2016 Vedder River Gravel Removal Issue—November 2017 Agency-Public Review

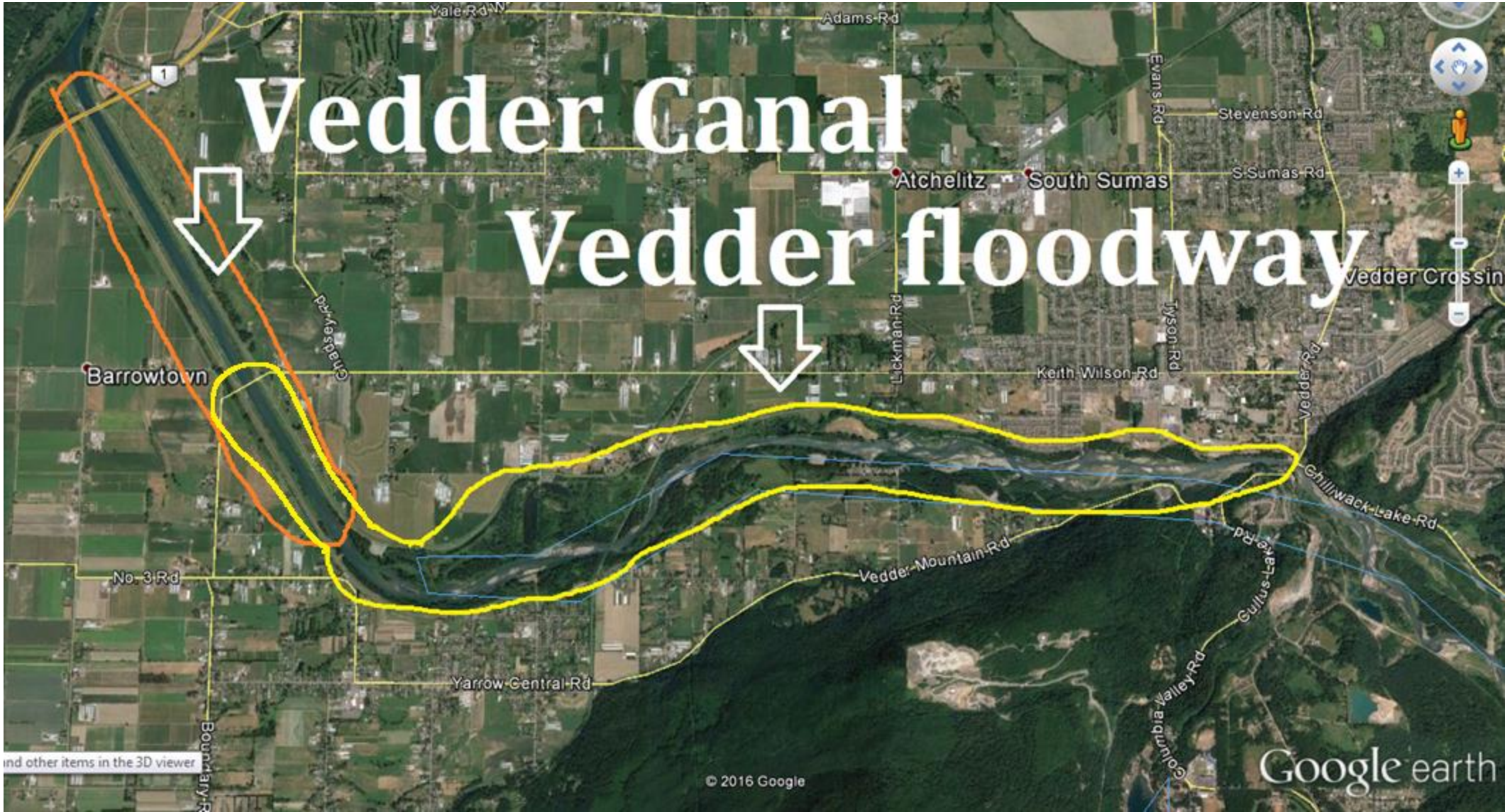
Stewardship Meeting with Agencies

City Hall

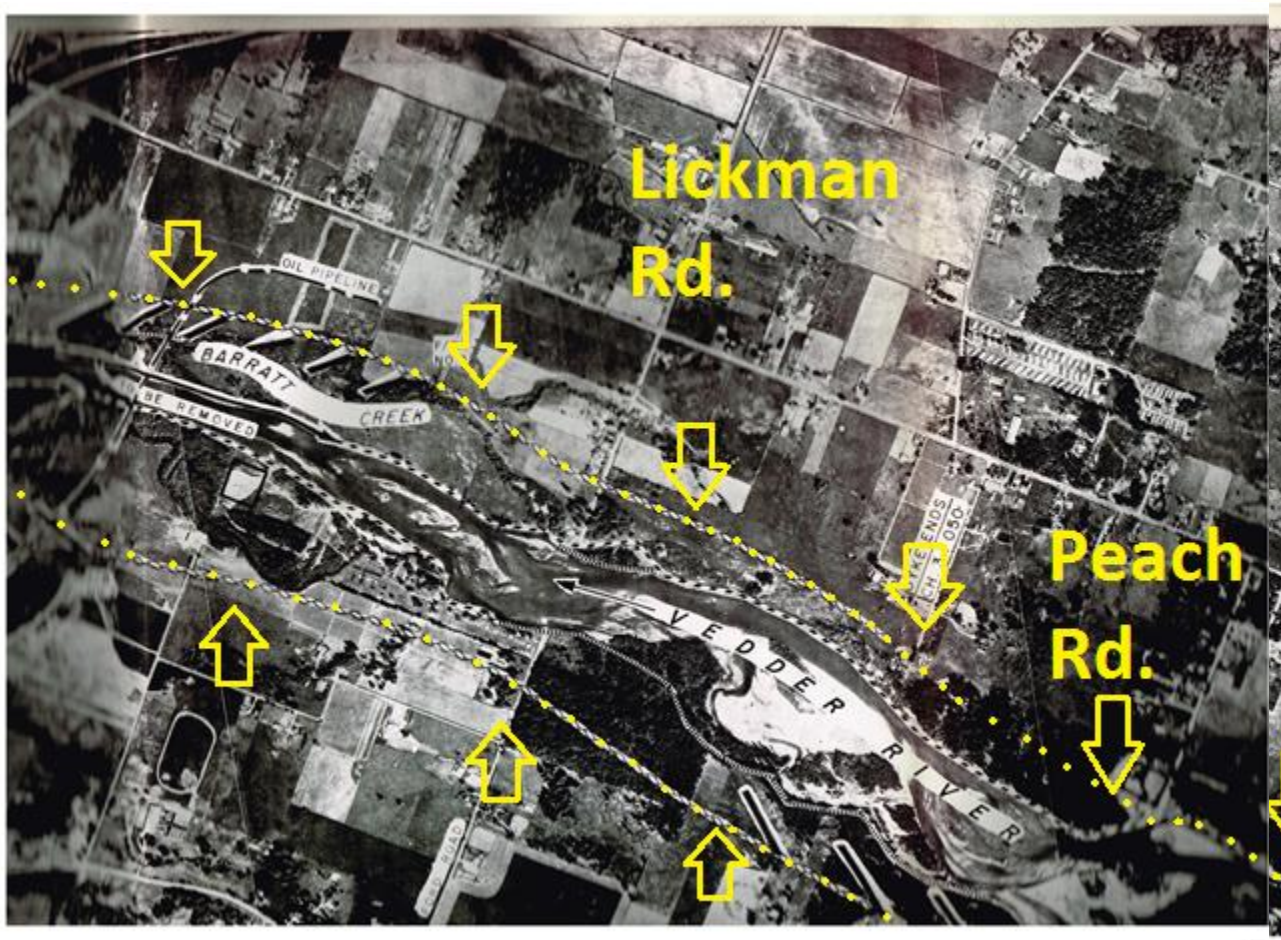
Chilliwack, BC

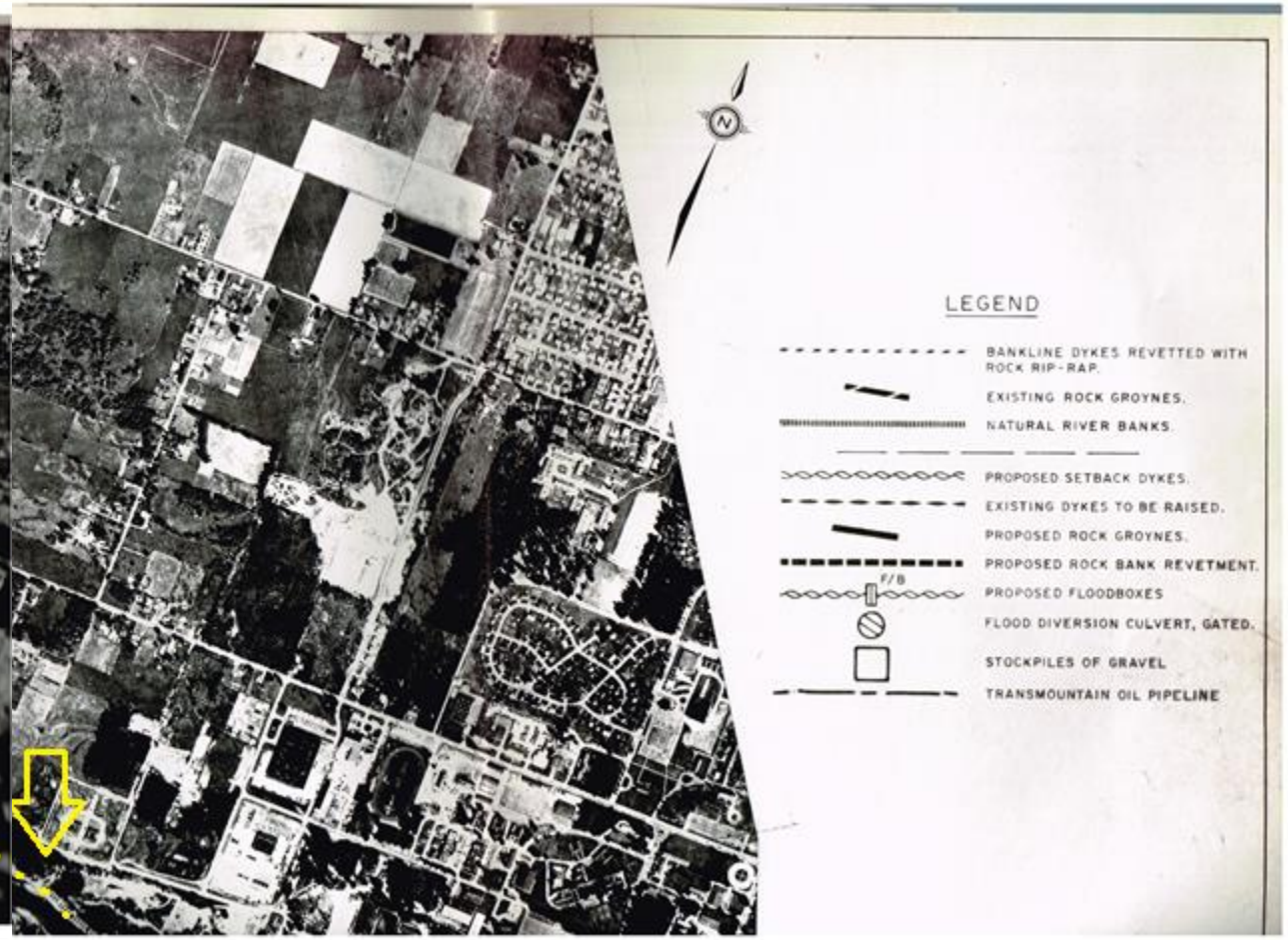
November 27, 2017

Where is the Vedder Floodway?



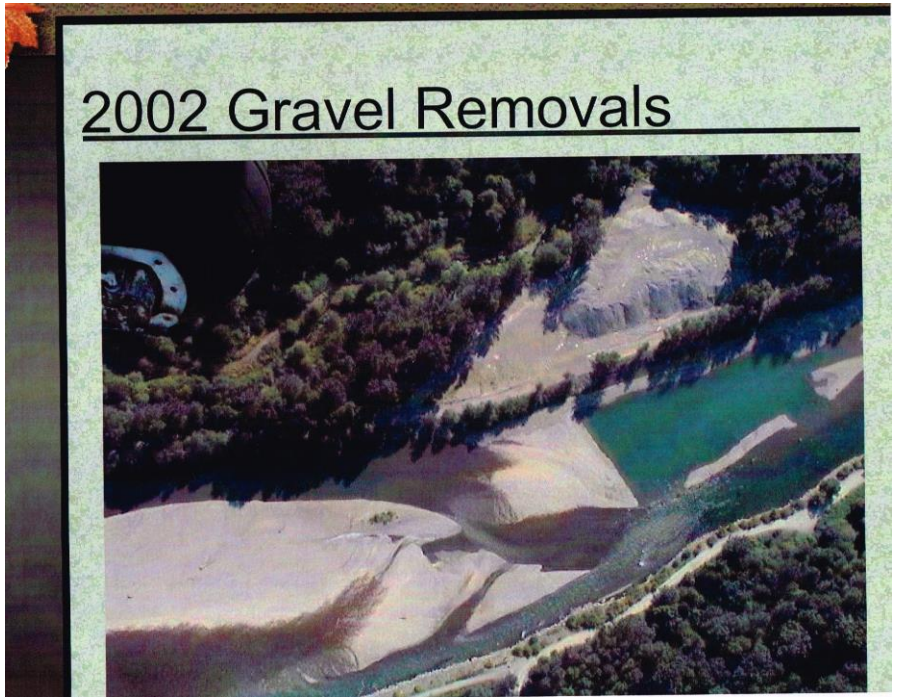
Dike development of the Vedder Floodway in the 1980's





Gravel removal was considered by the agencies to be a management tool to maintain floodway capacity

Aggradation in the Vedder River and the Vedder Canal can increase the risk of flooding. The Vedder River Management Area Committee (VRMAC) has planned and managed gravel removals for flood control purposes annually from 1990 to 1997 and biennially from 1998 to the present. Gravel removals were also undertaken prior to 1990 by various entities, but those removals were not coordinated by VRMAC.



PRESENTATION THESIS

THE MANAGEMENT OF SEDIMENT REMOVALS TO LONG TERM AVERAGE IS NOT DEFENSIBLE BECAUSE THE SEDIMENT VOLUMES HAVE BEEN DECLINING SINCE 2006 (KWL 2006) AND THE RIVER IS NOW ENTERING A STATE OF DEEP DEGRADATION DUE TO HISTORIC OVER-EXTRACTION AND LOW NATURAL INPUTS

Wright et al. (2016) (May)

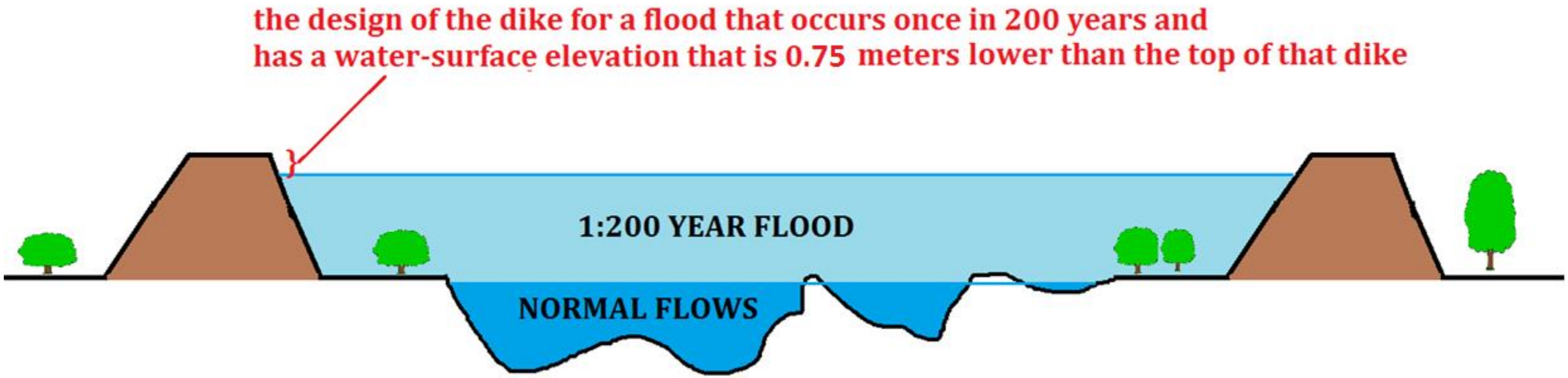
Introduction

The Vedder River Management Committee seeks to manage the floodway capacity of the Vedder River through periodic sediment removals. For 2016, seven excavation sites are proposed. The volume proposed is approximately equal to the long term biennial net accumulation of sediments. Sediment removal

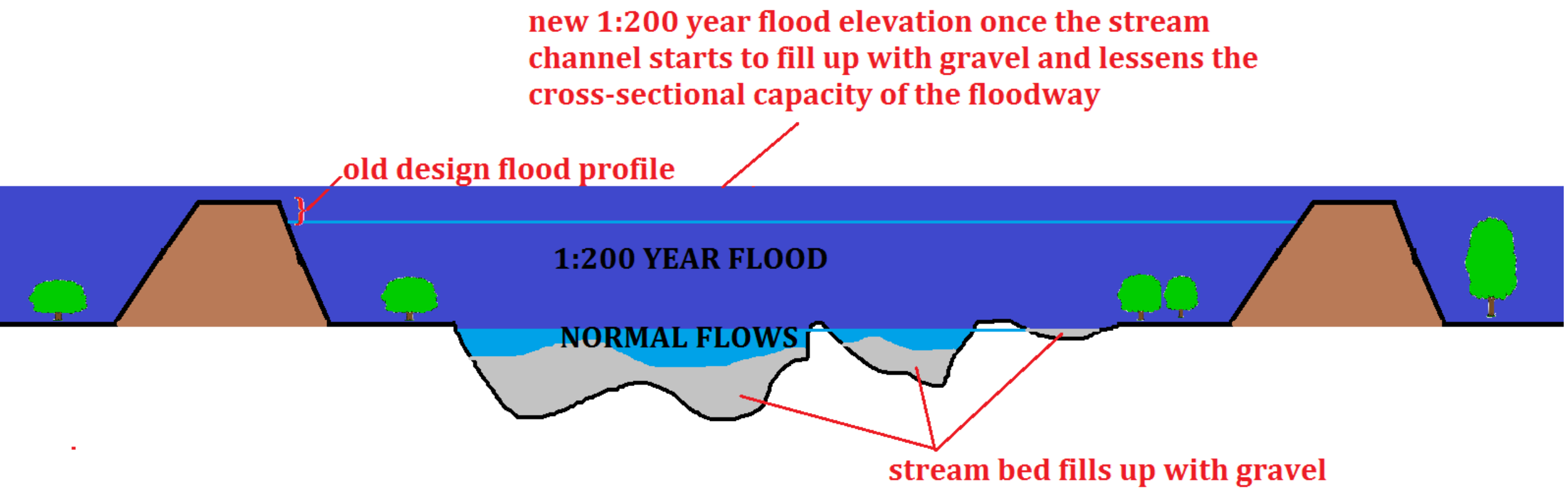
SECONDARY THESIS

THE REMOVALS WERE UNDERTAKEN IN SUCH A MANNER THAT COMPROMISED THE ECOLOGICAL INTEGRITY OF THE VEDDER RIVER

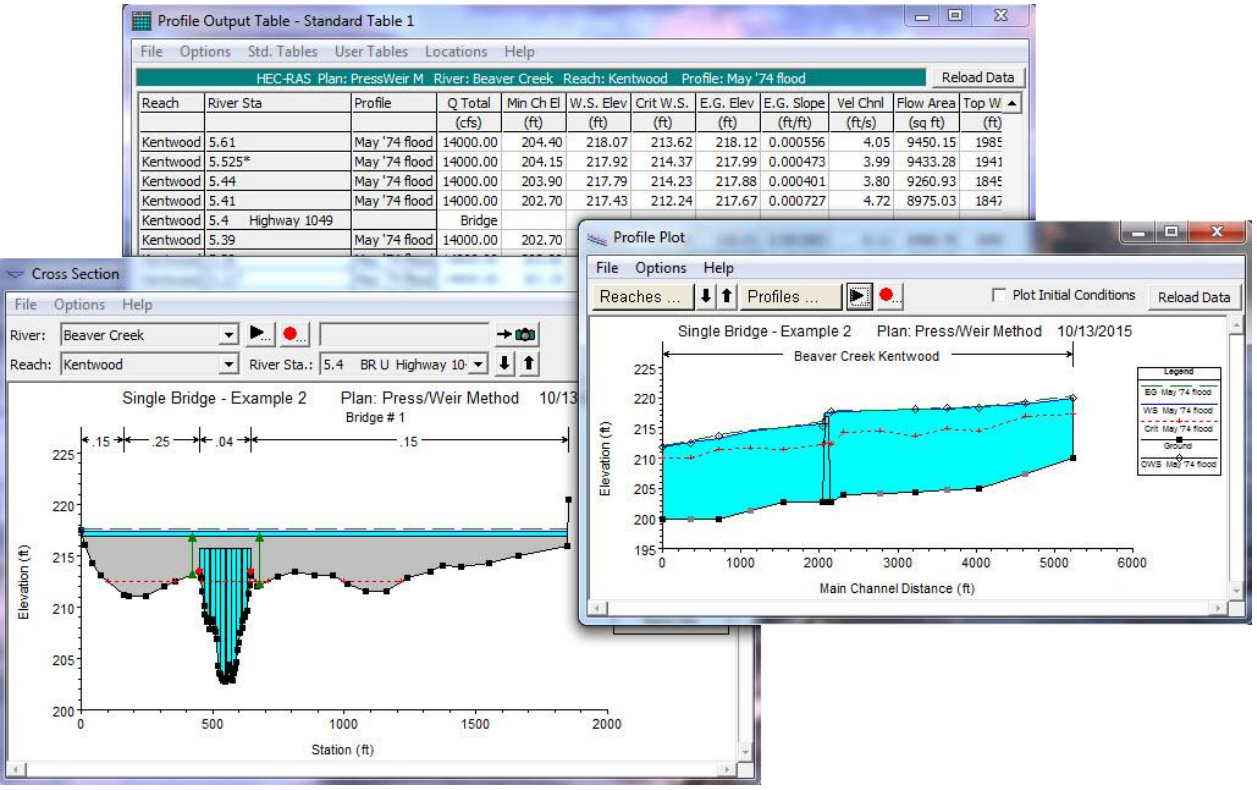
Dikes and flood levels before gravel deposits (0.6 m ~ 2 feet, currently 0.75 m)

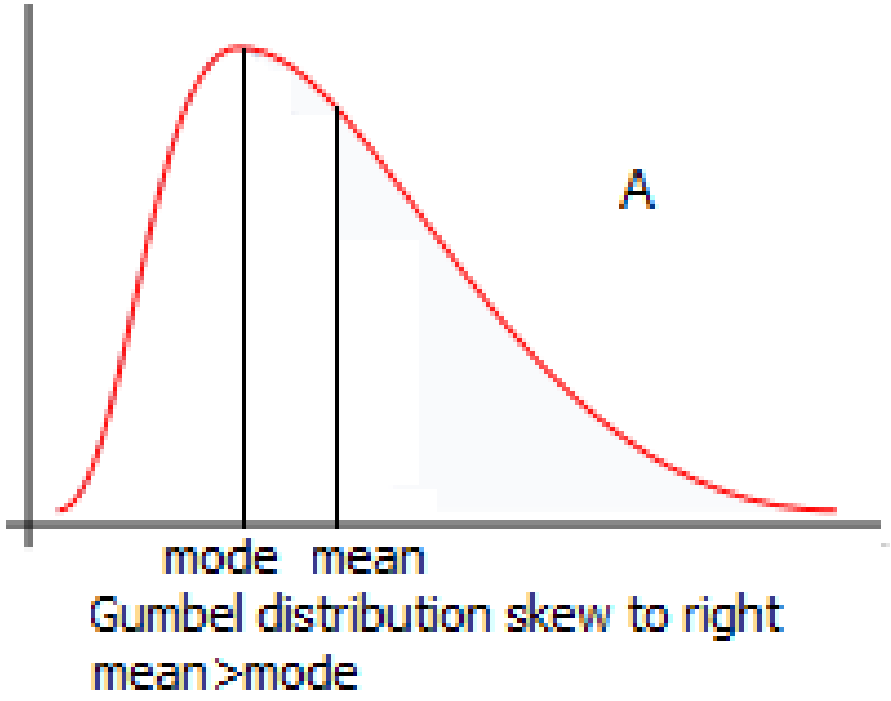


Flood level after gravel deposits—the water surface elevation rises above design levels

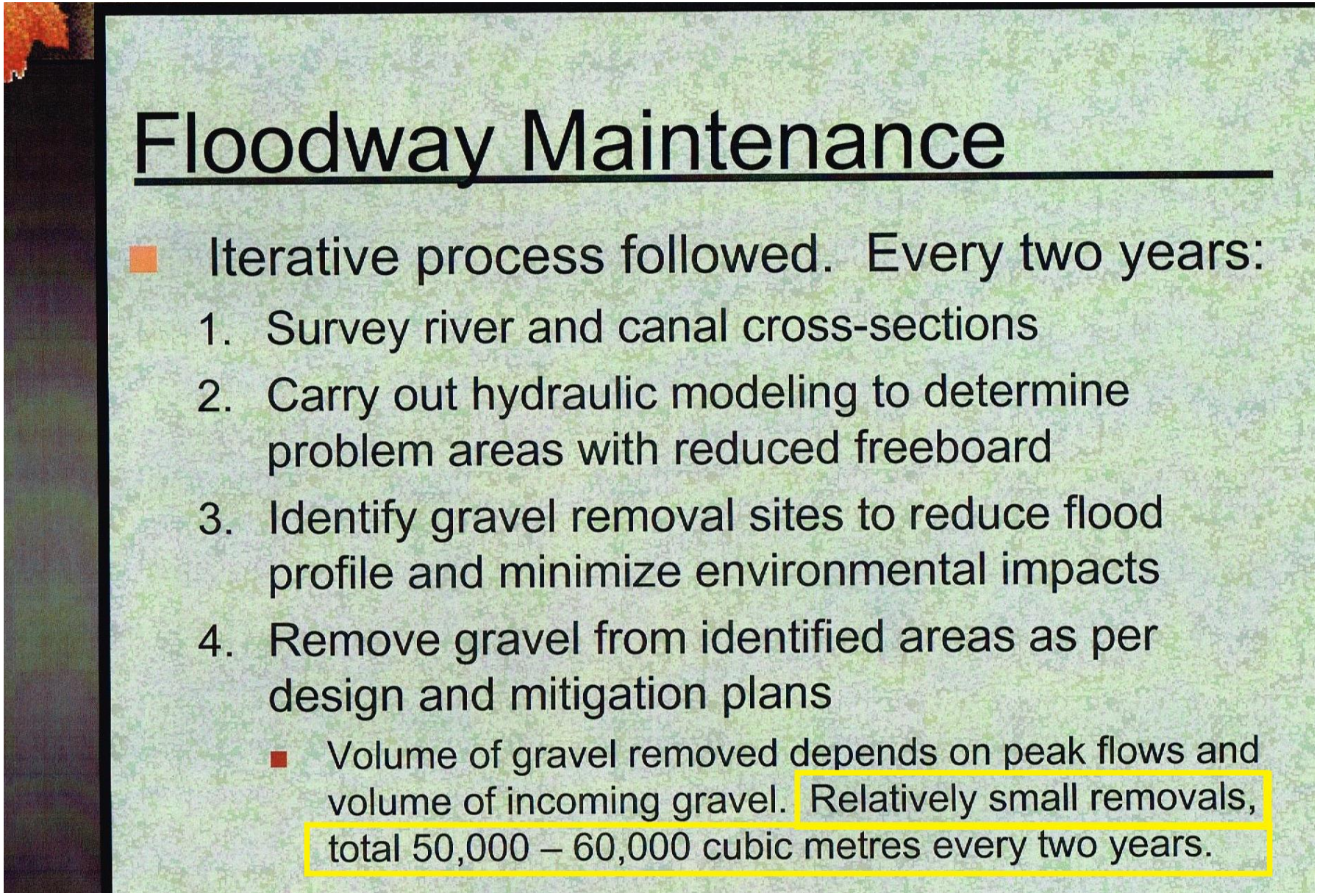


Dikes and their elevations are designed based on hydraulic (e.g., HEC-RAS) and hydrological models (e.g., log-log, Gumbel)





This issue is not new—2003 public presentation—City of Chilliwack (note the values proposed for removal)



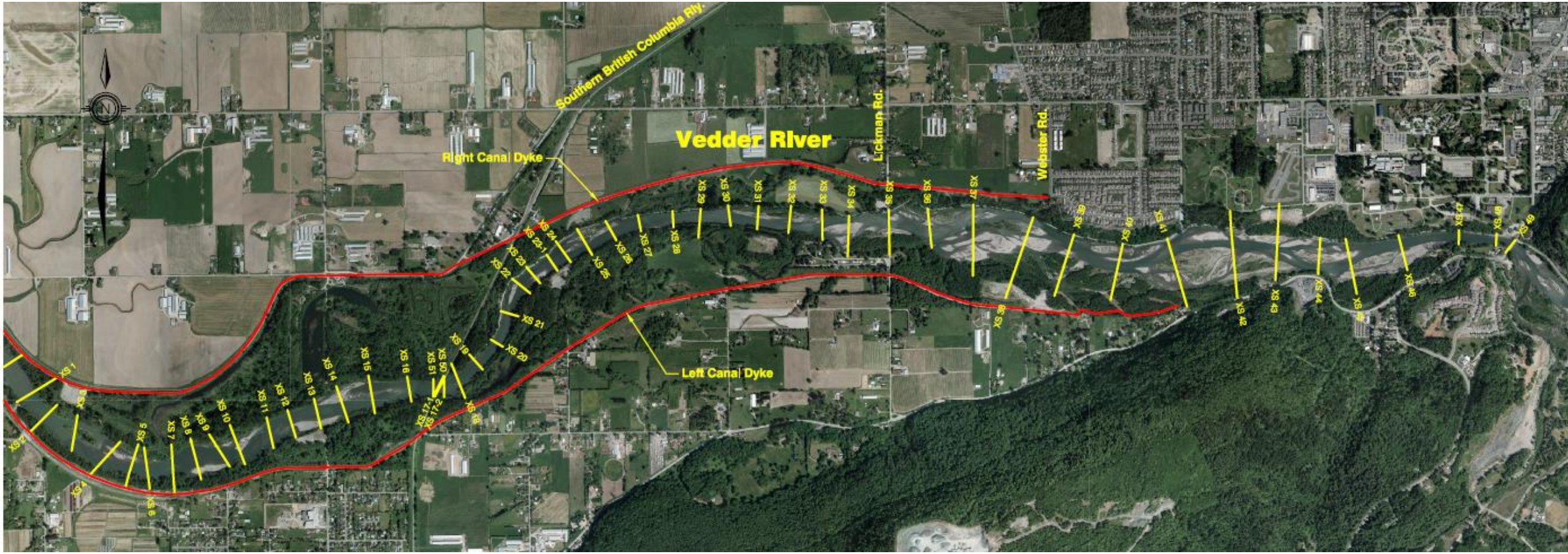
Tara Flundra, City of Chilliwack engineering department, 2003 presentation

4. Remove gravel from identified areas as per design and mitigation plans
   - Volume of gravel removed depends on peak flows and volume of incoming gravel. Relatively small removals, total 50,000 – 60,000 cubic metres every two years.

Over a million cubic meters of gravel since 1994

A total of 76 excavations, completed since 1994 with a total volume removal volume of 1,310,929 m^3, were reviewed. Although the precise location varies, 20 general excavation locations have been used for sediment removal projects. Most bars have been excavated two or three times. Yarrow Bar was excavated nine times, providing 17% of gravel removed from the Vedder River and 50% of gravel removed from the Lower Reach.

Cross-section measurements are used to calculate sediment inputs and losses and bed level/river elevations
KWL (2016) map of Vedder River cross sections



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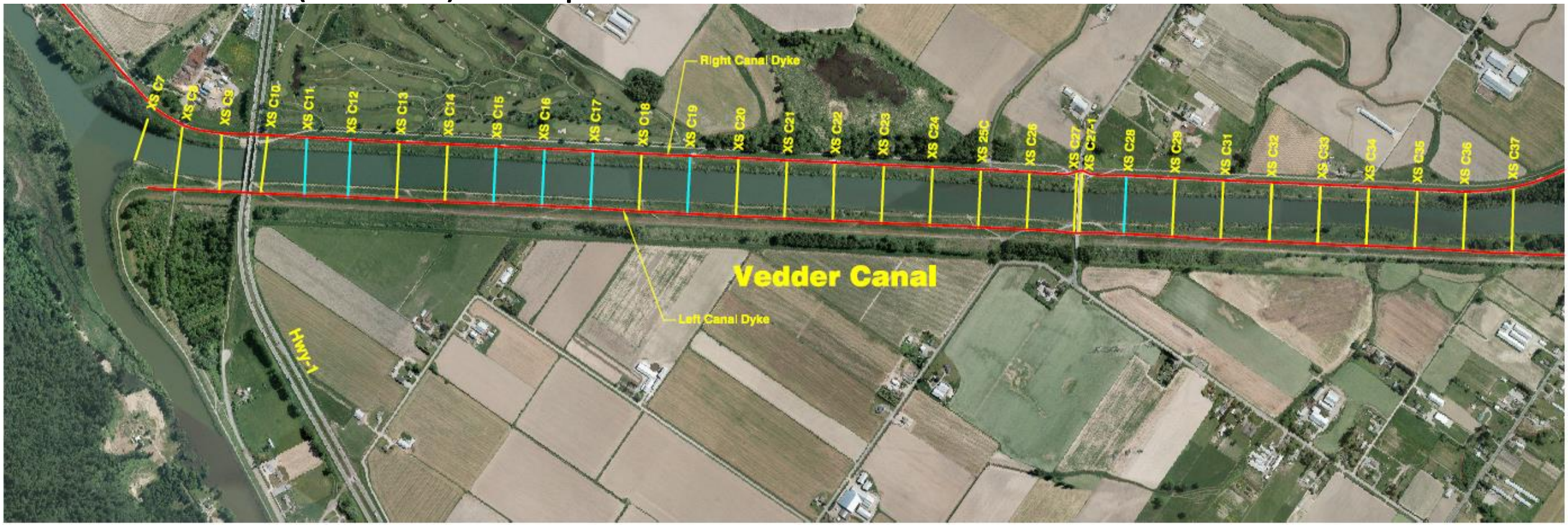


Notes:

1. Dyke alignment and Orthophoto Background received from City of Chilliwack.
2. Survey Cross Sections locations received from CRA Canada Surveys Inc.

XS Not Surveyed In 2016

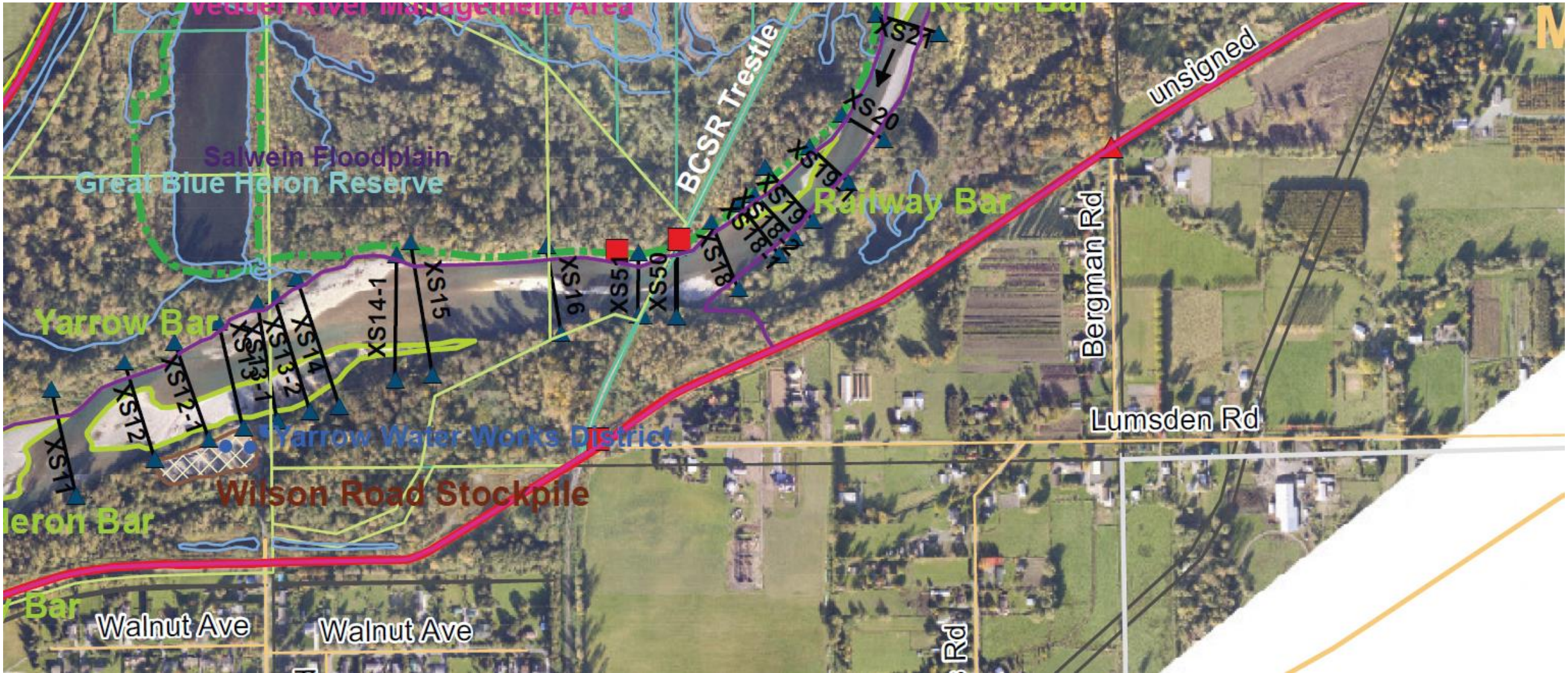
KERR WOOD LEIDAL
consulting engineers

0 100 (1:12,500) 600m

Vedder River
Cross Section Locations - Vedder Canal

Figure 1

Extra cross-sections needed at BCSR trestle because of the complicated nature of the river alignment



In order to be allowed to remove gravel, two senior agency authorizations are required including:

1. British Columbia Water Stewardship Division Section 11 *Water Sustainability Act* permission to work in and about a stream, and

2. permission from Fisheries and Oceans Canada to cause *Serious Harm* under the Canada *Fisheries Act* under a Section 35 authorization

A Section 11 Approval under the BC *Water Sustainability Act* allows for gravel removal to take place

Water Stewardship Division (FLNRO) manages such approvals

BRITISH COLUMBIA

August 8, 2016 Approval File: 2004412

City of Chilliwack
8550 Young Road
Chilliwack BC V2P 8A4

Attention: Frank Van Nynatten

Re: Application for Approval to make changes in and about Vedder River and Vedder Canal

An approval for the proposed changes in and about the Vedder River and Vedder Canal has been granted, subject to the conditions noted on the attached Approval document 2004412.

As part of the six year Section 11 Change Approval authorization, all specified reports required within the terms and conditions of the Approval must be submitted to Sandra Jensen, Authorizations Specialist, within the timelines established.

For each year of construction, the following persons, holders of water licences downstream, are to be advised 5 days prior to commencement of construction: 1) C031376 - Yarrow Waterworks District; 2) C065404 - Fisheries & Oceans Canada for Conservation (Construct Works); 3) F019953 and F020104 – Fraser Valley Duck & Goose for Irrigation; and 4) F019954 – Hooge Bruno for Domestic on Woodroofe Creek near Peach Creek Bar.

The holder of this Approval shall also advise the Southern Railway of British Columbia, 5 days prior to commencement of construction.

The holder of this Approval will also submit the DFO Authorization for the 2018 and 2020 proposed gravel removal years with the necessary reports required by May 30 of that biennial year.

Please be advised that applications for an approval can take up to 140 days to process. To improve our ability to review your application in a timely manner, please consider submitting information outlined in the South Coast Approval Guidelines available at: http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/approval_application_guidance_water_act_sec-9-south_coast_feb-2013.pdf.

A Paragraph 35(2) Approval under the Canada *Fisheries Act* allows for gravel removal to take place

DFO Habitat staff manage such approvals

Fisheries and Oceans Canada | Pêches et Océans Canada

Authorization No. : 16-HPAC-00518

PARAGRAPH 35(2)(b) *FISHERIES ACT* AUTHORIZATION

Authorization issued to:

City of Chilliwack and Ministry of Forests, Lands and Natural Resource Operations (*hereafter referred to as the "Proponent"*)

Attention to:

Mr. Frank Van Nynatten
Environmental Services and Engineering
City of Chilliwack
8550 Young Road
Chilliwack, BC
V2P 8A4

Mr. John Pattle
Head, Flood Safety Section
Ministry of Forests, Lands and Natural Resource Operations
Unit 200 - 10428 153rd Street
Surrey, BC
V3R 1E1

Location of Proposed Project:

Nearest community (city, town, village): Chilliwack
Municipality, district, township, county: City of Chilliwack
Province: British Columbia
Name of watercourse, waterbody: Vedder River
UTM Coordinates: 121°59'16.95"West and 49° 5'49.18" North ("Geisbrecht Bar")
122° 4'45.71" West and 49° 6'18.69" North ("Keith Wilson Bar")

Description of Proposed Project:

The proposed project of which the work(s), undertaking(s) or activity(ies) authorized is a part involves:

- The excavation and removal of sediment from 7 sites on the Vedder River for flow conveyance and flood protection.

The project is more specifically described in the authorization application package prepared by Nova Pacific Environmental, dated May, 2016, including "Proposed 2016 Vedder River Sediment Removal Project", "2014 Vedder River Gravel Excavation – Habitat Changes and Environmental Impacts", "2014 Vedder River Sediment Removal – Environmental Monitors Report" , memo dated June 27, 2016 to Teri Ridley, DFO "RE: 16-HPAC-00518 Vedder River gravel removal" **(Schedule 1)** and "Vedder River Management Area Plan Update", prepared by Tetra Tech EBA Inc. dated December 11th, 2015 **(Schedule 2)**.

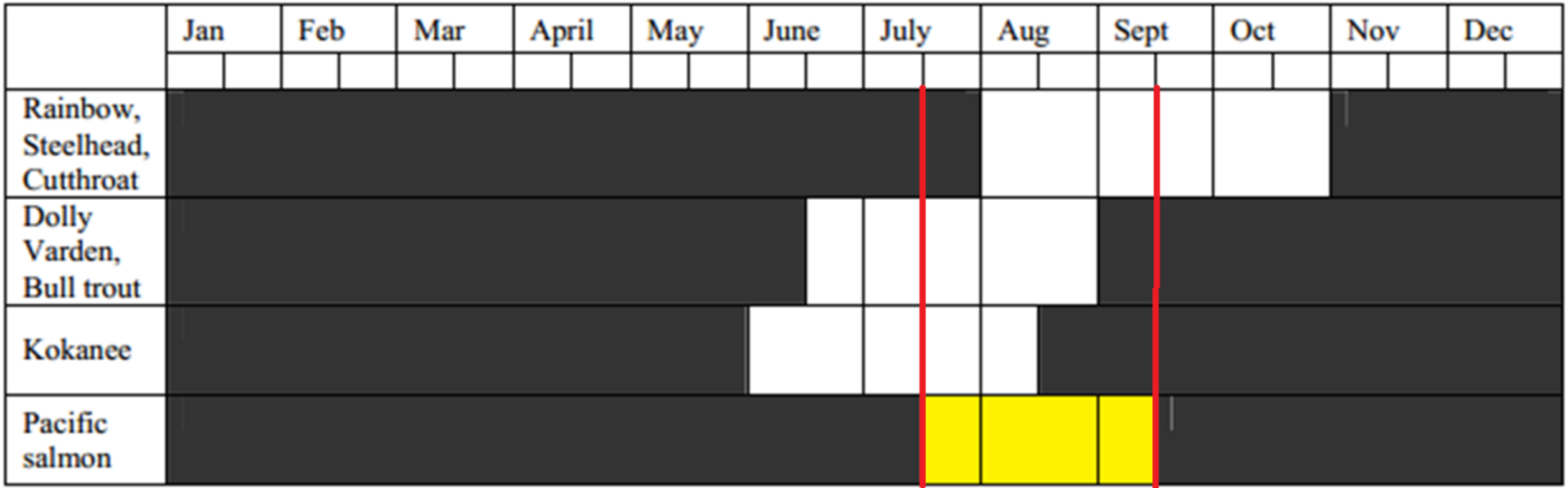
WHAT WERE THE CONDITIONS OF THESE APPROVALS?

TIMING ISSUES

Lower mainland fisheries work windows for in-and-about streams

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/work_windows_low_main.pdf

Table 1. Highest (dark shaded) and Lowest (un-shaded) Risk Periods for Lower Mainland Fish Species



Why did the Water Stewardship Division Authorization allow Chilliwack to go to September 30, contrary to the Lower Mainland work windows

(b) The changes to be made in and about the stream are:

To remove approximately 100,000 cubic meters of sediment and construct offsetting measures at specified gravel bars within the reaches of the Vedder River and Vedder Canal in the area bounded between the Vedder Crossing Bridge downstream to the Highway 1 Bridge, every two (2) years commencing with the 2016 fisheries window and concluding with the 2020 fisheries window. Works within the foreshore and the bed of the Vedder River and Vedder Canal may be within land owned by the City of Abbotsford,

(j) Work in the stream channel shall occur only during the period of July 15 to September 30, so that the fisheries interests are protected.

DFO original work window expired on Sept 15, 2016—why the difference between the two senior environmental agencies?

From: Date of Issuance **To: September 15th, 2016**

If the Proponent cannot complete the work(s), undertaking(s) or activity(ies) during this period, Fisheries and Oceans Canada (DFO) must be notified in advance of the expiration of the above time period. DFO may, where appropriate, provide written notice that the period to carry on the work, undertaking or activity has been extended.

The periods during which other conditions of this authorization must be complied with are provided in their respective sections below. DFO may, where appropriate, provide written notice that these periods have been extended, in order to correspond to the extension of the period to carry on a work, undertaking, or activity.

DFO work window extension to Sept 30, 2016 despite fish in the river and spawning

Fisheries and Oceans Canada / Pêches et Océans Canada

Pacific Region
200-401 Burrard Street
Vancouver, BC
V6C 3S4

Région du Pacique
Pièce 200 – 401 rue Burrard
Vancouver, (C.-B.)
V6C 3S4

Your file *Votre référence*

SEP 1 3 2016

Our file *Notre référence*
16-HPAC-00518

Mr. Frank Van Nynatten
Environmental Services and Engineering
City of Chilliwack
8550 Young Road
Chilliwack, BC
V2P 8A4

Mr. John Pattle
Head, Flood Safety Section
Ministry of Forests, Lands and Natural Resource Operations
Unit 200 – 10428 153rd Street
Surrey, BC
V3R 1E1

Dear Mr.Van Nynatten and Mr. Pattle:

Subject: Notification of modifications to dates in conditions of Paragraph 35(2)(*b*) *Fisheries Act* authorization 16-HPAC-00518

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada hereby modifies the conditions that relate to the period during which the work, undertaking or activity that will result in serious harm to fish can be carried on, for the authorization issued to you under paragraph 35(2)(*b*) of the *Fisheries Act* on July 22nd, 2016.

The period during which the work, undertaking, or activity can be carried on is now from July 22nd, 2016 to September 30th, 2016. Other dates in the authorization are modified as follows:

- Condition 4.4 September 30th, 2016.

How did the Program determine that the modification of dates…"*will not increase the level of harm to fish and habitat described in the authorization.*"?

The Program has determined that the modification of the dates in the conditions of authorization will not increase the level of harm to fish and habitat described in the authorization.

A copy of this letter must be kept on site while the work is in progress. Work crews must be familiar with and able to adhere to the conditions.

Failure to comply with the conditions of the authorization may lead to prosecution under the *Fisheries Act*.

Canada

.../2

If you or anyone conducting work on your behalf have any questions, please contact Teri Ridley at our Kamloops office at 250-851-4939, by fax at 250-851-4951, or by email at Teri.Ridley@dfo-mpo.gc.ca.

Yours sincerely,

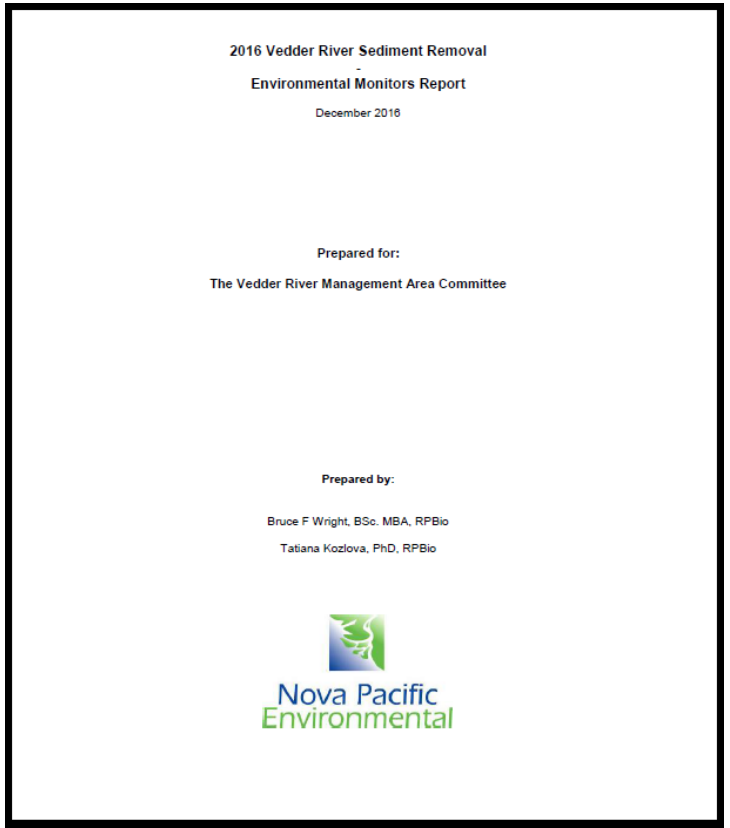
Rebecca Reid
Regional Director General
Pacific Region
Fisheries and Oceans Canada

Cc: Bruce Wright, Nova Pacific Environmental Ltd.

Timing—work window of July 15-September 15 and why was the proponent allowed, by DFO, to significantly exceed that September date, well after fish had started spawning in the river?

A spawned out male chum was observed just above Highway No. 1 bridge, September 30, 2016. (It had the same appearance as the fish in this photo.)

In fact there is no available evidence that the environmental consultant or the agencies had a clue as to which fish were in the river and where they were in relation to the gravel extractions—the environmental report provides no information in these regards



2016 Vedder River Sediment Removal

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Environmental Monitors Report

December 2016

Prepared for:

The Vedder River Management Area Committee

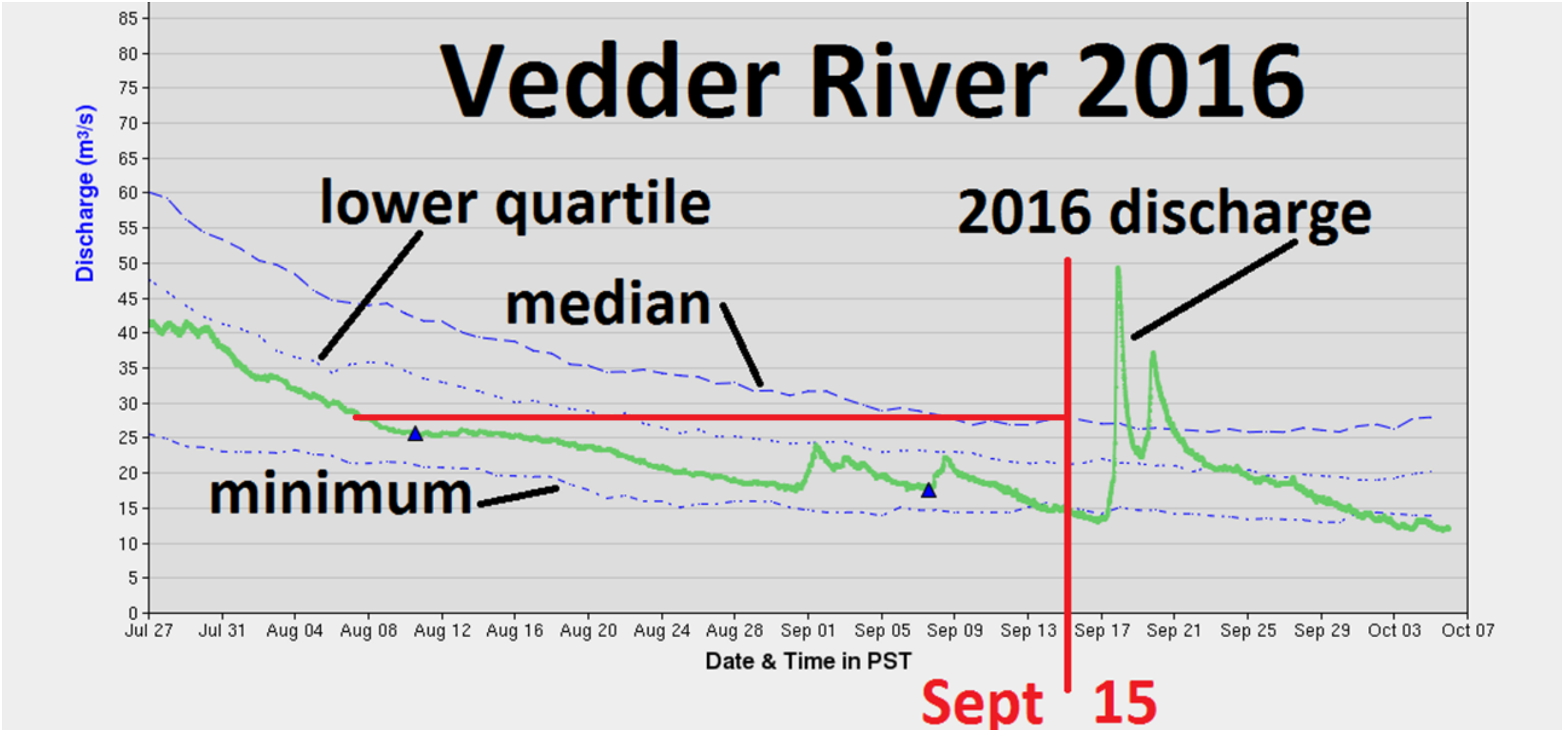
Prepared by:

Bruce F Wright, BSc. MBA, RPBio

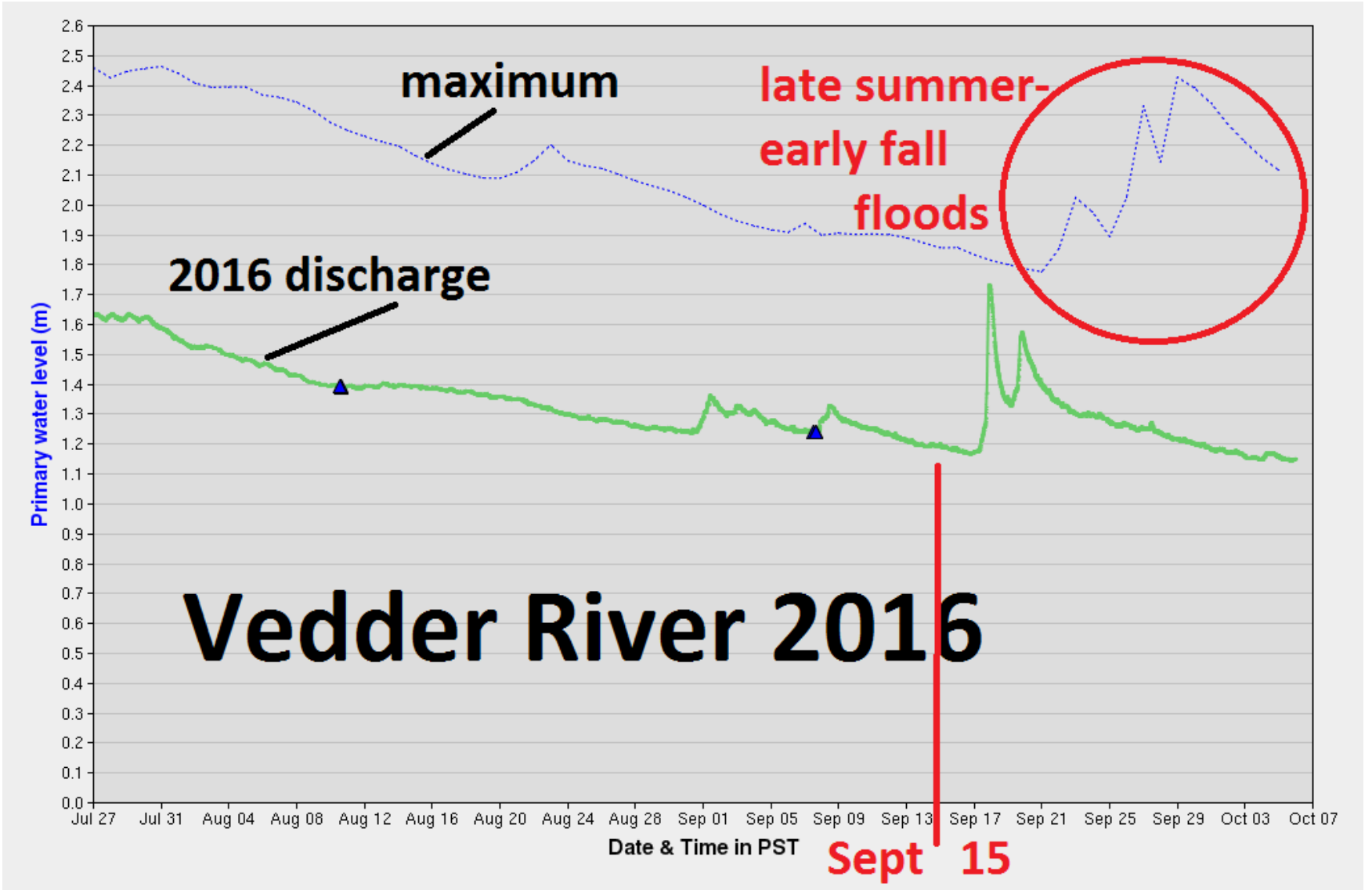
Tatiana Kozlova, PhD, RPBio

Nova Pacific Environmental

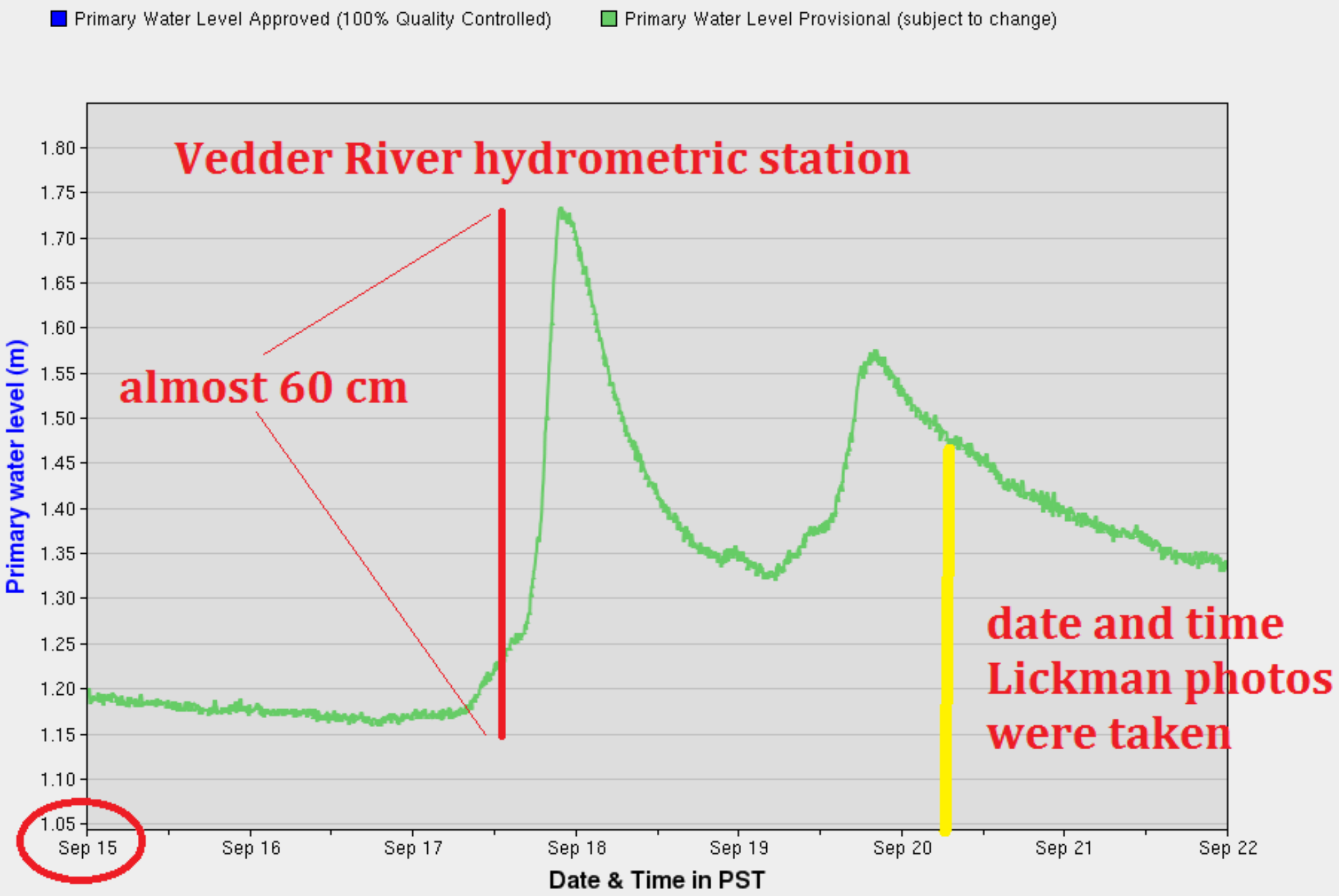
The flows in the Vedder River were low enough in 2016 to start work in early August—yet the Province only issued its approval Aug 8—why?



Historically Fall floods start in mid-to-late September—so why would an extension have been approved?



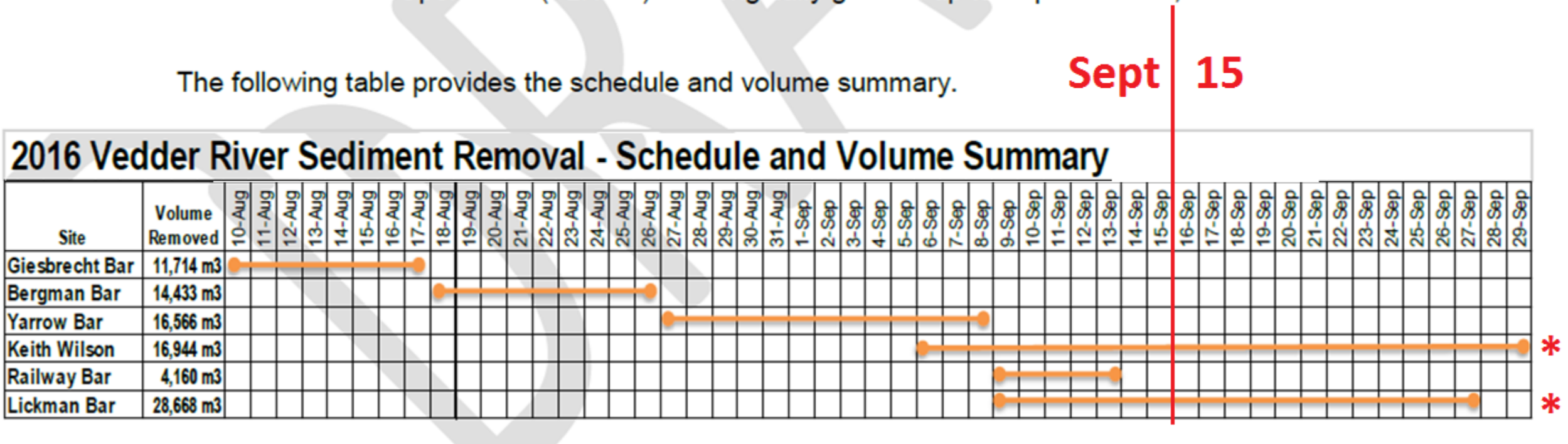
The river jumped up almost 60 cm on Sept 17 & 18, 2016



Half of the gravel was removed in September—why so late? Why did the Province wait until August 8 to approve removal when it has known for several decades prior that gravel would be removed in summer 2016?

The sediment removal work began on August 9th, 2016 and extended to September 29th, 2016. This required an extension of 14 days beyond the original September 15th end to the in-stream work window. The extension was authorized by The Department of Fisheries and Oceans (DFO) on September 13th, 2016. A Section 11 Authorization by The Ministry of Forests Lands and Natural Resource Operations (FLNRO) was originally granted up to September 30, 2016.

The following table provides the schedule and volume summary.



The only conclusion that can be made is that Chilliwack and the Province knew before-hand that the contractor did not have the capacity to undertake the project in a timely manner but still approved works until Sept 30, and at the outset DFO didn’t object, and then eventually acquiesced

FINE SEDIMENT CONTROL

PARAGRAPH 35(2)(b) *FISHERIES ACT* AUTHORIZATION

2. **Conditions that relate to measures and standards to avoid and mitigate serious harm to fish:**

2.1. Sediment and erosion control measures must be in place and shall be maintained, such that release of sediment is avoided at the location of the authorized work(s), undertaking(s), or activity(ies).

Section 11 August 8, 2017

(bb) The holder of this Approval must hire an appropriately Qualified Professional to conduct Environmental Monitoring on all in-stream works authorized under this Approval.

i) The Environmental Monitor shall attend the site prior to conducting any instream works to complete salvages and assist in the isolation of the stream, implementation of erosion and sediment control measures and perform environmental monitoring to ensure there is minimal environmental impact on the land and potentially fish and fish habitat of the stream.

Stop work orders when the project is being done poorly

Section 11 August 8, 2016

(cc) The Environmental Monitor is hereby granted authority to stop the work authorized under this Approval if deemed necessary by the Environmental Monitor to address risks to the environment.

Why was equipment allowed in the stream?

Section 11 August 8, 2016

(o) All proposed work shall be completed in isolation of the stream flows.

Entrainment of fine sediments into the stream due to the works—why was equipment allowed to work in the stream and create berms **after** flooding had started?

Why are there no silt fences or sediment abatement coverings?

What are these guys doing in the river?

Poor sediment management—using a berm of fine silt and gravel to isolate an extraction site

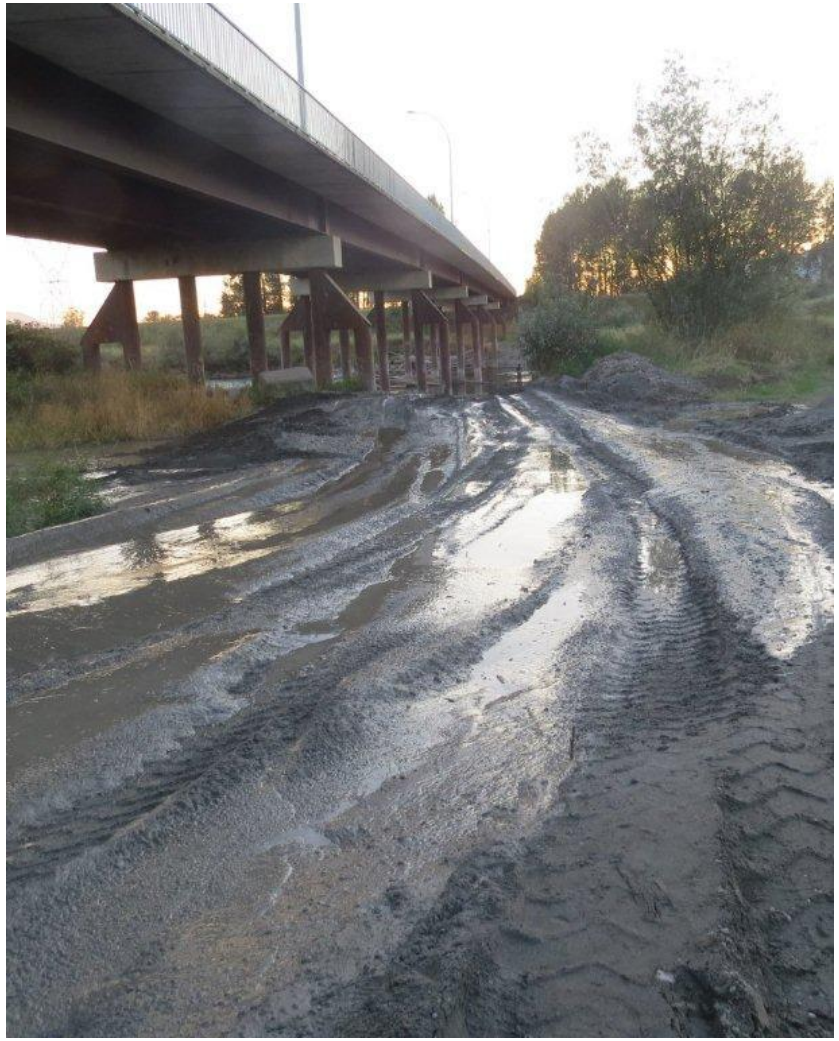
Using silt as a berm between the project and stream

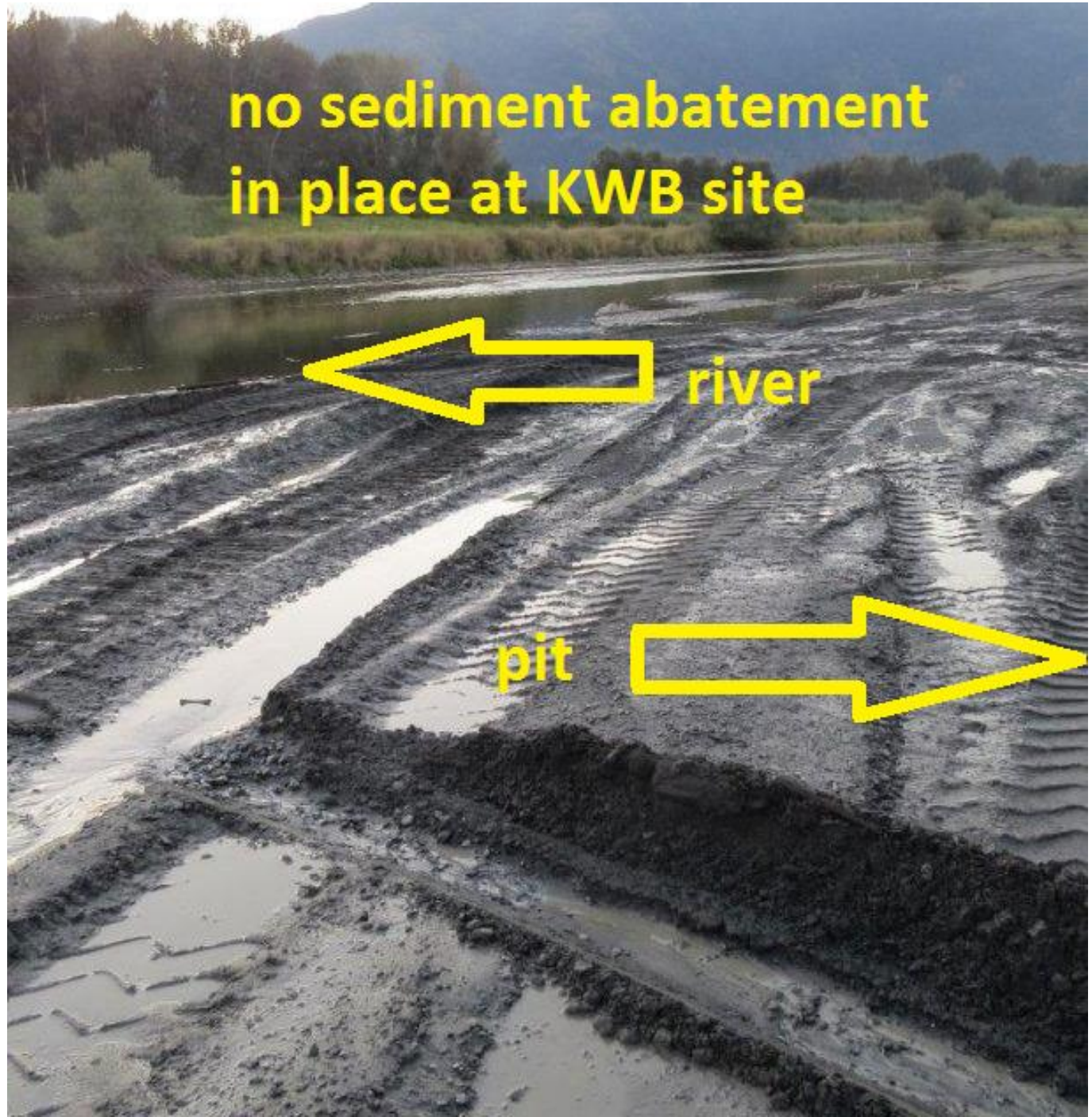

fines used to
construct
berm on river
side of pit

Bad silt management—no sediment erosion abatement structures

Bad management practices

Why is this allowed? Where were the on-site environmental monitors?




no sediment abatement
in place at KWB site
river
pit

Fines used to construct a berm at the KWB site adjacent to a high-flow pump station

KW5: Pump station outflow channel constructed. September 7, 2016.

KW6: Pump station water release. September 7, 2016.

KW7: Work in progress. View from downstream end of site. September 14, 2016.

KW8: Berm constructed at upstream end and along the river to continue excavation after heavy rain. September 23, 2016.

Lickman Pit constructed-stream and silt erosion—from Nova Pacific (2016) (Dec)

Habitat channel connected to the secondary channel and flowing to the right. September 27, 2016.

SILT ASSESSMENTS

Assessment of sediment entrainment in the stream vis a vis construction activities

Section 11 August 8, 2016

(s) Discharge and runoff water from the site into any watercourses may not exceed 25 mg/L above suspended solid levels of the receiving waters during normal dry weather

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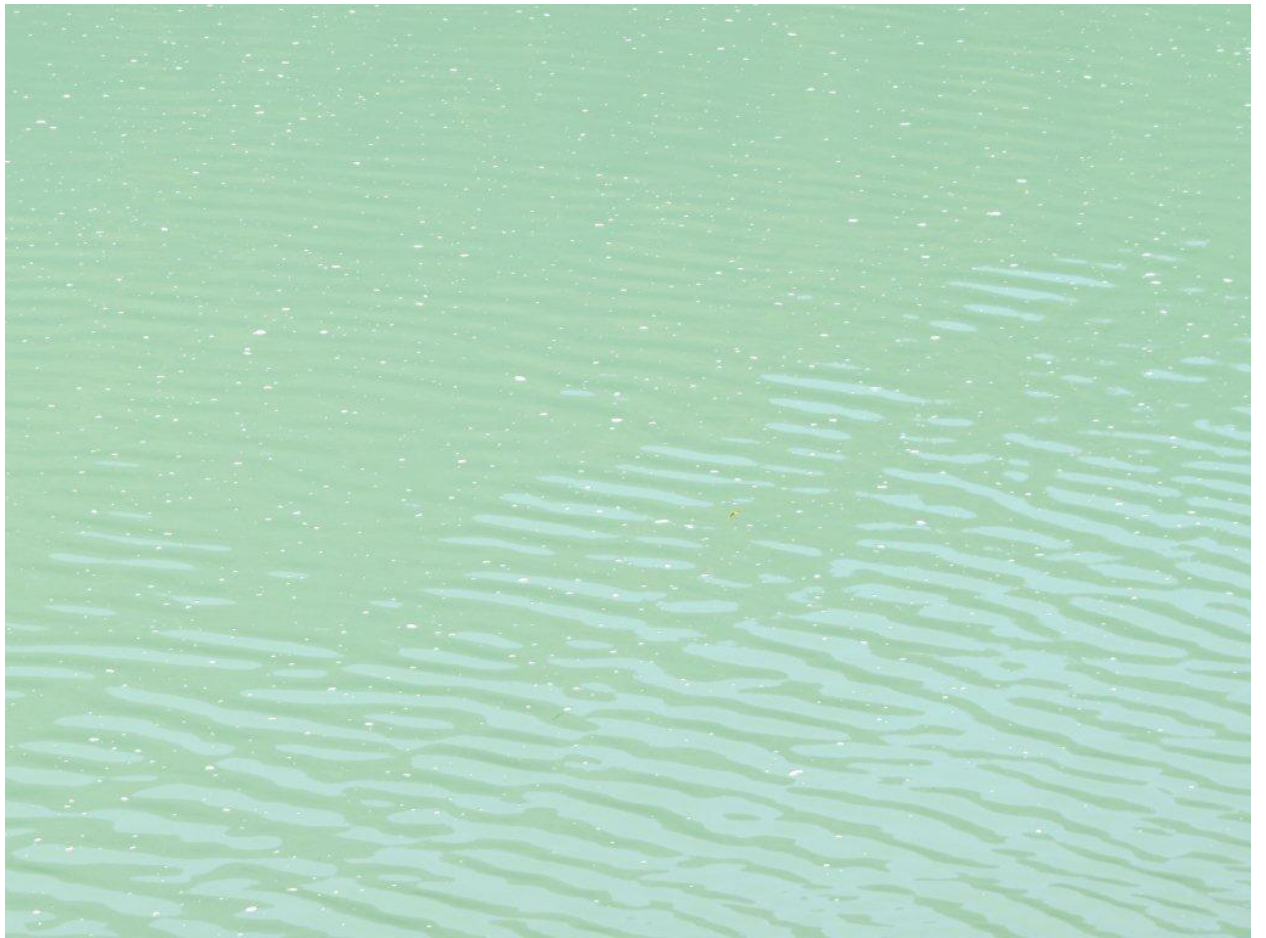
operation and 75 mg/L above suspended solid levels of receiving waters during storm events.

Where was the monitoring? Were water samples taken? What procedures/equipment did they use? Did the environmental monitors invoke a shutdown procedure for releases? Were the monitors on site?



FINE SEDIMENT RELEASES

Based on the Nova Pacific Report, there is no evidence that the environmental consultant had taken any meaningful baseline measurements of silt, or during the construction, or during a release event.

For the few data reported, there is no indication of exactly where samples were taken, when, by what equipment, or who did the work.

Consultant's report on a sediment incident

It seems likely that, as excavation proceeded, the turbid water of the pool intersected a zone of sub-gravel percolation and thereafter delivered some turbid water from the pit. As the turbidity discharge was minor in its effects and did not have a detrimental effect beyond the work zone, the work continued. The turbidity in the pit work zone cleared quickly once the excavation was complete and opened to the flowing water of the main channel. The secondary channel also received a significant portion of the flow. This is a good example of the environmental site monitoring which includes turbidity measurement to ensure that the contractor receives good direction to prevent any harmful habitat effect.

How did they know this to be true?

?

Where were the sampling locations and where is the BACI (Before After Control Impact) data?

Figure Y2: 2016 Yarrow Bar (16-13L) construction drawing. Photo taken March 19, 2016, drawing – August 24, 2016.

Nova Pacific statements re: a sediment incident.

How would they know that there was *"…no evidence of fish or other species in distress was observed…"* if the water was so dirty?

Yarrow Bar

As the excavated pit extended closer to its downstream end, water percolating from the ground into the small pool remaining from the 2014 excavation and located immediately downstream of the 2016 excavation was noted to contain silt. Turbidity was measured and the results are presented in the table below.

Table Y1: Turbidity measurements taken at Yarrow Bar excavation site on September 1st, 2016

Sampling location	Turbidity (NTU)
1. At location of silty water percolation	327
2. Mid-pool	48.8
3. Prior to outflow from secondary channel to main channel	28.1
4. Main channel (for baseline comparison)	1.7

The value for sampling station 1 was very high, and likely representative of water within the excavation that was close to the direct action of the excavator. The mid-pool excavation was less than 10m away from the point where percolation entered the pool. This rapid decrease would be due to a combination of immediate settling of suspended sediment and dilution. The area was checked and no evidence of fish or other species in distress was observed. Fish, mostly Longnose Dace, were seen throughout the pool and downstream sub-gravel fed microchannel.

	A	B	C
1		NTU's	mg/l
2	top-of-pool	327	1,119
3	mid pool	48.8	167
4	outflow	28.1	96
5	River	1.7	6
6	mg/l = 3.4216 NTU's		

Nova Pacific--meaningless data: no evident sampling design, no units, who, when, what, where not evident

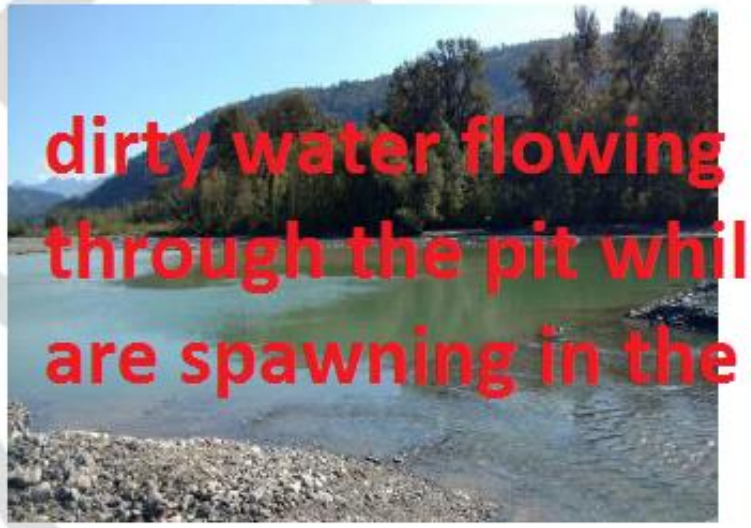
Table KW1: September 29th turbidity readings during pit opening **Keith Wilson bar**

Station	Location	Pre-opening	Mid-opening	Post-opening
Time		~9:00 am	~10:00 am	~11:30 am
Immediately D/S of opening	River	0.5	12.0	0.3
	Pit	48.4	58.7	48.8
Midway along the pit	River	0.3	7.2	0.9
	Pit	45.3	47.1	40.2
Immediately below outlet	River	2.2	23.9	27.3
Pump station channel	Channel	6.7	7.5	7.3
50m D/S of outlet	River	5.0	13.8	19.9
100m D/S of outlet	River	not sampled	14.1	18.5
150m D/S of outlet	Along bank	not sampled	not sampled	18.5
	~20m off bank	not sampled	not sampled	0.9

L7: Machinery on site. September 19, 2016.

L8: Inflow of completed site. September 27, 2016.

L9: Outflow of completed site. September 27, 2016.



L10: View of the completed excavation from downstream of the work, near second outflow to the constructed channel. September 27, 2016.

Where are the water sample data? Background, pit, upstream, downstream?

Silt mobilization into the Vedder River and gravel-borrow pile management

Wilson Road pit—how is this acceptable?

HABITAT OFFSETS

PARAGRAPH 35(2)(b) *FISHERIES ACT* AUTHORIZATION

4. **Conditions that relate to the offsetting of the serious harm to fish likely to result from the authorized work, undertaking or activity:**

4.1. Offsetting measures will follow the design plans and parameters outlined in: "Proposed 2016 Vedder River Sediment Removal Project", dated May 2016, prepared by Nova Pacific Environmental (**Schedule 1**).

4.2. As per the offsetting objective outlined in **Schedule 1** ("Proposed 2016 Vedder River Sediment Removal Project"), all reasonable efforts are to be made to optimize fish habitat outcomes as a result of the excavations.

4.3. Additional offsetting measures include habitat enhancements, shall be incorporated where appropriate provided the enhancements will not result in serious harm not identified above :

4.3.1. Site # 2 Lickman Bar: large woody debris will be keyed in around excavation site.

4.3.2. Site #3 Bergman Bar: habitat excavation along the left bank, upstream and downstream of the main pit involving deepening the left bank microchannel for improved rearing capacity, reduced fish stranding and additional Chum spawning habitat.

4.3.3. Site # 4 Railway Bar: habitat excavation at the downstream corner of pit along bank to maintain habitat values of small channel downstream of excavation.

4.3.4. Site #5 Downstream of Rail Bridge: habitat excavation along the right bank, deepening the secondary channel and keying in large woody debris into the habitat channel and adjacent areas.

4.3.5. Site #6 Yarrow Bar: maintaining a buffer zone for the microchannel, habitat excavation along the left bank, upstream and downstream of the main pit to improve flows, and keying in large woody debris.

4.3.6. Site #7 Keith Wilson Bar: habitat excavation along right bank involving pools and sections of microchannel and keying in large woody debris.

4.3.7. The Proponent shall provide no less than 1000 m^3 of gravel for use by DFO to enhance spawning sites in the Chilliwack/Vedder River. The storage site for this gravel stockpile shall be chosen in consultation with DFO Habitat Restoration Unit (Annacis Island at 604-666-8266).

4.5. All fish habitat offsetting measures shall be considered completed and functioning when each site achieves an increased or neutral habitat rating and a positive or neutral overall habitat score.

.../5

4.6. If the results of monitoring as required in condition 5 indicate that the offsetting measures are not completed by the date specified and/or are not functioning according to the above criteria in 4.5, the Proponent shall give written notice to DFO and put in place contingency measures and associated monitoring measures to ensure the offsetting is completed and/or functioning as required by this Authorization.

4.6.1. In the event that the habitat assessment score and rating reveal offsetting measures are not functioning, the proponent will determine the reason for failure(s), develop a contingency plan to address the failure(s) and implement corrective action(s) within one calendar year to bring offsetting measures to a level consistent with the standard stated in the Authorization conditions 4.5.

5. **Conditions that relate to monitoring and reporting of implementation of offsetting measures (described above in section 4):**

5.1. The Proponent shall report to DFO on whether the offsetting measures were conducted according to the conditions of this Authorization by providing the following:

5.1.1. An assessment report outlining habitat changes and environmental impacts for each site by implementing the following:

5.1.1.1. Detailed mapping of habitat conditions for each bar following the Vedder River Habitat Assessment Protocol **(Schedule 1** and **Schedule 2)**, which involves groundtruthing, aerial photography pre-excavation and post-excavation, approximately one year later, at similar river discharge rates, river cross-section surveys and hydraulic modelling.

did this happen?

5.1.1.2. Detailed assessment of habitat types and habitat ratings for each site following the Vedder River Habitat Assessment Protocol **(Schedule 1** and **Schedule 2)**.

5.1.1.3. Geo-referenced photographic assessment of the offsetting measures 4.3.1. to 4.3.6.

5.1.1.4. Identification of any functional concerns with the offsetting measures and description of any remedial measures taken.

5.1.2. A confirmation receipt from DFO Habitat Restoration Unit regarding the completion of 4.3.7 by December 31st, 2016.

How realistic is it that such habitat structures will survive the first freshet?

1: Giesbrecht Bar

Photos of LWD placed at Giesbrecht Bar and GPS locations

G1: LWD #G2016-1 – two pieces of LWD placed in scalped pit along the river side.

How realistic is it that such habitat structures will survive the first freshet?

G2: LWD #G2016-2 – several pieces of LWD placed in scalped pit along the bank side. Note a platform of boulders created upstream of LWD complex to enhance fish habitat.

How realistic is it that such habitat structures will survive the first freshet?

G3: LWD #G2016-3 – two pieces of LWD placed in scalped pit along the bank side. Note a platform of boulders created downstream of LWD complex to enhance fish habitat.

How realistic is it that such habitat structures will survive the first freshet?

2: Lickman Bar

Photos of LWD placed at Lickman Bar and GPS locations

L1: LWD #L2016-1 –LWD structure placed along the bank side of the pit.

How realistic is it that such habitat structures will survive the first freshet?

L2: LWD #L2016-2 –LWD structure placed along the bank side of the pit upstream of LWD #L2016-1.

How realistic is it that such habitat structures will survive the first freshet?

View of completed habitat channel looking downstream. September 27, 2016.

How realistic is it that such habitat structures will survive the first freshet?

3: Bergman Bar

Photos of LWD placed at Bergman Bar and GPS locations

B1: LWD #B2016-1 –LWD structure placed downstream along left bank habitat channel.

Were these habitat features ever assessed to actually work?

Bergman Bar Habitat Channel Enhancement

A habitat channel was excavated along the left bank to improve rearing capacity, provide additional Chum Salmon spawning habitat and reduce the potential for fry stranding. This work was intended to provide habitat that is independent of the surface flow at the upstream end of the bar and will maintain sub-gravel flow in case the inlet flow cut off.

Habitat channel construction work in progress looking upstream. August 26, 2016.

What we see now…

QUESTION: is Chilliwack's environmental consultant evaluating its own work?

And if so, why?

HOW MUCH GRAVEL DOES THE RIVER NEED TAKEN OUT TO PROVIDE REASONABLE FLOOD PROTECTION?

IF…

there are no significant flood-profile deficiencies,

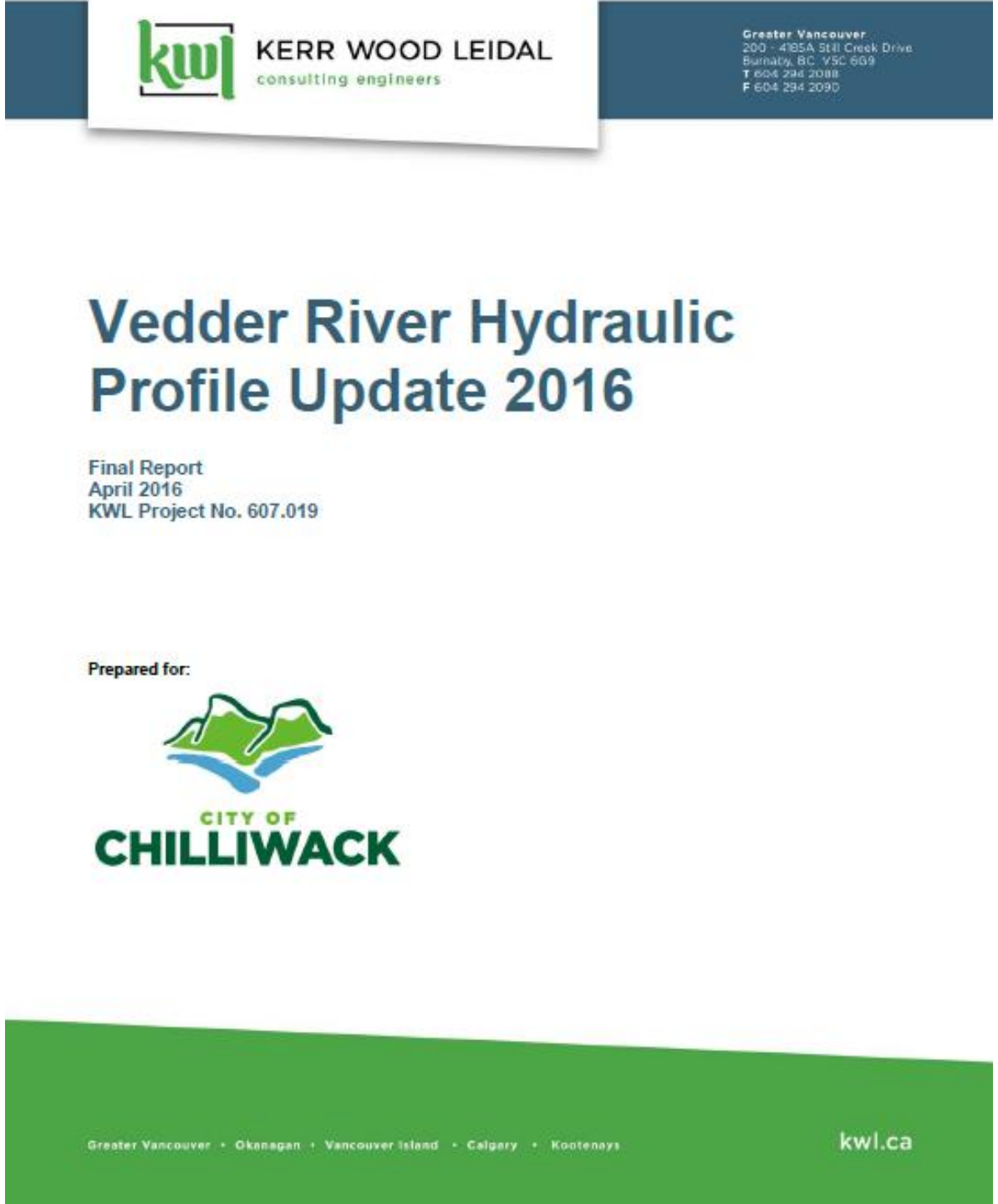
…and if…

there has been no significant sediment deposition,
or there has been degradation,

…then…

there should be no reason to take out any gravel.

The basis of 2016 gravel removal



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Vedder River Hydraulic Profile Update 2016

Final Report
April 2016
KWL Project No. 607.019

Prepared for:

CITY OF CHILLIWACK

How the data were obtained (KWL 2016)

The channel survey was conducted by CRA Canada Surveys Inc. from January 8 to February 26, 2016. The survey includes 23 cross sections in the Vedder Canal and 53 cross sections in the Vedder River. The 200-year design flood of 1,470 m^3/s was routed through the surveyed channel geometry using the HEC-RAS hydraulic model.

A sum of 800 cu. m./y of gravel was deposited between 2014 and 2016 yet the Province authorized 100,000 cu m. for 2016, or over 50 X's the amount

Natural deposition in the Vedder River and the Vedder Canal was calculated as the sum of the surveyed bed surface change (2014-2016) and the known excavation volume in 2014.

The average quantity of deposition in the Vedder River and Vedder Canal was calculated to be 800 m^3/y for the past two years (2014-2016).

There was a large margin of flood freeboard safety on the Vedder Canal and only a small deficiency on the north dyke on Vedder River for several hundred meters

In the Vedder Canal, the dike freeboard exceeded 0.75 m on both sides. In the Vedder River, the setback dike freeboard exceeded 0.75 m except on the right (north) dike from XS8 to XS13, which remained the same as 2014. However, the freeboard deficiency is smaller than in 2014 due to slight drop in the water level.

The lowest freeboard was found to be 0.44 m at XS9.

So, why was any gravel taken out of the Vedder Canal in in 2016?

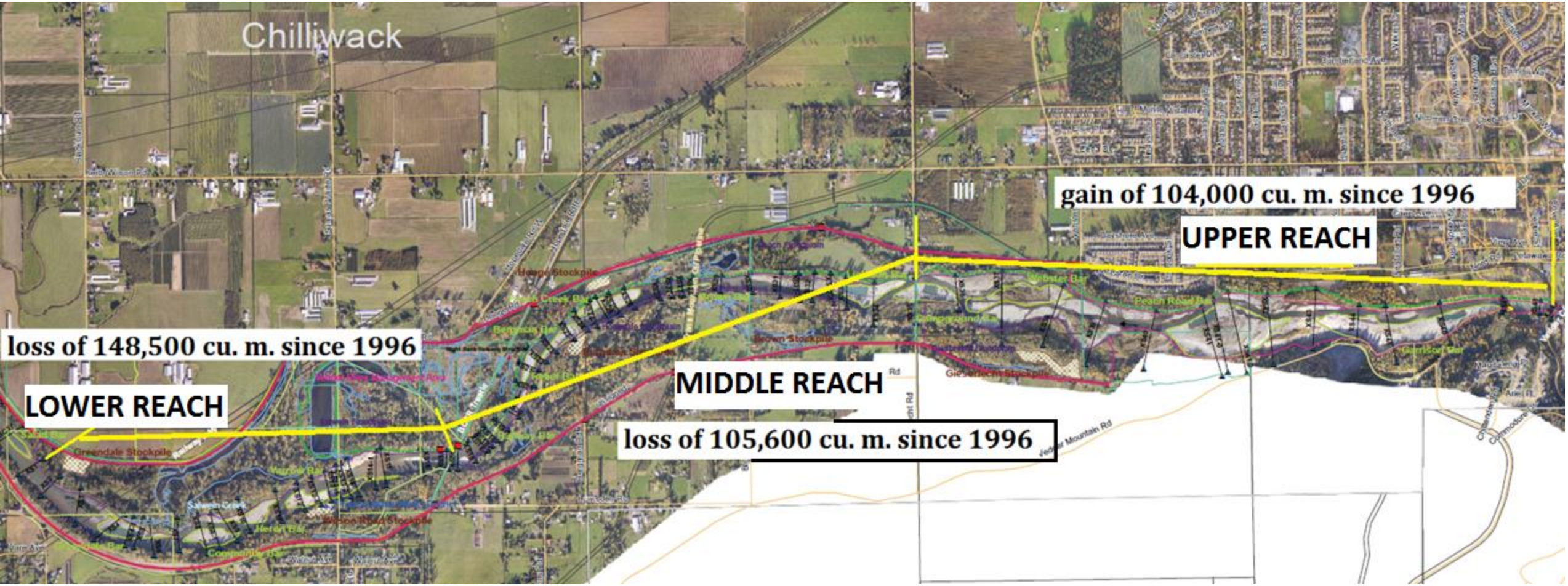
Note from Remko Rosenboom November 14, 2016

- Natural Deposition in the Vedder River and Vedder Canal:
  a) The 2016 survey results show channel degradation at all the Canal cross sections compared to the 1991 conditions. From 1991 to 2016, 114,300 m^3 degraded in the Canal, with 71% downstream of the Keith Wilson Bridge. Compared to the 2014 conditions, the 2016 channel survey shows a degradation of 28,500 m3 (22,900 m^3 downstream of the Keith Wilson Bridge and 5,600 m^3 upstream).

Note from Remko Rosenboom November 14, 2016 re: Vedder River

b) The Vedder River has degraded through the lower reach (XS1 to SRBC) and middle reach (SRBC to XS35), relative to 1996. The total losses from 1996 to 2016 are 148,500 m^3 in the lower reach and 105,600 m^3 in the middle reach. Most of the deposition of 104,000 m^3 occurred in the upper reach (XS35 to XS49) between SX39 to XS42, resulting in the formation of Giesbrecht Bar between XS40 and XS41.

Gravel losses and gains over the last 20 years for the Vedder River



CHANGING VOLUMES OF GRAVEL

KWL (2016) comments on steep decline in gravel inputs and deposition

Table 1 shows that Vedder Canal degraded at a rate of 5,300 m^3/y in the last two years. This is contrary to the long term trend (1981-2016) of aggradation at an average rate of 4,300 m^3/y, but is similar to the 2010-2012 condition. The Vedder River also lost bed material in the lower and middle reaches, which was due to a greater volume of excavation than deposition. The Vedder River upper reach aggraded by about 23,000 m^3. Overall, the Vedder River received 12,100 m^3 of deposition over the period 2014 to 2016. This is 15% of the long term biennial deposition rate (80,800 m^3) in the Vedder River.

CHANGING THE GOALPOSTS IN REGARDS TO THE CRITERIA FOR PROTECTION ADDS AN EVEN-MORE DIFFICULT DIMENSION FOR MAINTENANCE OF FLOOD PROFILE THROUGH GRAVEL REMOVAL

1990's-2010 the 1:200 year return flood = 1,330 cubic meters per second with a 0.6 m freeboard

After the 2010 upgrade, the 1:200 year return value was upgraded to 1,470 cubic meters per second with a 0.75 m freeboard requirement

Note that the for the “freeboard limited area”, the stream has already degraded substantially since 1996 BUT gravel removal now has almost no flood protection capacity

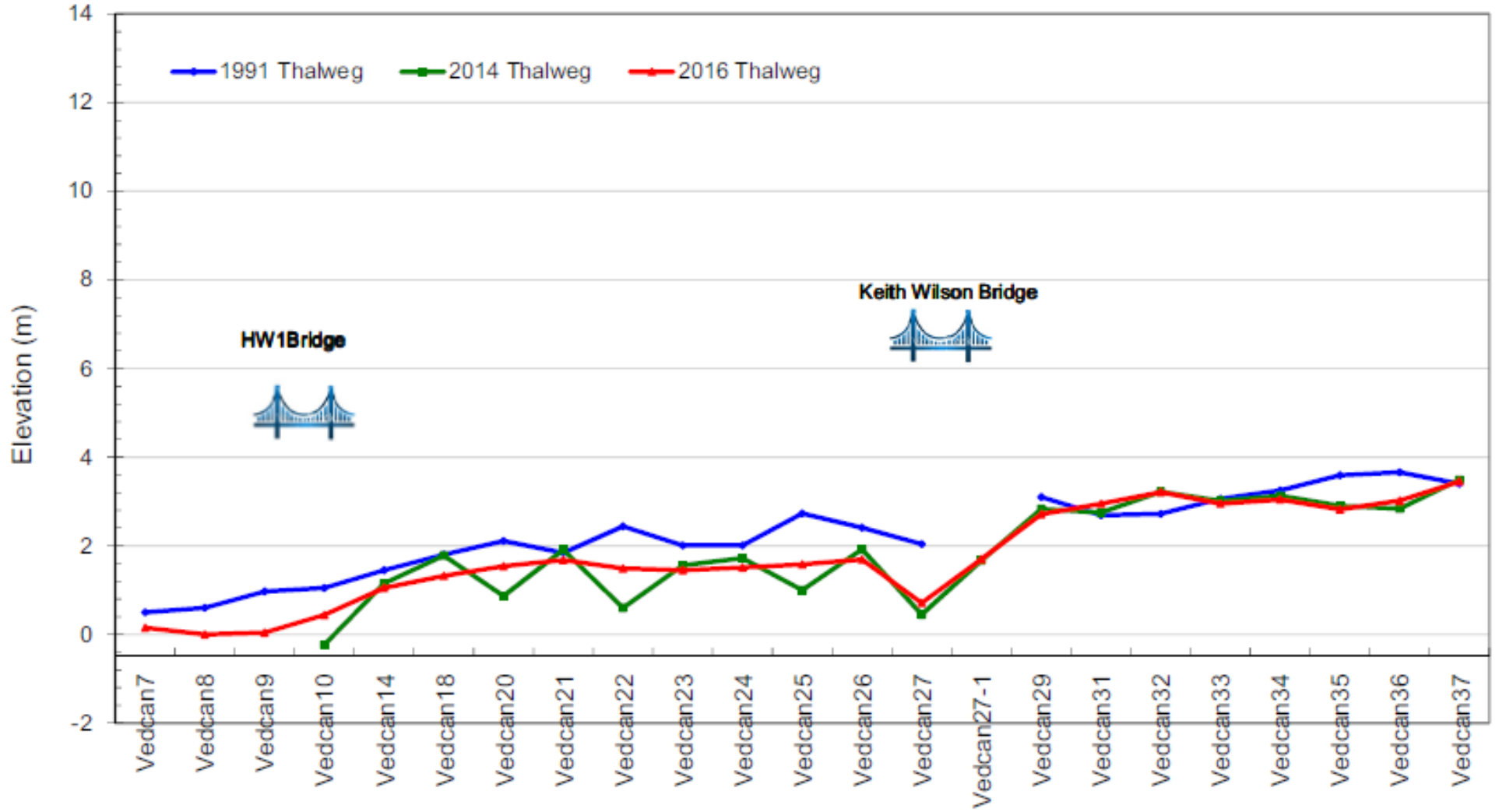
Nova Pacific Environmental identified seven potential excavation sites for consideration by the Vedder River Management Area Committee (VRMAC). Each of the excavation sites was evaluated to assess its flood control benefit. Six sites, namely Keith Wilson Bar, Yarrow Bar, Railway Downstream Bridge Bar, Railway Bar, Bergman Bar, and Lickman Bar were selected for the 2016 gravel removal program, with a total volume of 92,700 m^3. Giesbrecht Bar was recommended to be a provisional site in case construction difficulties are encountered at other sites (in particular, Railway D/S Bridge Bar and Railway Bar). The water level reduction resulting from the proposed gravel removal ranges from 1.0 to 2.0 cm in the freeboard limited area.

KWL (2016) analyses of Vedder Canal channel degradation

Note: “thalweg” is the deepest point in a river channel, often approximating the average center of the stream

The Thalweg is a line connecting the lowest points along the length of the river bed to define its deepest channel. The Vedder Canal Thalweg profiles for 1991, 2014 and 2016 are provided in Figure 3. Examination of the Thalweg profiles shows considerable changes in the Canal bed level between 1991 and 2016. The majority of the Thalweg dropped by 0.5 m to 1.0 m except for between XSC29 and XSC34 and at XSC37. A greatest Thalweg drop, ranging from 1.2 m to 1.3 m, was found at XSC25 and XSC27. At the downstream end of the canal (i.e. XSC7, XSC8, XSC9), the Thalweg has dropped on an average of 0.6 m. Relatively minor bed changes have occurred in the Canal since 2014. The 2014 channel excavation site at XSC23 (Boundary Bar) has partially infilled. XSC37 (Salad Bar) has infilled close to pre-excavation levels.

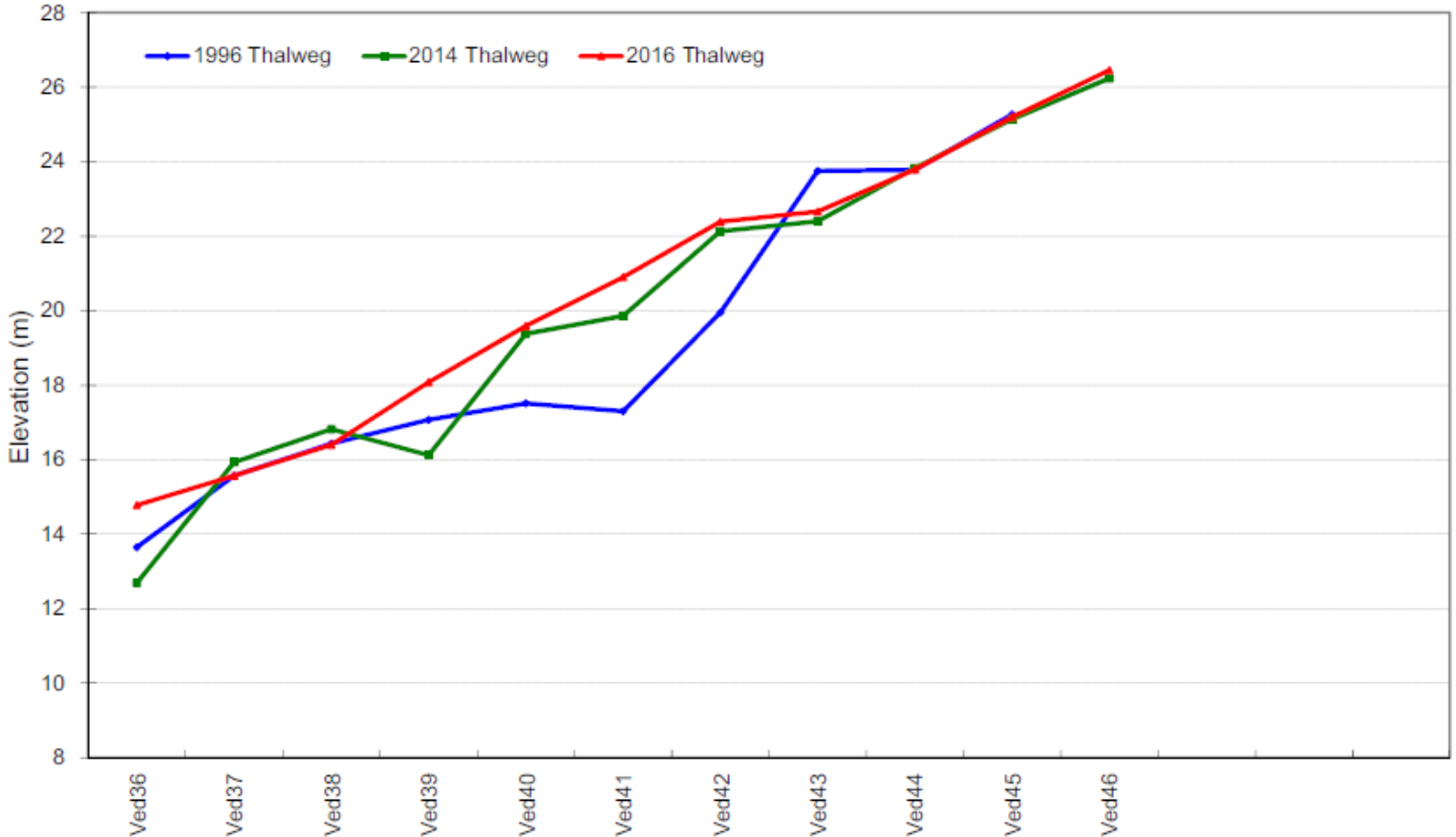
KWL (2016) thalweg elevations for the Vedder Canal—note the 2016 deepening compared to 1991



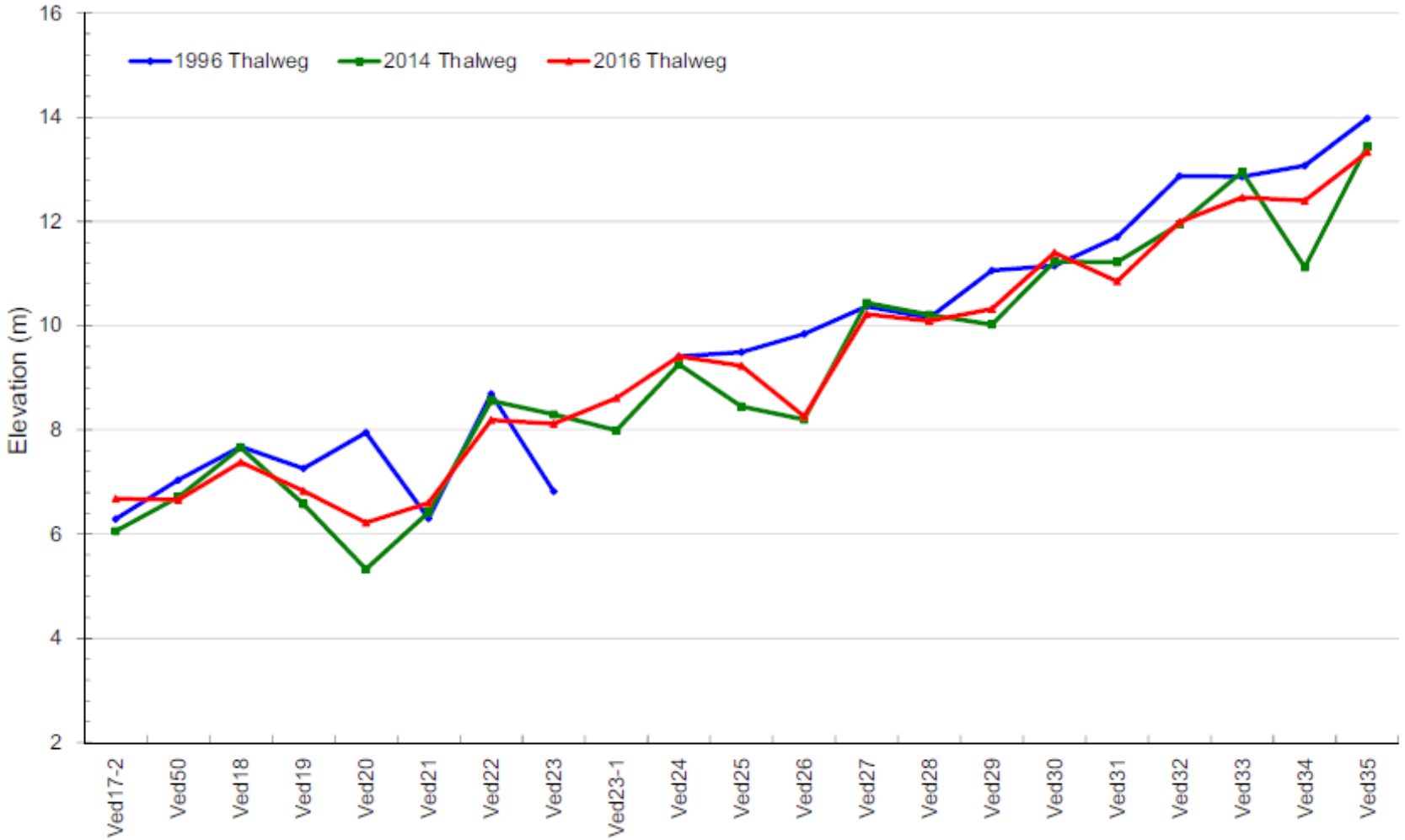
KWL (2016) Vedder River channel degradation—for the most part the stream is becoming far deeper in its middle channel—bad for juvenile salmonid rearing

The Vedder River Thalweg profiles for 1996, 2014 and 2016 are shown in Figures 4 to 6. Examination of the Thalweg profiles shows greatest degradation at XS11 and XS20, where the channel bed lowered by 2.1 m and 1.7 m, respectively, since 1996. The greatest Thalweg increase was found at the upper reach from XS 40 to XS42, with the mean increase averaging 2.7 m. Compared with the 2014

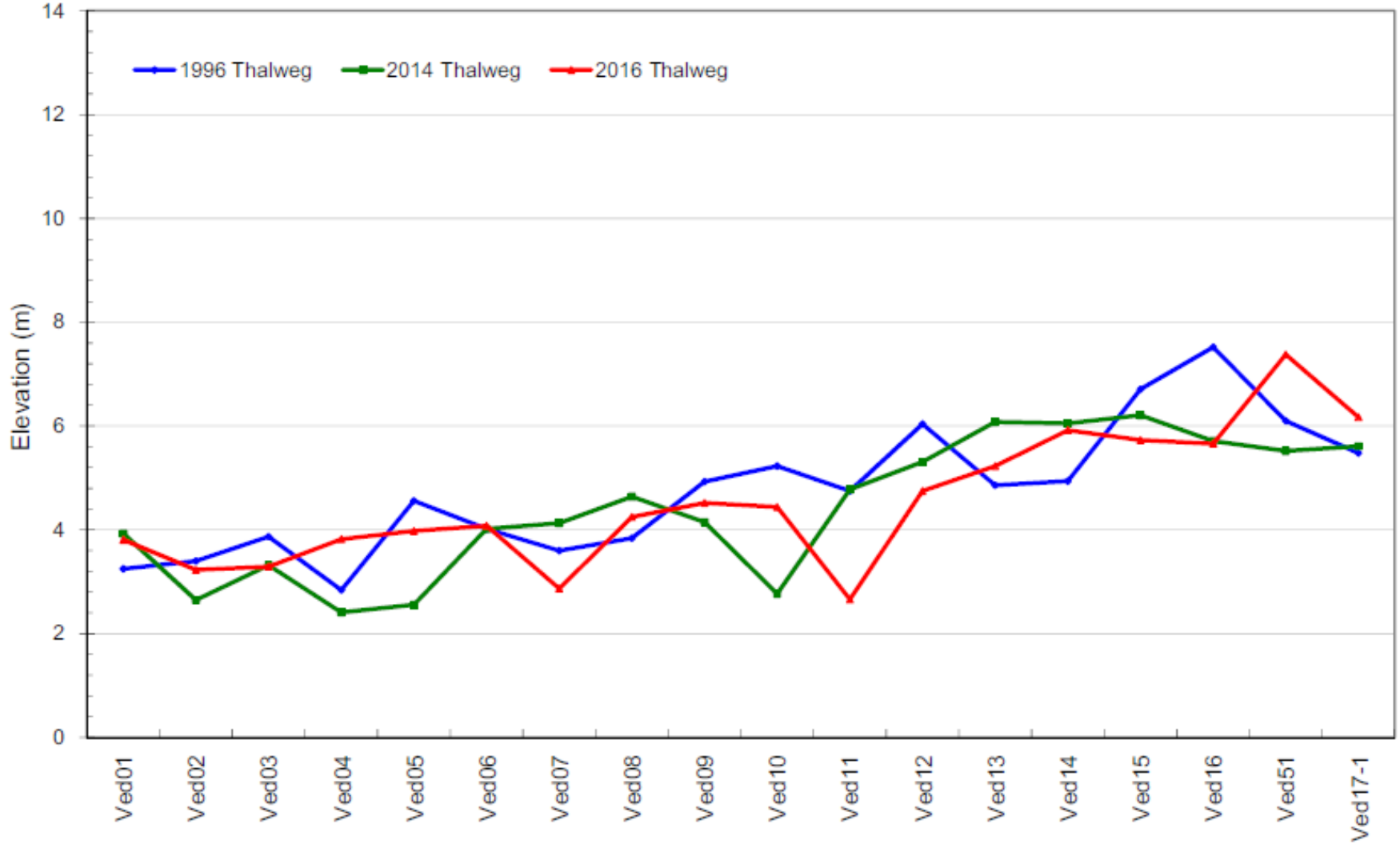
KWL (2016) thalweg elevations for the Vedder River XS46 to XS36—note that around 1996 there were a number of massive removals of gravel in this area which may account for this difference



KWL (2016) thalweg elevations for the Vedder River XS17-2 to XS35—note the 2016 deepening compared to 1996



KWL (2016) thalweg elevations for the Vedder River XS1 to XS17-1—note the 2016 deepening compared to 1996



KWL (2016) summary of gravel deposition/losses between 2014-2016

Gravel aggradation and degradation volumes in the Vedder Canal and Vedder River were calculated using the average end area method. Gravel excavation quantities for 2014 were obtained from Nova Pacific Environmental. Natural bed material deposition was calculated as the difference between surveyed bed material change and bed material excavation. Calculated changes in channel gravel quantities are shown in Table 1 for the past two years (2014-2016). Negative aggradation indicates degradation.

Table 1: Channel Gravel Quantities 2014-2016

Location	Bed Change (m^3)	Excavation (m^3)	Total Natural Deposition (m^3)	Total Natural Deposition (m^3/y)
XSC10 – XS1	-28,481	-17,879	-10,602	-5,300
XS1 – SRBC	-32,340	-19,150	-13,190	-6,600
SRBC – XS35	-16,256	-18,709	2,453	1,200
XS35 – XS45	22,857	0	22,857	11,500
			Annual Natural Deposition (m^3/y)	**800**

Note: positive value means river bed aggradation, negative value means degradation.

VEDDER CANAL

Table 2: Vedder Canal Gravel Quantities

Cross Section	Distance to D/S XS (m)	Volume Change 1991 to 2014 (m^3)	Volume Change 2014 to 2016 (m^3)	Volume Change 1991 to 2016 (m^3)
Vedder River XS1 to Keith Wilson Bridge				
XS1	185.93	-1,522	-891	-2,412
C37	151.48	-2,355	-535	-2,889
C36	152.07	-3,181	-893	-4,074
C35	152.34	-2,427	-1,641	-4,067
C34	152.36	-1,546	-1,044	-2,589
C33	152.34	-1,235	120	-1,115
C32	152.30	-818	282	-536
C31	152.39	-1,007	-25	-1,032
C29	292.16	-13,250	-901	-14,151
C27-1	15.98		-33	
C27				
Total		-27,339	-5,561	-32,867
Keith Wilson Bridge to Highway 1 Bridge				
C27	148.98	-6,499	-1,056	-7,555
C26	152.36	-1,902	-667	-2,570
C25	152.36	-3,799	-787	-4,586
C24	152.38	-2,739	-2,599	-5,338
C23	154.14	-2,964	-288	-3,252
C22		-3,945	819	-3,126
C21	152.35	-3,255	-1,063	-4,318
C20	304.71	-7,779	-4,129	-11,909
C18	609.41	-8,587	-13,585	-22,172
C14	572.00	-17,037	435	-16,602
C10				
Total		**-58,507**	**-22,920**	**-81,427**
Total for Canal		**-85,846**	**-28,481**	**-114,294**

NOTES

1. Quantity calculations are between the section and the next section downstream.
2. Negative numbers represent degradation. Positive numbers represent aggradation.
3. All surveys were prior to the year's excavation.
4. Cross section C27-1 was surveyed in 2014 and 2016, but not in 1991. The volume for C27-1 is included in the 2014 to 2016 total volume calculations, but not included in the 1991-2014 and 1991-2016 total volume calculation.

LOWER VEDDER RIVER

Table 3: Vedder River Gravel Quantities

Cross Section	Distance to D/S XS (m)	Volume Change 1996 to 2014 (m^3)	Volume Change 2014 to 2016 (m^3)	Volume Change 1996 to 2016 (m^3)
SRBC to XS1 (Lower Reach)				
SRBC	27.32	-969	-443	-1,412
XS51	120.45	-7,615	-3,161	-10,777
XS16	190.13	-10,060	-12,518	-22,578
XS15	154.57	-35	-10,354	-10,389
XS14	132.73	2,607	-5,257	-2,650
XS13	139.15	-3,495	-4,384	-7,879
XS12	116.94	-7,670	-1,424	-9,093
XS11	175.51	-18,022	4,306	-13,716
XS10	94.66	-8,125	2,856	-5,269
XS9	126.44	-9,891	604	-9,286
XS8	118.42	-10,762	-680	-11,442
XS7	131.03	-4,481	-850	-5,332
XS6	71.08	-2,187	1,535	-653
XS5	125.46	-6,913	1,959	-4,954
XS4	201.70	-16,993	-2,824	-19,817
XS3	163.68	-9,857	-1,292	-11,149
XS2	136.11	-1,679	-413	-2,092
Total		**-116,146**	**-32,340**	**-148,487**

MIDDLE VEDDER RIVER

Cross Section	Distance to D/S XS (m)	Volume Change 1996 to 2014 (m^3)	Volume Change 2014 to 2016 (m^3)	Volume Change 1996 to 2016 (m^3)
XS35 to SRBC (Middle Reach)				
XS35	204.85	-13,096	1,397	-11,699
XS34		-6,495	3,480	-3,015
XS33	165.19	-11,168	244	-10,924
XS32	159.56	-7,499	-732	-8,231
XS31	143.30	-3,778	-2,389	-6,167
XS30	146.78	-4,601	-3,278	-7,879
XS29	135.43	-3,716	-1,251	-4,967
XS28	169.52	-4,008	-2,235	-6,243
XS27	147.59	-4,240	-1,987	-6,228
XS26	143.62	-4,571	16	-4,556
XS25	-6,227	-4,398	1,538	-2,860
XS24	-7,340	-3,275	871	-2,404
XS23-1			-1,172	
XS23	-778	483	-1,182	-699
XS22	-3,454	-2,531	-2,116	-4,647
XS21	-5,178	-4,513	-1,945	-6,458
XS20	-4,677	-4,341	-1,599	-5,940
XS19	-4,019	-4,263	-2,586	-6,849
XS18	-1,828	-2,378	-2,059	-4,437
XS50	-727	-969	-443	-1,412
SRBC				
Total		-89,359	-16,256	-105,615

UPPER VEDDER RIVER

XS49 to XS35 (Upper Reach)				
XS49	79.05			
XS48	187.60			
XS47	291.29			
XS45	169.62	-27,666	829	-26,837
XS44	212.92	-32,971	90	-32,880
XS43	221.05	2,211	6,261	8,472
XS42	289.75	81,311	7,887	89,198
XS41	303.19	64,298	-928	63,370
XS40	264.43	25,244	2,338	27,581
XS39	225.47	18,503	3,895	22,398
XS38	251.80	-1,385	2,212	827
XS37	230.76	-23,709	1,506	-22,204
XS36	204.57	-24,321	-1,233	-25,554
XS35				
TOTAL		81,514	22,857	104,371

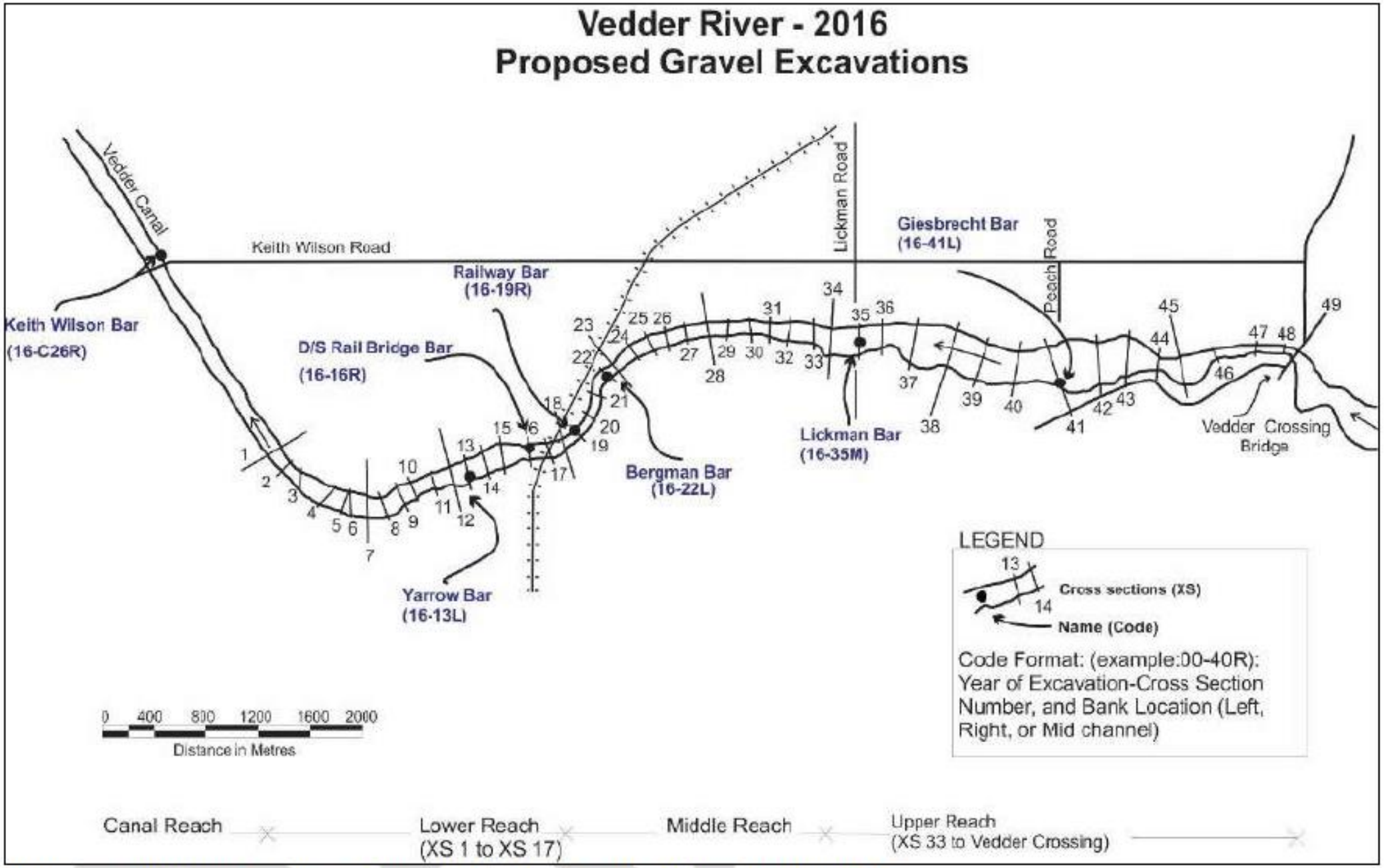
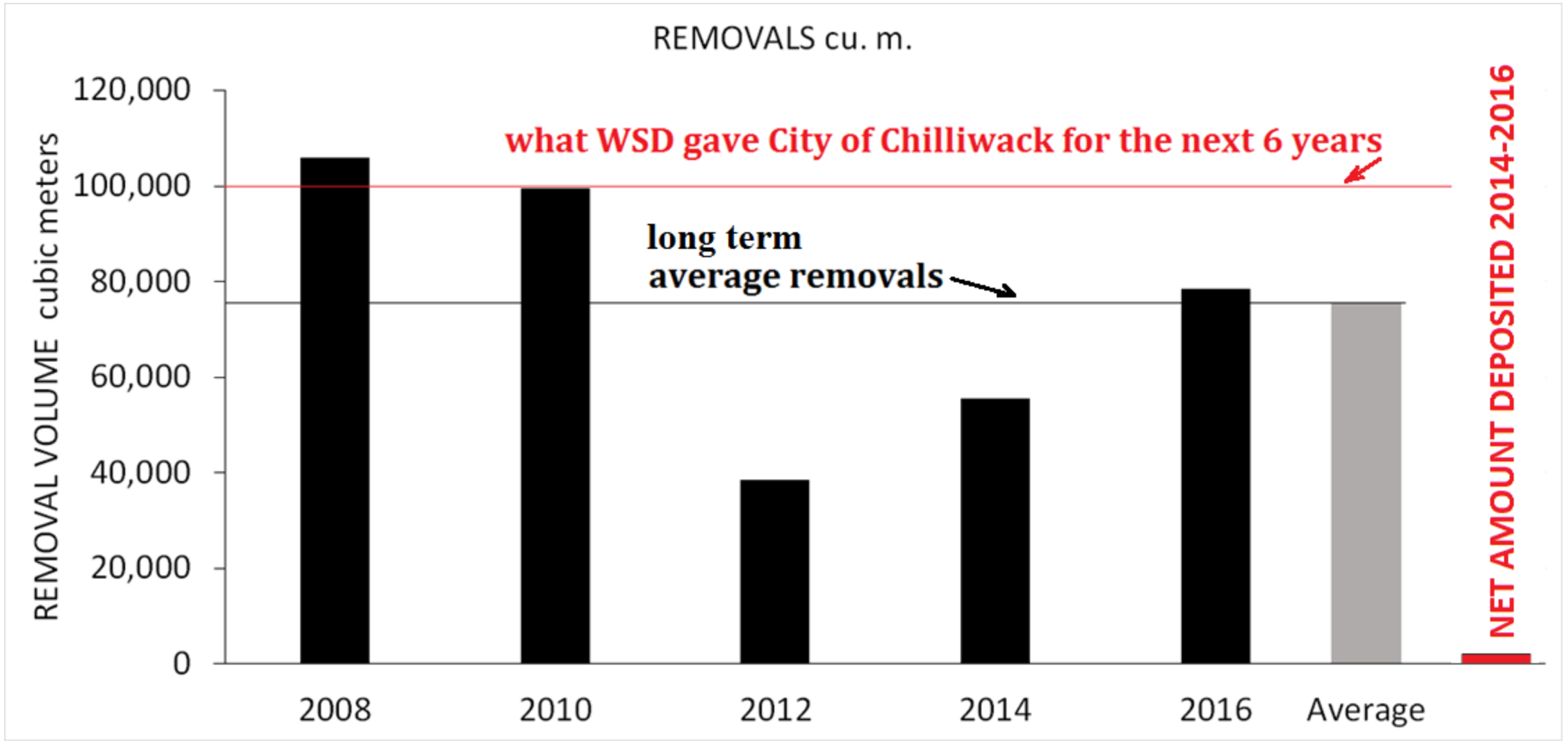


Figure 1 – Overview of sediment removal locations on the Vedder River in 2016

Long-term average removals



While there may have been an historic problem, the issue of natural gravel sedimentation appears to have slowed down to a "mere dribble"

c) The average deposition in the Vedder River and Vedder Canal was 45,400 m^3/y for the 20 years from 1996 – 2014 and 44,700 m^3/y deposition in the Vedder River and Vedder Canal for the 35 years from 1981 to 2016. The lack of significant flood events since 2006 has likely reduced the amount of sedimentation in the Vedder system (KWL April 2016).

EBA looked at the values from 1981-2010 and found the same general trend—gravel removal is now exceeding excavations by a large margin

OQM | Organizational Quality Management Program

Table 2.3: Vedder Canal and Vedder River Historical Gravel Budget (1981-2010)

Vedder Canal			
Reach	**Excavation (m^3)**	**Sediment Deposition (m^3)**	**Cumulative Bed Change (m^3)**
Vedder Canal	-97,900	145,000	47,100
Vedder River			
Reach	**Excavation (m^3)**	**Sediment Deposition (m^3)**	**Cumulative Bed Change (m^3)**
Upper Reach	-377,280	153,700	-223,600
Middle Reach	-844,328	826,500	-17,800
Lower Reach	-471,662	510,400	38,700
1981-2010 Total Vedder River			**-202,700**

Vedder Canal

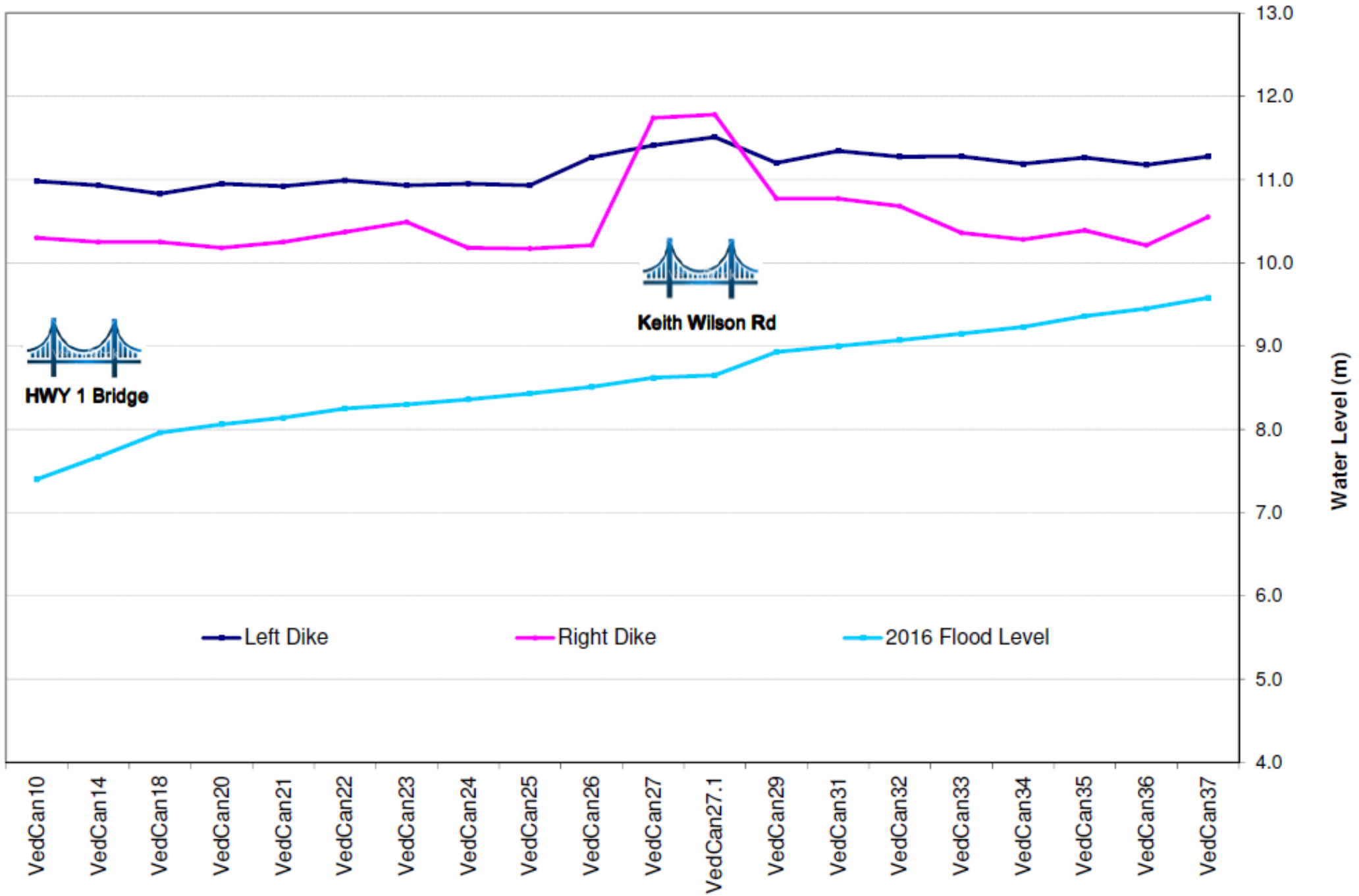


Table 4: 2016 Flood Profile and Dike Freeboard for the Vedder Canal

Cross Section	Dike Crest Elevation (m)		Calculated W.L. (m)	Dike Freeboard (m)	
	Left	Right	Starting at 7.4 m	Left	Right
C37	*11.28*	10.55	9.58	1.70	0.97
C36	*11.18*	10.21	9.45	1.73	0.76
C35	*11.26*	10.39	9.36	1.90	1.03
C34	*11.19*	10.28	9.23	1.96	1.05
C33	*11.28*	10.36	9.15	2.13	1.21
C32	*11.27*	10.68	9.07	2.20	1.61
C31	*11.34*	10.77	9.00	2.34	1.77
C29	*11.20*	10.77	8.93	2.27	1.84
C27.1	11.51	11.78	8.65	2.86	3.13
KW				ave. 2.1	ave. 1.5
C27	11.41	11.74	8.62	2.79	3.12
C26	*11.27*	10.21	8.51	2.76	1.70
C25	10.93	10.17	8.43	2.5	1.74
C24	10.95	10.18	8.36	2.59	1.82
C23	10.93	10.49	8.30	2.63	2.19
C22	10.99	10.37	8.25	2.74	2.12
C21	10.92	10.25	8.14	2.78	2.11
C20	10.95	10.18	8.06	2.89	2.12
C18	10.83	10.25	7.96	2.87	2.29
C14	10.93	10.25	7.67	3.26	2.58
C10	10.98	10.30	7.40	3.58	2.90
Note: The Italic numbers show the dike crest elevation that was raised in 2010.				ave. 2.9	ave. 2.2

Vedder Canal—historic position of the Province early 2000's

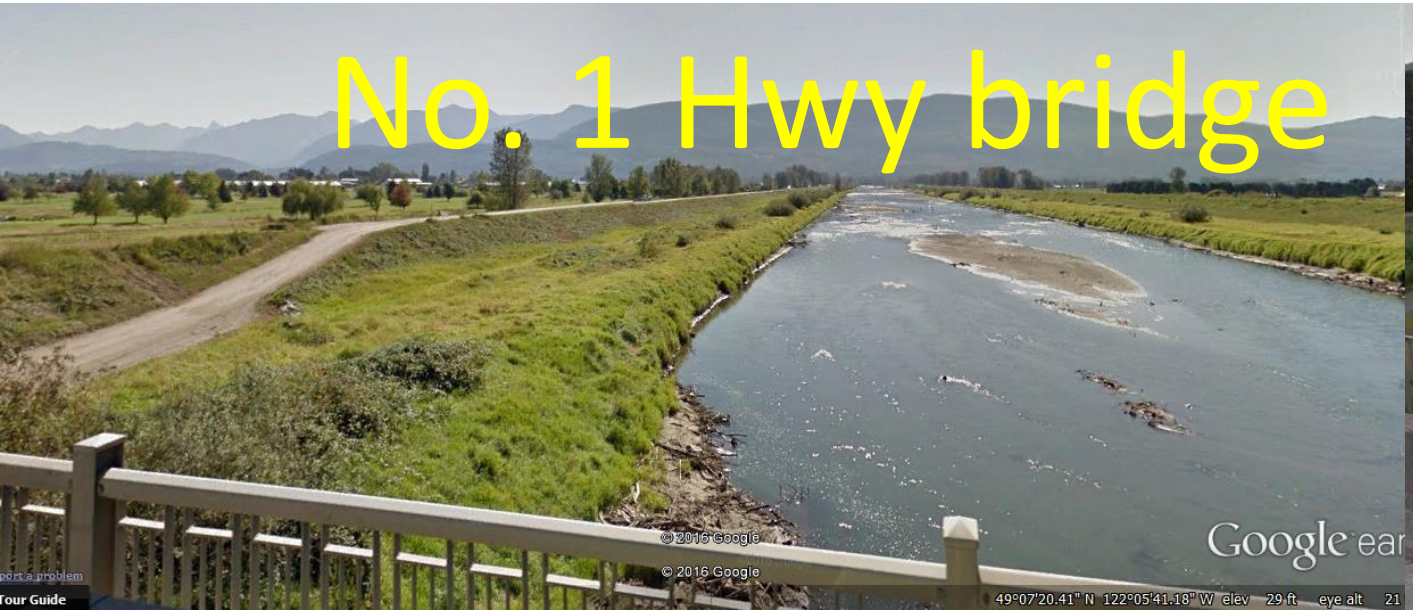
The river has deposited sediment in the canal since completion of the works in 1924, and this process will undoubtedly continue. However, dike crest elevations along the canal have been designed to withstand the Fraser River freshet design flood level, which is well above the maximum fall/winter flood design level for a flood in the Chilliwack/Vedder system. Therefore, the Vedder Canal dikes downstream of No. 3 Road currently have more than adequate freeboard, and will continue to do so, at least for the next several years. Nevertheless, the sediment deposition upstream of Keith Wilson Road and loss of freeboard in the lower reaches of the floodway is a long-term problem that the Vedder River Management Committee should address. The Committee should consider the establishment of permanent monitoring cross-sections in the canal that would be included in the floodway monitoring survey, undertaken approximately every two years.

I appreciate your bringing flood safety concerns to our attention. Ministry staff are available to discuss these matters with you and your staff. The Vedder River is extremely dangerous during a flood and constant vigilance is essential to the flood safety of the large and valuable protected area in Abbotsford and Chilliwack.

Yours truly,

J.W. McCracken, P.Eng.
Regional Director

Why is gravel being taken out of the Vedder Canal? It is designed for Fraser River flood backwatering (i.e., much larger capacity than needed for Vedder floods) and may be in a current state of degradation.



VEDDER RIVER FLOOD PROFILE

Vedder River flood profile—lower zone

Cross Section	Dike Crest Elevation (m)		Calculated W.L. (m)	Bank Freeboard (m)	
	Left	Right	Starting at 7.4 m	Left	Right
SRBC					
17.1			11.44		
51	13.12	12.80	10.94	2.18	1.86
16	12.00	12.31	10.76	1.24	1.55
15	11.67	11.80	10.63	1.04	1.17
14	*11.51*	11.40	10.53	0.98	0.87
13	*11.28*	11.10	10.49	0.79	**0.61**
12	*11.36*	11.00	10.38	0.98	**0.62**
11	*11.28*	10.90	10.38	0.90	**0.52**
10	*11.30*	10.80	10.31	0.99	**0.49**
9	*11.28*	10.70	10.26	1.02	**0.44**
8	*11.38*	10.80	10.24	1.14	**0.56**
7	*11.31*	11.10	10.18	1.13	0.92
6	*11.32*	11.25	10.07	1.25	1.18
5	*11.31*	11.30	10.05	1.26	1.25
4	*11.28*	11.10	10.03	1.25	1.07
3	*11.30*	10.70	9.95	1.35	0.75
2	*11.30*	10.65	9.80	1.50	0.85
1	*11.27*	10.65	9.67	1.60	0.98

Note: The Italic numbers show the elevation of the dike crest that was raised in 2010.
The bold numbers show the dike freeboard that does not meet the required 0.75 m.
Dike elevations and freeboards were not listed for XS22 to XS18, as the flow on the right bank is obstructed by the railway before reaching the setback dike. The right bank flow leaves the main channel between cross section XS21 and XS22 and forms a side channel through the right bank relief opening. This complex situation at the railway bridge makes freeboard assessment difficult.
*Flow leaving the right bank at XS48 will re-join the river at a lower location upstream of the critical reach.

Vedder River flood profile—middle zone

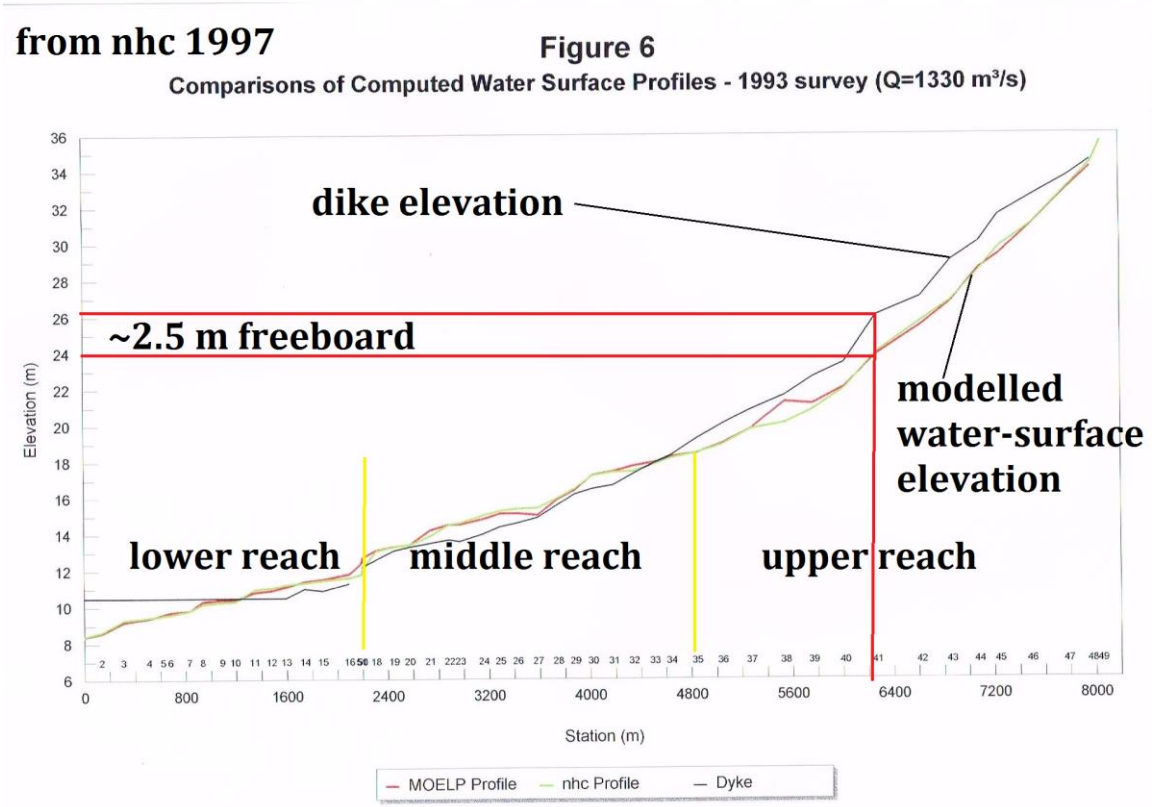
Cross Section	Dike Crest Elevation (m)		Calculated W.L. (m)	Dike Freeboard (m)	
	Left	Right	Starting at 7.4 m	Left	Right
39	22.70	--	21.49	1.21	--
38	21.79	22.20	20.46	1.33	1.74
37	21.00	21.00	19.38	1.62	1.62
36	20.50	20.50	18.63	1.87	1.87
35	19.57	19.40	18.05	1.52	1.35
34	18.67	18.81	17.47	1.2	1.34
33	18.20	18.30	16.80	1.4	1.5
32	17.44	17.80	16.13	1.31	1.67
31	17.12	17.30	15.91	1.21	1.39
30	16.92	16.95	15.57	1.35	1.38
29	16.55	16.60	15.40	1.15	1.2
28	16.24	16.00	15.10	1.14	0.9
27	15.52	15.40	14.46	1.06	0.94
26	15.48	15.05	14.29	1.19	0.76
25	14.88	14.90	13.88	1	1.02
24	14.79	14.75	13.66	1.13	1.09
23.1	14.61	14.50	13.31	1.31	1.2
23	14.4	14.18	13.08	1.33	--
22	14.35		12.94	1.42	--
21	14.14		12.80	1.35	--
20	13.79		12.52	1.28	--
19	13.54		12.33	1.22	
18	13.42		11.92	1.51	
50	13.25	12.98	11.55	1.72	1.45
17.2			11.53		

Vedder River flood profile—upper zone

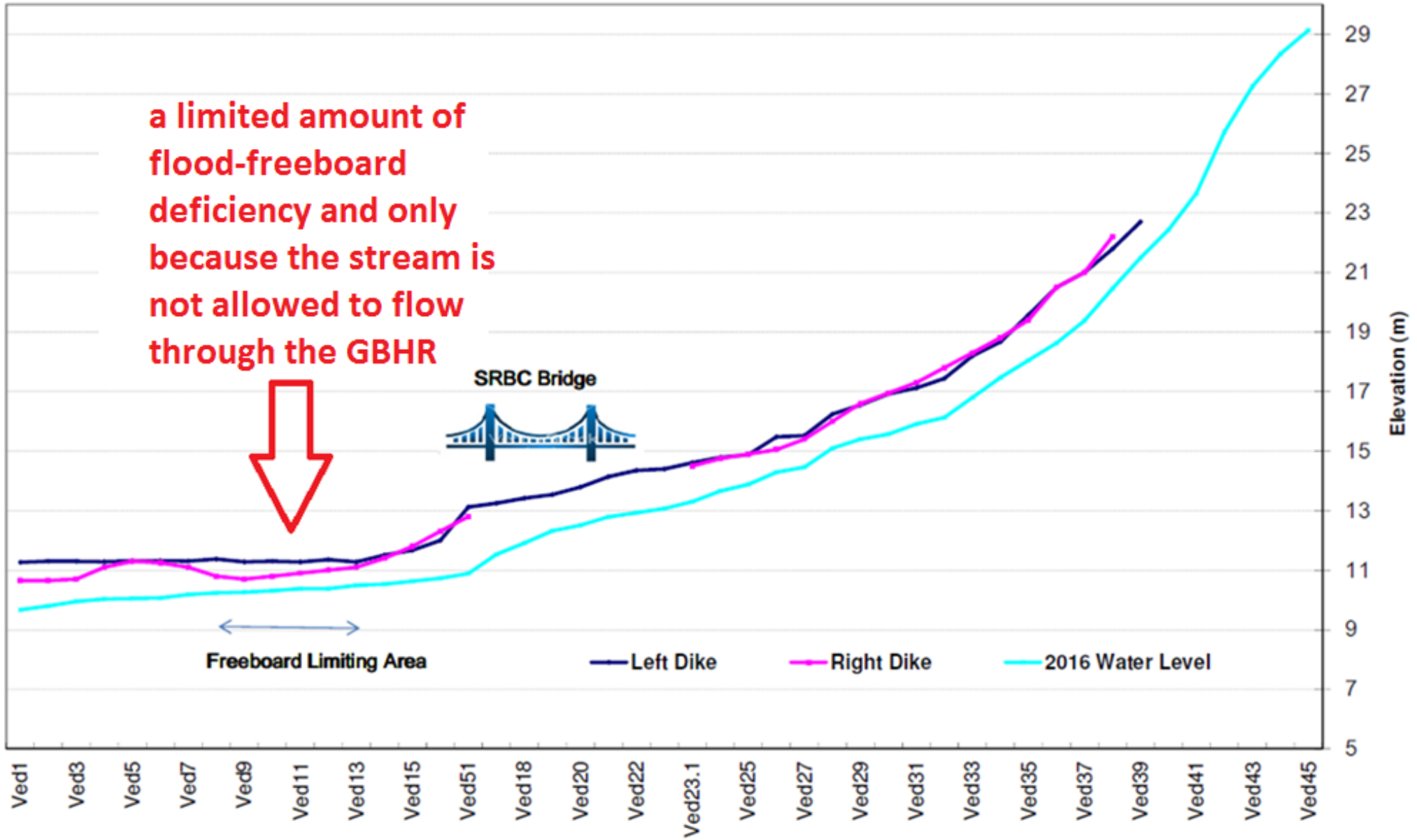
Table 5: 2016 Flood Profile and Bank/Dike Freeboard for the Vedder River

Cross Section	Bank Elevation (m)		Calculated W.L. (m)	Bank Freeboard (m)	
	Left	Right	Starting at 7.4 m	Left	Right
49	37.92	38.26	36.99	--	1.46
48	32.80	33.96	35.82	--	-1.43*
47	31.21	33.22	32.73	--	0.42
46	29.83	31.95	30.25	--	1.12
45	28.48	30.08	29.14	--	0.91
44	29.22	29.89	28.34	--	1.57
43	29.96	29.09	27.25	--	2.00
42	25.26	26.58	25.72	--	1.08
41	23.50	24.67	23.66	--	0.97
40	24.33	23.33	22.43	--	1.11
39	–	21.92	21.49	--	0.60

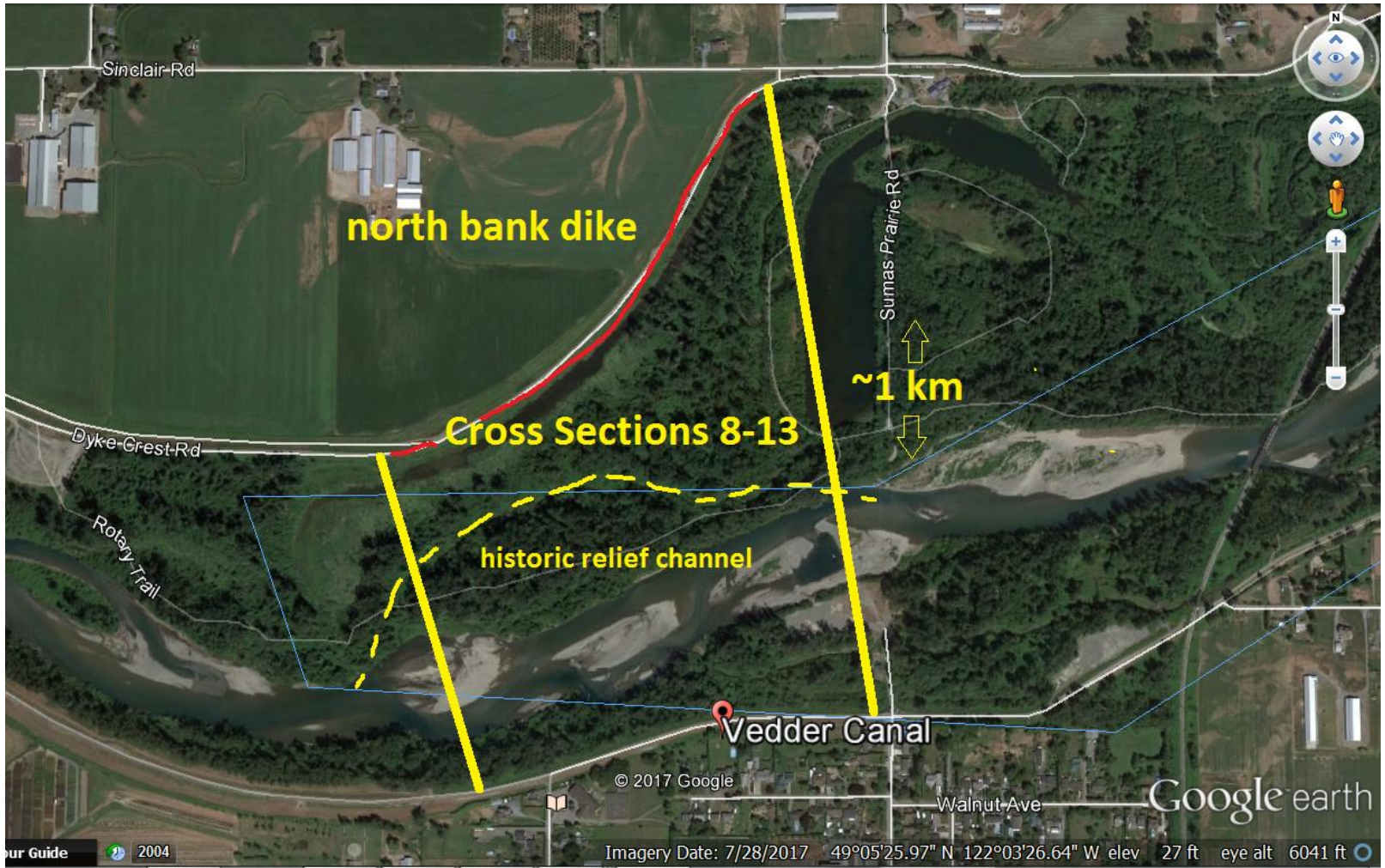
The upper reach has an enormous amount of natural freeboard and can absorb large quantities of gravel without compromising flood protection—why is it being mined? The argument that it is used as a trap is scientifically unfounded.



Vedder River flood profile



The locations of deficiencies are at XS8-XS13, an area of wide channel capacity but flows are compromised because the main river is not allowed to discharge through the Great Blue Heron Reserve, and the capacity is thusly restricted.



Water level reductions due to the 2016 removals c.a. 3 cm

Table 7: Hydraulic Effects on the Flood Profile

Site	Excavation Volume m^3	Influence Reach	Reach Length (km)	Average W.L. Reduction (cm)	Effectiveness Factor $(cm*km/m^3) \times 10^4$
Keith Wilson	17,200	XSC27-XS15	3.6	2	3.8
Yarrow	14,300	XS13-SRBC	0.7	2	0.9
Railway D/S of Bridge	26,850	XS15-XS18	0.6	5	1.0
Railway	3,200	XS19-XS23	0.4	1	1.9
Bergman	9,600	XS23-XS29	1.0	3	2.6
Lickman	21,500	XS35-XS37	0.4	4	1.2
Giesbrecht*	12,700	XS41-XS43	0.6	5	2.6

Note: The effectiveness factor = (Average W.L. Reduction for the XS) * (Influence Reach Length) / (Excavation Volume/10,000)
Giesbrecht Bar is proposed as a provisional site.

Trivial direct benefits via gravel removal at the freeboard compromised areas

Table 8: Updated Freeboard Resulting from the Proposed 2016 Gravel Excavations

Cross Section	R. Dike Elev. (m)	2016 W.L. (m)		R. Dike F.B. (m)	
		(pre-excavation)	(post-excavation)	(pre-excavation)	(post-excavation)
13	11.1	10.49	10.47	0.61	0.63
12	11.0	10.38	10.37	0.62	0.63
11	10.9	10.38	10.37	0.52	0.53
10	10.8	10.31	10.3	0.49	0.50
9	10.7	10.26	10.25	0.44	0.45
8	10.8	10.24	10.23	0.56	0.57

Note: this table only includes cross sections in the freeboard limited area.

Question—why is Water Stewardship Division bending over backwards to give the City of Chilliwack so much gravel when much of the Vedder River is currently in a stage of gravel loss?

Section 11 August 8, 2016

(h) The holder of this Approval has been provided a six year authorization in order to remove an approximate biennial quantity of 100,000 cubic meters of gravel from 2016 to 2020.

2016—authorization for the next 6 years

(b) The changes to be made in and about the stream are:

To remove approximately 100,000 cubic meters of sediment and construct offsetting measures at specified gravel bars within the reaches of the Vedder River and Vedder Canal in the area bounded between the Vedder Crossing Bridge downstream to the Highway 1 Bridge, every two (2) years commencing with the 2016 fisheries window and concluding with the 2020 fisheries window. Works within the foreshore and the bed of the Vedder River and Vedder Canal may be within land owned by the City of Abbotsford, the City of Chilliwack or the Crown, held under Land Act Reserve R162023, held under Crown Land File2411740. Sediment will be transport to a designated stockpile site that is held by the City of Abbotsford, the City of Chilliwack or the Crown.

Does Water Stewardship Division have a crystal ball that can predict how much gravel is depositing? 100,000 cubic meters per biennial over the next 6 years? Particularly when the stream is now running a large deficit in most sections?

UNAUTHORIZED GRAVEL REMOVALS

Section 35 *Fisheries Act* approvals from individual bars—the dimensions, thus the volumes, were explicitly set out in the authorization

The serious harm to fish likely to result from the proposed work(s), undertaking(s), or activity(ies), and covered by this authorization includes:

- The permanent alteration of up to 7500 m^2 (approximately150 m long by 50 m wide by 3.5 m maximum depth) of instream habitat resulting from the excavation of sediment from Giesbrecht Bar in the Vedder River.
- The permanent alteration of up to 7350 m^2 (approximately 105 m long by 70 m wide by 3.5 m maximum depth) of instream habitat resulting from the excavation of sediment from Lickman Bar in the Vedder River.
- The permanent alteration of up to 3375 m^2 (approximately 135 m long by 25 m wide by 4 m maximum depth) of instream habitat resulting from the excavation of sediment from Bergman Bar in the Vedder River.
- The permanent alteration of up to 1800 m^2 (approximately 90 m long by 20 m wide by 3 m maximum depth) of instream habitat resulting from the excavation of sediment from Railway Bar in the Vedder River.
- The permanent alteration of up to 6460 m^2 (approximately 190 m long by 34 m wide by 3.75 m maximum depth) of instream habitat resulting from the excavation of sediment from Downstream Rail Bridge Bar in the Vedder River.
- The permanent alteration of up to 5100 m^2 (approximately 85 m long by 60 m wide by 3 m maximum depth) of instream habitat resulting from the excavation of sediment from Yarrow Bar in the Vedder River.
- The permanent alteration of up to 6650 m^2 (approximately 190 m long by 35 m wide by 3 m maximum depth) of instream habitat resulting from the excavation of sediment from Keith Wilson Bar in the Vedder River.

UNAUTHORIZED OVERAGES OF GRAVEL EXTRACTION BY CHILLIWACK AS PER THE SECTION 35 *FISHERIES ACT* APPROVAL AMOUNTS

DFO Section 35 authorization			
DIMENS. CALC.S AMOUNT		OVERAGE	
AUTHORIZED	REMOVED		
26,250	11,714		UNDER
25,725	28,668	2,943	OVER
13,500	14,433	933	OVER
5,400	4,160		
15,300	16,566	1,266	
19,950	16,944		
		5,142	cu meters
		6,736	cu yards
	@$17/yd	$ 114,512.34	retail value

Section 11 August 11, 2016

(b) The changes to be made in and about the stream are:

To remove approximately 100,000 cubic meters of sediment and construct offsetting measures at specified gravel bars within the reaches of the Vedder River and Vedder Canal in the area bounded between the Vedder Crossing Bridge downstream to the Highway 1 Bridge, every two (2) years commencing with the 2016 fisheries window and concluding with the 2020 fisheries window. Works within the foreshore and the bed of the Vedder River and Vedder Canal may be within land owned by the City of Abbotsford, the City of Chilliwack or the Crown, held under Land Act Reserve R162023, held under Crown Land File2411740. Sediment will be transport to a designated stockpile site that is held by the City of Abbotsford, the City of Chilliwack or the Crown.

Section 11 August 8, 2016

(h) The holder of this Approval has been provided a six year authorization in order to remove an approximate biennial quantity of 100,000 cubic meters of gravel from 2016 to 2020.

Section 11 *Water Sustainability Act* approvals from individual bars

Section 11 August 8, 2016

(y) All works shall comply with the information provided in the Vedder River and Canal Flood Protection Method Statement provided with the application and all works shall comply and be located as shown in the drawings submitted on the Proposed Biennial Year Vedder River Sediment Removal Project report, prepared by Nova Pacific Environmental Ltd.

Section 11 *Water Sustainability Act* approvals for volumes from individual bars—the amount to be extracted per bar was explicitly provided

Wright et al. (2016) (May)

Table 2: Final Selection of Bars for Sediment Removal in 2016

#	Bar Name	Plan Developed	VRTC 1 comments	Yield (m^3)	Comment
1	Giesbrecht	Y	Proceed with site as back up	12,700	Long road to reopen plus tricky bridge access
2	Lickman -formerly Campground but now is on north side	Y	Look at volume increase (17,000m^3) by directing more flow to right	21,500	To offset hard erosion on left bank. Stockpile and access affect recreational users.
3	Bergman	Y	Try to increase volume (7,000m^3)	9,600	Large, easy access. Offers good habitat channel prospect.
4	Railway	Y	Link to Rail bridge site	3,200	Usual refill pattern
5	D/S Rail Bridge	Y	Expand volume (14,250m^3) significantly	26,850	Good opportunity but access is an issue
6	Yarrow	Y	Y	14,300	More upstream – direct flow across to left bank
7	Keith Wilson	Y	Y	17,200	Good candidate but need to coordinate with pump station discharge
	Total			**105,350**	

UNAUTHORIZED OVERAGES OF *WATER SUSTAINABILITY ACT*-APPROVED GRAVEL VOLUMES EXTRACTION BY CHILLIWACK

FLNRO Section 11 authorization as per				
	YIELD AUTHORIZED	AMOUNT REMOVED	OVERAGE	
Giesbrecht	12,700	11,714		UNDER
Lickman	21,500	28,668	7,168	OVER
Bergman	9,600	14,433	4,833	OVER
Railway	3,200	4,160	960	OVER
Yarrow	14,300	16,566	2,266	OVER
d/s Rail Bridge				NIL
Keith Wilson	17,200	16,944		UNDER
			15,227	cu meters
			19,947	cu yards
		@$17/yd	$ 339,105.29	retail value

Nova Pacific (2016) (December)

Site Reports – Upper Reach

The Upper Reach of the river is bounded by Vedder Crossing at the upstream end and by cross section (XS) 33 at the downstream end. The Upper Reach is characterized by coarser sediment, and is less confined by dykes and armour. As this area is not typically freeboard limited, sediment removal in this reach is intended to lessen the requirement to remove sediment downstream. Both sites selected for sediment removal in Upper Reach in 2016, Giesbrecht Bar and Lickman Bar, were located within lands administered by the Provincial Crown. The total planned yield from the Upper Reach was 34,200 m^3; however, the actual volume of excavated material was 40,641 m^3, or 119% of plan.

We see no evidence that Chilliwack received a variance from the Province for individual bar extraction amounts

Section 11 August 8, 2016

Approval File: 2004412

i) The holder of this Approval must notify the Water Manager immediately if there are significant changes to the proposed works from the biyearly Hydraulic Report and Proposed Vedder River Sediment Removal Project Report submitted to FLNR for the gravel removal;

ii) Significant changes may need to be authorized by FLNR prior to construction.

CONCLUSIONS

1. There was no reasonable rationale for providing Chilliwack an extension past the September 15 work window either by British Columbia or Canada. The fact that British Columbia gave Chilliwack an extension to September 30 from “the get-go” of the original Section 11 Authorization suggests collusion between the two agencies to circumvent normal and reasonable environmental protections. Fish were apparently spawning in the lower watershed between September 15 and 30.

2. There is no plausible explanation for Canada to provide an extension to the work window to September 30.

3. Protection of the stream from the release of fine sediments due to the project, as per the requirements of the authorizations provided by Province and Canada, was not followed.

4. The Environmental Consultant failed to use best scientific and technical methods to assess the control and monitoring of fine sediments releases in the stream during the construction period.

Conclusions (con't)

5. There is a question as to whether or not the offsets provide any meaningful compensation or mitigation.

6. Why (apparently) is the consultant auditing his own work?

7. There is no justification for providing three biennial removals based on a number of criteria including:

i. except for a short length of dike, that should be addressed by alternative means, there is no real flood deficiencies;

ii. the recent gravel inputs have been dramatically lower than the long-term average;

iii. the Vedder River, particularly the lower river and the Canal, is now in deep degradation and sediment starvation, and needs to recover;

8. The city of Chilliwack removed over 15,000 cubic meters of unauthorized gravel under the *Water Sustainability Act.*

Conclusions (con’t)

9. An external audit is needed to arbitrate the continued destruction of the Vedder River which is occurring in the context of non-defensible gravel removal in the pretext of flood protection.


end

DFO (*Fisheries Act*) PROSECUTIONS

PARAGRAPH 35(2)(b) *FISHERIES ACT* AUTHORIZATION

The failure to comply with any condition of this Authorization constitutes an offence under Paragraph 40(3)(*a*) of the *Fisheries Act* and may result in charges being laid under the *Fisheries Act*.

Canada *Fisheries Act* contravention penalties

Offence and punishment

40 (1) Every person who contravenes subsection 35(1) is guilty of an offence and liable

(a) on conviction on indictment,

(iii) in the case of a corporation that the court has determined to be a small revenue corporation,

(A) for a first offence, to a fine of not less than $75,000 and not more than $4,000,000, and

(B) for a second or subsequent offence, to a fine of not less than $150,000 and not more than $8,000,000; or

(b) on summary conviction,

(iii) in the case of a corporation that the court has determined to be a small revenue corporation,

(A) for a first offence, to a fine of not less than $25,000 and not more than $2,000,000, and

(B) for a second or subsequent offence, to a fine of not less than $50,000 and not more than $4,000,000.

FLNRO (*Water Sustainability Act*) PROSECUTIONS

Water Sustainability Act contravention penalties

Water Sustainability Act

High penalty offences

107 (1) A person who does any of the following commits an offence:

(a) fails to comply with a term or condition of an authorization, change approval or permit issued in relation to a sensitive stream or with a term or condition of a drilling authorization imposed for the protection of a sensitive stream;

(2) A person who commits an offence under this section is liable on conviction to the following:

(a) in the case of an offence that is not a continuing offence, a fine of not more than $1 000 000 or imprisonment for not longer than one year, or both;

(b) in the case of a continuing offence, a fine of not more than $1 000 000 for each day the offence is continued or imprisonment for not longer than one year, or both.

Penalty for monetary benefit

108 (1) If a person is convicted of an offence under this Act, the court may increase a fine imposed on the person by an amount equal to the court's estimation of the amount of the monetary benefit acquired by or that accrued to the person as a result of the commission of the offence.

(2) A fine increased under subsection (1)

(a) applies despite any provision that provides for a maximum fine, and

(b) is in addition to any other fine under this Act.

Liability of individuals for offences committed by a corporation

111 If a corporation commits an offence under this Act, an employee, officer, director or agent of the corporation who authorized, permitted or acquiesced in the offence commits the offence whether or not the corporation is prosecuted for the offence.