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Tsleil-Waututh Nation / tə səlilwətał xwəlməx<sup>w</sup>

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**Re: Whey-ah-Wichen Shoreline Adaptation and Restoration – Invasive Species Management**

Hello John,

Thank you for the opportunity for Inlailawatash to provide a workplan for initial invasive species management to support the Whey-ah-Wichen Shoreline Adaptation and Restoration Project. Detailed proposed management methods and cost estimates are outlined below. Due to the archaeological sensitivity of the entire site, the proposed methods are careful to avoid ground disturbance.

A cost estimate can be provided once project scope is defined.

Thank you for your consideration,

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## **INTRODUCTION**

Inlailawatash Limited Partnership (Inlailawatash) has been requested by Tsleil-Waututh Nation (TWN), in consultation with the District of North Vancouver (DNV) and the Vancouver Fraser Port Authority (VFPA) to propose a workplan for ecological restoration in areas impacted by invasive plants in Whey-ah-Wichen (WAW)/Cates Park (Figure 1).

Figure removed to protect archeological information.

**Figure 1. Whey-ah-Wichen/Cates Park, including archeologically sensitive area.**



The project is planned pre and post major project works to beginning in March 2025 by the Department of Fisheries and Oceans (DFO), restoring beach structural stability along the shoreline. Inlailawatash provides ecological restoration planning and management services to a range of clients around səliłwət/Burrard Inlet and is experienced in working on restoration sites, providing maintenance and adaptive management intervention to improve ecological function in restored areas as they develop into mature ecosystems. As the Whey-ah-Wichen shoreline is archeologically sensitive, our experienced and informed approach to invasive plant management with minimal ground disturbance is well positioned to provide ecological restoration and vegetation management services for Whey-ah-Wichen, working on TWN and District of North Vancouver managed land to provide vegetation management and site maintenance.

Invasive species management in Whey-ah-Wichen presents a number of unique challenges. As the site is archaeologically sensitive, invasive management methods must take care to minimize soil disturbance. Because of this, ongoing monitoring and maintenance will be required, as manual removal is not enough to completely eradicate an invasive plant in some cases. Many plants will aggressively resprout from root fragments left in the soil or plant parts that are left behind on the site. However, repeated cutting has been shown to reduce the cover of invasive plants over time. Inlailawatash proposes a strategy of repeated manual removal above ground cutting with methods to suppress regrowth by covering cut stems with a layer of cardboard, erosion blanket, or mulch, with herbicide use applied judiciously as required.

Due to the large scale of the site, the establishment of multiple invasive plant species, and the variety of invasive species present, priority species have been identified for management. Higher priority species include Knotweed (*Reynoutria japonica*, *Reynoutria x bohemica*, *Reynoutria sachalinensis*, *Koenigia polystachya* species), Himalayan Blackberry (*Rubus armeniacus*), English Ivy (*Hedera helix*), and Giant Hogweed (*Heracleum mantegazzianum*, identified in past surveys). These species are dominant in certain areas of the site or are Noxious weeds requiring treatment. Lower priority species include English Holly (*Ilex aquifolium*), Spurge Laurel (*Daphne laureola*), Himalayan Balsam (*Impatiens glandulifera*), and Butterfly Bush (*Buddleia davidii*, identified in past surveys). While there are individuals scattered throughout the site, they are not yet at risk of forming a monoculture, therefore it is recommended to treat the higher priority species first, as detailed below.

## PROPOSED SURVEY METHODS

An invasive plant survey will be carried out in the first phase of this project to collect an inventory for invasives plants present at WAW and prioritize areas for treatment, specifically areas affected by restoration site construction works and access. This information will inform measures on how invasive species will be managed during construction and the creation of a mitigation plan to prevent the introduction and spread of invasive species during construction following best management practices. Surveys will be conducted in spring 2025 ahead of construction. Invasive plants will be identified on site visually with careful search methods and mapped by experienced Qualified Environmental Professionals, building a comprehensive inventory.

The Invasive Plant Management Strategy for the District of North Vancouver (2015) recommends developing and maintaining an invasive plant inventory on District managed land to provide information and spatial data on plant abundance and distribution which provides information required to make informed

decisions regarding invasive plant management. Inlailawatash proposes using the free online Invasives BC form to collect survey data.

Using the Invasives BC format for collecting terrestrial data in WAW will be an effective way to collect data and can be uploaded to Invasives BC or kept offline as desired by land managers. Using an invasive plant mapping tool will provide the following advantages:

- Inventory collection can be completed by multiple project partners, staff and contractors in the field using handheld tablets
- Spatial data collected will be standardised and include info on species, location and abundance, area of coverage, density, and can be linked to treatment records;
- Land managers will be able to more accurately determine the phase of invasion of specific species. This will allow more confidence when deciding on the appropriate management strategy (i.e. eradicate, contain, control); and
- Data will be accessible to and easily shared with other agencies and neighbouring municipalities.

Initial invasive plant survey mapping has been completed by Hatfield consultants in 2023, this survey will be referenced and refined to reflect site conditions as of 2025 (Figure 2).



Figure 2. Invasive plant mapping on the Whey-ah-Wichen/Cates Park project area as of 2023.

## **PROPOSED MANAGEMENT METHODS**

Invasive plant management at Whey-ah-Wichen, including treatment recommendations, disposal methods and location, and mitigation measures for handling will all follow best practices developed by the Invasive Species Council of Metro Vancouver.

Follow-up monitoring is recommended for all treatments. Knotweed has been identified on site and will require follow up monitoring and treatment as a Noxious plant species. Giant Hogweed has not been identified recently on site but will also be considered in site surveys and treated if detected as a Noxious weed.

### **Knotweed**

#### **Treatment**

Knotweed has been identified onsite in an isolated patch at the northeast edge of the site. The most effective way to manage Knotweed is with herbicide treatments. We recommend using a stem injection or foliar application of glyphosate, a precise and effective way of treating this species group. Once the Knotweed has been treated, it can be left in place to desiccate. Ideally, this treatment will occur in Spring 2025 ahead of construction works, with a follow up check and treatment if needed in Fall 2025 and Spring 2026.

#### **Mitigation**

Knotweed should be surveyed and clearly marked in the field with flagging tape, signs, or temporary fencing to avoid accidental disturbance during construction and restoration activities. Manual removal of Knotweed carries a risk of invasive plant spread as this species group can easily be propagated from living plant fragments, so pesticide treatment and plant die back prior to removal of plant parts is recommended. All tools and clothing used by staff during the treatment must be thoroughly inspected and cleaned prior to leaving site, and vehicles inspected after transport of Knotweed to detect and remove plant fragments.

#### **Disposal**

Plant material will be disposed of as per best management practices. In the likely case that a small amount of material is removed the Knotweed debris will be disposed of as garbage at the North Shore Recycling and Waste Centre. If a large amount of material is removed, or mixed with soil for any reason, it will be brought to the Vancouver Landfill and Recycling Depot, which accepts Knotweed material and soil infested with Knotweeds for deep burial only with a complete Waste Assessment Form.

#### **Monitoring**

Follow up checks by a Qualified Environmental Professional should be carried out twice yearly for a minimum of one year, with follow up monitoring recommended Fall 2025, and Spring 2026.

### **Himalayan Blackberry**

#### **Treatment**

Himalayan Blackberry is scattered throughout the entire area of interest but is mostly concentrated growing along the shoreline. The most effective way to remove Himalayan Blackberry is by cutting, then digging out the root crowns to prevent the plants from resprouting. However, on this site, Inlailawatash proposes cutting back the blackberry, then covering the cut stems with a heavy landscaping blanket, cardboard, or a thick layer of mulch to smother the plants to attempt to suppress regrowth. We recommend this happens in Spring 2025, with a follow-up check in Fall 2025 to cut any additional stems that have resprouted.





We recommend using landscape blankets on areas that will be covered by beach nourishment material, and where blackberry has become a dominant monoculture (ie. on top of existing riprap). In areas that are to be replanted or where blackberry is interspersed with desirable native vegetation, we recommend covering the cut stems with a layer of mulch.

#### **Mitigation**

Blackberry vines should be cut back prior to work moving forward and not mixed into soil or rock as part of site restoration work to avoid further spread. Nesting bird surveys should be undertaken in blackberry patches prior to manual removal between March and September. It is best to delay removal if the blackberry patch is used as a nesting site for native passerine birds. Manually cutting the vines is not an effective control method on its own unless it is repeated multiple times over multiple years to exhaust the plants stored reserves, therefore follow up monitoring and treatment is key to species control.

#### **Disposal**

Plant material will be disposed of as per best management practices. Blackberry debris will be disposed of as green waste at the North Shore Recycling and Waste Centre.

#### **Monitoring**

Follow up checks by a Qualified Environmental Professional should be carried out multiple times yearly for a minimum of one year, with follow up monitoring recommended Summer 2025, Fall 2025, and Spring 2026.

### **English Ivy**

#### **Treatment**

English Ivy is well established at WAW. English ivy was observed both as a ground cover and as a climbing vine, winding its way up mature trees. Recommended treatment is to manage the ivy growing up the trees, and prevent vines from regrowing, but not focus on removing the ivy as a ground cover. The recommended time of year for English Ivy removal is late fall and winter, but all times of year are appropriate for manual removal.

To manage the English Ivy climbing up the trees, we recommend cutting the ivy at chest height on the tree, then again at the base of the tree. Metro Vancouver Best Management Practices for English Ivy recommends making the cut at chest height, then pulling the vines from the base of the tree and a 1-2m radius around the tree. This method involves digging out the roots of the ivy, which is contraindicated on the archeologically sensitive site. Therefore, we recommend cutting the vines at the base of the tree, then covering the cut stems with a layer of mulch at least 30cm thick, to smother the plants and prevent them from climbing back up the tree. Metro Vancouver BMP's recommend the mulch remain in place for at least two years prior to restoration activities if being used as the primary control method. Vines that are above the chest high cut should be left on the tree to desiccate on their own. Attempting to pull the vines away from the tree has the potential to damage the tree further and/or injure workers.

#### **Mitigation**

Ivy vines should be cut back prior to work moving forward and not mixed into soil or rock as part of site restoration work to avoid further spread. Nesting bird surveys should be undertaken at tree ivy treatment locations prior to manual removal between March and September. It is best to delay removal if the ivy patch is used as a nesting site for native birds. Manually cutting the vines is not an effective control method on its own unless it is repeated multiple times over multiple years to exhaust the plants stored reserves, therefore follow up monitoring and treatment is key to species control.

**Disposal**

Plant material will be disposed of as per best management practices. Ivy debris will be disposed of as green waste at the North Shore Recycling and Waste Centre.

**Monitoring**

Follow up checks by a Qualified Environmental Professional should be carried out twice yearly for a minimum of one year, with follow up monitoring recommended Fall 2025, and Spring 2026.

**Giant Hogweed****Treatment**

Giant Hogweed has been identified on the eastern shoreline of WAW in past years, with a small patch identified on the slope leading to the beach. Giant Hogweed poses a risk to human health and safety and must be removed by qualified environmental professionals wearing personal protective equipment to avoid chemical burns from the plant and its sap. The most effective way to remove Giant Hogweed is digging out the entire plant in the spring prior to the plant growing to full size (>3m). However, on this site, Inlailawatash proposes cutting back the hogweed, then covering the cut stems with a heavy landscaping blanket, cardboard, or a thick layer of mulch to smother the plants to attempt to suppress regrowth. We recommend this happen in spring 2025, with a follow-up check fall 2025 to cut any additional stems that have resprouted.

We recommend using herbicide to control Giant Hogweed if the plant has grown above 1m, using glyphosate applied as a foliar herbicide in spring on actively growing plants, followed with monitoring and subsequent summer herbicide treatment if needed.

**Mitigation**

Giant Hogweed should be surveyed and clearly marked in the field with flagging tape, signs, or temporary fencing to avoid accidental disturbance during construction and restoration activities. Giant Hogweed should be cut back prior to work moving forward and not mixed into soil or rock as part of site restoration work to avoid further spread. Giant Hogweed produces a large amount of seed and follow up monitoring should be conducted to assess if the seed bank is viable and producing new plants in the area.

**Disposal**

Plant material will be disposed of as per best management practices. Removed plant material will be double bagged and brought to the Vancouver Landfill and Recycling Depot, which accepts toxic plants such as Giant Hogweed for deep burial only with a complete Waste Assessment Form.

**Monitoring**

Follow up checks by a Qualified Environmental Professional should be carried out twice yearly for a minimum of one year, with follow up monitoring recommended Fall 2025, and Spring 2026.

**English Holly****Treatment**

English holly is occasionally scattered throughout the entire area of interest but is mostly under canopy in forested areas of WAW. The most effective way to remove English Holly is by cutting, then digging out the roots to prevent the plants from resprouting. However, on this site, Inlailawatash proposes cutting back the holly, then covering the cut stems with a heavy landscaping blanket, cardboard, or a thick layer of mulch to smother the plants to attempt to suppress regrowth. We recommend this happen in Spring 2025, with a follow-up check in Fall 2025 to cut any additional stems that have resprouted.



We would recommend using landscape blankets on areas that will be covered by beach nourishment material. In areas that are to be replanted or where holly is interspersed with desirable native vegetation, we recommend covering the cut stems with a layer of mulch.

**Mitigation**

English holly should be cut back prior to work moving forward and not mixed into soil or rock as part of site restoration work to avoid further spread. Nesting bird surveys should be undertaken in holly patches prior to manual removal between March and September. It is best to delay removal if the holly patch is used as a nesting site for native birds. Manually cutting the shrub is not an effective control method on its own unless it is repeated multiple times over multiple years to exhaust the plants stored reserves, therefore follow up monitoring and treatment is key to species control.

**Disposal**

Plant material will be disposed of as per best management practices. Holly debris will be disposed of as green waste at the North Shore Recycling and Waste Centre.

**Monitoring**

Follow up checks by a Qualified Environmental Professional should be carried out twice yearly for a minimum of one year, with follow up monitoring recommended Fall 2025, and Spring 2026.

**Spurge Laurel****Treatment**

Spurge Laurel has been identified throughout the shoreline area of WAW. Spurge Laurel poses a risk to human health and safety and must be removed by qualified environmental professionals wearing personal protective equipment to avoid chemical burns from the plant and its sap. The most effective way to remove Spurge Laurel is cutting the plant below the root collar with hand pruners or loppers. Spurge Laurel can re-sprout from the stem but will not re-sprout from the roots or below the root collar. Manual removal can be followed with covering the cut stems with a heavy landscaping blanket, cardboard, or a thick layer of mulch to smother the plants to attempt to suppress regrowth. We recommend this happen in Spring 2025, with a follow-up check in Fall 2025 to cut any additional stems that have resprouted.

**Mitigation**

Spurge Laurel should be surveyed and clearly marked in the field with flagging tape, signs, or temporary fencing to avoid accidental disturbance during construction and restoration activities. Spurge Laurel should be cut back prior to work moving forward and not mixed into soil or rock as part of site restoration work to avoid further spread.

**Disposal**

Plant material will be disposed of as per best management practices. Removed plant material will be double bagged and brought to the Vancouver Landfill and Recycling Depot, which accepts toxic plants such as Spurge Laurel for deep burial only with a complete Waste Assessment Form. Plant material will be transported outside the passenger compartment of the transport vehicle to avoid dangerous concentration of volatile compounds that can pose a risk to human health.

**Monitoring**

Follow up checks by a Qualified Environmental Professional should be carried out twice yearly for a minimum of one year, with follow up monitoring recommended Fall 2025, and Spring 2026.

## **Himalayan Balsam**

### **Treatment**

Himalayan Balsam has been identified on the west shoreline area of WAW. The most effective way to control Himalayan Balsam is manual removal. This species group has exploding seed pods that effectively distribute seed, due to the explosive nature of seed dispersion manual removal should only be conducted in spring prior to the seed capsules maturing. It is recommended to leave the plant in place until the following season if the seed capsules have matured. Hand pulling may be done carefully for removals as the roots are very shallow and weak and digging is not typically needed. Manual removal should remove as much of the root as possible. We recommend that the plants are removed prior to and up until the plants flower (May to early June), with follow up removals through the summer. Cutting may be used to remove the top of the plant to prevent fruit formation if needed, with seed pods contained in a bag prior to cutting if present. Himalayan Balsam can grow new flowering stems after cutting, requiring monitoring and follow-up for control.

### **Mitigation**

Himalayan Balsam should be surveyed and clearly marked in the field with flagging tape, signs, or temporary fencing to avoid accidental disturbance during construction and restoration activities. Plant parts may be buried if seeds have been removed.

### **Disposal**

Plant material will be disposed of as per best management practices. Himalayan Balsam debris will be disposed of as green waste at the North Shore Recycling and Waste Centre.

### **Monitoring**

Follow up checks by a Qualified Environmental Professional should be carried out twice yearly for a minimum of one year, with follow up monitoring recommended Summer 2025, and Spring 2026.

## **Butterfly Bush**

### **Treatment**

Butterfly Bush has been detected at WAW in past years and may still be present in the project area. Butterfly Bush has the potential to spread and should be removed when detected. Removing the entire plant including the root systems is the most effective way to eliminate Butterfly Bush. However, cutting the plants at ground level and leaving the roots intact can also be an effective way to manage the plant. This technique is most effective in the spring when the broom is flowering because this is when most of the plant's energy stores will have moved out of the roots, and it will have a lower ability to resprout. After cutting, we recommend monitoring the plants for regrowth and repeating the procedure when needed.

### **Mitigation**

Butterfly Bush should be cut back prior to work moving forward and not mixed into soil or rock as part of site restoration work to avoid further spread.

### **Disposal**

Plant material will be disposed of as per best management practices. Butterfly Bush debris will be disposed of as green waste at the North Shore Recycling and Waste Centre.

### **Monitoring**

Follow up checks by a Qualified Environmental Professional should be carried out twice yearly for a minimum of one year, with follow up monitoring recommended Fall 2025, and Spring 2026.

## **PLANTING**

Following invasive plant removal disturbed areas should be restored soon following removals, as per planting plans developed for the project. Spring or fall are appropriate planting periods, drought periods in summer and frost periods in winter should be avoided for planting.

All invasive plant material should be fully removed and growing medium applied with a layer of mulch cover for moisture retention and invasive plant suppression. Hardscape items such as split rail fence or rock should be installed prior to planting to avoid incidental damage to new plantings. Use of coarse woody debris (e.g. logs over 30cm diameter) as hardscape items is positive for planting structures as the wood will retain and release moisture and gradually decay, adding nutrients for plant growth.

New plantings should be protected with temporary fencing to mitigate potential grazing by Canada Geese or digging by pet dogs. Eco-cultural fencing (stick fence) constructed from natural plant material could be used to reduce disposable product use and the need for removal when plants are established, as a fence made of small diameter sticks will decay naturally.

Native plantings should be monitored following installation and watered for the first year of establishment if drought conditions occur where no precipitation is received for 14+ days. Replacement of plantings should occur in the case of significant mortality of the given plant species installed, using an adaptive management approach to determine species that successfully establish on site and species that are unsuccessful to inform further planting prescriptions.

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