



**River's Crossing**

**Native Plant Species Overview Assessment**

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## Introduction

LANDECA Services Inc. has been engaged to assist with the analysis of the existing landscape conditions on site to identify opportunities for potential salvage and reuse of native plant species prior to the proposed residential development of the property.

LANDECA's horticultural technicians and landscape designers, under the direction of a Certified Arborist and a Member of the Canadian Institute of Planners, completed the landscape analysis. It is important to note that the observations and recommendations outlined in this letter are intended to provide an overview of the landscape character of the property. Where appropriate and to provide background, the findings of the comprehensive Aqua-Tex Scientific Consulting Ltd. report, "*Riparian Management Zones – Lot alignment, RAR and SWM Pursuant to Rezoning Application RZ-02-11 – 1150 Bear Mountain Parkway*", have been referenced.

The objective of the overview assessment is to identify native species of interest and corresponding strategies for potential retention, salvage and reuse.

## Background

As noted in the Aqua-Tex report, much of the landscape in the area proposed for residential development has been previously disturbed, with an internal road system, two existing buildings, and on-site stormwater and wastewater treatment infrastructure. The site has experienced significant tree canopy loss due to blow down, leaving the forest edge vulnerable to further wind disturbance. Virtually all the existing disturbed areas are proposed for re-development.

The proposed residential concept of a clustered, conservation-style subdivision is envisioned to reflect the semi-rural character of the District of Highlands, with the surrounding forest to be preserved in perpetuity. Adopting a landscape strategy that focuses on the use of indigenous and drought-tolerant species plant species within the residential neighbourhood will contribute to the continuity of character for the property and will reflect principles of sustainable development, inherent in the project's design.

"This conservation subdivision design plan conserves natural landscapes by concentrating density on a very small proportion of the property (17%). This results in the development being less land-consumptive, ensuring that the majority of the land is permanently protected (under Covenant), contributing to an interconnected network of functional green spaces and connecting corridors – sustained, living semi-rural landscapes."

## Site Conditions

The site is characteristic of a Douglas fir forest, with rocky outcroppings supportive of stands of Arbutus trees. As the subject area has previously been disturbed, the forest is not mature and has suffered from loss of trees along the edges of the property adjacent to the Bear Mountain Parkway and from the existing development.

**Overview of Native Plant Species:**

The following is a list of native plant species observed during two site visits on 29 May 2012 and 13 June 2012.

**TREES:**

***Arbutus menziesii* (Pacific madrona)**



**Description:** Small to medium sized broadleaf evergreen tree to 30m tall with brownish red peeling bark revealing smooth chartreuse green young bark.

**Leaves:** Alternate, evergreen, oval leaves to 15cm long. Dark shiny green above and whitish-green below, hairless, leathery without teeth except sometimes on young growth.

**Flowers/Fruit:** White, urn-shaped, fragrant clusters of flowers followed by orange-red berries.

**Ecology:** Grows on dry, sunny, often-rocky sites with coarse sandy textured soils. Often found as part of Douglas fir and Garry oak ecosystem.

**Transplanting:** Seedlings do not like to be transplanted as they have a single, long taproot.

***Acer macrophyllum* (Bigleaf maple)**



**Description:** Large often, multi-stemmed, deciduous tree to 35m tall with young bark green and smooth, older bark ridged grey-brown and often covered with lichens, ferns and moss. There are more mosses and other plants associated with this maple than any species of tree in the region.

**Leaves:** Large 5 lobed, dark green on top and paler on bottom, maple leaves 15-30cm across with yellow fall colour.

**Ecology:** Grows on dry to moist sites often with Douglas fir trees on sites disturbed by fire, clearing or logging at low to mid elevations.

**Transplanting:** Seedlings often found under the parent tree can be easily transplanted in the winter and spring.

***Acer circinatum* (Vine maple)**



**Description:** Large shrub to small deciduous tree to 7m tall with sprawling pale green branches that mature to dull brown.

**Leaves:** Opposite 7-9 lobed green maple leaves arranged in a distinctive tiered pattern with yellow to red fall colour.

**Flowers/Fruit:** Small white flower clusters and winged green fruits.

**Ecology:** Grows in moist to wet soils usually found in the forest understory, along stream banks and sometimes in open areas, clear cuts, meadows and brush fields.

**Transplanting:** Seedlings can easily be transplanted in winter or spring.

***Pseudotsuga mensiesii* (Douglas fir)**



**Description:** Large, pyramidal, evergreen tree to 70m tall with drooping branches and thick, fluted, ridged, rough dark brown bark

**Leaves:** Flat yellowish-green needles 2-3cm long with small reddish-brown pollen cones and 5-10cm long hanging, oval, seed cones that start out green and age to reddish -brown to grey.

**Ecology:** Grows on a wide range of sites from dry, low elevations to moist mountainsides.

**Transplanting:** Seedlings can be transplanted in the spring.

***Thuja plicata* (Western red cedar)**



**Description:** Large evergreen conifer to 60m tall with drooping leader with large spreading, drooping branches that turn upward (j-shaped). Grey to reddish-brown bark that tears off in long fibrous strips.

**Leaves:** Scale-like, opposite, paired glossy yellowish green foliage with overlapping shingled arrangement that looks like a flattened braid.

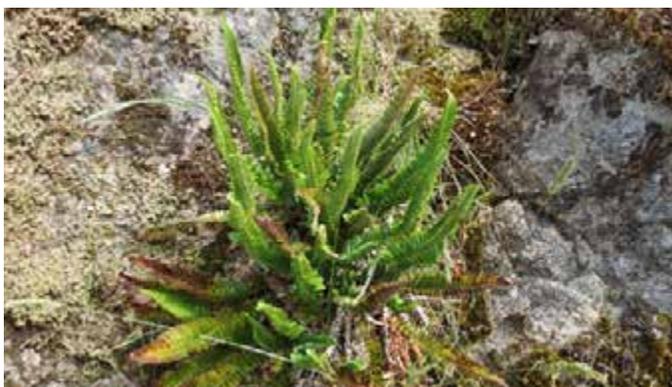
**Flowers/Fruit:** Minute, numerous reddish pollen cones and egg-shaped, 1cm long seed cones that start out green and mature to woody, brown colour and remain on the tree over the winter months.

**Ecology:** Grows in moist to wet soils, usually in forest ecosystems but also occurs in drier habitats at low to medium elevations.

**Transplanting:** Seedlings can be transplanted in the fall or spring.

**SHRUBS AND UNDERSTORY:**

***Blechnum spicant* (Deer fern)**



**Description:** Medium sized, evergreen, tufted fern.

**Leaves:** Two types of fronds, vegetative/sterile and reproductive. Vegetative fronds are attractive, glossy, evergreen rosette often pressed to the ground and broadly spreading. Later in the season finer textured reproductive, spore-bearing fronds arise vertically from the centre of the clump.

**Ecology:** Grows in moist to wet forest floors, wet slide areas, stream banks, bogs and lowlands to mid or subalpine elevations.

**Transplanting:** Transplants easily in spring and fall.

***Gaultheria shallon* (Salal)**



**Description:** Creeping to erect evergreen shrub spreading by layering, suckering and sprouting hairy branched stems that grow to variable heights 15cm-5m.

**Leaves:** Alternate, leathery, thick, shiny, sharply and finely toothed, egg-shaped evergreen leaves 5-10cm long.

**Flowers/Fruit:** Small pinkish-white urn-shaped flowers produced along branch ends and followed by blue-black edible berries in the fall.

**Ecology:** Grows on the forest floor, rocky bluffs from the sea-shore to low and medium elevations

**Transplanting:** Does not transplant easily due to its spreading underground root network and often leggy growth habit.

***Holodiscus discolor* (Ocean spray)**



**Description:** Erect, usually multi-stemmed, deciduous shrub to 4m tall with rigid young stems that mature to arching brownish, peeling branches.

**Leaves:** Alternate, deciduous, dull green, hairy, egg-shaped leaves 3-6cm long with lobed or coarsely toothed with reddish fall colour.

**Flowers/Fruit:** White to cream, small lilac-like flower in dense terminal pyramidal clusters that turn brown in the fall and remain on the plant over the winter. Tiny light brown hairy achenes (type of simple dry fruit).

**Ecology:** Dry to moist open sites (woodland, thickets, clearings, logged areas, ravine edges, coastal bluffs) at low to mid elevations.

**Transplanting:** Shrubs can be transplanted in late winter. Taking hardwood cuttings or removing suckers from the base of a stem just below the soil line in later winter can also propagate the shrub.

***Mahonia aquifolium* (Oregon Grape)**



**Description:** Erect, rhizomatous, stiffly branched, evergreen shrub with yellowish branches.

**Leaves:** Holly-like, glossy green leaves with 5-9 leaflets per leaf with several prominent spiny teeth.

**Flowers/Fruit:** Erect clusters of bright yellow flowers followed by edible blue berries.

**Ecology:** Grows in dry, open sites at low to middle elevations.

**Transplanting:** Shrubs can be transplanted in the spring or fall.

***Mahonia nervosa* (Dwarf Oregon-grape)**



**Description:** Erect rhizomatous, evergreen, stiff branched shrub to 60cm tall with holly-like leaves with yellowish wood and bark.

**Leaves:** Clustered, long, alternate, shiny green leaves with 9-19 leathery leaflets turning red or purplish in winter. Leaflets are oblong with spiny teeth closely resembling English holly.

**Flowers/Fruit:** Bright yellow flowers followed by edible blue berries that grow in elongated clusters.

**Ecology:** Grows in dry to fairly moist forest floors at low and middle elevations.

**Transplanting:** Transplants easily in the fall or spring.

***Polystichum munitum* (Sword fern)**



**Description:** Large evergreen fern to 1.5m tall with erect leaves forming a stout, woody, scaly rhizome.

**Leaves:** Dry-scaly stem with blade lance-shaped, erect to arching leaves forming a tight clump spreading out radially from a round base. Single-pinnate with leaflets alternating on the stalk.

**Sori:** Large, circular in two rows on either side of the midrib of each frond and are covered by a centrally-attached, umbrella-like indusium with fringed edges which produce light yellow spores.

**Ecology:** Moist forest floors at low and mid-elevations; one of the most widespread and abundant ferns in our region.

**Transplanting:** Transplants easily in fall and spring.

***Rosa nutkana* (Nootka rose)**



**Description:** Spindly deciduous shrub that grows to 3m tall with a pair of large prickles at the base of each leaf; other prickles are sometimes found on new growth but otherwise absent. Can easily form thickets due to its rhizomatous growth habit.

**Leaves:** Alternate, deciduous, compound green leaves with 5-7 toothed leaflets; leaflets elliptic 1-7cm long with rounded tips.

**Flowers/Fruit:** Large pink flowers 4-8cm across typically borne singly at the end of branches followed by pair shaped fruit called hips that remain on the shrub throughout the winter.

**Ecology:** Found in a variety of open habitats including shorelines, meadows, thickets, stream banks, roadsides and clearings at low to mid-elevations.

**Transplanting:** Transplants easily in the fall and spring.

***Rubus spectabilis* (Salmonberry)**



**Description:** Erect deciduous shrub to 4m tall with branching rhizomes forming dense thickets; twigs hairless, zigzag growth pattern with scattered prickles with golden-brown shedding bark.

**Leaves:** Alternate deciduous dark green leaves with 3 sharply toothed leaflets.

**Flowers/Fruit:** Large magenta pink flowers 4cm across appearing on short branches in the spring and are followed by edible yellow or reddish fruits that resemble a raspberry.

**Ecology:** Grows in moist to wet places on the forest floor, disturbed sites, stream banks, avalanche tracks and wet logged areas at low to subalpine elevations.

**Transplanting:** Transplants easily in the fall or spring.

***Symphoricarpos* (Snowberry)**



**Description:** Erect deciduous shrub with opposite branching and rhizomatous growth 0.5-2m tall with very fine twigs and young hairless stems.

**Leaves:** Opposite, deciduous, elliptic to oval green leaves 2-5cm long with smooth to wavy toothed margins which may be lobed on young stems.

**Flowers/Fruit:** Pink to white, bell-shaped 5-7cm long flowers in short dense groups flowered by clusters of white berry-like drupes that remain on the shrub throughout winter.

**Ecology:** Grows in dry to moist habitats in open forests, thickets, rocky slopes, river terraces, ravines, and beaches in low to middle elevations.

**Transplanting:** Transplants easily in the fall or spring.

#### PERENNIALS AND GROUNDCOVERS:

##### *Achillea millefolium* (Yarrow)



**Description:** Perennial aromatic, flowering herb usually rhizomatous 10-100cm tall.

**Leaves:** Fern-like, alternate, pinnately dissected green leaves

**Flowers/Fruit:** White to pinkish-red ray flowers and cream colour disk flowers grow on numerous heads in a short flat or round-topped cluster

**Ecology:** Grows on dry to moist, well drained open sites, meadows, rocky slopes, roadsides, gravel bars, clearings, and sometimes in open forests at low to high elevations.

**Transplanting:** Transplants easily in fall or spring.

##### *Zygadenus venenosus* (Meadow Death-Camas)



**Description:** Perennial flower from oval bulbs covered with blackish scales with stems to 60cm tall. The bulb and leaves are poisonous to humans and grazing animals.

**Leaves:** Mainly basal, grass-like, channeled, green to 30cm long becoming shorter up the stem.

**Flowers/Fruit:** Creamy-white bell or saucer-shaped flowers, foul-smelling, with green glands at the base of the petals which grow in compact terminal clusters; followed by cylindrical fruit capsules to 1.5cm long with spindle-shaped brown seeds.

**Ecology:** Grows in open forest edges, damp (in spring) meadows, grassy slopes and rocky outcropping at low to middle elevations.

**Transplanting:** Not suitable for transplant.

***Camassia quamash* (Common Camas)**



**Description:** Perennial herb that forms a purple flower from a deep, egg-shaped, 2cm long bulb that is grown to 70cm tall.

**Leaves:** Numerous, basal, grass-like green leaves to 2cm wide and 50cm long.

**Flowers/Fruit:** Pale to deep blue, occasionally white flowers to 3.5cm long grown in a terminal spike in groups of 5 or more; followed by egg-shaped capsules to 2.5cm long with stalks curved in towards stem (seed pods/stems in photo above).

**Ecology:** Grows on grassy slopes and meadows in the low to middle elevations. Common in a Garry Oak meadow and was the most important vegetable plant to the coastal people as a mainstay food.

**Transplanting:** Not suitable for transplant.

***Sedum spathulifolium* (Broad-Leaved Stonecrop)**

- Description:** Perennial, succulent herb to 20cm tall from stout rhizomes that grow upright or sprawling.
- Leaves:** Fleshy rosettes of sage-green, reddish in full sun, glaucous (grayish, bluish, or whitish waxy coating) sometimes wrinkled alternate, crowded oblong to wedge or spoon-shaped, fleshy, flattened leaves to 2cm long.
- Flowers/Fruit:** Bright yellow petals to 1cm long in groups of 5, which are lanced-shaped and pointed and form a flat-topped cluster atop of the leafy flowering stems.
- Ecology:** Grows on rocky outcrops, coastal bluffs, cliffs, and forest openings on coarse well-drained soils at low to middle elevations.
- Transplanting:** Easily transplanted by stem or leaves in fall or spring.

***Elymus glaucus* (Blue Wildrye)**

- Description:** Tufted perennial grass with small blue-grey leaves, usually forming small clumps 0.5-1.5m tall
- Leaves:** Blades are flat or slightly inrolled, usually lax, hairless to roughened, 5-12mm wide.
- Flowers/Fruit:** Cluster of flowers on a branch (inflorescence) is spike, erect, stiff, 5-15 cm long, with spikelets usually 2 per node, mostly 2-flowered and overlapping.
- Ecology:** Grows in open forests (coniferous and deciduous), in dry to moist openings, rocky slopes and clearings; common at low to mid elevations under Oak and Doug Fir canopy.
- Transplanting:** Can be transplanted in spring or early summer.

**A variety of mosses and lichens were also observed.**

**Native Plant Salvage and Reuse Strategies:**

The following outline our recommendations regarding potential salvage and reuse of the native plant species that are suited to transplanting.

- Most of the trees aside from saplings are not suitable for transplanting; however, where saplings are observed, the specimens can be harvested for transplanting provided care to retention of a large root ball is taken and supplemental irrigation is provided during re-establishment for one to two years following re-location.
- Many of the native shrubs can be easily transplanted if provided with supplemental irrigation during the dry season for the first year or two after relocation.
- Some of the perennials and groundcovers are suitable for transplant; however, the requirement for seasonal timing of species identification and harvesting could be very labour-intensive.
- The recommended time for transplanting and relocation of desirable native flora is in the wet season during fall or spring.

There are opportunities to salvage and reuse the native plant species on-site to both contribute to the ecology of the property and the character of the new neighbourhood in the forest setting.

We have identified three proposed receiving sites on the property where the intensive planting of salvaged plant material could be achieved:

**Street-side Bank along Bear Mountain Parkway**

This portion of the site has recently been largely cleared of invasive *Cytisus scoparius* (Scotch broom) and should be re-vegetated to stabilize the bank and prevent against re-infestation with Scotch broom. The planting of this bank with native plant species serves also to reflect the character of the property and differentiate the new Highlands neighbourhood from the adjacent Bear Mountain development. While the bank is north-facing, the surrounding area is largely cleared of mature trees and therefore the bank has good sun exposure and would be a suitable site for many of the transplanted species. There is also potential to consider the addition of nursery/field grown native tree species to further contribute to the landscape character at this important point of entry. Review of the planting plan and required irrigation infrastructure with the interested stakeholders would be required.

### Parklands/Garden Plot



This area of the site is proposed to be developed as a common amenity green space for the use and enjoyment of neighbourhood residents. The topography in this area slopes into a low ravine, which then opens up to a lower-lying area adjacent to the proposed Cottages site. The existing trees within the ravine area will be retained and therefore this receiving site would be suited to transplanted species seeking lower levels of light and sun exposure. As the Parklands/Garden Plots are part of the proposed Phase One development, there is an opportunity to establish an irrigation system to maintain the transplanted species and for use in the garden plot amenity area.

### Treehouse Rocky Outcrop



The landscape around the existing treehouse structure is characteristic of a rocky outcropping where Arbutus trees thrive and the existing stands of Arbutus trees are proposed to be retained. There is an opportunity to further support the native ecology of the site by transplanting suitable species from the property to this green space area. Also part of the Phase One development, the installation of a temporary irrigation system on this site is feasible.

In all cases, the ongoing management and maintenance of the transplanted species will be required to ensure their re-establishment and to guard against the potential re-colonization of invasive species within the newly planted native areas. LANDECA has been retained as part of the design team to monitor landscape and native plant species prior to, during, and post construction.

In addition to the on-site re-use of salvaged plant material, there are also opportunities to consider the potential transplanting of native plant species to off-site locations for reuse. Consultation with the Native Plant Society of British Columbia and other stakeholder / stewardship groups could be pursued as the project advances.

**Overview of Invasive Species:**

As the property has been previously cleared, it has been exposed to a number of non-native, invasive plant species which have subsequently colonized and spread on-site. The most pervasive of the invasive plant species noted during our site visits include *Cytisus scoparius* (Scotch broom) and *Rubus armeniacus* (*syn. Rubus discolor*) (Himalayan blackberry).

***Cytisus scoparius* (Scotch broom)**

**Description:** Spindly, deciduous green shrub with unarmed 5-angled branches; introduced species that is widespread and invasive endangering much of the regions native rainshadow flora.

**Leaves:** Deciduous, small, alternate leaves with 3 leaflets near the base of the branches becoming simple above and grow pressed close to the green branches.

**Flowers/Fruit:** Bright yellow, typical 'pea'-flower about 2cm long sometimes tinged with purple; followed by black flatted seed pods about 4cm long. Seeds are catapulted from the pod as it cures and dries and snaps apart making an audible noise.

**Ecology:** Introduced to Vancouver Island in 1850 by seed and now grows in open sites, especially on disturbed sites along road ways.

**Control/Removal:** Either by cutting the stem below the soil line in the dry season, or pulling the broom in late winter when the soils are moist and before the wild flowers begin to grow. Seeds can remain in the soils for many years until conditions are favorable for germination making it difficult to eradicate in one year.

***Rubus armeniacus* (syn. *Rubus discolor*) (Himalayan blackberry)**

**Description:** Robust erect to sprawling, more or less evergreen, shrub that arches and trails along the ground to 10m long and rooting at the ends, distinctly four-angled, armed with stout, recurved prickles; often forming dense, impenetrable thickets.

**Leaves:** Alternate, mostly evergreen trifoliate (on floral shoots), to 5-foliate green leaves 12-25cm wide with toothed, oval, smooth-green above, covered with white hairs below leaflets.

**Flowers/Fruit:** White to pinkish 5 petal flowers 2-3cm across with many stamens in clusters of 5-20 followed by edible Blackberries.

**Ecology:** Introduced Asian species that came from India via England and has widely naturalized in disturbed sites and streamside areas at low elevations.

**Control/Removal:** Two phase process starting with the removal of above ground vegetation and killing or removing the remaining root crown and major side roots. Long-term control is required to eradicate the species from an area. Long term solutions include repeated above ground cutting, grubbing out the root crown and major roots, foliar treatment, concentrated herbicide on freshly cut stumps, and dense planting of shade providing vegetation.

It is recommended that a comprehensive program of invasive species removal be implemented to work to clear the site of the broom and blackberry, and any other invasive species of concern that may be present. With the pervasive colonization of the broom in particular along Bear Mountain Parkway, control and removal of the invasive species on the River's Crossing site will create a strong differentiating character for the project.

LANDECA is pleased to be of assistance at this early stage in the development planning process and to provide ongoing landscape support and expertise as part of the design team as the project advances.

Information on the native plant species sourced from:

1. Plants of Coastal British Columbia. Copyright 1994 by the B.C. Ministry of Forests and Lone Pine Publishing
2. Native Plants in the Coastal Garden. Revised Edition Copyright 2002 by April Pettinger and Brenda Costanzo, Whitecap Books.