

SEISMIC RETROFIT UPPER LEVELS HIGHWAYS PROJECT HORSESHOE BAY UNDERPASSE ENVIRONMENTAL OVERVIEW ASSESSMENT

March 2022



Prepared for:

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DISTRIBUTION LIST

The following individuals/firms have received this document:

Name	Firm	Hardcopies	Email	FTP
Terrence Davies	T Y Lin International Canada	-	✓	-
Krista Englund	Ministry of Transportation and Infrastructure (MOTI)	-	✓	-

AMENDMENT RECORD

This report has been issued and amended as follows:

Issue	Description	Date	Prepared by	Reviewed by	Approved by
1	First Version of Seismic Retrofit of Upper Levels Highways Project: Horseshoe Bay	20220310	Emilia Mackowiak Technical Lead	Valerie Masterman Project Manager	Angus Johnston Project Director
2	Second Version of Seismic Retrofit of Upper Levels Highways Project: Horseshoe Bay	20220330	 Emilia Mackowiak Technical Lead	 Valerie Masterman Project Manager	 Angus Johnston Project Director

1.0 PROJECT OVERVIEW

The Ministry of Transportation and Infrastructure (MOTI) retained T.Y. Lin International Canada (T.Y. Lin) to conduct a seismic evaluation of four underpasses along Highway 1 in the District of West Vancouver, British Columbia (BC):

1. Horseshoe Bay Underpass;
2. Eagleridge Drive Underpass;
3. Caulfield Drive Underpass; and
4. Westmount Road Underpass.

The Seismic Retrofit Upper Levels Highways Project (the Project) includes seismic retrofit design and renewal work (if warranted) of all four underpasses¹. Hatfield Consultants has been retained by T.Y. Lin to assess environmental values and mitigation measures during the design, construction, and post-construction phases of the Project.

Environmental values are presented in three separate Environmental Overview Assessments (EOA). This EOA summarizes key environmental features within or near the Horseshoe Bay Underpass, associated measures to mitigate or avoid potential adverse environmental impacts during construction, and anticipated environmental regulatory requirements.

1.1 PROJECT LOCATION

The Project site is at the Horseshoe Bay Underpass, near the Horseshoe Bay Ferry Terminal, along Highway 1 in the District of West Vancouver, BC (Figure 1).

1.2 PROPOSED PROJECT WORKS

The scope of the Project includes the seismic retrofit of underpass structures to achieve the seismic performance criteria equivalent to the structures designed under the current codes. Proposed works are anticipated to include but are not limited to installing bearings, cables or threadbars, shear keys, seat extensions, girder extensions, integral connections, or other methods. Works are anticipated to take place within the footprint of the existing Underpass with additional area needed for temporary access and laydowns. The Project works will be limited to terrestrial components, with no anticipated adverse impacts to riparian or instream values.

T.Y. Lin will prepare designs for the structure retrofits based on geotechnical, environmental, and traffic engineering investigation inputs. Hatfield will assess the potential environmental impacts, including impacts to:

- Fish and aquatic habitat (including riparian areas and watercourse identification);
- Wildlife and wildlife habitat;
- Vegetation and landscaping (including invasive plant species); and
- Other environmental conditions.

¹ MOTI will be conducting the Caulfield Drive Underpass design.

Contaminated sites and archaeological conditions were not part of the scope of the EOA and therefore are not covered in this report. Mitigation plans have been prepared to limit the potential for environmental impacts during and following construction.

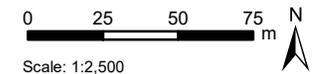
Figure 1 Environmental features around Horseshoe Bay Underpass.



Legend

Environmental Feature

- Butterfly bush



Scale: 1:2,500

Projection: NAD 1983 UTM Zone 10N

Data Sources:

- a) Environmental feature, Hatfield 2022.
- b) Background, GeoEye-1 50 cm image, 15 March 2020, Esri Online Service.



2.0 ENVIRONMENTAL ASSESSMENT

2.1 METHODS

This EOA provides an overview of environmental values, an assessment of potential project impacts and recommended mitigation measures to inform and support T.Y. Lin and MOTI with the design and construction of the Project.

The assessment was conducted through:

- A desktop literature review of information specific to the Project site using online databases; and
- A field assessment to survey environmental sensitivities associated with the Project site.

2.1.1 Literature Review

Data sources evaluated as part of the desktop review included:

- Habitat Wizard (BC MOE 2020a);
- BC Species and Ecosystems Explorer (BC MOE 2021b);
- District of West Vancouver WESTmap GIS service (CWV WESTmap 2022);
- Conservation Data Center (CDC) iMap (BC MOE 2021c);
- Community Mapping Network (CMN) atlases (CMN 2018);
- Wildlife Species Inventory (WSI) database (BC MOE 2020d);
- iNaturalist Canada (Canadian Wildlife Federation et al. 2020);
- eBird Canada (eBird 2020);
- Invasive Alien Plant Program (IAPP) Database and Map Display (BC MOE 2021);
- Metro Vancouver Sensitive Ecosystem Inventory Mapping App (Metro Vancouver 2019); and
- FrogWatch (Nature Canada 2020).

A search was completed for plant species, plant communities, and wildlife species at risk. The list obtained was refined for species that are provincially (CDC) or federally (*Species at Risk Act*) listed and known or believed to potentially occur within or in proximity to the Project site based on existing habitat conditions.

2.1.2 Field Assessment

A field assessment was completed by Emilia Mackowiak, a Biologist in Training (BIT) under the supervision of a Registered Professional Biologist, on December 07, 2021. The field assessment focused on environmental values within the Project site, proposed access and laydown areas, surrounding areas within an approximate 100 m buffer, and including a search of wildlife habitat features that may pose Project constraints beyond the 100 m buffer (e.g., raptor nests). General habitat conditions and representative photographs were collected. The Project site and surrounding areas were surveyed for raptor nests and other wildlife habitat features including watercourses, amphibian breeding wetlands, riparian areas, mammal dens, and wildlife trees.

2.2 RESULTS

2.2.1 Fish and Fish Habitat

No watercourses that meet the definition of a stream under the *Water Sustainability Act*, or aquatic species at risk, were identified within or near the Project site.

The nearest waterbody to the Horseshoe Bay Underpass is an unnamed watercourse located 300 m to the northeast of the Underpass.

2.2.2 Vegetation

The Project site occurs within the Coastal Douglas-fir moist maritime (CDFmm) biogeoclimatic subzone (iMapBC 2021). As described in Egan (1999), mature forests are typically dominated by coastal Douglas fir (*Pseudotsuga menziesii* var. *menziesii*) and western redcedar (*Thuja plicata*), with understory plants consisting of arbutus (*Arbutus menziesii*), Oregon grape (*Mahonia aquifolium*), common snowberry (*Symphoricarpos albus*) and salal (*Gaultheria shallon*).

The south side of the Underpass consisted of mature western hemlock and western redcedar (Photo 1). Young Douglas fir saplings are present on the east side of the Underpass as well. Further to the south of the Underpass, across Horseshoe Bay Drive, the cliff is covered in western hemlock, Douglas fir, and arbutus trees (Photo 2). Low lying shrubs and herbaceous plants on the cliff include salal and sword fern (*Polystichum munitum*).

The north side of the Underpass consists of a sloped hillside that contains mature western redcedar and red alder (*Alnus rubra*) (Photo 3). Underlying vegetation includes common snowberry, Indian plum (*Oemleria cerasiformis*), and sword fern. Tantalus Park, a municipal park of the District of West Vancouver, is located on the northeast of the north side of the Underpass. It contains mature western redcedar and a rich understory of sword fern, Oregon grape, and salal (Photo 4).



Photo 1 Mature western redcedar and western hemlock on the southeast of Underpass (2021-12-07).



Photo 2 Cliff covered in western redcedar, western hemlock, and arbutus. Underlying vegetation of salal and sword fern (2021-12-07).



Photo 3 Mature western redcedar and red alder on north side of Underpass (2021-12-07).



Photo 4 Mature Douglas fir and western redcedar with underlying Oregon grape and salal in Tantalus Park, northwest of the Underpass (2021-21-07).

2.2.2.1 Plants and Plant Communities/Ecosystems at Risk

No sensitive ecosystem inventory (CMN 2020b) or other detailed vegetation mapping data (CDC 2020b) is available for the Project site. The nearest plant species at risk is the hairy manzanita (*Arctostaphylos columbiana*) located approximately 1 km southeast of the Project site. No impacts to this plant are anticipated with the Project works. No wetlands or wetted areas were observed within the Project site during the field assessment. No rare plants or rare plant communities were identified during the field assessment.

2.2.2.2 Invasive Plant Species

The only invasive species that have been documented within approximately 1 km of the Project site according to CDC (2020b) is butterfly bush (*Buddleja davidii*). This plant is known to grow along highways and has the potential to occur within the Project site and surrounding area.

Invasive species documented at the Project site during the field assessment include Himalayan blackberry (*Rubus armeniacus*), butterfly bush, English ivy (*Hedera helix*), English holly (*Ilex aquifolium*) (see Photos 5, 6 and 7). These were documented on both sides of the Underpass. No Japanese knotweed (*Fallopia japonica*) was observed during the field assessment.



Photo 5 Himalayan blackberry and English ivy seen in Project area (2021-12-07).



Photo 6 Himalayan blackberry seen in Project area (2021-12-07).



Photo 7 Butterfly bush seen on south side of Underpass (2021-12-07).

2.2.3 Wildlife and Wildlife Habitat

No bird nesting activity was observed during the field assessment because it was conducted outside of the breeding bird window in the Lower Mainland (March 12 to August 31). No evidence of bat guano/whitewash was observed.

2.2.3.1 Migratory Birds

Because of the surrounding habitat, the Project site and nearby areas have the potential to accommodate tree-, shrub-, and ground-nesting passerines including but not limited to warblers, vireos, thrushes, flycatchers, sparrows, finches, woodpeckers, chickadees, kinglets, and swallows. No migratory birds were observed during the field assessment given the time of year.

2.2.3.2 Raptors

No evidence of raptors or raptor nests has been documented within 500 m of the Project site. No raptor nests were observed during the field assessment.

2.2.3.3 Mammals

Mammals that could exist in the area include bobcat (*Lynx rufus*), racoon (*Procyon lotor*), skunk species (*Mephitis spp.*), weasel species (*Mustela spp.*), eastern grey squirrel (*Sciurus carolinensis*), black bear (*Urus americanus*) and coyote (*Canis latrans*). Small ground-dwelling mammals including mice, voles, or shrews are likely present as these species occupy small home ranges. The area under the north side of the Horseshoe Bay Underpass can offer safe passage for wildlife between the two sides of the Underpass (Photo 8). No mammals were observed during the field assessment.



Photo 8 Potential wildlife corridor for animal passage at south side of Underpass (2021-12-07).

2.2.3.4 Wildlife Species at Risk

A preliminary list of species was generated from the provincial database by querying the CDC Species & Ecosystem Explorer database to identify listed species that have the potential to occur within or in proximity to the Project site (BC MOE. 2021b).

Habitat suitability information was used to refine the preliminary list of species for consideration. Scientific literature was further used to evaluate the suitability of habitat features found within the Project site to support critical life-history functions for each species on the preliminary species list. According to CDC (2021a), two at-risk avian species have the potential to occur at the Project site. Listed species with the potential to occur within or near the Project site are presented in Table 1.

Table 1 Listed wildlife species with the potential to occur within or in proximity to the Project site.

Scientific Name	Common Name	BC List ¹	SARA Status ²
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	Blue	Threatened
<i>Hirundo rustica</i>	Barn Swallow	Blue	Threatened

¹ BC CDC = Conservation Data Centre (Provincially Listed)

² SARA = Federal *Species at Risk Act*

Marbled Murrelet

Marbled Murrelet is known to nest either on the ground or in trees. Suitable nesting grounds at ground level include areas of rock scree slopes, cliffs, and boulders near the open ocean. Preferred nesting trees include western hemlock, western redcedar and Douglas fir. The nearest critical habitat for this species is documented approximately 900 m from the Project site.

Barn Swallow

Barn swallows are known to build their nests under bridges, ledges of buildings, and in caves or cliffs. They forage in open habitats, usually with an open body of water nearby. They can forage from their nest sites as far as 100 m. No nests were observed at the Underpass.

2.2.4 Noise and Vibration

The nearest residential property is approximately 110 m to the northwest of Horseshoe Bay Underpass.

2.2.5 Contaminated Sites

No signs of contamination were observed during the field assessment. A detailed assessment for contaminated sites has not been conducted as part of the scope of this EOA.

3.0 REGULATORY CONTEXT

Environmental legislation considered for potential applicability to the Project is summarized in Table 2.

Table 2 Summary of legislation.

Legislation	Agency	Area of Regulation	Possible Permits/ Actions
Federal			
<i>Migratory Birds Convention Act and Regulations</i>	Environment and Climate Change Canada	Prohibits injury, molestations, and destruction of migratory birds and their nests.	Bird nesting surveys and measures to protect active nests.
<i>Fisheries Act</i>	Fisheries and Oceans Canada	No person shall carry on any work, undertaking or activity that results in harmful alteration, disruption, or destruction of fish habitat.	Permits not required given absence of fish bearing/nutrient providing streams within or near the Project site.
<i>Species at Risk Act, S.C. 2002, c.29</i>	Fisheries and Oceans Canada, Environment and Climate Change Canada, and Parks Canada	Identifies and protects the critical habitat of Canada's species at risk.	Permits not required given adverse impacts to SARA species will not occur and works are not taking place on Federal lands.
Provincial			
<i>Water Sustainability Act</i>	Ministry of Forests, Lands, Natural Resource Operations and Rural Development	Regulates activities being carried out in and about a stream.	Permits are not anticipated.
<i>Wildlife Act</i>	Ministry of Forests, Lands, Natural Resource Operations and Rural Development	Provides for the conservation and management of wildlife populations (including fish) and habitat. Regulates works that could adversely affect raptors.	Permits are not anticipated. In the event that high value habitat is cleared, a qualified environmental professional (QEP) may recommend a salvage permit be obtained to collect and relocate wildlife.
<i>Weed Control Act, R.S.B.C. 1996, c. 487</i>	Ministry of Forests, Lands, Natural Resource Operations and Rural Development	Regulates the spread of invasive plants. Requires land occupiers to control the spread of provincial and/or regional noxious weeds on their land and premises.	Appropriate removal techniques for noxious weeds need to be taken to limit the spread of invasives. To be detailed in the Construction Environmental Management Plan (CEMP) and based on BMPs provided in Section 4.1.2.
<i>Spill Reporting Regulations of the Environmental Management Act</i>	Ministry of Forests, Lands, Natural Resources Operations and Rural Development	Establishes procedures for reporting the unauthorized release of substances into the environment as well as outlining details of reportable amounts for certain substances for sites having Provincial jurisdiction.	A Spill Response Plan shall be developed for the construction phase of the Project as part of the CEMP.

Table 2 (Cont'd.)

Legislation	Agency	Area of Regulation	Possible Permits/ Actions
<i>Provincial (Cont'd.)</i>			
<i>Environmental Management Act</i> Contaminated Sites Regulation	Ministry of Forests, Lands, Natural Resources Operations and Rural Development	Regulates industrial and municipal waste discharge, pollution, hazardous waste and contaminated site remediation. Part 4 regulates Contaminated Sites Remediation.	No permits anticipated.
<i>Heritage Conservation Act</i>	Ministry of Forests, Lands, Natural Resources Operations and Rural Development	Encourage and facilitate the protection and conservation of heritage property in BC.	Requires consultation with a professional archaeologist
<i>Municipal</i>			
<i>Noise Control Bylaw</i>	District of West Vancouver	Regulates the making of certain noises or sounds.	Permit required under Bylaw No. 4404.
<i>Tree Bylaw</i>	District of West Vancouver	Regulates, prohibits, and imposes requirements in relation to trees.	Permit required under Bylaw No. 4892.

4.0 ENVIRONMENTAL MITIGATION

4.1 BEST MANAGEMENT PRACTICES

Project works shall follow general mitigation measures and best management practices (BMPs) to avoid, reduce and/or mitigate the potential for adverse impacts.

The construction contractor(s) will be required to prepare and submit a Construction Environmental Management Plan (CEMP) detailing the environmental protection measures that will be used for the work. The CEMP will be required to comply with Section 165 (“Protection of the Environment”) (SS 165) of MOTI’s Standard Specifications for Highway Construction (MOTI 2020). The CEMP will be reviewed by, and must be accepted by, MOTI. Special Provisions (SPs) contained in the Project tender package will identify Project-specific environmental requirements that supplement the more general environmental requirements described in SS 165.

4.1.1 Wildlife and Wildlife Habitat

The following BMPs are recommended to avoid or mitigate the potential for adverse impacts to wildlife and wildlife habitat during construction:

- Flag clearing and disturbance boundaries on plants and in the field prior to ground disturbance;
- Limit vegetation disturbance to that which is required to safely conduct the work;
- Avoid disturbance to key habitat features (e.g., large mature dead and live trees, downed wood, wet areas);
- Use appropriate buffers, setbacks, or other mitigation measures (e.g., timing, noise) to avoid disturbance from activities;
- Avoid clearing and grubbing activities during the breeding period for migratory birds (March 15 to August 15) (where possible). If clearing during the breeding period for migratory birds is unavoidable, nesting bird activity surveys are recommended. These surveys shall adhere to the BMPs for terrestrial bird inventories and measures to avoid harming migratory birds, nests and eggs as described in *Avoiding Harm to Migratory Birds* (Environment Canada 2017). Surveys for marbled murrelet in the forested and cliff areas and barn swallow nests along and near the Underpass is recommended during the breeding period as well (mid-April to late August);
- Established a buffer around active nests to protect the nest and allow construction activities to proceed outside the buffer. Specific mitigation and monitoring requirements will be determined by the contractor(s) QEP;
- Reuse wood waste and coarse woody debris on-site where practicable;
- Incorporate wildlife awareness training into morning toolbox talks;
- Store wildlife attractants (e.g., food, fuels) in secure vessels (e.g., containers, vehicles) and remove attractants from site each day; and,
- Train workers to give right of way to wildlife and prohibit feeding.

4.1.2 Vegetation and Invasive Plant Management

The following BMPs are recommended to avoid or mitigate the potential for adverse impacts to vegetation, and for the management of invasive plants during construction:

- Conduct visual encounter surveys for vegetation species of conservation concern before the start of disturbance works;
- Minimize clearing widths by delineation of work areas;
- Prevent the spread of invasive plant species by following the BMPs outlined in the Best Practices for Managing Invasive Plants on Roadsides (MOTI and ISCBC 2019);
- Avoid or minimize grubbing and close-cut clearing where practicable to preserve root mats and expedite revegetation;
- Avoid parking, turning around, or staging equipment in areas with invasive species;
- Thoroughly clean and inspect equipment in a designated location (not near ditches) prior to mobilization onsite or leaving site to prevent the introduction of invasive species;
- Mechanical removal shall take priority over herbicide use, where practical;
- Identified areas of excavation containing invasive species (i.e., Himalayan blackberry, Scotch broom and English holy) shall be excavated to a minimum depth of 1 m. Invasive plant debris shall be segregated, bagged then transported offsite to an approved facility;
- Conduct a survey for Japanese knotweed in late spring to determine its presence or absence. Recommendations on the removal of this invasive species are to be included in the CEMP in the event it is encountered; and,
- Maintain a 20 m buffer between work areas and a stand of knotweed (unless it has been effectively chemically treated or there are plans to immediately remove and dispose of).

4.1.3 Site Restoration

If any ground disturbance occurs during construction works, the contractor will be required to re-seed the area with coastal seed mix. If a riparian area is disturbed, a full restoration plan is required.

4.1.4 Air Quality

The following BMPs are recommended to avoid or mitigate potential impacts from dust, fumes and greenhouse gases during construction:

- Follow safe handling and work procedures when working with chemicals, materials, fuels, liquids, wastes, vehicles, machinery, or equipment that could emit vapours, fumes, particulates, or dusts to air;
- Control dust emissions at the source where feasible to contain and limit the release of particles;
- Cover dry soil piles and exposed surfaces and/or wet down as necessary to prevent blowing dust and debris;

- Compact disturbed soils and revegetate slopes as soon as practical following construction; and
- Communicate and enforce idle reduction initiatives.

4.1.5 Noise and Vibration Management

The following BMPs are recommended to avoid or mitigate potential noise and vibration-related concerns during construction:

- Locate and/or orientate noise generating equipment to take advantage of inherent noise shielding available from the natural terrain, or other large objects and to reduce noise emissions from the site;
- Plan works efficiently to minimize the duration and extent of noise disturbance to sensitive human and wildlife receptors and to avoid wildlife disturbance or displacement;
- Place noisy equipment as far away as practical from sensitive noise receivers or amplifiers;
- Provide hearing protection (e.g., earplugs, earmuffs) to workers in areas where they may be exposed to noise levels of 85 dBA or greater; and,
- Comply with applicable noise control requirements (District of West Vancouver's Noise Control Bylaw No. 7332).

4.1.6 Waste Management

The following BMPs are recommended to avoid or mitigate potential waste concerns during construction:

- Dispose of construction-related waste at an acceptable disposal site;
- Implement measures and controls to prevent littering on site. Establish regular clean-up and disposal programs to prevent unnecessary accumulation of construction wastes;
- Segregate waste types in clearly marked bins and recycle where possible;
- Handle solid waste in accordance with applicable municipal, provincial, and federal regulations and disposed of at an authorized receiving facility; and,
- Handle food wastes in a manner that does not result in these wastes becoming animal attractants.

4.1.7 Spill Prevention and Emergency Response

The following BMPs are recommended to prevent, prepare for and respond to spills that may occur during construction:

- Provide proper storage, handling and labelling procedures for fuels and other hazardous materials;
- Provide drip tray containment for fuel dispensing equipment onsite;
- Prepare and post on-site a Spill Response Plan;
- Provide spill response materials in areas adjacent to active works which may have the potential to cause accidental spills and at sites where hazardous substances are stored or in use;
- Keep emergency contact lists on-site in an area accessible to personnel;

- Require training for Project personnel on environmental awareness and emergency/spill response prior to works;
- Properly label, store, and contain hazardous substances;
- Locate equipment maintenance, fueling, and controlled substance storage areas a minimum of 30 m from open water sources; and,
- Keep work areas and machinery tidy and free of excess oil, grease, and leaks.

In the event of an accidental spill or leak, the contractor(s) will immediately initiate the spill response procedures and notify the MOTI's Environmental Representative. Emergency Management BC shall be notified of spills of a reportable volume within 24 hours of the spill. An environmental incident report shall be generated that outlines the cause of the incident, measures taken to rectify the incident, outstanding issues that need to be addressed, and measures taken to prevent further incidents of a similar nature. Construction personnel shall be made aware of spill management and proper handling of hazardous materials (e.g., fuels, oils, and other hydrocarbons) to prevent harmful substances from entering the environment.

4.1.8 Erosion and Sediment Control Plan

The following BMPs are recommended to avoid or mitigate potential erosion and sediment control (ESC) concerns during construction:

- Collect, treat and test site water for applicable discharge criteria prior to discharge; and,
- Complete site inspections at minimum weekly and after 25 mm of rain in 24 hours as per MOTI's criteria.

4.2 CONTAMINATED SOILS MANAGEMENT

Assessment of contaminated sites is not within the scope of this EOA. However, the following BMPs are recommended to manage chance finds of soil contamination during construction:

- Train construction crews on how to recognize contaminated soils and what steps to follow to appropriately handle contaminated materials;
- Store excavated materials prior to confirmatory sampling and disposal if necessary;
- Obtain fill from a commercially reputable, clean source; and,
- Truck spoil to an approved and/or licensed receiving site as required.

5.0 CONCLUSION AND RECOMMENDATIONS

Given that the Project will not occur near a stream or sensitive habitat, permit applications pursuant to the *Fisheries Act* or the *Water Sustainability Act* are not anticipated for this Project. Less time-sensitive permits, including salvage permits under the *Wildlife Act*, may be required during the construction phase and can be sought by the contractor closer to the start of Project works.

Hatfield will continue to work with T.Y. Lin to inform design development to integrate environmental mitigation measures and limit environmental impacts.

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