



**City of Bellevue  
Development Services Department  
Land Use Staff Report**

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**Proposal Name:** Bellevue Botanical Garden Ravine Garden

**Proposal Address:** 12001 Main Street

**Proposal Description:** Critical Areas Land Use Permit for the installation of 2 bridges and 600 lineal feet of nature trail as an expansion of the Bellevue Botanical Garden at Wilburton Hill Park.

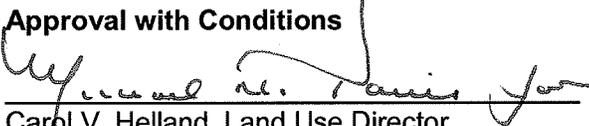
**File Number:** 10-112326-XE

**Applicant:** Scott VanderHyden, Bellevue Parks & Community Services

**Decisions Included:** Critical Areas Land Use Permit  
(Process II. LUC 20.30P)

**Planner:** Kevin LeClair, Planner

**State Environmental Policy Act  
Threshold Determination:** **Determination of Non-Significance**  
  
Carol V. Helland, Environmental Coordinator  
Development Services Department

**Director's Decision:** **Approval with Conditions**  
  
Carol V. Helland, Land Use Director  
Development Services Department

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**Application Date:** May 11, 2010  
**Notice of Application Publication Date:** May 27, 2010  
**Decision Publication Date:** June 24, 2010  
**Project/SEPA Appeal Deadline:** July 8, 2010

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For information on how to appeal a proposal, visit Development Services Center at City Hall or call (425) 452-6800. Comments on State Environmental Policy Act (SEPA) Determinations can be made with or without appealing the proposal within the noted comment period for a SEPA Determination. Appeal of the Decision must be received in the City's Clerk's Office by 5 PM on the date noted for appeal of the decision.



DEVELOPMENT SERVICES DEPARTMENT  
ENVIRONMENTAL COORDINATOR  
450 100<sup>th</sup> Ave NE., P.O. BOX 90012  
BELLEVUE, WA 98009-9012

## DETERMINATION OF NON-SIGNIFICANCE

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**PROPONENT:** Scott VanderHyden, Parks & Community Services Department

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**LOCATION OF PROPOSAL:** Wilburton Hill Park and Bellevue Botanical Garden, 12001 Main Street

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**NAME & DESCRIPTION OF PROPOSAL:**

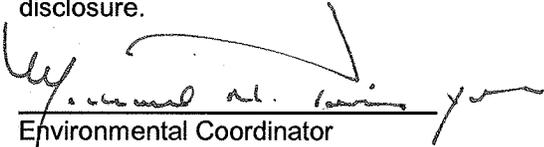
Critical Areas Land Use Permit for the installation of 2 bridges and 600 lineal feet of nature trail as an expansion of the Bellevue Botanical Garden at Wilburton Hill Park.

**FILE NUMBER:** 10-112326 XE

The Environmental Coordinator of the City of Bellevue has determined that this proposal does not have a probable significant adverse impact upon the environment. An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(C). This decision was made after the Bellevue Environmental Coordinator reviewed the completed environmental checklist and information filed with the Land Use Division of the Development Services Department. This information is available to the public on request.

- There is no comment period for this DNS. There is a 14-day appeal period. Only persons who submitted written comments before the DNS was issued may appeal the decision. A written appeal must be filed in the City Clerk's office by 5:00 p.m. on \_\_\_\_\_.
- This DNS is issued after using the optional DNS process in WAC 197-11-355. There is no further comment period on the DNS. There is a 14-day appeal period. Only persons who submitted written comments before the DNS was issued may appeal the decision. A written appeal must be filed in the City Clerk's Office by 5 p.m. on July 8, 2010.
- This DNS is issued under WAC 197-11-340(2) and is subject to a 14-day comment period from the date below. Comments must be submitted by 5 p.m. on \_\_\_\_\_. This DNS is also subject to appeal. A written appeal must be filed in the City Clerk's Office by 5 p.m. on \_\_\_\_\_.

This DNS may be withdrawn at any time if the proposal is modified so that it is likely to have significant adverse environmental impacts; if there is significant new information indicating, or on, a proposals probable significant adverse environmental impacts (unless a non-exempt license has been issued if the proposal is a private project); or if the DNS was procured by misrepresentation or lack of material disclosure.

  
\_\_\_\_\_  
Environmental Coordinator

June 24, 2010

Date

**OTHERS TO RECEIVE THIS DOCUMENT:**

State Department of Fish and Wildlife  
State Department of Ecology,  
Army Corps of Engineers  
Attorney General  
Muckleshoot Indian Tribe

## CONTENTS

I. Proposal Description.....	1
II. Site Description, Zoning, Land Use and Critical Areas.....	2
III. Consistency with Land Use Code Requirements:.....	4
IV. Public Notice and Comment .....	7
V. Summary of Technical Reviews.....	7
VI. State Environmental Policy Act (SEPA).....	8
VII. Changes to proposal as a result of City review.....	9
VIII. Decision Criteria .....	9
IX. Conclusion and Decision .....	10
X. Conditions of Approval.....	10

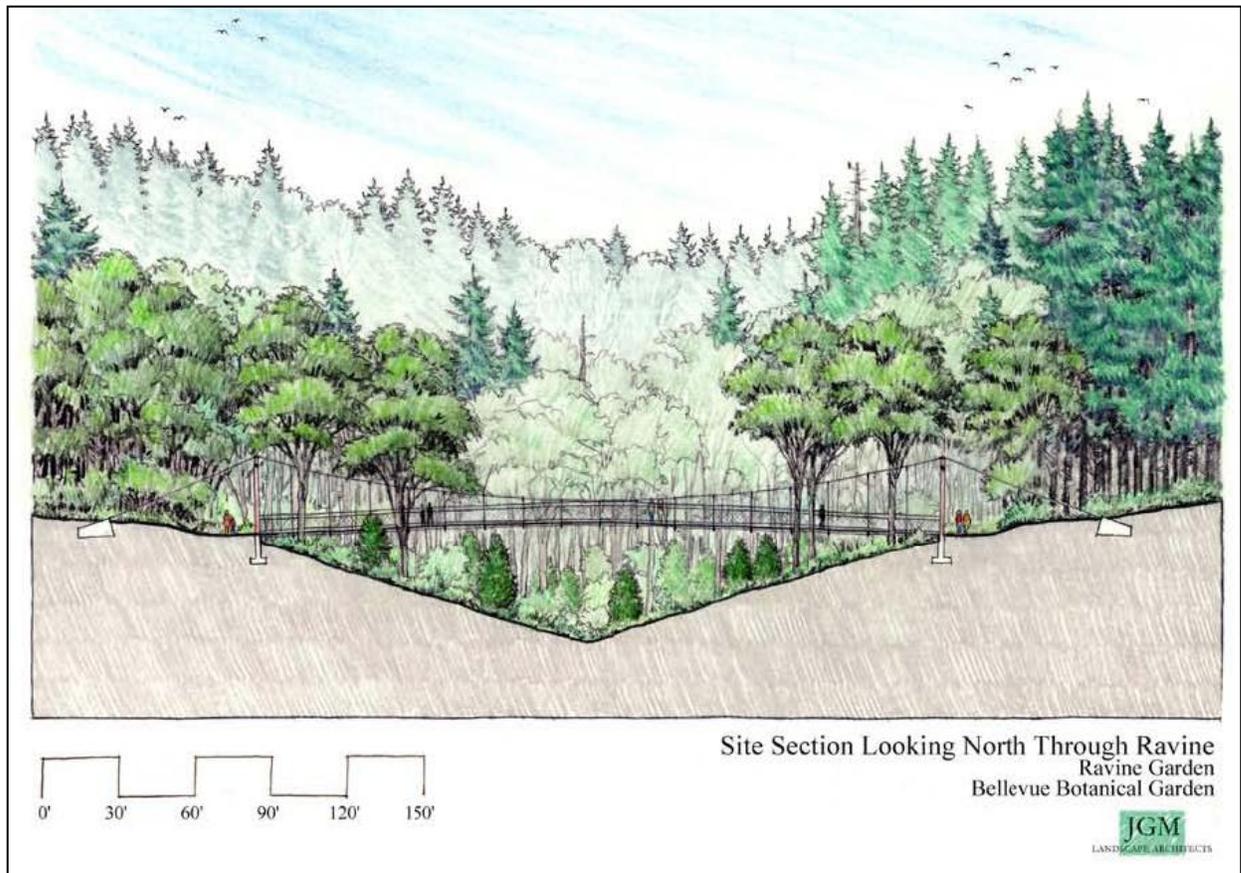
### **Attachments**

1. Environmental Checklist
2. Site Plan
3. Critical Areas Narrative
4. Geotechnical Evaluation
5. Habitat Assessment

### I. Proposal Description

The proposal is for an expansion of the Bellevue Botanical Garden at Wilburton Hill Park with the development of the “Ravine Garden” garden room. The proposed garden takes visitors along a pedestrian trail through a second growth forest and a small steep-sided ravine in the southeast corner of the Botanical Garden. The project includes the construction of one 150-foot suspension bridge and one 75-foot rigid bridge, of steel and wood construction. The bridges will span a ravine containing a seasonal, Type N stream and a geologic hazard critical area steep slopes. The bridges will allow visitors close proximity and intimate views of the plants, wildlife, and second growth forest canopy. The project also includes the addition of 600 lineal feet of pedestrian trail to the current trail system. The new trail segments will form a pedestrian connection between the bridges and complete the ravine trail loop which will begin and end at the existing Lost Meadow Trail. As mitigation for the permanent disturbance, the applicant is proposing to restore or enhance approximately 15,000 square feet of riparian buffer with native plants.

The proposal under consideration is an expansion of a City and public park per Land Use Code (LUC) 20.25H.055. It is an allowed use in critical areas and critical area buffers provided that compliance with certain performance standards is demonstrated.



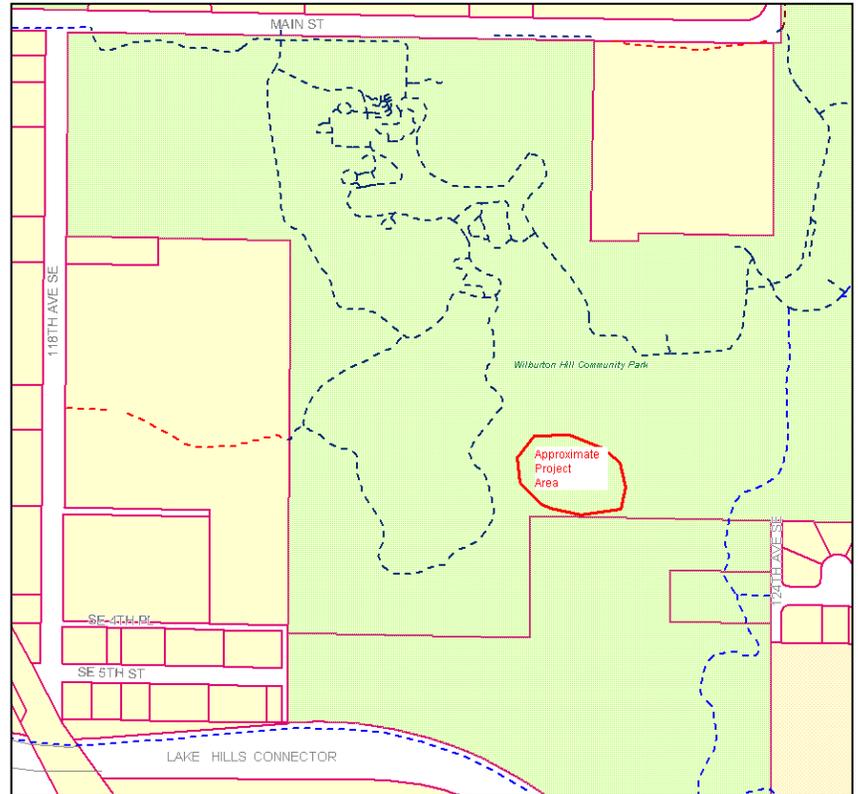
## II. Site Description, Zoning, Land Use and Critical Areas

### A. Site Description

The proposed project is located within Wilburton Hill Park at 12001 Main Street, Bellevue, WA. The park contains the Bellevue Botanical Garden (BBG). BBG is comprised of display gardens, woodlands, meadows and wetlands. The topography of site is irregular. Much of northern and central section of the site is flat or gently rolling but the southern section of the site is on a hillside and includes a ravine.

The BBG contains a variety of annual and perennial plant species for public viewing throughout the year and is well known to local horticulture and gardening groups. In 2006, the City acquired two parcels totaling 17 acres. The acquisition protects wildlife habitat in the park and garden, maintains seclusion from urban development and expands public education and enjoyment opportunities in the park.

In 2008, the Bellevue Parks & Community Services Department undertook an update to the BBG Master Plan. It was recommended for adoption by the Parks & Community Services Board and adopted by the Bellevue City Council. The updated master plan also underwent a preliminary SEPA review as a non-project action under Bellevue file # 08-114999 LM.



### B. Zoning

The portion of the property where the project is located is zoned R-1. Due to the presence of streams, wetlands and steep slopes in the vicinity, the property also is within the Critical Areas Overlay District.

### C. Land Use Context

Wilburton Hill Park and Bellevue Botanical Garden is located in the Wilburton Subarea. The Wilburton Subarea is centrally located in Bellevue. Access to I-405 and the Downtown makes the Subarea a desirable place to live and work. Jobs, stores, schools, and community parks are convenient and accessible. Combined, these amenities have greatly enhanced the quality of life for both the residents and business owners.

The Wilburton Subarea encompasses approximately 1,600 acres. Wilburton Hill Park is a little more than 120 acres in size, which makes it nearly 7% of the total land area of the subarea and major identifier of the character of the area.

Bellevue's Comprehensive Plan specifically includes the park in the subarea plan with Policy S-WI-39, which states, "Support implementation of the Wilburton Hill Park Master Plan, including neighborhood park elements." The Ravine Garden is an element of the Wilburton Hill Park Master Plan, updated in 2008.

#### **D. Critical Areas Functions and Values**

##### **i. Streams and Riparian Areas**

Most of the elements necessary for a healthy aquatic environment rely on processes sustained by dynamic interaction between the stream and the adjacent riparian area. Riparian vegetation in floodplains and along stream banks provides a buffer to help mitigate the impacts of urbanization. Riparian areas support healthy stream conditions.

Riparian vegetation, particularly forested riparian areas, affect water temperature by providing shade to reduce solar exposure and regulate high ambient air temperatures, slowing or preventing increases in water temperature.

The proposed project includes retention of all but two significant trees and installs nearly 15,000 square feet of additional native species plantings.

##### **ii. Geologic Hazard Areas**

Geologic hazards pose a threat to the health and safety of citizens when commercial, residential, or industrial development is inappropriately sited in areas of significant hazard. Some geologic hazards can be reduced or mitigated by engineering, design, or modified construction practices. When technology cannot reduce risks to acceptable levels, building in geologically hazardous areas is best avoided (WAC 365-190).

Steep slopes may serve several other functions and possess other values for the City and its residents. Several of Bellevue's remaining large blocks of forest are located in steep slope areas, providing habitat for a variety of wildlife species and important linkages between habitat areas in the City. These steep slope areas also act as conduits for groundwater, which drains from hillsides to provides a water source for the City's wetlands and stream systems. Vegetated steep slopes also provide a visual amenity in the City, providing a "green" backdrop for urbanized areas enhancing property values and buffering urban development.

### III. Consistency with Land Use Code Requirements:

#### A. Zoning District Dimensional Requirements:

The site is located in the R-1 zoning district. The proposal is well within the property, therefore the structure setbacks for the district are all met. The proposed height of the structure is 24 feet, which is below the 35-foot maximum allowed height of structures for the district.

#### B. Critical Areas Requirements LUC 20.25H:

##### i. Performance Standards for New or Expanded City and Public Parks LUC 20.25H.055.C.3.g

The following discussion explains how the proposal complies with the performance standards for New or Expanded City and Public Parks for trails

##### a. Trail location and design shall result in the least impacts on the critical area or critical area buffer;

The trail layout is contoured to follow the existing topography and is routed to avoid impacts to significant trees and desirable vegetation. The width of the trail is the minimum necessary to allow vehicular and emergency access.

##### b. Trails shall be designed to compliment and enhance the environmental, educational, and social functions and values of the critical area with trail design and construction focused on managing and controlling public access and limiting uncontrolled access;

As stated above, the new trail is proposed to take the visitor on a meandering stroll through native evergreen and deciduous forest with myriad native trees and shrubs to observe. The proposed Ravine Garden adds to the educational value of the garden and is consistent with the mission of the botanical garden. The design of the bridge approaches with rock "wing walls" have the intended function of controlling access as a trail user comes close to the most sensitive feature of the garden, the ravines with seasonal streams.

##### c. Trails shall be designed to avoid disturbance of significant trees and to limit disturbance of native understory vegetation;

Approximately 49 significant trees exist within the project area predominate species include Big Leaf Maple, Western Red Cedar, Douglas Fir, and Western Hemlock. All existing trees will be protected during construction. All significant trees within the project area will be remain with the exception of removal of one 12" diameter Cedar near the west suspension bridge approach and one 12" diameter Maple near the east rigid bridge approach to accommodate the abutment footing. Any significant trees designated for removal because of poor health or assessed as hazardous by a certified arborist will be 'snagged'; woody debris will be added to the stream bed and other appropriate areas.

The plan proposes removal of invasive species from the critical area buffer (mainly Himalayan Blackberry), augmentation of the current understory vegetation and forest with more native trees, shrubs, and herbaceous plants to increase the ravine's biological diversity and avoid introducing non-native plants.

##### d. Trails shall be designed to avoid disturbance of habitat used for salmonid rearing or spawning or by any species of local importance;

The trail is completely outside of the critical area itself, but within the critical area buffer of the stream and geologic hazard critical area. A habitat assessment was

conducted by the applicant for the update of the park master plan. It was determined that the Ravine Garden would have some negative impact on wildlife movement in the short term associated with construction impacts, but that the restoration with native plant species, along with the preservation of significant trees would result in very little long term negative impacts to species of local importance.

**e. The trail shall be the minimum width necessary to accommodate the intended function or objective;**

As stated above, the trail is the minimum width necessary to allow emergency and maintenance access to and across the suspension bridge.

**f. All work shall be consistent with the City of Bellevue's "Environmental Best Management Practices" and all applicable City of Bellevue codes and standards, now or as hereafter amended;**

The work is consistent with the Environmental Best Management Practices relative to trail construction techniques and integrated pest management.

**g. The facility shall not significantly change or diminish overall aquatic area flow peaks, duration or volume or flood storage capacity, or hydroperiod;**

The proposed bridge crossings of the Type N stream are proposed to be no less than 12 feet above the bed of the seasonal stream channel. There will be no impact to the peak flows, duration or volume or flood storage capacity or hydroperiod of the stream.

**h. Where feasible and consistent with any accessibility requirements, any trail shall be constructed of pervious materials;**

New trail segments will maintain a 6 feet standard park width and be overlaid with pervious mulch surfacing which will help with erosion in wet winter months. The exception will be a 200-foot segment which will provide a shared pedestrian and maintenance access to the suspension bridge. This portion of will be 10 feet wide and receive an ADA compliant crushed rock surfacing to allow access for disabled and elder visitors. Although this section of trail will not be considered pervious surface, it is necessary to have one vehicular access point wide enough to accommodate a maintenance or emergency vehicle if the need arises.

**i. Crossings over and penetrations into wetlands and streams shall be generally perpendicular to the critical area, and shall be accomplished by bridging or other technique designed to minimize critical area disturbance considering the entire trail segment and function; and**

The proposed bridges are perpendicular to the stream corridor.

**j. Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210.**

The applicant has prepared plans that detail how temporary disturbance will be repaired in the area of trail and bridge construction. The applicant has also prepared a restoration planting plan for a 15,000 square feet of native planting to mitigate for the permanent disturbance associated with the trail and bridges. The applicant is also planning to utilize the large woody debris generated from the removal of the two trees required for the suspension bridge footing in the restoration plan.

**C. Consistency with Land Use Code Critical Areas Performance Standards:**

**i. Performance standards for steep slopes LUC 20.25H.125**

**a. Structures and improvements shall minimize alterations to the natural contour of the slope, and foundations shall be tiered where possible to conform to existing topography;**

The improvements include 600 lineal feet of trail and two bridges. The work will occur entirely in the critical area buffer of the steep slopes. No modification of the slopes is required. The natural contours will be preserved.

**b. Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation;**

The structural improvements to the site include the two bridges. The structures are situated to take advantage of the steep-sided ravine but also to avoid unnecessary impacts to significant trees in the area. Two trees are to be removed for the placement of the anchors for the suspension bridge.

**c. The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties;**

The bridges and trail are being designed to preserve the existing topography. The design has been reviewed and certified by a geotechnical engineer to be safe and will not cause a need for any additional buffers on other properties.

**d. The use of retaining walls that allow the maintenance of existing natural slope area is preferred over graded artificial slopes where graded slopes would result in increased disturbance as compared to use of retaining wall;**

No retaining walls are proposed to retain or modify slopes.

**e. Development shall be designed to minimize impervious surfaces within the critical area and critical area buffer;**

The designed trail and bridge are utilizing pervious materials to the greatest extent possible, except for a 200 lineal feet of trail which will be crushed gravel to allow for universal access.

**f. Where change in grade outside the building footprint is necessary, the site retention system should be stepped and regrading should be designed to minimize topographic modification. On slopes in excess of 40 percent, grading for yard area may be disallowed where inconsistent with this criteria;**

No grade changes are proposed.

**g. Building foundation walls shall be utilized as retaining walls rather than rockeries or retaining structures built separately and away from the building wherever feasible. Freestanding retaining devices are only permitted when they cannot be designed as structural elements of the building foundation;**

No building foundations are proposed. By utilizing a suspension-type bridge the footing is the minimum necessary to support the tower structure.

**h. On slopes in excess of 40 percent, use of pole-type construction which conforms to the existing topography is required where feasible. If pole-type construction is not technically feasible, the structure must be tiered to conform to the existing topography and to minimize topographic**

**modification;**

The footings for the suspension bridge and the fixed bridge are outside of the steep slope.

**i. On slopes in excess of 40 percent, piled deck support structures are required where technically feasible for parking or garages over fill-based construction types; and**

No parking or garage structures are proposed.

**j. Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210.**

The applicant has supplied a mitigation and restoration plan that is consistent with the requirements of LUC 20.25H.210.

**ii. Performance Standards for streams LUC 20.25H.080.A**

The performance standards for stream contained in LUC 20.25H.080.A are only applicable to Type F and S streams. The stream in the project area is a Type N stream, therefore these performance standards are not applicable.

**iii. Performance standards for Habitat associated with Species of Local Importance LUC 20.25H.160**

The applicant prepared a habitat assessment for the property. The assessment reported that the project area is likely used by pileated woodpecker and several bat species. The recommendation was to preserve the large, significant trees and convert patches of Himalayan blackberry and English ivy to native species. The proposal seeks to preserve all but two significant trees and will restore a large area of Himalayan blackberry with native plants.

#### **IV. Public Notice and Comment**

Application Date:	May 11, 2010
Public Notice (500 feet):	May 27, 2010
Minimum Comment Period:	June 10, 2010

The Notice of Application for this project was published in the City of Bellevue weekly permit bulletin. No comments were received from the public as of the writing of this report.

#### **V. Summary of Technical Reviews**

**Clearing and Grading:**

The Clearing and Grading Division of the Development Services Department has reviewed the proposed development for compliance with Clearing and Grading codes and standards. The Clearing and Grading staff found no issues with the proposed development.

## **VI. State Environmental Policy Act (SEPA)**

The environmental review indicates no probability of significant adverse environmental impacts occurring as a result of the proposal. The Environmental Checklist submitted with the application adequately discloses expected environmental impacts associated with the project. The City codes and requirements, including the Clear and Grade Code, Utility Code, Land Use Code, Noise Ordinance, Building Code and other construction codes are expected to mitigate potential environmental impacts. Therefore, issuance of a Determination of Non-Significance (DNS) is the appropriate threshold determination under the State Environmental Policy Act (SEPA) requirements.

### **A. Earth and Water**

A temporary erosion and sedimentation control plan is included in the project plans, and addresses all requirements for restoring the site to its current condition as well as erosion and sedimentation management practices. Erosion and sediment control best management practices include the installation of silt fencing around the work area and covering exposed soils to prevent migration of soils to the stream corridor. The applicant will also be required to submit information regarding the use of pesticides, insecticides, and fertilizers to avoid impacts to water resources. See Section X for a related condition of approval.

### **B. Animals**

The project site is part of a larger natural area that contains quality habitat for birds and mammals. The proposed trail is designed to snake through existing mature vegetation and only two significant trees will be removed with this proposal. The mature vegetation on the site provides potential habitat to bald eagles and pileated woodpeckers who are known to be in the vicinity, however no impacts are anticipated since the only significant trees will be removed.

### **C. Plants**

The site contains no threatened or endangered plants. The site however, is forested with primarily native trees, shrubs and ground covers. A mitigation and restoration plan to restore temporary disturbance and mitigate for permanent disturbance has been submitted and will be approved pursuant to the required building permit for the bridges. See Section X for related conditions of approval.

### **D. Noise**

Construction noise will be limited by the City's Noise Ordinance (Chapter 9.18 BCC) which regulates construction hours and noise levels. See Section X for a related condition of approval.

## **VII. Changes to proposal as a result of City review**

No changes were made to the proposal as a result of City review.

## **VIII. Decision Criteria**

### **A. Critical Areas Land Use Permit Decision Criteria 20.30P**

The Director may approve or approve with modifications an application for a critical areas land use permit if:

#### **1. The proposal obtains all other permits required by the Land Use Code;**

**Finding:** The proposal is required to obtain a building permit from the City of Bellevue prior to construction.

#### **2. The proposal utilizes to the maximum extent possible the best available construction, design and development techniques which result in the least impact on the critical area and critical area buffer;**

**Finding:** The project is utilizing a suspension bridge for a 150-foot span across a ravine containing a Type N stream. The use of the suspension bridge allows for a smaller bridge footing closer to the top of the ravine side slopes, because the anchors are placed over 80 feet from the top of the slope.

#### **3. The proposal incorporates the performance standards of Part 20.25H to the maximum extent applicable, and ;**

**Finding:** The proposal complies with the applicable performance standards, as discussed in Section III above.

#### **4. The proposal will be served by adequate public facilities including street, fire protection, and utilities; and;**

**Finding:** The site is currently served by adequate public facilities including streets, fire protection and utilities. The proposal will not create any additional need for these services.

#### **5. The proposal includes a mitigation or restoration plan consistent with the requirements of LUC Section 20.25H.210; and**

**Finding:** A mitigation and restoration plan consistent with the requirements of LUC 20.25H.210 is included with the project proposal. It includes restoration plans for all areas of temporary disturbance, along with enhancement of approximately 15,000 square feet of forest area currently dominated by invasive, non-native plants.

**6. The proposal complies with other applicable requirements of this code.**

**Finding:** As discussed in Section IV & V of this report, the proposal complies with all other applicable requirements of the Land Use Code.

**IX. Conclusion and Decision**

After conducting the various administrative reviews associated with this proposal, including Land Use Code consistency, SEPA, City Code and Standard compliance reviews, the Director of Planning and Community Development does hereby **approve with conditions** the proposal to construct one 150-foot suspension bridge and one 75-foot rigid bridge within the Type N stream and steep slope critical area and buffer at the Wilburton Hill Park and Bellevue Botanical Garden located at 12001 Main Street.

**Note- Expiration of Approval:** In accordance with LUC 20.30P.150 a Critical Areas Land Use Permit automatically expires and is void if the applicant fails to file for a Clearing and Grading Permit or other necessary development permits within one year of the effective date of the approval.

**X. Conditions of Approval**

**The applicant shall comply with all applicable Bellevue City Codes and Ordinances including but not limited to:**

<u>Applicable Ordinances</u>	<u>Contact Person</u>
Clearing and Grading Code- BCC 23.76	Janney Gwo, 425-452-6190
Land Use Code- BCC 20.25H	Kevin LeClair, 425-452-2928
Noise Control- BCC 9.18	Kevin LeClair, 425-452-2928

**The following conditions are imposed under the Bellevue City Code or SEPA authority referenced:**

**1. Restoration for Areas of Temporary Disturbance:** A restoration plan for all areas of temporary disturbance is required to be submitted for review and approval by the City of Bellevue prior to the issuance of the Clearing and Grading Permit. The plan shall include documentation of existing site conditions and shall identify the restoration measures to return the site to its existing conditions per LUC 20.25H.220.H.

Authority: Land Use Code 20.25H.220.H  
Reviewer: Kevin LeClair, Land Use

**2. Mitigation for New Permanent Disturbance:** A mitigation plan for all areas of permanent new disturbance is required to be submitted for review and approval by the City of Bellevue prior to issuance of the Building Permit. The plan shall document the total area of permanent disturbance and area of new critical area buffer to satisfy a replacement ratio of one to one.

Authority: Land Use Code 20.25H.XXX  
Reviewer: Kevin LeClair, Land Use

**3. Rainy Season restrictions:** Due to the proximity to a Type N stream, no clearing and grading activity may occur during the rainy season, which is defined as November 1 through April 30 without written authorization of the Development Services Department. Should approval be granted for work during the rainy season, increased erosion and sedimentation measures, representing the best available technology must be implemented prior to beginning or resuming site work.

Authority: Bellevue City Code 23.76.093.A,  
Reviewer: Janney Gwo, Clearing and Grading

**4. Pesticides, Insecticides, and Fertilizers:** The applicant must submit as part of the required Clearing and Grading Permit information regarding the use of pesticides, insecticides, and fertilizers in accordance with the City of Bellevue's "Environmental Best Management Practices".

Authority: Land Use Code 20.25H.220.H  
Reviewer: Kevin LeClair, Land Use

**5. Noise Control:** Noise related to construction is exempt from the provisions of BCC 9.18 between the hours of 7 am to 6 pm Monday through Friday and 9 am to 6 pm on Saturdays, except for Federal holidays and as further defined by the Bellevue City Code. Noise emanating from construction is prohibited on Sundays or legal holidays unless expanded hours of operation are specifically authorized in advance. Requests for construction hour extension must be done in advance with submittal of a construction noise expanded exempt hours permit.

Authority: Bellevue City Code 9.18  
Reviewer: Kevin LeClair, Land Use

City of Bellevue Submittal Requirements	<b>27a</b>
<b>ENVIRONMENTAL CHECKLIST</b>	
5/19/2010	
<p>If you need assistance in completing the checklist or have any questions regarding the environmental review process, please visit or call Development Services (425-452-6800) between 8 a.m. and 4 p.m., Monday through Friday (Wednesday, 10 to 4). Assistance for the hearing impaired: Dial 711 (Telecommunications Relay Service).</p>	
<b>BACKGROUND INFORMATION</b>	
Property Owner: <b>City of Bellevue Parks &amp; Community Services</b>	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; background-color: #e0e0e0;"> <p style="margin: 0;"><b>REVIEWED</b></p> <p style="margin: 0;"><i>By Kevin LeClair at 4:19 pm, May 19, 2010</i></p> </div>
Proponent: <b>Same</b>	
Contact Person: <b>Scott Vander Hyden, Project Coordinator</b>	
Address: <b>PO 90012, Bellevue WA 98008</b>	
Phone: <b>452-452-4169</b>	
<p>Bellevue File # 10-112326 XE</p> <p>Proposal Title: <b>Ravine Garden at the Bellevue Botanical Gardens</b></p> <p>Proposal Location: <b>12001 Main Str. Bellevue, WA (Main Street/124<sup>th</sup> Ave NE)</b> (Street address and nearest cross street or intersection) Provide a legal description if available.</p> <p>Please attach an 8 ½" x 11" vicinity map that accurately locates the proposal site.</p>	
<p>Give an accurate, brief description of the proposal's scope and nature:</p> <ol style="list-style-type: none"> <li>1. General description: <b>The proposed Ravine Garden will take visitors along a loop trail which crosses a steep-sided ravine in the southeast corner of the Bellevue Botanical Garden. Garden construction will include a 75' long x 6' wide (rigid) bridge, and a 150' long x 5' wide pedestrian suspension bridge. Both bridges, which span the ravine in different locations and be connected by a pedestrian allowing for a loop connection starting and ending at an existing lost meadow trail. The project also includes 600Inft of new pedestrian trail surface. The design will allow close proximity and intimate views of the wildlife, native plants, and second growth forest growing along either side and inside the ravine. The basic design philosophy underlying this garden is to work with the natural features and processes of the site and interpret these to visitors as an educational experience while they experiencing the dramatic feeling of enclosure that containment within this small-scale landform offers.</b></li> <li>2. Acreage of site: <b>53 Acres</b></li> <li>3. Number of dwelling units/buildings to be demolished: <b>0</b></li> <li>4. Number of dwelling units/buildings to be constructed: <b>0</b></li> <li>5. Square footage of buildings to be demolished: <b>0</b></li> <li>6. Square footage of buildings to be constructed: <b>0</b></li> <li>7. Quantity of earth movement (in cubic yards):</li> <li>8. Proposed land use: <b>Public Garden</b></li> </ol>	

9. Design features, including building height, number of stories and proposed exterior materials: **Garden construction will include a 75' long x 6' wide (rigid) bridge, and a 150' long x 5' wide pedestrian suspension bridge. The towers at each end of the suspension bridge will be approximately 23.0' above grade. Both bridges will be made predominantly of steel construction and will span the ravine in different locations, allow for a loop trail connection starting and ending at an existing main loop trail. The project will also include approx. 600lnft of new trail surface, interpretive elements, and more than 15,000 sqft of new native plantings.**

10. Other

Estimated date of completion of the proposal or timing of phasing: **Construction is expected to begin in third quarter of 2010 and be complete by late 2010 or early 2011.**

Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. **No**

List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. **Geotechnical Report (2010), Habitat Assessment (2008), Topographic survey (2010), Master Plan SEPA (2008)**

Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. List dates applied for and file numbers, if known. **None**

List any government approvals or permits that will be needed for your proposal, if known. If permits have been applied for, list application date and file numbers, if known. **Critical Areas Land Use and Building Permit w/ Clear& Grade. Not yet applied for.**

Please provide one or more of the following exhibits, if applicable to your proposal. (Please check appropriate box(es) for exhibits submitted with your proposal):

- Land Use Reclassification (rezone) Map of existing and proposed zoning
- Preliminary Plat or Planned Unit Development  
Preliminary plat map
- Clearing & Grading Permit  
Plan of existing and proposed grading  
Development plans
- Building Permit (or Design Review)  
Site plan

A critical areas land use permit is required for disturbance and/or modification of the critical area and critical area buffer. This then followed by a required building permit.

**REVIEWED**  
*By Kevin LeClair at 4:19 pm, May 19, 2010*

# Attachment 1 - SEPA Checklist

Clearing & grading plan

- Shoreline Management Permit
- Site plan

## A. ENVIRONMENTAL ELEMENTS

### 1. Earth

- a. General description of the site:  Flat  Rolling  Hilly  **Steep slopes**  Mountains  Other
- b. What is the steepest slope on the site (approximate percent slope)? **40% +**
- c. What general types of soil are found on the site (for example, clay, sand, gravel, peat, and muck)? If you know the classification of agricultural soils, specify them and note any prime farmland. **Geotech borings encountered similar soil conditions in all areas explored. Apprx. ½ foot forest duff and topsoil underlain by soft to stiff sandy and silty soils.**
- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.  
**No**
- e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill. **Approx. 68 cu yards of disturbed volume in the critical area buffer for excavation of bridge abutments. Approx. 340 cu yards in non-buffer areas for bridge earth anchors. Approx. 4,000 sqft of clearing and grading work for new trail construction. Total soil amount of volume to be replaced with cast in place concrete in critical area buffer for bridge abutments 33.34 cu yards. Total in non-buffer area for earth anchors is 18 cu yds.**
- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. **Erosion could occur if improper TESC techniques are not followed during project construction. In particular near the top of slope during excavation for bridge abutments. If proper TESC techniques are followed, chances of any significant erosion would be remote. Once the project is complete erosion is not likely as visitors will be encouraged to use defined trails and bridges. Strategically placed fencing, wing walls signage, and landscape buffering will also encourage visitors to use marked trails. Project is required to comply with clearing and grading rules and standards contained in BCC 23.76.**
- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)? **1,200 sqft bridge surfaces and 2,000sqft crushed rock trail surface. Total sq footage of impervious surface at the Bellevue Botanical Garden is less than 6%. The site is 53 acres of which approximately 3-4 acres is currently impervious surface. The project will increase the impervious surface amount by apprx. 3,200sqft**
- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: **Standard COB specifications for TESC during construction and restoration planting. Trail and bridge construction work will be consistent with COB clearing and grading code, permit conditions, and all other applicable standards and**

## Attachment 1 - SEPA Checklist

codes including *"Environmental Best Practices"*.

### 2. AIR

- a. What types of emissions to the air would result from the proposal (i.e. dust, automobile odors, and industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known. **Minimal odors emissions from gas or diesel powered equipment during construction and from ATV service vehicle after construction.**
  
- b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.  
**No**
  
- c. Proposed measures to reduce or control emissions or other impacts to the air, if any: **Turn off power equipment when not in use.**

### 3. WATER

#### a. Surface

- (1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into. **Both bridges will span a unnamed seasonal stream, of Class N non-fish bearing origin which flows into Kelsey Creek.**
  
- (2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If Yes, please describe and attach available plans. **Bridges will span creek in two separate locations. Plan attached.** Creeks are classified as Type N streams with seasonal flow. Construction of the bridges should be conducted during the summer dry season.
- (3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. **None. Not applicable.**
  
- (4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known. **No**
  
- (5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan. **No**

**REVIEWED**

**By Kevin LeClair at 4:21 pm, May 19, 2010**

## Attachment 1 - SEPA Checklist

- (6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge. **No**

### b. Ground

- (1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description. **No**

- (2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc.) Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. **None**

### c. Water Runoff (Including storm water)

- (1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe. **None**

- (2) Could waste materials enter ground or surface waters? If so, generally describe. **No**

- d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any: **Grading trails and using mulch surfacing to control surface run off and redirect water away from potential erosion/impact areas, restoration plantings in all disturbed areas, additional 15,000sqft native plantings, and proper TESC controls and monitoring during construction .**

## 4. Plants

- a. Check or circle types of vegetation found on the site:

deciduous tree: alder, maple

evergreen tree: fir, cedar, hemlock

shrubs typical nw native varieties (full list included in habitat study)

grass

**REVIEWED**

**By Kevin LeClair at 4:22 pm, May 19, 2010**

## Attachment 1 - SEPA Checklist

- pasture
- crop or grain
- wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
- water plants: water lily, eelgrass, milfoil, other
- other types of vegetation

b. What kind and amount of vegetation will be removed or altered? **Apprx. 4,000 sqft native vegetation will be removed or transplanted for trail and bridge construction. Mainly sword fern, blackberry and a mix of other native shrubs and small trees. All sword fern will be replanted within project area.**

c. List threatened or endangered species known to be on or near the site. **A Habitat study was conducted on the site and no federally or state threatened and endangered species or sensitive species were identified within the BBG. Osprey, Bald Eagle, and Peregrine Falcon are known to nest next within 2 miles of the project site.**

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: **The plan proposes removing invasive plant species (mainly exotic blackberry) and planting over 15,000 sqft of additional native shrubs and trees for screening, buffering, aesthetic and wildlife enhancement.**

### 5. ANIMALS

a. Check or circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

x Birds: **hawk, heron, eagle, red breasted sapsucker, osprey, peregrine falcon, song sparrow, pileated woodpecker.....complete list of those observed in completed habitat study**

x Mammals: **deer, rabbit, raccoon, mole, gray squirrel**

Fish: bass, salmon, trout, herring, shellfish, other:

b. List any threatened or endangered species known to be on or near the site. **None known to be on site.**

c. Is the site part of a migration route? If so, explain. **No**

d. Proposed measures to preserve or enhance wildlife, if any: **Installation of over 15,000 sqft of native tree and shrub plantings, 'snagging' any unhealthy significant trees or those identified hazardous for removal by certified arborist. Leaving wood debris in stream bed and other designated areas.**

**REVIEWED**

**By Kevin LeClair at 4:23 pm, May 19, 2010**

## Attachment 1 - SEPA Checklist

### 6. Energy and Natural Resources

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy need? Describe whether it will be used for heating, manufacturing, etc. **N/A**
- b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe. **No**
- c. What kinds of energy conservation features are included in the plans of the proposal? List other proposed measures to reduce or control energy impacts, if any: **none**

### 7. Environmental Health

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste that could occur as a result of this proposal? If so, describe. **No**

(1) Describe special emergency services that might be required. **One vehicular access to the suspension will be created to accommodate an aid vehicle should the need arise**

(2) Proposed measures to reduce or control environmental health hazards, if any. **None**

#### b. Noise

(1) What types of noise exist in the area which may affect your project (for example, traffic, equipment, operation, other)? **None**

(2) What types and levels of noise would be created by or associated with the project on a short-term or long-term basis (for example, traffic, construction, operation, other)? Indicate what hours noise would come from the site. **Short term basis, construction equipment and power tool operation during duration of the project (3 months). Noise would be limited to M-F and COB code for construction hour of operation.**

(3) Proposed measures to reduce or control noise impacts, if any: **None**

**REVIEWED**

**By Kevin LeClair at 4:23 pm, May 19, 2010**

## 8. Land and Shoreline Use

- a. What is the current use of the site and adjacent properties? **Public Garden**
- b. Has the site been used for agriculture? If so, describe. **No**
- c. Describe any structures on the site. **Visitor Center, pavilion, water feature, cabin, and two homes**
- d. Will any structures be demolished? If so, what? **No**
- e. What is the current zoning classification of the site?
- f. What is the current comprehensive plan designation of the site? **Public Garden**
- g. If applicable, what is the current shoreline master program designation of the site? **Not applicable**
- h. Has any part of the site been classified as an “environmentally sensitive” area? If so, specify. **Two identified wetlands exist on the Botanical Garden site but are not located within the project area. A ravine with slopes exceeding 40% exists within the project area.**
- i. Approximately how many people would reside or work in the completed project? **There are currently 3 full time COB employees that are responsible for all Botanical garden maintenance operations. This project area will now be included in their workload planning.**
- j. Approximately how many people would the completed project displace? **None**
- k. Proposed measures to avoid or reduce displacement impacts, if any: **N/A**
- i. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: **Master Plan SEPA for Garden issuance of non-project determination of non-significance in 2008**

## 9. Housing

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. **None**

**REVIEWED**

**By Kevin LeClair at 4:23 pm, May 19, 2010**

## Attachment 1 - SEPA Checklist

- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. **None**
  
- c. Proposed measures to reduce or control housing impacts, if any: **N/A**

### 10. Aesthetics

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed? **Bridge towers at each entry point to the suspension bridge will be approx. 23' above grade. Steel will be the principle building material of the bridges with some organic elements including natural stone and wood included in the design as aesthetic features.**
  
- b. What views in the immediate vicinity would be altered or obstructed? **None**
  
- c. Proposed measures to reduce or control aesthetic impacts, if any: **Architectural design of bridges, natural elements of stone, wood, pavers, and plantings will also be incorporated in the and around the structures.**

### 11. Light and Glare

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur? **None**
  
- b. Could light or glare from the finished project be a safety hazard or interfere with views? **No**
  
- c. What existing off-site sources of light or glare may affect your proposal? **None**
  
- d. Proposed measures to reduce or control light or glare impacts, if any: **None**

### 12. Recreation

**REVIEWED**

**By Kevin LeClair at 4:23 pm, May 19, 2010**

## Attachment 1 - SEPA Checklist

- a. What designated and informal recreational opportunities are in the immediate vicinity? **Public Garden and Soccer Field**      The Bellevue Botanical Garden and Wilburton Hill Park consists of several miles of soft-surface nature trails with multiple bridge crossing of low topographic features.
- b. Would the proposed project displace any existing recreational uses? If so, describe. **No**
- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: **N/A**

### 13. Historic and Cultural Preservation

- a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe. **None**
- b. Generally describe any landmarks or evidence of historic, archeological, scientific, or cultural importance known to be on or next to the site. **None known**
- c. Proposed measures to reduce or control impacts, if any: **None**

### 14. Transportation

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any. **Single vehicular access to the Botanical Garden exists off of 124th Ave NE**
- b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop? **No. Approximately 1/4 mile**
- c. How many parking spaces would be completed project have? How many would the project eliminate? **Currently the site has 53 existing parking spaces. The project would not add or eliminate parking.**
- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private). **No**
- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. **No**
- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur. **It is not known how many additional trips the project would generate but it is not expected to be significant. Peak volumes at the Garden occur on weekends between 9-5 and weekday evenings after 5PM in the summer months of June/July and August**

Attachment 1 - SEPA Checklist

g. Proposed measures to reduce or control transportation impacts, if any: **None**

**15. Public Services**

a. Would the project result in an increased need for the public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe. **No**

b. Proposed measures to reduce or control direct impacts on public services, if any. **None**

**16. Utilities**

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other. **All major utilities exist at different locations within the Botanical Garden, no utilities exist at, or near, the project area.**

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed. **None proposed.**

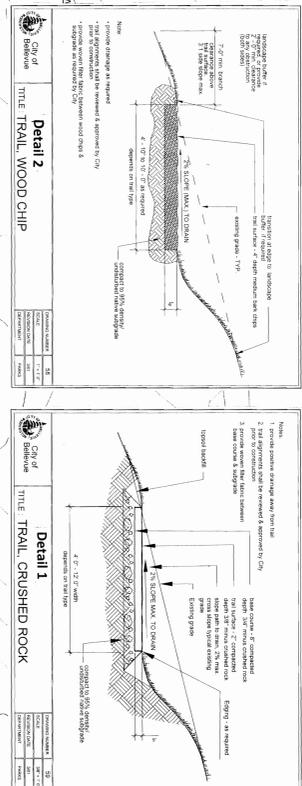
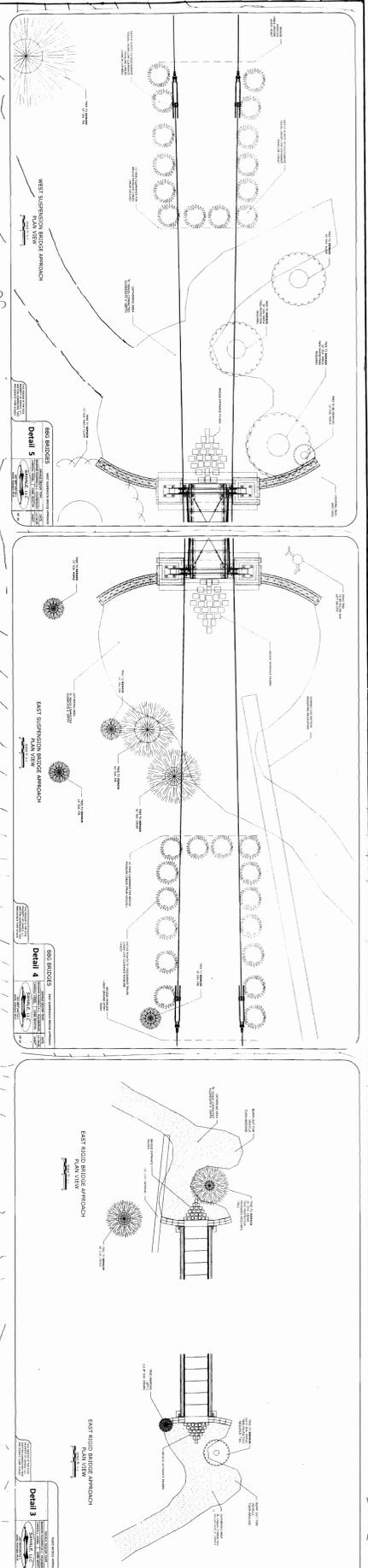
**Signature**

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Submitted by Scott VanherHyden with  
Signature.....Bellevue Parks & Community Services.....

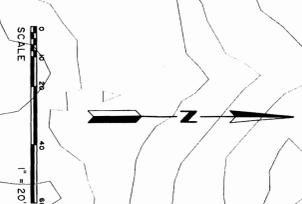
Date Submitted.....Submitted on May 17, 2010.....

**REVIEWED**  
*By Kevin LeClair at 4:25 pm, May 19, 2010*



**TRAIL ALIGNMENT SYMBOL KEY**

Symbol	Trail	sqft	Surface material
	Existing Pedestrian Trails (to remain)		Mulch
	New ADA Pedestrian Maintenance Access Trail	2,000 sqft	3/8" Crushed Rock
	New Pedestrian Trails	1,500 sqft	Mulch
	New Bridge Approaches	1,200 sqft	3/8" Crushed Rock
	Total New Pathway Surfaces	4,700 sqft	



Project Title:

# BELLEVUE BOTANICAL GARDEN RAVINE GARDEN

**CITY OF BELLEVUE**  
PARKS & COMMUNITY SERVICES DEPARTMENT  
PO BOX 90012  
BELLEVUE, WA 98009-9012

Design:	
Title:	TRAIL ALIGNMENT PLAN
Sheet No.:	2A

## Attachment 3 - Critical Areas Narrative

5/10/10

### Permit 09-133926 XM

#### Critical Areas Land Use Permit Narrative

#### Bellevue Botanical Garden-Ravine Garden Project

##### The BBG Masterplan Update:

The 2008 Botanical Garden Master Plan Update process was initiated to reassess previous planning efforts and to reconsider garden needs and goals. The planning process included a public process, an environmental review process (SEPA) with a determination of non-significance, and approval by Parks Board. The plan update was adopted by Bellevue City Council in January 2009. The revised Plan retains the goal of developing gardens which are small-scale so that visitors can apply the gardens' design lessons to their own yards by demonstrating successful uses of native plants and native plant communities in gardens. The BBG MP update included preliminary designs for two new 'garden rooms', the Ravine Garden and the Wetland-Sun Terraced Gardens.

##### The Ravine Garden:

In 2009, the City of Bellevue selected the Ravine Garden for further design development and construction. The proposed garden takes visitors along a pedestrian trail through a second growth forest and a small steep-sided ravine in the southeast corner of the Botanical Garden; this site is within a larger reserve area named in the master plan as the Cascadia Experience. The project entails construction of one (1ea) 75' L x 6' W rigid bridge and one (1ea) 150' x 5' W suspension bridge, both made predominantly of steel construction. The bridges will span the ravine in locations approximately 200ft apart and will allow visitors close proximity and intimate views of the plants, wildlife, and second growth forest canopy. Construction will also include approximately adding 600 lft pedestrian trail to the current ravine trail system. The new trail segments will form a pedestrian connection between the bridges and complete the ravine trail loop which will begin and end at the Lost Meadow Trail.

New trail segments will maintain a 6.0 ft standard park width and be overlaid with pervious mulch surfacing which will help with erosion in wet winter months. The exception will be a 200 lft segment which will provide a shared ped/maintenance access to the suspension bridge from the lost meadow loop trail leading to the suspension bridges west entrance. The trail in this area will be 10.0 ft wide and receive an ADA compliant crushed rock surfacing to allow easier access for disabled and elder visitors wishing to experience the suspension bridge.

### Attachment 3 - Critical Areas Narrative

Although this section of trail will not be considered pervious surface, it is necessary to have one vehicular access point wide enough to accommodate a maintenance or emergency vehicle if the need arises. As well, although the proposed bridge decking will not be considered pervious, it only temporarily interrupts precipitation that would otherwise immediately enter the stream. Wing walls will be incorporated at the four bridge entry points to discourage visitors from drawing near the top of the slope which could cause erosion near bridge entry points. All trail and bridge construction work will be consistent with COB clearing and grading code and permit conditions, and all other applicable standards and codes including *“Environmental Best Practices”* to prevent any potential erosion problems during construction. The trails and bridges in the critical area buffer are well above the ordinary high water mark of the unnamed class D seasonal non-fish bearing stream associated within the project area. Design of the proposed trails and bridges will result in the least amount of critical area impacts possible and all impacts will take place in the critical areas buffers. There will be no change in flow peaks or storage capacity of the stream during or after construction is complete.

The project proposes planting of over 15,000 sqft of native vegetation to increase the habitat and aesthetic value of the project area and a mitigation plan will be prepared in accordance with Land Use requirements. The plan proposes some removal of invasive species from the critical area buffer (mainly Himalayan Blackberry), augmentation of the current understory vegetation and forest with more native trees, shrubs, and herbaceous plants to increase the ravine’s biological diversity and avoid introducing non-native plants into the Cascadia Experience. All existing sword ferns impacted by trail and bridge construction will be transplanted on site. Signage will be installed to clearly convey to visitors they must remain on marked trails. Interpretive elements will be incorporated into the project and will compliment the Botanical Gardens existing interpretive program. Approximately 49 significant trees exist within the project area predominate species include Big Leaf Maple, Western Red Cedar, Douglas Fir, and Western Hemlock. All existing trees will be protected during construction. All significant trees within the project area will be remain with the exception of removal of one (1ea) 12” diameter Cedar near the west suspension bridge approach and one (1ea) 12” diameter Maple near the east rigid bridge approach to accommodate the abutment footing. Any significant trees designated for removal because of poor health or assessed as hazardous by a certified arborist will be ‘snagged’; woody debris will be added to the stream bed and other appropriate areas.

Goals of the design include the desire to increase the ecological function of the project site and to make visitors familiar with, and appreciative of, the plant communities of the region while allowing interpretation of hydrologic processes of site. Around this, visitors will experience the dramatic feeling of enclosure that containment within this small-scale landform offers while interpretive programs will demonstrate and suggest how such delicate landform features might be preserved, conserved and augmented in other locations. The basic design philosophy underlying the garden is to work with its natural features and processes and interpret these to visitors as part of an educational program.

### Attachment 3 - Critical Areas Narrative

The proposed project will be served by adequate public facilities. No additional public facilities will be required with implementation of the proposed project. The proposed project complies with all other applicable City of Bellevue Land Use Codes.

**Report  
Geotechnical Consultation  
Proposed Bridges  
Bellevue Botanical Garden  
Bellevue, Washington**

**June 3, 2009  
ICE File No. 0860-001**

DRAFT

**Prepared For:  
Sahale, LLC**

**Prepared By:  
Icicle Creek Engineers, Inc.**

# ICICLE CREEK ENGINEERS

Geotechnical, Geologic and Environmental Services

June 3, 2009

Carroll Vogel, Principal  
Sahale, LLC  
2501 Westlake Avenue North  
Seattle, Washington 98109

Report  
Geotechnical Consultation  
Proposed Bridges  
Bellevue Botanical Garden  
Bellevue, Washington  
ICE File No. 0860-001

## INTRODUCTION

Icicle Creek Engineers (ICE) is pleased to submit this report regarding our geotechnical consultation for two proposed bridges at the Bellevue Botanical Garden in Bellevue, Washington. Our services are described in our Scope of Services and Fee Estimate dated March 18, 2009 and were authorized in writing by Adam C. Peck of Sahale, LLC on May 18, 2009. The Bellevue Botanical Garden site is shown relative to nearby physical features on the Vicinity Map, Figure 1. The proposed locations of the bridges are shown on Site Plan A, Figure 2.

## PROJECT DESCRIPTION

Our understanding of the project is based on conversations and email correspondence with Carroll Vogel of Sahale, LLC. We understand that the project includes design and construction of two bridges, including a 140-foot span suspension bridge and a 70-foot span truss bridge. The suspension bridge will include insertion points for the main ground anchor cable behind the bridge abutments. Carroll Vogel of Sahale, LLC requested that ICE evaluate the site subsurface soil and groundwater conditions at each of the abutment and ground anchor points, and to provide an evaluation of slope stability in the vicinity of these structures. Details regarding the location of the proposed bridges are shown on Site Plan B, Figure 3

## SCOPE OF SERVICES

The purpose of our services was to observe the surface conditions and to explore the subsurface soil and groundwater conditions as a basis for evaluating slope stability and providing geotechnical criteria for bridge design. Specifically, our services included the following:

- Review readily available geologic and geotechnical information in the site vicinity.
- Complete a geologic reconnaissance of the bridge sites with particular emphasis on the abutments, ground anchors and steep slope areas.
- Explore subsurface soil and groundwater conditions by drilling six test borings to depths of about 11½ to 14 feet using portable, mini-track drilling equipment.
- Complete moisture content laboratory testing on soil samples obtained from the borings.

- Evaluate pertinent physical and engineering characteristics of the soils based on the results of the field explorations, laboratory testing and our experience.
- Evaluate the stability of steep slopes in the vicinity of the bridge abutments and provide recommendations for maintaining slope stability, as appropriate.
- Provide recommendations for earthwork including stripping and excavation of unsuitable soils, fill compaction and subgrade preparation requirements, and suitability of on-site soils for use in structural fills including an evaluation of the effects of weather and/or construction equipment on the workability of site soils.
- Provide a brief summary of recommendations for foundation and ground anchor design, including passive pressures and drainage considerations.

### **GEOLOGIC SETTING**

Based on regional geologic mapping by the U.S. Geological Survey (USGS – Waldron, H.H., Liesch, B.A., Mullinieaux, D.R., 1962, “Preliminary Geologic Map of Seattle and Vicinity, Washington,” Map I-354), the bridge sites are underlain by “older clay, till and gravel.” Older clay, till and gravel is described by the USGS as “silt, clay, fine sand and till, very compact.” The “older clay, till and gravel” soil unit is referred to in this report as “older sediments.” Older sediments were deposited by streams, lakes and directly by a glacier. Typically, the older sediments are in a dense to very dense or very stiff to hard condition as a result of being overridden by glacial ice.

### **SITE CONDITIONS**

#### **SURFACE CONDITIONS**

##### **General**

The proposed bridge sites are located within an upland area in the Puget Sound lowlands. The upland area is characterized by a nearly level to gently undulating topography, though locally dissected by steep-sided ravines and wide swales such as at the proposed bridge sites. These ravines and swales are typical indicators of where streams have eroded through the glacial till that caps the upland area and into the somewhat more erodible older sediments that underlie the glacial till.

The area of the Bellevue Botanical Garden property where the proposed bridge sites are located is undeveloped and forested though crossed by gravel- and bark-surfaced trails. A secondary trail that forks off of the Lost Meadow Trail crosses within a few feet of the southwest abutment of the proposed suspension bridge. The proposed truss bridge is in a more remote area and is not accessed directly by any existing trails.

##### **Proposed Suspension Bridge**

The proposed suspension bridge site occupies a narrow V-shaped ravine that is approximately 30-foot deep with sideslopes inclined at about 35 to 40 degrees (70 to 84 percent grade). The base of the ravine is occupied by a stream that is characterized by an incised channel with 4- to 5-foot near-vertical sides and a width of about 4 to 6 feet. “Incised channels” are typically not considered a natural erosional feature. Usually a stream becomes incised because of increased high flows which cause the stream to downcut (incise) so rapidly that the sideslopes of the ravine do not have a chance to adjust to the natural level of the stream. The increase in high flows is usually because of an upgradient change in water runoff such as uncontrolled runoff from a parking lot, playfield or other man-created impervious surface.

The sideslopes of the ravine are relatively even-surfaced although the southwest slope is somewhat irregular. This irregularity in slope surface does not appear to be landslide related. Both sideslopes are vegetated with mature second-growth evergreen and deciduous trees. The evergreen trees

are relatively straight-trunked which is an indicator of stable slope conditions. We did not observe springs or seepage on the ravine sideslopes. We did not observe surface evidence of landsliding.

The bridge abutments are planned along the top of the ravine sideslopes which is gently sloping (less than 10 percent grade) toward the ravine on either side.

### **Proposed Truss Bridge**

The proposed truss bridge site occupies a shallow swale that is approximately 10-feet deep with sideslopes inclined at about 20 to 25 degrees (36 to 47 percent grade). The base of the swale is occupied by a stream (same stream that occurs at the proposed suspension bridge site, though upgradient) that is characterized by an incised channel with 1- to 2-foot near-vertical sides and a width of about 3 to 4 feet. The origin of the incised channel is similar as previously described for the proposed suspension bridge. The lesser degree of incisement of the stream channel at the proposed truss bridge site, compared with the deeper incised channel at the proposed suspension bridge site, is likely because of 1) less gradient and/or 2) "siltier" (less erodible) soils.

The sideslopes of the swale are relatively even-surfaced. Both sideslopes are vegetated with mature second-growth evergreen and deciduous trees. The evergreen trees are relatively straight-trunked which is an indicator of stable slope conditions. We did not observe springs or seepage on the swale sideslopes. We did not observe surface evidence of landsliding.

The bridge abutments are proposed along the top of the swale sideslopes which is gently sloping (less than 10 percent grade) toward the swale on either side.

## **SUBSURFACE CONDITIONS**

### **General**

Subsurface conditions at the site were explored by drilling Borings B-1 through B-6 to depths ranging from about 11½ to 14 feet using portable drilling equipment (mini-track) owned and operated by Geologic Drill Exploration, Inc. of Spokane, Washington. The test borings were completed on May 20, 2009. The test borings locations as shown on Figure 3 were determined in the field by measuring distances from existing site features.

The test borings were continuously observed by a geologist from our firm who observed and classified the soils encountered, observed groundwater conditions, and prepared a detailed log of each boring. Soils were classified in general accordance with the classification system described in Figure 4. The logs of the test borings are presented in Figures 5 through 10. These logs are based on our interpretation of the field data and indicate the various types of soils encountered. They also indicate the depths at which the soils or their characteristics change, although the change might be gradual. Soil samples obtained from the test borings were tested for moisture content; the test results are included on the boring logs.

In general, the test borings encountered conditions consistent with regional geologic mapping by the USGS.

The following table summarizes the approximate thicknesses and depths of the primary soil layers at the proposed suspension bridge site.

Test Boring Number	Location	Total Depth (feet)	Topsoil and Weathered Soil	Older Sediments
			Thickness (feet)	Depth (feet)
B-1	SW abutment	13	2½	2½
B-2	SW ground anchor	11½	2	2
B-4	NE abutment	14	2	2
B-5	NE ground anchor	11½	2½	2½

Notes: SW = southwest; NE = northeast

The following table summarizes the approximate thicknesses and depths of the primary soil layers at the proposed truss bridge site.

Test Boring Number	Location	Total Depth (feet)	Topsoil and Weathered Soil	Older Sediments
			Thickness (feet)	Depth (feet)
B-3	West abutment	11½	3	3
B-6	East abutment	11½	3	3

### Proposed Suspension Bridge

Borings B-1 and B-4 were drilled at the proposed bridge abutment locations. Borings B-2 and B-5 were drilled at the proposed ground anchor locations. The borings generally encountered similar conditions consisting of up to about ½ foot of forest duff and topsoil underlain by about 1½ to 2 feet of weathered soil (soft to stiff sandy silt and silt with sand). Underlying the weathered soil at a depth of about 2 to 2½ feet, the borings encountered undisturbed, native older sediments to the completion depth of the test borings. The older sediments consisted of stiff to hard sandy silt with variable amounts of gravel and occasional thin layers of fine sand, medium dense to very dense silty fine sand with variable amounts of gravel, and gravel with sand. No groundwater was observed in Borings B-1, B-2, B-4 and B-5.

### Proposed Truss Bridge

Borings B-3 and B-6 were drilled at the proposed bridge abutment locations. The borings generally encountered similar conditions consisting of up to about ½ foot of forest duff and topsoil underlain by about 2½ feet of weathered soil (soft to stiff sandy silt). Underlying the weathered soil at a depth of about 3 feet, the borings encountered undisturbed, native older sediments to the completion depth of the test borings. The older sediments consisted of stiff to hard sandy silt with variable amounts of gravel and occasional thin layers of fine sand and medium dense to very dense silty fine sand with variable amounts of gravel. No groundwater was observed in Borings B-3 and B-6.

### SEISMICITY

The Puget Sound region is seismically active. Seismicity in this region is attributed primarily to the interaction between the Pacific, Juan de Fuca, and North American plates. The Juan de Fuca plate is subducting beneath the North American plate. It is thought that the resulting deformation and breakup of the Juan de Fuca plate might account for the large-magnitude deep-focus earthquakes in this region.

Thick deposits of glacial and non-glacial sediments occur throughout most of the Puget Sound Basin. Due to the thick sediment cover, little is known regarding the nature of faults in the underlying bedrock. The Seattle Fault, the Southern Whidbey Island Fault, the Tacoma Fault and Olympia Fault zones are the only known structural geology features that have indicated ground displacement in the Quaternary age glacial and interglacial sediments in the Puget Sound region. These faults are located several miles to tens of miles from the proposed substation site with the exception of the Seattle Fault Zone that passes directly through the proposed bridge sites.

An abbreviated listing of major (greater than 5.0 magnitude) earthquake events in the Puget Sound region according to the Pacific Northwest Seismograph Network is presented below.

### Summary of Major Earthquakes

<u>Event</u>	<u>Date</u>	<u>Location</u>	<u>Richter Magnitude</u>
North Cascade Earthquake	December 15, 1872	Chelan, WA	6.8 (est.)
Pickering Passage Earthquake	February 15, 1946	Olympia, WA	5.8
Straight of Georgia Earthquake	June 23, 1946	Courtenay, BC	7.4
Olympia Earthquake	April 13, 1949	Olympia, WA	7.1
Seattle-Tacoma Earthquake	April 29, 1965	SeaTac, WA	6.5
Duvall Earthquake	May 3, 1996	Duvall, WA	5.4
Satsop Earthquake	July 3, 1999	Satsop, WA	5.8
Nisqually Earthquake	February 28, 2001	Olympia, WA	6.8

## CONCLUSIONS AND RECOMMENDATIONS

### SLOPE STABILITY

#### Proposed Suspension Bridge

Based on our site observations and test borings, we conclude that the sideslopes of the ravine are susceptible to surficial landslides (less than 5-feet thick). Under natural circumstances with no stream incisement (the stream is incised 5- to 6-feet deep at this location), the slopes would be adequately stable. However, the stream by its incisement has effectively undercut the toe of the slope causing the slope to be susceptible to landsliding. The primary reason that landsliding has not occurred is likely because of the dense vegetation which forms a cohesive root mat. Over time and with additional incisement (if not corrected), the slope will begin to fail; how much time this will take is difficult to predict.

For the purpose of mitigating the slope stability concerns, we recommend the following:

- Site preparation should be minimized to the extent that this is practical; maintaining existing vegetation.
- The abutment foundations, as currently located, should be embedded at least 2 feet into the native older sediments. The surficial 2 to 2½ feet of topsoil and weathered soil is prone to soil creep which could cause the foundation to laterally shift over time if not properly embedded.

#### Proposed Truss Bridge

Based on our site observations and test borings, we conclude that the sideslopes of the ravine are adequately stable with respect to potential landslides. As previously described, the stream channel at this location is incised, but not as deep as the suspension bridge stream channel, and the slopes are less steep. The slopes are densely vegetated which is a favorable condition for slope stability.

For the purpose of mitigating the slope stability concerns, we recommend the following:

- Site preparation should be minimized to the extent that this is practical; maintaining existing vegetation.
- The abutment foundations, as currently located, should be embedded at least 1 foot into the native older sediments. The surficial 3 feet of topsoil and weathered soil is prone to soil creep which could cause the foundation to laterally shift over time if not properly embedded.

#### **SITE PREPARATION AND EARTHWORK**

- We recommend that the foundation areas be stripped of vegetation and significant organic material. We expect that the stripping depths will be about 1 foot to remove the surficial forest duff and topsoil layer and weathered soil containing appreciable roots and other organic material. Greater depths may be necessary in areas with thick vegetation and trees. This material should be removed off-site or used for landscaping purposes.
- Fill placed in structure areas should be compacted to at least 95 percent of the maximum dry density (MDD) in general accordance with ASTM Test Method D 1557. Structural fill material should be free of debris, organic contaminants and rock fragments larger than 6 inches. The suitability of material for use as structural fill will depend on the gradation and moisture content of the soil. As the amount of fines (soil particles passing the U.S. Standard No. 200 sieve) increases, soil becomes increasingly more sensitive to small changes in moisture content and adequate compaction becomes more difficult to achieve. We recommend that structural fill contain no more than about 5 percent fines for placement in wet weather. The percent fines can be higher for placement in dry weather, providing that the fill material is moisture-conditioned as necessary for proper compaction.
- The on-site soils (weathered soil and older sediments) typically contain a high percentage of fines, are sensitive to moisture, and will be difficult to moisture-condition and adequately compact during wet weather. The topsoil is considered unsuitable for use as structural fill during any weather conditions.

#### **FOUNDATIONS**

- **Foundation embedment:** We recommend that the footings adjacent to slopes be embedded at least 2 feet (proposed suspension bridge) or 1 foot (proposed truss bridge) into the native older sediments. This will result in a footing base about 4 feet below the existing ground surface. This minimum embedment depth will also provide for adequate passive earth pressure against the sides of each footing. In order to maximize both bearing capacity and passive pressure, we recommend that the footing subgrade consist of native older sediments and that all footings be cast neatly (without concrete forms) against the native soil.
- **Bearing Capacities:** Assuming foundation subgrades are prepared as previously described, the foundations can be designed for the following maximum net allowable soil bearing capacities. These values, presented in pounds per cubic foot (psf) incorporate static and transient (wind/lateral load or seismic) safety factors of at least 2.0 and 1.5, respectively.

<u>Design Parameter</u>	<u>Allowable Value</u>
Static Bearing Capacity	3,000 psf
Transient Bearing Capacity	4,000 psf

- **Settlement:** Based on the foundation design criteria given above, we estimate that total static settlement should be less than 1 inch.

- Passive Earth Pressure:** A foundation that has been constructed as described above will resist static and transient (wind/lateral load or seismic) lateral movements by means of passive earth pressure and base friction. We recommend using the following design values, where passive pressure is given in pounds per cubic foot (pcf) of equivalent fluid weight. These values incorporate static and transient safety factors of at least 1.5 and 1.1, respectively.

<u>Design Parameter</u>	<u>Allowable Value</u>
Static Passive Pressure (level foreslope)	350 pcf
Static Passive Pressure (2H:1V foreslope)	135 pcf
Static Passive Pressure (1.5H:1V foreslope)	90 pcf
Transient Passive Pressure (level foreslope)	475 pcf
Transient Passive Pressure (2H:1V foreslope)	185 pcf
Transient Passive Pressure (1.5H:1V foreslope)	125 pcf

- Base Friction:** We estimate that an allowable friction coefficient of 0.4 could be assumed for footing bases cast directly on the native older sediments.

**DRAINAGE CONSIDERATIONS**

Areas disturbed by construction activities will be susceptible to erosion until effective protective cover is established. We recommend that bare soil areas be protected using an appropriate geotextile, such as North American Green C125, Anti-Wash Geojute, or an equivalent. Seeding and planting of these areas should be done before placing the geotextile or erosion control fabric.

**SEISMIC CONSIDERATIONS**

**General**

As previously described, the Seattle Fault zone passes directly through the proposed bridge sites. Currently, no standards have been developed for mitigating potential affects of a Seattle Fault zone earthquake other than those standards listed in the 2009 International Building Code (IBC).

**IBC Seismic Design Criteria**

Based on our review of available geologic information and the subsurface soil conditions encountered in the test boring explorations, we interpret the native soil conditions at the site to correspond to Seismic Site Class D, as defined by the 2009 IBC. This classification pertains to a stiff soil profile with Standard Penetration Test (SPT) value ranging from 15 to 50.

Additional IBC seismic design parameters obtained from the USGS Earthquake Hazards Program (Seismic Hazard Curves) include the following:

Peak Ground Acceleration Coefficient*	0.30
Spectral Response Acceleration $S_s$	1.377
Spectral Response Acceleration $S_1$	0.466
Site Coefficient $F_a$	1.0
Site Coefficient $F_v$	1.534

\* earthquake having a 10-percent probability of exceedance in 50 years (corresponding to a return interval of 475 years)

**Liquefaction Analysis**

Our liquefaction analysis of the site was based on a Magnitude 7.5 earthquake occurring directly beneath the site, and a peak horizontal ground acceleration of 0.30g. Liquefaction is the phenomenon wherein soil strength is dramatically reduced when subjected to vibration or shaking. Liquefaction generally occurs in saturated, loose sand deposits, though recent studies have shown that silty sand or sandy silts are also susceptible to liquefaction. Our analyses indicate that the weathered soil and native older sediments encountered in our explorations have a very low susceptibility to liquefaction during the design earthquake.

**USE OF THIS REPORT**

We have prepared this report for use by Sahale, LLC. The data and report should be provided to prospective contractors for bidding or estimating purposes, but our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

When the design has been finalized, we recommend that the final design drawings and specifications be reviewed by our firm to evaluate that our recommendations have been interpreted and implemented as intended.

There is the possibility that subsurface conditions could vary with location across the site, as well as with time. A contingency for unexpected conditions should be included in the project budget and schedule. Sufficient field observation, testing and consultation should be provided by our firm during construction to evaluate that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions encountered during the work differ from those anticipated, and to evaluate whether or not earthwork and foundation installation activities comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No warranty or other conditions, express or implied, should be understood.

\*\*\*\*\*

Carroll Vogel  
Sahale, LLC  
June 3, 2009  
Page 9

## Attachment 4 - Geotechnical Report

We hope this letter report meets your present needs. Please feel free to call if you have any questions or comments regarding concerning the project.

Yours very truly,  
Icicle Creek Engineers, Inc.

Brian R. Beaman, PE, LHG  
Principal Engineer/Hydrogeologist

I

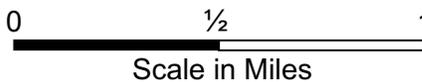
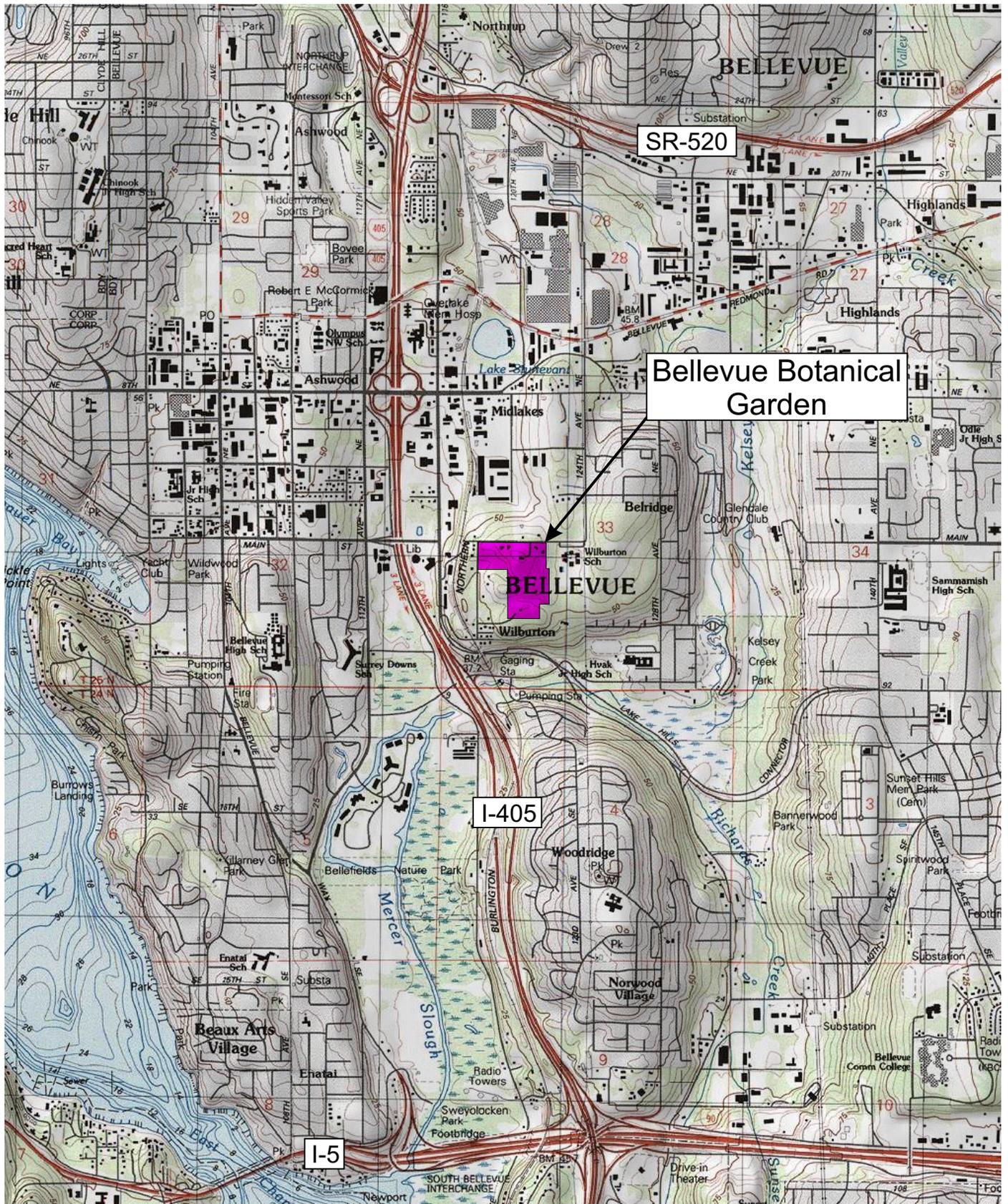
Kathy S. Killman, LEG  
Principal Engineering Geologist

Document ID: 0860001.report

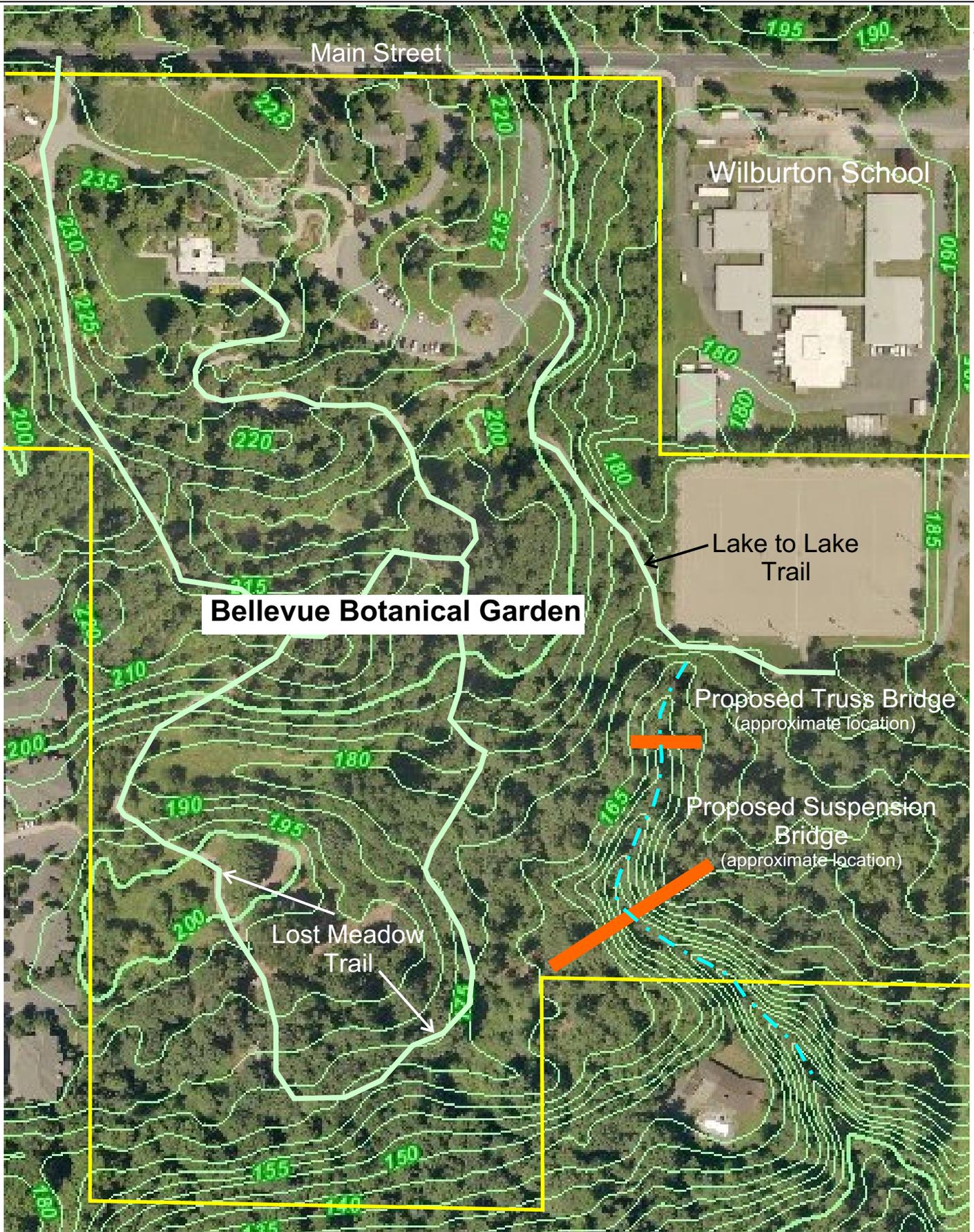
Three copies submitted

Attachments: Vicinity Map – Figure 1  
Site Plan A – Figure 2  
Site Plan B – Figure 3  
Explanation for Boring Logs – Figure 4  
Boring Logs – Figures 5 to 10

DRAFT



Attachment 4 - Geotechnical Report

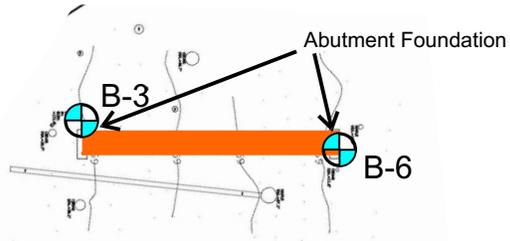


Base map reference: King County iMAP, aerial photograph dated 2007

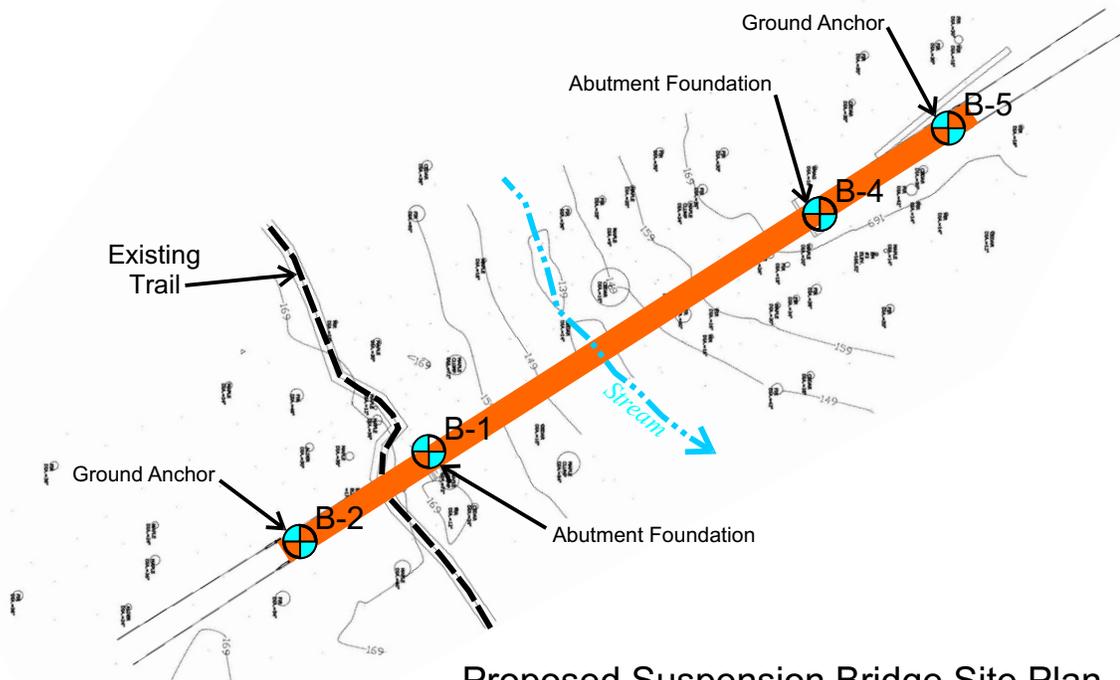
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Scale in Feet  
Attachment 4 - Geotechnical Report

# Attachment 4 - Geotechnical Report



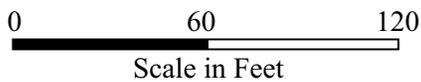
### Proposed Truss Bridge Site Plan



### Proposed Suspension Bridge Site Plan

Base map reference: Sahale, LLC, May 19, 2009, "Bellevue Botanical, Relational Plan View", Page 1 of 3

## EXPLANATION



B-3  Boring Location

**Unified Soil Classification System**

MAJOR DIVISIONS			Soil Classification and Generalized Group Description	
Coarse-Grained Soils  More than 50% retained on the No. 200 sieve	GRAVEL More than 50% of coarse fraction retained on the No. 4 sieve	CLEAN GRAVEL	GW	Well-graded gravels
			GP	Poorly-graded gravels
		GRAVEL WITH FINES	GM	Gravel and silt mixtures
			GC	Gravel and clay mixtures
	SAND More than 50% of coarse fraction passes the No. 4 sieve	CLEAN SAND	SW	Well-graded sand
			SP	Poorly-graded sand
		SAND WITH FINES	SM	Sand and silt mixtures
			SC	Sand and clay mixtures
Fine-Grained Soils  More than 50% passing the No. 200 sieve	SILT AND CLAY  Liquid Limit less than 50	INORGANIC	ML	Low-plasticity silts
			CL	Low-plasticity clays
	SILT AND CLAY  Liquid Limit greater than 50	INORGANIC	OL	Low plasticity organic silts and organic clays
			MH	High-plasticity silts
	ORGANIC	CH	High-plasticity clays	
		OH	High-plasticity organic silts and organic clays	
Highly Organic Soils	Primarily organic matter with organic odor	PT	Peat	

Notes: 1) Soil classification based on visual classification of soil is based on ASTM D2488-06.  
 2) Soil classification using laboratory tests is based on ASTM D2487-06.  
 3) Description of soil density or consistency is based on interpretation of blow count data and/or test data.

**Soil Particle Size Definitions**

Component	Size Range
Boulders	Coarser than 12 inch
Cobbles	3 inch to 12 inch
Gravel	3 inch to No. 4 (4.78 mm)
Coarse	3 inch to 3/4 inch
Fine	3/4 inch to No. 4 (4.78 mm)
Sand	No. 4 (4.78 mm) to No. 200 (0.074mm)
Coarse	No. 4 (4.78 mm) to No. 10 (2.0 mm)
Medium	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Finer than No. 200 (0.074 mm)

**Soil Moisture Modifiers**

Soil Moisture	Description
Dry	Absence of moisture
Moist	Damp, but no visible water
Wet	Visible water

**Key to Boring Log Symbols**

Sampling Method	Boring Log Symbol	Description
Blows required to drive a 2.4 inch I.D. split-barrel sampler 12-inches or other indicated distance using a 300-pound hammer falling 30 inches.	34 	Location of relatively undisturbed sample
	12 	Location of disturbed sample
	21 	Location of sample attempt with no recovery
Blows required to drive a 1.5-inch I.D. split barrel sampler (SPT - Standard Penetration Test) 12-inches or other indicated distance using a 140-pound hammer falling 30 inches.	14 	Location of sample obtained in general accordance with Standard Penetration Test (ASTM D-1586) test procedures.
	30 	Location of SPT sampling attempt with no recovery.
Pushed Sampler	P 	Sampler pushed with the weight of the hammer or against weight of the drilling rig.
Grab Sample	G 	Sample obtained from drill cuttings.

Note: The lines separating soil types on the logs represents approximate boundaries only. The actual boundaries may vary or be gradual.

**Laboratory Tests**

Test	Symbol
Moisture Content	MC
Density	DN
Grain Size	GS
Percent Fines	PF
Atterberg Limits	AL
Hydrometer Analysis	HA
Consolidation	CN
Compaction	CP
Permeability	PM
Unconfined Compression	UC
Unconsolidated Undrained TX	UU
Consolidated Undrained TX	CU
Consolidated Drained TX	CD
Chemical Analysis	CA

JMS:05/21/09

Logged by: JMS

Project Name: Bellevue Botanical Gardens

ICE File No. 0860-001

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Groundwater Information	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
						Moisture Content (Percent - ■)						
0	Forest duff and topsoil											
1	Mottled brown and light brown sandy SILT (soft to stiff, moist to wet) (weathered soil) (drill cuttings)		ML									
2												
3	Mottled brown and light brown sandy SILT (very stiff, moist) (older sediments)		ML	25		●						
4	GRAVEL (older sediments) (drill action and cuttings)											
5	Mottled brown and light brown sandy SILT (hard, moist) (older sediments)		ML	44			●					
6												
7	Mottled brown and light brown silty fine SAND with occasional gravel (very dense, moist) (older sediments)		SM	52				●				
8												
9	Gray fine GRAVEL with sand (very dense, moist) (older sediments)		GP	53				●				
10												
11												
12												
13	Boring completed at 13 feet on May 20, 2009		GP	50-6"						●	No groundwater observed	
14												
15												
16												
17												
18												
19												
20												

See Figure 4 for explanation of symbols

JMS: 05/21/09

# Boring B-2

Approximate Ground Surface Elevation: 170 Feet

Logged by: JMS

Project Name: Bellevue Botanical Gardens

ICE File No. 0860-001

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Groundwater Information	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Forest duff and topsoil											
1	Mottled brown and light brown sandy SILT (soft to stiff, moist to wet) (weathered soil) (drill cuttings)		ML									
2	Mottled brown and light brown sandy SILT and a trace of fine gravel (stiff, moist) (older sediments)		ML	15								
3						●						
4												
5	Mottled brown and light brown sandy SILT with thin layers of fine sand (hard, moist) (older sediments)		ML	40								
6							●					
7												
8												
9	Gray sandy SILT (hard, moist) (older sediments)		ML	44								
10												
11												
12	Boring completed at 11.5 feet on May 20, 2009											
13												
14												
15												
16												
17												
18												
19												
20												

No groundwater observed

See Figure 4 for explanation of symbols

JMS:05/21/09

Approximate Ground Surface Elevation: 170 Feet

Logged by: JMS

Project Name: Bellevue Botanical Gardens

ICE File No. 0860-001

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Groundwater Information
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
0	Forest duff and topsoil										
1	Mottled brown and light brown sandy SILT (soft to stiff, moist to wet) (weathered soil) (drill cuttings)		ML								
3	Mottled brown and light brown sandy SILT (very stiff, wet to moist) (older sediments)		ML	22		●					
6	Gray sandy SILT with thin layers of fine sand (very stiff, moist) (older sediments)		ML	19		●					
8	Gray sandy SILT with thin layers of fine sand (very stiff, moist) (older sediments)		ML	19		●					
11	Gray sandy SILT with thin layers of fine sand and fine gravel (hard, moist) (older sediments)		ML	85/11"						●	No groundwater observed
12	Boring completed at 11.4 feet on May 20, 2009										
13											
14											
15											
16											
17											
18											
19											
20											

See Figure 4 for explanation of symbols

JMS:05/21/09

Logged by: JMS

Project Name: Bellevue Botanical Gardens

ICE File No. 0860-001

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Groundwater Information	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
						Moisture Content (Percent - ■)						
0	Forest duff and topsoil											
1	Mottled brown SILT with fine sand (soft to stiff, moist to wet moist) (weathered soil) (drill cuttings)		ML									
2												
3	Mottled brown and light brown silty fine SAND with a trace of fine gravel (moist, medium dense) (older sediments)		SM	27				●				
4												
5	Mottled brown and light brown silty fine SAND with thin layers of fine sand (moist, very dense) (older sediments)		SM	58					●			
6												
7	Mottled brown and light brown silty fine SAND with thin layers of fine and coarse sand (moist, dense) (older sediments)		SM	47					●			
8												
9	Gray sandy SILT (very stiff, moist) (older sediments)											
10												
11			ML	26				●				
12												
13	grades to hard		ML	36					●			
14	Boring completed at 14 feet on May 20, 2009											No groundwater observed
15												
16												
17												
18												
19												
20												

See Figure 4 for explanation of symbols

JMS:05/21/09

Logged by: JMS

Project Name: Bellevue Botanical Gardens

ICE File No. 0860-001

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Groundwater Information	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
						Moisture Content (Percent - ■)						
0	Forest duff and topsoil											
1	Mottled brown and light brown sandy SILT (soft to stiff, moist to wet) (weathered soil) (drill cuttings)		ML									
2												
3	Mottled brown and light brown sandy SILT and a trace of fine gravel (hard, moist) (older sediments)		ML	41				●				
4												
5												
6			ML	52				●				
7												
8	occasional thin layers of fine sand		ML	41				●				
9	Gray sandy SILT (very stiff, moist) (older sediments)											
10												
11			ML	30				●				
12	Boring completed at 11.5 feet on May 20, 2009											
13												
14												
15												
16												
17												
18												
19												
20												

No groundwater observed

See Figure 4 for explanation of symbols

# Boring B-6

Approximate Ground Surface Elevation: 170 Feet

JMS:05/21/09

Logged by: JMS

Project Name: Bellevue Botanical Gardens

ICE File No. 0860-001

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Groundwater Information
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
						Moisture Content (Percent - ■)					
						20	40	60	80		
0	Forest duff and topsoil										
1	Mottled brown and light brown sandy SILT (soft to stiff, moist to wet) (weathered soil) (drill cuttings)		ML								
2	occasional charcoal fragments at 2 feet										
3	Mottled brown and light brown silty fine SAND with thin layers of fine gravel (medium dense, moist) (older sediments)		SM	28				●			
4											
5											
6	grades to very dense		SM	57					●		
7											
8	Brown sandy SILT with occasional thin layers of fine sand (hard, moist) (older sediments)		ML	41					●		
9											
10	Gray sandy SILT (hard, moist) (older sediments)		ML								
11	Mottled brown and light brown silty fine SAND with occasional gravel (very dense, moist) (older sediments)		SM	90/11"					●		
12	Boring completed at 11.5 feet on May 20, 2009										
13											
14											
15											
16											
17											
18											
19											
20											

No groundwater observed

See Figure 4 for explanation of symbols

# Bellevue Botanical Gardens

## Habitat Assessment

April 23, 2008

*Prepared for:*  
City of Bellevue

*Prepared by:*  
Brian Missildine  
Skillings Connolly, Inc.



## Table of Contents

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Executive Summary .....	1
Introduction.....	2
Objectives .....	4
Methodology.....	4
Habitats .....	4
Vegetation.....	7
Wildlife .....	8
Noxious and Non-native Vegetation.....	9
Management Recommendations.....	9
References.....	12

### Tables

Table 1. Vegetation Species Observed During Survey.....	7
Table 2. Avian Species Observed During Field Survey .....	8
Table 3. Mammals Observed During Field Survey.....	9
Table 4. Amphibians Observed During Field Survey.....	9

### Exhibits

Exhibit 1. Vicinity Map .....	3
Exhibit 2. Primary Habitats.....	6

## Executive Summary

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The Bellevue Botanical Garden (BBG) is a horticultural center and natural reserve that is adjacent to Wilburton Park in Bellevue, Washington. BBG recently purchased a plot to the south of the park and would like to incorporate the newly purchased property by adding trails and bridges, removing invasive vegetation, and planting additional native vegetation. The newly purchased property is primarily inhabited by Douglas fir, alder, and native understory but does have some non-natives such as English Ivy. In addition, the BBG would like to improve the northwest corner of the property into a garden room which would entail removing invasive Himalayan blackberry and other vegetation. Bellevue Municipal Code (BMC) stipulates that on developments of this size, a habitat assessment be conducted in order to identify species of concern or ecological communities of concern that may be affected by project construction (BMC 20.25H.165).

This habitat assessment was conducted to analyze the flora and fauna species that utilize the BBG and areas adjacent to it. Washington Department of Natural Resources (DNR) and Washington Department of Fish and Wildlife (WDFW) databases and other literature were analyzed to determine if threatened or endangered species or ecosystems have been identified in the area. Two Skillings Connolly biologists visited the site to assess habitat in mid February 2008. During this site visit, many common bird species were observed and egg masses of two amphibian species were found. It was determined the BBG has many quality habitat features and many species that were not observed could utilize the area if access or migratory corridors were present. No federal or state species of concern were identified in the BBG, but various birds of prey nest within 3 miles of the BBG and salmon spawn in nearby Richards Creek and Kelsey Creek. However, evidence of one local species of concern, the pileated woodpecker, was observed during the field visit.

The BBG plans to expand its trail system into the new acquisition which should not cause significant impacts to any habitat attributes. Skillings Connolly recommends that the BBG remove invasive species like Himalayan blackberry and English Ivy throughout the entire park, especially the northwest corner of the park. Skillings Connolly also recommends enhancing the buffer of wetland "B".

## Introduction

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The Bellevue Botanical Garden (BBG) is comprised of display gardens, woodlands, meadows and wetlands that are located in an urban environment. The mission of the BBG is to perpetuate and further enhance the BBG as a learning resource in partnership with the City of Bellevue. The BBG hosts many annual and perennial plant species for public viewing throughout the year and is well known to local horticulture and gardening groups. The City of Bellevue purchased/acquired two approximate 17-acre parcels (adjacent to BBG) in 2006. The objective of this acquisition was to protect existing wildlife habitat, maintain seclusion from encroaching urban sprawl and expand opportunities for public education and enjoyment in the park.

As part of the BBG expansion, the City of Bellevue requested Skillings Connolly, Inc. to provide a habitat assessment of the BBG, inclusive of the new parcels. Skillings Connolly conducted a habitat assessment survey on February 27, 2008, to evaluate and inventory wildlife and to provide management recommendations for existing habitat types located within the BBG.

### *Project Settings*

The Bellevue Botanical Gardens are situated within the City of Bellevue (pop. 117,000), King County Washington. The BBG is surrounded by urbanization and is within 0.5 miles of the highly developed Interstate 405 corridor (Exhibit 1: Vicinity Map). The study area encompasses the entire BBG which is located within Township 25 North, Range 05 East, Section 33.

The topography of site is irregular. Much of northern and central section of the site is flat or gently rolling but the southern section of the site is on a hillside and includes a ravine.

### *Project History*

The BBG was the site of the Wilburton settlement until it was logged in the early 1900's. The land was never replanted and was left to regenerate. In the early 1930's, the VonBuskirk's from Montana built a log cabin and farm at the site where the visitors' center exists. The cabin and farm was eventually overcome by insects and age and was replaced by a more modern home complete with atrium and recirculating pond. The site was eventually deeded to the City of Bellevue in 1984 for the purpose of becoming a public park. Also, in 1984 the Bellevue Botanical Garden Society was formed to promote the use of the property as a botanical garden. By 1989, almost 40 acres was set aside by the Bellevue City Council for a botanical park and reserve. After several years of construction and planning, the park was finally opened in 1992. Since 1992, the BBG has undergone many improvements including the acquisition of two approximately 17 acre lots in 2006 that will be incorporated into the BBG. (Source: <http://www.bellevuebotanical.org>)



BELLEVUE BOTANICAL GARDEN



Attachment 5 - Habitat Assessment

## Objectives

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The objectives of the habitat assessment are as follows:

- Create and/or update site inventory of habitat common to the BBG, paying particular attention to the identification of priority and/or keystone species.
- Identification and description of habitat-types represented in the BBG and a portrayal of each habitat type in terms of attributes, constraints, and potential opportunities for restoration and/or enhancement.
- Develop list/matrix of species of local importance (as listed in the Bellevue Municipal Code).
- Provide specific habitat enhancement recommendations for the newly acquired parcels.

## Methodology

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Wildlife and habitat surveys were conducted on February 27, 2008, between the hours of 0930 and 1430. Initially the weather was overcast with sporadic rain but turned to overcast with sun breaks by the afternoon. Temperatures during the survey ranged from 48<sup>o</sup> to 54<sup>o</sup> Fahrenheit.

Terrestrial surveys were conducted by: 1) meandering through the park on and off trail noting habitat types and species present (plant and animal); 2) observing the ground for tracks; and, 3) listening for auditory clues of species present but not readily visible. Aquatic surveys were conducted visually along the edges of the wetlands as well as wading through the wetland taking note of any amphibian egg masses that were present.

In addition to the physical survey of the BBG, information was collected from reviewing the following documents for information on vegetation, topography, sensitive species, and habitats in the project vicinity.

- U.S. Geologic Survey (USGS) 7.5 minute topographical map
- Bellevue Botanical Garden Wetland Delineation Report 2007
- Priority Habitat and Species Maps
- Endangered Species Act lists from USFWS and NOAA
- WDFW Habitats and Species Report
- Bellevue Botanical Gardens website
- City of Bellevue Critical Areas Ordinance
- King County Noxious weed list

## Habitats

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The BBG consisted of five habitat types. Forest is the primary habitat followed by wetlands, open meadows/grassy areas, Himalayan blackberry, and the botanical garden (not in any specific order). While streams were observed on-site, they did not represent typical stream type habitats. We were unable to locate the head or the channel in some places of the stream in the northwest

corner due to the tremendous over-story of Himalayan blackberries. This stream ended in a roadside ditch where it went sub-surface. The other stream was located in the ravine, which we were not able to successfully access. Below is a description of the habitat types and species of local importance that were observed within those habitats (Exhibit 2 Primary habitats).

The forested habitat is somewhat atypical of northwest forests and can be described as a Westside Lowlands conifer-deciduous forest. The forest is heterogeneous with no species having overall dominance. Typical northwest forests are mainly dominated by Douglas Fir. This is primarily a result of past logging practices that included replanting Douglas fir as the only species. However, the BBG is unique in the sense it was logged in the early 1900's but was never replanted and left to restore naturally. Furthermore, many snags and downed woody debris have been left as key habitat components. Bull (2002) mentions that snags and downed woody debris is a critical portion of a diverse forest. Thomas (1979) found over 57 percent of the vertebrates in Pacific Northwest forest associate with snags and downed woody debris.

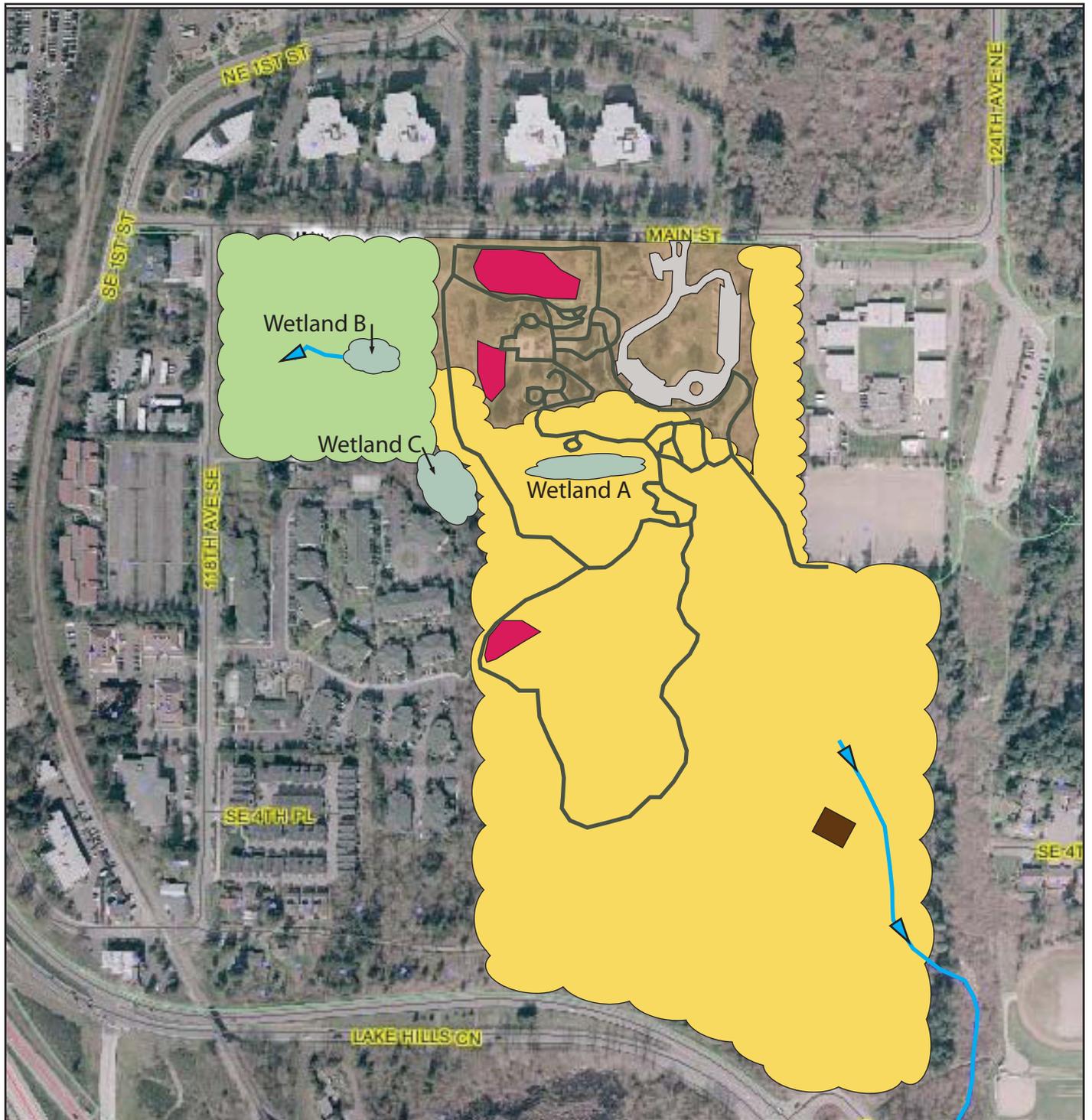
No species of local importance (BMC 20.25H.150-165) was observed in the forested habitat; however, evidence of pileated woodpecker was noted at multiple locations. In addition, the forested area most likely supports species of local importance such as bald eagle perching habitat, red-tailed hawk perching and foraging habitat, and year round habitat for bats (*Myotis* and *Plecotus* spp.) (See Exhibit 2 for habitat map). Lastly, a large nest was observed in the lower branches of a large cottonwood approximately 70 feet off the ground. The nest was monitored for over 10 minutes but no species were observed in or around the nest. The nest could have been from a red-tailed hawk but the surveyors were unable to confirm this through visual observation.

Three wetlands exist on site and were previously delineated by Skillings Connolly Inc. (2006; 2007). Primary vegetation found in the wetlands included sedges, cat tails, soft rushes, and skunk cabbage. No species of local importance were observed in the wetlands, however, Great Blue Herons and bats would be expected to use wetland habitat for foraging. Egg masses from long-toed salamanders and Pacific chorus frogs were observed in the wetlands.

Two meadow/grassy areas were observed within the forested area of the park. No species of local importance were observed in any of the meadows/grassy area. However, open meadow/grassy area habitat could be used by raptors such as red-tailed hawks, peregrine falcon, and merlin as foraging habitat.

The main interior of the complex is a botanical garden with a variety of native and non-native plant species and man-made structures such as buildings and impervious surface. Vegetation surveys were not conducted within the main complex due to the fact it was a cultivated garden. However, wildlife was noted when observed.

Habitat in the northwest corner of the park was primarily dominated by Himalayan blackberry. Alder, big leaf maple, cottonwood, Oregon ash, hawthorn, and orchard trees were also present. Himalayan blackberry is so thick in this section of the park no other vegetation can establish itself. This portion was not well surveyed because of the difficulty migrating through the Himalayan blackberry. In addition, a small (<8 inches wide) stream was observed



- |   |                                       |  |                    |
|---|---------------------------------------|--|--------------------|
|  | Botanical Garden                      |  | Existing residence |
|  | Himalayan Blackberry/ Common Hawthorn |  | Streams            |
|  | Grass/ Open Meadows                   |  |                    |
|  | Forest                                |  |                    |
|  | Wetlands                              |  |                    |

Attachment 5 - Habitat Assessment

within this area and is most likely an outlet from Wetland B (Skillings Connolly 2007).

## Vegetation

The following vegetation was observed during the survey. It is important to note that there is more species present but because of the time of year the survey was conducted, some vegetation may still be dormant and/or unidentifiable. This includes horsetails, bracken fern and other seasonal plants. No vegetation with sensitive status or local importance was noted during the site visit. The Department of Natural Resources Natural heritage program website was consulted in order to ascertain if any of the native plant communities at BBG are considered rare. None of the plant communities at BBG seemed to match the plant communities recognized by the Natural Heritage Program. The website notes that recognized plant communities tend to be biased toward areas that have been undisturbed by people. Noxious and non-native plants are discussed in a dedicated section on page 7.

**Table 1. Vegetation Species Observed During Survey.**

Douglas Fir	<i>Pseudotsuga menziesii</i>
Red Alder	<i>Alnus rubra</i>
Western Red Cedar	<i>Thuja plicata</i>
Western Hemlock	<i>Tsuga heterophylla</i>
Big leaf Maple	<i>Acer macrophyllum</i>
Salal	<i>Gaultheria shallon</i>
Oregon Grape	<i>Mahonia nervosa</i>
Sword Fern	<i>Polystichum munitum</i>
Licorice Fern	<i>Polypodium glycyrrhiza</i>
Madrona	<i>Arbutus menziesii</i>
Cascara	<i>Rhamnus purshiana</i>
Pacific Yew	<i>Taxus brevifolia</i>
Indian Plum	<i>Oemleria cerasiformis</i>
Holly	<i>Ilex aquifolium</i>
English Ivy	<i>Hedera helix</i>
Himalayan Black berry	<i>Rubus discolor</i>
Trailing Blackberry	<i>Rubus ursinus</i>
Laural	<i>Laurus noblis</i>
Sitka Spruce	<i>Picea sp</i>
Red Huckleberry	<i>Vaccinium parvifolium</i>
Snowberry	<i>Symphoricarpos albus</i>
Slough Sedges	<i>Carex obnupta</i>
Weeping Willow	<i>Salix sp</i>
Soft Rush	<i>Juncus effusus</i>
Cattail	<i>Typha latifolia</i>
Skunk Cabbage	<i>Lysischiton americanum</i>
Creeping Buttercup	<i>Ranunculus repens</i>
Oregon Ash	<i>Fraxinus latifolia</i>
Watson's Willowherb	<i>Epilobium ciliatum</i>

Common Hawthorn	<i>Crataegus monogyna</i>
Water Parsley	<i>Oenanthe sarmentosa</i>
Black Cottonwood	<i>Populus balsamifera</i>
Bitter cherry	<i>Prunus emarginata</i>

## Wildlife

The Washington Department of Fish and Wildlife (WDFW) furnished Skillings Connolly with a Habitat and Species Report for the section, township and range that includes the BBG. In addition, U.S. Fish and Wildlife Service and National Marine Fisheries Service Endangered Species Act lists were reviewed to determine the presence of federally threatened or endangered species. No federally or state threatened and endangered species or sensitive species were identified within the BBG. Osprey, bald eagle and peregrine falcon, all state species of concern, are known to nest in certain locations that are within a 2 mile radius of the BBG. Richards Creek, Goff Creek and Kelsey Creek are occupied by priority anadromous fish and priority resident fish.

Avian species were the most abundant within the park (Table 2). Very few mammals were observed and this is most likely due to the daily presence of human activity and the urban setting that exists outside of the park boundaries (Table 3). Eastern gray squirrels, a non-native species, were observed foraging in the park. Finally, a pair of mallards was observed in the wetland within the garden. The mallards were accustomed to human activity and have probably been hand fed in the past based on their behavior towards the surveyors. Other wildlife that was not observed but could be present in the park includes owls, opossums, deer, rabbits, numerous species of rodents (voles, mice, and rats), skunks, bats, and coyotes.

Two amphibian species, Pacific chorus frog and long-toed salamanders were observed by either vocalization or egg mass identification during the site visit. Other amphibians such as red-legged frogs could use the wetland habitat. Avian species tolerant of isolated patches of mature forest could use the park as year-round habitat or during migration. This includes many passerines (perching birds) and birds of prey. Because of the time of year the surveys were conducted many potential species present in the summer were not observed.

**Table 2. Avian Species Observed During Field Survey**

Song Sparrow	<i>Melospiza melodia</i>
Varied Thrush	<i>Ixoreus naevius</i>
American Robin	<i>Turdus migratorius</i>
Mallard	<i>Anas platyrhynchos</i>
Red Breasted Sapsucker	<i>Sphyrapicus ruber</i>
Bushtit	<i>Psaltriparus minimus</i>
Black-Capped Chickadee	<i>Parus atricapillus</i>
Oregon Junco	<i>Junco hyemalis</i>
American Crow	<i>Corvus brachyrhynchos</i>
European Starling	<i>Sturnus vulgaris</i>

Golden Crown Kinglet	<i>Regulus satrapa</i>
Anna's Hummingbird	<i>Calypte anna</i>
Northern Flicker	<i>Colaptes auratus</i>
Pileated Woodpecker	<i>Cryocopus pileatus</i>
House Sparrow	<i>Passer domesticus</i>
Steller's Jay	<i>Cyanocitta stelleri</i>

**Table 3. Mammals Observed During Field Survey.**

Eastern Gray Squirrel	<i>Sciurus carolinensis</i>
Raccoon	<i>Procyon lotor</i>
mole	<i>Talpidae spp.</i>

**Table 4. Amphibians Observed During Field Survey.**

Pacific Chorus Frog	<i>Pseudacris regilla</i>
Long-toed Salamander	<i>Ambystoma macrodactylum</i>

## Noxious and Non-native Vegetation

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Himalayan Blackberry was observed sparsely throughout the park, primarily in areas that had been previously disturbed. However, the northwest corner of the park has the largest concentration with over 80 percent of the ground being covered with Himalayan blackberry.

English ivy was observed climbing several trees on the recently purchased parcel close to the house. English ivy has been used as decorative ground cover but has become an ecological threat to native species.

Other non-native species that were observed in very sparse numbers included laurel, English holly and creeping buttercup; the latter two are on the King County noxious weeds of concern list (King County 2008).

## Management Recommendations

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Overall, the habitat in the park is fairly diverse. The park also contains habitat features like standing snags, downed woody debris, open spaces and a wide range in tree sizes. The new addition in to the south end of the park will generally stay in its current state with the exception of the construction of trails and a bridge over the ravine. The new addition in the northwest side of the park will likely undergo blackberry removal, native plantings and trail construction. Since much of the BBG is devoted to horticulture, herbicides and pesticides are used sparingly. BBG gardener Jan Beck informed Chris Holcomb, a staff scientist with Skillings Connolly, that integrated pest management is practiced and that insecticides and herbicides are not applied within 50 feet of the edge of the wetlands. Herbicides like Garlon™ and Roundup™ are applied sparingly to control Himalayan blackberry. Although herbicides and insecticides may harm amphibians, the level of application seems to be minimal. The following is a description of the management recommendations.

**Eliminate Himalayan Blackberry**

Removal of the Himalayan blackberry and selective retention of other trees in the northwest corner of the park should occur in order to re-establish a more natural vegetation setting. Select healthy big-leaf maple, alder, and other native species could be left in place in the northwest corner along with planting other trees and shrubs to improve habitat conditions. Removal could be conducted using heavy equipment, or potentially by goats, however, a small stream meanders through the Himalayan blackberry and it should be marked before any work commences in that area. In addition, the area could be replanted with native vegetation. The smaller patches of Himalayan blackberry within the forested area could be removed by hand or by applying herbicide.

**Eliminate English Ivy**

English ivy should be removed in its entirety, especially where it is climbing up trees. English ivy is a threat to the integrity of the forested area of the park. English ivy can form thick layers on the forest floor thereby smothering native vegetation and inhibiting tree seedling growth (National Park Service 2002). The ivy can be killed by cutting the vines at the base of the tree then removing the roots in their entirety. Monitoring will have to be conducted to ensure the ivy does not re-grow.

**Enhance the Buffer of Wetland B**

A portion of the wetland buffer of Wetland B can be enhanced by planting more shrubs and trees. There is a grassy hillside between the eastern edge of this wetland and the trail that would be an appropriate area for shrubs and trees. Currently, this area is dominated by non-native grass species and shrubs would improve the wetland's hydrologic and water quality functions. Since this area is within a wetland buffer, a Critical Areas Land Use Permit (BMC 2030P) will need to be obtained. Generally, the City of Bellevue does not permit the planting of exotic plants in critical area buffers but exceptions can be made for public parks (Kevin LeClair pers. comm.). Since amphibians breed in the wetland, care should be taken to maintain current levels of sunlight on the seasonal pond. A planting plan incorporating low-lying native shrubs near the wetland buffer and exotic shrubs or trees near the trail may be suitable. The addition of large woody debris would also enhance this area for the amphibians.

**Species of Local Importance Recommendations***Pileated woodpecker*

Pileated woodpeckers were not observed in the park, however evidence of nesting and foraging was observed during the field reconnaissance surveys. It appears the BBG is already providing adequate habitat for this species by maintaining snag and stump habitat. Larson et al. (2004) recommends maintaining a sufficient number of large snags and decaying trees for nest and foraging habitat. Larson et al. 2004 also recommends that hard trees with evidence of foraging or nesting cavities should be retained.

*Great Blue Heron*

Great Blue Herons were not observed on-site; however, the wetlands within the BBG do provide foraging habitat for this species. Management recommendations for Great Blue Heron revolve primarily around nesting habitat. Human disturbance is identified as one of the largest impacts on Great Blue Herons and minimization of this disturbance is a management recommendation.

*Myotis and Plecotus*

No bats were observed during the field survey; however, this was expected since the surveys were conducted during the day and bats are nocturnal. The habitat in the BBG is conducive to bats, especially hibernacula habitat with the abundance of snags with cavities. Furthermore, the wetlands provide optimum foraging habitat because of insect production from the ponds. There are no specific management plans for bats, but maintaining snags and wetland habitat will help maintain their survival. Bat boxes could also be used in place of snags if necessary. If bat boxes are used, the following is recommended.

Place the house in full sun, preferably on its own pole; the next-best location is on the southern side of a building in full sun. The optimal temperature range is between 85 and 104 degrees F. Don't put it on a tree, as it will be in too much shade and too close to perch sites used by hawks and owls. Keep the area around the entrance clear of obstructions for 20 feet (WDFW).

In conclusion, after review of the BBG Tree Management Plan (2007) and the Habitat Assessment, it appears that both documents are in relative agreement regarding management recommendations. The inclusion of the Tree Management Plan recommendations and management recommendations from the Habitat Assessment will improve habitat features in the BBG.

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