site	cu.m.	3480		
C2.6	4	Excavate Compacted Sand and Gravel and	011 720	1900		
C2.0	9	Place in lake, on-site	Cu.III.	1800		
C2.7	4 9	Excavate Original Rockfill and Place in- lake, on-site	cu.m.	6720		
C2.8	4	Remove Existing Woodstave Offtake Pipe and Dispose Off-Site	lin.m.	90		

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SPQ 5 - 5

ITEM	MOESS SECTION	DESCRIPTION	UNITS	QTY	RATE	AMOUNT
С3.0		Renaturalise Dam Footprint and Spillways				
C3.1	4	Clean River Channel to Bedrock	lin.m.	100		
C3.2	4	Place and Compact Two (2) Metres of Excavated Fill on Exposed Bedrock	cu.m.	100		
C3.3	4 9 14	Place Topsoil and Hydroseed Excavated Slopes	sq.m.	700		
C3.4	6	Reinstate Asphalt Pathways	sq.m.	150		
C4.0		Renaturalise Exposed Lake Bottom				
C4.1	4 9 14	Remove Sediment Within Channel Extents	cu.m.	300		
C4.2	4 9 14	Construct Two (2) metre Wide Wood-Chip Pathways on Compacted Subgrade	lin.m.	200		
C4.3	9	Place Topsoil and Hydroseed Above 1:100 year Flood Limit	sq.m.	3000		
C4.4	14	Plantings	sq.m.	7550		
	4		_			
C4.5	9	Treat River Channel	lin.m.	220		
~	14					
C5.0		Construct Pathway Bridge				
C5.1		Cast-in-Place Concrete Abutments	cu.m.	20		
C5.2		Steel Truss Footbridge, 3.0m wide	lin.m.	40		
C5.3		MOT Standard Bicycle Railing	lin.m.	80		
C5.4		Shipping and Installation Costs	L.S.	1		
			Part C carried f Tender Su	Sub-Total forward to mmary	\$	