

“A taste for the beautiful is most cultivated out of doors”

~ Henry David Thoreau, *Walden*, 1854

“Embrace uncertainty and unpredictability. Surprise and structural change are inevitable in systems of people and nature”

~ C.S. Holling, 2001

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Executive Summary

The proposed restoration of the Native Plant Garden on the University of Victoria campus is designed to be an educational experience for people of all ages. This site has been neglected over the past ten years and it is our aim to restore the area by planting native plants, removing invasive species and creating a space of learning. Local schools ranging from elementary, secondary to post-secondary will be involved in the creation of signs, online plant identification brochure and rock pathways. By integrating various levels of learning throughout the planning, implementation and monitoring of this project we are hoping to engage the community to create a unique cultural and educational space.

As one of UVIC's few remaining green spaces inside of Ring Road, this location has the potential to serve as both an oasis for quiet contemplation as well as a place for environmental education. In order to maintain this green space within the confines of the expanding University it is necessary to create a multi-use area that is culturally important to the students and local community members. Many of the current courses provided by the University are focused upon local knowledge and native plants. These courses often begin with a native plant tour on the campus. By restoring the Native Plant Garden and enhancing the educational opportunities many of the current programs will gain a much needed demonstration space. The surrounding District of Oak Bay and its associated community are focused upon native plants and walking trails as well. This restoration project addresses these needs from the community and will provide volunteer opportunities geared to create a sense of place within their neighbourhood. The success of this restoration will be gained by bringing together community members and educational institutions to work toward a common purpose.

1.0 Introduction

Native Plant Gardens are a means of restoring degraded ecosystems and retaining or creating a sense of place in an area. Native Plant Gardens have many benefits that can be incorporated within a community, for example, excellent climate adaptation and identification with a cultural sense of place (Koester, 2008). Native plants have evolved with the local climate and conditions by: making them easy to care for once established, providing habitat for local birds, insects and fungi, and engaging local community members (Koester, 2008). By promoting naturally occurring plants and animals in an area we can help to protect the biodiversity and resilience of the ecosystem.

According to the Ecological Restoration Principles and Guidelines there are several purposes for any restoration project. Some of these reasons include; safeguarding biodiversity, natural capital, providing ecosystem services for future generations, increasing populations of rare or threatened species, enhancing landscape connectivity, and contributing to the improvement of human well-being (Parks Canada, 2008). The area chosen for this restoration project has been the previous site of a Native Plant Garden started in collaboration with Vancouver Island Public Interest Research Group (VIPRIG) and the University of Victoria (UVIC). Nancy Turner was extensively involved in the creation of the original garden and felt it was important for many reasons such as: to provide educational opportunities for many departments, encourage students, faculty, and staff to value local native plants for their botanical, historical, cultural, and aesthetic qualities. Furthermore, the garden also seeks to enhance biodiversity on the campus and provide shelter and habitat for native birds, insects and other wildlife (Harrop-Archibald, 2007). The creation of this Native Plant Garden aims to address the

restoration purposes outlined by Parks Canada and will be focusing upon biodiversity and human well-being through volunteer and educational opportunities. The desire for community engagement through the involvement of students at varying levels of education is the backbone of this restoration project. Educational outcomes and opportunities will be the main focus throughout the implementation and future monitoring of the Native Plant Garden.

2.0 Site Analysis

2.1 Location

The location chosen for this restoration project is inside of Ring Road between the MacLaurin Building, Parking Lot E, Cunningham Woods and the Medical Sciences Building, see Figure 1. The proposed site is located at 48°27'43" N, 123°18'51" W and has an area of approximately 1015 m². It is a wooded/shrubby area surrounded by walking paths, lawns and the parking lot. Within our target area there is a small man-made pond, trees, bushes and moisture loving plants.

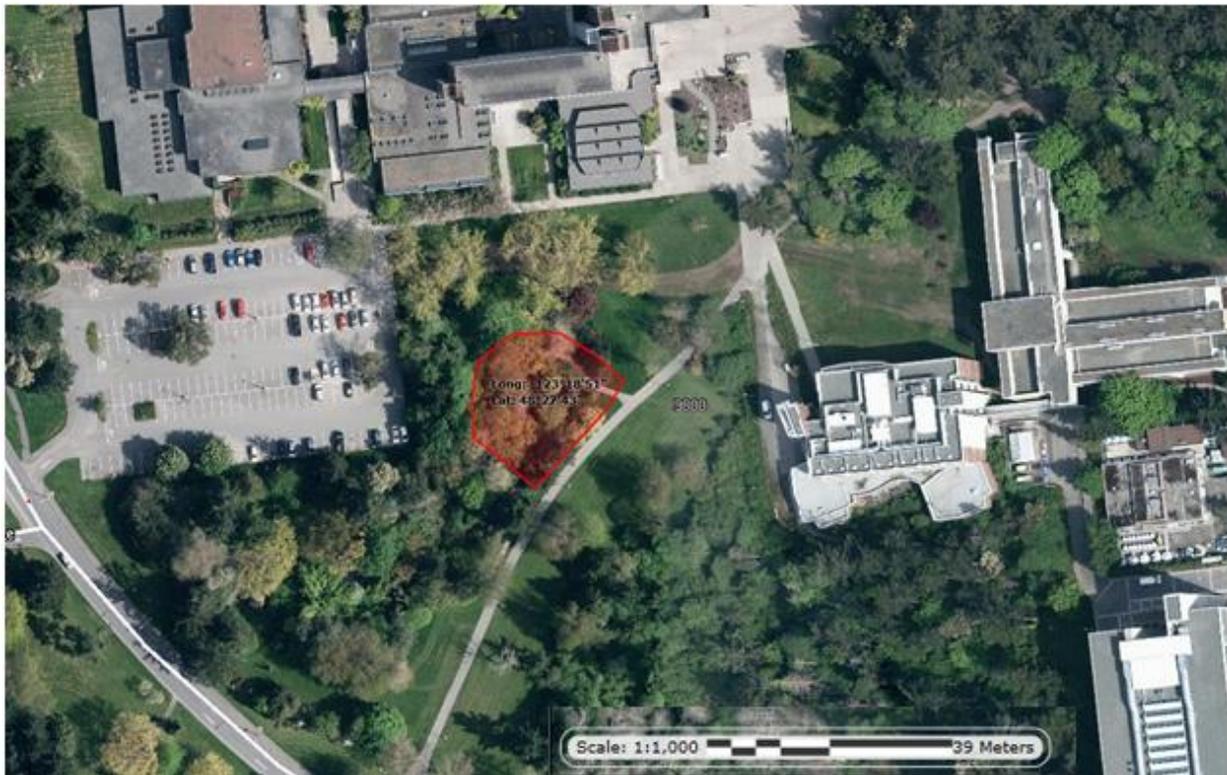


Figure 1. Proposed restoration site located on the University of Victoria campus. (crdatlas.ca)

2.2 Biotic Conditions

This site is composed of a mix of native and invasive species due to a previous restoration project that has been left unattended. The garden area is at a lower elevation than the surrounding paths and parking lot resulting in a very wet microclimate (Weir et al., 2008). Our site encircles a pond where moisture loving plants have settled, illustrated in Figure 2.



Figure 2. Native Plant Garden, proposed location for restoration project as seen from entrance pathway.

Some of the current native plants located within the restoration site include: Sword Fern (*Polystichum munitum*), Common Snowberry (*Symphoricarpos albus*), Scouler's Willow (*Salix scouleriana*), Nootka Rose (*Rosa nutkana*), see Appendix 1 for current plant list. The invasive species identified within the Native Plant Garden are: Bamboo (*Phyllostachys atrovaginata*), English Ivy (*Hedera helix*), and Holly (*Ilex aquifolium*). The current plant summary is quite

different from the plant list provided from the previous restoration project in July 2001 (Harrop-Archibald, 2007), see Appendix 2. This difference may be caused by invasive species or the very wet environment being unsuitable habitat for certain native plants chosen to be planted by the original project. The act of restoring and creating a cultural place within this unique space will help to preserve it for future generations.

2.3 Abiotic Conditions

Many factors affect the restoration area including: soil conditions, climate, hydrology, topography and geology. The site location lies on a drumlinoid ridge and consists mainly of Victoria Marine Clay (Harrop-Archibald, 2007). Victoria Marine Clay tends to be quite stiff near the surface and becomes firm to soft at greater depths. The clay deposits have differing depths depending upon the area, however, in this site it ranges between five to eight meters (Harrop-Archibald, 2007). The Native Plant Garden has been classified as a swamp, which is wet and with soil that is rich in nutrients, especially nitrogen (Harrop-Archibald, 2007). This area has a low water table and is ideal for native plants requiring bog-like conditions (Davidson, 1993). The low water table indicates that during winter months the area is submerged in water while in the summer it may dry up with no visible trace of water present. The University of Victoria is located at a topographic peak between Gordon Head and Cadboro Bay with an approximate elevation of 70 m above sea level (Environment Canada, 2012). The hydrology of this area is split between four local watersheds: Finnerty Creek, Cadboro Bay drainage system, Hobbs Creek and Bowker Creek (Harrop-Archibald, 2007). The climatic region on Southern Vancouver Island is classified as the Coastal Douglas Fir biogeoclimatic zone. This zone lies in

the rain shadow of Vancouver Island and the Olympic Mountains. It has warm, dry summers and fairly mild, wet winters (Egan, 1999). Victoria has an annual rainfall of approximately 607 mm (Environment Canada, 2012). It is important to take note of the abiotic conditions when selecting native plants.

2.4 Site History

Many different people have occupied and used the land that we currently call the University of Victoria. It is centered upon traditional Coastal Straits Salish territory where Elders recall foraging for berries and harvesting root vegetables (Harrop-Archibald, 2007). The 1800s brought about colonization by English settlers and the land was taken over for new uses. There was a military base called the Gordon Head Army camp occupying the land during the mid-1900s, see Figure 3. By this time the land had been extensively logged and dramatically changed from the Indigenous uses (Harrop-Archibald, 2007).



Figure 3. Gordon Head Army base in 1942 (Turner & Lovell, 1999)

An initial purchase of 120 acres of land was made in 1959 by Victoria College (Harrop-Archibald, 2007). The college expanded by purchasing additional land from the Hudson Bay Company in 1961 (Turner & Lovell, 1999). The creation of a new charter and the formation of the University of Victoria occurred in 1963, see Figure 3 (Turner & Lovell, 1999). The slow process of remodeling the land into a campus took many years, see Figure 4. The University expanded to 403 acres and planted 10 000 trees to transform the barren army base into the park-like campus that exists today, see Figure 5 (Turner & Lovell, 1999).



Figure 4(the top image). First building site for the University of Victoria. (Turner & Lovell, 1999)



Figure 5. The University of Victoria as seen in 1964 as the Clearihue Building, the laying of this building's foundations occurred in 1962 shown below . (Turner & Lovell, 1999)

The restoration site was the original location for Finnerty Gardens where many ornamental flowers were planted around 1974 (Weir et al., 2008). By 1988, these plants were moved to their current location outside of Ring Road (Weir et al., 2008). The VIPIRG along with the School of Environmental Studies, using funds from the Graduating Class of 1993, created and implemented the current Native Plant Garden (VIPIRG, 1993). This garden was created in 1993 and monitored by VIPIRG until 2002 (VIPIRG, 2002). Since 2002 many native plants have declined in numbers, been extirpated and invasive plants invading some areas.



**Figure 6. The University of Victoria as seen in 1992
(Turner & Lovell, 1999)**

The Native Plant Garden is used by many students and local residents as it is still a pleasant green space on campus. Although it is much quieter than other parts of campus there have been one or two people walking through the area each time field data was being collected for this project. Many bikers fly past the garden on their way to class, however, the bushes and trees protect this area making it a secluded and peaceful space to walk, see Figure 7



Figure 7. View from the pathway inside of the Natural Plants Garden

2.5 Problem Identification

There are several factors that could affect the success of this restoration project. Invasive species can be a barrier to the successful implementation of a Native Plant Garden. The invasive plants located within the restoration site are known for rapid growth and the ability to overtake the local plants. Since invasive species lack their normal predators they have the ability to grow faster than the locally adapted plant species. The removal and consistent monitoring of invasive species is required to prevent this threat from overtaking the native plants being restored.

Another threat to this restoration project is the large number of deer that have begun to reside on the UVIC campus. The deer population is expanding rapidly due to their lack of predators and the availability of food. The Native Plant Garden may be another source of food for deer unless a plan to protect the garden is devised. Finnerty garden has been experiencing the effects of deer and the resulting loss of important plant species. Their solution was to install a deer fence around the perimeter of the garden to prevent entry. A similar solution may have to be implemented in order to protect the Native Plant Garden. The ever expanding University campus may become another obstacle for a successful restoration. There are very few spaces left, especially within Ring Road, that are possible locations for new buildings. At any point the campus planning committee could choose to rezone the Native Plant Garden and change this green space into another building site. The most effective way to prevent destruction of this green space is to create and maintain cultural importance. By creating a space with educational opportunities and local culture it increases its value within the campus community.

2.6 Jurisdiction

The Natural Plants Garden is situated within two jurisdictions. The restoration project must be approved by the University of Victoria and the District of Oak Bay, see Figure 8. Since the University has currently established this site as a natural garden, there is no need for rezoning of the land. Permission from facilities management to alter the site will still be required. The District of Oak Bay encourages native planting and the removal of invasive species and may be a source of promotion and fund-raising within the community (District of Oak Bay, 2012). The next section will detail the policy, goals and objective for this restoration project.

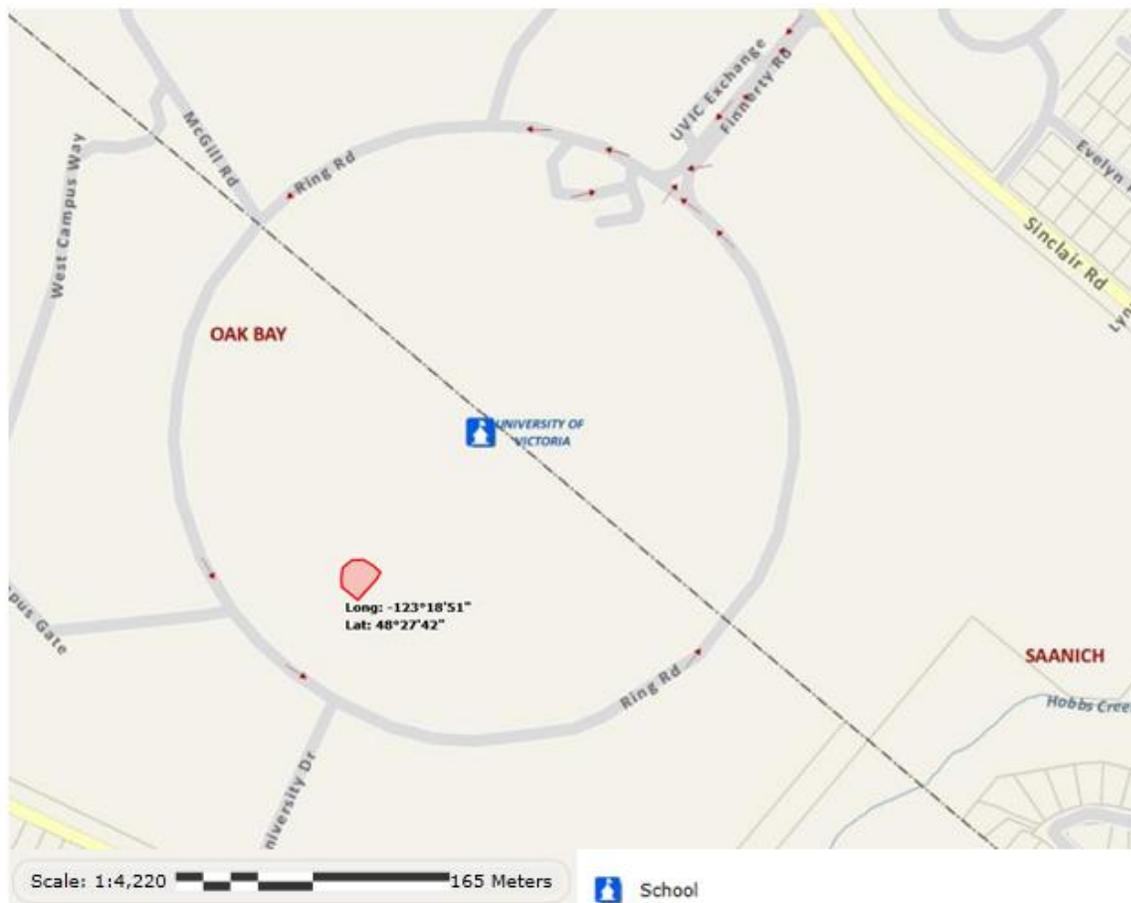


Figure 8. Site location base map showing district border and surrounding access points (crdatlas.ca)

3.0 Restoration Policy, Goals and Objectives

3.1 Policy/Vision Statement

To reinstate the Native Plant Garden by restoring and adding native plants to the ecosystem, in addition, to provide an area of educational value by creating a plant identification brochure and plant signs to encourage educational institutions: UVIC, Camosun and surrounding grade schools, to utilize the area to promote and enhance community and educational engagement with local plants and their history. The success of the project will be achieved by engaging with the community and different levels of educational institutions (elementary, middle and post secondary) to assist in the creation of the signs, the rock pathway and the plant brochure.

3.2 Goals

The goals for this project are qualitative measurements that will assist in the cultivation of the plan. Through these qualitative goals the quantitative objectives (listed in the next section) will be combined to create the design of the site plan. These goals are broad statements that this project hopes to achieve in three designated time frame ranging from 0-10 years, as see in Appendix 3. These seven goals relate both to the policy/vision statement and to the objectives to ensure successful implementation of the design.

- I. To successfully promote this project to be implemented, monitored and maintained for the long-term on UVIC's campus by actively engaging with the community and local education institutions.
- II. To restore the selected location to its original intended use as a Native Plant Garden.
- III. To plant native species that will grow in this local ecosystem, amongst the plants already in the ecosystem and those chosen to be planted in the ecosystem.
- IV. To remove, as much as possible, invasive and non-native plants that are dominate in the ecosystem.
- V. To create zone signs, with students from a local elementary or middle school, that identifies plants by their common name, Latin name and fact (i.e. Historical use) about the plant.
- VI. To create a rock pathway with students from local kindergarten classes that marks the garden's pathway.
- VII. To create a plant identification brochure that is accessible online to enhance to educational use of the area.

3.3 Objectives

The objectives are quantitative measurements that will guide the monitoring and implementation of the project. The figure in Appendix 3, the Objective Chart, breaks down the four objectives in to three different time frames: 0-12 months, 1-5 years and 5-10 years. Each objective has direct actions that are to occur during the specified time frame in order to achieve the objectives and the goals associated with that objective.

3.31 Objective I: Increase the number of native plants in the ecosystem

Through objective I (one) this project hopes to help achieve goals II, III and IV. In Appendix 3 the chart states the action that needs to occur in order to fulfill objective I and achievement of goals II through IV. Objective I includes: planting, transplanting and growth from invasive removal. The map in appendix 4, illustrates the current site with the identification of what is presently found there, both native and non-native species. Found in Appendix 5 the map illustrates the ideal planting of native species. Through objective I the plan hopes to achieve an increase of 20% in the first time frame, 40% in the second and 80% in the third. The map in Appendix 4 will help guide the planting of the new native species over the course of the implementation portion.

3.32 Objective II: Identification and management of invasive species

Through objective II this project hopes to help accomplish goals II, III and IV. Appendix 4 identifies the current invasive plants needing removal in the ecosystem. There are two parts to this objective: identification and management. In the Objective Chart, found in the Appendix 3, the first time frame (0-12 months) states that the action of observation that should take place to attempt to identify all the of the invasive and non-native plant species. Although Appendix 1 has listed the ‘present day’ invasive plants in the ecosystem if there is a disturbance between now and the implementation of the project the action of observation and identification in the first time frame will prove extremely useful and efficient in the long term. For the management side a 20% reduction of all know invasives and non-native plants.

In the second time frame (1-5 years) the identification objective is the continual monitoring of previously identified invasives and non-native species, especially the aggressive or dominant ones; such as Bamboo, Holly, or English Ivy. It will also provide the opportunity to observe and identify any new threats to the ecosystem. The reduction of known and/or new invasives will continue under the management side of the objective by 50%.

The final time frame (5-10 years) the identification aspect is identical to the previous time frame. The management in the number of reducing invasives increases to 90%. If throughout the first two time frames there is a continual return of a specific species a containment plan should be created to mitigate the spread of the species. The exact details of the containment plan will depend on the specific plant; however, the containment plan may be the continued removal and monitoring of the species. Plants like Bamboo and English Ivy are extremely difficult to remove entirely from the ecosystem; therefore, the containment plan should be flexible to fit the species it is attempting to target.

3.33 Objective III: Educational aspects can be seen – visible and readable zone signs

Objective III deals with the educational aspect of the signage. Objective III aims to assist in achieving goals I, V and VI. There will be a totally of eight signs that will be implemented by the end of the first year. It is crucial that the signs are not only visible and readable but that during their creation they are used to engage with local educational institutions and children. The creation of all eight of the signs and the rock path are ways in which kids and educational institutes can participate in the building and creation of this space.

In the first time frame the zone signs should be started by reaching out to local elementary classes that would be interested in drawing specific species for the seven zone signs, see Appendix 6 for an example of a zone sign. It would be beneficial to have student grade three and above draw the plants for the zone signs. This collaboration and project should be completed by the end of the first time frame. The welcome sign design, see Appendix 7 for an example of the welcome sign, will follow a similar time line as the zone signs. However, there is only one welcome sign. It may only require one kindergarten class to help with the drawing of the border for the welcome sign. This collaboration and project should be completed at the end of the first time frame. The rock path can engage another local kindergarten class. First, they can collect the rocks themselves by planning an outing to the beach with the organizers of the garden. Secondly, they will paint the rocks and come out to the garden and place them along the designated pathway. This collaboration and project should be completed by the end of the first time frame.

The second time frame requires less collaboration. From year 1 to 5 all the signs should be in place, with a sub-objective to have them completed within one year. It is crucial to the project to have these signs in place by the end of the first year because the plant identification brochure (described in the next section) will take slightly longer to create. The signs, therefore, can begin to build interest and visits to the area immediately.

The final time frame requires maintenance of the existing signage to ensure their visibility and readability. This design chose to create larger signs and less of them instead of individual plaques, as seen in other gardens, because it will be easier to maintain only eight signs as appose to individual ones.

3.34 Objective IV: Educational plant identification brochure design

Objective IV outlines the design for the plant brochure; see Appendix 8 for an example of the brochure. Objective IV aims to assist in achieving goals I and VII. The plant brochure seeks to further engage individuals and educational groups in the area by providing a brochure, available online, that contains specific knowledge on local native plants, facts about them and historical uses. The significance of the plant brochure will be its flexibility and adaptability to the site. This project seeks to engage University of Victoria Environmental Studies students in ES 200, ES 321, ES 341 and ES 421 to aid in the maintenance of the brochure. The hope is that every year these students and the faculty of Environmental Studies will engage in maintaining the brochures up to date information and availability.

In the first time frame the initial outline of the brochure should be created. The brochure will include a photograph of the plant species, ecosystem facts and other information such as historical uses, biological make up or other interesting features of the specific species. At the conclusion of the first time frame, 12 months, the brochure should be ready to publish online.

The second time frame will begin with the publication of the plant identification brochure online. Environmental Studies classes can be utilized to do monitoring and updating of the plant identification brochure as many of the classes, listed above, participate in campus walks to educate students on native plants. Instead of walking all over campus this garden will provide a place in which these walks can provide many native species and in return these walks can also provide updated information on the site, both on native plants and non-native plants.

The final time frame follows an identical path as the time frame listed above. The continual updating of the information on the plant brochure needs to occur to ensure that it is updated in a timely fashion and readily available to members of the community, UVIC faculties and other educational institutions who may want to utilize the areas for educational purposes.

3.4 Summary

The policy/vision statement should be the overarching principal guiding the project. The seven goals are then individual statements that are qualitative in manner that help guide the direct actions, implementation and monitoring to take place. The objectives assist in the time line of the ‘when’ and ‘how’ exact actions should occur. The policy/vision statement guides both the goals and objective as useful tools to steer direct actions, timing of actions and standards for evaluation.

4.0- Implementation

4.1 Introduction

As noted in the introduction of this project, both VIPIRG and UVIC, have done past work on this site. Due to the lack of management in the past 10 years we have chosen this target site to update and enhance both native plant species and educational aspects. In pursuit of achieving the policy/vision statement implementation of this project seeks to restore the value and integrity of the site through the planting of native species and educational engagement. One

of the key components to the implementation of this project will be planting bioclimatic appropriate species to ensure achievement in meeting our objectives and goals. The following sections will outline the ways in which this project seeks to accomplish a successful implementation of the native plant garden.

4.2 Community Engagement

Our policy/vision statement details the basic guidelines of engaging the local students and community in the implementation process. In the first timeframe we hope to engage primary and secondary students and in the second and third timeframe we hope to engage post secondary students (see Appendix 6 and 7). By engaging in a wide variety of users we hope to create a more inviting space. Personal touches of children's drawings create a welcoming atmosphere. The rock pathway allows for a shorter walk as well as a visually stimulating visit.

In combination with the engagement of local students and community members, restoration can lead to a meaningful reestablishment of ecocultural processes. Ecocultural restoration has the capacity to push beyond the strict dualism between culture and nature. Restoration resists this division "by implicating human practice and participation inside ecological processes. A restored ecosystem is usually hard to separate from the human participation that went into its making. If ecological restoration exists only to perpetuate the separate estates of nature and culture, it will not break the pattern. What is inspiring about restoration is that it does change the pattern under the right conditions" (Higgs, 2003, p. 240).

4.3 Site Preparation

This project should be implemented in April 2013 to ensure native species have the ability to establish a healthy integral relationship within the site. Through these 3 steps in relation to the Objective Chart in Appendix 3, ongoing management and monitoring will occur to ensure goals and objectives are met.

4.31 Preliminary Research

Preliminary research relates to Objective II: identification and management of non-native and invasive species. In Appendix 3 the Objective Chart lays out the precise activity requirements to occur in order to achieve desired objectives set out in the timeline. Management of the site will continue to reduce invasive and non-natives by 20%, 50%, 90% respectively. Reoccurring observation, congruent with the objective chart will result in frequent identification of all present invasive and non-native plant species.

4.32 Planting

Appendix 9 lists the proposed plantings of the zones. In zone A there are two native plant species that are currently present; Sword Fern (*Polystichum minutum*) and Common Snowberry (*Symphoricarpos albus*). Also in this zone is a Blood Maple Tree (*Acer palmatum*) it was planted as a memorial out of respect. It is not a native plant to B.C. To complement the native plant species present in this zone the following plants have been selected; Cascara (*Rhamns*

purshiana), Salmonberry (*Rubus spectabilis*), and Arctic Lupine (*Lupinus arcticus*). Cascara was chosen because it grows in moist-to-wet soils and flourishes alongside other Maple species (Eakins et al, 1998). Salmonberry was chosen due to its role as an aggressive recolonizing species in order to combat invasives in the zone. Arctic Lupine was selected for its recovery capabilities as an excellent nitrogen fixer.

Zone B will consist of Salmonberry, Mock-Orange (*Philadelphus lewisii*) and Orange Honeysuckle (*Lonicera ciliosa*) which will be planted alongside already present Bluejoint Grass (*Calamagrostis Canadensis*) and Reed Canary Grass (*Phalaris arundinacea*). These were selected due to their affinity for wet soils.

Zone C consists of Sword Fern, Oak Tree (*Quercus robur*), Common Snowberry, Nootka Rose (*Rosa nutkana*) and Scouler's Willow (*Sailx scouleriana*). The plants designated for zone C is Orange Honeysuckle and Pacific Bleeding Heart (*Dicentra formosa*). Pacific Bleeding Heart is a very common species found in swampy bog sites and ravine areas (Pojar et al, 2004).

Zone D currently consists of invasives that are slated to be removed. Dull Oregon Grape (*Mahonia nervosa*), Black Twinberry (*Lonicera involucrata*) and Indian Plum (*Oemlaeria cerasiformis*) will be planted within in this zone. Dull Oregon Grape is commonly found in disturbed sites and second growth forests (Pojar et al, 2004). Black Twinberry is in the same genus as Orange Honeysuckle. It is found in swampy and stream clearings (Pojar et al, 2004). Indian Plum grows well in open woody moist area. (Pojar et al, 2004).

Zone E contains the species: Narrow-Leaved Bur-Reed (*Sparaganimu angustifolium*), Sword Fern, Dull Oregon Grape, Reed Canary Grass (*Phalaris arundinacea*). Pacific Bleeding Heart will be planted alongside the native plants listed above.

Zone F currently has an Oak Tree and Sword Fern present. To be planted within zone F is Black Twinberry, Salmonberry and Pacific Bleeding Heart.

Zone G contains a Scouler's Willow (*Salix scouleriana*) and to be planted with this Willow is Pacific Crab Apple (*Maus fusca*) and Pacific Bleeding Heart. Pacific Crab Apple is commonly found in moist swampy sites often infringes on estuaries (Pojar et al, 2004).

4.33 Implementation of rock path, signage, and identification plant brochure

The implementation of the rock path will engage grades 1 to 2 from Campus View Elementary School. The hope is for students to collect rocks from a local beach to take back to their classroom and paint in their own creative manner. The implementation for the welcome sign will engage grades 3-5 from Campus View Elementary School in creatively designing the plant border to the welcome sign (see Appendix 7). The implementation of the identification plant brochure (Appendix 9) will be prioritized for Environmental Studies students enrolled ES 200, 321, 341 and 421. Each semester students in one of the designated course's can participate in updating and formatting the identification plant brochure.

5.0 Management

5.1 Introduction

The main focus of management is to reduce the number of invasive and non-native plant species in the ecosystem. By taking an adaptive management approach, throughout the three stages, we hope this project will be undertaken by the UVIC Facility Management to maintain the site. Below details the labor activities needed.

5.2 Labor Division Time frame I: 0-12 months

Time frame I will be the most labor intensive with the focus on removing non-native and invasive species. UVIC Facility Management can seek volunteers from the community, UVIC faculty and students to help promote efficiency during this timeframe. The focus should remain on removing invasive and non-native species. We estimated roughly 10-15 people putting in 15 hours during this timeframe. These numbers are based upon the size of the site and intensity of removal needed. Planting will commence when all invasive and non-native species are completely removed from the site.

5.3 Labor Division Time frame II: 1-5 years

This time frame will focus on the containment and removal of non-native and invasive plant species, as well as new threats. This timeframe will need roughly 4-6 people putting in 12-18 hours monthly. This number is based upon Facility Management practices. The timeframe also requires the labor and time to post the welcome sign and the seven zone signs in the designated spots.

5.4 Labor Division Time frame III: 5-10 years

This time frame reflects the same focus as time frame II, listed above, it requires the same amount of hours of labor to ensure the objectives and goals are continually met.

5.5 Budget

UVIC facility management will provide equipment including items such as: gloves, shovels, clippers, hoes, and rakes. However, it is important to note that this project has chosen to focus labor use versus machinery use to employ a smaller ecological footprint. This project focuses on the reciprocity of engaging the local and supporting the local to keep energy and services within the community. Reference Appendix 10 and 11 to view the breakdown of the budget. Please act upon this budget as a guideline, not all services need to be utilized, such as the towing and dumping of debris.

6.0- Monitoring

For detailed information on the monitoring plan for this restoration project, please see Wendy Anthony's submission.

7.0 Conclusion

This restoration plan has sought to detail the restoration of a specified green space within UVIC's Ring Road. We hope to convince all parties involved of the viability of this project by our attempt to engage with local educational and community members. By incorporating different levels of learning the proposed restoration seeks to engage the community and students to create a distinctive cultural and educational space. The Native Plant Garden will include all level of students through hands on learning as well as providing a sense of place and community. Educational institutions will benefit from this project by hands on learning, a space to enhance native plant knowledge and getting students out of the classroom.

This project has worked to detail the step by step process in regards to enhancing the chosen area. However, it is crucial to note that nature does not follow charts, graphs or outlines. When implementing and monitoring this restoration plan the project leads need to stay flexible and adaptable. As we have seen with previous restoration attempts certain plants take root better than others. To maintain the long term viability of the Native Plant Garden it is important to allow nature to take its course and humans to encourage and assist in that process. The recovery of this site will not necessarily follow our exact plan that is what makes nature so inviting.

Green space within Ring Road is limited. To ensure that this green space is protected for future generations UVIC and the local community needs to embrace the long term commitment of restoration. Passion and motivation is required to fulfill the goals and objectives detailed in this project. We hope to see both UVIC and the community of Oak Bay take on this challenge and restore an area that can provide cultural, historical and environmental significant for the future.

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9.0 Appendix

Appendix 1 - Current plants found in the UVic native plant garden as of November 2012

Scientific Name	Common Name	Scientific Name	Common Name
<i>Polystichum munitum</i>	Sword Fern	<i>Acer palmatum</i>	Blood Maple Tree
<i>Symphoricarpos albus</i>	Common Snowberry	<i>Rosa gymnocarpa</i>	Baldhip Rose
<i>Phyllostachys atrovaginata</i>	Bamboo	<i>Calamagrostis Canadensis</i>	Bluejoint Grass
<i>Phalaris arundinacea</i>	Reed Canary Grass	<i>Quercus</i>	Oak Tree
<i>Sparaganium angustifolium</i>	Narrow-Leaved Bur-Reed	<i>Nuphar polysepalum</i>	Yellow Pond Lily
<i>Elymus mollis</i>	DuneGrass	<i>Salix scouleriana</i>	Scouler's Willow
<i>Mahonia nervosa</i>	Dull Oregon Grape	<i>Rosa nutkana</i>	Nooka Rose
<i>Ilex</i>	Holly	<i>Ficus</i>	Fig Tree
<i>Thuja plicata</i>	Western Red Cedar	<i>Sambucus racemosa</i>	Red Elder Berry

* Plant inventory may not be complete as there were some plants we were unable to identify, however there is a noticeable decrease in plants which may be due to invasive species or the wet conditions which are not favorable to many of the native plants previously placed in this location.

Appendix 2 - Native plants in the UVic native plant garden as of July 2001 (Harrop-Archibald, 2007)

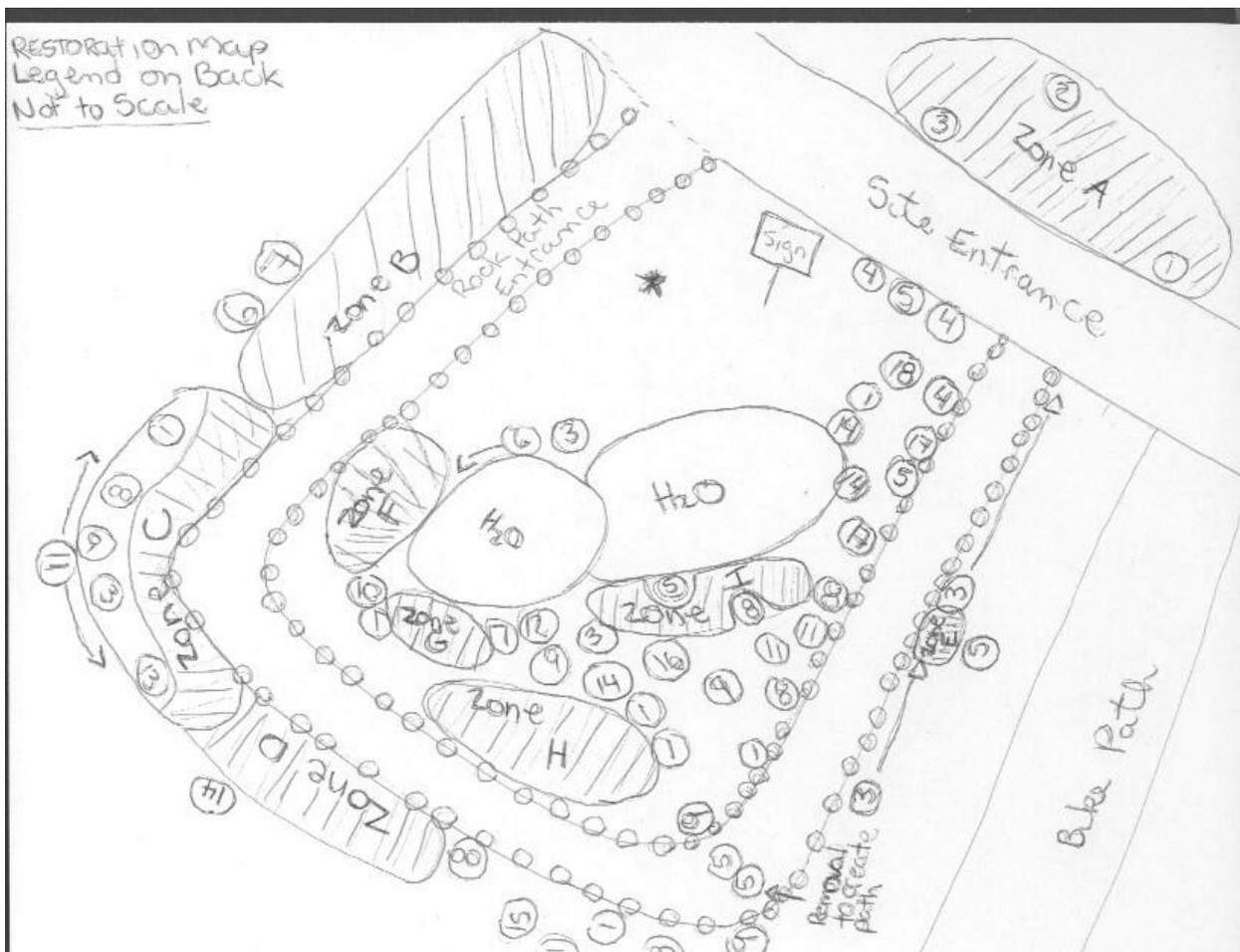
Scientific Name	Common Name	Scientific Name	Common Name
<i>Achlys triphylla</i>	Vanilla-leaf	<i>Adiantum pedatum</i>	Northern Maiden-hair Fern
<i>Allium cernuum</i>	Nodding Onion	<i>Amelanchier alnifolia</i>	Saskatoon
<i>Aquilegia formosa</i>	Columbine	<i>Arctostaphylos uva-ursi</i>	Kinnikinnik
<i>Aruncus dioicus</i>	Goat's Beard	<i>Artemisia tridentata</i>	Sagebrush
<i>Aster subspicatus</i>	Douglas' aster	<i>Athyrium filix-femina</i>	Lady Fern
<i>Blechnum spicant</i>	Deer Fern	<i>Camassia leichtlinii</i>	Great Camas
<i>Camassia quamash</i>	Common camas	<i>Ceanothus velutinus</i>	Snowbrush
<i>Cornus stolonifera</i>	Red-Osier Dogwood	<i>Delphinium menziesii</i>	Menzies' Larkspur
<i>Dicentra formosa</i>	Bleeding heart	<i>Disporum smithii</i>	Fairy Bells
<i>Dodecatheon cusickii</i>	Cusick's Shootingstar	<i>Dodecatheon hendersonii</i>	Henderson's Shootingstar
<i>Dodecatheon meadia</i>	Shootingstar	<i>Dodecatheon pulchellum</i>	Few-flowered Shootingstar
<i>Dryopteris expansa</i>	Sping wood fern	<i>Eriophyllum lanatum</i>	Woolly Sunflower
<i>Erythronium oregonum</i>	Easter lily	<i>Erythronium revolutum</i>	Pink Easter lily
<i>Fauri crista-galli</i>	Deer-cabbage	<i>Fragaria chiloensis</i>	Coastal strawberry
<i>Fragaria vesca</i>	Wild strawberry	<i>Gaultheria shallon</i>	Salal
<i>Geranium viscosissimum</i>	Sticky geranium	<i>Gymnocarpium dryopteris</i>	Oak fern
<i>Gymnocarpium robertianum</i>	Oak fern	<i>Heuchera micrantha</i>	Small-flowered Alum Root
<i>Iliamna rivularis</i>	Stream globe-mallow	<i>Iris setosa</i>	Northern Flag
<i>Ledum groenlandicum</i>	Labrador Tea	<i>Linnaea borealis</i>	Twinflower
<i>Lonicera ciliosa</i>	Orange Honeysuckle	<i>Mahonia aquifolium</i>	Tall Oregon Grape
<i>Mahonia nervosa</i>	Dull Oregon Grape	<i>Maianthemum dilatatum</i>	False lily-of-the-Valley
<i>Malus fusca</i>	Pacific crabapple	<i>Matteucia struthiopteris</i>	Ostrich Fern
<i>Mimulus guttatus</i>	Yellow Monkey-Flower	<i>Mitella ovalis</i>	Oval-leaved Mitrewort
<i>Oemleria cerasiformis</i>	Indian-Plum	<i>Oplopanax horridus</i>	Devil's club
<i>Oxalis oregana</i>	Oregon Sorrel	<i>Pachistima myrsinites</i>	False box
<i>Penstemon fruticosus</i>	Shrubby Penstemon	<i>Philadelphus lewisii</i>	Mock Orange
<i>Physocarpus capitata</i>	Ninebark	<i>Potentilla fruticosa</i>	Shrubby Cinquefoil
<i>Polypodium glycyrrhiza</i>	Licorice Fern	<i>Polystichum braunii</i>	Braun's Holly Fern
<i>Polystichum munitum</i>	Sword fern	<i>Quercus garryana</i>	Garry oak
<i>Rhododendron albiflorum</i>	White-flowered rhododendron	<i>Rhododendron macrophyllum</i>	Pacific rhododendron
<i>Ribes divaricatum</i>	Wild Gooseberry	<i>Ribes lacustre</i>	Black Gooseberry
<i>Ribes laxiflorum</i>	Trailing Black Currant	<i>Ribes lobbii</i>	Gummy Gooseberry
<i>Ribes sanguineum</i>	Red-flowering Currant	<i>Ribes viscosissimum</i>	Sticky currant
<i>Rosa gymnocarpa</i>	Bald Hip Rose	<i>Rosa nutkana</i>	Nootka Rose
<i>Sambucus racemosa</i>	Red Elderberry	<i>Saxifraga integrifolia</i>	Grassland saxifrage
<i>Sedum spathulifolium</i>	Broad-leaved Stonecrop	<i>Shepherdia canadensis</i>	Soapberry
<i>Sisyrinchium californicum</i>	Yellow-eyed Grass	<i>Sisyrinchium douglasii</i>	Satin Flower
<i>Smilacina racemosa</i>	False Solomon's Seal	<i>Solidago canadensis</i>	Goldenrod
<i>Sorbus stichensis</i>	Mountain ash	<i>Spiraea betulifolia</i>	Birch-leaved spirea
<i>Symphoricarpos albus</i>	Snowberry	<i>Symphoricarpos mollis</i>	Trailing snowberry
<i>Tellima grandiflora</i>	Fringecup	<i>Tiarella trifoliata</i>	Foamflower
<i>Tolmiea menziesii</i>	Piggy-back Plant	<i>Trautvettaria caroliniensis</i>	False Bugbane
<i>Trillium ovatum</i>	Trillium	<i>Triteleia hyacinthina</i>	Fool's Onion
<i>Vaccinium parvifolium</i>	Red Huckleberry	<i>Vaccinium ovatum</i>	Evergreen Huckleberry
<i>Vaccinium vitis-idaea</i>	Lingonberry	<i>Viburnum edule</i>	Highbush Cranberry
<i>Viola glabella</i>	Stream Violet	<i>Woodwardia fimbriata</i>	Giant Chain Fern
<i>Xerophyllum tenax</i>	Bear grass	<i>Zygadenus venenosus</i>	Death Camas

Appendix 3 – Objective Chart

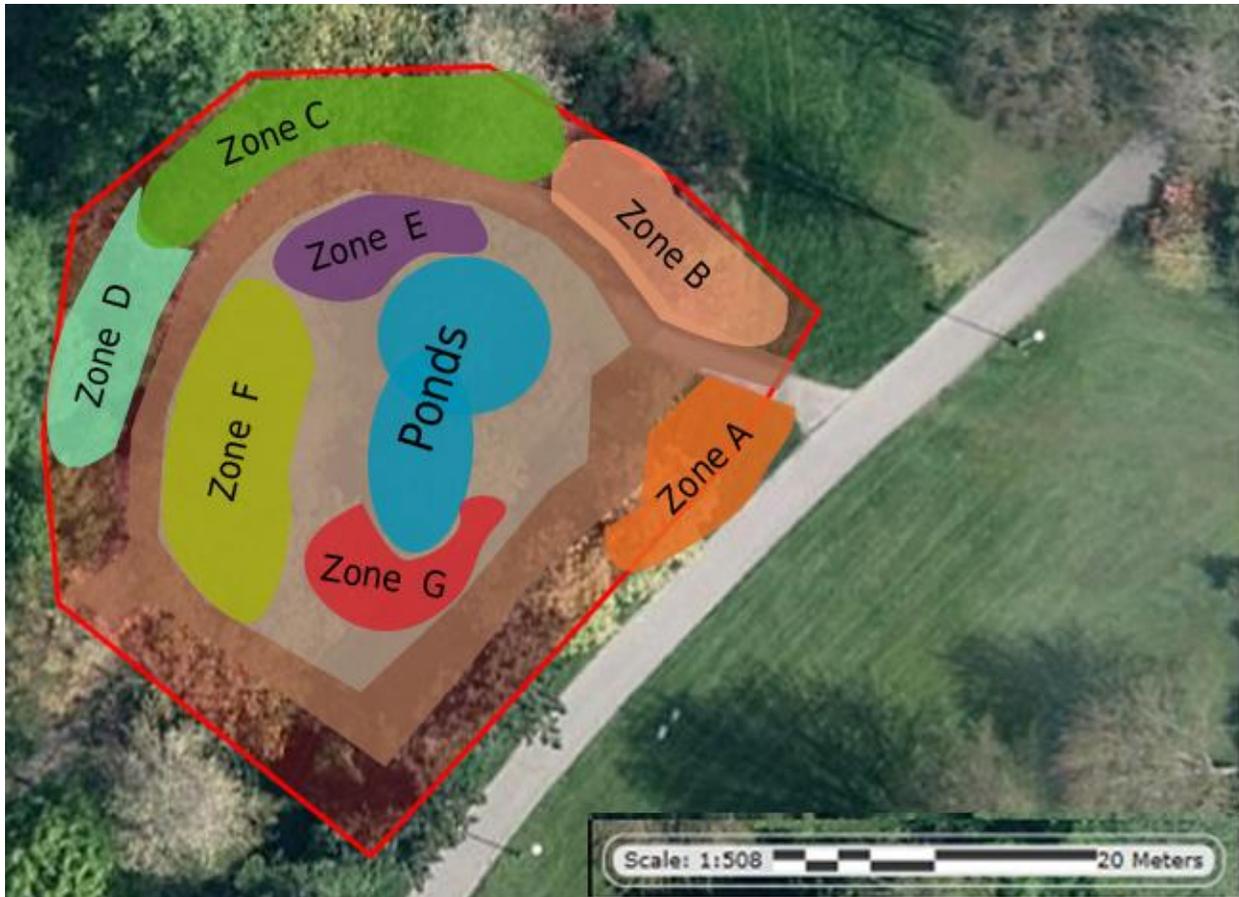
	0 – 12 months	1 -5 Years	5 – 10 years
<p>Native Plants in Ecosystem</p> <p>(Involving planting, transplanting and growth from invasive removal)</p>	20% Increase	40% Increase	80% Increase
<p>Identification management of non-native and invasive species</p>	<p>Identification: Observe the ecosystem and attempt to identify all invasive and non-native plant species.</p> <p>Management: Reduction of Known Invasives and Non-Natives by 20%</p>	<p>Identification: Continued monitoring of previously identified Invasives and Non-Natives. Identification of new threats</p> <p>Management: Reduction of Known Invasives and Non-Natives by 50%</p>	<p>Identification: Continued monitoring of previously identified Invasives and Non-Natives. Identification of new threats</p> <p>Management: Reduction of Known Invasives and Non-Natives by 90%</p>
<p>Educational Objectives: Signage and Rock Path Way</p>	<p>Zone signs in the work with local elementary students drawing the plant species</p> <p>Rock pathway created with local kindergarten, grade 1 and two kids, painting the rocks and coming to the site to lay the rocks in place</p> <p>Welcome sign created with local elementary, grades 3-5, kids drawing the border of the sign</p>	<p>Zone Signs in place by the end of the first year</p> <p>Welcome sign in place by the end of the first year</p>	<p>Maintenance of existing signage to maintain their visibility and readability.</p>
<p>Educational Objectives: Plant</p>	Initial outline and creation of Plant Identification Brochure	Publication of brochure with information on additional natives	Publication of brochure with information on additional natives

<p>Identification Brochure</p>	<p>including information on ecosystem as well as past and present invasives.</p> <p>(Published at the conclusion of year one)</p>	<p>corresponding to the signage.</p> <p>Updating of information (post-secondary students) on ecosystem as well as past and present invasives</p>	<p>corresponding to the signage.</p> <p>Updating of information on ecosystem as well as past and present invasives</p>
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Appendix 4 – Hand drawn map of location and current species (not to scale)



Appendix 5 – Zone Map



Appendix 6: Zone Sign

This is an example of a Zone sign. The pictures will not be computer generated but drawn from by local elementary or middle school kids. (Pictures on this sign do not accurately represent the

Zone A



- Baldhip Rose (*Rosa Gymnocarpa*) : Found in a variety of ecosystems, from woody to moist sites and low to mid elevations. Tea can be made from young leaves and twigs. Local First Nations, Cowichan, Saanich, Ditidaht and Nuu-chah-nulth use the rose hips as food.



- Common Snowberry (*Symphoricarpos albus*): Found in moist open forests, river banks and ravines and in low to mid elevations. The white berries are poisonous and are historically known by some First Nations as 'snake's berry' or 'corpse berry'. Spot the Snowberries all around the garden!



- Red Elderberry (*Sambucus racemosa*): Found in along stream banks, swampy thickets and moist clearing and usually at low to mid elevations. Red Elderberry is an important berry for the North and and Central coast First Nations. The berry was cooked thoroughly to make jams and jellys boiled to make a sauce.



- Dull Oregon Grape (*Mahonia nervosa*): Found in dry to moist sites, open and closed forest at low to mid elevation. It is most commonly found in second growth forests. The purple berries produces are edible but tart! They are often mixed with another native berry, Salal to make a jam.

plants describes. It is to show what the sign would theoretically look like.)

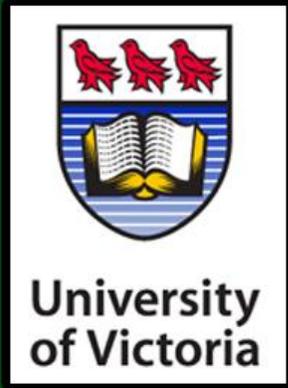
Appendix 7 – Welcome Sign

This sign is an example of the welcome sign for the front of the garden. The pictures around the border would not be computer generated but drawings from a local elementary school done by the students.



Appendix 8: Identification Plant Brochure

University of Victoria
Native Plant
Garden



University
of Victoria

2012 Restoration
Project

SHRUBS



Mock-Orange (*Philadelphus lewisii*)
Dried powdered leaves mixed with grease and used as a healing rub for sores and swollen joints

- crushed leaves and flowers mixed with water and used as effective body cleaner
- Stems and wood used for basket making.



Snowberry (*Symphoricarpos albus*):

- Grows well in moist open forests along river terrace and ravines
- Berries are poisonous, used in small doses to settle an upset stomach
- Known as the "revenge" berry



Black Twinberry (*Philadelphus lewisii*):

- Berries are edible but quite bitter tasting
- Used as a rub-on dye to prevent greying hair
- Berry juice used to treat sore eyes
- rushed leaves used as a poultice to open sores



Salmonberry (*Rubus spectabilis*):

- Bright pink flowers blooming early in spring
- Raspberry-like berries in a range of colours golden, ruby, or blackish
- Berries are eaten raw, or turned in to jams and wines

Page 1
(Web Address)

GROUND COVER



Indian Plum (*Oemlaeria cerasiformis*):

- First native tree to leaf out and to bloom in the Victoria area
- Bark tea taken as purgative tonic
- bark also taken to treat tuberculosis and has ben used as a general healing agent.



Notka Rose (*Rosa nutkana*):

- Rose hips are rich in vitamins A, B, E, K
- Three Rose hips contain as much vitamin C as an orange
- Cooked seeds eaten to relieve sore muscles
- Rose petals taken to relieve headaches, heartburn and mouth sores



Dull Oregon Grape (*Mahonia nervosa*):

- Found in low to middle elevations in second growth forest areas
- Berries are edible but tart
- Often mixed with Salal berries to jam
- Leaf tea to used to treat kidney and skin problems

Page 2
(Web Address)



Sword Fern (*Polystichum munitum*):

- Found in midle to low elevations in moist forests.
- Traditionally used for pit cooks and as a bedding or flooring.
- cooked rhizomes used as a cure for diarrhea



Orange Honeysuckle (*Lonicera ciliosa*)

- Chewed leaves applied to bruises
- Nectar highly sought after by hummingbirds
- Fibers used by First Nations to make mats and capes.
- Fruit is edible but not popular, sweet nectar also edible



Pacific Bleeding Heart
(*Dicentra formosa*)

- Root tincture can help pain relief and be applied externaly to bruise and sprains
- Tea made from leaves and stems has calming effect, often used after traumatic experiences



Reed Canary Grass (*Phalaris arundinacea*):

- Found in wet, disturbed sites including marshes, streambanks and along wetlands
- The stems were traditionally boiled and dried in the sun and used for decorating baskets

Page 3
(Web Address)

Bluejoint Grass (*Calamagrostis Canadensis*)
- Grows well in moist wet sites, along streambanks, and in wetland areas.
- Very aggressive colonizer following disturbance
- Native grass to BC



Scouler's Willow (*Salix scouleriana*):
- Young leaves, buds and inner bark are rich in vitamin C
- Bark chewed or made into tea to treat digestive problems, headaches, arthritis, rheumatism and urinary tract infections



SMALL TREES

Cascara (*Rhamnus purshiana*):
- Bark used as non-habit forming laxative
- Used to induce vomiting when poisoning suspected
- Bark chewed as a vermifuge for rheumatism and arthritis





University of Victoria

Pacific Crab Apple (*Malus fusca*):
- Only native apple tree to BC
- Bark traditionally used as a laxative as well as to treat ulcers and other stomach disorders.
- Fruit chewed by hunters to suppress thirst



Oak Tree (*Quercus robur*):
- Teas made of bark used in washes and gargles to treat inflamed gums, sore throat, burn, cuts, insect bites and rashes
- Root bark boiled to make a purgative tea
- Acorns an important wildlife food source



Page 4 (Web Address)

Page 5 (Web Address)

Citations:

Klinkenberg, Brian. (Editor) 2012. E-Flora BC: Electronic Atlas of the Flora of British Columbia (eflora.bc.ca). Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver. [Nov 20, 2012]

Pojar, J & McKinnon, A. 2004. Plants of Coastal British Columbia: Including Washington, Oregon, and Alaska. BC Ministry of Forests, BC Forest research program. Vancouver, British Columbia, Lone Pine Publishing

Appendix 9: Zone Plant List

Zone A:

Planted:

- Cascara – *Rhamnus purshiana* X 1
- Salmonberry – *Rubus spectabilis* X 4
- Arctic Lupine – *Lupinus arcticus*: X 4

Already Present:

- Sword Fern – *Polystichum minutum*
- Blood Maple Tree – *Acer palmatum*
- Common Snowberry – *Symphoricarpos albus*

Zone B:

Planted:

- Salmonberry – *Rubus spectabilis* X 4
- Mock-Orange – *Philadelphus lewisii* X 4
- Orange Honeysuckle – *Lonicera ciliosa* X 4

Already Present:

- Bluejoint Grass – *Calamagrostis Canadensis*
- Reed Canary Grass - *Phalaris arundinacea*

Zone C:Planted:

- Orange Honeysuckle – *Lonicera ciliosa* X 4
- Pacific Bleeding Heart – *Dicentra formosa*: X 4

Already Present:

- Sword Fern – *Polystichum munitum*
- Oak Tree - *Quercus robur*
- Common Snowberry – *Symphoricarpos albus*
- Nooka Rose – *Rosa nutkana*
- Scouler's Willow – *Salix scouleriana*

Zone D

Planted:

- Dull Oregon Grape – *Mahonia nervosa* X 2
- Black Twinberry – *Lonicera involucrate* X 2
- Indian-plum – *Oemlaeria cerasiformis* X 1

Zone E

Planted:

- Pacific Bleeding Heart – *Dicentra Formosa* X4

Already Present:

- Narrow-Leaved Bur-Reed – *Sparaganium angustifolium*
- Sword Fern – *Polystichum munitum*
- Dull Oregon Grape – *Mahonia nervosa*
- Reed Canary Grass - *Phalaris arundinacea*

Zone F

Planted:

- Black Twinberry - *Lonicera involucrata* X4
- Salmonberry – *Rubus spectabilis* X2
- Pacific Bleeding Heart – *Dicentra formosa* X4

Already Present:

- Oak Tree - *Quercus robur*
- Sword Fern – *Polystichum munitum*

Zone G

Planted:

- Pacific Crab Apple – *Malus fusca* X1
- Pacific Bleeding Heart – *Dicentra Formosa* X3

Already Present:

- Scouler's Willow – *Salix scouleria*

Appendix 10: Budget for Plant Lists

Plant List:						
Common Name	Latin Name	Quantity	Size of Planter	Price per unit (CAN \$)	Source	Total (CAN \$)
Arctic Lupine	<i>Lupinus arcticus</i>	4	1 gallon	12.99	GardenWorks 4290 Blenkinsop Road, Saanich, BC V8X 2C4 (250) 721-2148	51.96
Black Twinberry	<i>Lonicera involucrata</i>	6	2 gallon	10.99	GardenWorks 4290 Blenkinsop Road, Saanich, BC V8X 2C4 (250) 721-2149	65.94
Cascara	<i>Rhamnus purshiana</i>	1	1 gallon	12.99	GardenWorks 4290 Blenkinsop Road, Saanich, BC V8X 2C4 (250) 721-2140	12.99
Indian Plum	<i>Oemlaeria cerasiformis</i>	1	1 gallon	12.99	GardenWorks 4290 Blenkinsop Road, Saanich, BC V8X 2C4 (250) 721-2145	12.99
Mock-Orange	<i>Philadelphus lewisii</i>	4	1 gallon	12.99	GardenWorks 4290 Blenkinsop Road, Saanich, BC V8X 2C4 (250) 721-2143	51.96
Orange Honeysuckle	<i>Lonicera ciliosa</i>	8	1 gallon	9.99	GardenWorks 4290 Blenkinsop Road, Saanich, BC V8X 2C4 (250) 721-2146	79.92
Pacific Bleeding Heart	<i>Dicentra formosa</i>	15	1 gallon	12.99	GardenWorks 4290 Blenkinsop Road, Saanich, BC V8X 2C4 (250) 721-2149	194.85
Pacific Crab Apple	<i>Malus Fusca</i>	1	2 gallon	24.99	GardenWorks 4290 Blenkinsop Road, Saanich, BC V8X 2C4 (250) 721-2141	24.99
Salmonberry	<i>Rubus spectabilis</i>	10	1 gallon	12.99	GardenWorks 4290 Blenkinsop Road, Saanich, BC V8X 2C4 (250) 721-2142	129.90
					TOTAL (Can \$)	625.50

Appendix 11: Final Budget

Miscellaneous:				
Item	Quantity	Price per unit (CAN \$)	Source	Total (CAN \$)
20"x24" Signage	8	65.00	Garside Signs and Displays 1054 North Park Street Victoria, BC V8T 1C6 (250) 385-4825	520.00
			Total (Can \$)	520.00

Services:				
Service Required	Estimated volume (yards³)	Price per volume (CAN \$)	Source	Total (CAN \$)
Disposal of Debris	3	425.00	Haul a Day Junk Removal 1645 Ryan Street, Victoria, BC V8R 2X5 (250) 888-1221	425.00
			Total (Can \$)	425.00

Budget Sections	Totals
Plant List	625.50
Miscellaneous	455.00
Services	425.00
Grand Total (Can \$)	1570.50

10.0 Group Evaluation

Having overcome many obstacles in the creation of this restoration project we are overjoyed to be able to hand in a successfully completed proposal. In order to accomplish this task we came together as a group and honestly consider this project equally distributed amongst the four of us. We have indicated the author of each section, however, the length of time spent editing, formatting and polishing as a group over powers individual efforts. We worked as a team to complete the project you have just read.