

April 27, 2009

Ref. No.: 1461

Ms. Lisa McDonald, B.Sc., Dipl. Tech.
Habitat Biologist
Fisheries and Oceans Canada
Mission Field Office
32873 London Avenue
Mission, BC
V2V 6M7

**Re: Highway 7 Nelson to Wren Street Four-Laning Project, Mission, BC
Project Review Information for DFO- Supplemental Information**

Dear Ms. McDonald:

Further to the initial project review information package submitted to Fisheries and Oceans Canada (DFO) in January 2009, please find enclosed supplementary information for the abovementioned project. Final design work has been completed for the project and the tendering process is underway for subsequent construction. Now that the detailed design drawings are available we have completed final calculations of the fish and fish habitat related impacts associated with the highway widening and new bridge installation.

As outlined in the initial information package, the project includes the widening of Highway 7 between Nelson Street (to the west) and Oliver Street (to the east) to four lanes from its current two-lane configuration and replacement of the existing bridge over Silverdale Creek. In addition, several hundred meters of existing roadbed will be modified at each end of the project site including the installation of preload/surcharge west of Nelson Street to accommodate future highway widening works associated with Nelson Street intersection improvements.

Fish Habitat Impact Assessment

Highway Widening Related Impacts

The highway widening works will entail the lateral encroachment and infilling of much of the southern ditch line. The impacts were recalculated based on the encroachment from the top of the highway shoulder to the toe of the proposed slope. As shown in Table 1 below and on attached drawings R1-592-102, 103, 104 and 105, a total of 23,470 m² of riparian vegetation will be affected by the proposed highway widening works. The quality of this aquatic habitat has been described in our January 2009 submission but in general these ditches provide seasonal rearing habitat for juvenile salmonids during periods of high water in the Fraser River and

Silverdale and Chester Creek. Overwintering opportunities in these connected channels depends on the amount and quality of water available during the winter period.

Table 1: Summary of Project Impacts

Watercourse	Location /	Habitat Description	Riparian Area Impact (m ²)
Highway Widening Related Impacts (23,470 m²)			
Roadside Watercourse (Ditch)	West of Nelson Street Sta. 19+35 to 27+00	Fish bearing during high water (freshet) conditions	10,177
Roadside Watercourse (Ditch)	East of Nelson Street to West of Silverdale Creek Sta. 27+00 to 33+00	Fish bearing during high water (freshet) conditions	8,579
Roadside Watercourse (Ditch)	East of Silverdale Creek Sta. 33+75 to 35+60	Fish bearing during high water (freshet) conditions	2,486
Roadside Watercourse (Wetland)	Sta. 35+70 to 37+70	Contributes to downstream fish populations	2,228
Bridge Related Impacts (1,556 m²)			
Silverdale Creek	Sta. 33+00 to 33+75	30m from wetted perimeter during low water conditions	1,264
Silverdale Creek	Sta. 33+00 to 33+75	Floodplain Bench	292
Total Project Impacts			25,026 m²

The total impact area is slightly higher than the calculation provided in the January 2009 information package (50% design stage). The major difference between the two estimates is that the preload works west of Nelson Street were not included as part of the original calculations. In addition to the encroachment of ditch areas, a calculation was included for the impact to the wetland area east of Sta. 35+70 (see drawings R1-592-104 and R1-592-105). This wetland area is accessible to fish from Silverdale Creek, primarily during high water periods, and contributes nutrients to downstream fish habitat. In order to maintain connectivity between the wetland and Silverdale Creek a fish-passable ditch will be maintained along the toe of slope between the highway and the CN Rail ballast. The path of this ditch from the culverts at Sta. 38+20 flows west to Silverdale Creek is shown by blue arrows on the drawings. Further enhancement of fish passage will result from the removal of the access road and culvert at Sta. 35+60. It is important to note that a remnant ditch will also remain along the toe of slope west of Silverdale Creek. This ditch will also be fish-passable during period of high water.

Bridge Related Impacts

As detailed in Table 1, approximately 1,556 m² of existing riparian vegetation will be eliminated due the Silverdale Creek bridge replacement. This has been calculated based on a 30 m setback from the high-water mark shown on the attached drawing R1-592-104. Correspondingly, 292 m² of the total riparian impact occurs on the floodplain bench located to the south of the existing bridge. No instream impacts are associated with the bridge replacement. The impacts will be offset in part through the removal of the old wooden bridge structure including 16 instream piles.

Habitat Compensation Plan

Based on initial discussions with DFO a 2:1 compensation ratio would be required for riparian impacts from the proposed project. Therefore, approximately 5 ha of compensation area will be needed to offset the project impacts. This is a considerable area and virtually none of it can be accommodated on-site. Therefore, discussions regarding off-site compensation options to offset aquatic habitat losses detailed above are currently underway between the Province (MOT), DFO, local stewardship groups and the District of Mission. In this regard, there appear to be several promising options involving a financial contribution to offset costs associated with additional enhancements in the Silverdale Creek wetland area north of the project site, and the possible contribution of funds to acquire a parcel of land in the general project area for conservation and enhancement purposes. In order to further advance these compensation options it is necessary to calculate estimated costs for the creation of equivalent riparian habitat at an offsite location. Cost estimates are provided in Table 2 below.

Table 2: Summary of Estimated Compensation Costs

Cost Item	Unit Cost	Number of Units	Cost
Riparian Planting - 60% shrubs, 40% trees (85% deciduous and 15% conifer)*	s.13,s.17		s.13,s.17
<i>Deciduous Trees (based on 17,018 m² of planting area)</i>		4,255 trees	
<i>Coniferous Trees (based on 3,003 m² of planting area)</i>		751 trees	
<i>Shrubs (based on 30,031 m² of planting area)</i>		30,031 shrubs	
Environmental Monitoring during Site Preparation and Planting			
Maintenance over initial growth period (10% of hard costs)			
Post Construction Monitoring (5 years of follow-up inspections and reporting)		5 years	
Total Cost			

* Includes cost of plant stock (2 gal pots) and planting

Spacing Formula: $N = \text{Area} / (L \times W)$, where N = number of plants, L = spacing between rows, and W = spacing between columns

Planting Densities: Shrubs 1 m spacing; Trees 2 m spacing

Based on the figures presented above the estimated unit cost for the riparian planting is in the range of \$20.00 per plant.

Silverdale Wetland Enhancements

There is potential for additional riparian and wetted habitat enhancements on this parcel. In discussions with Matt Foy, DFO Habitat Restoration Biologist, his thoughts are that more work could be done in a 2010 work window similar to the March work window used this year (e.g. pre-freshet), with summer 2010 being another option for additional work.

There are many benefits to doing additional work on this site. For example, the project:

- is probably the most shovel ready of the options presented, with much of the administrative planning, approvals, project delivery model and conceptual design either completed or delivered in the initial phase of work;
- has good MoT linkages (through our Environmental Enhancement Fund);
- should be cost-effective and will provide excellent benefits; and
- is within the primary watershed of impacts, immediately upstream of the highway widening works.

Also since the property is already secured as an environmental area, it offers savings in time and effort to negotiate, purchase and protect an environmental area. The photos below show areas within the Silverdale Wetland site that could be developed with additional enhancement works.



Additional areas that may be developed into enhanced wetted and riparian habitat.



Riparian areas along existing pond are candidates for reed canary grass removal and planting with native wetland, shrub and tree species to provide higher biodiversity.

Property Acquisition Partnership Model

Although there remain some uncertainties concerning property acquisition and associated potential enhancement opportunities, MoT has been working with local stakeholders to identify potential properties in the general project area. In this regard, the attached list (Attachment A) has been compiled by the District of Mission to provide a brief description of eight priority properties and their locations (Attachment B). The Silverdale Avenue property (property number 2) has been the focus of previous discussions with DFO but several other properties on the list also have good conservation/enhancement potential for both aquatic and terrestrial habitat.

In addition to the property list, we have also attached a proposed partnership model (Attachment C) and sample implementation plan (Attachment D) for compensation funding previously worked out between Ducks Unlimited and the Vancouver Fraser Port Authority. The model provides a possible mechanism for property acquisition and subsequent enhancement initiatives. We would be interested in your comments on the applicability of this type of process for our project.

As indicated above the following drawings are attached as part of this information package:

- Ministry of Transportation Engineering Drawings for the Highway 7 Nelson to Wren Street Four-Laning No. R1-592-101 to No. R1-592-105 modified to show riparian impacts from the highway widening and bridge replacement.

Based on the information provided in this package we would appreciate hearing back from you concerning the acceptability of our compensation cost estimate and the progress made on

possible property acquisition to offsite compensation requirements. Please feel free to contact the undersigned at 604 926-3261 (cell 604 787-8076) if you have any related questions or supplementary information requests.

Sincerely yours,

Hatfield Consultants Partnership

A handwritten signature in black ink, appearing to read 'A. Stockwell', with a stylized flourish at the end.

Alan Stockwell, M.Sc., R.P.Bio.
Senior Environmental Specialist & Partner

Attachment A

CONFIDENTIAL
FOR DISCUSSION PURPOSES ONLY

Properties of Interest to the District of Mission re: Hwy 7 Widening & Compensation
s.13,s.16,s.17

Priority	Property Description	Area(ha)	Address	Comments
1	s.13,s.16,s.17			
2				
3				
4				
5				

s.13,s.16,s.17	
6	
7	
8	

Attachment B

Location of Properties of Interest

Copyright

Attachment C

Partnership Model for Project Compensation

The concept of this model is to improve resource efficiencies and effectiveness amongst partners for habitat acquisition and restoration at a regional scale. The first priority is to secure property, generally through acquisition (although other options such as donation or conservation covenants may also exist). Residual funds after acquisition or future funds obtained through a variety of initiatives would be targeted towards restoration. However, in some cases, restoration funding may be targeted to parcels of land that are already secured by a partner. The model should not be onerous in terms of resources, as once priority properties are identified for acquisition and restoration and agreed up by the committee, the committee convenes only when funding opportunities exist.

The proposed Partnership Model provides a vehicle that will allow MoT to compensate for fisheries and wildlife impacts related to the development of the Highway 7 Nelson to Wren highway and bridge improvement project. The Partnership will facilitate land acquisition and enhancement works on property(ies) with significant conservation potential.

The objectives of this partnership model for compensation/mitigation are to:

- a) Provide compensation/mitigation funding in a fund that can be held for five (5) years, relaxing the requirement to complete compensation and mitigation activities within a year of the activity triggering DFO authorization. This would allow the selection and development of optimal projects.
- b) Enable the fund to contribute funding to mitigation projects that involve multiple stakeholders (i.e. local government and non-governmental agencies) or leverage other funding mechanisms (i.e. Bridge Coastal)
- c) Ensure there is transparency and accountability for project selection and delivery that meets the needs of Fisheries and Oceans Canada.
- d) Ensure that applicable projects include both acquisition and restoration (enhancement) activities.

Proposed Partnership Model

The key element of the Partnership Model is the organization of a Steering Committee to oversee the partnerships activities and spending to ensure that the funds are spent appropriately and to the best advantage to meet the objectives of the partnership.

The Steering Committee should include members that have local knowledge of potential projects, experience in prioritizing and delivering projects and the ability to receive and administer funds. Potential members include: District of Mission; Ducks Unlimited Canada; Fisheries and Oceans Canada; Stave Valley Salmonid Enhancement Society; Pacific Salmon Foundation; and other groups that have related interests

The Process

- 1) DFO Authorization
 - a) The DFO authorization process identifies habitat type and amount of required compensation (e.g. hectares of riparian habitat).
 - b) The compensation funding (i.e. dollars) is provided through the DFO authorization with potential feedback on the appropriate dollar amount from the steering committee.
- 2) Mitigation Fund Financial Administration
 - a) The compensation funding is placed into the account of one of the agencies on the steering committee. The funding cannot be used or accessed until the Project Implementation Plan is approved by DFO signature (e.g. Lower Fraser Area Chief)
- 3) Steering committee
 - a) Identifies potential projects (acquisition and restoration/enhancement)
 - b) Develops criteria to prioritize projects
 - c) Selects projects
 - d) Develops project concept and links with other funding opportunities (if possible). The concept includes whether funding is applied to a single project or to a combination of acquisition/restoration projects and the general approach (i.e. acquisition of property, riparian planting, tidal flooding etc).
 - e) Develops detailed Project Implementation Plan that includes background, objectives, activities, monitoring procedures, any technical information and associated cost (i.e. design, implementation, immediate and long term monitoring) as well as agency who will deliver the project (see attached example of Rose-Kirkland).
- 4) Project Implementation Plan report is signed off by DFO staff prior to project implementation.
- 5) Identified agency delivers the project and is reimbursed from the fund upon submitting a progress report that identifies activities completed as well as financial costs incurred. This reporting would continue until the post-construction monitoring commitments are completed (if applicable).
- 6) All project status and monitoring reports are provided to the steering committee, which includes DFO.

Attachment D

Sample Implementation Plan: Vancouver Fraser Port Authority – Deltaport Third Berth

From: Eedy, Rachael ENV:EX
Sent: Wednesday, June 3, 2009 10:55 AM
To: Karpouzi, Vasiliki ENV:EX
Subject: File A2005620 Silverdale compensation plan

Hi Vaso,

Thanks for your comments. DFO has informed me that this application will require Fisheries Act Authorization and that they are still working with MoT on the compensation plans.

Sincerely,
Rachael

From: Karpouzi, Vasiliki ENV:EX
Sent: Monday, June 1, 2009 3:52 PM
To: Eedy, Rachael ENV:EX
Subject: REQUEST: File A2005620 compensation plan

Dear Rachael,

I am in the process of reviewing the A2005620 file. My understanding is that the proposed works involve widening of 2 km of road, the removal of the existing bridge and the installation of a new clear span structure at Loughheed Highway. The works will result in the loss of over 21,000 200 m². I have not seen in the application any compensation plans. Is there such a plan in your file, or at least being discussed by the proponent and the review agencies? If yes, ESD would like to see it.

Many thanks
Vaso

From: Eedy, Rachael ENV:EX
Sent: Tuesday, June 16, 2009 11:57 AM
To: 'astockwell@hatfieldgroup.com'
Cc: Ullah, Aman ENV:EX; Karpouzi, Vasiliki ENV:EX
Subject: Site visit for MoT Silverdale Approval application A2005620

Dear Alan:

I am working on the technical review of this Approval application for instream works on Silverdale and tributaries.

Could you please give me a call to arrange for a site visit?

Some possible dates are the 24th after 2pm, the morning of the 25th and between 10am to 4 pm on the 26th. I would likely be joined by a water resources engineer from our division (Aman Ullah) and a reviewer from the ministry's Environmental Stewardship Division (Vaso Karpouzi). I expect that the site visit would take about 1 hour, 2 hours maximum.

We are interested in discussing construction plans and habitat considerations during the site visit. I'll send you some preliminary comments later this week.

Sincerely,
Rachael Eedy

Rachael Eedy, M.Sc., R.P.Bio
Water Stewardship Technician
Water Stewardship Division
Ministry of Environment
Phone: (604)-582-5361
Email: Rachael.Eedy@gov.bc.ca
10470-152 Street, Surrey, BC V3R 0Y3

From: Eedy, Rachael ENV:EX
Sent: Wednesday, June 24, 2009 3:49 PM
To: Karpouzi, Vasiliki ENV:EX
Subject: FW: MoT Silverdale Creek instream works (our file A2005620)

Hi Vaso,

Please see messages below and reply directly to DFO and TC if you wish. Copy me on any new ESD comments that are related to the Approval file.

Note that providing this type of advice to the CEAA review would be ESD's role (not WSD). However, since ESD is also involved in the Approval review, please make sure it's clear that the advice is from your division (not WSD or MoE as a whole).

Cheers,
Rachael

From: McDonald, Lisa [mailto:Lisa.McDonald@dfo-mpo.gc.ca]
Sent: Wednesday, June 24, 2009 2:33 PM
To: Eedy, Rachael ENV:EX
Cc: colleen.phung@tc.gc.ca
Subject: RE: MoT Silverdale Creek instream works (our file A2005620)

Hi Racheal,

Thank you for the notice - I was hoping that ESD was going to have a chance to review this file. This project is being reviewed pursuant to CEAA, with Transport Canada (TC) acting as the Federal Environmental Assessment Coordinator. TC referred the project to Environment Canada - CWS, however, I am not sure if EC has responded with comments, or if they have referred the project to MoE to respond on their behalf, or none of the above.

Regardless, it would be very useful if ESD could forward their wildlife-related comments to both DFO and TC, including mitigation/compensation measures required to avoid significant environmental effects, and identification of any impacts to wildlife that, in the opinion of ESD, can not be mitigated/compensated for.

Colleen Phung is the TC representative handling this file - her email address is colleen.phung@tc.gc.ca.

Thanks again!

Sincerely

Lisa McDonald, B.Sc., Dipl. Tech.
Habitat Biologist | Biologiste de l'habitat
Fisheries and Oceans Canada | Pêches et Océans Canada
Habitat and Enhancement Branch | Direction de l'habitat et de la mise en valeur
Lower Fraser East | Secteur de l'est du Bas de Fraser
Telephone | téléphone 604.814.1070
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From: Eedy, Rachael ENV:EX [mailto:Rachael.Eedy@gov.bc.ca]
Sent: June 24, 2009 2:00 PM

To: McDonald, Lisa
Subject: MoT Silverdale Creek instream works (our file A2005620)
Hi Lisa,

FYI, I was at this site yesterday (Ministry of Transportation highway widening in Mission) with someone from Environmental Stewardship (ESD). ESD is concerned about impacts to the watercourses (Silverdale and ditch channels). They are aware of DFO's involvement and have not provided specific advice related to fish habitat. However, ESD has made specific suggestions related to habitat compensation for lost bird and wildlife habitat, such as planting suggestions. This information has/will be forwarded directly to MoT as the applicant.

Sincerely,
Rachael
Rachael Eedy, M.Sc., R.P.Bio
Water Stewardship Technician
Water Stewardship Division
Ministry of Environment
Phone: (604)-582-5361
Email: Rachael.Eedy@gov.bc.ca
10470-152 Street, Surrey, BC V3R 0Y3

Russell, Veronica A ENV:EX

From: Eedy, Rachael ENV:EX
Sent: Wednesday, June 24, 2009 5:39 PM
To: Karpouzi, Vasiliki ENV:EX
Subject: FW: Follow up on Site visit for MoT Silverdale Approval application A2005620
Attachments: A6_EBB Highway 7 Wildlife Assessment.pdf

From: Alan Stockwell [<mailto:astockwell@hatfieldgroup.com>]
Sent: Wednesday, June 24, 2009 5:33 PM
To: Eedy, Rachael ENV:EX
Cc: Cyr, Joanne TRAN:EX
Subject: RE: Follow up on Site visit for MoT Silverdale Approval application A2005620

Hi Rachael:

I have attached a copy of the wildlife assessment for the Silverdale project.

Thanks,
Alan

**WILDLIFE HABITAT ASSESSMENT OF HIGHWAY 7
BETWEEN WREN ST. AND NELSON ST. MISSION, BC.**

**FOR
HATFIELD CONSULTANTS**

**BY
EBB ENVIRONMENTAL CONSULTING INC.**



Wildlife Habitat Assessment of Highway 7 between Oliver St. and Nelson St. Mission, BC.

REPORT TO

**Alan Stockwell
Hatfield Consultants Ltd.
201 - 1571 Bellevue Avenue
West Vancouver, BC, V7V 1A6**

FOR

Wildlife Habitat Assessment

November 2008

EBB Environmental Consulting Inc.

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Executive Summary

The BC Ministry of Transportation (MOT) is proposing to widen Lougheed Highway (Highway 7) from Wren Street to Nelson Street just west of Mission, British Columbia. This is a stretch of approximately 1.5 km. Currently, this section of Highway 7 is the only section of two lane highway from Maple Ridge to Mission and causes congestion. To facilitate this expansion, EBB Environmental Consulting Inc was requested to conduct a wildlife habitat assessment to determine if any plant or animal species will be impacted by the proposed project.

This document provides the results of the survey, including the potential presence of three species at risk: red-legged frog, green heron, and great blue heron. Habitat rankings are also provided for an additional five species at risk, as the project footprint is within their respective geographic ranges. In addition, some suggested mitigation techniques are provided at the end of the document.

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1 Introduction

1.1 Background and Rationale

The BC Ministry of Transportation (MOT) is proposing to widen Lougheed Highway from Wren Street to Nelson Street just west of Mission, British Columbia, a stretch of approximately 1.5 km. Currently, this section of the highway is the only two lane section from Maple Ridge to Mission and as a result causes congestion. To facilitate this expansion a wildlife habitat assessment has been conducted to determine if any species will be impacted by the proposed project.

1.2 Objectives

The objective of the survey was to determine the habitat types and assign an occurrence potential for any federal or provincial listed species within the possible construction footprint for between Wren Street and Nelson Street along Highway 7.

2 Survey Area

The survey was undertaken approximately one kilometre northwest of Mission, BC along the Lougheed Highway (Hwy 7). The survey started at Oliver Street and paralleled Hwy 7 to Nelson Street. The survey included the ditches along both sides of Hwy 7, Silverdale creek (from Silverdale Avenue to approximately 200m downstream of Hwy 7) and the lower pond of the Silverdale Wetlands enhancement project.

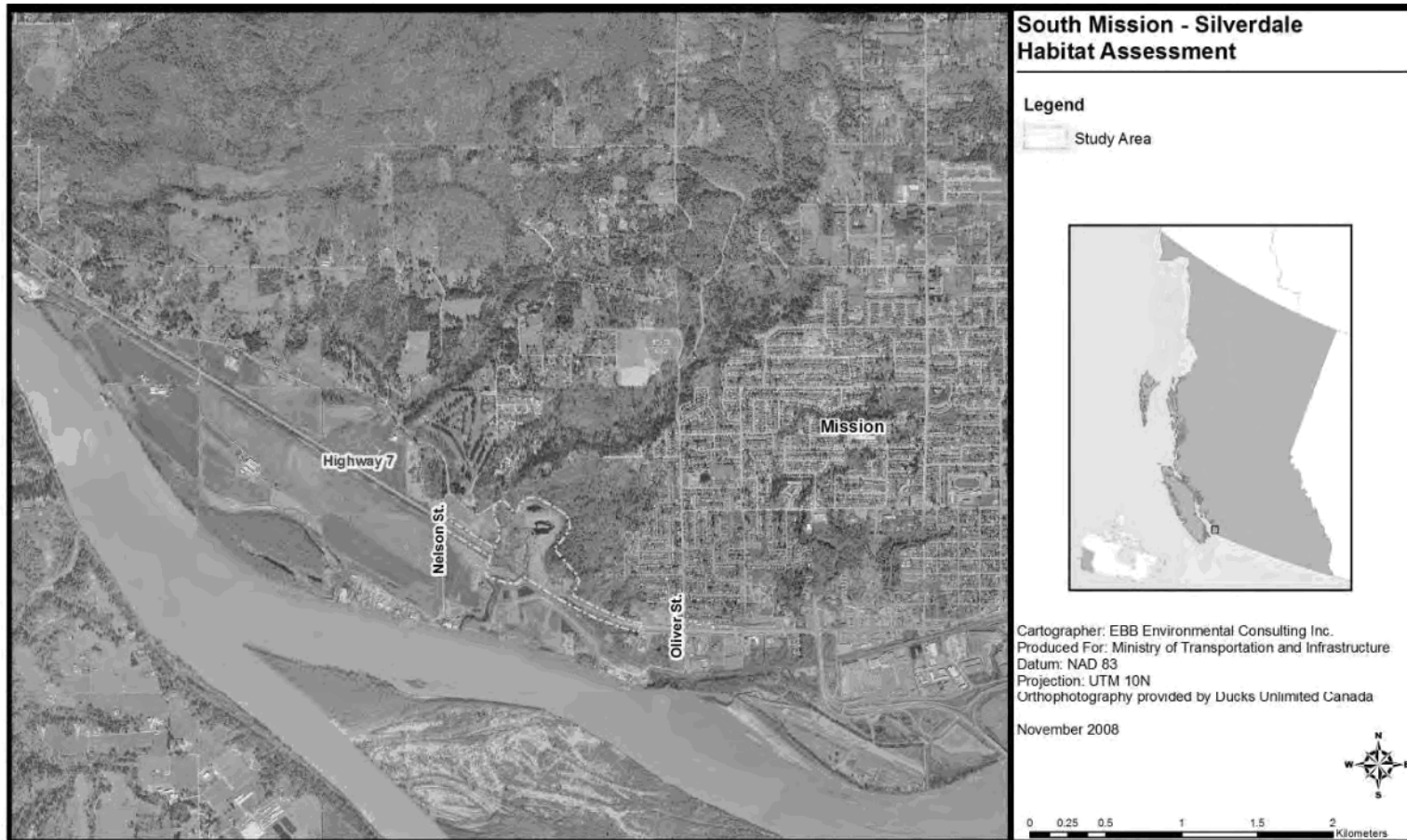


Figure 1: Location of Survey Area.

3 Methodology

3.1 Small Mammal Trapping

To detect small mammals utilizing the survey area live traps were set in a variety of sites selected according to provincial guidelines ***Best Management Practices Guidelines for Pacific Water Shrews in Urban and Rural Areas*** (Craig and Vennesland 2007) and on the proximity to forage, shelter and water. The traps were a combination of 33 pit-fall traps, 25 Longworth and 60 Sherman small mammal traps.

The pit-fall traps consisted of 33, 6 L buckets. The buckets were buried flush with the ground and within 1 m of Silverdale Creek. Buckets were lined with shredded cellulose fibre bedding to provide shelter and a sponge to absorb moisture. Buckets were baited using moist cat food or meal worms. Bait was replaced every 24-hour period or as required. All the buckets had drift fences, either natural barriers or made of wood, running perpendicular to the creek and upland. The drift fences were anchored with wooden stakes with the end of the wood extending over the edge of the bucket. This method was used to further secure the bucket in place in case of any storm events. To prevent rain from entering the buckets clothes pegs were secured to the lip of the bucket which held the lid elevated, allowing access to the bucket.

The Longworth and Sherman traps were used to sample along the Loughheed Highway, the Silverdale Enhancement ponds, and Silverdale Creek. The traps were strategically placed within 1 m of identified watercourses using natural vegetation as cover. The traps were baited with meal worms and cat food which was changed as needed or every other day. The traps had cotton balls in them to provide shelter and insulation. The traps were checked every 8 hours (October 23 to 31) at approximately 06:30, 14:30, and 22:30. The buckets were cleaned three times during the survey with all materials replaced.

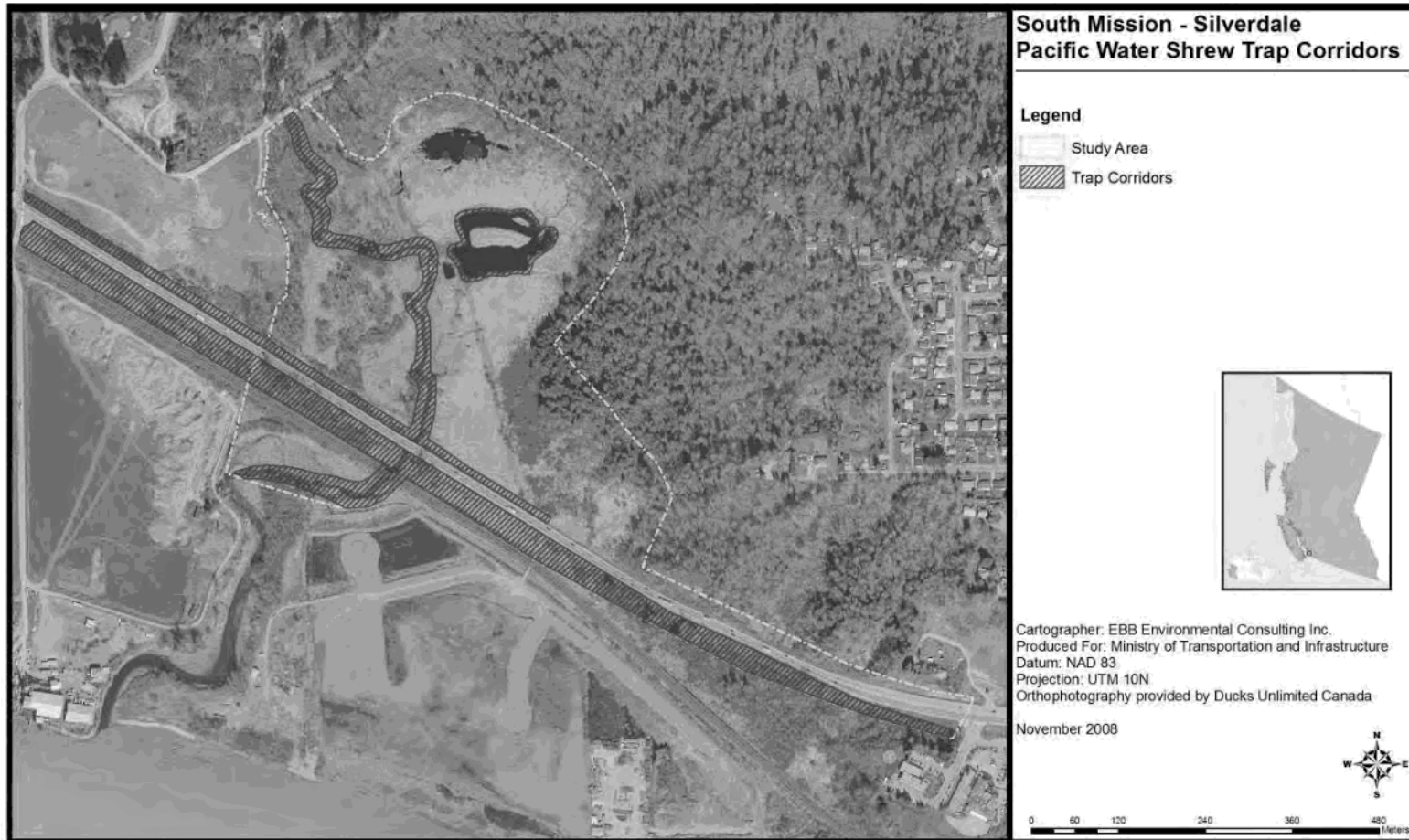


Figure 2: Pacific Water Shrew Trap Corridors.

3.2 Habitat Assessment Methodology

Habitat within the study area for identified species at risk was assessed by sampling random locations. Sampling site locations were recorded using GPS (UTM, NAD 83) and parameters for each site were logged. Photos were taken for each of the major directionalities (north, south, east, and west) to provide a record of the identified habitat at the time of assessment.

Data collected for the habitat assessment consisted of three overarching parameters: plant structure, physical site conditions, and incidental wildlife observations.

3.3 Plant Structure

In order to assess and classify the habitat, plant communities were identified and described. Species were recorded by vegetative strata (i.e. tree, shrub, and herbaceous layers). Habitat classifications were assigned based on the dominate vegetation identified for the plant communities.

3.4 Physical Site Conditions

Concurrent to describing the vegetative characteristics of the site, physical characteristic were recorded. These included:

Slope – given in degrees

Aspect – given in compass quadrant bearing

Elevation – in meters above sea level.

3.5 Incidental Wildlife Occurrences

During field surveys, any incidental observations of wildlife within the study area were recorded. Visual observations, tracks, song, and scat were counted as wildlife observations.

4 Identified Habitats

Six habitat types were identified during field assessments. These included forest, old field, ditch, pond, marsh, and creek.

4.1 Forest

(CWH_{dm} Site Series 12)

The forested habitat was located predominately to the north of Hwy 7, with small early seral elements at the northeast and southeast end of Hwy 7. The predominate tree species were western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and sitka spruce (*Picea sitchensis*). Understory vegetation was dependant on the distance from the edge of the bordering old field habitat. Within the initial 30 m the

understory consisted of spiny wood fern (*Dryopteris expansa*), sword fern (*Polystichum munitum*), red huckleberry (*Vaccinium parvifolium*), false lily-of-the-valley (*Maianthemum dilatatum*), skunk cabbage (*Lysichiton americanum*) and regenerating western hemlock and western red cedar. Beyond 30 m, the forest understory transitioned to dense Himalayan blackberry (*Ribes discolor*) and salmonberry (*Rubus spectabilis*), with instances of skunk cabbage in depressions.

The early seral elements consisted of a canopy dominated by red alder (*Alnus rubra*) occasional occurrences of bigleaf maple (*Acer macrophyllum*), and an understory cover of dense Himalayan blackberry.



Figure 3: Interior forest structure within the transitional zone (edge to forest interior, Photopoint ID [PPID] 10212008_11).



Figure 4: Interior forest structure (PPID 10212008_12).

4.2 Old Field

North of Hwy 7, bordering Silverdale Creek, is a large expanse of old field habitat, Silverdale Wetlands. This old field habitat is dominated by reed canary grass. Minor components to the habitat include black hawthorn (*Crataegus douglasii*), Pacific crab apple (*Malus fusca*), red alder, red-osier dogwood (*Cornus stolonifera*), Himalayan blackberry, Pacific willow (*Salix lucida* ssp. *lasiandra*), hardhack (*Spiraea douglasii* ssp. *douglasii*), cattail (*Typha latifolia*), and Scouler's willow (*Salix scouleriana*).



**Figure 5: Old field habitat, high occurrence of reed canary grass.
Foreground to tree line (PPID 10212008_09).**



Figure 6: Old field habitat, eastern perspective (PPID 10212008_10).

4.3 Ditch

Ditches occurred to the north and south of the highway alignment. The major species within the habitat type were reed canary grass and Himalayan blackberry, which was present throughout the entire ditch line. Minor components in the ditch habitat included Pacific willow, hardhack, white clover (*Trifolium repens*), common horsetail, black cottonwood (*Populus trichocarpa*), Canada thistle (*Cirsium arvense*), red-osier dogwood, yarrow (*Achillea millefolium*), baldhip rose (*Rosa gymnocarpa*), thimbleberry (*Rubus parviflorus*), tufted vetch (*Vicia cracca*), cattail, red alder, skunk cabbage, spiny wood fern (*Dryopteris expansa*), lady's thumb (*Polygonum persicaria*), and Scotch broom (*Cytisus scoparius*).



Figure 7: Northwestern pond (image taken from Nelson St. easement, PPID 10182008_15).



Figure 8: Typical ditch habitat, eastern perspective (PPID 10182008_02).



Figure 9: Ditch habitat showing incursion of Himalayan blackberry (PPID 10182008_04).

4.4 Pond

Six ponds were identified in the study area. Three ponds were located within the Silverdale Wetlands, and are enhancement ponds created for waterfowl and amphibian use (Jim Taylor, Pers. Comm. 2008). With the exception of the northernmost pond, the ponds did not have much aquatic vegetation, and limited emergent vegetation. Only one aquatic (yellow pond lily [*Nuphar polysepalum*]) and two emergent (cattail and American bulrush [*Schoenoplectus americanus*]) vegetation species existed within the banks of the ponds. Minor species within approximately 15 m of the northernmost pond included Pacific crab apple, hardhack, cattail, and cutleaf blackberry. Reed canary grass comprised the remainder of the vegetative cover.

Three additional ponds were located on the western side of the study area; two ponds were located between Highway 7 and the rail tracks to the south, and one to the north. These ponds appear to be fed by runoff from Highway 7, and were wetted at the time of survey. Vegetation included Himalayan blackberry, hardhack, pacific willow, reed canary grass, tule (*Scirpus lacustris*), tapered rush (*Juncus supiniformis*), and creeping spoked-rush (*Eleocharis palustris*).



Figure 10: Central pond in Silverdale Wetlands.



Figure 11: Northernmost pond, with yellow pond lily.



Figure 12: Ditch pond, southeast of study area (PPID 10182008_02).

4.5 Marsh

Marshes were the predominate habitat at the eastern side of the study area, between Hwy 7 and the rail tracks. The primary covers for marshes were cattail and reed canary grass. Dispersed throughout the marshes were hardhack, Himalayan blackberry, cutleaf blackberry, skunk cabbage, Pacific willow, common horsetail (*Equisetum arvense*), spiny wood fern, salmonberry, red-osier dogwood, and lady's thumb. Tree species were generally restricted to the periphery of the marsh, and included red alder, black cottonwood, red cedar, paper birch (*Betula papyrifera*), bigleaf maple, and Douglas-fir.



Figure 13: Typical marsh habitat (PPID 10182008_06).



Figure 14: Sedge marsh habitat within northern easement ditch (PPID 10182008_14).

4.6 Creek

Intersecting the study area is Silverdale Creek, a fish bearing creek that runs from the Fraser River. Silverdale Creek ran generally north-south within the study area. Vegetation on the stream banks varied little from the typical vegetation within the old field and ponds. To the north of the study area the predominate vegetation included sitka spruce, Himalayan blackberry, cutleaf blackberry, reed canary grass, red alder and policeman's helmet (*Impatiens glandulifera*). To the south the creek was bordered with red alder and reed canary grass. Reed canary grass dominated the stream banks for more than half of the stream reach within the study area.



Figure 15: Typical northern streambank vegetation, southern perspective (PPID 10212008_03).



Figure 16: Typical southern streambank vegetation, southern perspective.

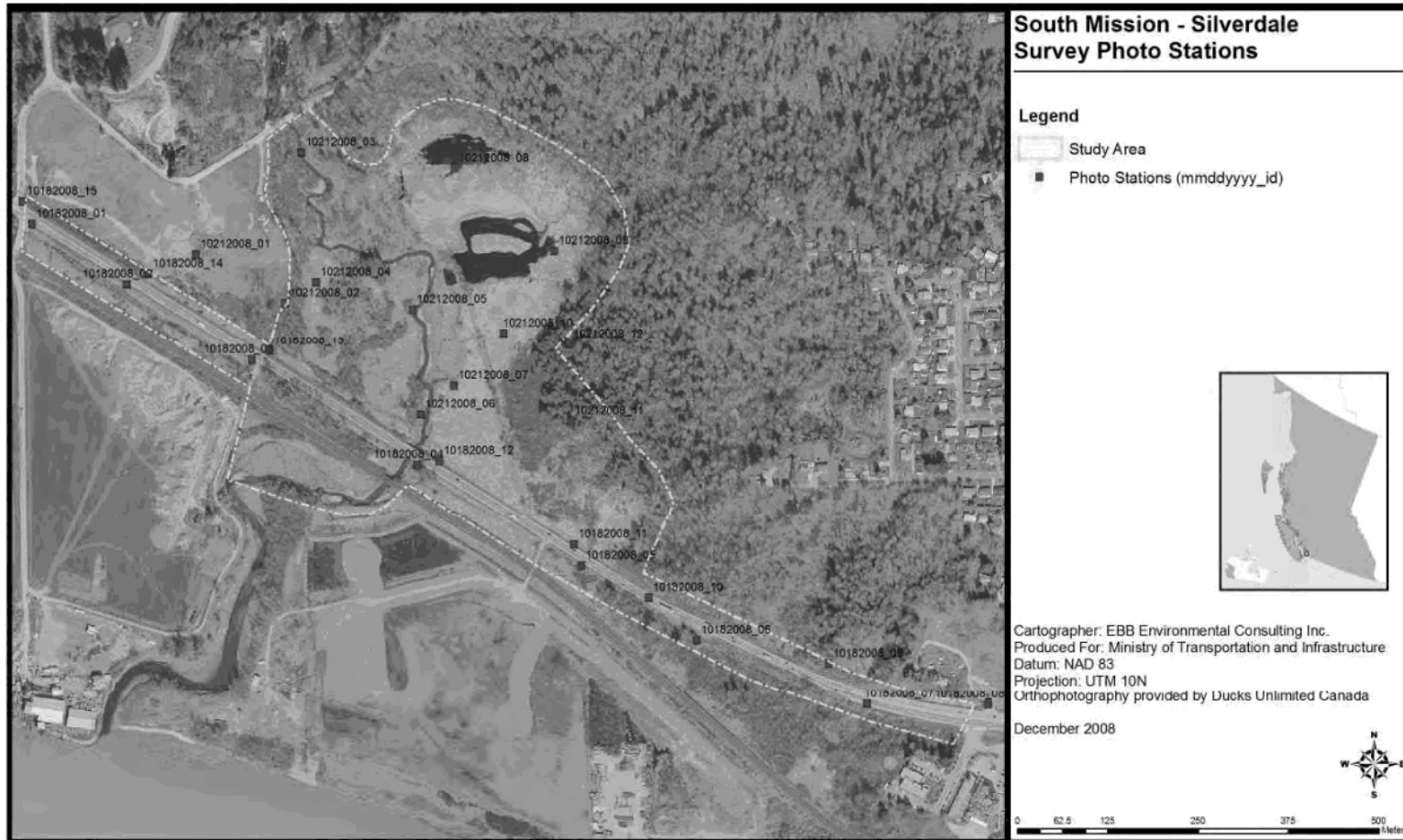


Figure 17: Photo stations from survey.

5 Species At Risk

Eight provincially and federally listed species at risk have potential to occur at the Silverdale site. These species include two floral elements: Phantom orchid (*Cephalanthera austiniæ*) and northern watermeal (*Wolffia borealis*), and six faunal elements: western toad (*Bufo boreas*), red-legged frog (*Rana aurora*), green heron (*Butorides virescens*), great blue heron (*Ardea herodias* ssp. *fannini*), Pacific water shrew (*Sorex bendirii*), and Oregon forestsnail (*Allogona townsendiana*). Field personnel conducted habitat assessments within the study area to determine presence of the species and the potential of the identified habitats to support the identified species at risk.

Phantom Orchid

BC CDC: Red COSEWIC: Threatened

The phantom orchid is a perennial, saprophytic plant that occurs in the lower Fraser Valley. Stems of the phantom orchid typically reach heights of 20-55 cm, and have a creeping rhizome root network (Klinkenberg 2008). The phantom orchid has been typically found in moist to mesic forests (CDF_{mm} , CWH_{dm} , CWH_{xm1} , CWH_{xm2}). Nourishment for the phantom orchid is obtained from decaying coniferous humus provided through a symbiotic relationship with fungi from the Thelophoraceae family. The plant is often found at the bases of birches, bigleaf maple, Douglas-fir (*Pseudotsuga menziesii*), and western red cedar.

The phantom orchid prefers little or sparse groundcover and typically grows on a limestone substrate (Environment Canada, Species at Risk). The species flowers only when the conditions are ideal and can lay dormant for up to 17 years. Only three Canadian sites have phantom orchids that flower on a regular basis (Environment Canada, Species at Risk). The species is endemic to the Pacific Northwest, and has a restricted distribution in British Columbia. BC populations are only found on the Saanich Peninsula of Vancouver Island, Saltspring Island, and the lower Fraser Valley. Approximately 100 individuals are thought to exist at all sites combined (Environment Canada, Species at Risk).

No occurrences of phantom orchid were encountered during field surveys. Potential for this species to occur is limited. While suitable forest cover does exist within project area, the dense herbaceous cover that is present will likely depress the occurrence potential of the species. The potential for the identified habitat to support phantom orchid is limited, and unlikely to support a viable population.

Assigned Occurrence Potential: Low

Northern Watermeal

BC CDC: Red COSEWIC: Not Listed

Little information is available for northern watermeal. The genus *Wolffia*, to which northern watermeal belongs to is the smallest of the Lemnaceae family, and at only 0.5 to 2 mm in length are the smallest flowering plants in the world (Crawford and Landolt 1995). While this species does flower, reproduction is primarily achieved asexually through the rapid division of fronds (Landolt 1986).

The BC Conservation Data Centre (BC CDC) lists the habitat requirements for the species as ponds, lakes, slow moving streams located in the lowland and montane zones of BC, specifically the Coastal Western Hemlock dry maritime (CWH_{dm}), CWH very dry maritime variant 1 (CWH_{dm1}), and the Interior Cedar Hemlock dry warm (ICH_{dw}) zones (BC CDC).

No occurrences of northern watermeal were encountered during field surveys. While the six ponds located just north to the project area do satisfy the habitat requirements for the species, given the mechanism of reproduction, it is highly improbable that the species will utilize the habitat unless it is introduced.

Assigned Occurrence Potential: Low

Western Toad

BC CDC: Yellow COSEWIC: Special Concern

Western toads breed in a variety of aquatic habitats, both natural and manmade. Western toads have been found in, but are not exclusive to, tree or shrub canopies, coarse woody debris, or emergent vegetation. The species has been known to breed in ponds, stream edges, shallow margins of lakes, and in ditches in road ruts (Environment Canada, Species at Risk). Outside of the breeding season, western toads are typically found in terrestrial habitats that often include a dense shrub cover. It has been suggested that western toads prefer clearcuts over closed canopy forests, in part due to the higher density of shrub cover. Western toads have also been shown to utilize roadside ditches outside of the breeding season.

No occurrences of western toad were observed during field assessment. Habitat identified within the study area did reveal areas which have a potential to be utilized by western toads. These areas include the three ponds at the western edge of the study area and the three ponds within the Silverdale Wetlands. The three ponds that occur to the west of the study area are within the proposed construction footprint.

Assigned Occurrence Potential: Moderate

Red-legged Frog

BC CDC: Blue COSEWIC: Special Concern

Red-legged frogs prefer cool temperate coastal forests. Red-legged frogs can make extensive movements between overwintering areas, breeding sites, and summer foraging areas although dispersal distances are unknown (Ovaska and Sopuck 2004). They breed in small wetlands, shallow ponds or slow streams that are well shaded. Red-legged frogs are explosive breeders, with reproduction occurring for only a short period in early spring (e.g., 2-4 weeks). Breeding adults spend much of their time on land, straying quite a distance from the water if the weather is damp. They will often take shelter under logs or other debris to stay cool and damp. Red-legged frogs exhibit site fidelity to natal breeding ponds and females may lay their eggs in the same locations within a breeding site each year. The species has a limited range in BC, found only in the southwestern part of the province.

Red-legged frogs were not observed during the field assessment; however, the presence of this species was confirmed during ENKON's environmental review of the project (2007) when the three individuals were documented (R.F. Binnie and Associates 2007) within the proposed construction footprint.

Assigned Occurrence Potential: High

Green Heron

BC CDC: Blue COSEWIC: Not Listed

The green heron is at the northern edge of its distribution in British Columbia. In British Columbia, the green heron breeds mostly in the Georgia Depression Ecoprovince in the southwestern corner of the province (Fraser and Ramsey 1996), but is considered locally uncommon (Campbell et al. 1990). Most local green herons migrate, but a few overwinter. Preferred habitats are fresh water and estuarine environments that have slow-moving or shallow water for foraging and nearby dense trees or tall shrubs for nesting (Fraser and Ramsey 1996). All the nests found in British Columbia have been in trees or tall shrubs of red alder, Pacific crab apple, black hawthorn, Garry oak (*Quercus garryana*), Douglas-fir, and bigleaf maple.

The BC CDC has records of adults and juveniles within the construction footprint, suggesting a high likelihood of breeding. However, the last observation recorded on the CDC is from 1987. The habitat is still suitable for this species, but there are no recent occurrences.

Assigned Occurrence Potential: Moderate

Great Blue Heron

BC CDC: Blue COSEWIC: Special Concern

Of the five subspecies recognised for *Ardea herodias* two occur within British Columbia; *A.h. fannini* and *A.h. herodias*. *A.h. fannini* occupies the BC coast west of the coastal mountains ranges, whereas *A.h. herodias* occurs in the southern portion of BC east of the coastal mountain ranges (COSEWIC 2008). The great blue heron measures 60 cm in height, 97 to 137 cm in length, and has a body mass of 2.1 to 2.5kg. The plumage of the species is primarily a blue-grey colour. The adults having a white crown (COSEWIC 2008).

The *fannini* subspecies differs from *herodias* in breeding behaviour and morphology; specifically, it is smaller and has darker plumage than *A.h. herodias*. Habitat requirements for *A. h. fannini* are dependant on the time of year. Since the species forages on fish, frogs, other aquatic life, mice, and insects (Peterson 1990), important foraging sites for this heron include various aquatic areas such as wetlands, tidal flats, riverbanks and lakeshores (COSEWIC 2008). During breeding, nest site locations must be within a 10 km radius of a forage site. Nesting typically occurs in large communities, and often with numerous nests situated in one tree (Harrison 1979). The most common tree species for nesting are red alder, black cottonwood, bigleaf maple, sitka spruce, and Douglas-fir (COSEWIC 2008). Nesting generally occurs in areas free of human disturbance, but may occur in developed areas. Site fidelity is highly variable, and dependant on the level of disturbance and nesting pairs (COSEWIC 2008). Typically sites with high disturbance and less than 25 breeding pairs will experience low site fidelity, whereas sites with higher density breeding pairs and low disturbance experience high site fidelity.

During the surveys of the areas no nests were observed, however, several herons were observed foraging in the ponds, to the north of the construction area, and along Silverdale Creek within the proposed construction footprint.

Assigned Occurrence Potential: Moderate to High (for forage)

Pacific Water Shrew

BC CDC: Red COSEWIC: Endangered

The Pacific water shrew is the largest North American *Sorex* species. On average the Pacific water shrew measures 154 mm total length, 19 mm hindfoot length, 70 mm tail length, and has a body mass of 10.6 g (COSEWIC 2006). As a member of the order Insectivora, the Pacific water shrew feeds mainly on aquatic invertebrates and soft-bodied terrestrial invertebrates (Reid 2006). In addition to size, the species can be

identified by its dark brown to black dorsal fur and dark brown ventral fur. The hindfoot of this shrew has numerous stiff hairs that assist with swimming (Craig and Vennesland 2007). The ideal habitat for the Pacific water shrew has been defined as a riparian habitat surrounding a permanent stream or creek (<10 m wide) or wetlands of any size class with a mature coniferous forest (dominate tree cover of western red cedar and or western hemlock), mature deciduous, or mixedwood forest (Craig and Vennesland 2007) and with a canopy cover exceeding 50% (COSEWIC 2006). Secondary habitat includes streams ranging from 10 to 20 m width with suitable surrounding habitat, ephemeral or intermittent watercourses, heavy shrub cover, or sites similar to the ideal habitat but at a younger structural stage (Craig and Vennesland 2007). A small mammal survey was conducted over an eight day period in which no Pacific water shrews were captured. Although these results do not prove that Pacific water shrews do not inhabit the survey areas (both the project area and the construction footprint) the likelihood is extremely low considering the low to nil habitat quality.

Assigned Occurrence Potential: Low

Oregon Forestsnail

BC CDC: Red COSEWIC: Endangered

One of the largest terrestrial BC snails; the Oregon forestsnail shell ranges from 28 to 35 mm in size. The adult shell is pale brown to straw-yellow in colour, and consists of 5¼ to 6 whorls that have irregular, light coloured axial riblets, and exceedingly fine, wavy spiral striae (COSEWIC 2002). Habitat requirements for the Oregon forestsnail are not well known for British Columbia. The species has been observed occupying mixed-wood and deciduous forests, dominated by bigleaf maple. Oregon forestsnail has also been observed in forests that include black cottonwood (*Populus balsamifera* spp. *trichocarpa*), willows (*Salix* spp.) and western red cedar. In all instances, a dense herbaceous cover was present, and stinging nettle dominated the herbaceous layer (COSEWIC 2002). Oregon forestsnail are thought to require habitat that includes coarse woody debris and a substantial amount of leaf litter. Shade provided by the herbaceous layer and tree canopy is also thought to be a critical component of the species habitat as it provides temperature moderation and protection from moisture loss (COSEWIC 2002). Oregon forestsnails have been observed at elevations ranging from 7 to 360 m above sea level.

Field personnel did not encounter any Oregon forestsnails during investigations of both the project area and the construction footprint. The identified forest to the north of Hwy 7 does have a low to moderate potential for supporting this species. Once past the transition zone, the forest became dense with Himalayan blackberry and salmonberry, and had a mixed coniferous and deciduous tree cover. These components do satisfy aspects of the suggested habitat requirements for the species, specifically herbaceous

cover and forest floor coarse woody debris and leaf litter. Stinging nettle was absent from habitat surveyed.

Assigned Occurrence Potential: Low

Species at Risk Summary Table

Species	Occurrence Potential	Location within the project	
		Project Area	Construction Footprint
Phantom Orchid	Low	X	
Northern Watermeal	Low	X	
Western Toad	Moderate		X
Red-legged Frog	High		X
Green Heron	Moderate		X
Great Blue Heron	Moderate to High		X
Pacific Water Shrew	Low		X
Oregon Forest Snail	Low		X

6 Conclusion

6.1 Species at Risk

Should the proposed widening of Highway 7 go forward, specific mitigation measures will be required to ensure minimal impacts to local wildlife and vegetation, particularly species at risk. Historical data and the survey results presented here confirm the presence of three species of conservation concern within the proposed construction footprint: red-legged frog, green heron and great blue heron.

The red-legged frog may utilize the roadside ditches, but is likely using Silverdale Creek and the enhancement ponds upstream. This assumption relies on the knowledge that the ditches offer relatively poor habitat suitability particularly in comparison to the highly ranked habitat directly upstream and downstream of the survey area.

Green herons have not been recorded in the area since 1987. Based on their preference for tall shrubs or deciduous trees and slow moving waters the heron is not likely to utilize the area directly adjacent to Hwy 7. The ditches are unsuitable for

foraging as they are choked with reed canary grass and exposed to high noise levels from highway and rail traffic. Furthermore, there is no suitable nesting habitat directly adjacent to the highway.

Great blue herons have been observed foraging in the survey area, specifically along the lower stretch of the Silverdale Creek, downstream of the Canadian Pacific railway bridge. Although great blue herons have been observed foraging along major roadways it is extremely unlikely that they would utilize the ditches adjacent to Highway 7 due to the close proximity of more suitable habitat along Silverdale Creek.

6.2 Suggested Mitigation

Prior to works commencing, the proponent should conduct a small mammal/amphibian salvage, according to the British Columbia Resource Inventory Standards Committee (RISC) protocols in the proposed footprint to minimize losses to local populations. The salvage would be required due to the confirmed presence of red-legged frog and also mitigate potential concerns from the BC Ministry of Environment regarding Pacific water shrews. As noted earlier Pacific water shrews are unlikely to inhabit the area directly adjacent to Hwy 7, indicated by their absence during the small mammal surveys.

Concurrent to small mammal and amphibian salvage efforts, crews should conduct stick nest surveys for raptor and heron presence. Should these surveys be delayed until the spring, a more comprehensive breeding bird survey would be required.

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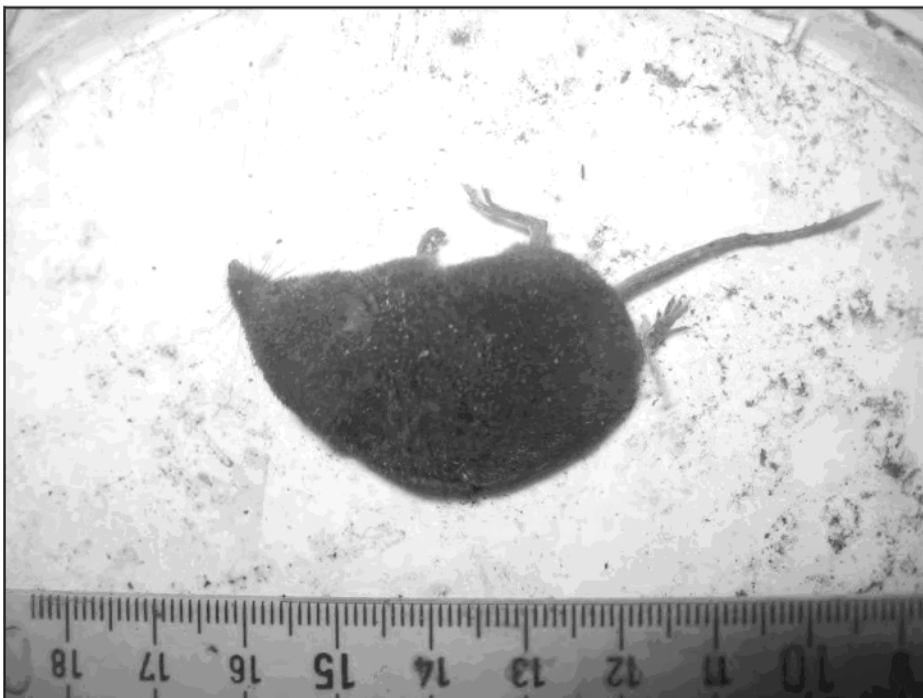
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Appendix A: Capture Images and Trap Locations



Dusky Shrew, October 25, 2008. 05:25.



Dusky Shrew, October 28, 2008. 07:40.



Pitfall trap locations.



Southern Sherman/Longworth trap location on Silverdale Creek.



Typical ditch trapping locations, Sherman and Longworth.

Appendix B: Small Mammal Survey Results

PWS Trap Results - Silverdale

Date	Time	Crew	TrapID	TrapType	Species	Capture Details			
						BL (mm)	TL (mm)	HF (mm)	WT (g)
25-Oct-08	5:25	GS	SC18	PF	M-SOMO	53	45	11	7
25-Oct-08	6:00	GS	SC19	SH	M-PEMA	-	-	-	-
25-Oct-08	6:12	GS	SE17	SH	M-PEMA	-	-	-	-
25-Oct-08	6:21	GS	SE15	SH	M-PEMA	-	-	-	-
25-Oct-08	6:25	GS	SE12	SH	M-PEMA	-	-	-	-
25-Oct-08	6:47	GS	NE07	SH	M-PEMA	-	-	-	-
25-Oct-08	7:04	GS	NE03	LW	M-PEMA	-	-	-	-
25-Oct-08	15:00	AR	SE28	LW	M-PEMA	-	-	-	-
26-Oct-08	7:00	AR	NE02	LW	M-PEMA	-	-	-	-
26-Oct-08	7:15	AR	NE03	SH	M-PEMA	-	-	-	-
26-Oct-08	7:20	AR	NE07	SH	M-PEMA	-	-	-	-
26-Oct-08	7:30	AR	SE05	SH	M-PEMA	-	-	-	-
26-Oct-08	7:55	AR	SE06	SH	M-PEMA	-	-	-	-
26-Oct-08	8:00	AR	SE09	SH	M-PEMA	-	-	-	-
26-Oct-08	8:20	AR	SE15	SH	M-PEMA	-	-	-	-
26-Oct-08	8:25	AR	SE17	SH	M-PEMA	-	-	-	-
26-Oct-08	8:30	AR	SE19	SH	M-PEMA	-	-	-	-
26-Oct-08	9:00	AR	NSC10	LW	M-PEMA	-	-	-	-
26-Oct-08	17:02	GS	SSC02	LW	M-MITO	-	-	-	-
27-Oct-08	7:10	AR	NE02	LW	M-PEMA	-	-	-	-
27-Oct-08	7:13	AR	NE04	SH	M-PEMA	-	-	-	-
27-Oct-08	7:45	AR	SE03	LW	M-PEMA	-	-	-	-
27-Oct-08	7:50	AR	SE06	SH	M-PEMA	-	-	-	-
27-Oct-08	8:00	AR	SE14	LW	M-PEMA	-	-	-	-
27-Oct-08	8:10	AR	SE18	SH	M-PEMA	-	-	-	-
27-Oct-08	15:15	GS	NSC10	LW	M-PEMA	-	-	-	-
27-Oct-08	15:20	GS	NSC09	LW	M-PEMA	-	-	-	-
28-Oct-08	6:42	GS	SE14	LW	M-PEMA	-	-	-	-
28-Oct-08	7:40	GS	SC21	PF	M-SOMO	45	39	13	6
28-Oct-08	8:09	GS	NS10	LW	M-PEMA	-	-	-	-
29-Oct-08	16:31	OB	On Trail	-	M-MITO	-	-	-	-
29-Oct-08	16:33	OB	On Trail	-	M-SOVA	-	-	-	-
28-Oct-08	15:30	AR	SC12	PF	M-MITO	-	-	-	-
30-Oct-08	6:30	AR	NE07	SH	M-PEMA	-	-	-	-
30-Oct-08	6:55	AR	SE14	LW	M-PEMA	-	-	-	-
30-Oct-08	7:00	AR	SE15	SH	M-PEMA	-	-	-	-
30-Oct-08	18:30	GS	SE14	LW	M-PEMA	-	-	-	-
30-Oct-08	18:42	GS	SE07	LW	M-PEMA	-	-	-	-
30-Oct-08	18:50	GS	SE03	LW	M-PEMA	-	-	-	-
30-Oct-08	19:30	GS	NE02	LW	M-PEMA	-	-	-	-

Code Definitions:

Traps: SH – Sherman, LW – Longworth, PF – Pitfall

Capture Details: BL – Body Length, TL – Tail Length, HF – Hindfoot Length, WT - Weight

Species (RISC): M-MITO – Townsend's Vole, M-PEMA – Deer Mouse, M-SOMO – Dusky Shrew, M-SOVA – Vagrant Shrew

Appendix C: GPS Coordinates for Small Mammal Traps

Silverdale Trap Locations

TrapID	TrapType	Name	Zone	Easting	Northing	Elevation
CP01	LW	POI002	10	547293	5443144	0
CP02	SH	POI003	10	547285	5443159	0
CP03	SH	POI004	10	547288	5443170	0
CP04	SH	POI005	10	547300	5443174	0
CP05	SH	POI006	10	547318	5443177	0
CP06	LW	POI007	10	547333	5443174	0
CP07	SH	POI008	10	547350	5443174	0
CP08	SH	POI009	10	547402	5443160	0
CP09	SH	POI010	10	547397	5443152	0
CP10	SH	POI011	10	547394	5443154	0
CP11	LW	POI012	10	547383	5443146	0
CP12	SH	POI013	10	547389	5443122	1
CP13	LW	POI014	10	547364	5443094	0
CP14	SH	POI015	10	547347	5443092	0
CP15	LW	POI016	10	547340	5443092	0
CP16	SH	POI017	10	547326	5443089	0
CP17	SH	POI018	10	547314	5443084	0
NSC01	SH	POI019	10	547049	5443294	31
NSC02	SH	POI020	10	547058	5443290	17
NSC03	SH	POI021	10	547055	5443288	9
NSC04	LW	POI022	10	547061	5443277	10
NSC05	LW	POI023	10	547066	5443272	14
NSC06	LW	POI024	10	547060	5443266	14
NSC07	LW	POI025	10	547070	5443250	15
NSC08	LW	POI026	10	547074	5443240	13
NSC09	LW	POI027	10	547088	5443231	17
NSC10	LW	POI028	10	547089	5443227	11
SC01	PF	POI029	10	547097	5443221	8
SC02	PF	POI030	10	547101	5443213	6
SC03	PF	POI031	10	547080	5443202	4
SC04	PF	POI032	10	547093	5443189	8
SC05	PF	POI033	10	547099	5443168	3
SC06	PF	POI034	10	547099	5443153	5
SC07	PF	POI035	10	547108	5443137	0
SC08	PF	POI036	10	547128	5443131	0
SC09	PF	POI037	10	547148	5443131	2
SC10	PF	POI038	10	547165	5443126	0
SC11	PF	POI039	10	547183	5443122	2
SC12	PF	POI040	10	547201	5443124	2
SC13	PF	POI041	10	547227	5443128	2
SC14	PF	POI042	10	547237	5443121	2
SC15	PF	POI043	10	547239	5443095	5
SC16	PF	POI044	10	547240	5443076	5
SC17	PF	POI045	10	547237	5443063	4
SC18	PF	POI046	10	547219	5443051	3
SC19	PF	POI047	10	547238	5443028	2
SC20	PF	POI048	10	547240	5443006	0
SC21	PF	POI049	10	547240	5442991	3
SC22	PF	POI050	10	547235	5442973	0
SC23	PF	POI051	10	547227	5442960	1
SC24	PF	POI052	10	547241	5442932	1
SC25	PF	POI053	10	547239	5442910	1
SC26	PF	POI054	10	547241	5442889	1
SC27	PF	POI055	10	547233	5442884	1
SC28	PF	POI056	10	547237	5442878	2
SC29	PF	POI057	10	547230	5442869	0
SC30	PF	POI058	10	547219	5442860	1
SC31	PF	POI060	10	547208	5442842	5
SC32	PF	POI061	10	547200	5442827	9

SC33	PF	POI062	10	547191	5442820	7
SSC01	LW	POI063	10	547174	5442808	3
SSC02	LW	POI064	10	547162	5442797	3
SSC03	SH	POI065	10	547148	5442790	2
SSC04	SH	POI066	10	547134	5442794	4
SSC05	SH	POI067	10	547121	5442800	0
SSC06	SH	POI068	10	547109	5442804	0
SSC07	SH	POI069	10	547096	5442805	0
SSC08	SH	POI070	10	547083	5442807	2
SSC09	SH	POI071	10	547069	5442808	4
SSC10	SH	POI072	10	547054	5442816	4
SSC11	SH	POI073	10	547021	5442811	3
SSC12	SH	POI074	10	547006	5442808	2
SSC13	SH	POI075	10	546988	5442810	0
SSC14	SH	POI076	10	546993	5442824	4
SSC15	SH	POI077	10	547008	5442824	3
SE01	SH	POI110	10	547856	5442487	6
SE02	SH	POI109	10	547853	5442487	3
SE03	LW	POI108	10	547776	5442518	8
SE04	SH	POI107	10	547747	5442529	9
SE05	SH	POI106	10	547726	5442543	5
SE06	SH	POI105	10	547687	5442562	4
SE07	LW	POI104	10	547655	5442574	3
SE08	SH	POI103	10	547614	5442594	9
SE09	SH	POI102	10	547583	5442607	17
SE10	SH	POI101	10	547553	5442627	0
SE11	LW	POI100	10	547525	5442649	5
SE12	SH	POI099	10	547485	5442669	0
SE13	SH	POI098	10	547450	5442693	2
SE14	LW	POI097	10	547412	5442721	6
SE15	SH	POI096	10	547392	5442732	3
SE16	LW	POI095	10	547346	5442757	4
SE17	SH	POI094	10	547315	5442773	5
SE18	SH	POI093	10	547282	5442798	5
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SE20	SH	POI059	10	547215	5442835	1
SE21	SH	POI091	10	547170	5442863	4
SE22	SH	POI090	10	547134	5442885	6
SE23	SH	POI089	10	547100	5442909	2
SE24	SH	POI088	10	547051	5442940	2
SE25	SH	POI087	10	547037	5442947	0
SE26	SH	POI086	10	546990	5442976	5
SE27	SH	POI085	10	546958	5442996	0
SE28	LW	POI084	10	546933	5443015	0
SE29	SH	POI083	10	546902	5443035	2
SE30	SH	POI082	10	546869	5443051	0
SE31	SH	POI081	10	546827	5443077	3
SE32	LW	POI080	10	546798	5443098	3
SE33	SH	POI079	10	546771	5443113	2
SE34	LW	POI078	10	546713	5443146	2
NE01	SH	POI119	10	546742	5443154	0
NE02	LW	POI118	10	546858	5443092	4
NE03	SH	POI117	10	546959	5443026	1
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NE05	SH	POI115	10	547098	5442944	0
NE06	LW	POI114	10	547193	5442895	0
NE07	SH	POI113	10	547254	5442843	2
NE08	LW	POI112	10	547319	5442801	0
NE09	SH	POI111	10	547387	5442757	0

Code Definitions:
Traps: SH – Sherman, LW – Longworth, PF – Pitfall

From: Eedy, Rachael ENV:EX
Sent: Monday, July 6, 2009 10:57 AM
To: Karpouzi, Vasiliki ENV:EX
Subject: MoT Silverdale habitat comp 1 of 2 A2005620

From: Cyr, Joanne TRAN:EX
Sent: Monday, July 6, 2009 9:16 AM
To: Eedy, Rachael ENV:EX
Subject: Habitat balance and compensation plan for Highway 7 Nelson to Wren

Hello Rachael,

See docs attached.

Joanne



Attachment D
Habitat Balance.p...



Attachment E
Silverdale Wetlan...



Attachment F
Property Acquisit..

Joanne M. Cyr BSc.
Assistant Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region
7818 6th Street
Burnaby, BC V3N 4N8
T: 604-660-8072
C: 604-240-8489
F: 604-660-0350

HABITAT BALANCE
Hwy 7 Wren Street to Nelson Street 4 Laning

Watercourse	Location	Habitat Description	Construction Habitat Loss			Post-Construction Habitat Gain		Net Habitat Gain		Proposed Compensation
			Aquatic/Floodplain	Riparian	Compensation Ratio	Aquatic/Floodplain	Riparian	Aquatic/Floodplain	Riparian	
Highway Widening Related Impacts (m ²)										
Roadside Drainage Watercourse	s.13,s.17	Fish bearing during high water conditions – low to moderate temporary salmonid rearing habitat and nutrient contribution to downstream fish populations	2,815	2,707	1:1	2,815	2,707	0	0	s.13,s.17
Roadside Drainage Watercourse		Fish bearing during high water conditions – low to moderate temporary salmonid rearing habitat and nutrient contribution to downstream fish populations	2,815	2,707	2:1	5,630	5,416	2,815	2,707	
Roadside Drainage Watercourse and Wetland Area		Fish bearing during high water conditions – low to moderate temporary salmonid rearing habitat and nutrient contribution to downstream fish populations	6,909	9,136	2:1	13,818	18,272	6,909	9,136	
Roadside Drainage Watercourse		Fish bearing during high water conditions – low to moderate temporary salmonid rearing habitat and nutrient contribution to downstream fish populations	1,284	3,737	1:1	1,284	3,737	0	0	
Bridge Related In										
Silverdale Creek		30m from wetted perimeter during low water conditions Fish bearing during high water conditions – moderate temporary salmonid rearing habitat	443	1,151	2:1	886	2,302	443	1,151	
TOTAL PROJECT IMPACTS			14,266	19,438		24,433	32,434	10,167	12,994	

s.13,s.17

Activity	Unit Cost	Quantity	Cost
Ground preparation / invasive plant removal	s.13,s.17	7500 m ²	s.13,s.17
Ground cover seeding		7500 m ²	
Planning and design and consultation			
Beaver guards			
Riparian Planting - 60% shrubs, 40% trees (85% deciduous and 15% conifer)*			
<i>Deciduous Trees (based on 2550 m² of planting area)</i>	s.13,s.17	638	
<i>Coniferous Trees (based on 450 m² of planting area)</i>		112	
<i>Shrubs (based on 4500 m² of planting area)</i>		4500	
new channel construction		5000	
As-built drawings			
Environmental Monitoring during Site Preparation and Planting			
Maintenance over initial growth period			
Post Construction Monitoring (5 years of follow-up inspections and reporting)		5 years	

Activity	Unit Cost	Quantity	Assumptions	Cost
Ground preparation / invasive plant removal	s.13,s.17	18486 m ²	Based on rate used for Evans Connector Project	s.13,s.17
Soil		18486 m ²	Based on rate used for Evans Connector Project	
Ground cover seeding		18486 m ²	Based on rate used for Evans Connector Project	
Planning and design				
Beaver guards				
Riparian Planting - 60% shrubs, 40% trees (85% deciduous and 15% conifer)*				
<i>Deciduous Trees (based on 6285 m² of planting area)</i>	s.13,s.17	1571 trees	Includes cost of plant stock (2 gal pots) and planting based on previous project examples.	
<i>Coniferous Trees (based on 3,003 m² of planting area)</i>		277 trees	Spacing Formula: $N = \text{Area} / (L \times W)$ where N = number of plants L = spacing between rows W = spacing between columns	
<i>Shrubs (based on 30,031 m² of planting area)</i>		11092 shrubs	Planting Densities: Shrubs 1 m spacing; Trees 2 m spacing	
new channel construction		15334 m ²	Provided by MoT Senior Biologist based on previous project experience	
Environmental Monitoring during Site Preparation and Planting				
Maintenance over initial growth period			Hard costs include ground preparation, soil application, seeding, planting, channel construction	
Post Construction Monitoring (5 years of follow-up inspections and reporting)		5 years		

From: Eedy, Rachael ENV:EX
Sent: Monday, July 6, 2009 10:58 AM
To: Karpouzi, Vasiliki ENV:EX
Subject: MoT Silverdale habitat comp 2 of 2 A2005620
Attachments: Sample_Implementation_Project_Report_RoseKirk.pdf; 090427 HWY 7 DFO Supplemental Information Final submitted to DFO 29Apr09.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Hi Vaso,

Note that MoT has asked if a representative from ESD would participate in the steering committee for planning habitat compensation.

Rachael

-----Original Message-----

From: Cyr, Joanne TRAN:EX
Sent: Monday, July 6, 2009 9:38 AM
To: Eedy, Rachael ENV:EX
Cc: Alan Stockwell (astockwell@hatfieldgroup.com); Czernick, Greg G TRAN:EX; Lee, Brian TRAN:EX
Subject: Highway 7 information regarding compensation plan and partnership model

Hello Rachael,

In our submission to DFO on 29April09 (attached), we outlined a partnership model to deliver the compensation plan for the project. While the habitat balance figures and compensation costs have been updated since this document was submitted, the information regarding the partnership model is current.

In our submission to DFO on 19June09, we provided additional information in response to DFO's concern that properties identified for potential acquisition were not sufficiently characterized with respect to viability to support the proposed enhancements. Our response is copied below:

"MoT has been in discussions with potential partners including the District of Mission, Ducks Unlimited Canada, and the Stave Valley Salmonid Enhancement Society regarding a strategy to advance the partnership model option. All participants recognize the need to assess the viability of potential properties, but this unfortunately cannot be accomplished to the level of detail requested before the project authorization is required. The suggested approach to give DFO assurance of the ability of the partnership to provide adequate project compensation is outlined below:

1. Potential partners provide proof of agreement in principle to forming a partnership based on the proposed model to undertake land acquisition and restoration activities.

2. Complete a desktop assessment of the biological values and water resources of each identified property.

3. Complete site visits with DFO, including habitat restoration biologists, and other stakeholders. Quantify potential riparian and instream restoration potential of each property and use the information to assign priority to the properties.

4. Proceed to formalize the partnership, once the DFO authorization has been issued, and convene the steering committee to begin work with the goal of securing a viable property by the end of project construction".

In further discussions with DFO regarding the partnership model, we have committed to preparing a memorandum of understanding for signature by all interested stakeholder groups that outlines the roles and responsibilities of the various groups. The Ministry of Environment is invited to participate in the partnership with a role on the technical steering committee. In this capacity, MoE can ensure that wildlife habitat compensation is addressed alongside the fisheries compensation aspects in any future property acquisition or habitat enhancement projects designed to offset impacts associated with the project.

Regards,
Joanne

Activity	Unit Cost	Quantity	Assumptions	Cost
Ground preparation / invasive plant removal	s.13,s.17	18486 m ²	Based on rate used for Evans Connecto Project	s.13,s.17
Soil		18486 m ²	Based on rate used for Evans Connecto Project	
Ground cover seeding		18486 m ²	Based on rate used for Evans Connecto Project	
Planning and design				
Beaver guards				
Riparian Planting - 60% shrubs, 40% trees (85% deciduous and 15% conifer)*				
Deciduous Trees (based on 6285 m ² of planting area)	s.13,s.17	1571 trees	Includes cost of plant stock (2 gal pots) and planting based on previous project examples.	
Coniferous Trees (based on 3,003 m ² of planting area)		277 trees	Spacing Formula: N = Area / (L*W) where N = number of plants L = spacing between rows W = spacing between columns	
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Environmental Monitoring during Site Preparation and Planting				
Maintenance over initial growth period			Hard costs include ground preparation, soil application, seeding, planting, channel construction	
Post Construction Monitoring (5 years of follow-up inspections and reporting)		5 years		

From: [Karpouzi, Vasiliki ENV:EX](#)
To: [Eedy, Rachael ENV:EX](#)
Cc: [Barrett, Scott ENV:EX](#); "[Lisa.McDonald@dfo-mpo.gc.ca](#)"
Subject: RE: MoT Silverdale habitat comp 2 of 2 A2005620
Date: Thursday, July 9, 2009 2:58:13 PM

Dear Rachael,

The Ecosystems Branch (Environmental Stewardship Division) believes that Highway 7 widening works immediately south of the Silverdale wetland will result in the loss of valuable habitat. In particular, works will entail the lateral encroachment and infilling of much of the southern ditch line, resulting in loss of a pond-line open waterway as well as surrounding well-established mature riparian shrubs and trees. The ponds provide seasonal rearing habitat for juvenile salmonids and feed nutrients to downstream fish habitat through the Silverdale Creek, which connects the adjacent wetland and ponds with the Fraser River. Moreover, the ponds may serve as useful breeding habitat for red-legged frogs and northwestern salamanders, as both species have been recorded in the area. Also, Great Blue Herons have been observed foraging in the ponds, while the adjacent wetland has been recognized as one of the few remaining in the Fraser Valley of vital importance to migrating and wintering waterfowl and wading birds. The wetland provides foraging, roosting and nesting grounds for species such as mallards, wood ducks, wigeons, teals, scaups, and herons.

In recognizing the habitat and wildlife values associated with the Silverdale wetland network and the need to adequately offset the loss of important habitat as a result of highway widening works, Ecosystems agrees in principle to contributing to, as we are able, a partnership with MoT, DFO, DoM, and local stewardship groups with related interests.

Ecosystems urges that the following provisions be met and included in the Memorandum of Understanding, to ensure a successful partnership:

- A detailed habitat and species (fish and wildlife, including sensitive and species at risk) inventory be completed, prior to works proceeding, to assist in properly enumerating ecosystem values.
- Terms of References (ToR) be developed during the early stages of the partnership building process. ToR will help detail:
 - The vision, objectives, and scope of the partnership.
 - The roles and responsibilities of all agencies and local groups involved in the partnership. It should also be clearly stated that the technical steering committee will only deal with compensation-related (e.g., potential properties for acquisition, habitat and wildlife values properly addressed and adequately incorporated in the habitat compensation plan) and not construction-related issues.
 - The budget and other financial resources assigned and secured for the fish and wildlife habitat compensation plan implementation;
 - The expected timeline (briefly discussed on page 11 of the letter submitted to DFO by Alan Stockwell, Hatfield Consultants, on April 27, 2009) that will lead to the completion of the habitat compensation project;
 - The plans and procedures decided upon to monitor long-term effectiveness of

compensation works.

Acquisition of land and off-site habitat compensation should not exclude any on-site mitigation opportunities. The proponent should explore possibilities on-site to enhance the biological value of the remnant ditches by, for instance, establishing connections with the wetland north of Highway 7 (creation of wildlife corridors), and implement a water quality treatment plan. Such efforts may assist in alleviating temporary construction-related impacts, as well as permanent effects associated with loss of habitat and habitat fragmentation.

Ecosystems recommends that all the above provisions be part of the *Water Act* approval requirements issued by WSD.

Ecosystems will participate in the partnership with a role in the technical steering committee. I will represent Ecosystems until the end of my term (September 18, 2009), upon which Scott Barrett, or another delegate, will take over.

Sincerely,

Vasiliki Karpouzi, M.Sc.
Scientific Technical Officer
Ecosystems Branch
Ministry of Environment
2nd floor, 10470 - 152 Street
Surrey BC
V3R 0Y3
Tel: 1 604 582 5329
Fax: 1 604 930 7119
Email: Vasiliki.Karpouzi@gov.bc.ca

-----Original Message-----

From: Eedy, Rachael ENV:EX
Sent: Monday, July 6, 2009 10:58 AM
To: Karpouzi, Vasiliki ENV:EX
Subject: MoT Silverdale habitat comp 2 of 2 A2005620

Hi Vaso,

Note that MoT has asked if a representative from ESD would participate in the steering committee for planning habitat compensation.

Rachael

-----Original Message-----

From: Cyr, Joanne TRAN:EX

Sent: Monday, July 6, 2009 9:38 AM

To: Eedy, Rachael ENV:EX

Cc: Alan Stockwell (astockwell@hatfieldgroup.com); Czernick, Greg G TRAN:EX; Lee, Brian TRAN:EX

Subject: Highway 7 information regarding compensation plan and partnership model

Hello Rachael,

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In our submission to DFO on 19June09, we provided additional information in response to DFO's concern that properties identified for potential acquisition were not sufficiently characterized with respect to viability to support the proposed enhancements. Our response is copied below:

"MoT has been in discussions with potential partners including the District of Mission, Ducks Unlimited Canada, and the Stave Valley Salmonid Enhancement Society regarding a strategy to advance the partnership model option. All participants recognize the need to assess the viability of potential properties, but this unfortunately cannot be accomplished to the level of detail requested before the project authorization is required. The suggested approach to give DFO assurance of the ability of the partnership to provide adequate project compensation is outlined below:

1. Potential partners provide proof of agreement in principle to forming a partnership based on the proposed model to undertake land acquisition and restoration activities.
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4. Proceed to formalize the partnership, once the DFO authorization has been issued, and convene the steering committee to begin work with the goal of securing a viable property by the end of project construction".

In further discussions with DFO regarding the partnership model, we have committed to preparing a memorandum of understanding for signature by all interested stakeholder groups that outlines the roles and responsibilities of the various groups. The Ministry of Environment is invited to participate in the partnership with a role on the technical steering committee. In this capacity, MoE can ensure that wildlife habitat compensation is addressed alongside the fisheries compensation aspects in any future

property acquisition or habitat enhancement projects designed to offset impacts associated with the project.

Regards,
Joanne

From: [Eedy, Rachael ENV:EX](#)
To: [Karpouzi, Vasiliki ENV:EX](#)
Subject: FW: Site visit for MoT Silverdale Approval application A2005620
Date: Thursday, June 18, 2009 3:52:42 PM
Attachments: [R1-592-100PL_20090616-106.pdf](#)
[R1-592-100PL_20090616-101.pdf](#)
[R1-592-100PL_20090616-102.pdf](#)
[R1-592-100PL_20090616-103.pdf](#)
[R1-592-100PL_20090616-104.pdf](#)
[R1-592-100PL_20090616-105.pdf](#)

Hi Vaso,

Additional material attached for A2005620 referral. Shows the areas of impacted ditches and ditch riparian.

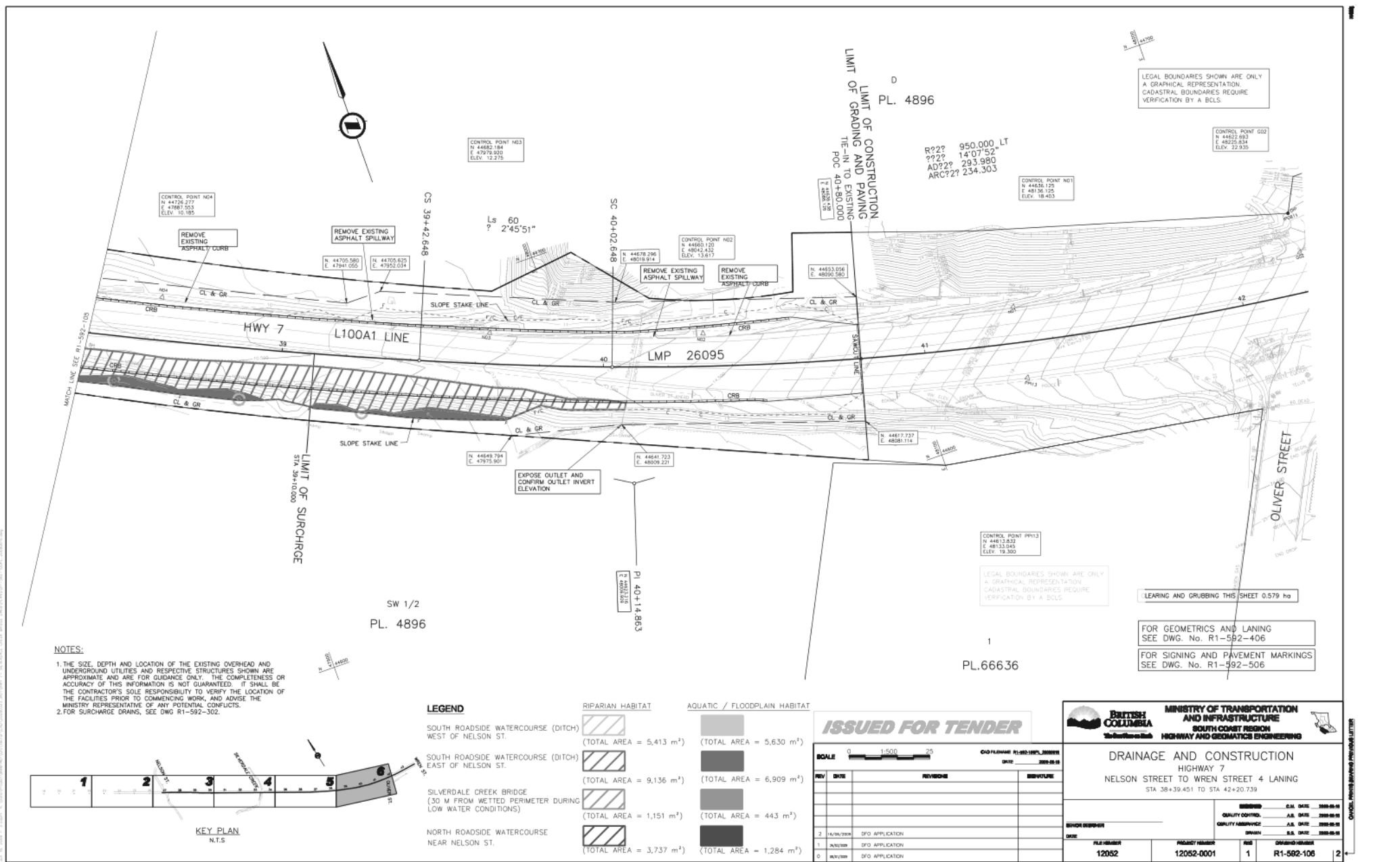
Rachael

From: Alan Stockwell [<mailto:astockwell@hatfieldgroup.com>]
Sent: Wednesday, June 17, 2009 11:14 AM
To: Eedy, Rachael ENV:EX
Subject: RE: Site visit for MoT Silverdale Approval application A2005620

Hi Rachael:

As discussed, here are the impact drawings for the Silverdale project. See you on the 23rd.

Thanks,
Alan



NOTES:
1. THE SIZE, DEPTH AND LOCATION OF THE EXISTING OVERHEAD AND UNDERGROUND UTILITIES AND RESPECTIVE STRUCTURES SHOWN ARE APPROXIMATE AND ARE FOR GUIDANCE ONLY. THE COMPLETENESS OR ACCURACY OF THIS INFORMATION IS NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO VERIFY THE LOCATION OF THE UTILITIES PRIOR TO COMMENCING WORK, AND ADVISE THE MINISTRY REPRESENTATIVE OF ANY POTENTIAL CONFLICTS.
2. FOR SURCHARGE DRAINS, SEE DWG R1-592-302.

SW 1/2
PL. 4896

1
PL.66636

LEGEND

SOUTH ROADSIDE WATERCOURSE (DITCH) WEST OF NELSON ST.		RIPIARIAN HABITAT (TOTAL AREA = 5,413 m²)		AQUATIC / FLOODPLAIN HABITAT (TOTAL AREA = 5,630 m²)
SOUTH ROADSIDE WATERCOURSE (DITCH) EAST OF NELSON ST.		(TOTAL AREA = 9,136 m²)		(TOTAL AREA = 6,909 m²)
SILVERDALE CREEK BRIDGE (30 M FROM WETTED PERIMETER DURING LOW WATER CONDITIONS)		(TOTAL AREA = 1,151 m²)		(TOTAL AREA = 443 m²)
NORTH ROADSIDE WATERCOURSE NEAR NELSON ST.		(TOTAL AREA = 3,737 m²)		(TOTAL AREA = 1,284 m²)

KEY PLAN
N.T.S

ISSUED FOR TENDER

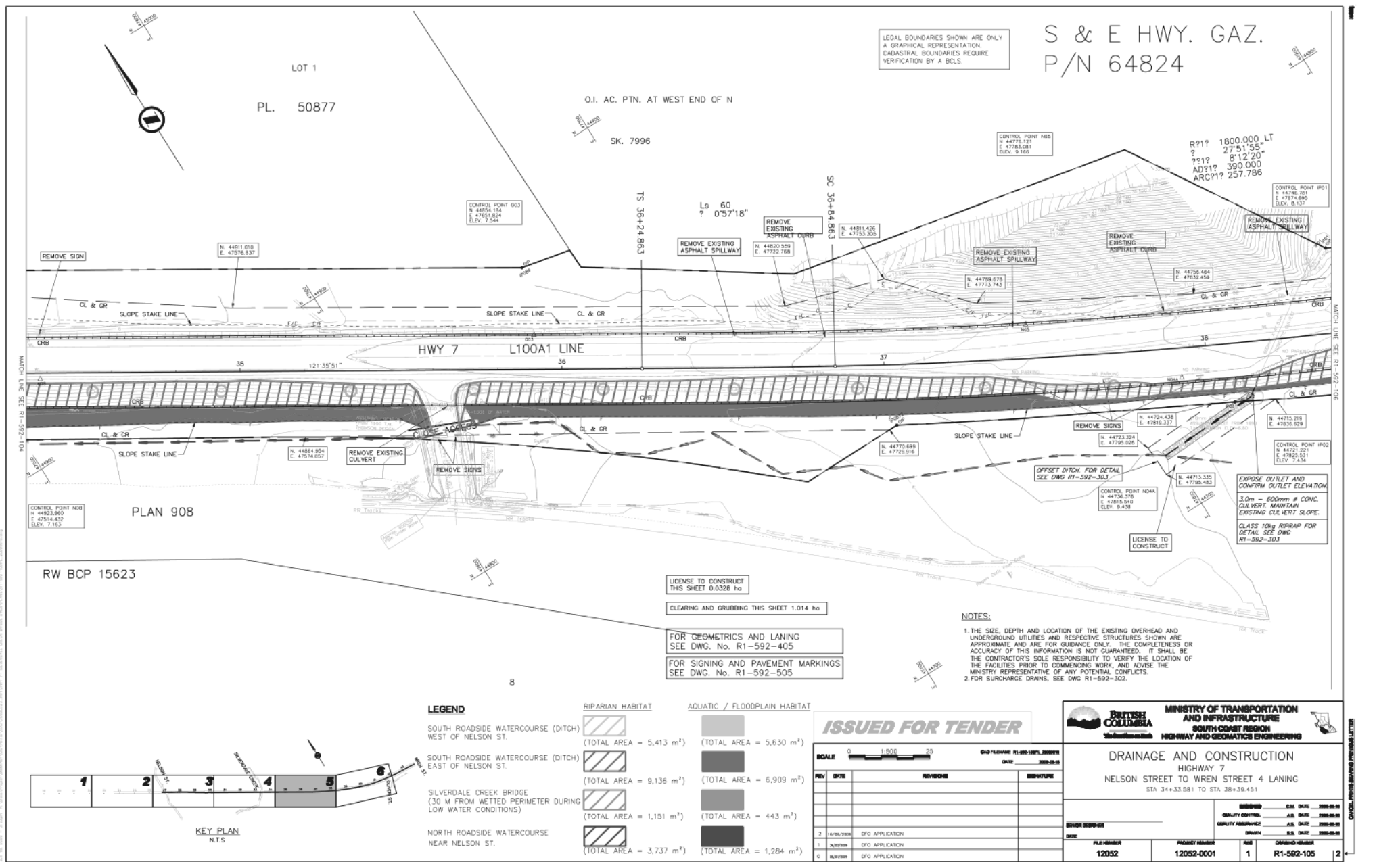
SCALE	0 1:500 25	DATE	2020-05-18
REV	DATE	REVISION	SIGNATURE
1	14/05/2020	DFO APPLICATION	
2	26/05/2020	DFO APPLICATION	
3	06/06/2020	DFO APPLICATION	

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY AND GEOMATICS ENGINEERING

DRAINAGE AND CONSTRUCTION
HIGHWAY 7
NELSON STREET TO WREN STREET 4 LANING
STA 38+39.451 TO STA 42+20.739

DESIGNED	C.M. DATE	2020-05-18
QUALITY CONTROL	A.S. DATE	2020-05-18
QUALITY ASSURANCE	A.S. DATE	2020-05-18
DRAWN	A.S. DATE	2020-05-18

DATE	FILE NUMBER	PROJECT NUMBER	SHEET	DRAWING NUMBER
	12052	12052-0001	1	R1-592-108



S & E HWY. GAZ.
P/N 64824

LEGAL BOUNDARIES SHOWN ARE ONLY
A GRAPHICAL REPRESENTATION.
CADASTRAL BOUNDARIES REQUIRE
VERIFICATION BY A BCL.

NOTES:

1. THE SIZE, DEPTH AND LOCATION OF THE EXISTING OVERHEAD AND UNDERGROUND UTILITIES AND RESPECTIVE STRUCTURES SHOWN ARE APPROXIMATE AND ARE FOR GUIDANCE ONLY. THE COMPLETENESS OR ACCURACY OF THIS INFORMATION IS NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO VERIFY THE LOCATION OF THE FACILITIES PRIOR TO COMMENCING WORK, AND ADVISE THE MINISTRY REPRESENTATIVE OF ANY POTENTIAL CONFLICTS.
2. FOR SURCHARGE DRAINS, SEE DWG R1-592-302.

LEGEND

- SOUTH ROADSIDE WATERCOURSE (DITCH) WEST OF NELSON ST.
- SOUTH ROADSIDE WATERCOURSE (DITCH) EAST OF NELSON ST.
- SILVERDALE CREEK BRIDGE (30 M FROM WETTED PERIMETER DURING LOW WATER CONDITIONS)
- NORTH ROADSIDE WATERCOURSE NEAR NELSON ST.

RIPIARIAN HABITAT

- (TOTAL AREA = 5,413 m²)
- (TOTAL AREA = 9,136 m²)
- (TOTAL AREA = 1,151 m²)
- (TOTAL AREA = 3,737 m²)

AQUATIC / FLOODPLAIN HABITAT

- (TOTAL AREA = 5,630 m²)
- (TOTAL AREA = 6,909 m²)
- (TOTAL AREA = 443 m²)
- (TOTAL AREA = 1,284 m²)

ISSUED FOR TENDER

REV	DATE	REVISION	REVISION
1	14/05/2018	DWG APPLICATION	
2	14/05/2018	DWG APPLICATION	
3	14/05/2018	DWG APPLICATION	

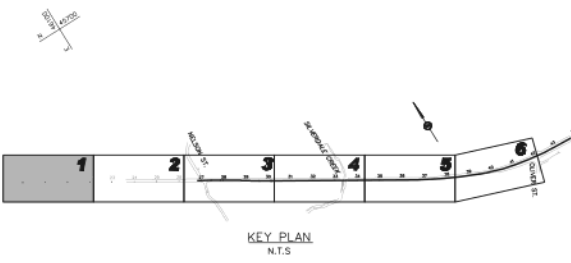
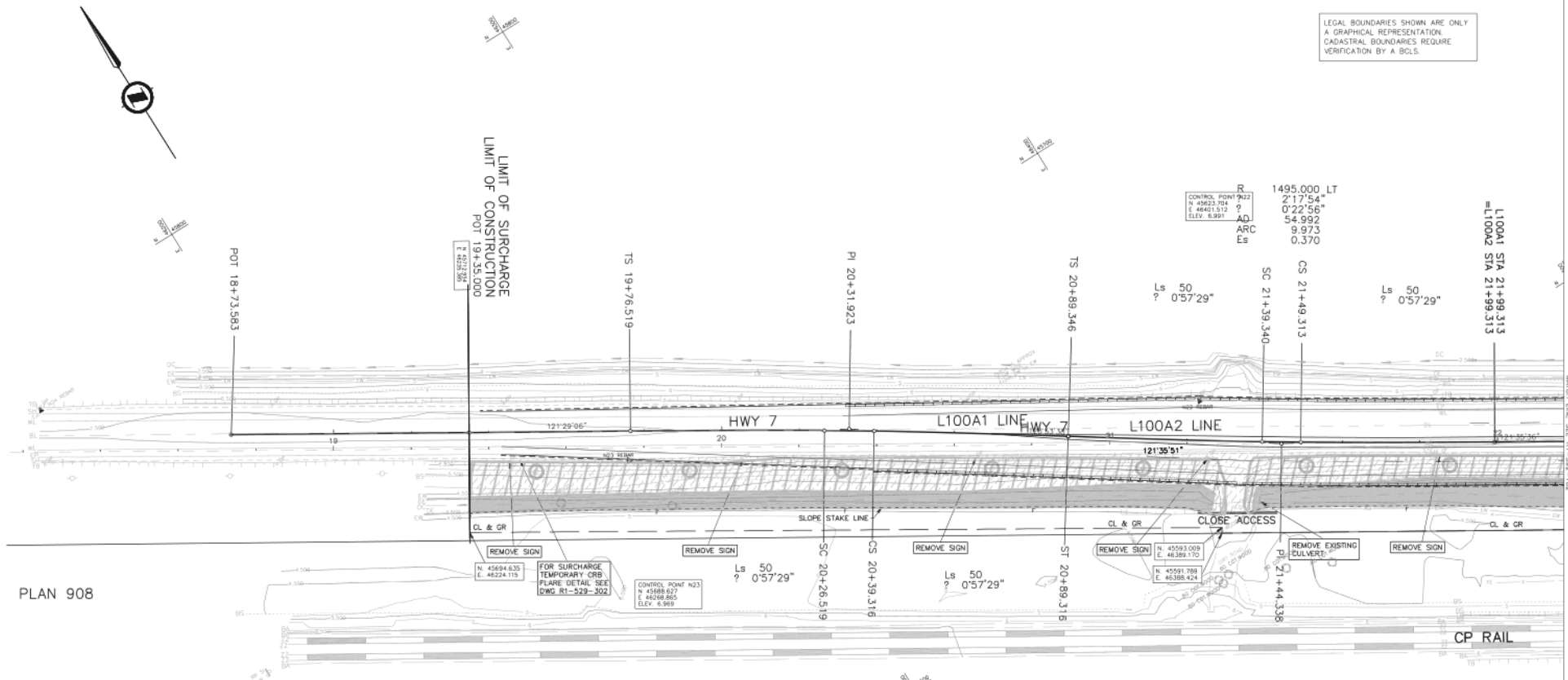
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTH COAST REGION
HIGHWAY AND GEOMATICS ENGINEERING

DRAINAGE AND CONSTRUCTION
HIGHWAY 7
NELSON STREET TO WREN STREET 4 LANEING
STA 34+33.581 TO STA 38+39.451

ISSUED	C.M. DATE	1998-05-01
QUALITY CONTROL	A.S. DATE	1998-05-01
QUALITY ASSURANCE	A.S. DATE	1998-05-01
DESIGN	A.S. DATE	1998-05-01

PROJECT NUMBER	12052
PROJECT NUMBER	12052-0001
REV	1
PROJECT NUMBER	R1-592-105

PLAN 908



LEGEND

SOUTH ROADSIDE WATERCOURSE (DITCH)
WEST OF NELSON ST.

SOUTH ROADSIDE WATERCOURSE (DITCH)
EAST OF NELSON ST.

SILVERDALE CREEK BRIDGE
(30 M FROM WETTED PERIMETER DURING
LOW WATER CONDITIONS)

NORTH ROADSIDE WATERCOURSE
NEAR NELSON ST.

RIPIARIAN HABITAT

(TOTAL AREA = 5,413 m²)

(TOTAL AREA = 9,136 m²)

(TOTAL AREA = 1,151 m²)

(TOTAL AREA = 3,737 m²)

AQUATIC / FLOODPLAIN HABITAT

(TOTAL AREA = 5,630 m²)

(TOTAL AREA = 6,909 m²)

(TOTAL AREA = 443 m²)

(TOTAL AREA = 1,284 m²)

NOTES:

1. THE SIZE, DEPTH AND LOCATION OF THE EXISTING OVERHEAD AND UNDERGROUND UTILITIES AND RESPECTIVE STRUCTURES SHOWN ARE APPROXIMATE AND ARE FOR GUIDANCE ONLY. THE COMPLETENESS OR ACCURACY OF THIS INFORMATION IS NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO VERIFY THE LOCATION OF THE FACILITIES PRIOR TO COMMENCING WORK, AND ADVISE THE MINISTRY REPRESENTATIVE OF ANY POTENTIAL CONFLICTS.
2. FOR SURCHARGE DRAINS, SEE DWG. R1-592-302.

CLEARING AND GRUBBING THIS SHEET 0.529 ha

FOR GEOMETRICS AND LANING
SEE DWG. No. R1-592-401

FOR SIGNING AND PAVEMENT MARKINGS
SEE DWG. No. R1-592-501

ISSUED FOR TENDER

REV	DATE	REVISIONS	SIGNATURE
1	14/01/2018	DWG APPLICATION	
2	14/01/2018	DWG APPLICATION	
3	14/01/2018	DWG APPLICATION	

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE SOUTH COAST REGION HIGHWAY AND GEOMATICS ENGINEERING	
DRAINAGE AND CONSTRUCTION HIGHWAY 7 NELSON STREET TO WREN STREET 4 LANING STA 20+10.000 TO STA 21+17.163	
REVISION DATE 12052	REVISION DATE 12052-0001
REVISION DATE 1	REVISION DATE R1-592-101

From: Eedy, Rachael ENV:EX
Sent: Monday, July 20, 2009 11:02 AM
To: Karpouzi, Vasiliki ENV:EX
Subject: FW: A2005620 habitat compensation and clarification for Silverdale

Hi Vaso,

Please see the 2007 wildlife report attached. I'm waiting for the habitat compensation MOU and will copy this to you when it's received.

Rachael

Note that ESD also found that the habitat assessment did not include enough field work or sampling at different times of the year. Was any additional information on wildlife and habitat collected?

Because of the underlying issue of the safety of the bridge and the deadline to have it replaced, the project has been under a very tight schedule. The habitat assessment work completed by Hatfield for the project expanded on work previously completed by Enkon. I have attached a copy of the Enkon report for your information. The decision, supported by DFO, to adopt the watercourse classifications from the SHIM mapping network for watercourses in the project area was made to expedite the assessment process. At this point, there is insufficient time to perform additional data collection and analysis.



A5_Enkon Hwy7
Enviro Constrain...

DRAFT REPORT
Highway 7 Upgrade
Silverdale to Wren

Environmental Constraints
and Costs

Prepared for:

R.F. Binnie & Associates Ltd.
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Project No.: 1237-006

November 2007

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1.0 INTRODUCTION

The Ministry of Transportation (MoT) is considering widening Highway 7 between Silverdale and Wren Street in Mission to four lanes. A design for the widening was completed to tender-ready level in 1990. MoT has requested a design review and updated cost estimate for constructing the upgrade. The review includes consideration of environmental constraints and associated costs.

The 1990 design is based on constructing the additional lanes primarily on the south side of the highway. The Highway 7 Planning Study prepared by Delcan notes: “The ditches either side of Highway 7 between Silverdale Avenue and Silverdale Creek (a distance of approximately 4 km) are considered potentially fish-bearing; some of these ditches are fish-bearing all year round. Therefore any improvement options in this area must include mitigation measures to address watercourse impacts.”

ENKON Environmental Limited (ENKON), a subconsultant to R.F. Binnie & Associates Ltd., conducted an environmental review of the 1990 highway design. The specific objectives included the following:

- reviewing the existing detailed design, and commenting on the feasibility of the design, in consideration of current environmental standards and practices;
- identifying any environmental constraints that would preclude or severely limit construction options;
- preparing an order of magnitude estimate of current environmental mitigation/compensation works that would be required for the existing design; and
- estimating consulting fees for permits and approvals during detailed design stage, and monitoring work during construction stage.

2.0 ENVIRONMENTAL RESOURCES

2.1 Fisheries Resources

2.1.1 Methodology

Prior to conducting field work, ENKON reviewed background information on the highway design and fisheries resources of the site. The review included:

- 1990 design drawings;
- Fraser Valley Regional District (FVRD 2007) *Habitat Atlas*. [Online, available from: <http://www.shim.bc.ca/fvrd/main.htm>, accessed November 5, 2007]; and
- British Columbia Ministry of Environment (MoE 2007) *Habitat Wizard*. [Online, available from: <http://www.env.gov.bc.ca/habwiz/>, accessed November 5, 2007].

ENKON visited the project site on October 26, 2007 to assess fish habitat values. The assessment classified watercourses and identified streamside protection and enhancement areas (SPEA) as defined in the *Fish Protection Act, Riparian Areas Regulation* (RAR).

2.1.2 Existing Information

The FVRD *Habitat Atlas* and MoE *Habitat Wizard* show two major fish-bearing watercourses within the project area, Chester Creek and Silverdale (alias Silver) Creek. According to *Habitat Wizard*, the westernmost watercourse, Chester Creek, contains chum and coho salmon, cutthroat trout (blue-listed), lamprey, and threespine stickleback. Silverdale Creek, which crosses under Highway 7 east of Nelson Road, supports chum, coho, pink and sockeye salmon, cutthroat trout, rainbow trout/steelhead, brown catfish (formerly brown bullhead) and lamprey. Silverdale Creek was stocked with cutthroat trout from 1982 to 1996.

Habitat Wizard shows that in the western half of the project area Chester Creek flows as a roadside ditch on the south side of Highway 7 between the highway and the CPR track. However, the 1990 design drawings do not show a culvert at the intersection of Chester Creek and Highway 7, suggesting that the creek actually flows along the north side of the highway.

2.1.3 Survey Results

This section describes the field observations of watercourses and fisheries resource values. The descriptions are presented by road segment based on the survey stations used in the 1990 design drawings.

2.1.3.1 Roadside Drainage (STA 0+96.550 to STA 04+37)

FVRD mapping shows that the drainage along the north side of Highway 7 west of the culvert at STA 04+37 is a fish-bearing channelized stream, although the fish-bearing status of the westernmost portion is unknown (Figure 1). The direct connectivity of the ditch to Chester Creek via culverts at STA 03+80 confirms the probable fish-bearing status of the drainage, which provides potential rearing habitat for salmonids. However, due to lack of headwaters, reclassification as a roadside ditch rather than a channelized stream is recommended. The 1990 design drawings show the connection of an upslope ditch at approximately STA 03+60; however this ditch likely conveys seasonal roadside runoff from Silverdale Road and would not constitute a channelized stream.\

The roadside drainage on the south side of the highway is also mapped as a fish-bearing channelized stream. The probable fish-bearing status (potential rearing habitat) is confirmed based on direct connectivity to Chester Creek.

2.1.3.2 Chester Creek (STA 04+37 to STA 17+60)

Potentially high value fish habitat was confirmed along both the north and south toe-of-fill from STA 04+37 through to the STA 17+60 (the eastern point where Chester Creek intersects Highway 7; see Figure 1). This segment is characterized by potential rearing and migration habitat for salmonids.

Flows within both north and south roadside drainages are attributed to Chester Creek (watershed code 100-049300). Based on field observations, from the point that it intersects Highway 7 to the culvert at STA 04+37 Chester Creek flows along the north side of the highway. However, the large volume of water present in the watercourse on the south side of the highway suggests that this watercourse has a hydraulic connection to Chester Creek, likely via seepage through permeable fill. The presence or absence of a culvert at the point where Chester Creek meets the highway could not be confirmed due to dense blackberries and concerns about safe access into the ditch. Assuming lack of a culvert, only the north watercourse provides a route for salmonid migration, while both watercourses provide overwintering and/or rearing habitat.

The north and south roadside water features (Photographs 1 and 2) are characterized as slow-moving channelized watercourses with negligible instream cover (i.e. LWD¹). Visual observations of high turbidity and dense aquatic vegetation (duckweed – *Lemna minor*), along with the surrounding agricultural land use, suggest potentially eutrophic or

¹ LWD – large, woody debris

Legend

- Natural Stream, Fish Presence
- Natural Stream, Unknown Fish Presence
- Channelized Stream, Fish Presence
- Channelized Stream, Unknown Fish Presence



Highway 7 Silverdale to Wren	FVRD Watercourse Classifications
Figure 1	 Prepared by: ENKON Environmental Ltd.
November 2007	

mesotrophic conditions. Instream cover is limited primarily to overhanging vegetation along channel margins. The linear nature of the channels shows their manmade nature. However, the as the flows originate from a natural watercourse, both watercourses are classified as channelized streams. Although access to the watercourses was prohibited by safety constraints, the slow-moving system is assumed to be characterized by a predominantly mud substrate that affords no direct spawning habitat values. However, perennial water supplies and the direct link to a natural upstream channel via the northern channel maintain functions for migration and rearing habitat.



Photograph 1 – Downstream view of northern channel at Chester Creek.



Photograph 2 – Upstream view of southern channel at Chester Creek.

Riparian habitat along the channelized portions of Chester Creek is characterized by discontinuous and patchy segments of deciduous tree and shrub species:

- Willow (*Salix* sp.);
- Salmonberry (*Rubus spectabilis*);
- Black cottonwood (*Populus balsamifera*);
- Red osier dogwood (*Cornus stolonifera*);
- Hardhack (*Spiraea douglassi*);
- Beaked hazelnut (*Corylus cornuta*);
- Bigleaf maple (*Acer macrophyllum*);
- Red alder (*Alnus rubra*).

The remaining portions of the channel banks (Photograph 3 & 4) are characterized by extended segments of Himalayan Blackberry (*Rubus discolor*).



Photograph 3 – Extensive Himalayan blackberry characterizing the south road margin along the southern Chester Creek channel.



Photograph 4 – Himalayan blackberry characterizes extensive areas of the left bank of the northern Chester Creek channel.



Photograph 5 – Upstream view of roadside drainage ditch upstream from Chester Creek.



Photograph 6 – Backwatering of northern roadside ditch attributed to beaver dam at Chester Creek confluence.

2.1.3.3 STA 17+60 to STA 27+00

Drainage features located to the east of the confluence of Chester Creek and channelized roadside watercourses along the north road edge from STA 17+60 to STA 27+00 (Nelson Road; see Figure 1) are limited to a manmade roadside drainage ditch (Photograph 5). The hydrology of this feature is assumed to be controlled by intercepted shallow groundwater, a result of construction below the historical floodplain, and backwatering attributed to the culvert and beaver dam observed at Chester Creek (Photograph 6).

The south ditch from the approximate location of Chester Creek to Nelson Road appears to be a hardhack swamp with no significant flows observed (Photograph 7). The hydrology of this drainage feature is assumed to be controlled by backwatering during

high water conditions. The south ditch located east of Chester Creek is assumed to afford negligible habitat value with the exception of potential over-winter rearing during high-water conditions.



Photograph 7 – Upstream view of roadside drainage ditch upstream from south Chester Creek channel.



Photograph 8 – Upstream roadside ditch drainage from STA 31+00.

Online mapping (FVRD 2007) illustrates two separate datasets from 1999 and 2001 with conflicting classifications. The 1999 dataset classifies the drainage as a channelized watercourse with unknown fish presence while 2001 datasets classify the drainage as a channelized watercourse with known fish presence. Based on the apparent lack of defined headwaters it is recommended that these drainage features be reclassified as drainage ditches.

2.1.3.4 STA 27+00 – STA 33+30

Roadside drainage ditches from STA 27+00 through to STA 33+30 (Silverdale Creek bridge) are characterized as manmade roadside drainage ditches with no defined headwaters. Hydrology is assumed to be controlled by intercepted shallow groundwater and winter flooding. Online watercourse classification mapping (FVRD 2007) shows a classification as a channelized stream with unknown fish presence in the northern ditch between STA 27+00 and approximately STA 31+00 (Photograph 8). At STA 31+00 this ditch is crossed by a gravel road crossing accessing the adjacent agricultural land. The road crossing includes a culvert with a flap-gate to prevent backwatering during flooding. Below the flap gate the roadside drainage is classified (FVRD 2007) as a channelized stream with known fish presence (Photograph 9); however, an earlier (1999) dataset indicates unknown fish presence. The northern ditch from STA 31+00 to Silverdale Creek is mapped in the online Provincial fisheries resource datasets (BC Ministry of Environment 2007) and is referenced as watershed code 100-051900-03515; however, no fish distribution or habitat information is provided.



Photograph 9 – Downstream north roadside ditch drainage from STA 31+00 to Silverdale Creek.



Photograph 10 – Upstream view of roadside drainage ditch from STA 31+00.

The FVRD (2007) watercourse classification mapping for the southern roadside drainage ditch indicates a classification as a channelized stream with known fish presence through to its confluence with Silverdale Creek (Photographs 10 and 11).

Field assessment of both the north and south ditches indicates the presence of manmade drainage ditches with no defined headwaters. Similar to the roadside drainage features described previously, the hydrology is assumed to be controlled by one or a combination of intercepted shallow groundwater and backwatering during high water conditions. The substrate of the ditches is dominated by reed canary grass and shrub with no visible residual pool areas. As such, potential fish habitat values afforded by the ditches are assumed to be limited to potential over-winter rearing during high water conditions.



Photograph 11 – Cross channel view south roadside ditch drainage prior to confluence with Silverdale Creek.



Photograph 12 – Upstream view of Silverdale Creek from existing bridge crossing.

2.1.3.5 Silverdale Creek (STA 33+17.5 to 33+53.8)

Silverdale Creek (Watershed Code: 100-051900) is a confirmed fish-bearing watercourse. Potential spawning habitat (cobble and gravel substrate) was observed in the immediate vicinity of the proposed crossing upgrade (Photograph 12). Around the existing crossing the riparian zone of Silverdale Creek is floodplain bench marsh wetland vegetated primarily with reed canary grass.

2.1.3.6 STA 33+53.8 to STA 40+95 – North Side

Road margins from STA 33+53.8 through to 36+60 along both north and south roadsides are characterized as marsh wetlands within the floodplain bench of Silverdale Creek (Photograph 13 & 14). Review of available online watercourse classification mapping (FVRD 2007) indicates a classification as a channelized stream with known fish presence in the northern ditch from its confluence with Silverdale Creek to STA 35+60 (Figure 1). Field inspection revealed a manmade drainage ditch located along the road margin. The ditch is excavated into saturated wetland soils and has no significant headwater. As a result, the drainage feature is recommended for classification as a ditch rather than a channelized stream. The change in classification would not alter its fish-bearing status.

East of the fish-bearing segment from approximately STA 35+60 through to STA 38+20 the northern ditch becomes a minor roadside drainage swale (Photograph 15). Online watercourse mapping (FVRD 2007) shows a classification as a channelized stream with unknown fish presence. Based on a lack of defined headwaters, a lack of visible scour and the manmade nature of the roadside swale, this feature is recommended for classification as a non-fish habitat ditch. As non-fish habitat, this ditch segment would not be regulated under the *Fisheries Act* or *Fish Protection Act*.

The field survey confirmed the presence of a hillslope stream that is conveyed to the south roadside ditch via a culvert crossing under Highway 7 at approximately STA 38+20 (Photograph 16). Online watercourse classification mapping (FVRD, 2007) shows a natural stream with unknown fish presence on the hill north of Highway 7 (Figure 1). The lower section (north of the highway) is mapped as a channelized stream; however, field assessment revealed the presence of a marsh wetland area in an historical alluvial fan area of the hillside ravine. Based on the limited channel definition, negligible pool areas observed, presence of a culvert crossing and steep gradient of the channel a non-fish bearing status is recommended. Visible flows and a probable stormwater discharge origin are assumed to provide permanent flow.

A second hillslope stream was confirmed at approximately STA 40+05 (Photograph 17). Online mapping (FVRD 2007) classifies this watercourse as a natural stream with unknown fish presence. Based on the limited channel definition, negligible pool areas observed, presence of a culvert crossing and steep gradient of the channel a non-fish bearing status is recommended. Visible flows and an assumed stormwater discharge origin would dictate a status of permanent flow.



Photograph 13 – West view along north road margin of Silverdale floodplain marsh wetland.



Photograph 14 – West view along south road margin of Silverdale floodplain shrub-carr and marsh wetland.



Photograph 15 – Roadside drainage swale at STA 35+60 – non fish habitat.



Photograph 16 – Hillside tributary watercourse at STA 38+20

2.1.3.7 STA 33+53.8 to STA 40+95 – South Side

Similar to the northern ditch between STA 33+53.8 and STA 35+60, the southern ditch is classified (FVRD 2007) as a channelized watercourse with known fish presence. Upstream from an access road/culvert crossing at STA 35+60, the feature is classified as a channelized stream with unknown fish presence (Figure 1). Field assessment confirmed this classification, based on the presence of defined headwaters traced to culvert discharge conveying flows from the hillslope drainage/wetland complex located at the north margin of the highway at STA 38+20. In addition, field assessment confirmed connectivity of the second hillslope drainage conveyed to the south by a culvert at approximately STA 40+05. The south roadside ditch conveys surface drainage from the two hillslope streams to Silverdale Creek. The aquatic habitat along the south margin of the road east of STA 33+53.8 is characterized as a wetland complex which

transitions from a marsh wetland to a transitional shrub-carr wetland immediately east of the access road crossing at STA 35+60 (Photograph 18) and a wooded swamp.



Photograph 17 – Upslope view of wetland/watercourse at STA 40+05



Photograph 18 – Swamp wetland transition to shrub-carr wetland along south road margins in vicinity of STA 40+05.



Photograph 19 – Food and nutrient tributary watercourse confirmed along southern road margin from STA 40+05 to Silverdale Creek.

The watercourses located upstream from the access road crossing are assumed to be non-fish bearing based on negligible channel definition and a lack of significant residual pool areas (Photograph 19). Minor channel definition with organic and fine-substrate suggests negligible flow energy and potential seasonal flows, which further corroborates the non-fish bearing status. However, the wetland area from Silverdale Creek (STA 33+53.8) to the access road culvert crossing (STA 35+60) has over-wintering habitat potential due to backwatering during high water conditions.

2.2 Terrestrial Resources

2.2.1 Methodology

2.2.1.1 Literature Review

A literature review including analysis of local land cover and biogeographical maps, as well as biological resources and local databases, facilitated the habitat assessment and future recommendations for wildlife habitat protection during expansion of Highway 7. Prior to conducting surveys, the following reports, databases and maps were reviewed:

- BC Conservation Data Centre Rare Vertebrate, Plant and Plant Community Tracking Lists identified in the Chilliwack Forest District;
- BC Conservation Data Centre Rare Element Occurrence reports for the project area and surrounding area;
- Species at Risk Act Public Registry Species List for British Columbia;
- Ministry of Forests and Range, Research Branch BEC Web classification site [online, www.for.gov.bc.ca/hre/becweb/];
- Fraser Valley Regional District – Habitat Atlas [online, <http://www.shim.bc.ca/fvrd/main.htm>]
- Other relevant resources for the study site (i.e. Official Community Plan, Local Neighbourhood Plans, land use, land ownership, topographic mapping, aerial photography); and
- 1990 design drawings.

2.2.1.2 Field Survey

Biological reconnaissance surveys were conducted on November 1, 2007 to assess overall habitat types within the north and south clearing limits of the proposed Highway 7 upgrade. The survey documented broad forest and meadow habitat conditions, characterized structural components, predominant tree, understory and herbaceous species at various levels of cover, identified the presence of any provincially red²- or blue³-listed vascular plants or plant communities, and evaluated potential habitat suitability for provincially red- and blue-listed wildlife and federal Species at Risk⁴.

All wildlife surveys were conducted according to the relevant provincial Resources Information Standards Committee survey protocols including:

- Species Inventory Fundamentals: Standards for Components of British Columbia's Biodiversity No. 1 (Version 2.0);

² Red-listed species are those believed to be endangered or threatened in the province.

³ Blue-listed species are considered to be vulnerable and "at risk", but not yet endangered or threatened in the province.

⁴ As defined by Schedule 1 of the federal *Species at Risk Act*

- Inventory Methods for Raptors: Standards for Components of British Columbia's Biodiversity No. 11 (Version 2.0); and
- Inventory Methods for Pond-breeding Amphibians and Painted Turtle: Standards for Components of British Columbia's Biodiversity No. 37 (Version 2.0).

Survey protocol was adjusted where appropriate to include the relevant provincial Best Management Practices, including *Environmental Best Management Practices for Urban and Rural Land Development in British Columbia*.

Intense ground-based reconnaissance surveys in the upland and riparian habitats for wildlife and wildlife sign (nests, whitewash, hair, feathers, tracks, wildlife trails, scat, dens, and burrows) were conducted in conjunction with terrestrial habitat surveys on November 1, 2007. Wildlife assessments focused on those provincially or federally listed species that have the potential to occur within the Highway 7 study area based on their specific habitat requirements.

2.2.1.3 Birds

ENKON conducted encounter foot transects during daylight hours for raptor nests and breeding bird/passerine nests, and raptor activity (prey remains, regurgitated pellets, whitewash, feathers, nest or roost cavities) throughout all habitat types, along stream margins, in dense vegetation, forested areas and open meadow. The surveys were performed to verify raptor use of the area. An intensive search was feasible due to the small size of the development area. Several 10-minute stand watches were also conducted in open areas to detect the potentially activity of raptors soaring overhead. Audio/visual observations of all raptor and other bird species encountered during the survey were documented. No nocturnal raptor surveys to detect owls and owl nesting sites were conducted.

2.2.1.4 Small Mammals

Small mammal reconnaissance surveys were conducted with efforts focused primarily on terrestrial moist forest habitat, abundant large woody debris and leaf litter on the north and south streambanks in an effort to detect use by Pacific water shrew and mountain beaver. Upland meadow and open habitat encounter searches focused on the underside of boulders, shrubs, and large woody debris to detect evidence of burrows and travel routes.

2.2.1.5 Reptiles and Amphibians

During the habitat surveys ENKON searched for potential herptile habitat in streams and wetlands, at streambanks and in saturated regions within the upland habitat. Surveys also included searching in and around all large coarse woody debris in moist forested habitats and other areas of suitable refuge for herptiles. Although surveys focused on red-legged frog and western toad detections, all incidental amphibian sightings were recorded.

2.2.1.6 Other Wildlife

Incidental visual encounters of large mammals or other wildlife species, and/or signs of use (trails, scat, dens, burrows, tracks, prey accumulation), were documented throughout all terrestrial and riparian area habitat surveys.

2.2.1.7 Species of Concern

Provincially and federally-listed species of concern known or with a potential to occur in the project area were identified through the literature survey. Habitat requirements and other relevant information identified prior to the assessment facilitated surveys for presence and/or signs of activity for these species within the study site. Terrestrial survey protocol included documentation of the presence of any listed animal, plant species and/or plant community observed during reconnaissance surveys.

2.2.2 Existing Information

2.2.2.1 Project Setting

The project area lies within the Coastal Western Hemlock Dry Maritime Biogeoclimatic Subzone (CWHdm). This subzone is characterized by warm relatively dry summers, and moist mild winters. Western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga mensiesii*), and bigleaf maple typically comprise the dominant forest vegetation with a dense understory of salmonberry and sword fern (*Polystichum munitum*).

2.2.2.2 Species of Concern

The Conservation Data Centre's (CDC) Terrestrial Information Mapping Service reports mapped occurrences of two terrestrial animal taxa at risk or of special concern within a 5-km radius of the proposed highway upgrade (Appendix A). Observations of taxa documented in this area include 2003-2007 records of the red-listed Oregon forestsnail⁵ (*Allogona townsendiana*) and 1974-1987 records of the blue-listed green heron (*Butorides virescens*).

The Conservation Data Centre's (CDC) Terrestrial Information Mapping Service also reports mapped occurrences of two plant taxa of concern within a 5-km radius of the project site (Appendix A). The documented sightings include 1984 records of the red-listed phantom orchid⁶ (*Cephalanthera austiniiae*) and 1997 records of the red-listed northern water-meal (*Wolffia borealis*).

Of the 56 red- and blue-listed species listed in the BC Conservation Data Centre's Rare Vertebrate Tracking List for the Chilliwack Forest District, only a few have potential to occur in the study area. Habitat within the watercourses and wetlands adjacent to

⁵ Federally listed as Endangered

⁶ Federally-listed as Threatened

Highway 7 is suitable for blue-listed the red-legged frog⁷ (*Rana aurora*). In addition, the federally-listed (Special Concern) western toad (*Bufo boreas*) may occur in this habitat. There is minimal potential for the great blue heron (*Ardea herodias fannini*) and the short-eared owl (*Asio flammeus*) nest in and around the riparian and open grass sites within the project area. However, great blue herons are likely to forage in the watercourse and wetlands.

2.2.3 Habitat Resources

The landscape in the study area consists of ~4 km of paved highway bounded on the north and south sides by gravel shoulders, drainage ditches, streams and wetlands with a wide range of canopy cover from nil to mature black cottonwood and bigleaf maple. The broad habitat types represented are primarily mature deciduous patches with few young to mature conifers, dense riparian shrub cover, agricultural fields and urban residential. Vegetation varied from high quality riparian habitat including mature to old dominant black cottonwood trees with significant wildlife snags to open cultivated and flooded fields to urban residential roadside properties. Much of the area is highly disturbed from natural environmental conditions due to various impacts from human land use.

The aquatic habitats were dominated by dense stands of reed canary-grass (*Phalaris arundinacea*), giant horsetail (*Equisetum telmateia*) and Scouler's willow (*Salix scouleriana*) with some larger open water areas containing cattails (*Typha latifolia*) and yellow pond-lily (*Nuphar polysepalum*) (Table 1) (Photographs 20 to 23). These habitats, as well as vernal pools and other unnamed man-made drainages may provide seasonal habitat for amphibians and other small animals that require moist areas.

Table 1 Riparian and Emergent Plant Species Observed along Highway 7

Common Name	Latin Name
Cattail	<i>Typha latifolia</i>
Giant horsetail	<i>Equisetum telmateia</i>
Lady fern	<i>Gymnocarpium dryopteris</i>
Marsh cinquefoil	<i>Potentilla palustris</i>
Red alder	<i>Alnus rubra</i>
Red elderberry	<i>Sambucus racemosa</i>
Reed canarygrass	<i>Phalaris arundinacea</i>
Scouler's willow	<i>Salix scouleriana</i>
Variable willow	<i>Salix commutata</i>
Willow spp.	<i>Salix spp.</i>
Yellow pond-lily	<i>Nuphar polysepalum</i>

⁷ Which also is federally-listed as Special Concern



Photograph 20 – Wide stream and open water habitat with emergent cattails



Photograph 21 – Open water with floating water lilies and marsh cinquefoil



Photograph 22 – Dense reed canarygrass cover at stream edges



Photograph 23 – Wet marsh habitat surrounding creeks with giant horsetail, hardhack and Scouler's willow

The terrain upland of the creeks and wetlands was dominated by tall reed-canarygrass and impenetrable expanses of Himalayan blackberry with lesser proportions of Scouler's willow and red elderberry (*Sambucus racemosa*) (Table 2) (Photograph 24). Expansive wet old fields were present around wetlands, Chester Creek and Silver Creek and were dominated by reed canarygrass with patches of shrubs composed primarily of hardhack and red-osier dogwood (Photographs 25 and 26).

Patches of well established riparian areas included dominant tree canopy comprised of black cottonwood, bigleaf maple, red alder and paper birch (*Betula papyrifera*) (Photograph 27). Throughout the length of the project area there are trees greater than

Table 2 Upland and Streambank Plant Species Observed in Riparian Zones along the Highway 7 Project Area

Common Name	Latin Name
Apple *	<i>Malus sp.</i>
Baldhip rose	<i>Rosa gymnocarpa</i>
Bigleaf maple	<i>Acer macrophyllum</i>
Black cottonwood	<i>Populus balsamifera ssp. trichocarpa</i>
Cascara	<i>Rhamnus purshiana</i>
Common horsetail	<i>Equisetum arvense</i>
Douglas-fir	<i>Pseudotsuga menziesii</i>
Evergreen blackberry	<i>Rubus laciniatus</i>
Hardhack	<i>Spirea douglasii ssp. douglasii</i>
Himalayan blackberry	<i>Rubus discolor</i>
Indian plum *	<i>Oemleria cerasiformis</i>
Lodgepole pine	<i>Pinus contorta var. contorta</i>
Lombardi poplar *	<i>Populus nigra 'Italica'</i>
Mountain ash	<i>Sorbus Americana</i>
Paper birch	<i>Betula papyrifera</i>
Red-osier dogwood	<i>Cornus stolonifera</i>
Scotch broom *	<i>Cytisus scoparius</i>
Sword fern	<i>Polystichum munitum</i>
Thimbleberry	<i>Rubus parviflorus</i>
Vine maple	<i>Acer circinatum</i>
Western hemlock	<i>Tsuga heterophylla</i>
Western redcedar	<i>Thuja plicata</i>

*Exotic species

20 cm in diameter, which qualifies them as 'significant trees' under the District of Mission Tree Protection Policy. Many wildlife snags showed evidence of use by excavating woodpeckers and a variety of cavity nesting species.

2.2.4 Wildlife Resources

2.2.4.1 Birds

During ENKON's November 2007 reconnaissance surveys, 21 bird species were observed in the proposed expansion area (Table 3) including four great blue herons

foraging in wetlands and creeks (Photograph 27), two red-tailed hawks (*Buteo jamaicensis*) calling and soaring over eastern agricultural fields (Photograph 28) and one road-killed northern pygmy owl (*Glaucidium gnoma*) east of Nelson Road (Figure 2). Foraging excavations in the riparian zone indicated local pileated woodpecker (*Dryocopus pileatus*) presence.



Photograph 24 – Roadside drainage near at the east end of the project area



Photograph 25 – Wet open old field habitat near Silver Creek



Photograph 27 – Open fields of reed canarygrass at Silver Creek



Photograph 26 – Birch and cottonwood trees provide canopy cover on some riparian sections

Table 3 Bird Species Observed at Highway 7, Silverdale to Wren during Biological Surveys Conducted in November 2007

Status	Common Name	Latin Name
	American robin	<i>Turdus migratorius</i>
	Black-capped chickadee	<i>Parus atricapillus</i>
	Bushtit	<i>Psaltiriparus minimus</i>
	Chestnut-backed chickadee	<i>Peocile rufescens</i>
	Dark-eyed junco	<i>Junco hyemalis</i>
	Glaucous-winged gull	<i>Larus glaucescens</i>
	Golden-crowned kinglet	<i>Regulus satrapa</i>
Blue-listed	Great blue heron	<i>Ardea herodias</i>
	Mallard	<i>Anas platyrhynchos</i>
Raptor	Northern pygmy-owl	<i>Glaucidium gnoma</i>
	Northwestern crow	<i>Corvus caurinus</i>
	Pileated woodpecker	<i>Dryocopus pileatus</i>
	Red-breasted nuthatch	<i>Sitta canadensis</i>
Raptor	Red-tailed hawk	<i>Buteo jamaicensis</i>
	Red-winged blackbird	<i>Agelaius phoeniceus</i>
	Rock dove	<i>Columba livia</i>
	Song sparrow	<i>Melospiza melodia</i>
	Spotted towhee	<i>Pipilo maculatus</i>
	Steller's jay	<i>Cyanocitta stelleri</i>
	Winter wren	<i>Troglodytes troglodytes</i>
	Wood duck	<i>Aix sponsa</i>

One raptor nest was observed in the crown of a Douglas-fir tree on the southwest corner of Oliver Road and Highway 7 in front to the R.C.M.P. station (Photograph 29). The condition of the nest indicated recent use, likely to have been built and possibly active during the 2007 breeding season.

2.2.4.2 Small Mammals

There were no direct observations of small mammals within the development area during ENKON's surveys. However, numerous active burrows and tunnels were present in soils and grasses of the north and south banks of drainage ditches along the road and in open field habitats.



Legend		Red-legged Frog		Northern Pygmy Owl		Highway 7- Silverdale to Wren		Wildlife Observations
		Great Blue Heron		Beaver		1:15,200	Figure 2	
		Red-tailed Hawk		Beaver Dam		November 2007		
	Red-tailed Hawk Nest							Prepared by ENKON Environmental Ltd.





Photograph 27 – A juvenile great blue heron foraging for fish on the south side of Highway 7



Photograph 28 – A red-tailed hawk soaring over agricultural fields on the north side of Highway 7



Photograph 29 – Raptor nest in Douglas-fir tree at the corner of Highway 7 and Oliver Road



Photograph 30 – A road-killed red-legged frog found on the north side of Highway 7 just west of Chester Creek

2.2.4.3 Reptiles and Amphibians

No reptiles were detected. One provincially blue-listed amphibian species, the red-legged frog (*Rana aurora*), was detected both in the riparian area adjacent to Highway 7 at and road-killed on the gravel shoulder (Photograph 30). The deep, slow moving riparian areas on both sides of Highway 7 are favourable breeding habitat for red-legged frogs. In fact virtually the whole length of the project area and on both sides of Highway 7 is suitable breeding habitat for several frog, toad, salamander and reptile species.

2.2.4.4 Other Wildlife

Other signs of use (tracks, faecal droppings, scat, hair) by common wildlife species observed during the terrestrial surveys included black-tailed deer (*Odocoileus hemionus*), coyote (*Canis latrans*) and introduced eastern cottontail (*Sylvilagus floridanus*).

There were relatively abundant road mortalities along both the north and south sides of the road within the study area, most of which were wildlife species. These included a beaver (*Castor canadensis*), mink (*Mustela vison*), glaucous-winged gull (*Larus glaucescens*), northern pygmy owl (*Glaucidium gnoma*), spotted towhee (*Pipilo maculatus*), black-capped chickadee (*Parus atricapillus*) and red-legged frog (*Rana aurora*). Two road-killed domestic animals, a dog and a cat were also present on the north side of the highway.

2.2.5 Species of Concern

No rare plant species or plant communities previously identified and documented by the BC Conservation Data Centre in the surrounding area were observed in the study site. There is virtually no suitable habitat for the red-listed phantom orchid, which normally has been found in damp or moist coniferous forests. However, red-listed northern water-meal was found near the Stave River and Highway 7 in habitat similar to that of the Chester Creek roadside watercourses. Structured, stratified rare plant surveys are required to determine absolute presence or absence of northern water-meal or other listed plant species.

Two provincially blue-listed wildlife species were observed during ENKON's November 2007 biological reconnaissance surveys. Great blue heron were seen foraging at three locations within riparian zones, and three red-legged frogs were observed, two instream and one road-killed on the shoulder of Highway 7.

The abundance of high quality riparian aquatic and moist deciduous upland habitat in the study area provides favourable conditions for both the red-legged frog and the federally-listed western toad (which was not observed). Breeding ponds are relatively deep and contain some coarse woody debris from which frogs suspend egg masses. These areas are primarily where well established creeks zones are surrounded by matures stands of cottonwood. The predominance of mature trees, dense herbaceous understory and abundant large woody refuges are habitat of highest suitability for both amphibian species.

The fish-bearing creeks and ponds of the study area are valued feeding areas for great blue herons during most of the year. In addition, the adjacent open fields provide good foraging habitat during winter seasons for the herons' alternate sources, small rodents and terrestrial amphibians.

Two animal species of concern have been recorded within 5 km of the project area according to the CDC (the red-listed Oregon forestsnail and blue-listed green heron). The green heron prefers to forage in wetlands with stands of trees and nest in a tree, in a

dense thicket of shrubs, or in the reeds or cattails in a marsh. There are small patches of suitable nesting habitat within the project area and only minimal green heron breeding potential; however, highly suitable foraging habitat is present. Although no Oregon forestsnails were detected during the November 2007 survey, the deciduous patches of forest dominated by bigleaf maple and a dense understory of low herb and coarse woody debris that are present within the project area are prime habitat for this species. Structured surveys of the deciduous forest patches within proposed zone of construction are needed to determine their presence.

3.0 POTENTIAL IMPACTS AND MITIGATION

3.1 Fisheries Resources

3.1.1 Overview of Impacts

Potential impacts of the highway upgrade were assessed based on the 1990 drawing package with the exception of the Silverdale Creek crossing, which will be modified to a clear-span bridge. Riparian habitat losses were estimated based on the minimum streamside protection and enhancement areas (SPEA) defined under the RAR. The 1990 design appears to have minimized the impacts to the highest value fish habitat (Chester Creek) by widening on the north side of the highway west of the Chester Creek culvert (STA 04+37) and on the south side of the highway east of the culvert.

In general, the impacts include:

- Loss of instream and riparian habitat associated with the widening into the north roadside watercourse between STA 0+96.550 and STA 04+37;
- Loss of instream and riparian habitat associated with the widening into the south roadside watercourse between STA 04+37 and STA 17+60;
- Loss of riparian habitat associated with the channelized portion of Chester Creek between STA 0+96.550 and STA 17+60 on the north side of Highway 7 (based on the clear and grub lines shown on the 1990 drawings);
- Loss of instream and riparian habitat associated with side channel infilling at the Chester Road intersection with Highway 7;
- Loss of instream and riparian habitat associated with lengthening the culvert on Chester Creek at Highway 7;
- Loss of riparian habitat associated with the approaches to the Silverdale Creek crossing;
- Possible instream and riparian habitat losses associated with culvert lengthening and clearing/grubbing along the lower ends of two hillslope tributaries located east of Silverdale Creek; and
- Minor losses of riparian habitat associated with other roadside ditches.

All impacts to instream habitat and riparian habitat will require compensation to achieve the Fisheries and Oceans Canada policy for “No Net Loss” of fish habitat.

3.1.2 North Channel between STA 0+96.550 and STA 04+37

In this segment, the highway will be widened to the north. The existing roadside ditch (approximately 316 m) will be moved and re-established along the north side of the highway. Thus, there should be no net loss of instream habitat. However, the realignment will disturb riparian or potential riparian vegetation, which must be replanted.

Based on the FVRD classification of this roadside drainage as a channelized stream, application of the RAR would yield a minimum SPEA of 15 m established from high water mark. The full 15-m SPEA would apply only to the north bank of the watercourse because site potential vegetation (SPV) along the south bank is limited by the presence of the existing Highway 7 paved surface. The recommended reclassification of the drainage as a roadside ditch would reduce the required SPEA width to 5 m.

Replanting along the ditch banks could offset the habitat loss. Based on the 1990 design drawings, at least 5 m of plantable area along each bank is available within the existing right-of-way (average 7.3 m on the north bank). It would be necessary to acquire additional right-of-way to provide a 15-m plantable area, if required for the north bank (i.e., if the proposed watercourse reclassification were not accepted).

However, an alternative to “like-for-like” habitat compensation might be acceptable. The habitat function of the roadside ditch/watercourse could be enhanced by installing LWD to provide cover for rearing/overwintering salmonids. Alternatively, less than 1:1 compensation for “potential” riparian vegetation may be acceptable on the basis that replanting would provide functional riparian vegetation in areas where little or none currently exists. The options for habitat restoration/compensation would need to be discussed with Fisheries and Oceans Canada (DFO).

3.1.3 South Channel between STA 04+37 and STA 17+60

Impacts in this approximately 1200-m segment are associated primarily to the expansion of road fill to the south with the footprint of works (i.e. bottom of fill) resulting in near complete removal of the existing south channel bank riparian vegetation and potentially significant encroachment into the instream habitat areas. Moving and re-establishing this channel without any instream loss may be possible, but relocation would require additional removal of well established riparian vegetation along the south (left bank) margin of the watercourse.

Based on the classification of this channel as a channelized stream, the SPEA would extend 15 m from the high water mark. The full 15-m SPEA would apply only to the south bank of the watercourse because SPV along the north bank is limited by the presence of the existing Highway 7 paved surface. The south slope of the relocated ditch will afford on average 8.7 m of plantable area. There may be some additional plantable area between the top of ditch and the railway line. However, given the constraints imposed by the railroad, it likely will not be possible to provide a 15-m wide plantable area.

As noted for the north channel, it might be possible to compensate fully or partially for riparian habitat loss by improving the habitat function in the southern roadside watercourse. Negligible instream cover within the channel suggests that LWD complexing would be beneficial. Extensive areas of Himalayan blackberry could be replaced with more valuable, native riparian species. Improvements to hydraulic conditions (i.e. localized constrictions to increase flow velocity) might be considered to provide increased aeration within the relatively slow moving and potentially eutrophic waters. In addition, planting of wetland terraces along channel margins with emergent macrophytes could mitigate water quality concerns and provide additional high water refuge and amphibian habitat values.

3.1.4 North Channel (Chester Creek)

The 1990 design drawings show a clear and grub line along the south bank of the main Chester Creek channel (north roadside watercourse) both west and east of Chester Road. Clearing and grubbing would result in further losses of riparian vegetation. However, since the road widening is planned for the south side of the highway in this region, there does not appear to be a need for clearing and grubbing on the north side. Clearing and grubbing north of the highway should be avoided (preferably) or minimized to retain riparian vegetation along Chester Creek.

Alterations to the intersection of Chester Road with Highway 7 will result in instream and riparian habitat losses. The main channel of Chester Creek flows away from Highway 7 in an oxbow at Chester Road. Roadside ditches extend along the highway to both sides of Chester Road and provide off-channel fish habitat. The main creek channel will not be affected, but widening the intersection will reduce the instream off-channel habitat by approximately 40 m². Approximately 260 m² of riparian vegetation (or potential vegetation) also will be lost.

Instream habitat losses likely will require compensation at a 2:1 ratio. Requirements for riparian compensation could vary from 1:1 to 2:1, depending upon negotiations with DFO. Habitat compensation for instream and associated riparian losses is discussed in Section 3.1.5.

3.1.5 Chester Creek at Highway 7 Crossing

Culvert extension on Chester Creek at Highway 7 is estimated to result in the loss of approximately 27 m² of instream and 270 m² of riparian habitat. However, the amount of habitat loss and required compensation could be reduced by minimizing the culvert length. The 1990 design proposes to replace the existing perpendicular Chester Creek culvert under Highway 7 with a diagonal culvert. Extending the existing culvert or replacing it with a perpendicular culvert to minimize culvert length is preferred from an environmental perspective. Not only would a perpendicular culvert minimize habitat loss, but a shorter culvert would also be more conducive to fish passage.

If culvert replacement is pursued, the new culvert should be a bottomless arch or a box culvert with natural substrate. These types of culverts would avoid new instream habitat

loss and could restore some currently impacted instream habitat, potentially reducing compensation requirements.

If instream compensation still is necessary, there may be potential to expand/create additional off-channel habitat at the oxbow on Chester Creek at Chester Road. Based on the combined habitat loss associated with both the culvert crossing (initial estimate) and the off-channel habitat at Chester Road, the required 2:1 instream habitat compensation (134 m²) could be achieved by creating a 3-m wide by approximately 45-m long meander (or the equivalent in two or more smaller off-channel areas). However, construction of channel(s) might remove existing riparian vegetation, and it could be difficult to achieve even 1:1 riparian replacement given that most or all of the potential compensation area is within an existing riparian zone.

Another potential location for off-channel habitat creation is along the Chester Creek mainstem south of Highway 7, although additional land acquisition likely would be required. Depending upon the location in this area, a 45-m long channel planted 15 m on both sides could provide up to 1350 m² of riparian vegetation, or more than 2:1 compensation for the effects of culvert extension.

Further potential compensation options may exist within the floodplain/marsh wetland areas along the east margin of Silverdale Creek (although this area may not be acceptable for impacts in the Chester Creek watershed). Similar flood-bench ecosystems have been successfully used to afford in-stream and riparian habitat compensation. The construction of a sinuous channel to provide potential off-channel rearing may be possible pending further investigation of site hydrology, flood dynamics and local topography. Off-channel pool areas could be enhanced with overhanging vegetation, with localized site mounding to facilitate growth.

Wherever the compensation channel ultimately is located, it should be complexed with LWD to enhance instream habitat for fish and amphibians.

3.1.6 Silverdale Creek

The proposed bridge upgrade at Silverdale Creek will be a clear-span structure. Two-lane clear-span structures may be constructed under the terms of the DFO Operational statements without additional consultation; however, larger bridges and or operations related to the removal of the existing bridge and pilings will require additional consultation and approval by DFO regarding impacts to riparian habitat. The installation of any bridge crossing will require the submission of a notification under the *Water Act*, Water Regulation.

The proposed two-lane clear-span upgrade is assumed to meet all the following conditions defined by DFO Pacific Region Operational Statement for Small Clear-Span Bridges:

- Bridge is no greater than two lanes in width and does not encroach on the natural channel width by the placement of abutments, footings or rip-rap below the high water mark,

- Work does not involve the clearing of riparian vegetation. Removal of select plants within the road right-of-way can occur to meet operational and/or safety needs
- Project does not require multiple bridge crossings over the same watercourse, and
- Measures to protect fish and fish habitat listed in the Operational Statement for Small Clear-Span Bridges are incorporated when constructing the bridge.

Roadside drainages near the crossing will need to be re-established to afford no-net-loss of fish habitat. Re-establishing these ditches will restore the functional habitat value, considered to be food and nutrient contributions to Silverdale Creek and potential over-winter rearing habitat.

Wetland areas located to the east of Silverdale Creek at both the north and south road margins will be impacted based on the required fill for the bridge approaches. Wetland loss outside the riparian zone is not regulated by the *Fisheries Act*. However, loss within the riparian zone will require compensation. This loss is estimated at 66 m², assuming a 30-m riparian width based on the fish-bearing status of Silverdale Creek. Compensation potentially could be achieved along the mainstem of Silverdale Creek

3.1.7 Eastern Tributary Watercourses

Two hillside tributary watercourses provide flows and food and nutrient value to a small watercourse, assumed to be non-fish bearing, which flows west along the southern road edge between Silverdale Creek and STA 40+05. Riparian impacts along the unnamed stream and associated wetland complex potentially could be mitigated by reductions in the proposed clearing and grubbing limits. Compensation of habitat function, assumed to be primarily food and nutrient values, can be afforded by the construction and enhancement of a compensation channel with direct connectivity to Silverdale Creek to provide additional off-channel rearing for juvenile salmonids.

3.1.8 Other Roadside Drainage Features

The recommended classification of the roadside drainage features located east (upstream) from Chester Creek as ditches significantly reduces the estimates of riparian losses compared with classification of these watercourses as channelized streams. Where ditches are connected to fish habitat they are considered streams under the RAR and require an assessment and SPEA determination. However, based on the manmade nature and modified hydrology, ditches receive special consideration (i.e., reduced SPEAs).

The roadside drainage ditches within the Chester Creek watershed area east of Chester Creek and the drainage ditches located to the east of Nelson Road are identical in their origin and hydrologic and habitat function. For these watercourses, SPEA widths would be defined as 5 m from the ditch high water mark. The impacts of road widening will likely be compensated by reconstruction of hydraulic capacity (approximately 500 m of channel) and re-vegetation/enhancement of a minimum 5-m SPEA zone along all

potentially fish bearing segments. Thus, additional compensation beyond re-establishing the ditches and replanting the banks would not be required.

3.1.9 Additional Mitigation

In addition to compensation for habitat impacts, the following environmental mitigation will be required during construction:

- Implementation of sedimentation and erosion control works;
- Preparation and implementation of a spill contingency and spill response plan;
- Environmental monitoring, including full-time monitoring during ditch/watercourse relocation;
- Fish salvage operations prior to ditch/watercourse relocation and any other instream works; and
- Hydrology/hydrogeology studies to confirm hydraulic connectivity between Chester Creek (north channel) and the south channel, and (if necessary) highway design to ensure hydraulic connectivity is maintained.

3.2 Terrestrial Resources

3.2.1 Overview of Impacts

Potential impacts of highway construction on wildlife include:

- Loss of habitat for aquatic birds and amphibians;
- Potential harm to amphibian eggs, larvae and possibly adults, including federally-listed red-legged frogs and western toads;
- Potential disturbance of nesting birds, including raptors;
- Potential harm to red-listed Oregon forestsnails and/or northern water-meal, if these species are present.

3.2.2 Wetland Loss

Loss of wetlands and wetted channels will affect habitat for aquatic birds and amphibians, including red-legged frogs and (if present) western toads. Habitat compensation for these losses is not a legal requirement. However, fish habitat compensation works can (and should) be designed to provide amphibian habitat.

It is important that any construction within the watercourses and wetlands be preceded by an amphibian salvage operation, which could be conducted in conjunction with the fish salvage operations. An amphibian salvage plan will involve the survey, capture and removal of all amphibians present in sections of watercourses being reconstructed directly before any disturbance or in-stream works are conducted. Subsequently, any amphibians not detected during the original survey will be rescued during a slow-dewatering of these same instream sections. Amphibians which are captured and

removed will then safely be relocated to high suitability habitat local to the capture site where there will be no chance of further disturbance or harm to relocated animals. An amphibian salvage operation must be conducted under the terms of a wildlife permit obtained from the Ministry of Environment in advance of surveys and road construction works.

3.2.3 Effects on Nesting Birds

A raptor nest was observed in a Douglas-fir tree on the southwest corner of Oliver Road and Highway 7. Its condition indicated that it likely was active during at least the nest-building phase of the 2007 breeding season. To avoid potential disturbance to this and/or other (not currently identified) raptor nests within the project area during future road development, a diurnal and potentially a nocturnal raptor survey should be conducted prior to any vegetation clearing or construction works. Snags in the mature deciduous forest patches and wetland areas indicated use by cavity nesters such as woodpeckers and owls, such as the northern pygmy-owl found road-killed near a similar wetland site. Short-eared owls also nest in long grass of open fields surrounding wetlands. Depending on the extent of disturbance into grassy fen and wet meadow habitats, a nocturnal survey would mitigate potential disturbance to any raptor nests which could be present in these areas during future raptor nesting seasons (February 1 – August 15).

The following guidelines should be applied if active nests are found:

- If possible, permanently maintain undisturbed natural vegetation within a minimum distance of one and half tree lengths from the nest site; prevent construction machinery and workers from entering this buffer area.
- Avoid construction within 200 m of the nest during the nesting season.
- If the nesting bird continually flushes when activity occurs at the minimum buffer boundary (i.e. 200 m from the nest), increase the buffer area until the bird is no longer visibly disturbed.

3.2.4 Additional Mitigation

Structured surveys for rare plants and federal Species at Risk, specifically northern water-meal and Oregon forestsnail, should be conducted prior to clearing and ditch relocation. If these (or other rare species) are found, they should be salvaged and relocated to suitable habitat that will not be disturbed during highway construction.

If culvert replacement or installation of new culverts is planned, the use of oversized culverts to provide passage for wildlife such as amphibians and small mammals should be considered. Such culverts could reduce the incidence of roadkills, which currently appears high based on field observations.

4.0 ENVIRONMENTAL COSTS

4.1 Overview

Costs associated with environmental mitigation and other requirements include costs of the following:

- Obtaining environmental approvals;
- Construction of habitat compensation works;
- Preparation of an Environmental Management Plan;
- Fish and amphibian salvage operations;
- Raptor/nesting bird surveys;
- Species at Risk surveys/salvages; and
- Environmental monitoring during construction.

4.2 Environmental Approvals

Required environmental approvals will include a Section 35(2) Authorization under the federal *Fisheries Act* for impacts on fish habitat and approval under the provincial *Water Act* for relocating watercourses. The requirement for a Section 35(2) Authorization will trigger the *Canadian Environmental Assessment Act* (CEAA) and require the preparation of a CEAA screening report.

In order to obtain the Section 35(2) Authorization it will be necessary to design habitat compensation works acceptable to DFO. Due to the potential extent of the impacts, at least one onsite meeting and one or more follow-up (office) meetings with DFO are expected to be required.

The CEAA screening report would need to include an assessment of archaeological potential/impacts and potentially the results of surveys for Species at Risk including rare plants and Oregon forestsnails (although these might be delayed until immediately prior to construction).

Application for the *Water Act* approval would be a relatively straight-forward matter entailing filling out the appropriate form and possibly following up to ensure that the approval was received.

Order-of magnitude costs associated with these tasks are estimated as follows:

- Obtaining *Water Act* approval and Section 35(2) Authorization, including preparation of CEAA screening report, excluding archaeology and Species at Risk Surveys s.13,s.17
- Archaeological Overview and Impact Assessment Reports (for CEAA screening) s.13,s.17
- Species at Risk Surveys – see Section 4.7.

4.3 Construction of Habitat Compensation Works

Construction of habitat compensation works includes riparian plantings and construction of compensation channels (if undertaken). For the purpose of estimating costs, compensation does not include ditch/watercourse relocation, which is assumed to be part of the highway construction. It also does not include the cost of obtaining land on which to construct a compensation channel or undertake additional riparian planting (outside the new ditch slopes), if required to achieve “no net loss”.

Riparian plantings equivalent to 1:1 compensation for loss of existing and potential vegetation based on proposed SPEAs would amount to approximately 60,000 m². The cost of this planting could amount to about s.13,s.17 not including the cost of topsoil, which could be an additional s.13,s.17 . Planting only the available area on the ditch slopes (about 46,000 m²) would cost approximately s.13,s.17 , not including topsoil. It is possible that planting areas could be further reduced by substituting habitat complexing with LWD for some of the planting area. On a linear basis (i.e., per lineal meter of channel planted or complexed) the cost of LWD complexing would likely be 10% to 12% the cost of riparian planting.

Construction of approximately 135 m² of instream habitat (excavation and complexing with LWD) would cost about s.13,s.17 . The cost of planting 15 m on either side of the channel (~s.13,s.17 for top soil) is included in the total planting cost estimate (above).

4.4 Environmental Management Plan

An Environmental Management Plan would describe detailed site-specific sediment and erosion control measures, spill contingency and spill response plans, fish and amphibian salvage operations, environmental monitoring and other required mitigation measures. Preparation of this document would cost s.13,s.17

4.5 Fish and Amphibian Salvage Operations

Fish and amphibian salvages would be required along approximately 3500 m of channelized watercourse/ditches. These operations, which would be conducted

⁸ Estimated at \$44 per square meter for planting only plus \$10 per square meter for topsoil. Given the large area involved, a volume reduction in the price might be possible.

simultaneously, would require approximately 142 to 174 person-days⁹. The cost, including fees and expenses, is estimated at **s.13,s.17**

4.6 Raptor/Nesting Bird Surveys

Raptor/nesting bird surveys should be conducted prior to any clearing that occurs during the bird breeding season. The cost of fees plus expenses would be approximately **s.13,s.17** depending upon the number and nature (diurnal or nocturnal) of surveys required.

4.7 Species at Risk Surveys and Salvages

Structured surveys/salvages for rare plants, specifically northern water-meal and federal Species at Risk, specifically Oregon forestsnail, should be conducted prior to clearing and ditch relocation, if these surveys are not required for the CEAA screening. The cost of these surveys/salvages is estimated at **s.13,s.17**

4.8 Environmental Monitoring

Full-time environmental monitoring will be required during ditch relocation, which is expected to take about 84 days. For the remainder of the construction period (24 months), routine monthly monitoring is assumed. Based on the foregoing, total monitoring costs (including reporting) are estimated at about **s.13,s.17**. However, a contingency fee (at least **s.13,s.** should be added for the environmental monitor to respond to emergencies and/or questions from the site engineer.

4.9 Total Environmental Cost

The total estimated cost of environmental approvals, mitigation and compensation works ranges from **s.13,s.17**. These costs are summarized in Table 4. The major cost is habitat compensation, primarily riparian plantings. Planting costs have been estimated assuming 1:1 replacement for all riparian/potential riparian vegetation displaced during construction. These costs could be reduced significantly by negotiating alternative forms of compensation with DFO.

⁹ Assuming two people can salvage approximately 40-50 m of channel per day.

Table 4 Estimated Costs of Environmental Works

Item	Cost Range
Environmental Approvals	s.13,s.17
Habitat Compensation Works	
Environmental Management Plan	
Fish & Amphibian Salvages	
Raptor/Nesting Bird Surveys	
Species at Risk Surveys	
Environmental Monitoring	
Total Cost	

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Fish Habitat

5.1.1 Conclusions

Widening of Highway 7 between Silverdale and Wren Street in Mission will entail moving over 3500 lineal meters of fish-bearing or potentially fish-bearing ditches that flow into Chester Creek or Silverdale (Silver) Creek. Moving the ditches will result in the loss of approximately 60,000 m² of riparian vegetation (or potential vegetation), much of which can be restored by replanting along the new ditches.

With the exception of apparently excessive clear and grub limits, the 1990 design appears to have minimized impacts on fish habitat values. Specifically, the design includes widening the highway primarily to the south to avoid direct impacts on Chester Creek, which flows along the north side of the highway as a channelized stream. However, widening to the south and re-establishing the south roadside watercourse, which appears to be hydraulically connected to Chester Creek and fish-bearing, will pose some challenges. Specifically, moving the south watercourse will impact some well established riparian vegetation, which has significant fish and wildlife habitat values. Because of the proximity of the railway line to the south, replacing a full 15-m riparian area may not be possible. It will be necessary to negotiate with DFO to develop (if possible) alternative forms of habitat compensation, such as improving habitat function by providing instream complexing and/or taking credit for replacing extensive areas of invasive Himalayan blackberry with more valuable native vegetation.

Some loss of instream fish habitat will result from upgrading the intersection of Chester Road and Highway 7. Construction will entail infilling approximately 40 m² of off-channel habitat associated with Chester Creek. An additional loss of approximately 27 m² of instream habitat could result from extending the culvert that conveys Chester Creek under Highway 7. However, it would be possible to reduce or eliminate this loss by redesigning the culvert (see Section 5.1.2). The combined instream losses could be compensated by creating new off-channel habitat.

Impacts on fish habitat will require a Section 35(2) Authorization under the federal *Fisheries Act*. In order to obtain this authorization, a habitat compensation agreement will need to be negotiated with DFO. During these negotiations it may be possible to reduce the amount of riparian planting required as previously discussed.

The Section 35(2) Authorization will require additional mitigation measures. Specifically, fish salvages will be required along the entire length of ditch to be realigned

(unless appropriate sampling proves some segments to be non-fish bearing). Full-time environmental monitoring will be required during ditch realignment.

Additional environmental approvals also will be needed. The requirement for a Section 35(2) Authorization will trigger a CEAA screening. In addition, realigning the roadside watercourses will require approval under the provincial *Water Act*.

5.1.2 Recommendations

Fish habitat losses can be minimized by implementing the following recommendations:

- Minimize clearing and grubbing limits: in particular, avoid clearing and grubbing on the north side of the highway where lane construction will occur on the south;
- Minimize the length of the Chester Creek culvert under Highway 7: the 1990 design shows replacing the current culvert, which is perpendicular to the highway, with a diagonal culvert; the existing perpendicular culvert should be lengthened or replaced with a similarly-aligned culvert;
- If the Chester Creek culvert is to be replaced, install an open-bottom arch culvert or a box culvert with natural substrate to preserve and restore instream habitat; and
- Design the highway to maintain hydraulic connectivity between Chester Creek (north channel) and the south channel.

5.2 Wildlife Habitat

5.2.1 Conclusions

The roadside watercourses and associated patches of deciduous forest provide habitat or potential habitat for several provincially and/or federally-listed wildlife and vegetation species. These species include the red-legged frog (provincial blue list, federal Special Concern), which was observed on the project site¹⁰. Other species, which were not observed but for which suitable habitat is present, include western toad (federal Special Concern), Oregon forestsnail (provincial red list, federal Endangered) and northern water-meal (provincial red list).

Highway construction will disrupt habitat for the foregoing species of concern. However, fish habitat compensation works will also compensate for this habitat. With appropriate mitigation and compensation, wildlife and vegetation should not pose significant constraints on highway construction.

¹⁰ The blue-listed great blue heron also was observed, but this species is unlikely to be affected by the project.

5.2.2 Recommendations

The following recommendations should be implemented to protect vegetation and wildlife resources during highway construction:

- An amphibian salvage operation must be conducted under the terms of a wildlife permit obtained from the Ministry of Environment.
- Surveys/salvages for Oregon forestsnails should be conducted prior to clearing and grubbing in areas in areas that contain bigleaf maple.
- Structured surveys/salvages for rare plants (particularly northern water-meal) should be conducted prior to clearing, grubbing and ditch relocation.
- Raptor/nesting bird surveys should be conducted prior to any construction that occurs during the breeding season (February 1 – August 15). If nests are found, the nests must not be disturbed as long as eggs or young are present. For raptor nests, a no-construction zone should be established within a 200-m radius around the nest and maintained until the fledglings have left the nest.
- If any culverts under Highway 7 are replaced or new culverts installed, they should be designed to promote safe passage for amphibians and small mammals.

5.3 Environmental Costs

The total estimated cost of environmental approvals, mitigation and compensation works ranges from \$2.2 to \$3.5 million. About 90% of the cost is habitat compensation, primarily riparian plantings. Planting costs have been estimated assuming 1:1 replacement for all riparian/potential riparian vegetation displaced during construction. These costs could be reduced significantly by negotiating alternative forms of compensation with DFO.

APPENDIX A

Rare Species Occurrences (5-km Radius)



ENKON



BC Conservation Data Centre - Occurrence Report

1237 Binnie Hwy7 Site



Legend

Non-sensitive Occurrences

- Animal - Vertebrate
- Animal - Invertebrate
- Plant - Vascular
- Plant - Non-vascular
- Ecological Community

Masked Sensitive Occurrences

- Big Trees

Occurrence data is updated frequently.
This map should be considered out of
date 6 months after
October 29, 2007

For more information about the BC CDC
visit: <http://www.env.gov.bc.ca/cdc/>

Index Map

MAP COMPILATION
Projection: Albers Equal Area Conic
Datum: NAD 83

0 1.5 3 4.5 km.
Scale: 1:51,182

Map center: 49° 7' 49'' N, 122° 20' 52'' W



Province of British Columbia
Ministry of Environment

Map Created October 29, 2007

1 Overview

The British Columbia Ministry of Transportation and Infrastructure (MoT) is widening Highway 7 (Lougheed Highway) from Nelson Street to Wren Street, including upgrading the Nelson Street intersection, in Mission, BC. The project will result in the destruction of 33,704 m² of fish habitat from Silverdale Creek (1,594 m²) and its tributaries (32,110 m²).

MoT is required to compensate for the destruction of fish habitat associated with the Highway 7 widening project pursuant to Fisheries and Oceans Canada (DFO) Authorization No: 09-HPAC-PA2-00005, and consistent with the no-net-loss guiding principle of DFO's *Policy for the Management of Fish Habitat*. As such, a multi-stakeholder partnership is being developed through the creation of this Memorandum of Understanding (herein referred to as "this Agreement").

The intent of establishing this Agreement is three-fold:

- i. To ensure that 57,366 m² of fish habitat is created or enhanced such that there is a net-gain in the productive capacity of fish habitat associated with the Highway 7 widening project;
- ii. To engage and collaborate with other stakeholders who have an interest in fish habitat restoration and conservation and/or other interrelated environmental values (e.g. wetland conservation, wildlife and species at risk, etc.); and,
- iii. To improve resource efficiencies and maximize the success and benefits provided to fisheries and other interrelated resources through collaborative planning and project implementation.

2 Objective

The objective of this Agreement is to create or enhance a minimum of 57,366 m² of fish habitat (herein referred to as "the Objective"), consistent with DFO's hierarchy of preferences for fish habitat compensation options (from most to least preferred) as follows:

- i. Create or increase the productive capacity of like-for-like fish habitat in the same ecological unit as the fish habitat destroyed associated with the Highway 7 – Nelson to Wren Street project; and/or,
- ii. Create or increase the productive capacity of unlike fish habitat in the same ecological unit as the fish habitat destroyed associated with the Highway 7 – Nelson to Wren Street project; and/or
- iii. Create or increase the productive capacity of fish habitat in a different ecological unit as the fish habitat destroyed associated with the Highway 7 – Nelson to Wren Street project.

In order to ensure the Objective will be met, this Agreement will be divided into two phases. The first phase (Phase 1), will establish a compensation fund to be utilized for fish habitat compensation works (consistent with the aforementioned options) prior to November 30, 2010. More specific details regarding Phase 1 are provided in section 5 below.

The second phase (Phase 2) will establish a compensation fund to be utilized for fish habitat compensation works (consistent with the aforementioned options) prior to November 30, 2013. More specific details regarding Phase 2 are provided in section 6 below.

3 Project Area

Unless otherwise agreed upon by DFO, all works associated with this Agreement will be completed within the Lower Fraser River watershed, between the Stave River and the inlet of Nicomen Slough, with priority focus on Silverdale Creek, Chester Creek and lower reaches of the Stave River.

4 Project Partnership

A partnership will be developed through this Agreement. The Partnership will consist of members from the Parties as well as representatives from other groups or organizations that have an interest in fish habitat conservation or other interrelated environmental values. Partnership members, their individual areas of interest and their general partnership role(s) in this Agreement are as follows:

a. Ministry of Transportation and Infrastructure * (MoT)

Interest: To fulfill their obligation to compensate for the harmful alteration, disruption or destruction of fish habitat associated with the Highway 7 – Nelson to Wren Street project.

General Role(s): funding, advisory, decision-making and technical expertise (ecosystem restoration)

b. Fisheries and Oceans Canada * (DFO)

Habitat Management Unit (HMU) and Resource Restoration Unit (RRU)

Interest: To ensure MoT meets the obligation of achieving no-net-loss in the productive capacity of fish habitat associated with the Highway 7 - Nelson to Wren Street project and to assist with habitat compensation planning and construction

General Role(s): regulatory, advisory, decision-making, project implementation, and technical expertise (fish and fish habitat)

c. Ducks Unlimited Canada (DUC)

Interest: To support efforts to protect and enhance wetlands adjacent to the Fraser River such as Silverdale Creek and Chester Creek wetlands

General Role(s): administrative, potential property ownership, advisory and technical expertise (waterfowl and wetland conservation)

d. Fraser Valley Regional Watershed Coalition (FVRWC)

Interest: To support continued efforts to enhance the habitat of the Silverdale Creek and Chester Creek watersheds and to seek opportunities to facilitate multi-stakeholder projects that protect or enhance watersheds in the Fraser Valley.

General Role(s): administrative, project implementation, advisory and technical expertise (watershed restoration and community awareness)

e. Stave Valley Salmonid Enhancement Society (SVSES)

Interest: To support efforts to enhance and protect the Silverdale Creek and Chester Creek watersheds and to seek opportunities to facilitate property acquisition that will result in the protection or enhancement of those watersheds.

General Role(s): advisory and local expertise

f. Ministry of Environment (MoE)

Interest: To maintain and restore natural ecosystem diversity and fish and wildlife species and their habitat

General Role(s): advisory and technical expertise (wildlife, vegetation and species at risk)

g. District of Mission (DoM)

Interest: To support efforts to create additional habitat within the Silverdale Creek and/or Chester Creek watershed for the benefit of its residents, fish and wildlife.

General Role(s): advisory, potential property ownership and local expertise

* denotes mandatory involvement in the Partnership

The Partnership will be divided into two committees for each of the two phases, as follows:

i. Steering Committee

The specific roles of the Steering Committee are as follows:

- a. Provide guidance and direction to the Technical Committee;
- b. Review and approve physical works proposed by the Technical Committee; and,
- c. Oversee spending to ensure that funds are spent appropriately in order to meet the Objective.

ii. Technical Committee

The specific roles of the Technical Committee are as follows:

- a. Identify and prioritize potential projects to be reviewed and approved by the Steering Committee; and,
- b. Develop or arrange for the development of detailed plans for physical works.

Both committees will be guided by the principle that all interested persons shall be kept informed and that the contributions of all shall be acknowledged.

5 Phase 1

5.1 General Terms – Phase 1

The purpose of Phase 1 is to complete X m² of fish habitat compensation works by no later than November 30, 2010. To complete Phase 1, MoT will deliver a cheque in the amount of \$ X to FVRWC (herein referred to as “P1 Compensation Fund”). FVRWC will act as project lead and fund administrator for Phase 1. As such, MoT will also contribute \$ X to FVRWC for administrative costs associated with Phase 1 works (herein referred to as the “P1 Administration Fund”). The P1 Compensation Fund and the P1 Administration Fund will be placed in separate accounts.

As project lead and fund administrator for Phase 1, FVRWC will ensure a Project Implementation Plan (PIP) is completed. The PIP will include potential project options, refinement of Phase 1 roles and responsibilities and identification of key project requirements, deliverables and deadlines. Once a PIP is finalized and approved by the Steering Committee, FVRWC will deliver the project as per the terms of the plan. FVRWC will ensure that the project is delivered in a timely manner and that appropriate contract administration, project and financial reporting and project monitoring is completed in keeping with the Objective.

FVRWC may charge actual staff time costs for overseeing the administration of the P1 Compensation Fund and completion of project(s). FVRWC will be reimbursed from the P1 Administration Fund upon submitting a progress report to the Steering Committee, identifying completed activities and financial costs incurred. This reporting will continue until post-construction monitoring commitments are completed. Upon request by the Steering Committee, FVRWC must provide a statement of the P1 Compensation or Administration Fund account, including cash balance, interest earned and itemized expenditures.

At the discretion of the Steering Committee, FVRWC may receive an additional administration fee in the amount of 0.5% per year based on the interest earned on the P1 Compensation Fund account. FVRWC must adhere to investment policies, standards and practices that a person of ordinary prudence would exercise in dealing with the property of others. Funds must be prudently managed to limit exposure to undue financial risks and other adversity.

Any amount not distributed from the P1 Administration Fund or the P1 Compensation Fund by November 30, 2010, excluding funds scheduled for monitoring purposes identified in the PIP, must be transferred to the Phase 2 Compensation Fund.

5.2 Commitments, Roles and Responsibilities – Phase 1

Commitments, roles and responsibilities for each group or agency involved in Phase 1 are as follows:

	Funding	Administration & Project Lead	Steering Committee	Technical Committee
MoT	X		X	
DFO - HMU			X	
DFO - RRU				X
FVRWC		X		X

5.3 Timeline – Phase 1

The goal is to complete Phase 1 compensation works prior to November 30, 2010. Specific milestone dates for Phase 1 are as follows:

Milestone	Deadline
MoT to deliver P1 Compensation Fund and P1 Administration Fund cheques to FVRWC	August 31, 2009
Phase 1 Project Implementation Plan prepared by the FVRWC submitted to the Steering Committee for approval	January 31, 2010
Final plans for Phase 1 works submitted to DFO for approval	April 1, 2010
Phase 1 compensation works completed	November 30, 2010

6 Phase 2

6.1 General Terms – Phase 2

The purpose of Phase 2 is to complete X m² of fish habitat compensation works no later than November 30, 2013. To complete Phase 2, MoT will deliver a cheque in the amount of \$ X to DUC (herein referred to as "P2 Compensation Fund"). DUC will act as project lead and fund administrator for Phase 2. As such, MoT will also contribute \$ X to DUC for administrative costs associated with Phase 2 works (herein referred to as the "P2 Administration Fund"). The P2 Compensation Fund and the P2 Administration Fund will be placed in separate accounts.

The first priority of Phase 2 will be to secure property(ies) through acquisition or other options, such as donations or conservation covenants, and to complete X m² of fish habitat compensation works on that property. Land purchases will only be considered through this Agreement if the following conditions can be met:

1. The property has been adequately assessed by appropriately qualified professionals and it has been determined that there is enough potential on the property to meet or exceed the amount of fish habitat compensation works required to meet the Objective;
2. Additional funding can be leveraged through other sources, if needed, to ensure that the total area of fish habitat required to be created or enhanced through this Agreement will be fulfilled;
3. The land will be owned and managed, in whole or in part, by an entity for which protection and/or conservation is a primary objective (e.g., Ducks Unlimited Canada or The Nature Trust of British Columbia);
4. The land will be appropriately designated through legal means, such as through zoning or a section 219 *Land Titles Act* restrictive covenant, to protect and/or conserve intrinsic natural features, and
5. Human uses may be permitted; however, such uses are strictly regulated, secondary to and must be compatible with, the primary objective of protection and conservation of fisheries and other interrelated environmental values (e.g., wildlife, species at risk).

Properties will be selected based on DFO's hierarchy of preferences for habitat compensation works, biological priority and feasibility of fulfilling the Objective. Potential properties will be assessed for biological and hydrological values and potential riparian and instream creation or enhancement potential prior to securement.

A contingency plan will be prepared at the onset of Phase 2 project planning which will outline the process to be followed in the event that property can not be secured through purchase acquisition, donation or other means pursuant to the aforementioned conditions by August 31, 2011. More specific details regarding the Phase 2 project implementation are provided below.

6.2 Project Implementation – Phase 2

As project lead and fund administrator for Phase 2, DUC will prepare a PIP. The PIP will be developed in consultation with Steering and Technical Committee members and will include potential project options, refinement of Phase 2 roles and responsibilities and identification of key project requirements, deliverables and deadlines.

Specifically, the PIP for Phase 2 will:

- a. Identify potential properties for acquisition and restoration to meet the Objective;
- b. Include a preliminary plan for identification of priority properties and property assessments;
- c. Outline how members of the Technical Committee will seek to secure additional funding from other sources that may be interested in contributing to achievement of the Objective;
- d. Develop criteria to prioritize potential project(s) and project site(s);
- e. Designate sub-committees to assist with project deliverables;
- f. Include a list of activities and procedures to be followed with assigned representatives and scheduled deadlines;
- g. Develop an acceptable review and reporting procedure to account for project expenditures and ensure any other necessary agreements or contracts are completed;
- h. Include a contingency plan for project implementation if property can not be secured prior to August 31, 2011.

Upon Steering Committee approval of the PIP, DUC will deliver the project as per the terms of the plan. DUC will be responsible for ensuring the project is delivered in a timely manner, and that appropriate contract administration, project and financial reporting and project monitoring is completed. DUC will also be responsible for resolving construction-related issues during implementation of any restoration activities.

Once/if a property is secured, residual compensation funds and/or funding obtained through other means must be spent towards physical works targeted at the residual habitat compensation works required to meet the Objective (i.e. balance of the Objective remaining after Phase 1).

DUC may charge actual staff time costs for overseeing the administration of the P2 Compensation Fund and completion of project(s). DUC will be reimbursed from the P2 Administration Fund upon submitting a progress report to the Steering Committee, identifying completed activities and financial costs incurred. This reporting will continue until post-construction monitoring commitments are completed. Upon request by the Steering Committee, DUC must provide a statement of the P2 Compensation Funds including cash balance, and interest earned and itemized expenditures.

At the discretion of the Steering Committee, DUC may receive an additional administration fee in the amount of 0.5% per year based on the interest earned on the P2 Compensation Fund account. DUC must adhere to investment policies, standards and practices that a person of ordinary prudence would

exercise in dealing with the property of others. Funds must be prudently managed to limit exposure to undue financial risks and other adversity.

Any amount not distributed from the P2 Administration Fund must be transferred to the Phase 2 Compensation Fund and used for physical habitat compensation works. Annually, or more often upon request by the Steering Committee, DUC will provide a statement of the P2 Compensation Funds including cash balance, interest earned and itemized expenditures.

6.3 Commitments, Roles and Responsibilities – Phase 2

Commitments, specific roles and responsibilities of each group or agency involved in Phase 2 are defined below:

	Funding	Administration & Project Lead	Steering Committee	Technical Committee
MoT	X		X	X
DFO - HMU			X	
DFO - RRU				X
DUC		X		X
FVRWC				X
SVSES				X
MoE				X
DoM				X

6.4 Timeline – Phase 2

The goal is to complete Phase 2 and meet the overall Objective prior to November 30, 2013. Specific milestone dates for Phase 2 are as follows:

Milestone	Date
First meeting of the Partnership (to be organized and chaired by FVRWC)	October 1, 2009
Project Implementation Plan prepared by DUC submitted to the Steering Committee for review and approval.	November 30, 2009
Finalize preliminary property assessments and identification of priority properties and enhancement	May 2010
Deadline for property acquisition. After this date, efforts will be focused on the contingency plan.	August 31, 2011
Physical works required to meet the Objective completed	November 30, 2013

7 Authorized Representatives¹

Each Party or organization that participates on the Steering Committee or the Technical Committee will authorize an individual to make decisions on their behalf (the "Authorized Representative"). An alternate may also be designated and be given the authority to make decisions in the absence of the Authorized Representative

Organization	Authorized Representative	Alternate Representative
MoT	Sean Wong	Joanne Cyr
DFO – HMU	Lisa McDonald	Craig Sciankowy
DFO – RRU	Matt Foy	Jonathan Bulcock
FVRWC	Dr. Mike Pearson	Lance Lilly
DoM	Mike Younie	Sharon Fletcher
DUC	Dan Buffet	Les Bogden
MoE	Scott Barrett	Sheldon Reddekopp
SVSES	Jim Taylor	

¹ In the event that a named authorized or alternative representative is no longer able to act on behalf of his/her respective organization, the individual who assumes the original position of the representative shall become the new authorized or alternate representative.

8 Decision Making Process

Final decisions will be made through consensus at the Steering Committee level. If consensus is not possible, DFO, the approving agency, will make the final decision.

9 Amendments

Amendments to this Agreement must be in writing and signed by an authorized representative of each of the Parties

10 Effective Dates

The term of this Memorandum of Understanding is from August 10, 2009 to November 30, 2013, or until all Compensation Funds have been dispersed. If funds are still remaining at the end of this term, the Parties shall review this Agreement 6 months prior to the November 30, 2013 end date.

The Parties may terminate this Memorandum of Understanding in writing subject to 60 days notice, only after a meeting between all parties has been held to discuss the reason for the potential termination. In the event that the Memorandum of Understanding is terminated prior to complete dispersal of funds, the Compensation Funds and the Administration Funds must be immediately transferred into a special purpose account to be administered by DFO.

DRAFT

11 Signatures

The Parties acknowledge and agree to fulfill their roles and responsibilities as identified under this Memorandum of Understanding.

Ministry of Transportation and Infrastructure:

Signature

Date

NAME and TITLE:

Fisheries and Oceans Canada:

Signature

Date

NAME and TITLE:

Fraser Valley Regional Watersheds Coalition:

Signature

Date

NAME and TITLE:

Ducks Unlimited Canada:

Signature

Date

NAME and TITLE:

From: [Karpouzi, Vasiliki ENV:EX](#)
To: [Eedy, Rachael ENV:EX](#)
Cc: ["McDonald, Lisa"](#)
Subject: RE: A2005620 Silverdale MoT DFO question and updated MOU
Date: Thursday, August 6, 2009 12:30:28 PM

Hi Rachael,

With regards to the draft MoU, Ecosystems feels that it satisfies provisions put forth in the email I sent you on July 9, 2009. The MoU discusses the vision, objective, and scope of the partnership, and the commitments, roles and responsibilities of the partners. It also gives a clear timeline within which the two phases are anticipated to be completed. Once the budget is finalized, Ecosystems would like to see what the cost for the fulfillment of the habitat compensation plan is anticipated to be and how the budget is to be allocated to the different administration and project lead agencies for the two project phases.

Lisa, I will ask for a minor change to be made, **s.13**

s.13

s.13,s.16

With regards to habitat assessment for the area west of Nelson Road, Ecosystems' comments are as follows:

The channelized waterway south of Hwy 7 (between Nelson and Chester Roads) is directly connected and fed by two fish-bearing watercourses, Chester and Silverdale Creeks. Based on the FVRD Habitat Atlas and the MoE Habitat Wizard, the ditch in question is also characterized as fish-bearing.

According to the Habitat Assessment Report prepared by ENKON Environmental Ltd. in November 2007, a Red-legged frog (provincially blue-listed) was found road killed on Hwy 7 west of Chester Creek. Also, a Great blue heron (provincially blue-listed) was observed foraging in the ditch south of Hwy 7. The above indicate that the ditch in question may provide habitat for amphibians, and foraging grounds for wading birds. Also, during a site visit by ESD and WSD on June 23, 2009, Ecosystems noted that the ditch southwest of Nelson Road was characterized by dense, well-established riparian vegetation. In addition, ENKON underlined in the November 2007 habitat assessment report the need for structured, stratified rare plant surveys to determine absolute presence or absence of listed plant species and communities. No such surveys were conducted in the area of concern (between Nelson and Chester Roads) as stated in the supplemental wildlife habitat assessment report prepared by EBB Environmental Consultants Inc., for Hatfield Consultants, in November 2008.

Hence, Ecosystems requests a habitat and species (flora and fauna, including sensitive and species at risk) inventory be completed prior to any approval authorization of works in and about the open waterways west of Nelson Road, east of Chester Road, north and south of Hwy 7. This will allow for a proper assessment and enumeration of the fish, wildlife and habitat values of the open

waterways proposed to be filled in to accommodate widening of Hwy 7. It will also facilitate decision-making discussions concerning the habitat compensation plan as described in the MoU.

Survey protocols must adhere to and consider:

RISC Standards for

- Terrestrial Ecosystems – Biodiversity (available at <http://www.ilmb.gov.bc.ca/risc/pubs/tebiodiv/index.htm>);
- Terrestrial Ecosystems – Vegetation (available at <http://www.ilmb.gov.bc.ca/risc/pubs/teveg/index.htm>);
- Aquatic Ecosystems (available at <http://www.ilmb.gov.bc.ca/risc/pubs/aquatic/index.htm>);
- Fish Traps Threaten Pacific Water Shrew Recovery (article available at http://www.forrex.org/Streamline/ISS31/streamline_vol9_no2_art5.pdf).

Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia (available at http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare2006/develop_with_care_intro.html).

Thanks,
Vaso

Vasiliki Karpouzi, M.Sc.
Scientific Technical Officer
Ecosystems Branch
Ministry of Environment
2nd floor, 10470 - 152 Street
Surrey BC
V3R 0Y3
Tel: 1 604 582 5329
Fax: 1 604 930 7119
Email: Vasiliki.Karpouzi@gov.bc.ca

From: Eedy, Rachael ENV:EX
Sent: Wednesday, August 5, 2009 9:14 AM
To: Karpouzi, Vasiliki ENV:EX
Cc: 'McDonald, Lisa'
Subject: A2005620 Silverdale MoT DFO question and updated MOU
Importance: High

Hi Vaso,

Lisa McDonald (DFO) sent us an updated draft of the MOU (attached).

Lisa also asked about ESD's comments on the wildlife/habitat assessment for works west of Nelson street.

Lisa, in response to your question, the watercourse encroachment west of Nelson is included in the Approval application to MoE.

Vaso, DFO is looking for ESD's input on the adequacy of habitat assessment for the area West of Nelson (particularly in reference to Species at Risk) for the CEAA screening. I took a quick look at the November 2008 Wildlife Habitat Assessment report again and see that some of the survey area maps stop at Nelson.

Please copy me on any ESD-DFO correspondence that is relevant to the Approval review.

I hope to make a recommendation on Thursday or Friday on whether or not (or which portion of) the works could be approved for construction this August. Any additional comments from ESD and DFO are appreciated.

Thanks,
Rachael Eedy

Rachael Eedy, M.Sc., R.P.Bio
Water Stewardship Technician

Water Stewardship Division

Ministry of Environment

Phone: (604)-582-5361

Email: Rachael.Eedy@gov.bc.ca

10470-152 Street, Surrey, BC V3R 0Y3

From: McDonald, Lisa [mailto:Lisa.McDonald@dfo-mpo.gc.ca]
Sent: Wednesday, August 5, 2009 8:35 AM
To: Eedy, Rachael ENV:EX
Subject:

<<MoT Hwy 7 MoU.doc>>

Sincerely

Lisa McDonald, B.Sc., Dipl. Tech.

Habitat Biologist | *Biologiste de l'habitat*

Fisheries and Oceans Canada | *Pêches et Océans Canada*

Habitat and Enhancement Branch | *Direction de l'habitat et de la mise en valeur*

Lower Fraser East | *Secteur de l'est du Bas de Fraser*

Telephone | *téléphone* 604.814.1070

Facsimile | *télécopieur* 604.814.1064

E-mail | *Courriel* lisa.mcdonald@dfo-mpo.gc.ca





















s.22















August 7, 2009

File: A2005620

Ministry of Transportation and Infrastructure
7818 6th Street
Burnaby BC V3N 4N8

Attention: Joanne Cyr

**Re: Application for approval to make changes in and about Silverdale Creek and
Unnamed Streams, Approval 2005620**

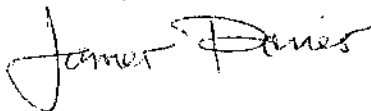
An approval for the proposed changes in and about Silverdale Creek and Unnamed Streams has been granted, subject to the conditions noted on the attached Approval document 2005620.

The Ministry of Transportation's (MoT) request to withdraw portions of the stream realignment works North of Highway 7 and West of Nelson Street from this application has been accepted. A new Approval application must be submitted if MoT wishes to obtain Approval for those works in future. Please contact Rachael Eedy at 604-582-5361 with any questions in this regard.

Please be advised that applications for an approval can take up to 140 days to process. If possible, please provide future applications at least 45 days in advance of your proposed start date.

If you have any questions or concerns please contact the Water Information Technician, Water Stewardship Division (604-582-5200).

Yours truly,



James Davies, P.Eng.
Designated Engineer under the *Water Act*

Enclosure

pc: Alan Stockwell, Hatfield Consultants, astockwell@hatfieldgroup.com
Jackie Chambers, MoT, Jackie.Chambers@gov.bc.ca

RE/klj

Ministry of
Environment

Water Stewardship Division
Water Allocation

Mailing Address/Location
10470 - 152nd Street, 2nd Floor
Surrey BC V3R 0Y3
Telephone: 604-582-5200
Fax: 604-930-7119

Web Address:
<http://www.env.gov.bc.ca>

APPROVAL

WATER ACT - Subsection 9(1), Clauses (a), (b) and (c)
(Changes in and about a stream)

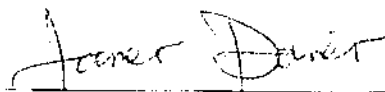
**Hatfield Consultants on behalf of
Ministry of Transportation and Infrastructure**

is hereby authorized to make changes in and about a stream as follows:

- (a) The name of the stream is Silverdale Creek and Unnamed Streams, herein referred to as "the stream".
- (b) The changes to be made in and about the stream are:

To realign streams South of the highway and East of Nelson Street by infilling part of the stream channels, construct a bridge, remove a bridge, extend a culvert, do instream work associated with floodbox removal, and remove and plant riparian vegetation all within land or land covered by water being part of Silverdale Creek and unnamed streams within Ministry of Transportation and Infrastructure, Right of Way, Plans LMP 26095, PL 4897, PL 4898 and LMP 2169.
- (c) This Approval does not authorize entry on privately held land or Crown land.
- (d) This Approval does not constitute authority of any other agency.
- (e) The holder of this Approval shall take reasonable care to avoid damaging any land, works, trees, or other property and shall make full compensation to the owners for any damage or loss resulting from the exercise of rights granted hereunder.
- (f) The work authorized shall be completed on or before September 30, 2011, and the holder of this Approval shall advise the Water Information Technician (604-582-5200) when the changes have been completed.
- (g) Work within the wetted perimeter of the stream shall be undertaken during the period August 1 to September 15, so that the fisheries interests are protected.
- (h) Upon commencement of the project, the work shall be pursued to completion as quickly as possible.
- (i) Care shall be exercised during all phases of the work to minimize siltation of the stream and to eliminate the release of any other debris or deleterious substances.

- (j) All works shall comply with engineering drawings 0997-101 Rev' PC and 0997-102 Rev' PD prepared by MMM Group and R1-592-103\104\105\106 Rev' 02 and R1-592-303 Rev' A prepared by Ministry of Transportation and Infrastructure.
- (k) The holder of this Approval shall be responsible for the repair, operation and maintenance of the works to the satisfaction of the Assistant Regional Water Manager.
- (l) Prior to the commencement of the works authorized under this Approval, the holder of this Approval shall have all the necessary permits from all the other agencies concerned, and must comply with all requirements of the *Fisheries Act* authorization, including the completion of habitat compensation works.
- (m) Prior to the commencement of the works authorized under this Approval, the holder of this Approval shall obtain authorization from Fisheries and Oceans Canada.
- (n) The holder of this Approval shall retain a qualified Environmental Monitor to supervise all in-stream works authorized under this Approval. In the event of an environmental incident or non-compliance with any of the terms or conditions of this Approval, the Environmental Monitor shall notify the Assistant Regional Water Manager (604 582-5200), within 24 hours.
- (o) The holder of this Approval and their contractors must comply with the Environmental Management Plan submitted with the application: Highway 7 Widening from Nelson Street to Wren Street (Project No. 2052-0001) and Ministry of Transportation and Infrastructure Bridge Project 12052-0001 Silverdale Creek Bridge No. 0997 Highway #7 Environmental Management Plan prepared by Scott Resource Services Inc., 2009.



Jim Davies, P.Eng.
Designated Engineer under the *Water Act*

File No.: A2005620	Date Issued: August 7, 2009	Approval No.: 2005620
Precinct: 20I-Mission		



**FISHERIES ACT S.35 (2) AUTHORIZATION
FOR WORKS OR UNDERTAKINGS AFFECTING FISH HABITAT**

Habitat File No.: 5300-02-MOTH-09-01
Authorization No.: 09-HPAC-PA2-00005

Authorization issued to:

Ministry of Transportation and Infrastructure
Attention: Brian Lee
7818 6th Street
Burnaby, BC V3N 4N8

Location of Project

The works or undertakings are located on Silverdale Creek and its tributaries between Nelson Street and Wren Street in Mission B.C.

Latitude/Longitude: 49° 08' 22" N / 122° 21' 35" W to 49° 07' 59" N / 122° 20' 77" W

Valid Authorization Period

The valid authorization period for the harmful alteration, disruption or destruction of fish habitat associated with the works or undertakings is:

From: August 10, 2009	To: September 15, 2010
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The valid authorization period(s) for the other conditions of the authorization are as set out below.

Description of Works or Undertakings

The British Columbia Ministry of Transportation and Infrastructure (MoT) is proposing to widen Highway 7 (Lougheed Highway) from two lanes to four lanes from Nelson Street to Wren Street, including the replacement and widening of the existing Silverdale Creek Bridge. The proposed new bridge will be a 37m concrete and steel clear-span structure, with abutments located outside of the 1:200 year high water mark.

In order to accommodate the road and bridge widening, the following harmful alteration, disruption and/or destruction (HADD) of fish habitat is authorized:

- i. The destruction of 9,136 m² of riparian habitat and 6,909 m² of aquatic/floodplain habitat on the roadside tributaries to Silverdale Creek south of Highway 7, east of Nelson Street and west of Oliver Street

- ii. The destruction of 1,151 m² of riparian habitat and 443 m² of aquatic/floodplain habitat on Silverdale Creek at the bridge crossing location

The above works are more specifically described in the following reports or drawings:

1. *Highway 7 Nelson to Wren Street Four-Laning Project, Mission, BC – Project Review Information Requirements for Fisheries and Oceans Canada* (January 16, 2009) report submitted to Lisa McDonald of Fisheries and Oceans Canada (DFO) by Alan Stockwell of Hatfield Consultants (attached to this Authorization as Appendix I).
2. *Drainage and Construction - Highway 7 Nelson Street to Wren Street 4 Laning Drawing Numbers R1-592-103 to R1-592-106* (Revision 2 – June 16, 2009) prepared by MoT (attached to this Authorization as Appendix II).
3. *Highway 7 Widening from Nelson Street to Wren Street (Project No. 2052-0001) and Ministry of Transportation and Infrastructure Bridge Project 12052-0001 Silverdale Creek Bridge No. 0997 Highway #7 Environmental Management Plan* (July 2009) report prepared for Imperial Paving Ltd. by Scott Resource Services Inc. (attached to this Authorization as Appendix III).
4. *Outlet Connector Channel Examples incl. Silverdale.doc* (July 3, 2009) email submitted to Lisa McDonald of DFO from Joanne Cyr of MoT (attached to this Authorization as Appendix IV).
5. *Response from MoT to DFO Comments* (August 7, 2009) email submitted to Lisa McDonald of DFO from Joanne Cyr of MoT (attached to this Authorization as Appendix V).

Conditions of Authorization

1.0 GENERAL CONDITIONS

- 1.1. The conditions of this Authorization notwithstanding, should the above works or undertakings, due to weather conditions, different soil or other natural conditions, or for any other reason, appear in the opinion of the DFO likely to cause greater impacts than the parties previously contemplated, then DFO may direct the Ministry of Transportation and Infrastructure (MoT), and its agents, and contractors, to suspend or alter works and activities associated with the project, to avoid or mitigate adverse impacts to fisheries resources. DFO may also direct MoT and its agents, and contractors, to carry out, at MoT's expense, any works or activities deemed necessary by DFO to avoid or mitigate further adverse impacts to fisheries resources. In circumstances where DFO is of the view that greater impacts may occur than were contemplated by the parties DFO may also modify or rescind this Authorization. If the Authorization is to be changed, MoT will be given an opportunity to discuss any proposed modifications or rescission.
- 1.2. Written notification of the commencement of all phases of works or undertakings shall be provided to the following DFO personnel a minimum of 10 days prior to the initiation of those works or undertakings.
 - i. DFO Fishery Officer Field Supervisor Jonathan Taylor (phone # 604.814.1058/ fax # 604.814.1064);

ii. DFO Habitat Biologist Lisa McDonald (phone # 604.814.1070/ fax # 604.814.1064).

2.0 CONDITIONS THAT RELATE TO MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE'S PLAN

- 2.1. MoT confirms that all plans and specifications relating to this Authorization have been duly prepared and reviewed by appropriate professionals working on their behalf. MoT acknowledges that they are solely responsible for all design, safety and workmanship aspects of all the works associated with this Authorization.
- 2.2. Works must comply with those criteria as identified within this Authorization. Harmful alteration, disruption or destruction of fish habitat other than that specifically identified within this Authorization is not permitted.
- 2.3. MoT must ensure that appropriate mitigation measures are applied to the project and that the works and undertakings comply with the requirements of the *Fisheries Act*.
- 2.4. Works must be conducted following the practices outlined in the *Highway 7 Widening from Nelson Street to Wren Street (Project No. 2052-0001) and Ministry of Transportation and Infrastructure Bridge Project 12052-0001 Silverdale Creek Bridge No. 0997 Highway #7 – Environmental Management Plan (Appendix III)*.
- 2.5. It is understood that by proceeding with the works referred to in this Authorization the proponent and their agent(s) and/or contractor(s) understand and agree to the foregoing and subsequent terms and conditions.
- 2.6. The terms of this Authorization are valid only until September 15, 2010. If the project or applicable phases of the project have not been substantially completed during the valid authorization period, or if the project design is altered so that these comments are no longer valid, an extension or addendum is required.

3.0 CONDITIONS THAT RELATE TO THE MITIGATION OF POTENTIAL IMPACTS TO FISH AND HARMFUL ALTERATION, DISRUPTION OR DESTRUCTION OF FISH HABITAT

The following measures will be implemented:

- 3.1. The HADD boundary will be delineated by professional surveyors prior to the commencement of any HADD identified in this Authorization. The boundary will be clearly marked with slope stakes placed at 20 meter intervals with offset references to the new road design centreline marked on the stakes. Silt fencing will be placed along the entire length of the HADD boundary, in line with the stakes. Once the boundary is established, an appropriately qualified professional(s) will determine the total area delineated for HADD and will provide MoT and DFO written confirmation of that area.
- 3.2. Qualified environmental and engineering professionals will complete an assessment of the existing watercourse corridor of the tributary to Silverdale Creek, located at the project site on the west side of Silverdale Creek prior to the initiation of works resulting in HADD of fish habitat. The assessment will consist of identifying a low flow/thalweg channel within the corridor, and determining the elevation of that channel along the entire length of the corridor. If through the assessment it is determined that the works or undertakings identified in this

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Authorization are likely to result in the loss or alteration of the thalweg or thalweg elevation, then additional plans must be prepared by MoT to mitigate or offset these changes (e.g. corridor may backwater less frequently or for shorter duration if the thalweg is elevated, resulting in reduction in productivity for residual corridor area). Plans must include the provision for the construction of a new thalweg that will maintain the elevation of the existing thalweg and must be submitted to DFO for review and approval by no later than August 24, 2009. An amendment of this Authorization may be required as identified in Condition 1.1.

- 3.3. Upon completion of the project, as-built drawings will be submitted to DFO, identifying the total area of fish habitat harmfully altered, disrupted or destroyed as part of the project.
- 3.4. A qualified environmental professional will assess existing culvert crossings under the highway located towards the eastern boundary of the project site. All culverts must be assessed for fish passage during all life stages and varying flow events. If it is determined that fish are not able to pass any culvert due to unacceptable grade or outlet elevation, the entire culvert must be replaced with a crossing suitable to pass fish at all life stages and during varying flow events. If the culverts are deemed to provide for adequate passage of fish, culvert extensions will be acceptable, provided that the extension does not impede fish passage, and they are designed and installed to allow for the long term maintenance of natural biophysical stream processes (e.g. bedload movement).
- 3.5. All work within 30 meters of any watercourse will be conducted during dry weather to mitigate the release of sediment into watercourses downstream of the work site. Upon commencement of this project, the work must be pursued to completion as quickly as possible, provided favorable conditions persist.
- 3.6. Instream works will only be completed during these periods:
 - i. August 10, 2009 and September 30, 2009
 - ii. August 1, 2010 and September 15, 2010.
- 3.7. Should MoT wish to alter the project, MoT will submit a written proposal to DFO Habitat Management Unit, Lower Fraser East at 32873 London Avenue, Mission, BC, V2V 6M7 describing the proposed changes in detail prior to initiating such works.
- 3.8. Sufficient water flow for fish will be maintained at all times downstream of instream works or undertakings while works or undertakings are occurring.
- 3.9. MoT will retain a qualified Fisheries Biologist or Technician to undertake a fish-salvage prior to commencement of any instream works. In order to capture or collect anadromous salmon species, a federal *License to Collect Fish for Scientific, Educational or Public Display Purposes* is required from DFO, while a *Fish Collection Permit* is required from the BC Ministry of Environment, Permit and Authorization Services Bureau to allow for capture and collection of non-anadromous and certain anadromous (i.e. steelhead) fish species for non-recreational purposes.
- 3.10. Instream work areas will be isolated from fish through the installation mesh fish nets or fences at the upstream and downstream ends of the work site.
- 3.11. Care will be taken not to disturb streamside vegetation outside of the areas identified within this authorization.
- 3.12. Machinery will not work from within or cross the wetted perimeter of any watercourse.

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- 3.13. The works will be monitored on a full-time basis by a qualified environmental monitor who is acceptable to DFO and familiar with current instream work best management practices. The monitor must have written authority from MoT to modify and/or halt any works if deemed necessary for the protection of fish and fish habitat, and to meet the conditions of this Authorization. MoT must provide DFO with a copy of a letter that clearly states the name of the environmental monitor and that the environmental monitor has such authority.
 - 3.14. The environmental monitor will report directly to Brian Lee, Greg Czernik or Joanne Cyr of MoT, regardless of whether the works are conducted by MoT crews or contractor(s) working on their behalf. MoT will be responsible for ensuring recommendations provided by the environmental monitor are adhered to.
 - 3.15. A pre-construction meeting will be held between the environmental monitor and the crew/contractor undertaking the work on the site to ensure an understanding of the mitigative best practices for the project.
 - 3.16. A copy of this Authorization will be forwarded to the contractor/crew supervisor and will be readily available at all times at the site while the work is proceeding.
 - 3.17. The environmental monitor will submit quarter-annual reports to DFO, including date-stamped photographs of the sites before, during and after works, and a final report within 60 days of completion of the Authorized works. The reports will outline project compliance with the conditions of this Authorization and should detail any difficulties encountered during the project. Any incomplete work will be described and details will be provided on the proposed schedule for completion.
 - 3.18. As a minimum, the standards for sediment and erosion control outlined in the jointly published BC Environment / Fisheries and Oceans "Land Development Guidelines for the Protection of Aquatic Habitat" will be adhered to. All work will be conducted in such a manner as to prevent sediment or sediment laden water from entering any watercourse. Upon completion of the works and once the site has become stable, sediment and erosion control structures such as silt fencing, hay bales or check dams will be removed.
 - 3.19. Turbidity levels immediately downstream of the work site will be sampled and measured during the course of the works at regular intervals and will be measured in NTU (Nephelometric Turbidity Units). During the works, turbidity levels must not exceed 25 NTU above background levels during dry weather, and 75 NTU above background levels during storm events. If during the course of the works, turbidity approaches those levels, then works must be halted in order to allow the turbidity levels to recede. If incidence of sediment release occurs above these standards DFO must be notified, and such incidences must be noted in the environmental monitoring report. The Environmental Monitor must ensure that appropriate sediment and erosion control measures are in place and functioning as intended during works to prevent such incidences from occurring.
 - 3.20. Refueling of machinery is to be conducted a minimum of 30 meters away from any watercourse, drainage channel and/or stormwater system catch basin.
 - 3.21. A spill containment kit will be readily accessible on-site in the event of release of a deleterious substance to the environment. Any spill of a deleterious substance that enters into a ditch, watercourse, ravine or storm sewer system will be immediately reported to the **Provincial Emergency Program (24-hour telephone) at 1-800-663-3456**. At least one person on-site during construction must have specific training in spill containment.

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- 3.22. No fuels, lubricants, construction wastes or any other deleterious substances may enter any ditch, watercourse, ravine or storm sewer system.
 - 3.23. All equipment and machinery working within 30 meters of any watercourse will be in good working condition, clean and free of leaks or excess oil and grease. No fuels, lubricants, construction wastes or other deleterious substances may enter any watercourse at any time.
 - 3.24. All machinery, vehicles and work sites will have emergency spill kits (pads, absorbent booms, etc) available on site. The kits shall be suitable for the quantities and types of material on site. Site personnel must be trained in the proper use of the kits in case of a spill.
 - 3.25. Any spills to ground or water, regardless of volume, will be reported to the Environmental Monitor immediately.
 - 3.26. Containment will be provided for any small equipment (pumps, generators, etc.) used within 30 meters of any watercourse, drainage channel and/or stormwater system catch basin.
 - 3.27. All excavated material and debris will be removed from the site or placed in a stable area above the high water mark of any watercourse, and protected from erosion by mitigating measures including temporarily covering exposed soil with polyethylene tarps and planting vegetation.
 - 3.28. All disturbed areas will be re-vegetated to prevent surface erosion and subsequent sedimentation of the watercourse. If planting is to be undertaken late in the growing season, additional measures may be required to ensure that the site is protected from surface erosion until conditions are suitable for seed germination and growth. Any areas determined to be unsatisfactorily protected (i.e., unsuccessful germination or inadequate rate of seeding) must be restored to DFO's satisfaction. Further, all disturbed areas must be revegetated with native grass, tree and shrub species as per DFO's Pacific Region Operational Statement *Riparian Areas and Revegetation* (available at www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/riparian-reveg_e.htm).

4.0 CONDITIONS THAT RELATE TO THE COMPENSATION FOR LOSS OF FISH HABITAT

In order to compensate for the harmful alteration, disruption and destruction of 17,639 m² of habitat associated with the authorized works and to achieve a no-net-loss of fish habitat, MoT agrees to the following:

- 4.1. Deliver compensation and administration funds totaling ~~s.13,s.16,s.17~~ to the Fraser Valley Regional Watersheds Coalition and Ducks Unlimited Canada, consistent with the conditions and requirements identified in the Memorandum of Understanding (MoU) attached to this Authorization as Appendix VI, by August 31, 2009. As part of the MoU, 35,278 m² of fish habitat will be created or enhanced, consistent with the following hierarchy of preferences for fish habitat compensation options (from most to least preferred):
 - i. Create or increase the productive capacity of like-for-like fish habitat in the same ecological unit as the fish habitat destroyed pursuant to this Authorization; and/or,
 - ii. Create or increase the productive capacity of unlike fish habitat in the same ecological unit as the fish habitat destroyed pursuant to this Authorization; and/or

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- iii. Create or increase the productive capacity of fish habitat in a different ecological unit as the fish habitat destroyed pursuant to this Authorization.
- 4.2. Ensure that a minimum of 35,278 m² of fish habitat will be created or enhanced to the satisfaction of DFO prior to November 30, 2013.
- 4.3. Fulfill their commitments pursuant to the MoU.

5.0 CONDITIONS THAT RELATE TO THE HABITAT MONITORING PROGRAM

Habitat monitoring of compensation works will be established through the MoU identified under Condition 4.1 above.

6.0 CONDITIONS THAT RELATE TO FINANCIAL SECURITY

Financial security is detail under Condition 4.1 above.

The holder of this Authorization is hereby authorized under the authority of section 35(2) of the Fisheries Act, R.S.C., 1985, c.F. 14, to carry out the work or undertaking described herein. This Authorization is valid only with respect to fish habitat and for no other purposes. It does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

Failure to comply with any condition of this Authorization may result in charges being laid under the Fisheries Act.

This Authorization form must be held on site and work crews must be made familiar with the conditions attached.

Date of Issuance:

August 14/2009

Approved by:

mat foy
A/ ~~Corino Salami~~ matthew Foy
Area Manager, Lower Fraser Area
Fisheries & Oceans Canada
Oceans, Habitat and Enhancement Branch

Ministry of Transportation and Infrastructure acknowledges that DFO has consulted with it regarding the terms of this Authorization, and confirms that it has reviewed and understands the terms of this Authorization, and it will comply with them.

Executed by the Ministry of)
Transportation and Infrastructure on the)
14th day of August, 2009 in)
the presence of:)

Joanne Cyr
Witness (signature))

Joanne Cyr
(print name))

Ministry of Transportation and Infrastructure

Per: *Valerie L. Fabrick*

Authorized signatory

Name

Title

Valerie L. Fabrick

Regional Manager Project Delivery

Appendix I

Highway 7 Nelson to Wren Street Four-Laning Project, Mission, BC – Project Review Information Requirements for Fisheries and Oceans Canada (January 16, 2009) report submitted to Lisa McDonald of DFO by Alan Stockwell of Hatfield Consultants.

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Appendix II

*Drainage and Construction - Highway 7 – Nelson Street to Wren Street 4 Laning - Drawing Numbers
R1-592-103 to R1-592-106 (Revision 2 June 16, 2009) prepared by MoT.*

Appendix III

Highway 7 Widening from Nelson Street to Wren Street (Project No. 2052-0001) and Ministry of Transportation and Infrastructure Bridge Project 12052-0001 Silverdale Creek Bridge No. 0997
Highway #7 Environmental Management Plan (July 2009) report prepared for Imperial Paving Ltd. by Scott Resource Services Inc.

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Appendix IV

Outlet Connector Channel Examples incl. Silverdale.doc (July 3, 2009) email submitted to Lisa McDonald of DFO from Joanne Cyr of MoT.

Appendix V

Response from MoT to DFO Comments (August 7, 2009) email submitted to Lisa McDonald of DFO from Joanne Cyr of MoT.

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Appendix VI
Memorandum of Understanding

Eedy, Rachael FLNR:EX

From: Letkeman, Joanne TRAN:EX
Sent: Tuesday, September 27, 2011 3:14 PM
To: FrontCounter BC Surrey ILMB:EX
Cc: Eedy, Rachael FLNR:EX
Subject: RE: Water Act Section 9 Notification - Unnamed Tributary to Silverdale Creek

Hello,

The DFO Habitat Restoration Group that will be constructing the works associated with this notification are considering an amended start date of October 15, 2011 and a completion date of October 31, 2011. Can you please note this as an update to the previously submitted notification?

The rationale behind the decision is the need for dry weather conditions.

Please contact me if you have any questions or concerns.

Regards,
Joanne Letkeman

Joanne M. Letkeman BSc.
Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region

Telephone: 604-660-8072
Fax: 604-660-2181

From: Letkeman, Joanne TRAN:EX
Sent: Friday, September 23, 2011 10:19 AM
To: FrontCounter BC Surrey ILMB:EX
Cc: Eedy, Rachael FLNR:EX
Subject: Water Act Section 9 Notification - Unnamed Tributary to Silverdale Creek

Please find attached supporting documents for Notification under the *Water Act*, Section 9.

<< File: Section 9 application Southeast Trib to Silverdale.pdf >> << File: GoogleEarth_Image.jpg >> << File: Silverdale ROW Channel.pdf >> << Message: Notification for September compensation work at Silverdale Mission MoTI >>

Best regards,
Joanne Letkeman

Joanne M. Letkeman BSc.
Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region

Telephone: 604-660-8072
Fax: 604-660-2181

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Eedy, Rachael FLNR:EX

From: Letkeman, Joanne TRAN:EX
Sent: Friday, September 23, 2011 10:19 AM
To: FrontCounter BC Surrey ILMB:EX
Cc: Eedy, Rachael FLNR:EX
Subject: Water Act Section 9 Notification - Unnamed Tributary to Silverdale Creek

Please find attached supporting documents for Notification under the *Water Act*, Section 9.



Section 9
Application South Coast Region.pdf



GoogleEarth, Image.jpg



Silverdale ROW
Channel.pdf



Notification for
September 2011.com...

Best regards,
Joanne Letkeman

Joanne M. Letkeman BSc.
Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region

Telephone: 604-660-8072
Fax: 604-660-2181

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Ministry of Environment

Approval Application or Notification for Changes In and About a Stream

Under Section 9 of the *Water Act* and Part 7 of the *Water Act Regulations*

*Incomplete or inaccurate forms do not constitute **Notification** & will not be accepted.*

Proceeding with works after submission of an incomplete or inaccurate form would be a violation of the Water Regulation

☐ **APPROVAL APPLICATION**

☒ **NOTIFICATION¹ (see USERS' GUIDE)**

1. Applicant Information (also complete sections 6 and 7)

Name: Ministry of Transportation and Infrastructure		
Address: 7818 6 th Street		
City: Burnaby	Province: BC	Postal code: V3N 4N8
Phone: 604 660-8072	e-mail: Joanne.letkeman@gov.bc.ca	

2. Location of Works

Street Address of Works (or nearest town): Highway 7, west of Mission, BC		
Stream Name: Unnamed tributary		Flows Into: Silverdale Creek
Location on Stream: Between decommissioned access road and Silverdale Creek		
Reference Landmarks: Silverdale Creek Bridge		Amount of disturbance in m ² : 900
Multiple Sites: YES / NO: No		Number of sites: 1
Latitude: 49°08'09.73" N	Longitude: 122°21'05.96" W	Elevation: 9m
Legal description of property where work is proposed: Highway R/W MP 2169 and That Part of Statutory Right Of Way Plan 908 Of The East Half Of The South West Quarter Section 19 Township 17 New Westminster District		

3. Drawing, Plan and Site Map

1. Attach drawing showing lot boundaries, location of buildings and of proposed works, stream direction and flow.
2. Attach a key map at an appropriate scale showing the location of the site.
3. Attach engineering drawings (may be required for works identified with ^F under **Requires Approval** section below).

4. Proposed Timing for Work

Start (day/month/year): 27/09/2011	Finish (day/month/year): 30/09/2011
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FOR OFFICE USE ONLY

Date Received:	Water File Number:
	Client Number:
	Application Number:
	Amount Received:
	Receipt Number:

Requires Approval:

- ☐ Bank Erosion Protection ^E
- ☐ Bridge Installation/maintenance/removal (other than clear span) ^E
- ☐ Stream Diversion ^{QP} Diversion berm structure plan required
- ☐ Large Debris Removal – by machine ^{QP} plan required
- ☐ Gravel Removal ^{QP}
- ☐ Other: Provide details in space below

*Provide culvert dimensions:

Length:

Width:

Diameter:

- ^E Professional Engineer may be required
- ^{QP} Qualified Professional may be required

Requires Notification:

- ☐ Installation*/maintenance/removal of road crossing **culvert** (*follow Forest Practices Code Stream Crossing Guidebook)
- ☐ Construction/maintenance/removal of a **clear span bridge**
- ☐ Construction/maintenance of a **pipeline crossing**
- ☐ Construction/maintenance/removal of a **pier or wharf**
- ☐ Cutting of **annual vegetation** in a stream channel
- ☐ Repair/maintenance of existing **dike** or **erosion protection works**
- ☐ Construction/maintenance of **storm water outfalls**
- ☐ Control of **Eurasian Watermilfoil** or other **aquatic vegetation**
- ☐ Construction/maintenance of **ice bridge, winter ford or snowfall**
- ☐ Maintenance of minor and routine nature by a public utility
- ☐ Removal of a **beaver dam** (As authorized under the Wildlife Act)
- ☐ Small debris removal – by hand
- ☐ Construction of a **temporary ford**
- ☐ Construction of a **temporary diversion** around a worksite

The following require Notification and may only be undertaken by the Crown in right of either Canada or British Columbia, or their Agents:

Federal/Provincial

- ☐ Construction/maintenance/removal of a flow or water level **measuring device**
- ☐ Construction/removal of a **fish fence** or **screen, fish or game guard**
- ☒ Restoration/maintenance of **fish habitat**

The following require Notification and may only be undertaken by the Crown in right of either British Columbia, or a Municipality, or their Agents:

Provincial/Municipal

- ☒ Restoration/maintenance of a **stream channel**
- ☐ Clearing of an obstruction from a bridge or culvert during a flood emergency¹
- ☐ Construction or placement of **erosion protection works** or **flood protection works** during a flood emergency²

¹ Some activities fitting the description for Notification may be reviewed by Ministry/Agency staff, who may decide that an Approval is required.

² Must be completed under direction of the Crown. No notification is required prior to undertaking works, but a description of changes must be submitted to a habitat officer within 72 hours of the change.

^{QP} QP means a professional who through suitable education, experience, accreditation and knowledge may be reasonably relied on to provide advice within their area of expertise.

Detailed Description of Work to be Performed (continue on next page):

Total area disturbed by proposed works (all sites): 900 m²

The instream works will be located south of Highway 7 and east of Silverdale Creek and will be completed during the instream work window (August 1 to September 30). The Ministry of Transportation and Infrastructure has entered into an agreement with the Fraser Valley Watersheds Coalition to contour the existing channel to ensure fish passage, add pools, a riffle and riparian planting to enhance habitat values in the southeast tributary to Silverdale Creek. To allow access to the instream area, a temporary culvert will be installed at an access location at the east end of the tributary that was previously decommissioned. The culvert will be removed upon completion of project works.

Fisheries and Oceans Canada habitat restoration staff will design and supervise construction of the works.

Detailed Description of Work to be Performed, continued (attach a separate document if more space is required):

Works will be located on MoT right-of-way and on Canadian Pacific right-of-way. These works are additional to works previously completed under Section 9 Approval A2005620.

6. Land Ownership

Please check one of the following:

☒ The applicant is the owner of the property.

☐ The property is Crown land. Tenure/licence number:

☒ The property is owned by the following Landowner (i.e. Landowner is different from applicant):

Landowner's Name: Canadian Pacific

Address: 1100 200 Granville St

City: Vancouver

Province: BC

Postal code:
V6C 2R3

Phone: 604 643 3379

e-mail: Sarah.Perrault@cpr.ca

Do you have the Landowner's written approval to enter the land(s) to complete the works? ☒ Yes ☐ No

Note: a) Ownership of all parcels of land on which the proposed works will occur must be identified, b) do not attach the written approval with the application, but keep it for your files as you may be asked to produce it during an inspection or audit.

7. Who is doing the Work?

Contact information for company designing and supervising construction of the work (if different from applicant):

Company Name: Fisheries and Oceans Canada

Contact Name: Dave Nanson

Professional Affiliation:

Address: 100 Annacis Parkway - Unit 3

City: Delta

Province: BC

Postal Code:
V3M 6A2

Phone: 604-666-8182

e-mail: Dave.Nanson@dfo-mpo.gc.ca

Contact information for company undertaking the construction (if different from applicant):

Company Name:

Contact Name:

Address:

City:

Province:

Postal
Code:

Phone:

e-mail:

8. Statement of intent

By submitting this application form, I declare that the information contained on this form is complete and accurate information. I have read, understood and will meet the requirements to construct works and changes in and about a stream in accordance with Section 9 of the *Water Act* and Part 7 Water Act Regulations including, for Notifications, Terms and Conditions as specified by a Habitat Officer of the Ministry of Environment.

With respect to a Notification, in accordance with Part 7 of the Water Regulation, Section 40(1), I declare that I have submitted my application 45 days prior to the commencement of any work by me, or anyone employed by me. I understand that I will be receiving a confirmation of receipt of the application by Ministry of Environment (including confirmation of the applicable dates for the 45 day period) and that, unless I receive a response from a Habitat Officer within this 45 day notification period, I understand that I should not commence any activities until the 45 day notification period has passed. I understand that it is an offence under the *Water Act* to make changes in and about a stream without authority.

Signed: _____

Application Date: 23/09/2011

day/month/year

9. Submission instructions

Send the completed form along with the following attachments to the local office in which the proposed works are located. Addresses for local offices are listed on the instruction sheet.

Please note that if you are providing a Notification, no fees are required. However, a fee of \$130.00 is required if you are submitting an application for an Approval. The \$130.00 Approval application fee is not refundable. Payment for the Approval fee may be made at FrontCounter BC offices with a credit card.

If the proposed works require an Approval, prior to proceeding further with this application please ensure that this project will be able to proceed under the Federal *Fisheries Act*.

Required Attachments for both Notifications and Approvals:

☒ Sketch plan (mandatory)

☐ Engineering drawing (mandatory for works requiring approval noted with ^E)

☒ Key location map (mandatory)

☐ For works requiring an Approval **only**, a cheque, money order or deposit by credit card for \$130 payable to: Minister of Finance. The fee is non-refundable. No fee is required for a Notification.

10. Responsibilities

You are required to comply with all applicable federal, provincial and municipal laws and regulations. If you anticipate that the planned work may result in harmful alteration, disruption or destruction of fish habitat you should send a copy of your completed Notification/Approval Application directly to the nearest office of Fisheries and Oceans Canada. Review and comment by DFO may necessitate changes to the proposed works.

Has a copy of this notification/approval application been sent to Fisheries and Oceans Canada (check one)?
YES ☐ NO ☒

If YES, indicate the DFO office that the notification/approval application has been sent (for DFO offices, see Users' Guide):

Eedy, Rachael FLNR:EX

From: Eedy, Rachael FLNR:EX
Sent: Wednesday, September 21, 2011 3:54 PM
To: Letkeman, Joanne TRAN:EX
Subject: Notification for September compensation work at Silverdale Mission MoTI

Hi Joanne,

The Ecosystems Section Head (Scott Barrett) and Habitat Officer (Joshua Malt) have no objection to this habitat complexing work proceeding immediately under Notification. I would ask however that you complete an actual Notification form first (see item #1 below)

As discussed, this is Notification-type work (fish habitat restoration by Crown), based on:

- the understanding that there is not considerable relocation of the channel (beyond what was already Approved);
- the understanding that your request is actually for additional works to what was in the Approval, not an extension of time for the works authorized in the Approval
- the understanding that MoT will obtain consent from CPR and any other affected tenure/land holders before starting work;
- and the assumption that the work will comply with the Water Regulation (i.e. sections 40 to 44 on Notification relating to protecting water quality, habitat, and water users)

For our records, I would ask that the following be submitted/re-submitted:

1. Please send in a Notification application form to FrontCounter BC filled out completely with this email string and the drawing attached. This will go to a new Notification file.
2. Once the Notification has been sent, please email me consenting to "abandon" the Approval amendment application, which is now no longer needed.

Thanks!

Rachael Eedy

Rachael Eedy, M.Sc., R.P.Bio
Water Officer

South Coast Regional Office, Resource Authorizations
Ministry of Forests, Lands and Natural Resource Operations
Phone: (604)-582-5361
Email: Rachael.Eedy@gov.bc.ca
Fax: 604-930-7119
Address: Second Floor, 10470-152 Street, Surrey, BC, V3R 0Y3
Our Vision: Economic prosperity and environmental sustainability

From: Barrett, Scott FLNR:EX
Sent: Wednesday, September 21, 2011 3:34 PM
To: Eedy, Rachael FLNR:EX
Cc: Malt, Joshua FLNR:EX; Robbins, Kristina FLNR:EX
Subject: RE: Potential Notification for September compensation work at Silverdale Mission MoTI

Good to go.

From: Eedy, Rachael FLNR:EX
Sent: Wednesday, September 21, 2011 2:36 PM
To: Malt, Joshua FLNR:EX; Barrett, Scott FLNR:EX
Cc: Robbins, Kristina FLNR:EX
Subject: RE: Potential Notification for September compensation work at Silverdale Mission MoTI

Thanks, Josh. I'll tell MoTI they can proceed with the work under Notification. Scott, if you have anything before then, please let me know by the end of this week.

Rachael

From: Malt, Joshua FLNR:EX
Sent: Wednesday, September 21, 2011 2:17 PM
To: Eedy, Rachael FLNR:EX; Barrett, Scott FLNR:EX; Robbins, Kristina FLNR:EX
Subject: RE: Potential Notification for September compensation work at Silverdale Mission MoTI

I have no problem with preceding in advance of the 45 day waiting period for this project.

Josh Malt, M.Sc., R.P.Bio.
Ecosystem Biologist
Forests, Lands, and Natural Resource Operations
10470-152 Street, Surrey, BC, V3R 0Y3

Tel: (604) 582-5282
Cell: (604) 992-7164
Fax: (604) 930-7119

From: Eedy, Rachael FLNR:EX
Sent: Wednesday, September 21, 2011 2:12 PM
To: Barrett, Scott FLNR:EX; Malt, Joshua FLNR:EX; Robbins, Kristina FLNR:EX
Subject: Potential Notification for September compensation work at Silverdale Mission MoTI
Importance: High

Hi Scott,

This work came in as an Approval amendment application but could fall under Notification (for restoration of fish habitat by Crown). MoTI has been asked by DFO to recontour/complex one of the channels that they re-aligned as part of that Silverdale highway work Approval. See attached drawing and Word document.

They want to do the work in late September. If Ecosystems has no objection, could they proceed in advance of the 45 day waiting time? I assume we would then ask MoTI to resubmit the paperwork with a Notification form attached for your Notification records (?)

((

If I don't hear back from any of you by Tuesday the 27th, I'll go ahead and review it as an Approval amendment. That option is also possible, but more work, and there might be some timing difficulties on this end (with signing s.22 s.22

Thanks!

Rachael

Rachael Eedy, M.Sc., R.P.Bio
Water Officer

South Coast Regional Office, Resource Authorizations
Ministry of Forests, Lands and Natural Resource Operations
Phone: (604)-582-5361
Email: Rachael.Eedy@gov.bc.ca
Fax: 604-930-7119
Address: Second Floor, 10470-152 Street, Surrey, BC, V3R 0Y3
Our Vision: Economic prosperity and environmental sustainability

From: Letkeman, Joanne TRAN:EX
Sent: Wednesday, September 21, 2011 1:54 PM
To: Eedy, Rachael FLNR:EX
Subject: FW: Request for amendment - Approval A2005620
Importance: High

Hi Rachel,

Below is my original email to Front Counter. Attached is the original approval and the amendment request. I have also attached the approved design drawing.

<< File: Silverdale ROW Channel.pdf >>

Please note that the works will be done by the Fraser Valley Watersheds Coalition and DFO Restoration on behalf of MoT, with MoT providing access construction and traffic control. DFO would like to complete these works as soon as possible as the fisheries timing window is ending at the end of this month. We appreciate your efforts to expedite this amendment.

Best regards,
Joanne Letkeman

Joanne M. Letkeman BSc.
Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region

Telephone: 604-660-8072
Fax: 604-660-2181

From: Letkeman, Joanne TRAN:EX
Sent: Wednesday, September 7, 2011 8:02 AM
To: FrontCounter BC Surrey ILMB:EX

Cc: Dunbar, Jay; 'Lance Lilley'; 'Nanson, Dave'; 'Alan Stockwell'; Johnson, Kym L FLNR:EX
Subject: RE: Request for amendment - Approval A2005620

Hello,

Please find attached the amendment form and a copy of the original approval. I believe the province is exempt from the fee.

Regards,
Joanne

<< File: Water Act Approval A2005620.pdf >> << File: Request for Amendment to Approval A2005620.docx >>

Joanne M. Letkeman BSc.
Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region

Telephone: 604-660-8072
Fax: 604-660-2181

From: Johnson, Kym L FLNR:EX
Sent: Tuesday, September 6, 2011 2:29 PM
To: Letkeman, Joanne TRAN:EX
Subject: RE: Request for time extension - Approval A2005620

My apologies. Here it is. << File: Amendment for Approval Form.doc >>

Kym Johnson
Water Information Technician
Water Allocation, South Coast Region
Ministry of Forests, Lands & Natural Resource Operations
2nd Floor - 10470 - 152nd Street, Surrey BC V3R 0Y3
Phone: 604-582-5340 | Fax: 604-930-7119
Our Vision: Economic prosperity and environmental sustainability

From: Letkeman, Joanne TRAN:EX
Sent: Tuesday, September 6, 2011 1:33 PM
To: Johnson, Kym L FLNR:EX
Subject: RE: Request for time extension - Approval A2005620

Thank you Kym. Could you please send the amendment form. It wasn't attached to your previous email.

Joanne

Joanne M. Letkeman BSc.
Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region

Telephone: 604-660-8072
Fax: 604-660-2181

From: Johnson, Kym L FLNR:EX
Sent: Tuesday, September 6, 2011 12:11 PM
To: Letkeman, Joanne TRAN:EX
Cc: Dunbar, Jay; 'Nanson, Dave'
Subject: RE: Request for time extension - Approval A2005620

Please request an amendment on your water approval (copy of amendment form attached).

Please submit the amendment and appropriate fees to FrontCounter BC.

Your approval expires on September 31, 2011. Please send a copy of the amendment to my attention, so we can begin processing before the approval expires.

I can be reached at the number below.

Kym Johnson
Water Information Technician
Water Allocation, South Coast Region
Ministry of Forests, Lands & Natural Resource Operations
2nd Floor - 10470 - 152nd Street, Surrey BC V3R 0Y3
Phone: 604-582-5340 | Fax: 604-930-7119
Our Vision: Economic prosperity and environmental sustainability

From: Letkeman, Joanne TRAN:EX
Sent: Friday, August 26, 2011 10:37 AM
To: Johnson, Kym L FLNR:EX
Cc: Dunbar, Jay; 'Nanson, Dave'
Subject: Request for time extension - Approval A2005620

Hello Kym,

MoT requests a two-week extension to the above mentioned approval expiry date to complete the final instream works associated with the approval.

Please get in touch s.22 i to discuss.

Thanks,
Joanne

Joanne M. Letkeman BSc.
Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region

Telephone: 604-660-8072
Fax: 604-660-2181

Eedy, Rachael ENV:EX

From: Cyr, Joanne TRAN:EX
Sent: Wednesday, July 22, 2009 8:56 AM
To: Eedy, Rachael ENV:EX
Cc: 'McQuibban, James'; 'colleen.phung@tc.gc.ca'
Subject: RE: A2005620 FN letters

Hi Rachael,

Thank you for this information. I have forwarded your email to James McQuibban at Transport Canada. In order to properly address these concerns, what action should the ministry take, if any? Would you advise that we contact the First Nations directly or will MoE be in contact with them to relay information about the project?

s.13,s.16

Regards,
Joanne Cyr

Joanne M. Cyr BSc.
Assistant Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region

Telephone: 604-660-8072
Fax: 604-660-0350

From: Eedy, Rachael ENV:EX
Sent: Friday, July 17, 2009 1:46 PM
To: Cyr, Joanne TRAN:EX
Subject: A2005620 FN letters

Hi Joanne,

As requested, here is a summary of the FN letters. Please forward this to Colleen or James as appropriate.

1. We received a letter from Larry George, Manager Lands and Governance Department, Cowichan Tribes dated May 29, 2009 (office phone: 250-748-3196). It identifies the site as being of interest as a tributary of the Fraser and salmonid habitat. s.13,s.16
s.13,s.16
I left a voice mail in response on June 24 and have not received any further correspondence.

2. We also received a letter from Chief Lisa Silver of Penelakut Tribe dated June 30, 2009 on July 14 (office phone 250-246-2321). It notes that the Penelakut people have traditionally used the Fraser and its tributaries s.13,s.16 ; resulting from the proposed activities.

Please contact the senders directly if you would like copies of the letters. I would prefer not to provide copies of FN letters to proponents or third parties without the sender's permission, as per Section policy.

My preliminary assessment is that considerations related to archaeology and construction methods do not require further review from WSD. Considerations related to fish, wildlife and habitat are reflected in earlier review and ongoing discussion regarding habitat compensation.

Sincerely,
Rachael Eedy

From: Cyr, Joanne TRAN:EX
Sent: Tuesday, July 14, 2009 10:31 AM
To: Eedy, Rachael ENV:EX
Cc: 'Alan Stockwell'; Lee, Brian TRAN:EX; Wong, Sean TRAN:EX; Czernick, Greg G TRAN:EX
Subject: RE: A2005620 habitat compensation and clarification for Silverdale

Rachael,

Thank you for your comments. We will get back to you with a response shortly. Were you able to communicate with Colleen Phung at Transport Canada regarding the FN comments that you received? I know that she is away at the moment and her alternate contact is James McQuibban. James can be contacted at 604-666-2694 or through email at james.mcquibban@tc.gc.ca.

I would also like to see the FN comments to make sure we adequately address their concerns.

Joanne

Joanne M. Cyr BSc.
Assistant Environmental Coordinator
Ministry of Transportation and Infrastructure
South Coast Region

Telephone: 604-660-8072
Fax: 604-660-0350

Eedy, Rachael ENV:EX

From: Karpouzi, Vasiliki ENV:EX
Sent: Thursday, July 9, 2009 2:58 PM
To: Eedy, Rachael ENV:EX
Cc: Barrett, Scott ENV:EX; 'Lisa.McDonald@dfo-mpo.gc.ca'
Subject: RE: MoT Silverdale habitat comp 2 of 2 A2005620

Dear Rachael,

The Ecosystems Branch (Environmental Stewardship Division) believes that Highway 7 widening works immediately south of the Silverdale wetland will result in the loss of valuable habitat. In particular, works will entail the lateral encroachment and infilling of much of the southern ditch line, resulting in loss of a pond-line open waterway as well as surrounding well-established mature riparian shrubs and trees. The ponds provide seasonal rearing habitat for juvenile salmonids and feed nutrients to downstream fish habitat through the Silverdale Creek, which connects the adjacent wetland and ponds with the Fraser River. Moreover, the ponds may serve as useful breeding habitat for red-legged frogs and northwestern salamanders, as both species have been recorded in the area. Also, Great Blue Herons have been observed foraging in the ponds, while the adjacent wetland has been recognized as one of the few remaining in the Fraser Valley of vital importance to migrating and wintering waterfowl and wading birds. The wetland provides foraging, roosting and nesting grounds for species such as mallards, wood ducks, wigeons, teals, scaups, and herons.

In recognizing the habitat and wildlife values associated with the Silverdale wetland network and the need to adequately offset the loss of important habitat as a result of highway widening works, Ecosystems agrees in principle to contributing to, as we are able, a partnership with MoT, DFO, DoM, and local stewardship groups with related interests.

Ecosystems urges that the following provisions be met and included in the Memorandum of Understanding, to ensure a successful partnership:

- A detailed habitat and species (fish and wildlife, including sensitive and species at risk) inventory be completed, prior to works proceeding, to assist in properly enumerating ecosystem values.
- Terms of References (ToR) be developed during the early stages of the partnership building process. ToR will help detail:
 - The vision, objectives, and scope of the partnership.
 - The roles and responsibilities of all agencies and local groups involved in the partnership. It should also be clearly stated that the technical steering committee will only deal with compensation-related (e.g., potential properties for acquisition, habitat and wildlife values properly addressed and adequately incorporated in the habitat compensation plan) and not construction-related issues.
 - The budget and other financial resources assigned and secured for the fish and wildlife habitat compensation plan implementation;
 - The expected timeline (briefly discussed on page 11 of the letter submitted to DFO by Alan Stockwell, Hatfield Consultants, on April 27, 2009) that will lead to the completion of the habitat compensation project;
 - The plans and procedures decided upon to monitor long-term effectiveness of compensation works.

Acquisition of land and off-site habitat compensation should not exclude any on-site mitigation opportunities. The proponent should explore possibilities on-site to enhance the biological value of the remnant ditches by, for instance, establishing connections with the wetland north of Highway 7 (creation of wildlife corridors), and implement a water quality treatment plan. Such efforts may assist in alleviating temporary construction-related impacts, as well as permanent effects associated with loss of habitat and habitat fragmentation.

Ecosystems recommends that all the above provisions be part of the *Water Act* approval requirements issued by WSD.

Ecosystems will participate in the partnership with a role in the technical steering committee. I will represent Ecosystems until the end of my term (September 18, 2009), upon which Scott Barrett, or another delegate, will take over.

Sincerely,

Vasiliki Karpouzi, M.Sc.

Scientific Technical Officer
Ecosystems Branch
Ministry of Environment
2nd floor, 10470 - 152 Street
Surrey BC
V3R 0Y3

Tel: 1 604 582 5329
Fax: 1 604 930 7119
Email: Vasiliki.Karpouzi@gov.bc.ca

-----Original Message-----

From: Eedy, Rachael ENV:EX
Sent: Monday, July 6, 2009 10:58 AM
To: Karpouzi, Vasiliki ENV:EX
Subject: MoT Silverdale habitat comp 2 of 2 A2005620

Hi Vaso,

Note that MoT has asked if a representative from ESD would participate in the steering committee for planning habitat compensation.

Rachael

-----Original Message-----

From: Cyr, Joanne TRAN:EX
Sent: Monday, July 6, 2009 9:38 AM
To: Eedy, Rachael ENV:EX
Cc: Alan Stockwell (astockwell@hatfieldgroup.com); Czernick, Greg G TRAN:EX; Lee, Brian TRAN:EX
Subject: Highway 7 information regarding compensation plan and partnership model

Hello Rachael,

In our submission to DFO on 29April09 (attached), we outlined a partnership model to deliver the compensation plan for the project. While the habitat balance figures and compensation costs have been updated since this document was submitted, the information regarding the partnership model is current.

Eedy, Rachael ENV:EX

From: Eedy, Rachael ENV:EX
Sent: Monday, July 6, 2009 10:58 AM
To: Karpouzi, Vasiliki ENV:EX
Subject: MoT Silverdale habitat comp 2 of 2 A2005620
Attachments: Sample_Implementation_Project_Report_RoseKirk.pdf; 090427 HWY 7 DFO Supplemental Information Final submitted to DFO 29Apr09.pdf

Hi Vaso,

Note that MoT has asked if a representative from ESD would participate in the steering committee for planning habitat compensation.

Rachael

-----Original Message-----

From: Cyr, Joanne TRAN:EX
Sent: Monday, July 6, 2009 9:38 AM
To: Eedy, Rachael ENV:EX
Cc: Alan Stockwell (astockwell@hatfieldgroup.com); Czernick, Greg G TRAN:EX; Lee, Brian TRAN:EX
Subject: Highway 7 information regarding compensation plan and partnership model

Hello Rachael,

In our submission to DFO on 29April09 (attached), we outlined a partnership model to deliver the compensation plan for the project. While the habitat balance figures and compensation costs have been updated since this document was submitted, the information regarding the partnership model is current.

In our submission to DFO on 19June09, we provided additional information in response to DFO's concern that properties identified for potential acquisition were not sufficiently characterized with respect to viability to support the proposed enhancements. Our response is copied below:

"MoT has been in discussions with potential partners including the District of Mission, Ducks Unlimited Canada, and the Stave Valley Salmonid Enhancement Society regarding a strategy to advance the partnership model option. All participants recognize the need to assess the viability of potential properties, but this unfortunately cannot be accomplished to the level of detail requested before the project authorization is required. The suggested approach to give DFO assurance of the ability of the partnership to provide adequate project compensation is outlined below:

1. Potential partners provide proof of agreement in principle to forming a partnership based on the proposed model to undertake land acquisition and restoration activities.
2. Complete a desktop assessment of the biological values and water resources of each identified property.
3. Complete site visits with DFO, including habitat restoration biologists, and other stakeholders. Quantify potential riparian and instream restoration potential of each property and use the information to assign priority to the properties.

4. Proceed to formalize the partnership, once the DFO authorization has been issued, and convene the steering committee to begin work with the goal of securing a viable property by the end of project construction".

In further discussions with DFO regarding the partnership model, we have committed to preparing a memorandum of understanding for signature by all interested stakeholder groups that outlines the roles and responsibilities of the various groups. The Ministry of Environment is invited to participate in the partnership with a role on the technical steering committee. In this capacity, MoE can ensure that wildlife habitat compensation is addressed alongside the fisheries compensation aspects in any future property acquisition or habitat enhancement projects designed to offset impacts associated with the project.

Regards,
Joanne



April 27, 2009

Ref. No.: 1461

Ms. Lisa McDonald, B.Sc., Dipl. Tech.
Habitat Biologist
Fisheries and Oceans Canada
Mission Field Office
32873 London Avenue
Mission, BC
V2V 6M7

**Re: Highway 7 Nelson to Wren Street Four-Laning Project, Mission, BC
Project Review Information for DFO- Supplemental Information**

Dear Ms. McDonald:

Further to the initial project review information package submitted to Fisheries and Oceans Canada (DFO) in January 2009, please find enclosed supplementary information for the abovementioned project. Final design work has been completed for the project and the tendering process is underway for subsequent construction. Now that the detailed design drawings are available we have completed final calculations of the fish and fish habitat related impacts associated with the highway widening and new bridge installation.

As outlined in the initial information package, the project includes the widening of Highway 7 between Nelson Street (to the west) and Oliver Street (to the east) to four lanes from its current two-lane configuration and replacement of the existing bridge over Silverdale Creek. In addition, several hundred meters of existing roadbed will be modified at each end of the project site including the installation of preload/surcharge west of Nelson Street to accommodate future highway widening works associated with Nelson Street intersection improvements.

Fish Habitat Impact Assessment

Highway Widening Related Impacts

The highway widening works will entail the lateral encroachment and infilling of much of the southern ditch line. The impacts were recalculated based on the encroachment from the top of the highway shoulder to the toe of the proposed slope. As shown in Table 1 below and on attached drawings R1-592-102, 103, 104 and 105, a total of 23,470 m² of riparian vegetation will be affected by the proposed highway widening works. The quality of this aquatic habitat has been described in our January 2009 submission but in general these ditches provide seasonal rearing habitat for juvenile salmonids during periods of high water in the Fraser River and

Silverdale and Chester Creek. Overwintering opportunities in these connected channels depends on the amount and quality of water available during the winter period.

Table 1: Summary of Project Impacts

Watercourse	Location /	Habitat Description	Riparian Area Impact (m ²)
Highway Widening Related Impacts (23,470 m²)			
Roadside Watercourse (Ditch)	West of Nelson Street Sta. 19+35 to 27+00	Fish bearing during high water (freshet) conditions	10,177
Roadside Watercourse (Ditch)	East of Nelson Street to West of Silverdale Creek Sta. 27+00 to 33+00	Fish bearing during high water (freshet) conditions	8,579
Roadside Watercourse (Ditch)	East of Silverdale Creek Sta. 33+75 to 35+60	Fish bearing during high water (freshet) conditions	2,486
Roadside Watercourse (Wetland)	Sta. 35+70 to 37+70	Contributes to downstream fish populations	2,228
Bridge Related Impacts (1,556 m²)			
Silverdale Creek	Sta. 33+00 to 33+75	30m from wetted perimeter during low water conditions	1,264
Silverdale Creek	Sta. 33+00 to 33+75	Floodplain Bench	292
Total Project Impacts			25,026 m²

The total impact area is slightly higher than the calculation provided in the January 2009 information package (50% design stage). The major difference between the two estimates is that the preload works west of Nelson Street were not included as part of the original calculations. In addition to the encroachment of ditch areas, a calculation was included for the impact to the wetland area east of Sta. 35+70 (see drawings R1-592-104 and R1-592-105). This wetland area is accessible to fish from Silverdale Creek, primarily during high water periods, and contributes nutrients to downstream fish habitat. In order to maintain connectivity between the wetland and Silverdale Creek a fish-passable ditch will be maintained along the toe of slope between the highway and the CN Rail ballast. The path of this ditch from the culverts at Sta. 38+20 flows west to Silverdale Creek is shown by blue arrows on the drawings. Further enhancement of fish passage will result from the removal of the access road and culvert at Sta. 35+60. It is important to note that a remnant ditch will also remain along the toe of slope west of Silverdale Creek. This ditch will also be fish-passable during period of high water.

Bridge Related Impacts

As detailed in Table 1, approximately 1,556 m² of existing riparian vegetation will be eliminated due the Silverdale Creek bridge replacement. This has been calculated based on a 30 m setback from the high-water mark shown on the attached drawing R1-592-104. Correspondingly, 292 m² of the total riparian impact occurs on the floodplain bench located to the south of the existing bridge. No instream impacts are associated with the bridge replacement. The impacts will be offset in part through the removal of the old wooden bridge structure including 16 instream piles.

Habitat Compensation Plan

Based on initial discussions with DFO a 2:1 compensation ratio would be required for riparian impacts from the proposed project. Therefore, approximately 5 ha of compensation area will be needed to offset the project impacts. This is a considerable area and virtually none of it can be accommodated on-site. Therefore, discussions regarding off-site compensation options to offset aquatic habitat losses detailed above are currently underway between the Province (MOT), DFO, local stewardship groups and the District of Mission. In this regard, there appear to be several promising options involving a financial contribution to offset costs associated with additional enhancements in the Silverdale Creek wetland area north of the project site, and the possible contribution of funds to acquire a parcel of land in the general project area for conservation and enhancement purposes. In order to further advance these compensation options it is necessary to calculate estimated costs for the creation of equivalent riparian habitat at an offsite location. Cost estimates are provided in Table 2 below.

Table 2: Summary of Estimated Compensation Costs

Cost Item	Unit Cost	Number of Units	Cost
Riparian Planting - 60% shrubs, 40% trees (85% deciduous and 15% conifer)*			
<i>Deciduous Trees (based on 17,018 m² of planting area)</i>	s.13,s.17	4,255 trees	s.13,s.17
<i>Coniferous Trees (based on 3,003 m² of planting area)</i>		751 trees	
<i>Shrubs (based on 30,031 m² of planting area)</i>		30,031 shrubs	
Environmental Monitoring during Site Preparation and Planting			
Maintenance over initial growth period (10% of hard costs)			
Post Construction Monitoring (5 years of follow-up inspections and reporting)		5 years	
Total Cost			\$714,735

* Includes cost of plant stock (2 gal pots) and planting

Spacing Formula: $N = \text{Area} / (L \times W)$, where N = number of plants, L = spacing between rows, and W = spacing between columns

Planting Densities: Shrubs 1 m spacing; Trees 2 m spacing

Based on the figures presented above the estimated unit cost for the riparian planting is in the range of \$20.00 per plant.

Silverdale Wetland Enhancements

There is potential for additional riparian and wetted habitat enhancements on this parcel. In discussions with Matt Foy, DFO Habitat Restoration Biologist, his thoughts are that more work could be done in a 2010 work window similar to the March work window used this year (e.g. pre-freshet), with summer 2010 being another option for additional work.

There are many benefits to doing additional work on this site. For example, the project:

- is probably the most shovel ready of the options presented, with much of the administrative planning, approvals, project delivery model and conceptual design either completed or delivered in the initial phase of work;
- has good MoT linkages (through our Environmental Enhancement Fund);
- should be cost-effective and will provide excellent benefits; and
- is within the primary watershed of impacts, immediately upstream of the highway widening works.

Also since the property is already secured as an environmental area, it offers savings in time and effort to negotiate, purchase and protect an environmental area. The photos below show areas within the Silverdale Wetland site that could be developed with additional enhancement works.



Additional areas that may be developed into enhanced wetted and riparian habitat.



Riparian areas along existing pond are candidates for reed canary grass removal and planting with native wetland, shrub and tree species to provide higher biodiversity.

Property Acquisition Partnership Model

Although there remain some uncertainties concerning property acquisition and associated potential enhancement opportunities, MoT has been working with local stakeholders to identify potential properties in the general project area. In this regard, the attached list (Attachment A) has been compiled by the District of Mission to provide a brief description of eight priority properties and their locations (Attachment B). The Silverdale Avenue property (property number 2) has been the focus of previous discussions with DFO but several other properties on the list also have good conservation/enhancement potential for both aquatic and terrestrial habitat.

In addition to the property list, we have also attached a proposed partnership model (Attachment C) and sample implementation plan (Attachment D) for compensation funding previously worked out between Ducks Unlimited and the Vancouver Fraser Port Authority. The model provides a possible mechanism for property acquisition and subsequent enhancement initiatives. We would be interested in your comments on the applicability of this type of process for our project.

As indicated above the following drawings are attached as part of this information package:

- Ministry of Transportation Engineering Drawings for the Highway 7 Nelson to Wren Street Four-Laning No. R1-592-101 to No. R1-592-105 modified to show riparian impacts from the highway widening and bridge replacement.

Based on the information provided in this package we would appreciate hearing back from you concerning the acceptability of our compensation cost estimate and the progress made on

possible property acquisition to offsite compensation requirements. Please feel free to contact the undersigned at 604 926-3261 (cell 604 787-8076) if you have any related questions or supplementary information requests.

Sincerely yours,

Hatfield Consultants Partnership

A handwritten signature in black ink, appearing to read 'A. Stockwell', with a long horizontal flourish extending to the right.

Alan Stockwell, M.Sc., R.P.Bio.
Senior Environmental Specialist & Partner

Attachment A

**CONFIDENTIAL
FOR DISCUSSION PURPOSES ONLY**

Properties of Interest to the District of Mission re: Hwy 7 Widening & Compensation
s.13,s.16,s.17

Priority	Property Description	Area(ha)	Address	Comments
1	s.13,s.16,s.17			
2				
3				
4				
5				

s.13,s.16,s.17	
6	
7	
8	

Attachment B

Location of Properties of Interest

Copyright

Attachment C

Partnership Model for Project Compensation

The concept of this model is to improve resource efficiencies and effectiveness amongst partners for habitat acquisition and restoration at a regional scale. The first priority is to secure property, generally through acquisition (although other options such as donation or conservation covenants may also exist). Residual funds after acquisition or future funds obtained through a variety of initiatives would be targeted towards restoration. However, in some cases, restoration funding may be targeted to parcels of land that are already secured by a partner. The model should not be onerous in terms of resources, as once priority properties are identified for acquisition and restoration and agreed up by the committee, the committee convenes only when funding opportunities exist.

The proposed Partnership Model provides a vehicle that will allow MoT to compensate for fisheries and wildlife impacts related to the development of the Highway 7 Nelson to Wren highway and bridge improvement project. The Partnership will facilitate land acquisition and enhancement works on property(ies) with significant conservation potential.

The objectives of this partnership model for compensation/mitigation are to:

- a) Provide compensation/mitigation funding in a fund that can be held for five (5) years, relaxing the requirement to complete compensation and mitigation activities within a year of the activity triggering DFO authorization. This would allow the selection and development of optimal projects.
- b) Enable the fund to contribute funding to mitigation projects that involve multiple stakeholders (i.e. local government and non-governmental agencies) or leverage other funding mechanisms (i.e. Bridge Coastal)
- c) Ensure there is transparency and accountability for project selection and delivery that meets the needs of Fisheries and Oceans Canada.
- d) Ensure that applicable projects include both acquisition and restoration (enhancement) activities.

Proposed Partnership Model

The key element of the Partnership Model is the organization of a Steering Committee to oversee the partnerships activities and spending to ensure that the funds are spent appropriately and to the best advantage to meet the objectives of the partnership.

The Steering Committee should include members that have local knowledge of potential projects, experience in prioritizing and delivering projects and the ability to receive and administer funds. Potential members include: District of Mission; Ducks Unlimited Canada; Fisheries and Oceans Canada; Stave Valley Salmonid Enhancement Society; Pacific Salmon Foundation; and other groups that have related interests

The Process

- 1) DFO Authorization
 - a) The DFO authorization process identifies habitat type and amount of required compensation (e.g. hectares of riparian habitat).
 - b) The compensation funding (i.e. dollars) is provided through the DFO authorization with potential feedback on the appropriate dollar amount from the steering committee.
- 2) Mitigation Fund Financial Administration
 - a) The compensation funding is placed into the account of one of the agencies on the steering committee. The funding cannot be used or accessed until the Project Implementation Plan is approved by DFO signature (e.g. Lower Fraser Area Chief)
- 3) Steering committee
 - a) Identifies potential projects (acquisition and restoration/enhancement)
 - b) Develops criteria to prioritize projects
 - c) Selects projects
 - d) Develops project concept and links with other funding opportunities (if possible). The concept includes whether funding is applied to a single project or to a combination of acquisition/restoration projects and the general approach (i.e. acquisition of property, riparian planting, tidal flooding etc).
 - e) Develops detailed Project Implementation Plan that includes background, objectives, activities, monitoring procedures, any technical information and associated cost (i.e. design, implementation, immediate and long term monitoring) as well as agency who will deliver the project (see attached example of Rose-Kirkland).
- 4) Project Implementation Plan report is signed off by DFO staff prior to project implementation.
- 5) Identified agency delivers the project and is reimbursed from the fund upon submitting a progress report that identifies activities completed as well as financial costs incurred. This reporting would continue until the post-construction monitoring commitments are completed (if applicable).
- 6) All project status and monitoring reports are provided to the steering committee, which includes DFO.

Attachment D

Sample Implementation Plan: Vancouver Fraser Port Authority – Deltaport Third Berth

HABITAT BALANCE

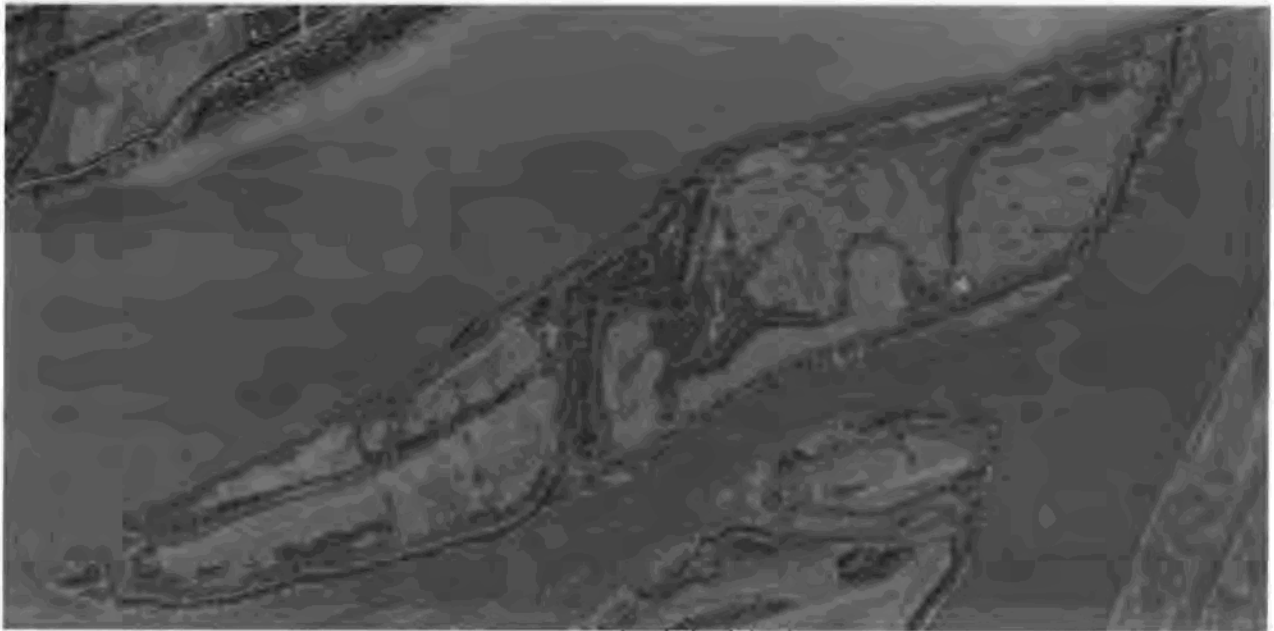
Hwy 7 Wren Street to Nelson Street 4 Lining

Watercourse	Location	Habitat Description	Construction Habitat Loss		Compensation Ratio	Post-Construction Habitat Gain		Net Habitat Gain		Proposed Compensation
			Aquatic/Floodplain	Riparian		Aquatic/Floodplain	Riparian	Aquatic/Floodplain	Riparian	
Highway Widening Related Impacts (m ²)										
Roadside Drainage Watercourse	s.13,s.17	Fish bearing during high water conditions – low to moderate temporary salmonid rearing habitat and nutrient contribution to downstream fish populations	2,815	2,707	1:1	2,815	2,707	0	0	s.13,s.17
Roadside Drainage Watercourse		Fish bearing during high water conditions – low to moderate temporary salmonid rearing habitat and nutrient contribution to downstream fish populations	2,815	2,707	2:1	5,630	5,416	2,815	2,707	
Roadside Drainage Watercourse and Wetland Area		Fish bearing during high water conditions – low to moderate temporary salmonid rearing habitat and nutrient contribution to downstream fish populations	6,909	9,136	2:1	13,818	18,272	6,909	9,136	
Roadside Drainage Watercourse		Fish bearing during high water conditions – low to moderate temporary salmonid rearing habitat and nutrient contribution to downstream fish populations	1,284	3,737	1:1	1,284	3,737	0	0	
Bridge Related In										
Silverdale Creek		30m from wetted perimeter during low water conditions Fish bearing during high water conditions – moderate temporary salmonid rearing habitat	443	1,151	2:1	886	2,302	443	1,151	
TOTAL PROJECT IMPACTS			14,266	19,438		24,433	32,434	10,167	12,994	

s.13,s.17

Activity	Unit Cost	Quantity	Cost
Ground preparation / invasive plant removal	s.13,s.17	7500 m ²	s.13,s.17
Ground cover seeding		7500 m ²	
Planning and design and consultation			
Beaver guards			
Riparian Planting - 60% shrubs, 40% trees (85% deciduous and 15% conifer)*			
Deciduous Trees (based on 2550 m ² of planting area)	s.13,s.17	638	
Coniferous Trees (based on 450 m ² of planting area)		112	
Shrubs (based on 4500 m ² of planting area)		4500	
new channel construction		5000	
As-built drawings			
Environmental Monitoring during Site Preparation and Planting			
Maintenance over initial growth period			
Post Construction Monitoring (5 years of follow-up inspections and reporting)		5 years	

Activity	Unit Cost	Quantity	Assumptions	Cost
Ground preparation / invasive plant removal	s.13,s.17	18486 m ²	Based on rate used for Evans Connector Project	s.13,s.17
Soil		18486 m ²	Based on rate used for Evans Connector Project	
Ground cover seeding		18486 m ²	Based on rate used for Evans Connector Project	
Planning and design				
Beaver guards				
Riparian Planting - 60% shrubs, 40% trees (85% deciduous and 15% conifer)*				
<i>Deciduous Trees (based on 6285 m² of planting area)</i>	s.13,s.17	1571 trees	Includes cost of plant stock (2 gal pots) and planting based on previous project examples.	
<i>Coniferous Trees (based on 3,003 m² of planting area)</i>		277 trees	Spacing Formula: $N = \text{Area} / (L \times W)$ where N = number of plants L = spacing between rows W = spacing between columns	
<i>Shrubs (based on 30,031 m² of planting area)</i>		11092 shrubs	Planting Densities: Shrubs 1 m spacing; Trees 2 m spacing	
new channel construction		15334 m ²	Provided by MoT Senior Biologist based on previous project experience	
Environmental Monitoring during Site Preparation and Planting				
Maintenance over initial growth period			Hard costs include ground preparation, soil application, seeding, planting, channel construction	
Post Construction Monitoring (5 years of follow-up inspections and reporting)		5 years		



OVERVIEW

During the harmonized environmental assessment review of the Deltaport Third Berth project (DP3), the Vancouver Fraser Port Authority (VFPA) developed, in consultation with the environmental agencies, a habitat compensation plan referred to as the DP3 Proposed Habitat Compensation Plan (March 12, 2006) (HCP). The HCP outlines strategic-level on-site and off-site habitat compensation initiatives to be undertaken to address the residual negative effects identified during the review process of the project. Based on the HCP, this Report has been prepared to describe the first proposed off-site habitat compensation project that will be delivered by Ducks Unlimited Canada (DUC) in partnership with VFPA, Fisheries and Oceans Canada (DFO), Environment Canada (EC) and Pacific Salmon Foundation (PSF).

BACKGROUND

As part of the DFO authorization 02-HPAC-PA1-000-000144 for the DP3 Project the VFPA agreed to complete offsite habitat compensation to create and protect fish and migratory bird habitat. This habitat compensation plan is described in Schedule D of the DFO Authorization, and is outlined in the Fish and Migratory Bird Habitat Agreement (dated Dec 4, 2006) between the VFPA, DFO, EC, DUC and PSF (Attached in Schedule G of the DFO authorization).

As part of the DP3 habitat offsite compensation plan, the VFPA agreed to fund \$1.5 million of fish and migratory bird habitat creation and protection works. The goal of the agreement is the creation of a minimum of 7.5 hectares of fish and migratory bird habitat in the lower Fraser River estuary as off-site habitat compensation for the DP3 Project.

To implement the compensation plan, the partnership developed a steering committee to provide direction and review potential sites and a technical committee to develop the detail requirements of physical works for the selected sites. The steering committee members are: Brad Fanos (DFO), Andrew Robinson (EC), Les Bogdan (DUC), and Dianne Ramage (PSF). The technical

committee members include: Matt Foy (DFO), Kathleen Moore (EC), Dan Buffett (DUC), Paul Usher (DUC), and Dianne Ramage (PSF). The steering committee identified and assessed several potential sites and determined a priority list based on the value of the habitat for fish and migrating birds. The most effective projects (in order of priority) will be:

- 1) Pool segment on Rose-Kirkland Island in the south arm of the Fraser River
- 2) Frenchies Island located on the south arm of the Fraser River
- 3) Intertidal habitat on the exterior of the dyke on Westham Island
- 4) Intertidal habitat on the Richmond foreshore (Grauer Property)
- 5) Harlock Island located adjacent to Westham Island
- 6) Other raised islands along the Fraser Foreshore

This summary report outlines the details and physical works required to complete the creation of 6.1 ha of habitat within the Pool segment on Rose-Kirkland Island located with the South Arm of the Fraser River.

LEGAL DESCRIPTION

PID	Legal Description	Current Ownership	Area	
			Ha	Acres
024-195-111	L3 DL 458 GP1 NWD	Nature Trust of BC	49.0	120.5
024-195-073	L 2 DL 5879 GP1 NWD	Nature Trust of BC	10.0	25.0
024-195-065	L 1 DL 534 GP1 NWD	Nature Trust of BC	27.0	67.5
	Total Area of existing parcels		86.0	213.0
	Total Area of Proposed Enhancement		6.1	15.0

LOCATION

Located in the south arm of the Fraser River in the municipality of Richmond, within the Metro Vancouver Area (formerly Greater Vancouver Regional District). It is approximately 1 km downstream of the George Massey Tunnel (Hwy 99) and accessible only by boat. The location of the physical works is located at UTM Zone10, Easting: 492293, Northing: 5439457

SITE DESCRIPTION

Habitat Description

The current habitat on the islands contains a mix of agricultural lands, wetlands and treed areas. Agricultural lands are annually planted in traditional soil-based crops such as corn, peas and grain that benefit migratory waterfowl and then the fields are managed as winter flooded areas that function as wetlands. The treed areas are second growth while a number of sloughs within the agricultural areas function as shallow wetlands and facilitate the management of water.

Historically the two islands, Rose and Kirkland were separated by a channel. However, after the 1960's the two islands were connected through dyking and the channel was converted into a freshwater Pool segment. Currently the Pool segment (Figure 1) is managed as a freshwater wetland and facilitates the filling and draining of the adjacent compartments of Rose, Kirkland and Holloway. Within the Pool segment, the one external water control structure manages the inflow and outflow between the Fraser River and the Pool segment, while 3 secondary control structures manage the inflow and outflow of water between the 3 compartments (Rose, Kirkland, Holloway) and the Pool segment.

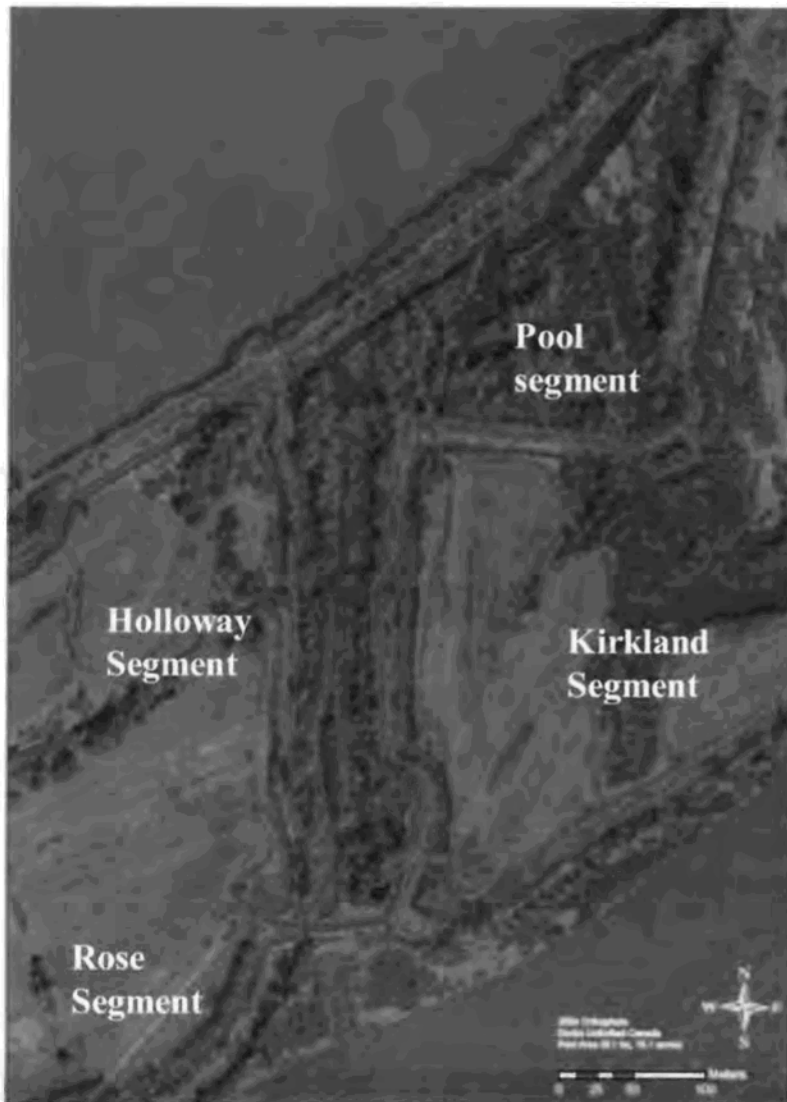


Figure 1. Location of proposed enhancement in Pool segment.

Fish Use

At present, fish use in the pool segment on Rose-Kirkland is limited by the current water management regime on the islands and the resulting water quality. Historically, an open channel between these islands would have provided productive intertidal habitat and access for a wide variety of anadromous and freshwater species native to the Fraser estuary.

Wildlife Use

Migratory waterfowl and other wetland dependent species are the main species at the site. Waterfowl species present during migration and winter include: mallard, northern pintail, American wigeon, green-winged teal and Canada geese. A single day bird count in February 2007, observed approximately 430 waterfowl using the corn fields. Other species include great blue heron.

SECUREMENT (Land Tenure)

In 1989, members of the Pacific Estuary Conservation Program secured the islands through a donation of Rose Island to The Nature Trust of British Columbia (TNT) and the purchase of Kirkland Island with funding from Canadian Wildlife Service, B.C. Ministry of Environment (MOE), Wildlife Habitat Canada, Habitat Conservation Trust Fund (HCTF), and TNT. The Nature Trust of British Columbia holds title to the property and upon the completion of the securement, leased it to the Ministry of Environment for 99 years. MOE subsequently licensed the property to the Kirkland Island Waterfowl Society (KIWS) until 2028.

ENHANCEMENT STRATEGY

In the mid 1990's, the island was enhanced by partners of the PECP through a combination of dike upgrades, dike rebuilds and installation of water control structures. This project builds on that enhancement as part of the VFPA Off-site habitat compensation for the DP3 berth Project referenced in the DFO authorization 02-HPAC-PA1-000-000144.

The proposed project will convert 6.1 ha of marginal freshwater wetland into productive tidal habitat. The Pool segment currently functions as an exchange zone between tidal waters outside the island and the remaining segments of the project. Due to the water regime, the pool segment habitat is of marginal quality as it contains an increasing amount of shrubs and invasive plants such as purple loosestrife.

The Pool segment of the project will be enhanced in 2008 to improve fish habitat and access by creating a tidal segment. Timing of the enhancement activities will be undertaken to avoid or minimize impact to fish or nesting migratory birds. Traditionally activities are undertaken within the fisheries window (July 15 – Sept 15) and outside the migratory bird breeding window (March 15 – August 15). Specifically the objectives are:

1. Develop/create intertidal habitat designed to benefit fish and water birds
2. Improve fish access and use of the pool segment at all times of the year
3. Enhance fish movement within the south arm of the Fraser River
4. Improve the water quality and aquatic productivity in the pool segment

The proposed activities (Figure 2) will include:

1. Breach of the north and south dikes of the pool segment and install concrete box culverts with stoplog inverts, to provide tidal flushing and drainage of water in the pool segment.
2. Upgrade of existing internal control structures to ensure adequate water level management of the agricultural fields in adjacent segments.
3. Upgrade approximately 1.0 km of dike from the current elevation of 2.0 m to 3.0 meters GSC (Geodetic Survey Canada) to provide adequate protection for the agricultural fields.
4. Excavate the pool segment to a preset elevation to facilitate tidal flushing
5. Installation of an experimental control flap gate on the Holloway segment to facilitate fish access.
6. Installation of riprap on the north side of the island on approximately 5m either side of the proposed breach location to mitigate high river velocities. DUC will also install additional riprap as part of its project maintenance program (outlined also in Figure 2), however that work will be funded by DUC sources and will NOT be funded through the DP3 Proposed Habitat Compensation Plan.

See Detailed Construction Drawings prepared by Northwest Hydraulic in Appendix 1.

MONITORING & EVALUATION

The monitoring approach will be used to create a baseline for fish and wildlife, reduce and avoid collateral damage to wildlife population habitat during the project and provide an evaluation of the project physical works. All reports and information associated with monitoring and evaluation will be provided to both EC and DFO. The following activities will be undertaken:

1. Fish inventory
 - a. Rationale: To monitor the incremental fish use of the site due to the physical works. Given the current water level operation, any fish present in the Pool segment will not be viable and therefore a habitat quality baseline will also be completed.
 - b. Location: Pool segment (treatment site) and other tidal areas (control sites)
 - c. Timing: 2008 (baseline) and 2009 (post-treatment)
2. Habitat inventory
 - a. Rationale: To monitor habitat change and infer impact of physical works. It is expected that habitat succession will take longer than 2 years and therefore the 5 and 10 year inventory will provide an evaluation of the physical works in an adaptive management approach.
 - b. Location: Pool segment (treatment site) and other terrestrial/aquatic areas (control sites)
 - c. Timing: 2008 (baseline), 2009 (post-treatment), 2013 (5 year post project) and 2018 (10 year post project).
3. Wildlife
 - a. Rationale: To document presence of wildlife species (e.g. birds, amphibian, etc) and infer impact of physical works.

- b. Location: Pool segment (treatment site) and other terrestrial/aquatic areas (control sites)
 - c. Timing: 2008 (baseline), 2009 (post-treatment)
- 4. Water level observations and management costs
 - a. Rationale: As part of the project, tidal gates (e.g. Peterman float gates) will be installed in the Holloway segment to increase fish access while maintaining water management for agriculture. Water levels and the costs to manage the tidal gates will be recorded. The result of this evaluation will determine whether the tidal gates will be removed or expanded to other controls in the future.
 - b. Location: Holloway (treatment) and Rose segment (control)
 - c. Timing: Throughout the year from fall 2008 to fall 2009.
- 5. Nest Search Program
 - a. Rationale: In the event DUC determines that project activities will unavoidably overlap with the breeding bird season, an Active Migratory Bird Nest Survey (AMBNS) program to reduce the likelihood of disturbing or destroying active nests will be employed. This program will reduce the likelihood that DU will be in contravention of the MBCA, and will be employed if potentially harmful activities are proposed for a period immediately before, during or immediately after the March 15 – August 15 period. DUC will seek advice from Environment Canada in the development of an AMBNS.
 - b. Location: Area impacted by physical works
 - c. Timing: Prior to initiation of physical works.

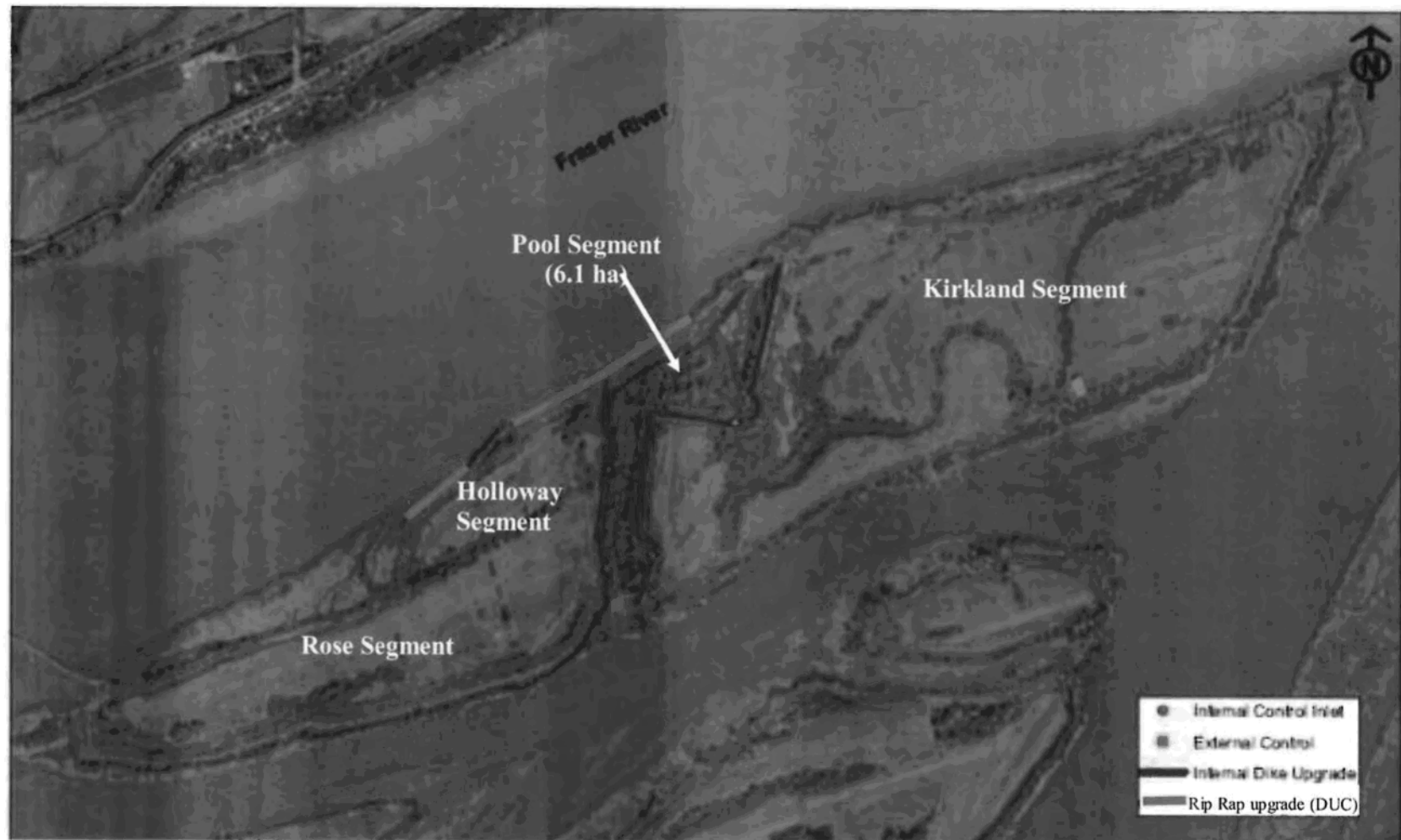


Figure 2. Location of proposed works within the Pool Segment on Rose-Kirkland Island

PROJECT COST

Item	Estimated		Actual to date (Mar 31, 2008)	
	Direct Costs	Staff Costs	Direct Costs	Staff Costs
Survey and Design (NW Hydraulics)	s.13,s.17			
Fish Inventory Pre/Post (2008 & 2009)				
Fish Salvage (Summer 2008)				
Enhancement Works (Summer 2008)				
Habitat Inventory & Gate Evaluation				
Subtotal				
GST (5%)				
Total Direct and Staff Costs				

Definitions: Direct Costs: Contractors & materials, Staff Costs: DUC Staff costs

* Staff time is a maximum of 15% of the Direct Costs

** If the project had to be secured there would be an additional purchase cost of s.13,s.17

However as this site is already secured by conservation agencies, this money will be redirected to similar projects that fall under the Fish and Migratory Bird Habitat Agreement (dated Dec 4, 2006) between the FVPA, DFO, EC, DUC and PSF.

RESTORATION AND MANAGEMENT RECOMMENDATIONS

The Rose, Kirkland and Holloway segments will continue to be managed for the benefit of migratory waterfowl through the lease agreement between Ministry of Environment and Kirkland Island Waterfowl Society.

The pool segment restored under this project, will be managed for the benefit of fish, migratory waterfowl and other wildlife. The pool segment will be a tidal channel to provide fish access and increase the amount of productive floodplain/mud flats resulting in a reduced amount of invasive species (e.g. loosestrife, blackberry). The improved habitat will benefit waterfowl, shorebirds and migratory birds in general as well as various fish species. Given the tidal nature of this segment, no active management is expected so the segment will be managed as a natural tidal habitat.

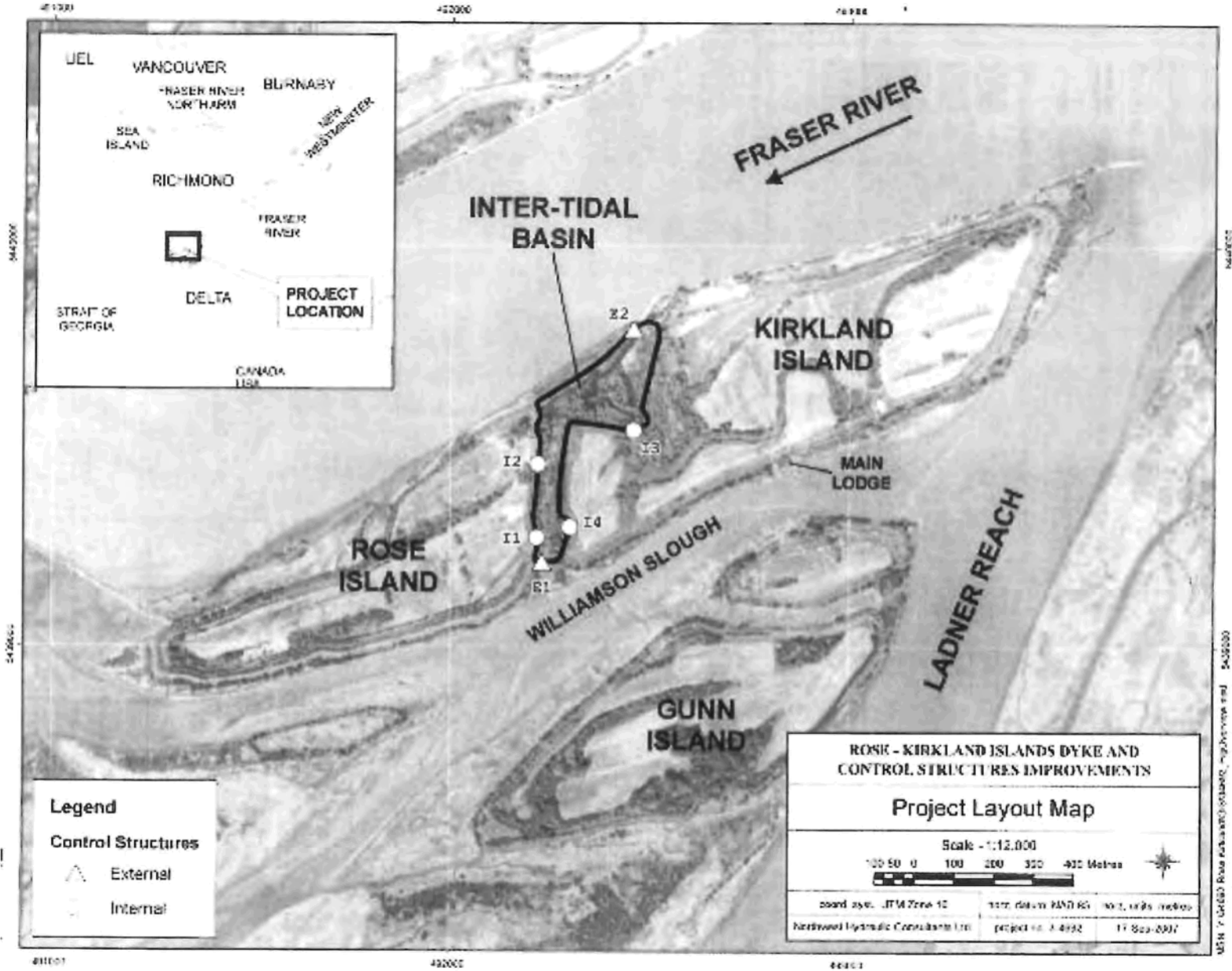
IMPLEMENTATION PROCESS

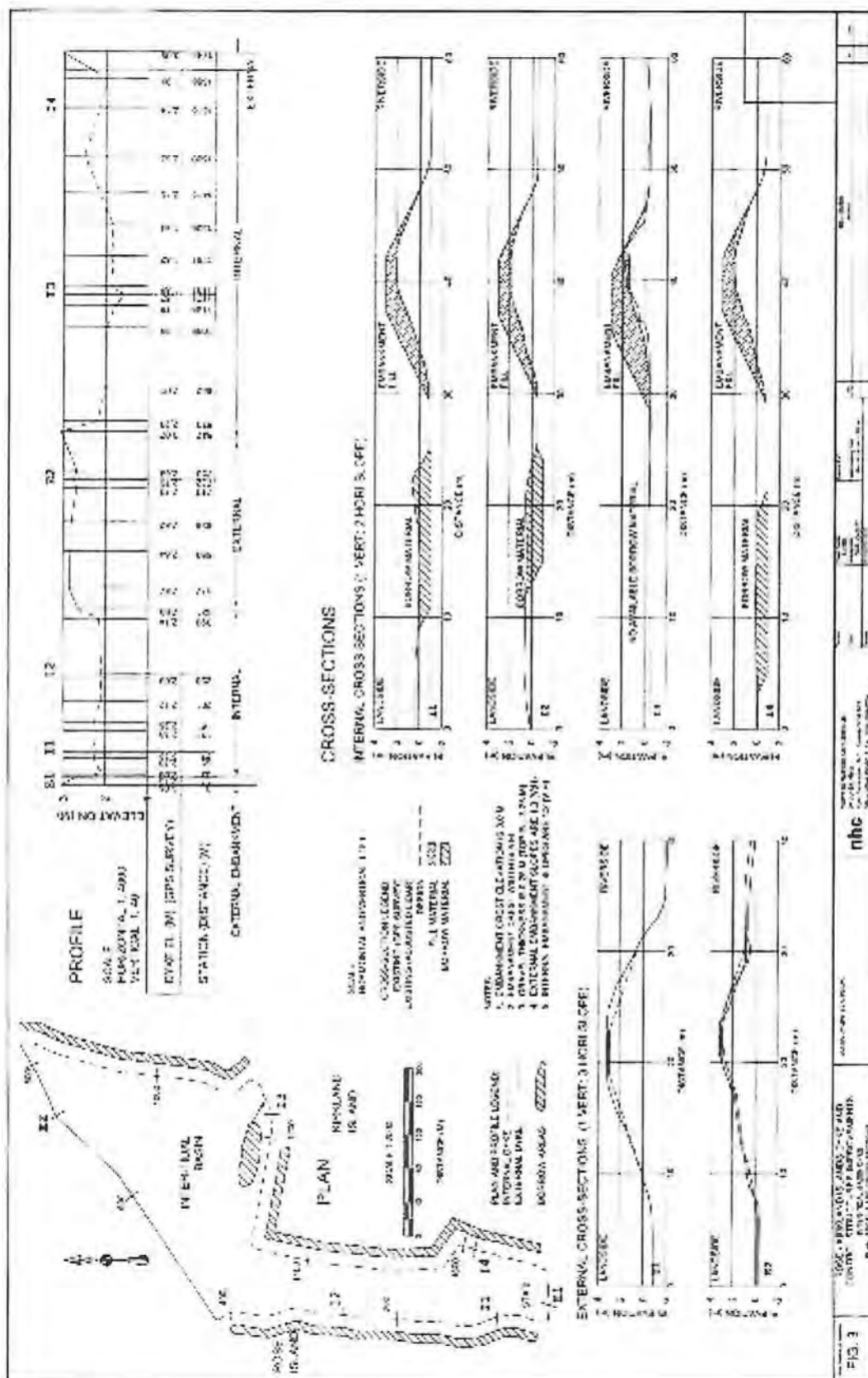
Date	Activity
Oct 2007	Design of Project
Nov 2007 – April 2008	Partner Approval and permits
Feb – Aug 2008	Fish Inventory to develop baseline
March 2008	DUC Board approval of project
June 2008	Habitat inventory and fish salvage in pool segment
July – Sep 2008	Target Construction Date for Enhancement
Feb – Aug 2009	Fish Inventory to compare to baseline
2013 and 2018	Habitat inventory

This summary report was reviewed and approved on the ____ day of _____, 2008.

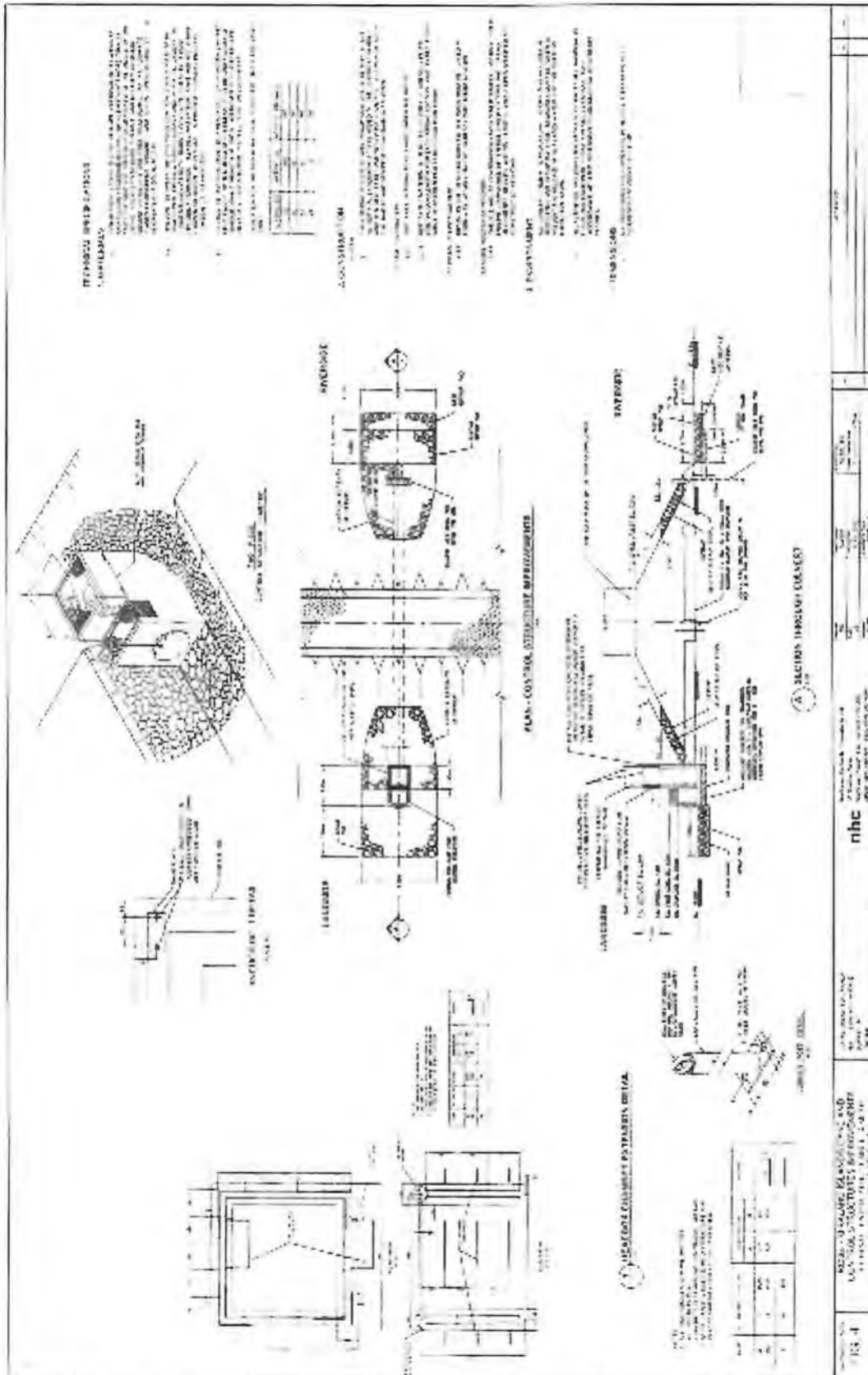
Director,
Canadian Wildlife Service

Lower Fraser Area Chief
Oceans, Habitat and Enhancement Branch
Fisheries and Oceans Canada

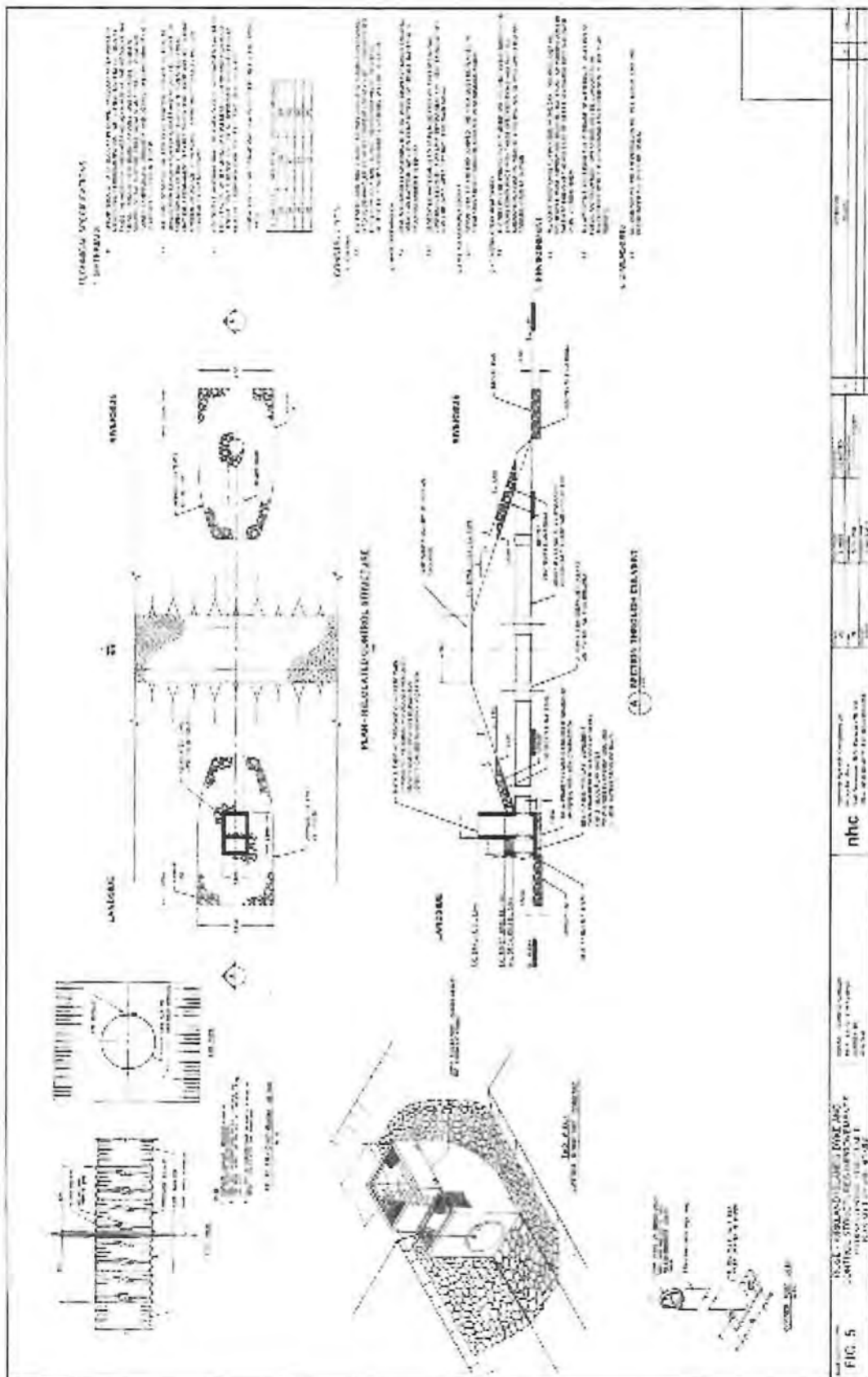


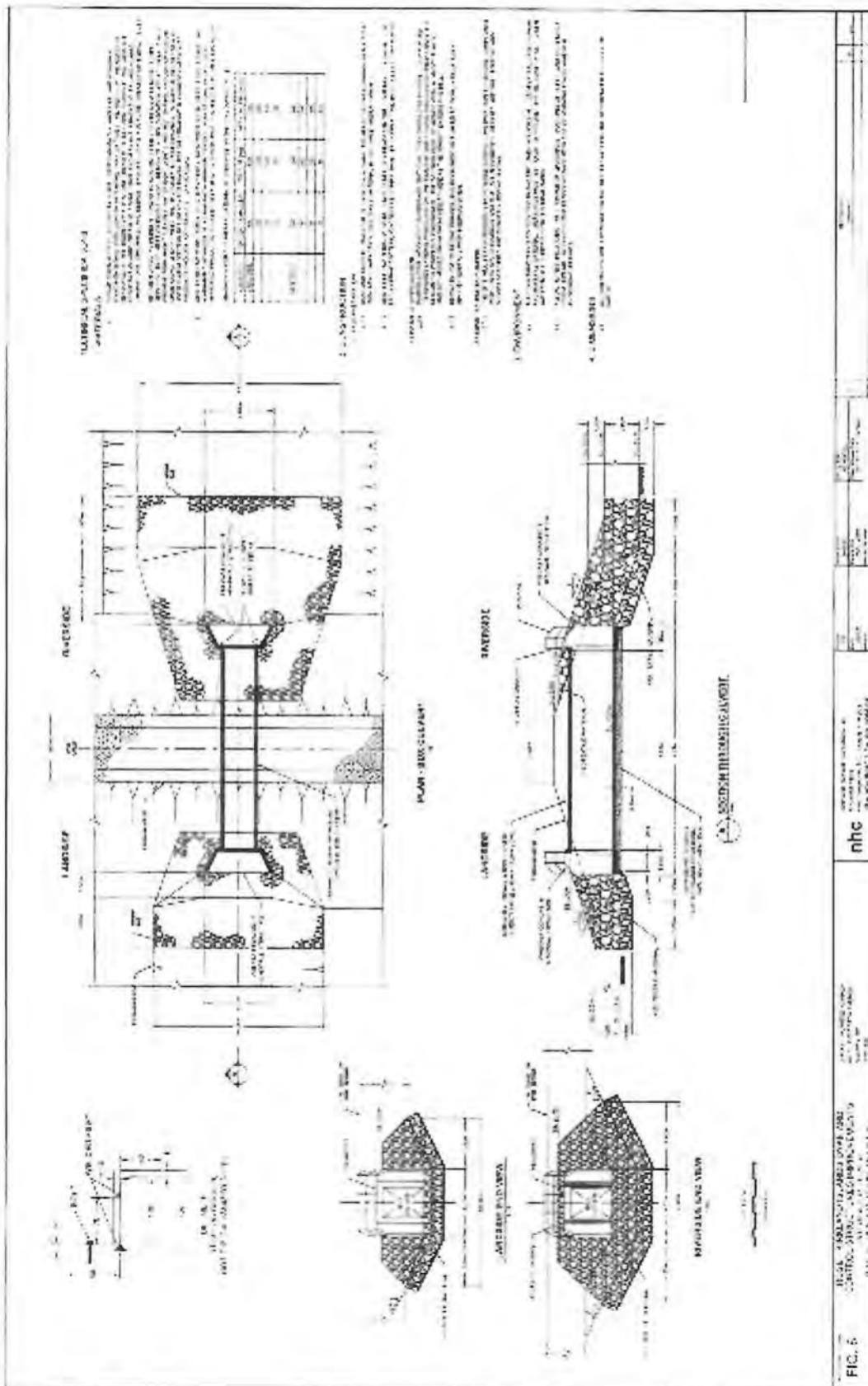


Appendix 1 –Rose & Kirkland Design (Northwest Hydraulic Consultants)



Appendix 1 –Rose & Kirkland Design (Northwest Hydraulic Consultants)







The Best Place on Earth

August 13, 2010

File: A2005753

Ministry of Transportation and Infrastructure
7818 6th Street
Burnaby BC V3N 4N8

Attention: Joanne Cyr

**Re: Application for approval to make changes in and about North and South Highway 7
Roadside Ditches, Approval 2005753**

An approval for the proposed changes in and about North and South Highway 7 Roadside Ditches has been granted, subject to the conditions noted on the attached Approval document 2005753.

Changes to the Silverdale Creek dike or other flood protection works considered to be a "dike" under the *Dikes Maintenance Act* requires Dike Maintenance Act approval. Further guidance can be found at the following link: http://www.env.gov.bc.ca/wsd/public_safety/flood/dma_approvals.html

Please be advised that applications for an approval can take up to 140 days to process. If possible, please provide future applications at least 90 days in advance of your proposed start date.

If you have any questions or concerns please contact the Water Information Technician, Water Stewardship Division, at 604-582-5200.

Yours truly,

Tim Bennett, P.Eng.
Assistant Regional Water Manager

Enclosure

pc: Craig Sciankowy, Fisheries & Oceans Canada (DFO)
Kristina Robbins, Environmental Stewardship Division (ESD)
Shawn Redden, R.P. Bio., Golder Associates

DS / sj

Ministry of Environment
Water Stewardship Division
South Coast Sub-Region

Mailing Address/Location
10470 – 152nd Street, 2nd Floor
Surrey, BC V3R 0Y3

Contacts:
Telephone: (604) 582-5200
Facsimile: (604) 930-7119
<http://www.gov.bc.ca/>
<http://www.gov.bc.ca/env/>

APPROVAL

WATER ACT - Subsection 9(1), Clauses (a), (b) and (c)
(Changes in and about a stream)

Ministry of Transportation and Infrastructure

is hereby authorized to make changes in and about a stream as follows:

- (a) The name of the stream is North and South Highway 7 Roadside Ditches, herein referred to as "the stream".
- (b) The changes to be made in and about the stream are:

To realign roadside ditches to the North and South of Highway 7 at the Nelson Street intersection; to remove and reinstall existing culverts passing under Nelson Street; and remove and plant riparian vegetation all within Ministry of Transportation and Infrastructure Highway 7 Road Right of Way at the corner of Nelson Street, District Lot 456, Group 1, New Westminster District.
- (c) This Approval does not authorize entry on privately held land or Crown land.
- (d) This Approval does not constitute authority of any other agency. The holder of this Approval shall have the necessary permits from other agencies concerned prior to the commencement of the works authorized herein.
- (e) The holder of this Approval shall take reasonable care to avoid damaging any land, works, trees, or other property and shall make full compensation to the owners for any damage or loss resulting from the exercise of rights granted hereunder.
- (f) The work authorized shall be completed on or before September 30, 2011, and the holder of this Approval shall advise the Water Information Technician (604-582-5200) when the changes have been completed.
- (g) A copy of this Approval (and associated plans/drawings listed on this Approval) must be available for inspection, upon request, at any location where the authorized changes in and about a stream are being undertaken.
- (h) Craig Sciankow, Fisheries and Oceans Canada, (604-814-1079) shall be notified 5 working days prior to commencement of construction/in-stream work.
- (i) Work within the wetted perimeter of the stream shall be undertaken between July 1 and September 15, unless extended by Fisheries and Oceans Canada, and in accordance with the technical rational provided in Section 3.8 of "Highway 7 Nelson Street

Intersection Improvement Project, Mission, BC - Project Review Information for Fisheries and Oceans Canada", Report 09-1450-5043, prepared by Golder Associates, dated April 20, 2010.

- (j) A diverse mix of trees, shrubs, and herbaceous plants appropriate to the site conditions, shall be planted to restore and revegetate disturbed areas. Only species native to the South Coast region are to be utilized.
- (k) Prior to the commencement of the works authorized under this Approval, the holder of this Approval shall obtain authorization from Fisheries and Oceans Canada.
- (l) All work shall be carried out in accordance with the Ministry of Environment's "Standards and Best Practices for In-stream Works" and the appropriate Fisheries and Oceans Canada guidelines. The Ministry's guidance can be found at the following link:
<http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>.
- (m) All works shall comply with "Highway 7 Nelson Street Intersection Improvement Project, Mission, BC - Construction Environmental Management Plan", Report Number 09-1450-5043, dated June 1, 2010 and prepared by Golder Associates.
- (n) All works shall comply with "Highway 7 Nelson Street Intersection Improvement Project, Mission, BC - Project Review Information for Fisheries and Oceans Canada", Report 09-1450-5043, prepared by Golder Associates, dated April 20, 2010.
- (o) The holder of this Approval shall retain a qualified Environmental Monitor to supervise all in-stream works authorized under this Approval. In the event of an environmental incident or non-compliance with any of the terms or conditions of this Approval, the Environmental Monitor shall notify the Assistant Regional Water Manager (604 582-5200), within 24 hours.



Tim Bennett, P.Eng.

Assistant Regional Water Manager