

Appendix I

Environmental Report

TECHNICAL MEMORANDUM

TO: Paul Agate, Stantec

DATE: September 20, 2006

FR: Dave Munday

JOB NO: 05-1414-060

**RE: MALAHAT PROJECT – PRELIMINARY OVERVIEW OF THREE DESIGN
OPTIONS IN THE AREA OF GOLDSTREAM RIVER TO THE SUMMIT**

This technical memorandum provides a preliminary overview of the identified potential environmental issues or constraints associated with each of the three proposed design options currently under consideration by Stantec for the upgrade of the Malahat section of the Trans Canada Highway north of Victoria, B.C. The study area is approximately 19 km long and extends from the northeastern limit of Goldstream Park at the existing Highway 1 to the existing four lane highway section of Highway 1 just southwest of Bamberton. The three options that are being considered at this time include Options H4 - Near West, H6 - Niagara Main, and H1b - Improve Existing Highway.

1.0 SCOPE

This preliminary overview of environmental issues or constraints is based primarily on the alignment of the three design options as indicated in the figures provided by the Stantec Design Team and the proximity of roadway improvements to existing environmental features. Specific constructability issues as they relate to environmental effects have not been assessed as this would require a more detailed project description and would also require reconnaissance level field investigations. For example, we do not know the operational details related to stream crossings, or cut and fill operations related to highway expansion and construction, which would only be known at a later phase in the design process. At this stage of assessment, features associated with the alignment corridor for each of the three options have been reviewed with the assumption that effects are limited to within the corridor footprint. This conservative approach is consistent with preliminary environmental assessment protocols, and it would be expected that improved project performance may be possible through mitigation and design changes in response to specific environmental concerns. This assessment has not considered ancillary features such as laydown areas and temporary roadways for detours during construction, as these features are only resolved during later stages of the design process.

The following environmental features are addressed for each of the design options, as appropriate:

- Environmentally sensitive areas;
- Fish and aquatic habitat;

- Vegetation and wildlife;
- Rare and endangered species; and
- Archaeology.

Potential effects to recreation and park uses are not specifically assessed, although preliminary comments are provided regarding potential environmental constraints related to Goldstream Park, Sooke Hills Wilderness Regional Park Reserve, and the Trans Canada Trail. It is our understanding that park user related issues are being addressed in greater detail by other investigators and are not part of the scope for this assessment.

Information was derived from a number of sources, as outlined in our first technical memorandum dated November 8, 2005, including:

- Sooke Hills Wilderness and Mount Wells Regional Parks Management Plan;
- Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands 1993-1997;
- Ministry of Sustainable Resource Management Terrestrial Information Mapping Site;
- Fisheries Information Summary System (FISS) Database;
- CRD Parks website information; and
- Provincial Heritage Register.

In addition, information obtained during the public consultation process, which took place in June 2006, was also considered and has been presented where appropriate.

Identified environmental features are provided in the following series of figures, which also provide information concerning the designated park areas:

Figure 1 – Malahat Terrestrial Resources

Figure 2 – Malahat Aquatic Resources

Figure 3 – Malahat Archaeological Resources

A discussion of the anticipated regulatory environment and permitting requirements is provided at the end of this technical memorandum. In addition, the next steps required to complete a more detailed environmental review for the Malahat expansion project are discussed.

2.0 DESIGN OPTION H4 - NEAR WEST

2.1 Environmentally Sensitive Areas

As identified by sensitive ecosystems mapping, Riparian, Wetland, Older Forest and Woodland ecosystems are mapped along this alignment as polygons or areas. The length of polygons that are adjacent to this roadway option are approximately 45, 150, 60 and 500 m, respectively for the four types of sensitive ecosystems noted above. This alignment also crosses 16 creeks for which riparian areas are not characterized, but can be expected to be present to some extent representing additional environmentally sensitive areas.

2.2 Fish and Aquatic Habitat

There are 16 streams noted on the Environmentally Sensitive Areas maps that are not all represented in the fish and aquatic habitat databases. These streams are likely not fish bearing but likely do represent fisheries habitat as defined by the *Fisheries Act*. Of those 16 creeks, 3 of them crossing Design Option H4 – Near West and are listed in the fisheries database as supporting fish species. They are as follows: Goldstream River, Niagara Creek, and Irving Creek.

Goldstream River has been identified in existing fisheries databases as a river that supports species of cutthroat trout (both anadromous and resident populations), steelhead trout, rainbow trout, Chinook salmon, chum salmon, coho salmon, small mouth bass, pumpkinseed sunfish and prickly sculpin. The same databases indicate that Niagara Creek contains steelhead trout. Irving Creek is listed in the databases as containing anadromous Chinook salmon. Arbutus Creek is not listed as containing fish species, although it is the largest ocean-bound tributary of Wigglesworth Lake, which provides habitat for cutthroat trout. Bamber Creek is not listed in the fisheries databases, but discharges to Saanich Inlet, a known salmon receiving area, therefore fish species may reasonably be found in the lower reaches of this creek.

Spectacle Creek, although it is not listed in the fisheries databases, connects to Spectacle Lake, which supports various salmon and trout species such as steelhead, rainbow, brook, kokanee and cutthroat as well as three-spine stickleback, Northern pikeminnow, peamouth chub, and general suckers, whitefish and stickleback species. Spectacle Lake has also been stocked between 2001 and 2005 with rainbow trout from New Vancouver Island Hatchery.

As Design Option H4 – Near West crosses known fish bearing streams, mitigation measures will be required to limit the potential for riparian habitat disturbance and to control the potential for increased sediment and erosion from exposed soils and waste rock that could affect fisheries resources in those streams. A development buffer and special provisions for in-water and near-water work would be required.

2.3 Vegetation and Wildlife

This alignment will result in the loss of some vegetation and wildlife habitats. The use of a common corridor with the railway right-of-way and existing highway would reduce habitat fragmentation, but these combined rights-of-way may also act as an increased barrier to some wildlife movement.

2.4 Rare and Endangered Species

There is the potential to negatively affect the Western screech owl and its habitat, where this alignment crosses Goldstream River. All creeks and riparian areas may provide habitat for the common water shrew, which is red-listed by the British Columbia Conservation Data Centre (CDC).

Woodland ecosystems, which will be crossed by this alignment, are known to support the highest diversity of plants in coastal British Columbia, and Gary Oak Woodlands are home to nearly 100 species at risk (Ward et.al 1998). Riparian areas also have a high potential to contain vegetation species at risk.

Southeast Vancouver Island has been identified as “a critical area for marbled murrelets and the part of the province where habitat protection is most critically needed” (email comm. Dr. Alan Burger September 13, 2006). Marbled murrelet are listed as threatened under Schedule 1 of the *Species at Risk Act* (SARA) and are a provincially red listed species. There is evidence of past nesting of marbled murrelets in the Sooke Hills Wilderness Regional Park Reserve (Burger et al 2000; Figure 4 and 5). The results of the study conducted by Burger et al in 1998 and 1999 determined that the Greater Victoria Water Supply Area (GVWSA) and the Sooke Hills Wilderness Park Reserve represent the most important habitat for marbled murrelets on Vancouver Island due to the presence of minimally fragmented areas of old-growth and mature forest (Burger et al 2000). It has been recommended that “management of the forests to maintain and restore the remnant murrelet populations should include minimizing logging, road-building, trail-building or any other human activities within 500 m of suitable [old growth forest] stands” (Burger et al 2000). Although Design Option H4 – Near West does not appear to extend into the

Sooke Hills Wilderness Regional Park Reserve, the potential for negative impacts to this critical marbled murrelet habitat should be considered when conducting a more detailed assessment of this design option.

2.5 Archaeology

Design Option H4 – Near West crosses Goldstream River, Niagara and Arbutus Creeks and two unnamed creeks in the southern section of the Malahat corridor. There is a recorded archaeological site at the mouth of Arbutus Creek less than 300 m downstream from the proposed alignment crossing. Potential for additional archaeological sites is considered to be moderate to high, as the creek may have been used as a travel route to gain access to inland subsistence resources. The alignment crosses narrow but apparently level landforms on both sides of Niagara Creek and north of Goldstream River. These areas are also considered to have moderate to high potential for archaeological resources.

At this time, the potential for archaeological resources located in the northern 7 km of this alignment design option has not been assessed. Further details will be provided in a revised technical memorandum when this information is obtained.

2.6 Goldstream Provincial Park

This alignment adds approximately 3,250 m of roadway within the Goldstream Provincial Park area and would adversely affect the largest Woodland sensitive ecosystem protected by the park. This alignment also causes the greatest fragmentation of the park area.

3.0 DESIGN OPTION H6 - NIAGARA MAIN

3.1 Environmentally Sensitive Areas

This alignment design option affects the greatest diversity and extent of environmentally sensitive areas. As identified by sensitive ecosystems mapping, The length of polygons for sensitive ecosystems adjacent to this highway option are approximately 90 m of Riparian, 700 m of Wetland and 2,350 m of Older Forest habitats. Construction near these habitats will require mitigation measures to limit impacts to the actual highway corridor. Additionally, this alignment has 14 creek crossings for which riparian areas are not characterized, but can be expected to be present to some extent representing additional environmentally sensitive areas.

3.2 Fish and Aquatic Habitat

Design Option H6 – Niagara Main, commencing at the south end, parallels the existing highway and Goldstream River. It crosses an unnamed tributary of Goldstream River and five unnamed tributaries of Niagara Creek, two of which originate from unnamed lakes in the Sooke Hills Wilderness Regional Park Reserve. Design Option H6 – Niagara Main continues parallel to the Niagara Creek and the western edge of Wigglesworth Lake and surrounding wetlands. It then crosses Camsusa Creek tributary, Irving Creek, an unnamed watercourse, and Spectacle Creek before reconnecting to the existing highway. Proceeding north, Design Option H6 – Niagara Creek would also cross Bamber Creek.

Of the 14 stream crossings mentioned in the environmental sensitive areas section, 3 of those streams are known to support fish, according to information provided in fisheries databases. As previously indicated, Goldstream River, Niagara Creek and Irving Creek have been identified as fish bearing waterbodies. Wigglesworth Lake is also known to support fish species. Camsusa Creek, Spectacle Creek, and Bamber are not listed in the fisheries databases as containing identified fish species, but all three creeks connect to Saanich Inlet, a known salmon receiving area, and may reasonably support fish in the lower reaches of the creeks. In addition, Spectacle Creek originates from Spectacle Lake, which supports a diversity of fish species.

Even though Design Option H6 – Niagara Main appears to follow the existing highway right-of-way along the Goldstream River, through road widening during construction there is still potential for disturbance to sensitive aquatic habitats. Mitigation will be required at this section, as Goldstream River is a major fish and fish habitat resource. Other potentially sensitive fish and fish habitat areas that the Design Option H6 – Niagara Main alignment may encounter are the crossings of Niagara Creek tributaries, Camsusa Creek, Irving Creek, and Spectacle Creek. The largest environmental sensitive area of the Design Option H6 – Niagara Main would appear to be the approximate 800 m that runs parallel to the northern section of Niagara Creek and then through approximately 400 m of the wetlands surrounding Wigglesworth Lake and the shoreline of Wigglesworth Lake itself. A development buffer and special provisions for in-water and near-water work will be required for construction near these areas.

3.3 Vegetation & Wildlife

This design option has the greatest new footprint and, expectedly, will produce the greatest losses of vegetation and wildlife habitats. The length of new highway in this

section will also cause the greatest habitat fragmentation relative to the other alignment options.

3.4 Rare and Endangered Species

There is the potential of adversely affecting the Western screech owl and its habitat, where this alignment crosses Goldstream River. Although all creeks, wetland and riparian areas on all options should be considered potential common water shrew habitat at this time, this option crosses the greatest amount of potential water shrew habitat in addition to being the closest route to the known capture location (~250m). Riparian and wetland areas also have a good potential to contain plant species at risk.

This design option has the greatest potential for impacting the critical marbled murrelet habitat previously described for Option H4 – Near West, as the alignment transits through the Sooke Hills Wilderness Regional Park Reserve where evidence of past nesting of marbled murrelets has been identified (Burger et al 2000; Figure 4 and 5). A more detailed assessment would be required to identify the environmental effects and required mitigation measures to offset any negative impacts to this critical marbled murrelet habitat related to this design option.

3.5 Archaeology

The southern section of Design Option H6 – Niagara Main crosses Goldstream River, Niagara Creek and five of its tributaries in close proximity to confluences, as well as Irving Creek, Spectacle Creek and Camsusa Creek. The alignment crosses four additional unnamed creeks. There is a recorded archaeological site at the mouth of Camsusa Creek at Misery Bay. The site is approximately 3.1 km downstream from the proposed crossing site; however, archaeological potential is considered to be moderate along the creek due to the likelihood that it was used as a travel corridor from the site to gain access to inland subsistence resources. The alignment passes Wigglesworth Lake on the west side, immediately adjacent to the lake. Terrain within the alignment corridor is variable and includes saddles and side slopes with potentially level benches associated with Niagara Creek and Wigglesworth Lake that could have archaeological site potential. No archaeological sites have been recorded within the alignment corridor; however, there are a number of recorded inland archaeological sites to the north of the project area, likely indicating a data gap rather than a lack of archaeological resources.

At this time, the potential for archaeological resources located in the northern 7 km of this alignment design option has not been assessed. Further details will be provided in a revised technical memorandum when this information is obtained.

3.6 Goldstream Provincial Park

This alignment has the least impact to the park relative to the other alignment options with approximately 680 m of roadway added to the park area.

3.7 Sooke Hills Wilderness Regional Park Reserve

This design option has the greatest potential for impacting the Sooke Hills Wilderness Regional Park Reserve through fragmentation and impact to critical marbled murrelet habitat.

3.8 Trans Canada Trail

This is the only alignment option that impacts the proposed Trans Canada Trail. According to available data, the trail would be impacted by the highway for almost 3 km of its length.

4.0 DESIGN OPTION H1B – “IMPROVE EXISTING HIGHWAY”

4.1 Environmentally Sensitive Areas

As identified by sensitive ecosystems mapping, only Older Forest ecosystems are likely to be affected along this alignment (approximately 2000 m). This alignment also crosses eleven creeks for which riparian areas are not characterized, but can be expected to be present to some extent representing additional environmentally sensitive areas.

4.2 Fish and Aquatic Habitat

Generally this design option follows the existing highway alignment. More information will be required regarding the project “footprint” for this option, such as proposed extensions to existing stream crossings and the resultant effects on associated riparian zones.

Commencing at the southern end of the study area, the existing highway runs parallel to the Goldstream River. It crosses an unnamed tributary of the Goldstream River, Niagara

Creek, a short unidentified watercourse which discharges into Finlayson Arm, and Arbutus Creek, which also connects with Finlayson Arm. It subsequently crosses two unnamed creeks, Camsusa Creek, Irving Creek, Colpman Creek and Spectacle Creek (all of which flow into Finlayson Arm). Further north the alignment crosses Bamber Creek.

It is understood that there is one section of Design Option H1b – Improve Existing Highway, south of the Malahat summit that will branch off the existing highway alignment, forming a new roadway. The new roadway will cross three unnamed creeks (with final discharge to Saanich Inlet), as well as Irving Creek and Colpman Creek.

Goldstream River, Niagara Creek, and Irving Creek are fish bearing streams as described previously. Arbutus Creek is not listed as containing fish species, although it is the largest ocean-bound tributary of Wigglesworth Lake, which provides habitat for cutthroat trout. In addition, Spectacle Creek originates from Spectacle Lake, which also provides habitat for various salmon and trout species. Furthermore, Spectacle Creek and Bamber Creek are not listed as fish bearing streams, but both connect to the Saanich Inlet as well and may reasonably support fish in the lower reaches of the creeks. Although Malahat Creek does not cross the alignment option, it is within close proximity and may be impacted by development as it connects to Saanich Inlet

Mitigation measures may be required to limit potential for riparian habitat disturbance and to control potential for increased sediment and erosion from exposed soils and waste rock from affecting fisheries resources; especially in Goldstream River and at the creek crossings. A development buffer and special provisions for in-water and near-water work will be required.

4.3 Vegetation & Wildlife

This alignment will result in the loss of some vegetation and wildlife habitats. Widening the existing highway corridor would reduce habitat fragmentation compared to the other two alignment options, but these wider rights-of-way may also act as an increased barrier to some wildlife movement.

4.4 Rare and Endangered Species

This option has the highest potential of adversely affecting the Western screech owl and its habitat, because of its proximity to the Goldstream River where the owl's preferred habitat occurs. All creeks and riparian areas may provide habitat for the common water

shrew. Riparian and wetland areas also have a high potential to contain plant species at risk.

Although Design Option H1b – Improve Existing Highway does not appear to extend into the Sooke Hills Wilderness Regional Park Reserve, the potential for negative impacts to this critical marbled murrelet habitat should be considered when conducting a more detailed assessment for this design option.

4.5 Archaeology

This option does not appear to directly impact any recorded archaeological sites, and the potential for impacting currently unrecorded sites is assessed as low-moderate because the option generally follows the existing alignment. A highly significant archaeological site (site DcRv-44) is located on the shoreline at the mouth of Arbutus Creek. The full extent of the site has not been determined through subsurface testing. The preliminary drawings for this option suggest that construction will be inland from the existing alignment, and therefore the archaeological site should not be impacted. If significant fill placement towards the inlet is required, impacts to this known archaeological site could occur.

At this time, the potential for archaeological resources located in the northern 7 km of this alignment design option has not been assessed. Further details will be provided in a revised technical memorandum when this information is obtained.

4.6 Goldstream Provincial Park

This option will increase the footprint of the highway within the park (widening and/or new routing). The impacts of this alignment are reduced by some overlap with the existing highway rights of way and the use of a tunnel. Although this route will have similar levels of fragmentation as the other two options, this fragmentation will be closely associated with the existing highway corridor, helping to minimize effects on park facilities.

5.0 PUBLIC CONSULTATION

The feedback from the public consultation process provided no specific comments for the three design options. In general, the comments indicated that the public had issues of concern for the following:

- Impacts to deer and quail;
- Wilderness values;
- Old growth trees;
- Sharp tailed snakes in north highlands;
- Preservation of wild land;
- Ecological sensitivity of Saanich Inlet;
- Protection of fish resources at Goldstream Park;
- Proximity to lake; and
- Sensitive habitat in sensitive coastal Douglas-fir ecosystem.

Written public consultation responses from groups such as the Western Canada Wilderness Committee, Saanich Inlet Protection Society, Habitat Acquisition Trust, and the Victoria Fish and Game Protective Association generally stated their concerns for the potential environmental impacts to the natural areas of the Malahat corridor associated with roadway construction, but made no recommendation for or against any of the three route options assessed in this technical memorandum.

6.0 ASSESSMENT

The results of the assessment of Options H4, H6, and H1b are ranked in Table 1 (below).

Table 1 Ranking* of potential environmental constraints for three highway corridor options

Discipline	Rank		
	Option H4 – Near West	Option H6 – Niagara Main	Option H1b – Improve Existing Highway
Environmentally sensitive areas	4	5	3
Fish and aquatic habitat	4	5	3
Vegetation and wildlife	4	5	3
Rare and endangered species	4	5	4
Archaeology ¹	4	5	2
Goldstream Park	5	2	4
TransCanada Trail	1	5	1
Sooke Hills Wilderness Regional Park Reserve	1	5	1
Total Score	23	32	18

* = Ranking of expected magnitude of effect with 1 being the least effect to 5 being the greatest effect

Based on this preliminary information, Options H1b - Improve Existing Highway corridor, is ranked lowest for environmental constraints to development. Option H6 – Niagara Main is ranked as the highest for environmental constraints to development for all evaluated criteria, except for impacts to Goldstream Park, due to its deviation from the existing alignment along its entire length in the study area. Options H4 – Near West is ranked between the two other options for environmental constraints to development. However, specific environmental constraints for any option may be significant, requiring development of mitigation measures and/or habitat compensation strategies. Further assessment would be required to identify specific impacts, mitigation measures, and possible requirement for habitat compensation. This is discussed further in section 8.0.

7.0 POTENTIAL PERMITTING REQUIREMENTS

The following is an overview of the potential permitting or approval requirements for the three design options. Confirmation of permitting/approval requirements can be made

¹ At this time, the potential for archaeological resources located in the northern 7 km of each design option has not been assessed. Ranking for archaeological resources is based on the alignment distance minus the northern 7 km. The ranking will be revised once the northern 7 km is assessed.

once the final design option is selected and a field assessment of the alignment is conducted.

As the roadway proposed for construction and/or improvements is less than 20 km continuous length (Design Option H1b proposes 18.83 km of construction area; Design Option H4 19.13 km; and Design Option H6 19.73 km) and will not include additions of two lanes or greater throughout the total length, the *British Columbia Environmental Assessment Act* (BCEAA) is not expected to be triggered; however, upon selecting a design option, this assumption should be confirmed through communications with the British Columbia Environmental Assessment Office.

The *Canadian Environmental Assessment Act* (CEAA) is anticipated to be the guiding environmental assessment process at the screening level. It is likely that Fisheries and Oceans Canada (DFO) will determine that harmful alteration, disruption or destruction of fish habitat (HADD) will occur as a result of the stream crossings. When a HADD is identified by DFO, a federal *Fisheries Act* Section 35(2) Authorization for Works or Undertakings Affecting Fish Habitat is required. The need for this authorization requires DFO to conduct an environmental assessment pursuant to the CEAA in order to issue the final Section 35(2) Authorization. In addition to the environmental assessment and reporting, a key requirement of a Section 35(2) Authorization is the provision of compensation habitat to offset habitat loss. A habitat balance sheet is prepared that will summarize calculated habitat losses resulting from the project, calculated habitat gains resulting from implementation of the proposed compensation habitat option(s), and net gain or loss of habitat. Upon agreement of the habitat option(s) to be implemented, DFO will require detailed designs of the compensation habitat option(s) and monitoring plans of the compensation habitat before the Section 35(2) Authorization is issued.

The Section 35(2) Authorization will likely also include the requirement for an environmental management plan (EMP), which will outline the roles and responsibilities of the owner and contractors for environmental protection measures such as, but not limited to, sediment and erosion control, soil management and handling procedures, spill prevention and emergency response planning, water quality and aquatic habitat protection, terrestrial vegetation and wildlife habitat protection, hazardous and non-hazardous construction waste material management, air quality and dust control, noise management, surface water and ground water protection, and archaeology mitigation measures.

The initial review process by the DFO will be initiated with the submission of a complete and comprehensive information package; however, the review may take anywhere from

less than 1 month to 3 months depending on the current DFO project review demands. Additionally, the CEAA review process will involve other regulatory agencies, such as Environment Canada and the Canadian Coast Guard (CCG) and consultation with First Nations groups with territorial land and resource claims and stakeholder groups. The CCG review would be pursuant to the *Navigable Waters Protection Act* whereby an approval is required if any bridge works associated with roadway improvements or new road way construction over a navigable body of water is proposed. The entire CEAA review process may take anywhere from several months to a year.

The BC Ministry of Environment (MOE) will require Section 9 applications for any instream works associated with the highway construction. The primary focus of this legislation is with respect to changes in flow and carrying capacity for streams. MOE is usually a referral agency for the Section 35(2) process, and conversely DFO is a referral agency for provincial applications under the Section 9 process.

All three design options propose roadway changes or new roadway construction within the Goldstream Regional/Provincial Park, and option H6 – Niagara Main also proposes new roadway construction within the Sooke Hills Wilderness Regional Park Reserve. Goldstream Provincial Park is designated as a Class A park, which would fall under the jurisdiction of the *BC Park Act* (BCPA). The majority of the land within Goldstream Provincial Park is zoned as “Natural Zone”, and is intended to provide non-intensive recreation use while remaining in its natural state (Ministry of Lands, Parks and Housing 1986). Section 16(a) of the BCPA states that unless “authorized by a valid and subsisting park use permit or resource use permit [the following must not occur:] use or occupy [of] land in a park or recreation area for [use as] a log storage area, mill site, road, right of way, disposal area for tailings or waste or any other industrial purpose.”

The Sooke Hills Wilderness Regional Park Reserve is under the jurisdiction of the Capital Regional District (CRD). The park is managed under the *Local Government Act* (Bills 55 and 67), and appropriate permits will be required prior to any development within the Park. The Sooke Hills Wilderness and Mount Wells Regional Parks Management Plan was created in 2001, which outlines management priorities for this area. Four park management zones have been created, including the Sensitive Environment Zone which includes the Niagara Canyon. According to CRD the Niagara Canyon contains ecosystems and species sensitive to human activities and a high degree of protection is their priority (CRD Parks 2001). The Niagara Canyon area is also the location of recorded nest sites for marbled murrelets. The proposed route option H6 – Niagara Main runs parallel to the Niagara Canyon, in very close proximity to the river.

The newly created section of the Trans Canada Trail follows the Niagara Canyon as well, and will be impacted by the construction of Option H6 – Niagara Main.

8.0 DETAILED REVIEW OF DESIGN OPTIONS

In order to progress towards the selection of a design option, a more detailed review of the environmental features identified in this technical memorandum would be required. Field investigations would be conducted to ground-truth the information obtained during the desktop review of the fish and fish habitat, vegetation and wildlife, and rare and endangered species features. In addition, Archaeological Impact Assessments (AIAs) would be conducted for each design option. It is anticipated that these studies would cost in the order of \$70,000 to \$80,000 and would require between three to four months to complete.

It is important to note that in order to conduct the archaeological impact assessments a Heritage Inspection permit issued by the Archaeology Branch (Ministry of Tourism, Sports and the Arts) pursuant to Section 14 of the provincial *Heritage Conservation Act* is required. The permit application timeline takes approximately six to eight weeks to obtain a heritage inspection permit once submitted, as applications are first reviewed by the Archaeology Branch for consideration, then they are sent to First Nations groups that claim the area within their traditional territory for a four week review period on the proposed methodology. If there are no issues raised during the referral period, then the Archaeology Branch will recommend the permit be issued. Once a permit is acquired, archaeological fieldwork can usually commence soon after.

Following the selection of the preferred option, a screening level CEAA assessment would be required, which would use build on the information collected in the previous environmental assessments. The CEAA assessment would consider all potential environmental effects and would identify sufficient mitigation/ compensation to limit these environmental effects to acceptable levels. The CEAA process would include the outcome of an alternatives analysis and would require input from a First Nations and public consultation process to confirm that all issues were considered in the process. The CEAA process also requires the identification of any other projects, both existing and approved, that might lead to cumulative environmental effects in combination with the Malahat expansion project. The scope of a CEAA screening environmental application could be in excess of \$100,000 depending on the way in which the project is contracted by the BC Ministry of Transportation. In the case of a design-build (DB) delivery strategy, the CEAA assessment can only be based on general design information, which means that the successful DB contractor would be required to prepare specific

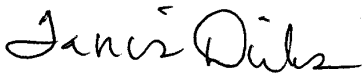
environmental plans to confirm that the levels of mitigation implied in the CEAA would be met.

9.0 CLOSURE

We trust this technical memorandum provides the environmental input you require at this time. Please contact David Munday at 881-7372 if you require further information.

Yours truly,

GOLDER ASSOCIATES LTD.

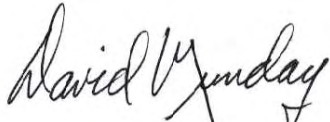


for Nicole Wallace, B.Sc., B.I.T.
Aquatic Specialist



Gina Lemieux, B.Sc., R.P.Bio
Aquatic Specialist

Reviewed by



Dave Munday, R.P. Bio., MBA
Senior Environmental Specialist

NW/GDL/DRM/knb

10.0 REFERENCES

Burger, Alan E., Volker Bahn, and Anna Young. 2000. Marble Murrelets in the Coastal Douglas-fir Forests of SE Vancouver Island in 1998 and 1999. Submitted to: Habitat Conservation Trust Fund, Forest Renewal B.C. (Research), Endangered Species Recovery Fund, World Wildlife Fund Canada, Canadian Wildlife Service, Capital Region District Water and Parks divisions, B.C. Parks, B.C. Ministry of Environment Lands and Parks (Wildlife Branch), B.C. Ministry of Forests, Weyerhaeuser Ltd., Department of National Defence

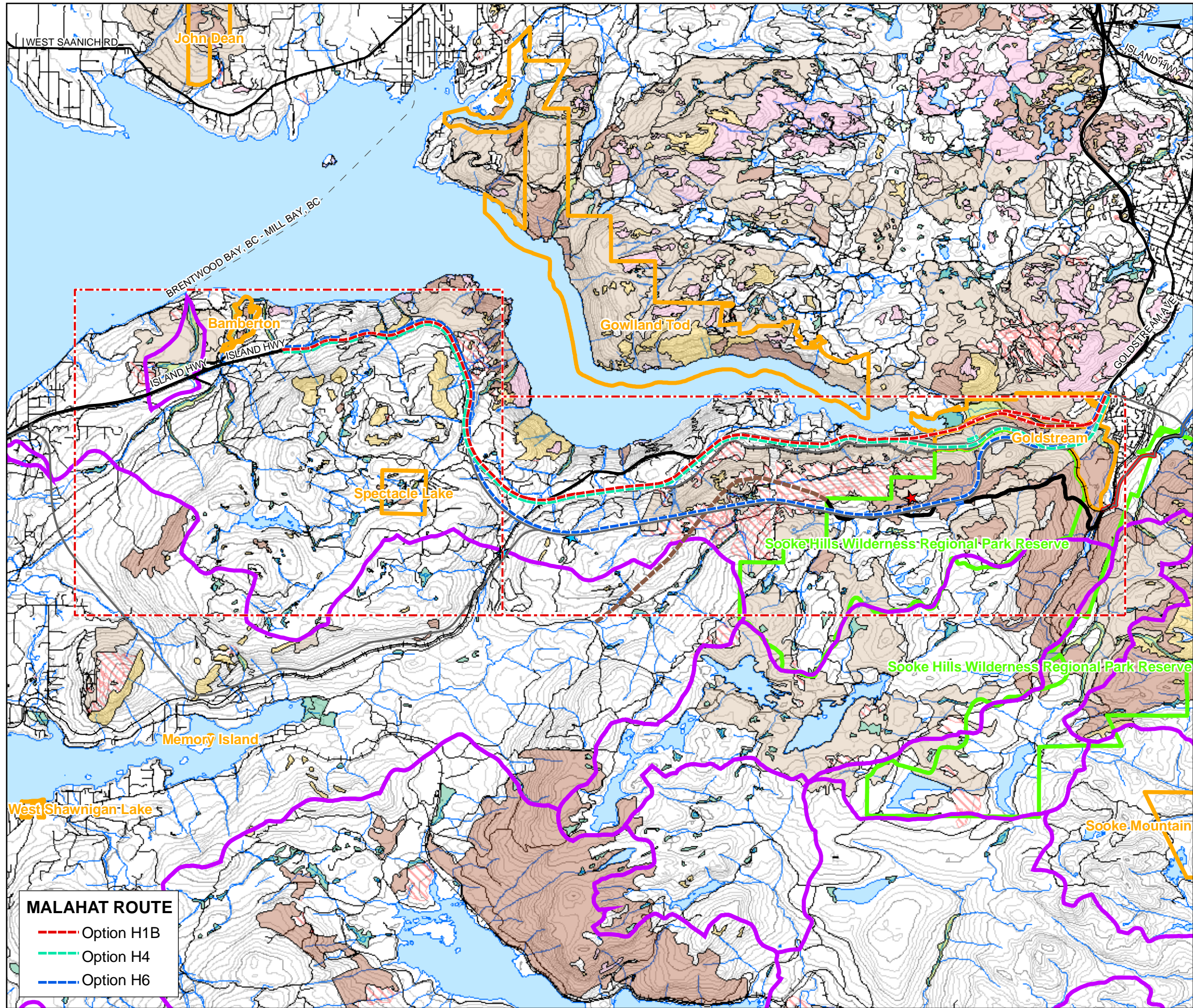
CRD Parks, November 2001. Sooke Hills Wilderness and Mount Wells Regional Parks Management Plan.

Ministry of Lands, Parks and Housing, 1986. Goldstream Provincial Park Master Plan.

Park Act [RSBC 1996] CHAPTER 344 at
http://www.qp.gov.bc.ca/statreg/stat/P/96344_01.htm#section16

Ward, P., G. Radcliffe, J. Kirkby, J. Illingworth and C. Cadrin. 1998. Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands, 1993 - 1997. Volume 1: Methodology, Ecological Descriptions and Results. Technical Report Series No. 320, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia.

N:\Bur-Graphics\Projects\2005\1414\05-1414-060\GIS\aprs\memorandum\figure-01_terrestrial-resources_rev4.mxd



MALAHAT ROUTE

- Option H1B
- Option H4
- Option H6

LEGEND

- ★ Dun Skipper - Blue Listed/Schedule 1 - Threatened
- ★ Common Water Shrew - Brooks Subspecies - Red Listed

Sensitive Ecosystems

- DD, DF, DR Disturbed Area
- CB Coastal Bluff
- HT Terrestrial Herbaceous
- OF Older Forest
- RI Riparian
- SV Sparsely Vegetated
- WN Wetland
- WD Woodland
- FS Seasonally Flooded Agricultural Fields
- SG Older Second Growth Forest

Study Area

Community Watershed Boundary

Provincial Park

Regional Park

Trans Canada Trail

- Route determined, land acquired, built, but not open to the public
- Route determined, land acquired, not yet built
- Public and private land, route not yet determined

Lake

River

Highway

Road

Railroad

Bridge

Tunnel

20m Elevation Contour

100m Elevation Contour

REFERENCE

MSRM, CRD, AXYS, Stantec
Datum: NAD 83 Projection: UTM Zone 10N

0 750 1,500 3,000
Meters
SCALE: 1:75,000

PROJECT STANTEC CONSULTING LTD.
MALAHAT ROUTE
VICTORIA, B.C.

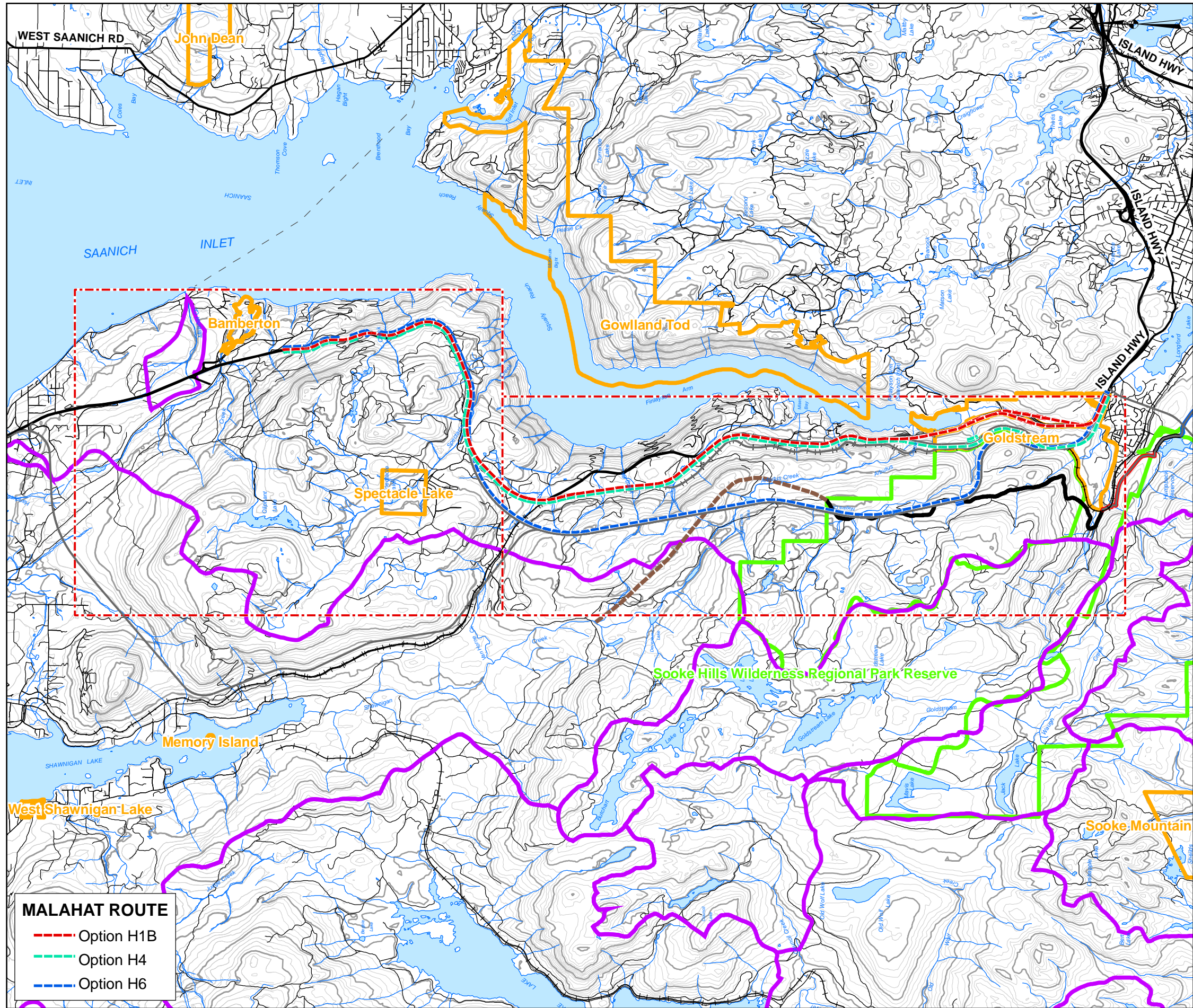
TITLE
MALAHAT TERRESTRIAL RESOURCES



PROJECT No. 05-1414-060	SCALE AS SHOWN	REV. 4
DESIGN DM 19 Dec. 2005		
GIS CDB 19 Dec. 2005		
CHECK DM 19 Dec. 2005		
REVIEW		

FIGURE: 1

N:\Bur-Graphics\Projects\2005\1414\05-1414-060\GIS\aprs\memorandum\figure-02_aquatic-resources_rev4.mxd



LEGEND

Study Area

Community Watershed Boundary

Provincial Park

Regional Park

Trans Canada Trail

Route determined, land acquired, built, but not open to the public

Route determined, land acquired, not yet built

Public and private land, route not yet determined

Lake

River

Highway

Road

Railroad

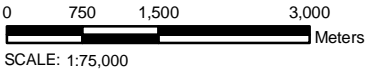
Bridge

Tunnel

20m Elevation Contour

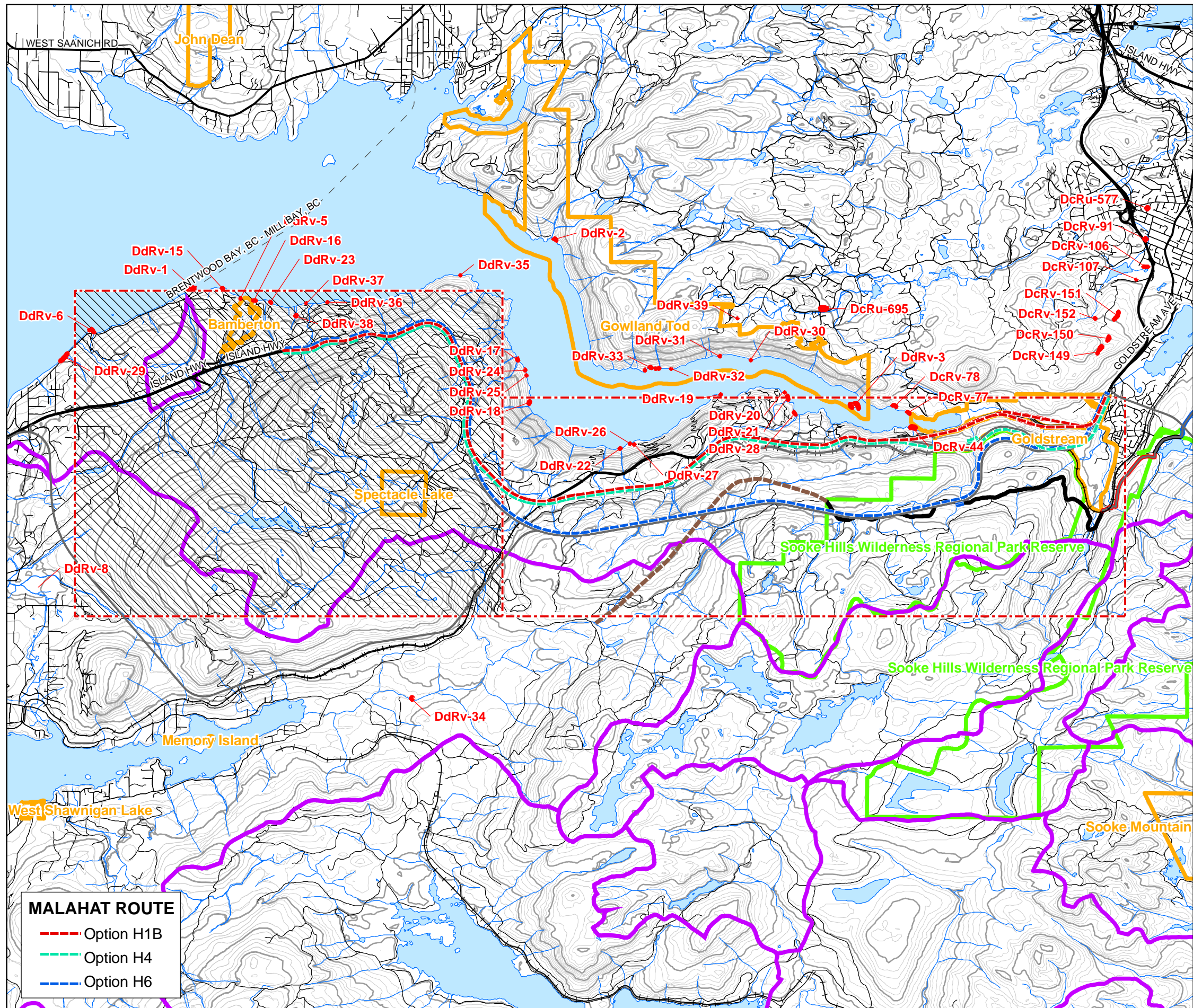
100m Elevation Contour

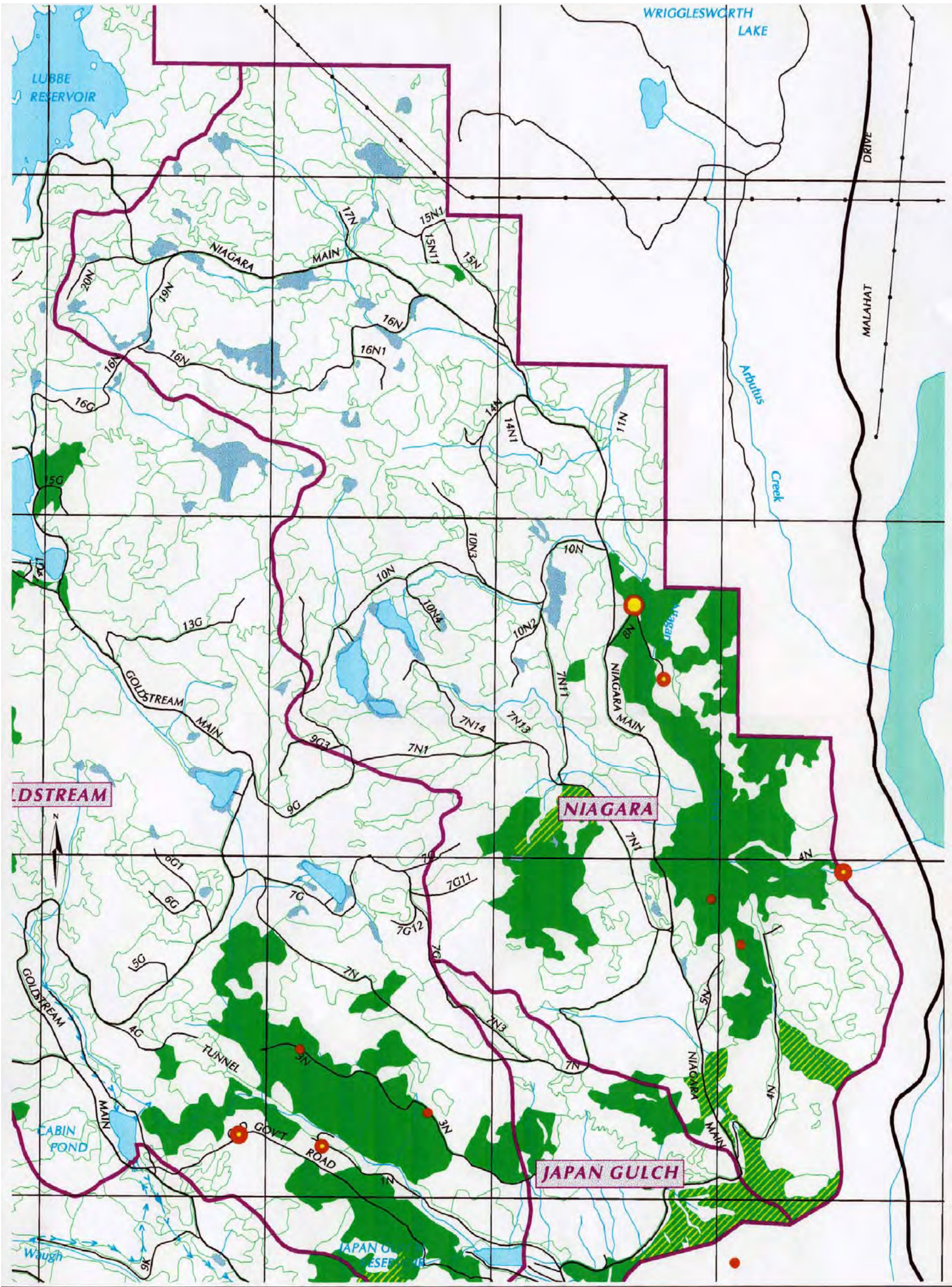
REFERENCE
MSRM, CRD, AXYS, Stantec
Datum: NAD 83 Projection: UTM Zone 10N



PROJECT	STANTEC CONSULTING LTD. MALAHAT ROUTE VICTORIA, B.C.			
TITLE	MALAHAT AQUATIC RESOURCES			
 Golder Associates Burnaby, B.C.	PROJECT No. 05-1414-060			SCALE AS SHOWN
	DESIGN	DM	19 Dec. 2005	REV. 4
	GIS	CDB	19 Dec. 2005	
	CHECK	DM	19 Dec. 2005	
				FIGURE: 2

N:\Bur-Graphics\Projects\2005\1414\05-1414-060\GIS\aprs\memorandum\figure-03_archaeological-sites_rev4.mxd





MAP LEGEND

- HIGHWAY
- PRIMARY ROAD
- SECONDARY ROAD
- B.C. HYDRO POWERLINE
- COMPARTMENT BOUNDARY
- FOREST COVER

- 0 - 10 DETECTIONS
- 11 - 20 DETECTIONS
- 21 - 30 DETECTIONS
- > 30 DETECTIONS
- 0 - 5 OCCUPIED DETECTIONS
- 6 - 10 OCCUPIED DETECTIONS
- 11 - 15 OCCUPIED DETECTIONS
- NO DETECTIONS

- POTENTIAL BREEDING HABITAT
- AREAS CHECKED AND FOUND UNSUITABLE
- AREAS CHECKED AND FOUND UNSUITABLE
- RESERVOIR, LAKE & RIVER
- WETLANDS
- OCEAN

MAP DATA:
NIAGARA
COMPARTMENT

PLOTTING DATE: AUGUST 1998
PLOTTING SCALE: 1:20,000
NORTH AMERICAN DATUM 1983
UTM ZONE 10

PRODUCED BY: HUGH HAMILTON LTD.
DIGITAL DATA PROVIDED BY:
CAPITAL REGIONAL DISTRICT
WATER DEPARTMENT

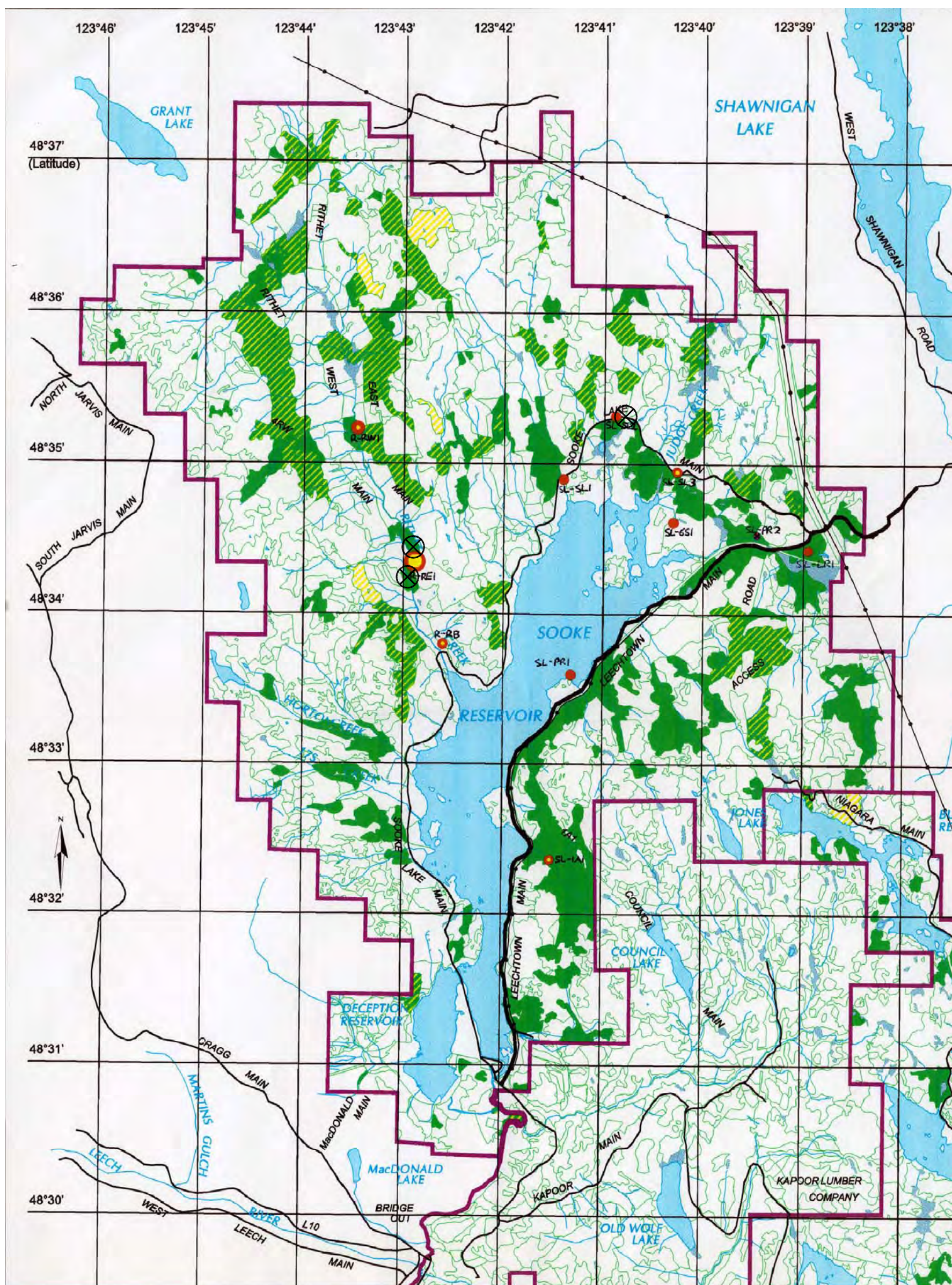
NOTES:

Source: Burger, A.E., V. Bahn, and A. Young. 2000. Assessment of nesting habitat for Marbled Murrelets in the Coastal Douglas-fir forests of SE Vancouver Island in 1998 and 1999. Department of Biology, University of Victoria.




MURRELET HABITAT AND SIGHTING RECORD
IN THE NIAGARA AREA

MALAHAT ROUTE STUDY

FIGURE



MAP LEGEND

-  PROPERTY BOUNDARY
 HIGHWAY
 PRIMARY ROAD
 B.C. HYDRO POWERLINE
 FOREST COVER

-  0 - 10 DETECTIONS
 11 - 20 DETECTIONS
 21 - 30 DETECTIONS
 > 30 DETECTIONS
 NEST LOCATIONS

-  0-5 OCCUPIED DETECTIONS
 6-10 OCCUPIED DETECTIONS
 11-15 OCCUPIED DETECTIONS
 NO DETECTIONS

-
- YELLOW HATCHING - AREAS NOT FLAGGED AS POTENTIAL HABITAT AND FOUND UNSUITABLE
 GREEN/YELLOW HATCHING - AREAS FLAGGED AS POTENTIAL HABITAT AND FOUND UNSUITABLE
- POTENTIAL BREEDING HABITAT AREAS CHECKED AND FOUND UNSUITABLE AREAS CHECKED AND FOUND UNSUITABLE
- RESERVOIR, LAKE & RIVER WETLANDS OCEAN
- 1 km 0 km 1 km 2 km

- MAP DATA:
Sooke
Watershed**

PLOTTING DATE: AUGUST 1998
PLOTTING SCALE: 1:45,000
NORTH AMERICAN DATUM 1983
UTM ZONE 10

PRODUCED BY: HUGH HAMILTON LTD.
DIGITAL DATA PROVIDED BY:
CAPITAL REGIONAL DISTRICT
WATER DEPARTMENT

MURRELET HABITAT STUDY / SIGHTING RECORD

NOTES:

Source: Burger, A.E., V. Bahn, and A. Young. 2000. Assessment of nesting habitat for Marbled Murrelets in the Coastal Douglas-fir forests of SE Vancouver Island in 1998 and 1999. Department of Biology, University of Victoria.



FILE No. FIGURES.dwg

PROJECT No.	05-1414-0610
-------------	--------------

SCALE 1:50000

DATE 14 SEPT

DESIGN	N/A
--------	-----

CAD	DGM
-----	-----

CHECK	JS
-------	----

TITLE

SFPT 06

DESIGN	N/A
--------	-----

CAD	DCM
-----	-----

CHECK	IS
-------	----

MURRELET HABITAT AND SIGHTING RECORD IN THE SOOKE WATER SHED AREA

MALAHAT ROUTE STUDY

FIGURE