MITIGATION PLAN

1. Response to City Comment on sediment forebay maintenance:

"The proposed marsh area has been determined to accumulate sediment and the design team proposes vehicular access in perpetuity to facilitate removal of this sediment. Since all of the wetland mitigation and banked wetland creation area is downstream of the sedimentation basin, the long-term status as wetland, and therefore the perpetual success of the mitigation, would seem to be dependent on the continual removal of sediment. In general, mitigation that depends upon continued maintenance is discouraged. Ideally, mitigation should produce habitats that are self-maintaining in perpetuity or at least are compatible with natural ecosystem change."

Design Team Response:

- The design of the oxbow marsh has been revised to minimize sedimentation in the wetland creation area. From the TetraTech Memorandum dated March 4, 2009 (Attachment 3):

> *"Sands and heavier sediments will fall out in the upstream portion of the marsh. In order to help localize this deposition, we have proposed a "settling zone" immediately downstream of the diversion weir. While settling would be enhanced by a pond or pit, we proposed only a zero-slope reach to avoid stranding fish.*
> *Silts and clays, which are held in suspension longer than heavier material, will deposit further downstream in the marsh. Our calculations compared sediment deposition rate (average flow depth divided by particle fall velocity) to the average retention time through the marsh to estimate potential sediment capture rates in the marsh, which on the order of up to 30 percent. We expect this material to deposit primarily in the over-bank areas of the marsh; the low-flow channel will fill at a slower rate because of its higher gradient and better potential to experience flushing flows.*
>
> Maintenance Footprint and Frequency
> *We currently propose that the "settling zone" at the upstream end of the marsh should be maintained. This maintenance would involve vactoring sediment deposits in the settling zone, which is approximately 50 feet long by 20 feet wide. Using a conservative dry bulk density[1] and a safety factor of two, our estimate of average annual deposition is approximately 16 CY. The maintenance frequency would depend on the actual deposition rate during a particular time period and possibly the size of vactor truck used. A large vactor truck might have up to 9 CY of debris capacity, which suggests that maintenance would be required about once a year (with an average of about two trips to the decanting station). Because the marsh represents such large increase in wetland area, the settling zone area could be excluded from mitigation area calculations without going below mitigation requirement thresholds for the site.*
> *We do not propose maintenance in the remainder of the marsh. We expect fine sediment deposition primarily in the overbank areas of the marsh (those areas outside the low-flow channel), which would not inhibit flow through the marsh significantly. If the low-flow channel becomes plugged, water may seek an alternate path through the marsh. Given the small magnitude and velocity of flow through the marsh, this possible meandering would not present a significant risk to the marsh.*
> *We believe that the marsh's value as mitigation does NOT depend on future maintenance actions. Maintenance measures will primarily help maintain the marsh's effectiveness in addressing water quality. If the marsh was left unmaintained, the result would likely be a natural progression of the marsh from a flow-through oxbow configuration to a back-water channel configuration. Such a change in morphology would not be particularly beneficial for the marsh's water quality function, but water quality is only a secondary goal of the marsh. Lack of maintenance would not negate the overall value of the project as mitigation."*

overall Juanita Beach Park operation and maintenance plan. This O&M plan is implemented by City of Kirkland Parks and Recreation staff and/or contractors, who are on-site on a regular basis to operate and maintain the park.

- If the marsh was left un-maintained, the result would likely be a natural progression of the marsh from a flow-through oxbow configuration to a back-water channel configuration. Such a change in morphology would not be particularly beneficial for the marsh's water quality function, but does not necessarily negate the habitat value of the marsh.

4. Response to the City comment below

"Address the sewer line that runs east to west along the beach, and across the creek. It appears to be within the area to be disturbed by the proposed promenade, wetland plant installation, and other work. Please address how the project will protect the sewer line during construction, retain maintenance access, and comply with requirements in COK Pre-Approved Plan Policy S-1: Requirements for Construction near Lakefront Sewer Line."

Design Team Response:

- The wetland enhancement and promenade is within the easement or overtop of the line. Currently both manholes are buried 1-2 feet below the sand. The manhole is being raised for access. The JA Brennan design team has been discussing access issues to the sewer with King County (King County owns and maintain the line). Planting will require provisions, or a hold-harmless agreement with parks, see attached S-1. Paving is allowed over the easement, however no structures are permitted to be constructed within the easement.

BUFFERS

1. Respond to statement on marsh buffers (Proposed marsh would be a WDOE Cat. III with a 60 ft. buffer; CoK Type I with 100 ft. buffer + 10 ft. bldg. setback).

"The proposed marsh would, upon its completion, be defined as a Type 1 wetland under KZC 90.30. This is due to its ability to provide significant habitat to state or federally listed threatened or endangered fish species. As a Type 1 wetland, it would have a 100-foot standard buffer, plus a 10-foot building setback. The mitigation plan only shows a 25-foot buffer and no discussion of buffer reduction is presented. The larger buffer and setback would extend onto the neighboring property to the west, thereby potentially encumbering future development. Per KZC 90.55.4, the creation or expansion of a wetland buffer on any property other than the subject property would only be allowed if a statement signed by the owners of all affected properties affirms that the encumbrance is consented to. It appears that the proposed marsh comes within roughly 80 feet of the western neighboring property."

Design Team Response:

- The JA Brennan design team has reconfigured the outlet of the marsh approximately 4 feet to the east so that 100-foot buffer encumbrances do not extend onto the neighboring property. The western most edge of the oxbow marsh's buffer (Type 1, 100-foot buffer) extends over public right of way owned and maintained by the City of Kirkland. Please see attached revised graphics to view the location of the oxbow marsh's buffer.

2. Respond to comment on Juanita Creek buffer:

"Similarly, since the new channel is designed to be used by salmonid fish, it would satisfy the requirements of Type A streams, expanding the stream buffer (75-foot buffer plus 10-foot setback) and bringing to bear all of the stream requirements of such areas per Chapter 90."

Design Team Response:

- The JA Brennan design team revised the existing conditions plans to indicate a 75-foot buffer around Juanita Creek.

3. Respond to comment on performance standards:

"The performance standards section needs revision. First year survival for all planted species should be 100% acknowledging that the standard can be met either by survival or first-year warranty replacement. All references to survival of species should be for native plant species. Similarly, all references to percent cover should allow desirable native volunteer vegetation to count towards each percentage goal. Due to the complexity and size of the plan combined with replanting and/or substitution, tracking of percent survival beyond the second year is difficult and not very meaningful to the success of the site. Survival standards in year three and beyond are not needed."

"Birdsfoot trefoil should also be included in the list of invasive weeds to be managed at below 10% cover."

Design Team Response:

- The Mitigation Plan has been revised to indicate 100% survivability of *all* native plant species will be required at the end of Year 1. Noted that survival only includes native plant species. The revised performance standards for the wetland mitigation is provided below.
- Survival standards for Year 1 and beyond have been removed with an emphasis on monitoring for diversity and percent cover for all Years beyond Year 1.
- Birdsfoot trefoil has been added to the list of invasive weeds to be managed below 10% cover. A revised invasive weeds plant list is provided below.

Revised Performance Standards

Performance standards have been established that correspond to the stated mitigation goals. These standards are the primary factors that will be used to judge the success of the mitigation project. While specific performance criteria provide important benchmarks and will help to direct maintenance and contingency efforts, the mitigation goals must also be considered when evaluating mitigation success. The performance standards are as follows:

- YEAR 1: 100% of at least three species of planted native trees and 100% of at least four species of planted native shrubs will survive after the first year following planting and will cover at least 15% of the areas in the Lake Washington shoreline designated for planting native species. The 100% survival rate can be met by survival with one-year warranty plantings for any missing native trees and shrubs.
- YEAR 1: 100% of at least three species of planted native trees and 100% of at least four species of planted native shrubs will survive after the first year following planting and will cover at least 15% of the Oxbow Marsh, Wetlands B and C, (palustrine forested and scrub-shrub [PFO/PSSC]), and the Juanita Creek/wetland buffer areas. The 100% survival rate can be met by survival with one-year warranty plantings for any missing native trees and shrubs.
- YEAR 1: 100% of at least four species of native emergent and grass species will survive after the first year following planting and will cover at least 40% of the Oxbow Marsh, Wetlands B and C (PFO/PSSC), and the Juanita Creek/wetland buffer areas. The 100% survival rate can be met by survival with one-year warranty plantings for any missing emergent and grass species.
- YEAR 1: 100% of at least four species of native emergent and grass species will survive after the first year following planting and will cover at least 60% of the restoration palustrine emergent (PEM)

wetland meadow areas in Wetland E and the planted Wetland E buffers. The 100% survival rate can be met by survival with one-year warranty plantings for any missing emergent and grass species.

- YEAR 3: At least three species of planted native trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 30% of the areas in the Lake Washington shoreline designated for planting native species.
- YEAR 3: At least three species of planted native trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 30% of the Oxbow Marsh, Wetlands B and C, (palustrine forested and scrub-shrub [PFO/PSSC]), and the Juanita Creek/wetland buffer areas.
- YEAR 3: At least four species of native emergent and grass species will survive after five years after planting and will cover at least 50% of the Oxbow Marsh, Wetlands B and C (PFO/PSSC), and the Juanita Creek/wetland buffer areas.
- YEAR 3: At least four species of native emergent and grass species will survive after the first year following planting and will cover at least 70% of the palustrine emergent (PEM) wetland meadow areas in Wetland E and the planted Wetland E buffers.
- YEARS 5 and 7: At least three species of planted native trees and at least four species of planted native shrubs will survive after five and seven years after planting and will cover at least 35% of the areas in the Lake Washington shoreline designated for planting native species.
- YEARS 5 and 7: At least three species of planted native trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 35% of the Oxbow Marsh, Wetlands B and C, (palustrine forested and scrub-shrub [PFO/PSSC]), and the Juanita Creek/wetland buffer areas.
- YEAR 5: At least four species of native emergent and grass species will survive after five years after planting and will cover at least 60% of the Oxbow Marsh, Wetlands B and C (PFO/PSSC), and the Juanita Creek/wetland buffer areas.
- YEAR 5: At least four species of native emergent and grass species will survive after the first year following planting and will cover at least 80% of the palustrine emergent (PEM) wetland meadow areas in Wetland E and the planted Wetland E buffers.
- YEAR 10: At least three species of native planted trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 50% of the areas in the Lake Washington shoreline designated for planting native species.
- YEAR 10: At least three species of planted native trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 50% of the Oxbow Marsh, Wetlands B and C, (palustrine forested and scrub-shrub [PFO/PSSC]), and the Juanita Creek/wetland buffer areas.
- YEAR 10: At least four species of native emergent and grass species will survive after five years after planting and will cover at least 50% of the Oxbow Marsh, Wetlands B and C (PFO/PSSC), and the Juanita Creek/wetland buffer areas.
- YEAR 10: At least four species of native emergent and grass species will survive after the first year following planting and will cover at least 90% of the palustrine emergent (PEM) wetland meadow areas in Wetland E and the planted Wetland E buffers.
- ALL YEARS: Annually monitor the installation to ensure integrity of the weir structures and stream stabilization measures. Repair and/or replant marsh habitat and stream stabilization measures as

necessary. Remove or modify any debris that threatens the integrity of the weir structures or stream stabilization measures.

- ALL YEARS: Inspect annually and after significant storm events (greater than 0.5 inches precipitation over 24 hours) the settling zone upstream of the marsh. Remove sediment in the settling zone as necessary to provide no more than 9 inches of sedimentation above the as-built grade settling zone over a five-year period, measured approximately 25 feet downstream of the diversion weir. In the marsh, remove or modify any localized sedimentation that might disrupt fish passage or contribute to fish stranding.
- YEARS 1, 3, and 5: During the January through June period, conduct juvenile fish monitoring by installing a fyke net or other methods to assess the extent and pattern of fish use of the marsh. Fyke net will be installed near downstream end of marsh, and monitored during two discreet 24-hour periods each month.
- ALL YEARS: Annually during the January through June period, observe flow characteristics in marsh and creek when Juanita Creek is at or above the expected median flow rate for the month when the observation is made. Remove or modify debris or sediment that disrupts a continuous hydraulic connection between the marsh and Juanita Creek. The continuous hydraulic connection should include a stream path through the marsh from the diversion weir to mouth, with no pools disconnected from the marsh channel.ALL YEARS: Invasive weeds (identified below) will not comprise more than 10 percent of the vegetation cover during any monitoring year, with the exception of purple loosestrife (*Lythrum salicaria*) and Japanese knotweed (*Polygonum cuspidatum*), for which there is a zero tolerance standard (0% cover in any year). Other invasive weeds include:

  Poison Hemlock (*Conium maculatum*)
  Himalayan blackberry (*Rubus procerus*)
  Evergreen blackberry (R. *laciniatus*)
  Scot's broom (*Cytisus scoparius*)
  Reed canarygrass (*Phalarus arundinacea*)
  Climbing nightshade (*Solanum dulcamara*)
  Field morning-glory (*Convolulus arvensis*)
  Burdock (*Arctium minus*)
  Knapweed (*Centaurea* spp.)
  Canada thistle (*Cirsium arvense*)
  Bull thistle (*C. vulgare*)
  Teasel (*Dipsacus sylvestris*)
  St. John's wort (*Hypericum perforatum*)
  Russian thistle (*Salsola kali*)
  Tansy ragwort (*Senecio jacobaea*)
  Common tansy (*Tanacetum vulgare*)
  Birdsfoot trefoil (*Lotus corniculatis*)

4. Respond to comments on monitoring schedule:

"No schedule was shown for the monitoring plan. Note that KZC 90.554.c requires two site visits in each of the required five monitoring years. The first visit is typically a maintenance review in the spring; the summer or fall visit contains the bulk of the fieldwork."

Design Team Response:

- A schedule has been included in Section 8.10 Monitoring Plan. See revised text below.

2009 Addendum to 2008 Juanita Beach Park Wetland & Stream Mitigation Plan

Revised 8.10 Monitoring Plan

Mitigation monitoring shall be conducted by a qualified person for a ten-year period on Years 1, 3, 5, 7, and 10. Year 1 will begin one year from the date the USACE accepts the as-built drawings for the mitigation plan construction. Year 1 will also serve as the one-year warranty inspection. A qualified person could include the mitigation designer or a qualified wetland biologist. Each year monitoring will be conducted twice – once in the spring between April 1 and May 30th and in the fall between September 1 and October 31st. Monitoring will assess the following parameters:

1. Function of control structures, hydrology and flows at Oxbow Marsh;
2. Sedimentation at Oxbow Marsh;
3. Fish use, passage and stranding issues at Oxbow Marsh;
4. Native vegetation establishment (percent survival and cover, vigor, and diversity);
5. Control of invasive species;
6. Wildlife observations;
7. Photographic ground points;
8. Human encroachment, including trampling, vandalism, and trash dumping;
9. Success relative to Performance Standards; and
10. Contingency Plan.

The monitoring results will be related to the performance standards and, if warranted, recommendations shall be made based on these findings to assure mitigation success. Monitoring reports will be submitted to the Seattle District USACE Regulatory Branch, the Muckleshoot Tribe, WDOE, WDFW, and the City of Kirkland by December 31st of each monitoring year.

ATTACHMENT 1: THE WATERSHED COMPANY LETTER, DATED 1/16/09

THE WATERSHED COMPANY

SCIENCE & DESIGN

January 16, 2009

Janice Soloff
City of Kirkland
Planning and Community Development Department
123 – 5th Avenue
Kirkland, WA 98033

Re: Juanita Beach Park Phase 1 environmental review
The Watershed Company Reference Number: 080704.3

Dear Janice:

Thank you for the opportunity to review the above-referenced project for compliance with the standards and regulations found in Chapter 90 of the Kirkland Zoning Code (KZC). We are also reviewing how the project complies with the Shoreline Substantial Development process. However, this review will be provided under separate cover.

Project Summary
The applicant proposes several improvements to Juanita Beach Park to improve use of the site by the public. These improvements include a new boardwalk and "Promenade" path, public gathering areas, and improvements to existing lawn and beach areas. The application also incorporates several components to improve water quality and wildlife habitat. Some of these components are in the form of habitat enhancement and wetland creation to mitigate for impacts to wetlands, wetland buffers and stream buffers. Finally, a small portion of the enhancement is to be set aside as a mitigation bank for future permitting needs of the City. Habitat enhancement/mitigation will take the form of the addition of hydrogeomorphic complexity in Wetland E, the creation of a side channel on Juanita Creek, the creation of a wetland "marsh" adjacent to Juanita Creek, and wetland and stream buffer enhancement with native plants.

Findings
Wetland Determination
The characterizations of wetland hydrology, soils and vegetation that produced the final wetland boundaries are accurate. The Washington State Rating Forms were not reviewed for accuracy, as these forms are not used by the current City of Kirkland

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sensitive areas regulations in Chapter 90. The City uses a unique form to rate wetlands for regulation. City wetland rating forms were supplied for Wetlands E and F in the determination report; no such forms were supplied for Wetlands A, B, C or D. While we did not come to the same number of points on the forms, we found the classification of Wetlands E (Type 3 – ~~75~~-foot buffer plus 10-foot setback) and F (Type 1 – 100-foot buffer plus 10-foot setback) to be accurate. 50' buffer

We disagree with the classification of Wetlands A, B, C and D as Type 1. The code definition of Type 1 wetlands includes those contiguous to the lake and those that provide *significant* habitat to federally listed species. Since Wetlands A, B, C and D are outside the Lake Washington Ordinary High Water Mark and all water moves toward (not from) the lake from the wetlands, they are not contiguous. While the stream provides habitat for listed fish, the wetlands do not provide much, if any, habitat and certainly do not provide *significant* habitat. Rating forms for these wetlands should be completed to determine the wetland rating, appropriate buffers and other relevant regulations.

Stream Determination
The submittal accurately identifies Juanita Creek as a Type A stream in a primary basin, requiring a 75-foot buffer plus a 10-foot setback.

Impacts to Wetland E
KZC 90.55 1. j (which applies via KZC 90.55.3) requires the applicant to show that there is no practical or feasible alternative with less impact to the wetland. Modification to Wetland E is proposed for the community commons (fill), portions of the Promenade (fill) and a path and playchip area at the east end. Un-quantified impacts appear to be proposed by a series of step stones crossing the wetland south of the proposed picnic shelter. Portions of the lawn area within the existing buffers are proposed to be retained/improved. However, no mitigation is proposed for this continued non-conforming use. Furthermore, the buffer is proposed for a 50% reduction, which is more than the 30% reduction allowed in KZC 90.60.1. The mitigation notes this discrepancy and states that a variance is needed for approval.

A discussion of mitigation sequencing is provided on pages 31 and 32 and the need for providing logical pedestrian access is discussed. However, it appears that fill impacts of the Promenade south of the commons could be further minimized by lengthening the proposed boardwalk. Furthermore, is it absolutely critical that the commons be perfectly circular in plan-view? Aesthetic concerns aside, an oblong- or oval-shaped area would appear to present similar amphitheater functions and would avoid much of the impact. Similarly, it is unclear why the playchip area,

occupying the eastern end of Wetland E and its buffer, needs to be situated as shown. Note that KZC 90.70 allows "access through wetlands and buffers in conjunction with a public park."

Impacts to Wetlands B and C

Impacts to Wetlands B and C are described as temporary. The modifications to these wetlands are presented as enhancements necessary to allow creation of the wetland marsh and side channel features. Per Table 5, the impacts are being mitigated at a 1:1 ratio. Such modification appears to be addressed in two code sections: First, 90.55.2 and .3 state that no land surface modification shall occur in Type 2 or 3 wetlands except as provided in each subsection. Although, both subsections state that the applicant may request a modification of the section requirements. Second, KZC 90.65 allows for wetland restoration by removing "material detrimental to the area" or through the addition of "native plants and other habitat features." Creation of a new hydrogeomorphic regime in these wetlands, as proposed, could legitimately be viewed as a habitat enhancement. City officials such as the City Attorney and/or Planning Director should be consulted as to which section applies to this project and how similar questions have been interpreted in the past. Regulations aside, it is our opinion that these wetlands are of extremely low functional value and, provided other questions of the plan could be resolved, the improvement in habitat far outweighs the minor losses within Wetlands B and C.

Mitigation Plan

The proposed marsh area has been determined to accumulate sediment and the design team proposes vehicular access in perpetuity to facilitate removal of this sediment. Since all of the wetland mitigation and banked wetland creation area is downstream of the sedimentation basin, the long-term status as wetland, and therefore the perpetual success of the mitigation, would seem to be dependent on the continual removal of sediment. In general, mitigation that depends upon continued maintenance is discouraged. Ideally, mitigation should produce habitats that are self-maintaining in perpetuity or at least are compatible with natural ecosystem change. The word "restoration" is used throughout the mitigation plan. True restoration of form and function would imply the lack of a need for ongoing maintenance, i.e. sediment removal. Characterizing the proposed mitigation as *restoration* would imply that a course had been set for the "restored" habitat to continue to maintain its now-natural form *or* that it had been set up to evolve on its own through a progression of successive natural forms and, similarly, that it would continue to provide a succession of natural habitat functions. The need for maintenance prompts a series of questions: Who would be responsible for sediment

removal? Would it be on a regular basis or only as needed? Are regular inspections planned? If so, by whom and how often? Would Kirkland Parks be responsible for sediment removal or would Public Works take over? What is the contingency if sediment is not removed and the loss of mitigated wetland takes place? Given the uncertainty represented by these questions, we recommend that any proposed mitigation be independent of the need for maintenance beyond the five-year establishment period.

It appears that creation of the oxbow marsh as proposed would require a number of mature trees to be removed. How many and of what size and species? Could marsh configuration be altered such that more of these trees are retained, such as on hummocks?

The proposed marsh would, upon its completion, be defined as a Type 1 wetland under KZC 90.30. This is due to its ability to provide significant habitat to state or federally listed threatened or endangered fish species. As a Type 1 wetland, it would have a 100-foot standard buffer, plus a 10-foot building setback. The mitigation plan only shows a 25-foot buffer and no discussion of buffer reduction is presented. The larger buffer and setback would extend onto the neighboring property to the west, thereby potentially encumbering future development. Per KZC 90.55.4, the creation or expansion of a wetland buffer on any property other than the subject property would only be allowed if a statement signed by the owners of all affected properties affirms that the encumbrance is consented to. It appears that the proposed marsh comes within roughly 80 feet of the western neighboring property.

Similarly, since the new channel is designed to be used by salmonid fish, it would satisfy the requirements of Type A streams, expanding the stream buffer (75-foot buffer plus 10-foot setback) and binging to bear all of the stream requirements of such areas per Chapter 90.

Buffers
The plan incorrectly displays buffers. Buffers for the new wetland are too narrow and not shown for the new stream channel (see above). Also, the plan shows direct buffer offsets that produce sharp corners as opposed to radius curves. This results in buffers that are slightly larger at each corner. All of the standard/proposed modified City of Kirkland sensitive areas buffers for both wetlands and Juanita Creek should be shown on the plans, except where they overlap.

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There are several key details missing from the plan that should be incorporated into the final design. These include a grading plan for the low flow channel, streambed gravel specifications, gravel cross-sections, specifications for topsoil, especially in excavated areas, and details on soil amendment or de-compaction where re-vegetation is to take place without excavation.

The performance standards section needs revision. First year survival for all planted species should be 100% acknowledging that the standard can be met either by survival or first-year warranty replacement. All references to survival of species should be for *native* plant species. Similarly, all references to percent cover should allow desirable native volunteer vegetation to count towards each percentage goal. Due to the complexity and size of the plan combined with replanting and/or substitution, tracking of percent survival beyond the second year is difficult and not very meaningful to the success of the site. Survival standards in year three and beyond is not needed.

The proposed plant list contains several plant species that are hybrids, not native to lowland King County or are otherwise inappropriate for mitigation sites in this ecoregion. These include the following: red maple, katsura tree, quaking aspen, scarlet oak, western redbud, silk tassel tree, Bradford pear, grand fir, incense cedar, snow brush, yellow twig dogwood, Pacific wax myrtle, blue elderberry, highbush cranberry, none of the "grasses" except the scouring rush, none of the "wildflower meadow" mix, except the tufted hairgrass (*Iris tenax* is fine), none of the "upland seed mix", except for meadow foxtail (birdsfoot trefoil is an invasive weed), dwarf red twig dogwood (ornamental cultivar), dwarf blue arctic willow, evergreen huckleberry, Roemer's red fescue, spike bentgrass, and meadow barley.

Birdsfoot trefoil should also be included in the list of invasive weeds to be managed at below 10% cover.

No schedule was shown for the monitoring plan. Note that KZC 90.554.c requires two site visits in each of the required five monitoring years. The first visit is typically a maintenance review in the spring; the summer or fall visit contains the bulk of the fieldwork.

The 2,900 sq ft Juanita Creek bank "layback area" cross-section shows live stakes installed where the bank is excavated. No information on the species is provided. Since this is a portion of the channel subject to summer backwatering and has a southern exposure, this area would benefit from installation of large shading conifers as well. Stakes at the top and middle of the bank will likely not survive

here, as they will not have a reliable hydrology source. In contrast to the cross section drawing, Figure 9 shows this area only sparsely vegetated.

Sedimentation

The text basically admits to placing the oxbow marsh in a depositional area where it can not likely be sustained by ongoing natural processes, as alluded to above, and calls it "restoration." Again, restoration should, by definition, be self-sustaining *or* be the first step along a naturally-occurring succession of habitat changes leading to such restored habitat.

It is stated that sedimentation in the oxbow marsh "is amplified by the reversal of natural seasonal fluctuation of lake levels due to operation of the navigational locks controlling water levels in Lake Washington, which pairs low stream flows in Juanita Creek with high lake levels during the summer." We disagree, and contend that the opposite is true. Deposition in the oxbow marsh area would tend to be much *higher*, not lower, if the lake's hydroperiod were more natural, being in that case higher in the winter and lower in the summer. Sediment is carried primarily by winter high flows and if the lake were higher in the winter it would be deposited at a higher elevation where the stream flows would meet placid lake water farther shoreward, in the oxbow marsh, rather than being carried, as the situation is now, farther lakeward.

The text states that a flow-through system is one of the strategies employed to minimize sedimentation, as opposed to a backwater channel. Again, we disagree. A flow-through system does not necessarily reduce sedimentation because the source of most of the sediment would be the creek, not the lake. Flow-through means that higher volumes of sediment–laden water from the creek will pass through the marsh increasing both sediment loading and likely or potential deposition. The area is essentially a delta, and channel-splitting (in this case induced) and deposition are things that tend to occur in deltas. Trying to fight the trend of the inherent, ongoing natural processes (deposition) within the project area setting can be difficult and frustrating. We disagree that a flow-through design would inherently or necessarily result in less deposition than a backwater design. It is stated in the text that that flow-through maintains circulation, but it fails acknowledge that the flow carries the sediment and, with respect to the marsh, is its source. Deposition cannot occur in quiet water if there's no sediment supply and therefore no sediment present to deposit, descriptive of a backwater area. Deposition does tend to occur in areas where sediment–laden water experiences a combination of decreasing velocities and/or depths (shear stress is dependent on both), an apt description of the proposed oxbow marsh area.

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It is stated that an objective is to deliver 25% of the summer low flow to the marsh. The amount or proportion of winter high flow or high event flow would be more relevant to the sedimentation issue. Summer low flows will carry relatively little sediment.

A sediment density of 0.76 tons per cubic yard is given and used in calculations resulting in an estimate of cubic yardage of sediment deposition per year. We suggest that the given ratio, and hence the calculations based on it, are in error. Perhaps the ratio has been inverted, in which case the correct density would be more like 1.3 tons per cubic yard. Water has a density of 0.84 tons per cubic yard; the value given would indicate that the sediment is less dense than water, which is implausible.

Finally, given that the project area is more or less at (and portions at times below) the placid lake level, have the erosional and depositional effects of wave action due to storms been evaluated for the project/project area?

Fish passage
The sheet pile diversion weir is described as being 2 feet wide and 4.5 feet high. Why not make the opening more orifice-like to limit flows during the really high-flow events and thereby further reduce the amount of sediment loading to the marsh?

It is not clear how fish passage would be maintained through the marsh. The sheet pile diversion weir does not look particularly passable on Figure 11C, plunging onto rocks and logs with no pool, though the plunge is not particularly high.

Page 48, second bulleted performance standard from bottom. Flow depth over the weirs, apart from any debris accumulation, is influenced primarily by stream flow, which is not controlled by the project. Hence specifying 3 inches or 12 inches of flow depth at any particular time is not too meaningful. Is it the intent that the depth of flow should be the same over the log weir (at the notch?) as for the sheet pile weir leading to the oxbow marsh at all flow levels? If so, this should be so-stated and the overall performance standard clarified.

Page 49, top bulleted performance standard. If the intent is to check for pools which are disconnected from the channel, the observations should be made when the flows are *lower* than typical as opposed to higher. Any isolated pools would be more likely to still be connected at the higher flows specified.

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Figure 11a. Plunges of 0.8 foot rather than the 1 foot shown may be required by WDFW to allow for passage of adult trout and even lower plunges may be needed if juvenile fish passage is required. See WAC 220-110-070. Other appended materials (Appendix D, Tetra Tech memo dated10/17/08) indicate that this issue has already been brought up, but not addressed on the plans or in the main report text.

Appendix D, Tetra Tech memo dated 10/17/08, Figure 1. Why are plunges created below each of the installed weirs at all, complicating the design with fish passage issues? Couldn't each of the weirs be lowered by, nominally, a foot to serve simply as gradient controls without the plunges? Alternatively, couldn't the marsh channel profile just be set to match the sheet pile weir elevation at the upstream end, regardless of what that elevation is?

Please call if you have any questions or if we can provide you with any additional information.

Sincerely,

Hugh Mortensen

Hugh Mortensen, PWS
Senior Ecologist

Gregory P. Johnston

Gregory P. Johnston, EIT/CFP
Senior Fisheries Biologist

ATTACHMENT 2

CITY OF KIRKLAND

123 FIFTH AVENUE • KIRKLAND, WASHINGTON 98033-6189 • (425) 587-3800

DEPARTMENT OF PUBLIC WORKS
PRE-APPROVED PLANS POLICY

Policy S-1: REQUIREMENTS FOR CONSTRUCTION NEAR LAKEFRONT SEWER LINE

A public sewer main that is accessed by means of a public sewer easement traverses certain lakefront properties within the City of Kirkland. Since this line crosses private property, and needs to be maintained by the City, the following requirements must be met for new construction in these areas.

1. There must be no encroachment into the easement at the ground surface by a structure.

2. Under certain circumstances, a cantilevered building design may be allowed into the easement. Up to 4 feet may be allowed for the 2nd and 3rd floors of a structure, providing 10 feet of vertical clearance is maintained between the finished grade and the underside of the cantilevered portion of the building.

3. Re-routing of the sewer main will be considered on a case by case basis, at the discretion of the Public Works Department; minimum pipe slopes must be maintained.

4. The City may request addition easement width if the current easement is determined to be inadequate, or does not meet the requirements of Easement Width Requirements, Policy G-1.

5. Building or wall footings that abut the easement may be required to extend to a depth equal to, or greater than, the depth of the sewer main.

6. At the discretion of the City, shoring/piling construction may be necessary to protect the sewer main during construction of the residential foundation.

7. The owner must sign a Hold-Harmless Agreement when installing landscaping plants or appurtenances within the easement.

Policy S-1 | Req. for construction next to swr along lake.doc

ATTACHMENT 3: MEMORANDUMS FROM TETRA TECH

TO:	Jim Brennan
FROM:	Marc A. Schulte, P.E. Tetra Tech
SUBJECT:	
Cc:	
Tt PROJECT No:	
DATE:	March 4, 2009

- This memorandum is to summarize the teleconference we had with Greg Johnson of The Watershed Company (TWC) the morning of Wednesday 25 February 2009, and will also serve as a summary of our response to TWC comments regarding the proposed marsh construction at Juanita Beach Park in Kirkland, Washington.
- Our discussion with Greg was based on a mutual understanding that the marsh depositional environmental and presents a complex problem for mitigation design. When considering flow-through versus backwater channel options, we explained that design team chose a flow-through marsh design primarily because it provided better opportunity for water quality treatment during the summer, not that it is particularly advantageous from the standpoint of sediment deposition.
- We agreed with Greg and acknowledged that the marsh is located in a depositional environment. Our discussion centered around not whether sedimentation will occur, but rather where and what rate at which sedimentation will occur. We reviewed our approach and calculations for sedimentation delivery and deposition with Greg. We explained that many of the features of the marsh design are intended to help manage the magnitude and location of the deposition. For instance, the 6-inch difference in elevation between the main channel weir and the diversion weir is intended to help exclude heavier bed sediments (sands and gravels) from migrating into the marsh.
- Greg asked us to elaborate more on the expected marsh depositional patterns and the proposed maintenance footprint and frequency of the marsh. We also discussed the impact of sediment deposition and maintenance on the marsh's dual role as mitigation and water quality, and considered alternatives for enhancing the design. The following narrative follows up on these requests.

- Sands and heavier sediments will fall out in the upstream portion of the marsh. In order to help localize this deposition, we have proposed a "settling zone" immediately downstream of the diversion weir. While settling would be enhanced by a pond or pit, we proposed only a zero-slope reach to avoid stranding fish.
- Silts and clays, which are held in suspension longer than heavier material, will deposit further downstream in the marsh. Our calculations compared sediment deposition rate (average flow depth divided by particle fall velocity) to the average retention time through the marsh to estimate potential sediment capture rates in the marsh, which on the order of up to 30 percent. We expect this material to deposit primarily in the over-bank areas of the marsh; the low-flow channel will fill at a slower rate because of its higher gradient and better potential to experience flushing flows.

- We currently propose that the "settling zone" at the upstream end of the marsh should be maintained. This maintenance would involve vactoring sediment deposits in the settling zone, which is approximately 50 feet long by 20 feet wide. Using a conservative dry bulk density[i] and a safety factor of two, our estimate of average annual deposition is approximately 16 CY. The maintenance frequency would depend on the actual deposition rate during a particular

time period and possibly the size of vactor truck used. A large vactor truck might have up to 9 CY of debris capacity, which suggests that maintenance would be required about once a year (with an average of about two trips to the decanting station). Because the marsh represents such large increase in wetland area, the settling zone area could be excluded from mitigation area calculations without going below mitigation requirement thresholds for the site.

- We do not propose maintenance in the remainder of the marsh. We expect fine sediment deposition primarily in the overbank areas of the marsh (those areas outside the low-flow channel), which would not inhibit flow through the marsh significantly. If the low-flow channel becomes plugged, water may seek an alternate path through the marsh. Given the small magnitude and velocity of flow through the marsh, this possible meandering would not present a significant risk to the marsh.
- We believe that the marsh's value as mitigation does NOT depend on future maintenance actions. Maintenance measures will primarily help maintain the marsh's effectiveness in addressing water quality. If the marsh was left unmaintained, the result would likely be a natural progression of the marsh from a flow-through oxbow configuration to a back-water channel configuration. Such a change in morphology would not be particularly beneficial for the marsh's water quality function, but water quality is only a secondary goal of the marsh. Lack of maintenance would not negate the overall value of the project as mitigation.
- The project will also emphasize an adaptive management approach to help minimize sediment deposition in the oxbow marsh (see narrative on "Design Enhancements," below).

- During our discussion with Greg, we explained that the project team had considered wave action from Lake Washington and concluded that the proposed marsh would not be at significant risk from wave energy. We based this judgment upon the existing geometry at the mouth of Juanita Creek, which makes a sharp turn just before it enters Lake Washington. This mouth geometry will help defend the marsh from wave action from the lake. In addition, there is little evidence of erosive conditions on the existing shoreline to indicate that wave action will be a significant concern at the project site.

- We discussed the monitoring language and will modify it to clarify its intent and application.

- We discussed several of the design enhancements suggested in the review letter. We will explore lowering the elevations specified in the preliminary design of the main and diversion weirs (in tandem, to maintain elevation differential to help keep bed materials from migrating into the marsh.)
- We discussed converting the slot weir at the diversion structure to an orifice. An orifice configuration could potentially reduce sediment delivery to the during high-flow events.
- We also discussed elaborating on an adaptive management approach, using stop logs to block the weir or orifice at critical times of the year to help manage sediment input to the marsh.
- These alternatives will be addressed in our design analysis and a modified weir configuration will be included in our next design submittal.

2009 Addendum to 2008 Juanita Beach Park Wetland & Stream Mitigation Plan

TO:	Jim Brennan
FROM:	Marc A. Schulte, P.E., D.WRE Tetra Tech
SUBJECT:	Memorandum
Cc:	
Tt PROJECT No:	
DATE:	March 4, 2009

- This memorandum summarizes responses to comments from the City of Kirkland regarding our hydraulic analysis from last October. The hydraulic memorandum focused on results concerning mean daily flow events and fish passage (minimum flow depths, connectivity, etc.); the City of Kirkland requested additional information regarding larger design flow events (2-year, 10-year, 25-year, 50-year, and 100-year annual peak events). These events were part of our original analysis, but not summarized in our memorandum.
- We are currently refining the marsh design based on comments received during the permit review process, including adjusting the weir heights and possibly replacing the slot weir with an orifice configuration. In addition, we are evaluating the potential benefit of using an adaptive management strategy that would use stop logs to manage flow diversion into the marsh. We will be able to provide a full report on the hydraulic analysis of the revised design once it is complete. We are offering the results of the preliminary analysis in the interim in order to help address the concerns indicated in the review comments.
- The tables below summarize the results of our HEC-RAS hydraulic simulations of the preliminary design for the 2-year through 100-year design events assuming both a low (wintertime) and a high (summertime) downstream boundary condition. The simulation used design flow rates from the City of Kirkland Surface Water Master Plan.
- Using the diversion weir scenario presented in the design development documents, approximately 7-8 percent of the flow from Juanita Creek would be diverted through the oxbow marsh during major flow events.
- The average marsh flow velocity during major flow events is on the order of 0.5 ft/sec. Velocities in the low-flow channel will be higher relative to the overall marsh velocity due to its lower Manning roughness coefficient and greater flow depth. Based on these preliminary results, we have concluded that flow through the marsh during major events on Juanita Creek should not present a significant risk to the marsh.

Table 1. Flow rate and average marsh flow velocities, winter downstream boundary condition (16.75 ft NAVD88).

Return Frequency	2-year	10-year	25-year	50-year	100-year
Flow Rate (cfs)					
Juanita Creek, Q_{MAIN}	228.0	319.0	367.0	404.0	441.0
Marsh Diversion, Q_{DIVERT}	18.5	24.1	25.0	28.6	30.6
Percentage, $(Q_{DIVERT}/Q_{MAIN})x100$	8.1%	7.6%	6.8%	7.1%	6.9%
Marsh Flow Velocity (ft/sec)					
Maximum	0.72	0.81	0.82	0.86	0.89
Minimum	0.36	0.40	0.40	0.40	0.38
Average	0.46	0.47	0.46	0.47	0.47

Table 2. Flow rate and average marsh flow velocities, summer downstream boundary condition (18.75 ft NAVD88).

Event Return Frequency	2-year	10-year	25-year	50-year	100-year

Flow Rate (cfs)					
Juanita Creek, Q_{MAIN}	228.0	319.0	367.0	404.0	441.0
Marsh Diversion, Q_{DIVERT}	18.5	24.1	25.0	28.6	30.6
Percentage, $(Q_{DIVERT}/Q_{MAIN})x100$	8.1%	7.6%	6.8%	7.1%	6.9%
Marsh Flow Velocity (ft/sec)					
Maximum	1.19	0.81	0.82	0.86	0.89
Minimum	0.36	0.40	0.40	0.42	0.43
Average	0.50	0.49	0.48	0.49	0.49

CITY OF KIRKLAND
123 FIFTH AVENUE, KIRKLAND, WASHINGTON 98033-6189
(425) 587-3225

DETERMINATION OF NONSIGNIFICANCE (DNS) .

CASE #: SEP09-00007 DATE ISSUED: 8/10/2009

DESCRIPTION OF PROPOSAL

Juanita Beach Park Phase I redevelopment project includes grading for new shoreline promenade, parking lot reconfiguration, rehabilitation of Juanita Creek, create an oxbow marsh wetland and channel, impact and restore three wetlands, remove pier baffles, abandon or remove water line, add water quality improvements.

PROPONENT:

LOCATION OF PROPOSAL

SOUTH SIDE OF JUANITA DR AT 97TH AVE.

LEAD AGENCY IS THE CITY OF KIRKLAND

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21.030 (2) (c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public upon request.

This DNS is issued under 197-11-340 (2); the lead agency will not act on this proposal for 14 days from the date above. Comments must be submitted by 5:00 p.m. 8/24/2009

Responsible official: 8/10/09

Eric Shields, Director
Department of Planning and Community Development
425-587-3225

Date

Address: City of Kirkland
123 Fifth Avenue
Kirkland, WA 98033-6189

You may appeal this determination to the Planning Department at Kirkland City Hall, 123 Fifth Avenue, Kirkland, WA 98033 no later than 5:00 p.m., August 24, 2009 by WRITTEN NOTICE OF APPEAL.

You should be prepared to make specific factual objections. Contact the Planning Department at 425-587-3225 to read or ask about the procedures for SEPA appeals.

Please reference case # SEP09-00007.

Publish in the Seattle Times (date): 8/13/09

ATTACHMENT 5

Distribute this form with a copy of the checklist to the following:

X Environmental Review Section, Department of Ecology,
P.O. Box 47703, Olympia, WA 98504-7703

X Department of Fish and Wildlife (for streams and wetlands - with drawings)
North Lake Washington Tributaries Area Habitat Biologist
16018 Mill Creek Boulevard, Mill Creek, WA 98012

X Department of Fish and Wildlife (for shorelines and Lake Wa. - with drawings)
Lake Washington Tributaries Area Habitat Biologist
C/O DOE
3190 160th Avenue SE, Bellevue, WA 98008

X Seattle District, U.S. Army Corps of Engineers, ATTN: ERIN LEGGE
P.O. Box C-3755
Seattle, WA 98124

___ Attn: Lynn Best, Acting Director, Environmental Division, Seattle City Light
700 5th Avenue, Suite 3316
P.O. Box 34023
Seattle, WA 98125-4023

X Attn: Environmental Reviewer
Muckleshoot Indian Tribe Fisheries Division
39015 172nd Avenue SE
Auburn, WA 98092

X Northshore Utility District,
P.O. Box 82489
Kenmore, WA 98028-0489

___ Shirley Marroquin
Environmental Planning Supervisor
King County Wastewater Treatment Division
201 South Jackson Street, MS KSC-NR-0505
Seattle, WA 98104-3855 - and -

___ Gary Kriedt
King County Metro Transit Environmental Planning
201 South Jackson Street, MS KSC-TR-0431
Seattle, WA 98104-3856

___ Director of Support Services Center
Lake Washington School District No. 414
P.O. Box 97039
Redmond, WA 98073-9739

___ David B. Johnston and Lillian Cruz (for projects consisting of more than 9 residential units)
Livengood, Fitzgerald and Alskog, PLLC
P.O. Box 908
Kirkland, WA 98083-0908

___ John Sutherland, Developer Services
Washington State Department of Transportation
15700 Dayton Ave. N., MS 240
P.O. Box 330310
Seattle, WA 98133-9710

X Jan McGruder Executive Director
East Lake Washington Audubon Society
13450 NE 100th St
Kirkland WA 98033

~~Kirkland, WA 98083~~

- Vivian Hawkins, Dept of Natural Resources, Shoreline District
950 Farman N., Enumclaw WA 98022

Applicant / Agent Michael Cogle, City of Kirkland Parks Community Services
- Drew Coombs, J.A. Brennan Associates, 100 S. King St., Suite 200
Seattle WA 98104
- DeStree Douglass, Douglass Consulting, 3518 Fremont Ave N. #536
Seattle WA 98103

cc: Case # SHR09-00001

Distributed to agencies along with a copy of the checklist. (see attached).

Distributed By: 8/10/09
Date:

SEPA_C_A, rev: 8/3/2009

CITY OF KIRKLAND
Planning and Community Development Department
123 Fifth Avenue, Kirkland, WA 98033 425.587-3225
www.ci.kirkland.wa.us

CITY OF KIRKLAND
NOTICE OF SEPA DETERMINATION
NOTICE OF ROAD CONCURRENCY TEST NOTICE

The City of Kirkland has conducted an environmental review and road concurrency review of the following project:

Permit No.: SHR09-00001/SEP09-00007
Proponent: City of Kirkland Parks Department
Location of proposal: South Side of Juanita Drive at 97th Avenue
Description of project: Juanita Beach Park Phase 1 redevelopment project includes grading for new shoreline promenade, parking lot reconfiguration, rehabilitation of Juanita Creek to create an oxbow marsh, wetland and channel, impact and enhance three wetlands, remove pier baffles, abandon or remove waterline, add water quality improvements.

Notice is hereby given that on August 10, 2009 the City of Kirkland issued a Determination of Nonsignificance (DNS) in accordance with the State Environmental Policy Act (SEPA) and Chapter 197-11 of the Washington Administrative Code.

SEPA Comments: Comments must be submitted by **5 PM** on August 24, 2009 to the City of Kirkland, Department of Planning and Community Development, 123 Fifth Avenue, Kirkland, WA 98033. Contact Janice Soloff for further information at (425) 587-3257.

Procedures to Appeal SEPA: You may contact Janice Soloff at (425) 587-3257 to ask about the procedures for SEPA appeals):
1. A written appeal must be filed with the Environmental Coordinator by **5 PM** on August 24, 2009 at the above address.
2. The appeal must contain a brief and concise statement of the matter being appealed, the specific components or aspects that are being appealed, the appellant's basic rationale or contentions on appeal, and a statement demonstrating standing to appeal. The following have standing to appeal: a) the applicant; b) any agency with jurisdiction; c) any individual or other entity who is specifically and directly affected by the proposed action. The appeal may also contain whatever supplemental information the appellant wishes to include.
3. Pay the $207.00 fee to file an appeal.

Notice is hereby given that the proposed project passed the road concurrency review and the City of Kirkland issued a road concurrency test notice in accordance with the Kirkland Municipal Code (KMC) Title 25.

Procedures to Appeal Road Concurrency:
1. Refer to KMC Chapter 25.23 for what decisions may not be appealed.
2. A written appeal must be filed with the Public Works Official, Thang Nguyen, by 5pm on August 24, 2009 at the above address.
3. A concurrency appeal will follow the same process as a SEPA appeal. See No. 2 and 3 above under SEPA appeals for procedures. A separate appeal fee of $195.00 is required.

There is no other opportunity to appeal road concurrency issues. Call Thang Nguyen at (425) 587-3869 if you have questions about what is addressed in concurrency review.

More information is available at www.kirklandpermits.net.
Publishing Date: August 13, 2009

Content of legal notice approved by: Janice Soloff
Janice Soloff

Janice Soloff

From: Deborah Powers
Sent: Tuesday, July 28, 2009 5:00 PM
To: Janice Soloff
Subject: RE: Tree Permit Addendum - response
Attachments: EcologicalArboriculture.doc

Janice,

Below are my comments to the Juanita Beach Park Phase 1 JAB memos. I've also attached an additional resource for wildlife snagging for reference.

It states in the Summary of Tree Protection for Phase 1 of the Juanita Beach Park Memo: **The complete bid set will incorporate the Tree Protection recommendations, including root pruning procedures, watering, and habitat tree creation methods as outlined in the Arborists' report as appropriate to the implementation of the Phase 1 design.**

The Tree Plan II Addendum memo appears to address these issues adequately in Tree Protection Specification 3.07. These special instructions should be shown on the site plans in the bid set of Phase 2.

Response to JAB's comments by number:

1. OK for dead or dying Trees #352, 311, and 417 to remain during Phase I construction. Tree #449, 416 is approved for reduction or removal, as is retention of Tree #404 during the project.
2. Will the Construction Documents with special instructions for work within the Limits of Disturbance be subject to review?
3. OK to remove Tree #356 (in poor/fair condition unable to sustain root loss/other impacts from construction).
4. Recommend arborist monitor Tree #409 for impacts from construction; recommend same for Tree #414.
5. Will irrigation, appropriate understory plantings and other landscaping revisions be submitted for review?
6. What grade changes specifically will occur within the LOD of trees located in the Oxbow Marsh area?
7. Recommend placing fence at the *Limits of Disturbance*, rather than dripline. Fence is to remain in place at the Limits of Disturbance for the duration of project. Recommend arborist to be on site for any work done within the Limits of Disturbance as described in the Tree Plan II Addendum, and to supervise fence replacement. Depending on the impact from construction activities, the arborist should make further recommendations such as pruning of broken branches and other aftercare additional to TREE AND PLANT PROTECTION MEASURES such as mulching, root treatments, etc.

The Tree and Plant Protection Specification Memo is very thorough, with the following additional comments:

J – Wildlife snag heights should be determined for safety and the target species. Attached are specifications/resources for wildlife snagging.

K – Use American Nursery Standards and ISA standards for assessing size of replacement trees. Caliper at 6" above grade, diameter at 4.5' from grade.

Let me know if you have any questions.

Thank you,

ATTACHMENT 6

Ecological Arboriculture: Trees as Habitat

A presentation by Scott Altenhoff
Mt. Pisgah Arboretum
May 3, 2008

Goals of presentation:

1) Inspire those who care for and about trees to learn as much as possible about forest ecology and the arboreal "web of life", and to think holistically when making tree-care decisions in all settings (rural, suburban, and urban).

2) Give audience an appreciation for the immense biological (and aesthetic) value of "dead " and decaying wood, and the large number of organisms that depend upon it.

3) Present/discuss the four essential and equally important considerations for successful arboreal habitat projects (ecology/aesthetics/safety/economics).

4) Provide realistic ideas for, and examples of "successful habitat projects", i.e. projects that are attractive to both humans and wildlife, serve habitat needs, and are safe and cost-effective over time.

5) Inspire/challenge audience to be creative and have fun with the work of tree care, habitat enhancement, environmental education, and art.

Key Points to Remember:

1) Trees are just one part of a highly evolved and interdependent network of organisms. To really take care of trees and landscapes means caring for the full "web of life" and promoting biodiversity- this is the essence of ecological arboriculture. In many ways this is a "Copernican revolution" for arboriculture and often meets with a considerable amount of skepticism and resistance.

2) Ecological arboriculture should be viewed as a complement to conventional arboriculture (natural target pruning)- not a replacement for it. It should never be used simply as an excuse to make poor cuts or to just be lazy by leaving deadwood in the canopy or on the ground. In almost every case, this type of work will demand more training, skill, forethought, time, and labor than conventional arboriculture (but the payoff is worth it).

3) Wildlife habitat planning involves far more than just tending to cavity/nests/den sites. It also involves providing for feeding/hunting/foraging areas, and resting/perching/observation sites.

4) Bacteria, fungi, lichens, mosses, liverworts, epiphytic plants, mistletoes, birds, and animals are all major contributors to the arboreal/forest biosphere and nutrient cycling. As such, they all warrant consideration when performing tree work. We should always familiarize ourselves with the actual (and potential) inhabitants of a site before starting work, and ask the question "How are the individual components contributing to the whole ecologically?"

5) In living trees roughly 5% of all cells are alive. In a decaying tree that percentage can be up to 40%.

6) Our greatest contribution as land/ tree stewards is not always in the actual work we perform, but in serving as biological advocates and educators. It is not necessary to know every last scientific detail in order to emulate natural processes and to provide others with appreciation of the beauty and complexity of arboreal ecosystems.

7) There are definite differences in the nature and role of decaying wood found in the crown of the tree, standing up at ground level, and lying down on the ground. It is important to consider the vertical microclimatic gradients relating to light levels, relative humidity, temperature, etc.

Considerations for Arboreal Habitat Enhancement

Safety is always a top priority (think both short and long-term)!

Access methods

Climbing with or without spurs (only for solid and stable trees)
Lifts/aerial trucks
Lines between adjacent trees

Techniques/Treatments

Coronet (crown-like) cuts
Vertical scarring for sapwells
Drilling
Fire hardening/sterilization of lower bole, roots, and ground
Fungal inoculates and beetle pheromones
Securing valuable deadwood in live trees with webbing
Leaving downed-wood piles

Some Target Species for Arboreal Habitat

1) Birds
    A) Pileated Woodpecker (*Dryocopus pileatus)*
    B) Northern Flicker (*Colaptes auratus*)
    C) Downy Woodpecker (*Picoides pubescens*)
    D) Hairy Woodpecker (*Picoides villosus*)
    E) Acorn Woodpecker (*Melanerpes formicivorus*)
    F) Western Screech Owl (*Otus kennicottii*)
    G) Northern saw-whet Owl (*Aegolius acadicus*)
    H) Great Horned Owl (*Bubo virginianus*)
    I) Osprey (*Pandion haliaetus*)
    J) Nuthatches (*Sitta canadensis/ Sitta carolinensis*)
    K) Corvids (*Corvus caurinus/Corvus corax*)
    L) Barn Owl (*Tyto alba*)
    M) American Kestrel (*Falco sparverius*)
    N) Tree Swallow (*Tachycineta bicolor)*
    O) Purple Martins (*Progne subis*)

P) Chickadees (*Poecile rufescens/ Poecile atricapilla*)
Q) Red breasted Sapsucker (*Sphyrapicus rubber*)
R) Flamullated Owl (*Otus flammeolus*)
S) Brown Creeper (*Certhia americana*)
T) Western Bluebird (*Sialia mexicana*)
U) Violet-green Swallow (Tachycineta thallasina)
V) Mountain Chickadee (*Poecile gambeli*)
W) Common Merganser (*Mergus merganser*)
X) Hooded Merganser (*Lophodytes cucullatus*)
Y) House Wren (*Troglodytes aedon*)
Z) Bewick's Wren (*Thryomanes bewickii*)
AA) Undesirables/Avian Pests
1) European Starling (*Sturnus vulgarus*)
2) House Sparrow (*Passer domesticus*)

2) Amphibians/Reptiles
A) Pacific Tree Frog (*Hyla regilla*)

3) Mammals
A) Bats (several from the Genus *Myotis)*
B) Northern Flying Squirrel (*Glaucomyus sabrinus*)
C) Douglas Squirrel (*Tamiasciurus douglasii*)
D) Western Gray Squirrel (*Sciurus griseus*)
E) Eastern Gray Squirrel (*Sciurus carolinensis*)
F) Fox Squirrel (*Sciurus niger*)- widely considered an undesirable
G) Red Tree Vole (*Arborimus longicaudus*)
H) Raccoon (*Procyon lotor*)
I) Fishers (*Martes pennanti*)
J) Pine Marten (*Martes americana)*
K) Weasel (*Mustela vulgaris*)

4) Insects/ Invertebrates
A) Honey Bees (A*pis mellifera*)
B) Orchard Bees (*Osmia lignaria*)
C) Beetles
D) Borers
E) Mites
F) Ants
F) Countless Others (the importance of native pollinators cannot be overestimated!)

5) Epiphytes/Endophytes
   A) Mosses
   B) Lichens
   C) Liverworts
   D) Ericaciae (plants from the Heather family)
   E) Ferns
   F) Trees (especially Western Hemlock)
   G) Fungi/ Conks
   H) Club Mosses

Details/ Situational Factors

Aspect, size and form of entry holes for cavities (different requirements for each species)
Heights of snags (for safety, utility, and longevity)
Material composition
Native flora and fauna
Aesthetics (a la Andrew Goldsworthy and Tom Brown, Jr.)

In Sum:

Spend time in the forest and amongst the trees observing the amazing richness, efficiency, and interconnectedness of the natural systems. Pay special attention to the role that "tree defects" play in terms of wildlife habitat, and note the complete lack of straight lines anywhere. Ideally, we should be cultivating as many of the same conditions as possible in our urban forests. Enhancing arboreal habitat doesn't mean detracting from site aesthetics or safety.

Remember that ecological arboriculture is not an excuse for sloppy work, laziness, of inattention to details-on the contrary-it demands more of us!

A Few Highly Recommended Websites:

www.arborecology.co.uk – Andrew Cowan and Arbor Ecology Ltd.

www.treeworks.co.uk – Neville Fay and Treework Environmental Practice

www.xerces.org – Xerces Society of Invertebrate Conservation

www.batcon.org – Bat Conservation International

www.fungi.com – Fungi Perfecti, LLC

www.batsnorthwest.org – Bats Northwest

www.eraptors.org – Cascade Raptor Center

www.birds.cornell.edu/allaboutbirds/ - Cornell Lab of Ornithology

www.newtribe.com – New Tribe Tree Climbing Gear and Instruction

www.ecology.com - Online Ecology Forum

www.tolweb.org – Tree of Life Web Project

j.a. brennan
associates pllc

Landscape Architects & Planners
100 S. King Street, Suite 200, Seattle, WA 98104
t. 206.583.0620 f. 206.583.0623
www.jabrennan.com

memo

To: Janice Soloff, Planning and Community Development, City of Kirkland

Date: 7/3/09

From: Drew Coombs

Project: **Juanita Beach Park Phase 1**

Re: **Juanita Beach Park Phase 1 – Tree Plan Review**

Comments:

Thank you for the comments regarding the Tree Protection Plan for Juanita Beach Park Phase 1 Design.

Summarization of Phase 1 Tree Protection Plan

It is our intent to incorporate, to the extent feasible, the recommendations of the Arborists' report "Evaluation of Trees at Juanita Beach Park." into the Phase 1 Design

Phase 1 design was adjusted based on preliminary field visits and comments with the Parks Arborist, and the City Arborist Deb Powers back in August and September of 2008. Significant changes were made from the Master Plan to the Phase 1Parking lot design to better preserve existing trees.
The complete bid set will incorporate the Tree Protection recommendations, including root pruning procedures, watering, and habitat tree creation methods as outlined in the Arborists' report as appropriate to the implementation of the Phase 1 design.

We have reviewed the City comments and have provided the following responses:

1. **City Comment:** Many trees that are dead or dying are shown as retained. Some of these trees are planned for high-use areas that, due to their high risk for failure, will be a safety hazard. (Example: Trees #311, 352, 404, 417, 449, etc). **The applicant and Kirkland Parks should consider their removal with the proposed improvements.**

   JAB Response:
   Phase 1 design is minimizing the limits of construction to reduce ground disturbance. A number of trees lie north of the limits of construction and are identified outside of this zone and are protected by fencing. This area is noted as 'Tree and Vegetation Protection Area". (Tree 352, and 311 are located within this zone)

   The Arborist report does identify tree 449 as non viable and recommends cable or reduction. Phase 1 design has taken this under consideration; tree 449 as identified above will be changed to a habitat tree or identified for removal.

ATTACHMENT 7

Tree 417 (Mugo Pine) has little improvements occurring within the vicinity of the tree, any improvements are occurring outside the drip line, though Tree 416 (Sawara Cypress) adjacent to tree 417 may need to be removed based on the improvements.

Tree 404 is an existing weeping willow that sits south of the existing Playground. The arborist does identify this tree as non viable, though it does recommend potential to save with tree protection. Phase 1 design intends to retain this tree in the short term, as it provides needed shade to the playground. Currently the tree protection plan has fencing at the drip line of the tree.

2. **City Comment:** A large number of existing trees (including Type I, or those worthy of retention) are shown with proposed improvements within their Limits of Disturbance (LOD). Many of the proposed improvements will likely result in severe root loss, the single most impact that causes decline and death of post-construction trees. (Examples: Trees #301, 303, 305, 308, 321-325, 364, 435-436, 440-442, 452). **The applicant should consider -**
   - **relocating improvements outside the Limits of Disturbance, or**
   - **provide special instructions for work within the LOD, or**
   - **remove the trees as part of the project.**

   Note: Work within LOD includes any grade changes, path construction, demolition, removal of existing asphalt, construction of parking lots, raingarden construction, wetland recreation, etc. 'Special instructions' include specifying the *Tree Protection Measures* outlined in the arborist report, ie: root pruning by arborist on site, watering, etc. with the addition of mulching and root treatments where applicable.

   JAB Response:

   Where feasible, the plans will be adjusted to further incorporate the tree protection measures identified in the Arborist report. The construction documents will specify work within the LOD.

3. **City Comment:** Many trees are currently in poor/fair condition, and will be unlikely to sustain even minor to moderate root loss from the proposed improvements (Example: Tree #356-358). **The applicant should consider relocating improvements outside their LOD, or remove the trees as part of the project.**

   JAB Response:
   After reviewing the City's comments about trees #356-#358 Phase 1 will remove, at a minimum, tree 356, based on the disturbance created by the new parking lot.

   The design may be able to accommodate slight adjustments to improve tree protection. This will need to be assessed based on health and safety factors and construction budget.

4. **City Comment:** Some trees have declined since their initial assessment. Like the trees listed above, they are less capable of withstanding root loss and other impacts from construction. (Example: Tree #409-414). **The applicant should consider relocating improvements outside their LOD and specify *Tree Protection Measures* to rehabilitate these trees, or remove the trees as part of the project.**

   JAB Response:
   Tree 409 (White ash) has minimal disturbance to the north, a path will be constructed within the outer portion of the drip line, root pruning measures, and tree protection are intended for this location, with on site monitoring as needed by a certified arborist.

   Tree 414 has minimal disturbance due to improvements, the southern edge of the parking area in this location is retaining all existing trees in Phase 1.

5. **City Comment:** New landscaping conflicts with existing mature retained trees. (Example: Tree #320, 337). **Landscape plans should be revised to avoid planting new trees within the driplines of existing mature trees. In addition, irrigated groundcovers should not be specified within the driplines of established drought-tolerant trees such as oaks.**

   JAB Response:
   The design team will assess the planting design and adjust as needed to minimize disturbance within the drip line of the existing trees due to new plantings. Tree 320 is an existing Red Oak, we agree restoration should be limited to seed in this area. Tree 337 is a Northern White Oak, restoration will consider the extent of the planting and seeding zone.

   In general the design will assess this comment to ensure appropriate planting design and installation techniques are used to minimize disturbance to the root zone.

   The irrigation system will be comprised of pop up spray heads and rotors. Pipe installation will incorporate the arborist recommendations for work within the tree root zone. The Oxbow marsh area and the rain gardens will be on a temporary irrigation system to assist with plant establishment. Irrigation zones in these areas are intended to only operate 3-5 years.

6. **City Comment:** Many of Juanita Parks' cottonwoods appear to be located in a wetland or buffer (Example: Trees #435-439, 464-468, 470, 475, 483). Some of the best/largest on this site appear to have regrading, path construction etc. within their LOD. Cottonwoods are not tolerant of root loss/damage, so these impacts will likely lead to their decline and eventual demise. The proposed improvements within the wetlands create high-use targets for what will become hazardous trees. **The applicant should consider relocating improvements outside their LOD, or consider wetlands and their buffers as low-use area altogether.**

   JAB Response:
   The design may be able to accommodate slight adjustments to improve tree protection. This will need to be assessed based on safety factors and construction budget as well as habitat values that are trying to be achieved in the region of the Oxbow Marsh.

Where feasible, the design may be able to incorporate short naturalistic walls using logs and boulder s to ease grading for the marsh in the vicinity of existing trees that are intended to be saved, for example trees 440-442 (Black Cottonwoods and Pin Oak.)

The Oxbow Marsh area is envisioned to be a low use pedestrian zone, limiting pedestrians to the path and viewpoints, prioritizing habitat values. This area is intended to become a natural marsh environment for improving fish habitat, with some water quality benefits. The retention of existing trees is important as they provide an established tree canopy to the riparian and marsh zone. The design is also trying to achieve a successional upland riparian habitat by planting a variety of native deciduous and conifer species appropriate to this environment. Adaptive management and maintenance of this area is critical to the success of the plantings, and the trees that will remain. Ultimately this will require monitoring trees that remain to balance safety hazards with habitat values.

7. **City Comment:** Fence locations are not specified at the Limits of Disturbance for retained trees per the arborist report. **Limits of Disturbance shall be transferred from the arborist report to retained trees. Where this is not feasible, the applicant shall provide special instructions for work within the LOD.**

The Type I trees are: #301, 320, 336, 337, 359, 361, 362, 381, 382, 398, 399, 405, 418, 431, 432, 440-443, 459, 464-468, 470, 475, 483. These trees are particularly worthy of retention; however a Parks Master Plan Tree Plan II may not be subjected to the same tree retention requirements as other development reviews.

JAB Response:
The limits of disturbance have been taken under consideration for the Tree Protection Plan. The fencing location shown represents a balance of work limits within the tree root zone of the tree to remain and protecting those areas that are not impacted by improvements. The reality of the construction will require the fencing to be shifted to accommodate the improvements; the current tree plan locates the fencing in a manner that should require little adjustment as construction moves ahead. Work within the drip line/ root zone of the trees will be required to satisfy the specifications of the contract, which will be based on the arborist's recommendations to perform this work.

The Tree Plan could adjust the fencing to locate it at the drip line or Limits of Disturbance (LOD), as identified in the Arborist report. This would require the contractor to move the fence only at the time of working within this zone, while incorporating the specified approach for working within the LOD. The challenge with this approach is introducing potential for further impacts to the root zone as the fencing is moved and relocated time and again through the construction period.

When work is to occur in the drip zone the specifications will be clear on these procedures incorporating the recommendations identified in the arborist report. (See attached spec. memo.)

In addition the design team has developed specifications, to be included in the bid set document. These will be modified to include the Arborists recommendations, see attached specification memo._

Implementation of Phase 1 is an important project for the City of Kirkland and will provide significant improvements to Juanita Beach Park. Tree protection measures and the retention of existing trees are critical to the success of the project; the challenge is in balancing these values with Phase 1 design, the health, safety and welfare of the public, and managing the construction budget. The design team has worked closely with City departments since the preliminary design of Phase 1, through the permit phase to make every effort to retain trees as much as possible. The recommendations from the Tree Plan review assist with improving the tree protection measures.

The critical component to the overall success of the project, including tree protection, will be close monitoring of construction to ensure compliance with the plans and specifications.

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memo

To: **Janice Soloff**
Planning and Community
Development, City of Kirkland

Date: 7/3/09

From: Drew Coombs

Project: **Juanita Beach Park Phase 1**

Re: **Tree Plan II Permit - Addendum - Tree Protection Specification**

Comments:

3.07 TREE AND PLANT PROTECTION MEASURES

A. The Contractor shall protect all trees as identified on the plans and other plant types on site from damage until project completion. If any tree or other types of plants are destroyed, disfigured or damaged so that in the Engineer's opinion removal is required, the Contractor will be assessed damages in accordance with the Penalties for Unauthorized Tree/ Vegetation removal listed below.

B. If at any time, the Contactor judges that the protection of a tree designated to be saved is incompatible with work required, or if operations necessarily threaten the health of the tree, notify immediately the Engineer and do no further work affecting the tree until a written agreement is reached concerning acceptable procedures.

C. Erect and maintain a readily visible temporary protective tree fencing as shown on the plans around trees to remain. Fencing shall be a barrier chain link fence as shown on the plans. For non-columnar trees, the fence shall be established at the drip line of the individual tree or group of trees, or as shown on the plans. For trees that are columnar, the fence shall be located beyond the drip line as determined by the Engineer.

D. Tree Protection fences shall be placed around each tree or group of trees to be retained.
   a. Tree Protection Fences are to be placed according to the plans.
   b. Tree Protection Fences must be inspected prior to the beginning of any construction of demolition work/activities.
   c. To avoid soil compaction over the tree root system, no materials shall be stored within protected zones. Nothing must be parked or stored within the Tree Protection Fences—no equipment, vehicles, soil, debris, or construction supplies of any sort.
   d. Vehicular equipment will not be permitted to deposit waste or wash out materials from their trucks within the Tree Protection Fences.

e. The Tree Protection Fences shall be clearly marked with the following or similar approved text in four inch or larger letters:

TREE PROTECTION AREA, ENTRANCE PROHIBITED
To report violations contact
City Code Enforcement
At 425-587-3225

E. In certain situations the tree protection fencing is located within the drip line of trees to protect. Procedures outlined below shall be followed for work within the drip line of trees to be retained to protect the long term survivability of the tree.

1) Ensure that any approved work done in the drip line subsequent to the removal of the protective fencing shall be accomplished with light machinery or hand labor.

2) When operating authorized equipment within the critical root zone, cover the areas adjoining the critical root zone of a tree with mulch to a depth of at least six inches or with plywood or similar material in order to protect roots from damage caused by heavy equipment.

3) When excavation occurs near trees that are scheduled for retention, the following procedures must be followed:

a) An International Society of Arboriculture, (ISA) Certified Arborist must be working with all equipment operators. (Owner will Provide Arborist)
b) The Certified Arborist should be outfitted with a shovel, hand pruners, a pair of loppers, a handsaw, and a power saw (a "sawsall" is recommended).
c) The excavation equipment must be placed to "comb" the material directly away from the trunk as opposed to cutting across the roots.
d) Combing is the gradual excavation of the ground cover plants and soil in depths that only extend as deep as the tines of the hoe.
e) When any roots of one inch diameter or greater, of the tree to be retained, is struck by the equipment, the Certified Arborist should stop the equipment operator.
f) The Certified Arborist should then excavate around the tree root by hand/shovel and cleanly cut the tree root.
g) The certified Arborist should then instruct the equipment operator to continue.

4) Installation of Utilities Under the Root Zone:

a. Boring under the root systems of trees (and other vegetation) shall be done under the supervision of and ISA Certified Arborist. This is to be accomplished by excavating a limited trench or pit on each side of the critical foot zone of the tree and then hand digging or pushing the pipe through the soil under the tree. The closest pit walls shall be a minimum of 7 feet from the center of the tree and shall be sufficient depth to lay the pipe at the grade as shown on the plan and profile.

b. Tunneling under the roots of trees shall be done under the supervision of an ISA Certified Arborist in an open trench by carefully excavating and hand digging around areas where large roots are exposed. No roots 1 inch in diameter or larger shall be cut.

c. The Contractor shall verify the vertical and horizontal location of existing utilities to avoid conflicts and maintain minimum clearances; adjustment shall be made to the grade of the now utility as required.

5) Watering:
   a) The trees will require significant watering throughout the summer and early fall in order to survive long-term. An effective watering system will need to be discussed with the park maintenance staff and the contractor to get adequate water to the trees.
      i. This may include temporary irrigation during the construction
   b) Adequate water in this case means applying enough water at a proper rate to allow the water to penetrate the soil to a depth of 18 to 20 inches. This should be done once every six weeks from mid-March through the end of October.
   c) Water more often when temperatures increase—every four weeks when temperatures exceed 80 degrees and every three weeks when the temperatures exceed 90 degrees. This drying out of the soil in between watering is important to prevent soil pathogens from attacking the trees.

F. Trunks of trees shall be protected when protective fences and platforms are being erected or taken down to avoid damage to the bark of the tree.

G. Neither excavation nor filling shall occur within the drip line of trees, which are preserved, except as shown on the plans and as noted above. Root pruning, hand digging and tunneling under the roots shall be used if site conditions dictate that excavation must pass through the root zone of a tree. This work shall be performed as noted above.

H. Trees shall be adequately watered during construction as noted above and shall receive nitrogen fertilizer to speed recovery where foliage damage has occurred. Trees shall receive a phosphate fertilizer where root damage has occurred. The crown of deciduous trees shall be pruned upon direction by the Engineer if the removal of roots is necessary.

I. The Engineer shall schedule periodic tree inspection within the construction site with the Owner. Maintenance and protection of trees and plants which are transplanted by a construction Contractor within or to locations off the construction site shall be the responsibility of the Contractor.

J. Habitat trees: Several trees are anticipated to be preserved and modified to leave a habitat snag. Trees shall be shortened and pruned as appropriate to remove hazardous portions of the existing tree. This work shall be done under the supervision of a landscape architectand a certified arborist. Large trunk sections shall be saved and placed as nurse logs in the vicinity of the Oxbow Marsh and the Enhanced portion of Wetland E as directed by the Engineer.

K. Penalty for Unauthorized Tree Removal:
Use "tree caliper" or greatest tree trunk diameter measured 30 inches above ground from lowest elevation or lowest point at the base of the tree.
(KZC - 95.55 Enforcement and Penalties – Also has associated fines for illegal tree removal)

SIZE (In Inches)	**COST**
¾	$ 60
1	$100
2	$200

3	$310
4	$450
5	$600
6	$880
7	$1,200
8	$1,530
9	$1,950
10	$2,430
11	$2,950
12	$3,480
13	$4,070
14	$4,730
15	$5,480
16	$6,330
17	$7,250
18	$8,300
19 and over	Use $500 per caliper inch

*Note: Go to next higher classification if a fraction above an indicated caliper. Remove interfering branches and roots without damage to trunks as directed upon approval of Engineer.

Gilles Consulting
Brian K. Gilles
425-822-4994

JAB Rec'd 4/13/09

EVALUATION OF TREES AT

JUANITA BEACH PARK
9703 NE Juanita Drive
Kirkland, WA 98034

December 19, 2008

PREPARED FOR:

Teresa Solitto, Park Project Coordinator
Kirkland Parks and Community Services
505 Market Street
Suite A
Kirkland, WA 98033-6189

PREPARED BY:

GILLES CONSULTING
Brian K. Gilles, Consulting Arborist
ISA Certified Arborist # PN-0260A
ASCA Registered Consulting Arborist # RCA-418
PNW-ISA Certified Tree Risk Assessor #148

RECEIVED
APR 2 2009
PLANNING DEPARTMENT

ATTACHMENT 8

Fax: 425-822-
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P.O. Box 2366 Kirkland, WA 98083

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EXECUTIVE SUMMARY

There is a combination of trees on the site plan and trees on the property:

185 = the number of trees on the site plan or numbered with tags.
12 = the number of trees that are no longer in the park or tag numbers not utilized.
173 = The number of trees evaluated on site.

- Off Property Trees:

- 2 trees are presumed to be off the property:
  - They are #'s 482 and 482 located west of the stream and west of the west property line.
  - # 482 is a *Non-Significant* Red Alder that is 5.8 inches in diameter that is in poor condition.
  - # 483 is a 20-inch diameter Cottonwood in Very Good condition.
    - Both trees can be protected from any construction and will not be negatively impacted.

- Right-of-Way Trees:

- There are 23 young street trees planted along Juanita Drive.
  - They are all *Non-Significant* due to their size. They are all in Very Good condition and are all Viable.
  - They should not be impacted by the construction and can all be retained.

- Subject Property Tree Status:

- 171 trees were evaluated on the subject property:

-Significance:

- 170 trees are greater than 6 inches in diameter and are, therefore, Significant.

- Viability

- 36 trees were rated as *Dead, Dying,* or *Poor*. These 34 trees are *Non-Viable.*
- The remaining 137 trees were rated as Fair, Good, Very Good or Excellent. They are *Viable.*

- Recommendations:

- *Potential to retain with tree protection measures*: trees with good health and structure that can survive.
- *Aerial inspection, consider cable or reduction*: trees previously topped that require more inspection to prevent injury or damage
- *Closely monitor*: these are trees in rapid decline that could become hazardous in less than one year.

Missing Trees

There were a few trees that were not included on the survey. They were labeled with the next number in the sequence, #'s 463 to 483, and then their approximate location was indicated on the included site plan. These trees may need to be surveyed to determine their exact location in relation to the proposed site improvements and their retain-ability. They are all west of the chain link fence along the western property line.

OBSERVATIONS

The park is located between Juanita Drive and the shore of Lake Washington. The park is nearly flat with a slight rise from the water to Juanita Drive. The park currently is comprised by a parking lot complex, a restroom facility, and lawns with trees scattered about, planter beds, a sand volleyball court, picnic facilities, and a natural stream.

In an effort to present the information and conclusions for each tree in a manner that is clear and easy to understand, I have included a detailed spreadsheet, *Attachment 2, Tree Inventory/Condition Spreadsheet*. The descriptions on the spreadsheet were left brief in order to include as much pertinent information as possible and to make the report manageable. A detailed description of the terms used in the spreadsheet and in this report can be found in *Attachment 3, Glossary*. A brief review of these terms and descriptions will enable the reader to rapidly move through the spreadsheet and better understand the information.

Additional Testing

No additional tests were performed during this site evaluation.

DISCUSSION

Trees on Adjacent Properties

There are only two trees on adjacent properties with canopies that overhang the park property. They are both west of the west property line, west of the north/south chain-link fence that extends from the western parking lot, now being used as a construction staging area, to the creek. Tree 482 is a 5.8-inch diameter Red Alder in poor condition. Tree 483 is a 20-inch Black Cottonwood in very good condition. Both can be adequately protected with tree protection fencing at or near the property line.

Right-of-Way Trees

There are 23 young trees planted in the planter strip along Juanita Drive. They are all recently planted and are all less than six inches in diameter. Therefore, they are all *Non-Significant*. However, they are all in fair and good condition and are *Viable*. They can all be protected during construction.

b. **Therefore**, I strongly recommend that all the previously topped Cottonwoods receive an aerial inspection. The inspection should include some form of more sophisticated test to determine the amount of rot present and the amount of solid wood that is supporting the large trunks above the forks that have developed at the topping wounds. The test could be as simple as a 1/8th inch drill used to determine the thickness of the solid wood and the extent of the decay; or they could be as extensive as the use of a Resistograph. (See the Resistograph description below for more detail.) The work can be done by an International Society of Arboriculture (ISA) Certified Arborist or Certified Tree worker using clean climbing techniques or by the use of a lift device. I strongly recommend the lift device in that it is safer for the person doing the test and the results will likely be of much higher quality.

c. There are three likely scenarios that will result: 1. trees will have advanced rot and the large trunks are potentially hazardous; 2. trees will have minor decay but still have the potential to live for decades; and 3. trees with no decay:
    i. Trees with advanced decay should be considered for shortening or removal for safety—they have the potential cause damage to life and property.
    ii. Trees with minor decay should be considered for cabling.
        1. Cabling is a technical arboricultural practice that helps to reduce the failure potential of weakly attached trunks such as these.
    iii. Trees with solid wood are still at risk of breakage due to their inherent weak attachments and included bark between the trunks. Included bark is inherently weak and can lead to trunk failure due to the lack of solid wood connection between the trunks.
        1. These trees should be cabled to reduce the risk of trunk failure and possible injury or property damage.

3. *Closely Monitor:*
    a. These are trees in rapid decline that could become hazardous in the future. The decline could turn around and the tree could improve in health or the decline could continue and the tree could become a potential hazard in the future.
    b. The trees should have an annual re-inspection to determine their condition and what should be done if anything.
4. *Habitat or Remove:*
    a. These are trees that are dead, dying, are in door health and/or poor structure. These are trees that there is no way to bring them back to health and they pose a potential hazard to life and property.
    b. They still have the potential to provide ecological/environmental benefits if they are shortened to a safe height and left on site. Some logs created

intended to be generic in nature. They will need to be adjusted to the specific circumstances of your site that takes into account the location of improvements and the locations of the trees.

WAIVER OF LIABILITY

There are many conditions affecting a tree's health and stability, which may be present and cannot be ascertained, such as, root rot, previous or unexposed construction damage, internal cracks, stem rot and more which may be hidden. Changes in circumstances and conditions can also cause a rapid deterioration of a tree's health and stability. Adverse weather conditions can dramatically affect the health and safety of a tree in a very short amount of time. While I have used every reasonable means to examine these trees, this evaluation represents my opinion of the tree health at this point in time. These findings do not guarantee future safety nor are they predictions of future events.

The tree evaluation consists of an external visual inspection of an individual tree's root flare, trunk, and canopy from the ground only unless otherwise specified. The inspection may also consist of taking trunk or root soundings for sound comparisons to aid the evaluator in determining the possible extent of decay within a tree. Soundings are only an aid to the evaluation process and do not replace the use of other more sophisticated diagnostic tools for determining the extent of decay within a tree.

As conditions change, it is the responsibility of the property owners to schedule additional site visits by the necessary professionals to ensure that the long-term success of the project is ensured. It is the responsibility of the property owner to obtain all required permits from city, county, state, or federal agencies. It is the responsibility of the property owner to comply with all applicable laws, regulations, and permit conditions. If there is a homeowners association, it is the responsibility of the property owner to comply with all Codes, Covenants, and Restrictions (CC&R's) that apply to tree pruning and tree removal.

This tree evaluation is to be used to inform and guide the client in the management of their trees. This in no way implies that the evaluator is responsible for performing recommended actions or using other methods or tools to further determine the extent of internal tree problems without written authorization from the client. Furthermore, the evaluator in no way holds that the opinions and recommendations are the only actions required to insure that the tree will not fail. A second opinion is recommended. The client shall hold the evaluator harmless for any and all injuries or damages incurred if the evaluator's recommendations are not followed or for acts of nature beyond the evaluator's reasonable expectations, such as severe winds, excessive rains, heavy snow loads, etc.

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#1 Location: The approximate location of the tree on the property.
#2 Tree #: Individual tree number.
#3 Species:

ABP/Pn	Austrian Black Pine, *Pinus nigra*
BCh/Pe	**Bitter Cherry, *Prunus emarginata***
BCw/Pt	Black Cottonwood, *Populus trichocarpa*
CApMsp	Crab Apple, *Malus sp.*
CBS/Pp	Colorado Blue Spruce, *Picea pungens*
CSW/SmT	Curl Screw Willow, *Salix matsudana 'Tortuosa'*
DC/Cd	Deodar Cedar, *Cedrus deodara*
DF/Pm	**Douglas Fir, *Pseudotsuga menziesii***
FlCh/Psp	Flowering Cherry, *Prunus sp.*
FlP/Psp	Flowering Plum, *Prunus sp.*
GAsh/Fp	Green Ash, *Fraxinus pennsylvanica*
GGC/Cl 'GG'	Green Globe Cypress, *Chamaecyparis lawsoniana 'Green Globe'*
IC/Cd	Incense Cedar, *Calocedrus decurrens*
M/Asp	Maple species, *Acer sp.*
MMsp	Magnolia, *Magnolia sp.*
MP/Pm	Mugo Pine, *Pinus mugo*
MtnA/Sa	Mountain Ash, *Sorbus aucuparia*
NM/Ap	Norway Maple, *Acer platanoides*
NS/Pa	Norway Spruce, *Picea abies*
NWO/Qa	Northern White Oak, *Quercus alba*
PL/Pl	Portugal Laurel, *Prunus lusitanica*
PO/Qp	Pin Oak, *Quercus palustris*
POC/Cl	Pixie Orford Cedar, *Chamaecyparis lawsoniana*
PP/Pp	Ponderosa Pine, *Pinus ponderosa*
Psp/Psp	Unknown Pine species, *Pinus species*
PW/Sl	Pussy Willow, *Salix lasiandra*
RA/Ar	**Red Alder, *Alnus rubra***
RM/Ar	Red Maple, *Acer rubrum*
RO/Qr	Red Oak, *Quercus rubra*
SC/Cp	Sawara Cypress, *Chamaecyparis pisifera*
SG/Ls	Sweetgum, *Liquidambar styraciflua*
SM/As	Silver Maple, *Acer saccharinum*
SP/Pc	Shore Pine, *Pinus contorta*
SP/Ps	Scots Pine, *Pinus sylvestris*
THL/Gt T	Thornless Honey Locust, *Gleditsia triacanthos v inermis*
TT/Li	Tulip Tree, *Liriodendron tulipifera*
unk dec	Unknown Deciduous Tree
Wa/Fe	White Ash, *Fraxinus americana*
WcFc/Ct	Western Cedar, *Thuja plicata* or Alaska Yellow Cedar, *Chamaecyparis nootkatensis*
WW/Sb	Weeping Willow, *Salix babylonica*

#4 DBH: Trunk diameter @ 4.5' above average ground level.
#5 Drip Line: The radius, the distance from the trunk to the furthest branch tips.
Limits of Disturbance: The boundary between the area of minimum protection
#6 around a tree and the allowable site disturbance as determined by a qualified professional.
#7 LCR: *Live Crown Ratio* - the amount of live canopy expressed as a % of the entire tree height.
#8 Symmetry: General shape of canopy and weight distribution of the tree around the trunk.
#9 Foliage: General description of foliage density that indicates tree health and vigor.
#10 Crown Condition: The most important external indication of tree health and vigor.
#11 Trunk: Description of trunk condition or abnormalities if any.
#12 Root Collar: The base of the tree where the trunk flares into the roots--deformities or problems are noted here.
#13 Roots: Root problems are noted here.
#14 Comments: Additional observations about the tree's condition.
#15 Significance: A "significant" tree is at least 6" in diameter measured at 4.5' above the average ground level.
#16 Current Health Rating: A description of general health ranging from dead, dying, hazard, poor, suppressed, fair, good, very good, to excellent.
Viability: A significant tree that is in good health with a low risk of failure due to structural defects, is relatively wind firm if isolated or
#17 remains as part of a grove, and is a species that is suitable for its location.
 # 18 Recommendation: Based upon the condition, this is an estimate of whether or not the tree is of sufficient health, vigor, and structure to consider retaining.
Development requirements may require the removal of the tree.
Trees recommended for removal for safety are noted in Red ink Columns 2, 3, 16--18.

1	2	3	4	5	6 – LIMITS OF DISTURBANCE				7	8	9	10	11	12	13	14	15	16	17	18
TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	SIGNIFICANCE	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
Between parking lot and road	301	DC/Cd	25.4"	22'	22'	22'	to SW	22'	90%	Gen. sym.	Dense	Healthy	Straight	NAD	-	West of driveway	Significant	Excellent	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	302	BCw/Pt	32.3"	24'	24'	24'	24'	24'	90%	Gen. sym.	ABS/ASE	Average	Forked @ 18'; typical	NAD	-		Significant	Good	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	303	DF/Pm	21.3"	16'	16'	to SW	16'	16'	65%	Min. asym.	Average	Average	Bowed	NAD	-	Sap flow on north side from 5 feet down to base. Possible banana crack. Loss of limbs in prior storms.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	304	BCw/Pt	32.9"	22'	22'	to parking lot	22'	22'	60%	Min. asym.	ABS/ASE	Regeneration average	Previously topped @ 35'; typical	NAD	-	Base is north of property line.	Significant	Fair	Viable	Aerial Inspection, consider cable or reduction
Between parking lot and road	305	GAsh/Fp	16.1" & 14.0"	24'	24'	24'	24'	24'	65%	Min. asym.	ABS/ASE	Regeneration healthy	Forked @ 3.5'	NAD	-	Previously topped at 24'	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	306	SP/Ps	12.5" & 6.6"	14'	14'	to parking lot	14'	14'	40%	Maj. asym.	Average	Weeping	Forked @ 4' with included bark down 8"	NAD	-	North of property line	Significant	Good	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	307	BCw/Pt	26.5"	24'	24'	to parking lot	24'	24'	75%	Gen. sym.	GBS/GSE	Healthy	Typical	NAD	-	North of property line	Significant	Good	Viable	Potential to retain with Tree Protection Measures

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1	2	3	4	5	6 – LIMITS OF DISTURBANCE				7	8	9	10	11	12	13	14	15	16	17	18
TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	SIGNIFICANCE	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
Between parking lot and road	325	SP/Ps	14.0"	17'	17'	to parking lot	17'	17'	80%	Maj. asym.	Average	Average	Leans NW; kinked @ 24'	NAD	Restricted	Just north of parking lot.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	326	SC/Cp	8.5"	13'	13'	to parking lot	13'	13'	70%	Maj. asym.	Average	Regeneration healthy	Straight	NAD	Restricted	Just north of parking lot.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	327	PL/Pl	7.2", 6.5", & 3.1"	12'	12'	to parking lot	12'	12'	60%	Gen. sym.	Dense	Healthy	Forked @ 12" & 3.5'	NAD	Restricted	Just north of parking lot.	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	328	PL/Pl	6.6", 5.6", & 7.3"	14'	14'	to parking lot	14'	14'	60%	Gen. sym.	Dense	Healthy	Forked @ base	NAD	Restricted		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	329	PL/Pl	clump of 6	14'	14'	to parking lot	14'	14'	60%	Gen. sym.	Dense	Healthy	Forked @ base	NAD	Restricted	Diameters: 7.2", 4.1", 2.1", 5.7", 7.1", & 5.6"	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	330	SP/Pc	14.1"	n/a	n/a	n/a	n/a	n/a	25%	Maj. asym.	Thin	Broken Out	Contorted	NAD	-		Significant	Poor	Non-viable	Habitat or Remove
Between parking lot and road	331	PP/Pp	23.4"	18'	18'	18'	18'	18'	80%	Maj. asym.	Average	Regeneration average	Forked @ 13'	NAD	-	North fork broken out at 28 feet.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	332	SP/Ps	13.6"	12'	12'	12'	12'	12'	80%	Gen. sym.	Average	Average	Forked @ 28', straight below	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	333	ABP/Pn	22.2"	17'	17'	17'	17'	17'	70%	Gen. sym.	Average	Average	Forked @ 8'	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	334	SP/Pc	13.2"	14'	14'	14'	14'	14'	65%	Maj. asym.	Average	Average	Forked @ 6'	NAD	-	Canopy overtopped by Tree #333.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	335	DC/Cd	26.5"	24'	24'	24'	24'	24'	85%	Gen. sym.	Dense	Healthy	Typical	NAD	-		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	336	NWO/Qw	32.4"	46'	46'	to parking lot	46'	46'	75%	Min. asym.	ABS/ASE	Healthy	Typical	Girdling root south side	Restricted	15 feet north of parking lot.	Significant	Very good	Viable	Prune girdling root
Between parking lot and road	337	NWO/Qw	30.1"	32'	32'	to parking lot	32'	32'	75%	Min. asym.	ABS/ASE	Average	Leans west; typical	NAD	Restricted		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	338	CBS/Pp	6.5"	8'	8'	8'	8'	8'	90%	Gen. sym.	Average	Regeneration average	Leans north	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	339	GGC/Cl 'GG'	8.0" & 5.3" @ 24"	8'	8'	to parking lot	8'	8'	95%	Maj. asym.	Average	Average	Forked @ 6"	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	340	CBS/Pp	10.2"	9'	9'	9'	9'	9'	95%	Min. asym.	Dense	Healthy	Straight	NAD	-		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Between parking lot and road	341	CBS/Pp	7.9"	7'	7'	7'	7'	7'	98%	Min. asym.	Average	Average	Leans SE; serpentine	NAD	-	Spider mite infestation.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures

1	2	3	4	5	6 – LIMITS OF DISTURBANCE				7	8	9	10	11	12	13	14	15	16	17	18
TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	SIGNIFICANCE	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
In circle drive by entrance	359	DC/Cd	28.5"	23'	to edge of asphalt	to edge of asphalt	to edge of asphalt	to edge of asphalt	90%	Gen. sym.	Dense	Healthy	Typical	NAD	Restricted	Growing in circular planter in parking lot	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Fence line ne corner	360	DF/Pm	13.3"	14'	14'	14'	to property line	to parking lot	80%	Min. asym.	Average	Average	Leans east	NAD	Restricted	Between parking lot and east property line	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
Fence line ne corner	361	Wa/Fa	35.5"	40'	to sidewalk	40'	to property line	to asphalt	85%	Min. asym.	ABS/ASE	Average	Forked @ 8'	NAD	Restricted	next to circle parking lot	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
Fence line ne corner	362	Wa/Fa	26.9"	32'	to sidewalk	40'	to property line	to asphalt	85%	Maj. asym.	ABS/ASE	Average	Typical	NAD	Restricted		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
East lawn	363	BCw/Pt	33.0"	32'	32'	32'	to property line	32'	65%	Min. asym.	ABS/ASE	Regeneration average	Previously topped @ 34'	NAD	-		Significant	Fair	Viable	Aerial Inspection, consider cable or reduction
East lawn	364	BCw/Pt	42.6"	32'	32'	32'	to property line	32'	80%	Gen. sym.	ABS/ASE	Average	Forked @ 15'; previously topped @ 30'	NAD	Surface all directions		Significant	Fair	Viable	Aerial Inspection, consider cable or reduction
East lawn	365	gone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East lawn	366	gone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East lawn	367	gone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East lawn	368	BCw/Pt	29.2"	26'	26'	26'	26'	26'	40%	Gen. sym.	ABS/ASE	Average	Typical	NAD	Surface all directions	mower damage and rot in surface roots. Calloused wound on SE side at 18 feet to 21 feet. Possible trunk failure wound.	Significant	Fair	Viable	Aerial Inspection, consider cable or reduction
East lawn	369	BCw/Pt	33.1"	30'	30'	30'	30'	30'	35%	Min. asym.	ABS/ASE	Average	Center rot	Base rot	-	Calloused wound at 18 inches to 21 inches. Possible trunk failure wound. Calloused crack on west side from base up 10 feet with structural crack. Storm damage. Loss of limbs. Advanced carpenter ant infestation	Significant	Poor	Non-viable	Habitat or Remove
East of Parking Lot	370	BCw/Pt	14.3"	14'	to driveway	14'	14'	14'	60%	Min. asym.	ABS/ASE	Broken Out	Forked @ 15'	NAD	Restricted	8 feet south of driveway.	Significant	Poor	Non-viable	Habitat or Remove
East of Parking Lot	371	BCw/Pt	37.1"	30'	to driveway	30'	30'	to parking lot	40%	Gen. sym.	ABS/ASE	Average	Forked @ 26'	NAD	Restricted	Growing next to driveway and parking lot.	Significant	Fair	Viable	Aerial Inspection, consider cable or reduction
East of Parking Lot	372	gone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East of Parking Lot	373	BCw/Pt	28.8"	22'	22'	22'	22'	to parking lot	65%	Maj. asym.	ABS/ASE	Regeneration average	Forked @ 26' at old topping wound.	NAD	Surface north, east & south	Rot in surface roots. Leans east.	Significant	Fair	Viable	Aerial Inspection, consider cable or reduction
East of Parking Lot	374	BCw/Pt	24.5"	18'	18'	18'	18'	to parking lot	20%	Maj. asym.	PBS/PSE	Regeneration weak	Previously topped at 24'	Base rot	Root rot		Significant	Poor	Non-viable	Habitat or Remove
East of Parking Lot	375	M/Asp	8.6" & 7.7"	12'	12'	12'	12'	to parking lot	40%	Min. asym.	ABS/ASE	Average	Forked @ 4' with included bark down 2'	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
East of Parking Lot	376	BCw/Pt	32.5"	20'	20'	20'	20'	to parking lot	55%	Min. asym.	ABS/ASE	Average	Previously topped @ 25'	NAD	Surface	Rot pockets at topping wound. Dead branches in canopy. Loss of scaffold branches in past.	Significant	Poor	Non-viable	Habitat or Remove
East of Parking Lot	377	BCw/Pt	24.7"	20'	20'	20'	20'	to parking lot	40%	Min. asym.	ABS/ASE	Regeneration weak	Previously topped @ 25'	Possible base rot	Surface with rot		Significant	Fair	Viable	Aerial Inspection, consider cable or reduction
South side of Parking lot	378	NM/Ap	10.1"	10'	to parking lot	10'	10'	10'	70%	Maj. asym.	ABS/ASE	Weak	Leans north	NAD	Restricted	8 feet south of parking lot.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures

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TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	SIGNIFICANCE	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
South lawn by beach	397	SM/Aa	30.2"	25'	25	25'	25'	25'	70%	Min. asym.	ABS/ASE	Average	Forked @ 16'; leans south	NAD	-	Next to NE corner of rest room building. Lifting asphalt to SW by building.	Significant	Good	Viable	Potential to retain with Tree Protection Measures
NE corner of restroom	398	PO/Qp	28.4"	30'	30'	30'	30'	30'	85%	Gen. sym.	GBS/GSE	Healthy	Typical	NAD	Restricted		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
north side of restroom	399	POC/Cl	19.9"	8'	14'	to building	14'	14'	96%	Gen. sym.	Dense	Healthy	Straight	NAD	Restricted	by Garage door.	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
NW corner of restroom	400	MtnA/Sa	5.5", 5.5", & 5.3" @ 24"	10'	10'	to building	10'	10'	50%	Gen. sym.	ABS/ASE	Average	Forked @ base	Partially failed	Restricted	Near NE corner of rest room building	Significant	Good	Viable	Potential to retain with Tree Protection Measures
South lawn by beach	401	WW/Sb	16.2"	n/a	n/a	n/a	n/a	n/a	50'	Gen. sym.	ABS/ASE	Regeneration fair	Center rot	Base rot	Root rot	12 feet south of rest room building. Open wound 6 feet below fork on south side with rot. Surface roots all directions.	Significant	Poor	Non-viable	Closely Monitor
South lawn by beach	402	WW/Sb	13.5"	n/a	n/a	n/a	n/a	n/a	40'	Gen. sym.	PBS/PSE	Regeneration weak	Center rot	Base rot	Root rot	In lawn between rest room building and beach. Open wound with rot from base up 12 feet.	Significant	Poor	Non-viable	Potential to retain with Tree Protection Measures
South lawn by beach	403	WW/Sb	16.0"	n/a	n/a	n/a	n/a	n/a	65'	Gen. sym.	ABS/ASE	Regeneration average	Center rot	Base rot	Root rot	In lawn between rest room building and beach.	Significant	Poor	Non-viable	Potential to retain with Tree Protection Measures
South lawn by beach	404	WW/Sb	18.0"	n/a	n/a	n/a	n/a	n/a	60'	Gen. sym.	ABS/ASE	Average	Center rot	Base rot	Root rot	Between playground and beach.	Significant	Poor	Non-viable	Potential to retain with Tree Protection Measures
South side of Parking lot	405	DC/Cd	23.2"	18'	to parking lot	18'	to SW	18'	75%	Gen. sym.	Dense	Average	Typical	NAD	-	Foliage is slightly chlorotic	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
South side of Parking lot	406	BCw/Pt	32.8"	24'	to parking lot	24'	24'	24'	85%	Gen. sym.	ABS/ASE	Average	Forked @ 25'; typical	Possible base rot	Surface all directions	Mower damage in surface roots with advanced rot.	Significant	Fair	Viable	Aerial inspection, consider cable or reduction
South side of Parking lot	407	NM/Ap	12.0"	15'	to parking lot	15'	15'	15'	60%	Gen. sym.	ABS/ASE	Average	Bowed	NAD	Restricted	6 feet south of parking lot	Significant	Good	Viable	Potential to retain with Tree Protection Measures
South side of Parking lot	408	BCw/Pt	44.5"	34'	to parking lot	34'	34'	34'	65%	Gen. sym.	ABS/ASE	Average	Previously topped @ 36'	Possible base rot	Restricted	6 feet south of parking lot. Surface roots with mower damage.	Significant	Fair	Viable	Aerial inspection, consider cable or reduction
South side of Parking lot	409	Wa/Fa	14.9"	16'	16'	16'	16'	to fall zone	75%	Gen. sym.	ABS/ASE	Average	Typical	NAD	Restricted	Surface roots to NW. 2 feet north of swing fall zone	Significant	Good	Viable	Potential to retain with Tree Protection Measures
South side of Parking lot	410	THL/Gt 'I'	12.2"	20'	to parking lot	20'	20'	20'	55%	Min. asym.	ABS/ASE	Regeneration poor	Typical	NAD	Restricted	6 feet south of parking lot. Previously topped at 18 feet. Regenerating with 2 main leaders	Significant	Good	Viable	Potential to retain with Tree Protection Measures
South side of Parking lot	411	FIP/Psp	4.4" & 3.5"	12'	to parking lot	12'	12'	12'	75%	Gen. sym.	ABS/ASE	Average	Forked @ 3'	Base rot	Restricted	6 feet south of parking lot. Open wound on north side at base	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
South side of Parking lot	412	NM/Ap	11.0"	18'	to parking lot	18'	18'	18'	60%	Gen. sym.	ABS/ASE	Average	Straight	NAD	Restricted	6 feet south of parking lot.	Significant	Good	Viable	Potential to retain with Tree Protection Measures
South side of Parking lot	413	NM/Ap	12.8"	22'	to parking lot	22'	22'	22'	65%	Gen. sym.	ABS/ASE	Average	Typical	NAD	Restricted	7 feet south of parking lot.	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
South side of Parking lot	414	NM/Ap	17.3"	24'	to parking lot	24'	24'	to SW parking lot	75%	Gen. sym.	ABS/ASE	Average	Forked @ 6'; typical	NAD	Surface north	Rot in south roots.	Significant	Good	Viable	Potential to retain with Tree Protection Measures

1	2	3	4	5	6 – LIMITS OF DISTURBANCE				7	8	9	10	11	12	13	14	15	16	17	18
TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	SIGNIFICANCE	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
West of Bridge	432	DF/Pm	7.2"	11'	11'	11'	to driveway	to top of bank	95%	Gen. sym.	Dense	Healthy	Straight	NAD	Restricted		Significant	Excellent	Viable	Potential to retain with Tree Protection Measures
West of Bridge	433	DF/Pm	6.5"	8'	8'	8'	to top of bank	8'	98%	Gen. sym.	Average	Average	Straight	NAD	Restricted	Tip pruning from base up 6 feet. Base is 3 feet from top of bank.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
West of Bridge	434	NS/Pa	6.4"	12'	12'	12'	12'	12'	80%	Gen. sym.	Thin	Healthy	Straight	NAD	-	Mower damage at base and 4.5 feet on west side with sap flow. Sap sucker activity.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
West of Bridge	435	BCw/Pt	51.0"	36'	36'	36'	38'	36'	65%	Gen. sym.	ABS/ASE	Regenerating healthy	Center rot	Base rot	-	Open wound on NW side from 20 feet to 25 feet. Open wound on south side from 20 feet to 24 feet. Previously topped at 30 feet with rot column to base.	Significant	Poor	Non-viable	Habitat or Remove
West of Bridge	436	RA/Ar	12.8"	14'	14'	14'	to top of bank	14'	85%	Gen. sym.	Average	Average	Straight	Bowed @ base\	Restricted	Base is at top of bank	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
West of Bridge	437	CBS/Pp	9.0"	211'	11'	11'	to top of bank	12'	90%	Gen. sym.	Dense	Healthy	Serpentine	NAD	-	Spider mite infestation	Significant	Good	Viable	Potential to retain with Tree Protection Measures
West of Bridge	438	CBS/Pp	8.3" & 6.5"	13'	13'	13'	to top of bank	13'	85%	Gen. sym.	Dense	Healthy	Forked @ 18" with included bark down to base	NAD	-	Spider mite infestation. Early bark beetle infestation	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
West of Bridge	439	CBS/Pp	11.8"	12'	12'	12'	to top of bank	12'	98%	Gen. sym.	Dense	Healthy	Straight	NAD		Base is 14 feet west of top of bank	Significant	Excellent	Viable	Potential to retain with Tree Protection Measures
South lawn by beach	136	CSW/Sm'T'	10.5", 8.1", 5.5", 3.0", & 3.0"	16'	16'	16'	to top of bank	16'	80%	Min. asym.	ABS/ASE	Average	Forked @ 2' & 3'	NAD	Restricted	Growing just above flood line.	Significant	Good	Viable	Potential to retain with Tree Protection Measures
South lawn by beach	137	CSW/Sm'T'	11.2"	14'	14'	14'	to top of bank	14'	80%	Gen. sym.	ABS/ASE	Average	Forked @ 7'	Base rot	Restricted	Growing just above flood line. Broken trunk on north side at 2 feet with rot into base.	Significant	Fair	Viable	Monitor
West of Bridge	440	BCw/Pt	43.8"	38'	38'	38'	38'	38'	70%	Gen. sym.	ABS/ASE	Average	Previously topped @ 34'	NAD	Surface	Mower damage and rot in surface roots.	Significant	Fair	Viable	Aerial inspection, consider cable or reduction
West of Bridge	441	BCw/Pt	40.3"	34'	34'	34'	34'	34'	70%	Gen. sym.	ABS/ASE	Average	Previously topped @ 34'	NAD	Surface	Mower damage and rot in surface roots. Fungal fruiting bodies at base.	Significant	Poor	Non-viable	Habitat or Remove
West of Bridge	442	PO/Op	22.2"	20'	20'	20'	20'	20'	85%	Gen. sym.	Dense	Healthy	Typical	Partially exposed	-	Near picnic shelter	Significant	Very good	Viable	Potential to retain with Tree Protection Measures
West of Bridge	443	BCw/Pt	est. 31"	6'	6'	-	6'	6'	10%	Min. asym.	Regeneration average	Topped	Topped @ 13' with suckers	Possible base rot	Failed	Roots in stream. Tree failed to north. Ivy up 10'	Significant	Fair	Viable	Closely monitor
West of Bridge	444	NS/Pa	12.1"	6'	6'	6'	6'	6'	75%	Gen. sym.	Thin	Average	Slight lean north	NAD	-	Sap flow at branch collar wounds. Spider mite infestation.	Significant	Fair	Viable	Potential to retain with Tree Protection Measures
West of Bridge	445	P/Psp	8.5" & 8.0"	12'	4	12'	12'	12'	55%	Min. asym.	Thin	Average	Forked @ base	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
West of Bridge	446	CBS/Pp	3.1"	4'	3'	3'	3'	3'	25%	Min. asym.	Thin	Weak	Center rot	Partially failed; base rot	-	Popping bark. Open wound at base.	Significant	Poor	Non-viable	Closely monitor
West of Bridge	447	PO/Op	19.2"	28'	28'	28'	28'	28'	50%	Min. asym.	Average	Average	Typical	Partially exposed	Surface	Popping bark	Significant	Fair	Viable	Potential to retain with Tree Protection Measures

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1	2	3	4	5	6 – LIMITS OF DISTURBANCE				7	8	9	10	11	12	13	14	15	16	17	18
TREE LOCATION	TREE #	SPECIES	DBH	DRIP LINE	North	South	East	West	LCR	SYMMETRY	FOLIAGE	CROWN CONDITION	TRUNK	ROOT COLLAR	ROOTS	COMMENTS	SIGNIFICANCE	CURRENT HEALTH RATING	VIABILITY	RECOMMENDATION
West of Cain link fence in open space	465	BCw/Pt	13.7"	16'	16'	16'	16'	16'	70%	Min. asym.	ABS/ASE	Healthy	Typical	NAD	-		Significant	Very good	Viable	Potential to retain with Tree Protection Measures
West of Cain link fence in open space	466	BCw/Pt	6.8"	8'	8'	8'	8'	8'	20%	Maj. asym.	ABS/ASE	Weak	Typical	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
West of Cain link fence in open space	467	BCw/Pt	12.5"	15'	15'	15'	15'	15'	40%	Gen. sym.	ABS/ASE	Average	Leans north; typical	NAD	-		Significant	Good	Viable	Potential to retain with Tree Protection Measures
West of Cain link fence in open space	468	BCw/Pt	14.7"	18'	18'	18'	18'	18'	55%	Gen. sym.	ABS/ASE	Average	Slight lean NE; typical	NAD	-		Significant	Good	Viable	Potential to retain with Tree Protection Measures
West of Cain link fence in open space	469	RA/Ar	13.3" with English Ivy	12'	12'	12'	12'	12'	??	Gen. sym.	PBS/PSE	Broken Out	Straight	Ivy	-	Fungal infection on trunk. English Ivy up 28 feet.	Significant	Poor	Non-viable	Potential to retain with Tree Protection Measures
West of Cain link fence in open space	470	BCw/Pt	10.8"	16'	16'	16'	16'	16'	70%	Min. asym.	ABS/ASE	Average	Leans NW; typical	NAD	-	English Ivy up 20 feet.	Significant	Good	Viable	Potential to retain with Tree Protection Measures
West of Cain link fence in open space	471	BCw/Pt	6.5"	10'	10'	10'	10'	10'	55%	Maj. asym.	ABS/ASE	Average	Forked @ 8'-10'; typical	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
West of Cain link fence in open space	472	RA/Ar	10.0"	n/a	n/a	n/a	n/a	n/a	10%	Maj. asym.	PBS/PSE	Dead	Center rot	Root rot	-	English Ivy up 18 feet.	Significant	Dying	Non-viable	Habitat or Remove
West of Cain link fence in open space	473	RA/Ar	8.4" & 6.7"	16'	16'	16'	16'	16'	20%	Maj. asym.	PBS/PSE	Broken Out	Forked @ 1' with included bark to base	Internal structural weakness	-	NE fork dead. Bark sloughing.	Significant	Poor	Non-viable	Habitat or Remove
West of Cain link fence in open space	474	BCw/Pt	8.8"	14'	14'	14'	14'	14'	20%	Min. asym.	ABS/ASE	Healthy	Leans NE; typical	NAD	-		Significant	Fair	Viable	Potential to retain with Tree Protection Measures
West of Cain link fence in open space	475	BCw/Pt	9.1"	15'	15'	15'	15'	15'	35%	Gen. sym.	ABS/ASE	Healthy	Typical	NAD	-		Significant	Good	Viable	Potential to retain with Tree Protection Measures
West of Cain link fence in open space	476	PW/Sl	6.2"	11'	11'	11'	11'	11'	55%	Min. asym.	ABS/ASE	Weak	Leans north over property line	Base rot	-	Hazard beam crack in trunk from 5 feet to 9 feet with rot.	Significant	Poor	Non-viable	Habitat or Remove
West of Cain link fence in open space	477	RA/Ar	7.3"	12'	12'	12'	12'	12'	55%	Maj. asym.	PBS/PSE	Weak	Leans north over property line	NAD	-		Significant	Poor	Non-viable	Habitat or Remove
West of Cain link fence in open space	478	RA/Ar	6.7"	10'	10'	10'	10'	10'	50%	Min. asym.	PBS/PSE	Dead	Dead vascular cambium	Possible base rot	-		Significant	Dying	Non-viable	Habitat or Remove

ATTACHMENT 3 - GLOSSARY

Terms Used in This Report, on the Tree Condition / Inventory Spreadsheet, and Their Significance

In an effort to clearly present the information for each tree in a manner that facilitates the reader's ability to understand the conclusions I have drawn for each tree, I have collected the information onto a spreadsheet format. This spreadsheet was developed by Gilles Consulting based upon the *Hazard Tree Evaluation Form* from the book, *The Evaluation of Hazard Trees in Urban Areas*, by Matheney and Clarke. The descriptions were left brief on the spreadsheet in an effort to include as much pertinent information as possible, to make the report manageable, and, to not bore the reader with infinite levels of detail. A review of these terms and descriptions will allow the reader to rapidly move through the report and understand the information.

1) **TREE LOCATION**--indicates what general area of the site the tree is on, or whether the tree is Off the Project property.
2) **TREE #**—the individual number of each tree.
3) **SPECIES**—this describes the species of each tree with both most readily accepted common name and the officially accepted scientific name.
4) **DBH**—Diameter Breast Height. This is the standard measurement of trees taken at 4.5 feet above the average ground level of the tree base.
    i) Occasionally it is not practical to measure a tree at 4.5 feet above the ground. The most representative area of the trunk near 4.5 feet is then measured and noted on the spreadsheet. For instance, a tree that forks at 4.5 feet can have an unusually large swelling at that point. The measurement is taken below the swelling and noted as, '28.4" at 36"'.
    ii) Trees with multiple stems are listed as a "clump of x," with x being the number of trunks in the clump. Measurements may be given as an average of all the trunks, or individual measurements for each trunk may be listed.
        (1) Every effort is made to distinguish between a single tree with multiple stems and several trees growing close together at the bases.
5) **TREE CREDIT**—Tree Credit based on Trunk Diameter
6) **DRIP LINE**— the radius, the distance from the trunk to the furthest branch tips.
7) **LIMITS OF DISTURBANCE**— the boundary between the area of minimum protection around a tree and the allowable site disturbance as determined by a qualified professional.
    i) ***This is where the tree protection fence should be placed unless otherwise cleared by the project arborist.***
8) **% LCR**—Percentage of Live Crown Ratio. The relative proportion of green crown to overall tree height. This is an important indication of a tree's health. If a tree has a high percentage of Live Crown Ratio, it is likely producing enough photosynthetic activity to support the tree. If a tree has less than 30 to 40% LCR it can create a shortage of needed energy and can indicate poor health and vigor.

(5) Sparse—few leaves or needles on the twigs, an indication that the tree is under extreme stress and could indicate the future death of the tree
(6) Necrosis—the presence of dead twigs and branchlets. This is another significant indication of tree health. A few dead twigs and branches are reasonably typical in most trees of size. However, if there are dead twigs and branchlets all over a certain portion of the tree, or all over the tree, these are indications of stress or attack that can have an impact on the tree's long-term health.
(7) Hangers—A term to describe a large branch or limb that has broken off but is still hanging up in the tree. These can be particularly dangerous in adverse weather conditions.

11) **CROWN CONDITION**—the crown is uppermost portion of the tree, generally considered the top 10 to 20% of the canopy or that part of the canopy above the main trunk in deciduous trees and above the secondary bark in evergreen trees.

i) The condition of the tree's crown is a reflection of the overall health and vigor of the entire tree. The crown is one of the first places a tree will demonstrate stress and pathogenic attack such as root rot.

ii) If the **Crown Condition** is healthy and strong, this is a good sign. If the crown condition is weak, broken out, or shows other signs of decline, it is an indication that the tree is under stress. It is such an important indication of health and vigor that this is the first place a trained forester or arborist looks to begin the evaluation of a tree. Current research reveals that, by the time trees with root rot show significant signs of decline in the crown, fully 50% or more of the roots have already rotted away. **Crown Condition** can be described as:

(1) Healthy Crown—exceptional growth for the species.
(2) Average Crown—typical for the species.
(3) Weak Crown—thin spindly growth with thin or sparse needles.
(4) Flagging Crown—describes a tree crown that is weak and unable to grow straight up.
(5) Dying Crown—describes obvious decline that is nearing death.
(6) Dead Crown—the crown has died due to pathological or physical injury. The tree is considered to have significant stress and/or weakness if the crown is dead.
(7) Broken out—a formerly weak crown condition that has been broken off by adverse weather conditions or other mechanical means.
(8) Regenerated or Regenerating—formerly broken out crowns that are now growing back, Regenerating crowns may appear healthy, average, or weak and indicate current health of the tree.
(9) Suppressed—a term used to describe poor condition of an entire tree or just the crown. Suppressed crowns are those that are entirely below the general level of the canopy of surrounding trees which receive no direct sunlight. They are generally in poor health and vigor. Suppressed trees are generally trees that are smaller and growing in the

16) **SIGNIFICANCE**—a "significant" tree is at least 6" in diameter measured at 4.5' above the average ground level.
17) **CURRENT HEALTH RATING**— a description of general health ranging from dead, dying, poor, senescent, suppressed, fair, good, very good, to excellent.
18) **VIABILITY**— a significant tree that is in good health with a low risk of failure due to structural defects, is relatively wind firm if isolated or remains as part of a grove, and is a species that is suitable for its location.
    (1) Please note that many trees may be listed as "Non-Viable" due to poor health, poor structure, or the tree may be below the size threshold for a "Viable Tree." However, it is worth examining the Non-Viable Trees to determine if any or all of them can be left on the property. They can add significant benefit to the landscape and contribute to wildlife habitat.
19) **RECOMMENDATION**—this is an estimate of whether or not the tree is of sufficient health, vigor, and structure to consider retaining.

NOTE: TREES WITH THE SAME DESCRIPTION AND DIFFERENT RATINGS: Two trees may have the same descriptions in the matrix boxes, one may be marked "Significant," while another may be marked "Non-Significant." The difference is in the degree of the description—early necrosis versus advanced necrosis for instance. Again, these descriptions were left brief in an effort to include as much pertinent information as possible, to make the report manageable, and, not to bore the reader with infinite levels of detail.

TREE PROTECTION MEASURES:

1. Tree Protection Fences will need to be placed around each tree or group of trees to be retained.
    a. Tree Protection Fences are to be placed according to the attached drawing and as noted in the attached Tree Inventory/Conditions Spreadsheet, Column 6 - Limits of Disturbance.
    b. Tree Protection Fences must be inspected prior to the beginning of any construction or demolition work/activities.
    c. Nothing must be parked or stored within the Tree Protection Fences—no equipment, vehicles, soil, debris, or construction supplies of any sorts.

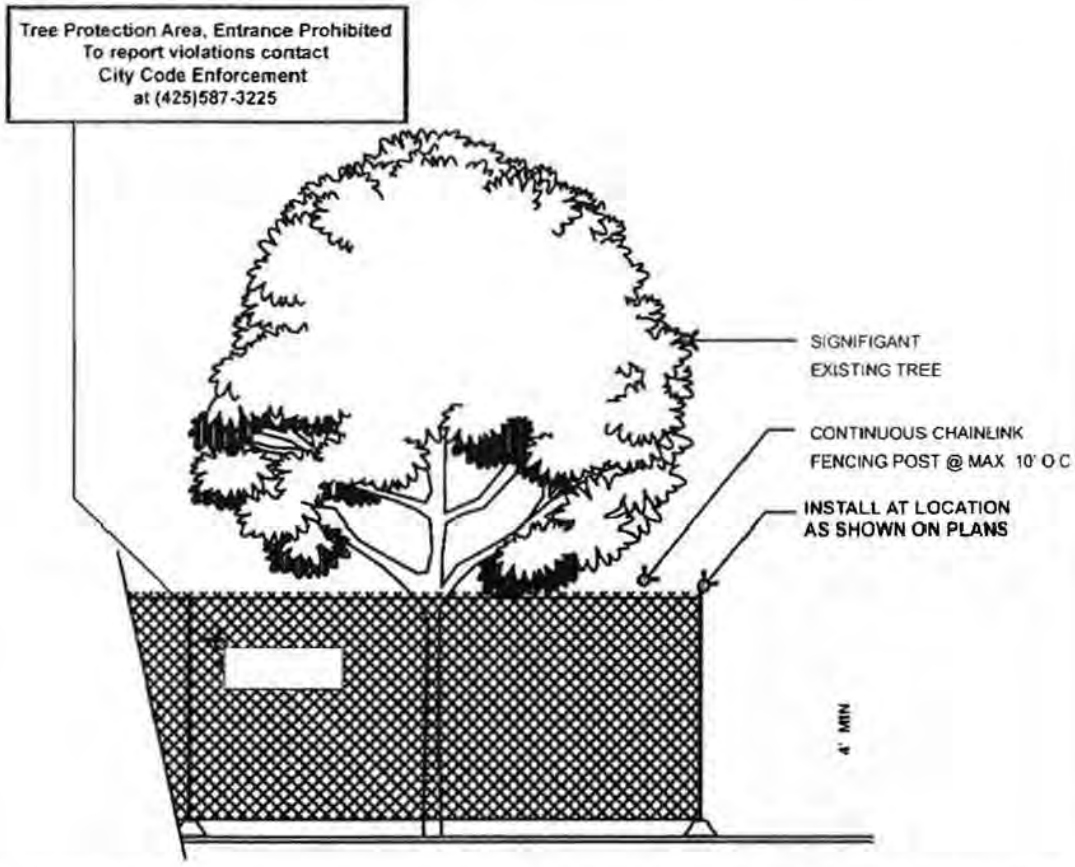
2. Cement trucks must not be allowed to deposit waste or wash out materials from their trucks within the Tree Protection Fences.

3. The Tree Protection Fences need to be clearly marked with the following or similar text in four inch or larger letters:

TREE PROTECTION AREA, ENTRANCE PROHIBITED
To report violations contact
City Code Enforcement
At 425-587-3225

5. When excavation occurs near trees that are scheduled for retention, the following procedure must be followed to protect the long term survivability of the tree:
    a. An International Society of Arboriculture, (ISA) Certified Arborist must be working with all equipment operators.
        i. The Certified Arborist should be outfitted with a shovel, hand pruners, a pair of loppers, a handsaw, and a power saw (a "sawsall" is recommended).
    b. The hoe must be placed to "comb" the material directly away from the trunk as opposed to cutting across the roots.
        i. Combing is the gradual excavation of the ground cover plants and soil in depths that only extend as deep as the tines of the hoe.
    c. When any roots of one inch diameter or greater, of the tree to be retained, is struck by the equipment, the Certified Arborist should stop the equipment operator.
    d. The Certified Arborist should then excavate around the tree root by hand/shovel and cleanly cut the tree root.
        i. The Certified Arborist should then instruct the equipment operator to continue.

FENCING SIGN DETAIL



1. MINIMUM FOUR (4) FOOT HIGH TEMPORARY CHAINLINK FENCE SHALL BE PLACED AT THE CRITICAL ROOT ZONE OR DESIGNATED LIMIT OF DISTURBANCE OF THE TREE TO BE SAVED. FENCE SHALL COMPLETELY ENCIRCLE TREE (S). INSTALL FENCE POSTS USING PIER BLOCK ONLY. AVOID POST OR STAKES INTO MAJOR ROOTS. MODIFICATIONS TO FENCING MATERIAL AND LOCATION MUST BE APPROVED BY PLANNING OFFICIAL.

2. TREATMENT OF ROOTS EXPOSED DURING CONSTRUCTION: FOR ROOTS OVER ONE (1) INCH DIAMETER DAMAGED DURING CONSTRUCTION, MAKE A CLEAN STRAIGHT CUT TO REMOVE DAMAGED PORTION OF ROOT. ALL EXPOSED ROOTS SHALL BE TEMPORARILY COVERED WITH DAMP BURLAP TO PREVENT DRYING, AND COVERED WITH SOIL AS SOON AS POSSIBLE.

3. NO STOCKPILING OF MATERIALS, VEHICULAR TRAFFIC, OR STORAGE OF EQUIPMENT OR MACHINERY SHALL BE ALLOWED WITHIN THE LIMIT OF THE FENCING. FENCING SHALL NOT BE MOVED OR REMOVED UNLESS APPROVED BY THE CITY PLANNING OFFICIAL. WORK WITHIN PROTECTION FENCE SHALL BE DONE MANUALLY UNDER THE SUPERVISION OF THE ON-SITE ARBORIST AND WITH PRIOR APPROVAL BY THE CITY PLANNING OFFICIAL.

4. FENCING SIGNAGE AS DETAILED ABOVE MUST BE POSTED EVERY FIFTEEN (15) FEET ALONG THE FENCE.

TREE PROTECTION FENCING DETAIL

ATTACHMENT 6 - REFERENCES

1. Dirr, Michael A. *Manual of Woody Landscape Plants, Their Identification, Ornamental Characteristics, Culture, Propagation, and Uses*. Champaign: Stipes Publishing Company, 1990.

2. Harris, Richard W. et al. *Arboriculture, Integrated Management of Landscape Trees, Shrubs, and Vines*. 4th ed. Upper Saddle River: Prentice Hall, 2004.

3. Matheney, Nelda P. and Clark, James R. *Evaluation of Hazard Trees*. 2nd ed. Savoy: The International Society of Arboriculture Press, 1994

4. Matheney, Nelda P. and Clark, James R. *Trees & Development, A Technical Guide to Preservation of Trees During Land Development*. Savoy: The International Society of Arboriculture Press, 1998.

5. Mathews, Daniel. *Cascade -- Olympic Natural History*. Portland, Oregon: Raven Editions with the Portland Audubon Society, 1992.

6. Mattheck, Claus and Breloer, Helge. *The Body Language of Trees, A Handbook for Failure Analysis*. London: HMSO, 1994.

7. Pojar, Jim and MacKinnon, Andy. *Plants of the Pacific Northwest Coast*. Redmond: Lone Pine Publishing, 1994.

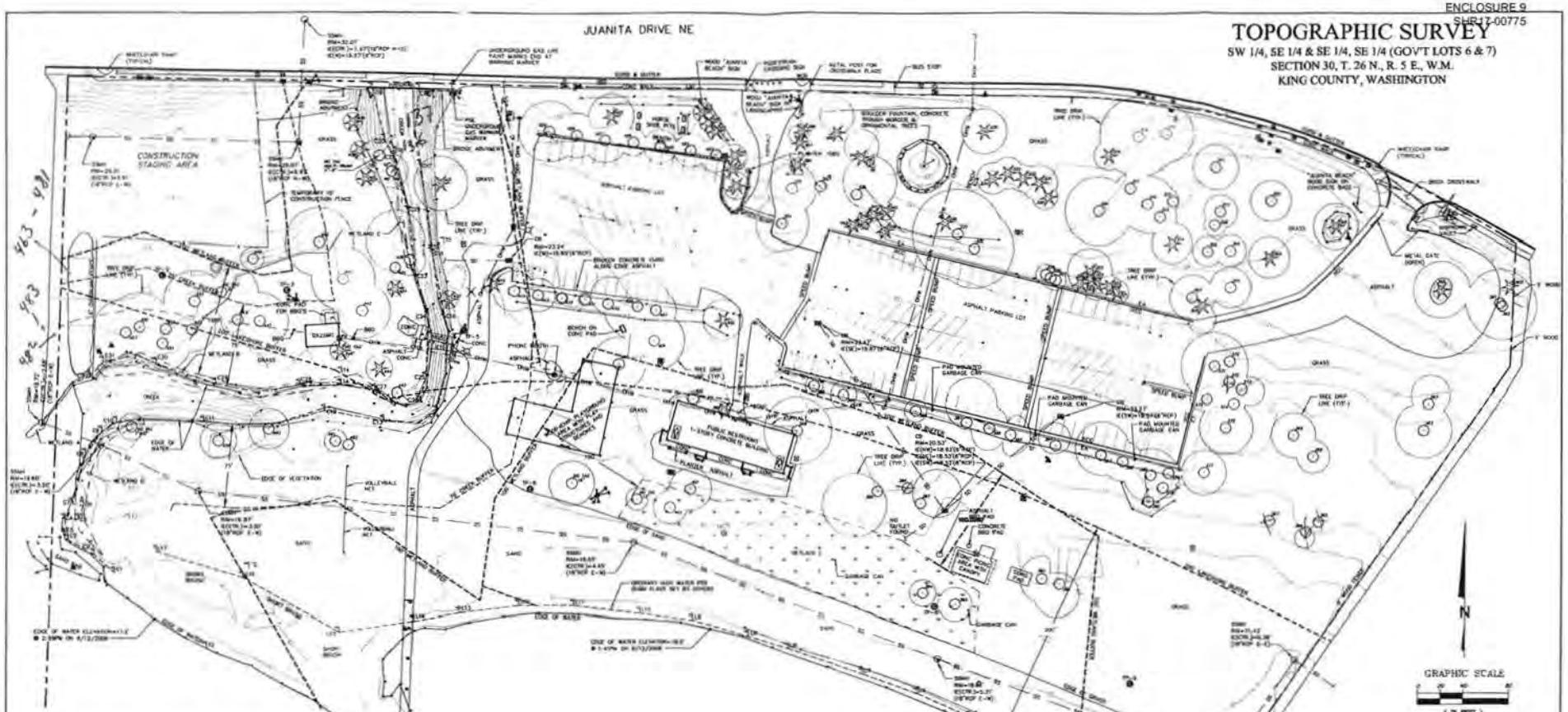
8. Pacific Northwest Chapter-ISA. *Tree Risk Assessment in Urban Areas and the Urban/Rural Interface*. Course Manual. Release 1.2. PNW-ISA: Silverton, Oregon, 2008.

9. Watson, Gary W., and Neely, Dan, eds. *Trees & Building Sites*. Savoy: The International Society of Arboriculture Press, 1995.

ENCLOSURE 9
SUB17-00775

TOPOGRAPHIC SURVEY

SW 1/4, SE 1/4 & SE 1/4, SE 1/4 (GOV'T LOTS 6 & 7)
SECTION 30, T. 26 N., R. 5 E., W.M.
KING COUNTY, WASHINGTON



LEGEND

WATER VALVE	DECIDUOUS TREE (WITH DIAMETER TAG)
FIRE HYDRANT	CONIFEROUS TREE (WITH DIAMETER TAG)
HOSE BIB	METAL SIGN POST
IRRIGATION CONTROL VALVE	WOOD SIGN POST
WATER METER	BOLLARD
POWER VAULT	KIOSK/KIOSK
PAD MOUNTED TRANSFORMER	OVERHEAD WIRE
STREET LIGHT VAULT	UNDERGROUND COMMUNICATIONS LINE
POWER METER	UNDERGROUND GAS LINE
POWER JUNCTION BOX	UNDERGROUND POWER LINE
UTILITY POLE	UNDERGROUND SANITARY SEWER LINE
UTILITY POLE W/ LIGHT	UNDERGROUND STORM DRAIN LINE
STREET LIGHT POLE	INVERT ELEVATION
YARD LIGHT	REINFORCED CONCRETE PIPE
GUY ANCHOR	DUCTILE IRON PIPE
TELEPHONE POLE	CORRUGATED METAL PIPE
TRAFFIC SIGNAL POLE W/ PEDESTRIAN	PLASTIC PIPE
TRAFFIC SIGNAL VAULT	CORRUGATED PLASTIC PIPE
TRAFFIC SIGNAL CABINET	WHEEL CHAIR RAMP
CATCH BASIN (CB)	CONCRETE SURFACE
SANITARY SEWER MANHOLE (SSMH)	EXTRUDED CONCRETE CURB
FENCE (AS NOTED)	EDGE OF ASPHALT
HANDICAP PARKING	FINISH FLOOR ELEVATION
TEST PIT LABELED PER FOUND LATH	ORDINARY HIGH WATER MARK
DENOTES WETLAND AREA	TRANSMIT LINE FLAG
ORDINARY HIGH WATER MARK FLAG	
ORDINARY HIGH WATER MARK FLAG	

SURVEYORS NOTES:

1. ALL UNDERGROUND UTILITY LOCATIONS ARE BASED ON OBSERVED EVIDENCE OF STRUCTURES AND UTILITY PAINT MARKS PLACED BY OTHERS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN-SERVICE OR ABANDONED. THE SURVEYOR DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION PROVIDED.

2. THE BOUNDARY LINES SHOWN HEREON ARE FOR REPRESENTATION PURPOSES ONLY AND NOT BASED ON A BOUNDARY RETRACEMENT SURVEY BY PACIFIC GEOMATIC SERVICES, INC. THE SOURCE FOR BOUNDARY LINES SHOWN IS ELECTRONIC KING COUNTY ASSESSOR DATA AS SHOWN ON PREVIOUS MAPPING SURVEYS.

3. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT, WHICH MAY REVEAL RESTRICTIONS AND EASEMENTS OF RECORD. ACCORDING TO, NONE ARE SHOWN HEREON.

4. WETLANDS SHOWN HEREON WERE LOCATED IN AUGUST OF 2008 IN CONJUNCTION WITH PREVIOUS MAPPING.

5. ORDINARY HIGH WATER MARKS (OHWM) WERE DELINEATED BY METRIUM BIOLOGIST DERRICK EDWGLASS ON AUGUST 25, 2008.

6. TREES NOTE TAGGED BY CITY OF KIRKLAND ARBORIST MARK PARDETT ON AUGUST 5, 2008. PLEASE REFER TO THE ARBORIST'S REPORT FOR INFORMATION ON THE TREES REFERENCED HEREON.

STATISTICS:

EQUIPMENT: TRIMBLE 5603 ROBOTIC TOTAL STATION
TRIMBLE HYPER GT GPS
METHODOLOGY: FIELD TRAVERSE
MEETS OR EXCEEDS SURVEY STANDARD AS PER
WAC 332-130-050
WAC 332-130-060
WAC 332-130-090
WAC 332-130-100
ALL SURVEY WORK OCCURRED IN AUGUST OF 2008

HORIZONTAL DATUM:

THE HORIZONTAL DATUM FOR THIS SURVEY IS NAD 83(91) WASHINGTON STATE PLANE, NORTH ZONE, BASED ON THE WASHINGTON STATE REFERENCE NETWORK, A REGIONAL COOPERATIVE OF GPS REFERENCE STATIONS, AND CITY OF KIRKLAND SURVEY CONTROL POINT 51.

VERTICAL DATUM:

THE VERTICAL DATUM FOR THIS SURVEY IS NAVD 88, BASED ON THE WASHINGTON STATE REFERENCE NETWORK, A REGIONAL COOPERATIVE OF GPS REFERENCE STATIONS, AND A PUBLISHED ELEVATION FOR CITY OF KIRKLAND SURVEY CONTROL POINT 51.

ELEVATION FOR CITY OF KIRKLAND SURVEY CONTROL POINT 51: 77.621 FEET

REVISIONS			
REV.	DESCRIPTION	BY	DATE

PACIFIC GEOMATIC SERVICES, INC.
LAND SURVEYING & MAPPING SERVICES
QUALITY SERVICE - CREATIVE SOLUTIONS
6906 216TH STREET SW, STE. 304
MOUNTLAKE TERRACE, WA 98043
PHONE:(425) 778-9620 FAX:(425) 778-2845
WEB: www.PacGeoInc.com
PGS / INC

SHEET TITLE: TOPOGRAPHIC SURVEY		DRAWN BY: JNM	CHECKED BY: KDB
		SCALE: 1" = 40'	DRAWING NAME: 0805701_TOPO.DWG
		DATE: 08/27/2008	
CLIENT: J.A. BRENNAN ASSOCIATES KIRKLAND, WASHINGTON		JOB NUMBER: 08-057-01	SHEET: 1 OF 1

Updated Juanita Beach Park Shoreline Permit – Attachment B

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Lake Washington Shoreline	I	I	200 ft	

Action: Concrete Surface for Promenade and Plaza (stage)	Applicable Code: 24.05.065; 24.05.085
Code Compliance:	**Rationale:**
24.05.065: (a) Goal. It is a goal of the city to provide the maximum reasonable opportunity for the public to view and enjoy the amenities of the shoreline area. 24.05.065: 2) All developments required to provide public pedestrian access along the water's edge should connect this access to the right-of-way unless access to the water's edge can easily be gained via existing access points. 24.05.065: (8) The city should seek to complete a public pedestrian walkway along the shoreline from Juanita Bay Park to Juanita Beach Park. This walkway should be a required condition of all development, other than single-family residential; or, where appropriate, the city may utilize public funds to complete improvements within the public pedestrian walkway. The walkway should consist of the continuance of the existing causeway. It should be designed so as to cause the least impact to these environmentally sensitive wetland areas and to private property. Their design may include portions elevated over wetlands or extended over the water. The walkway should include amenities such as benches or shelters, public sign systems, and information kiosks identifying the two public parks, historic or scenic features, jogging and bicycle trails, and access easements. 24.05.85: (a) Goal. It is a goal of the city to encourage development within the shoreline area that is visually coherent, provides visual and physical linkage to the shoreline, and enhances the waterfront.	The promenade and plaza provides the public with an area to view and enjoy the shoreline. Though the water's edge can already be accessed easily (walking across lawn), the promenade directs pedestrian flow to minimize trampling in sensitive areas. Promenade is consistent with comprehensive planning for Kirkland parks by initiating the construction of a pedestrian corridor within Juanita Beach Park. Promenade provides the public with a coherent and physical linkage to the Lake Washington shoreline.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Lake Washington Shoreline	I	I	200 ft	

Action: Asphalt Paths	Applicable Code: 24.05.065; 24.05.085
Code Compliance:	**Rationale:**
24.05.065: 1) Public pedestrian access along the water's edge of all shoreline development, other than single-family residential or where unique and fragile shoreline areas would be adversely affected, should be required of all developments. 24.05.85: (a) Goal. It is a goal of the city to encourage development within the shoreline area that is visually coherent, provides visual and physical linkage to the shoreline, and enhances the waterfront.	The asphalt path provides an ADA accessible pathway and access to the Lake Washington shoreline.

ATTACHMENT 9

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Lake Washington Shoreline	1	1	200 ft	

Action: Crushed Rock Paths	Applicable Code: 24.05.065; 24.05.085
Code Compliance:	**Rationale:**
1) Public pedestrian access along the water's edge of all shoreline development, other than single-family residential or where unique and fragile shoreline areas would be adversely affected, should be required of all developments. 24.05.85: (a) Goal. It is a goal of the city to encourage development within the shoreline area that is visually coherent, provides visual and physical linkage to the shoreline, and enhances the waterfront.	Crushed rock path provides pedestrian circulation within Juanita Beach Park The crushed rock paths connecting to the lakefront promenade provide coherent visual and physical linkages from NE Juanita Drive and the northern portion of Juanita Beach Park to the Lake Washington shoreline.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Lake Washington Shoreline	1	1	200 ft	

Action: Seat Walls	Applicable Code: 24.05.065; 24.05.085
Code Compliance:	**Rationale:**
(2) Projects should be encouraged to provide "street furniture," landscaping and other amenities within or adjacent to the right-of-way of Lake Street South and Lake Washington Boulevard to complement the pedestrian promenade along the shoreline.	Concrete seat walls are landscaping amenities as well as "street furniture". In addition, the seat wall disrupts the line of sight of Canadian geese, which is intended to reduce the numbers of geese landing at Juanita Beach Park.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Lake Washington Shoreline	1	1	200 ft	

Action: Plantings of native species along the shoreline	Applicable Code: 24.05.075
Code Compliance:	**Rationale:**
24.05.075: (a) Goal. It is a goal of the city to protect and enhance unique and fragile areas of flora and fauna and scenic vistas to help assure the continued availability of these resources for future generations.	Native species plantings along the shoreline protects the banks from erosion and provides habitat for wildlife.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Lake Washington Shoreline	I	I	200 ft	

Action: Water Quality swale planted with native species	Applicable Code: 24.05.075
Code Compliance:	**Rationale:**
24.05.075: (a) Goal. It is a goal of the city to protect and enhance unique and fragile areas of flora and fauna and scenic vistas to help assure the continued availability of these resources for future generations. 24.05.075: (2) Development in shoreline areas should be managed so that impacts on aquatic and land plants and animals are minimized.	The water quality swale increases water quality by treating surface run-off from the parking lot. The swale also increases the storage and water quality functions of Wetland E. The water quality swale manages pollution and reduces impact to aquatic and land plants and fish species.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Juanita Creek	I	A	75 ft	

Action: Excavation within the OHWM of the creek.	Applicable Code: 90.105
Code Compliance:	**Rationale:**
90.105: 5. The design and implementation features and techniques listed below, unless clearly and demonstrably inappropriate for the proposed relocation or modification: a. The creation of natural meander patterns; b. The formation of gentle and stable side slopes, no steeper than two feet horizontal to one-foot vertical, and the installation of both temporary and permanent erosion-control features (the use of native vegetation on stream banks shall be emphasized); h. The restoration of water flow characteristics compatible with fish habitat areas	Excavation within the OHWM of Juanita Creek is required to soften the bend located south of the pedestrian footbridge. Excavation is also required for installation of the log control weir and sheet pile diversion weir. The project shall replace and improve stream functions after temporary impacts associated with excavation below the OHWM of Juanita Creek. The creek restoration will include: removing bank hardening from Juanita Creek (26 square yards) and permanent erosion-control features such as softening sharp banks vulnerable to scouring with bioengineered bank stabilization (2,900 square feet (sf) (0.07 acres), and removing invasive species and planting native species in the riparian zone of the creek (37,061 sf) (0.85 acres). Restoration within the creek will be implemented at a nearly 2:1 (1.8:1) ratio as mitigation for the temporary impacts to the creek. The project would also create an Oxbow Marsh wetland, with off-channel habitat connected to Juanita Creek. The proposed marsh would reestablish native vegetation, provide valuable fish and wildlife habitat, improve water quality, and restore the type of habitat historically associated with the Lake Washington shoreline.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Juanita Creek	1	A	75 ft	

Action: Remove existing concrete riprap bank armoring	Applicable Code: 90.120
Code Compliance:	**Rationale:**
90.120: Planning Official approval is required prior to stream rehabilitation. The Planning Official may permit or require the applicant or property owner to restore and maintain a stream and/or its buffer by removing material detrimental to the stream and its surrounding area such as debris, sediment, or vegetation. The Planning Official may also permit or require the applicant to restore a stream or its buffer through the addition of native plants and other habitat features.	Removal of the existing concrete bank armoring is required to reduce streambank incision from high velocity flows. Bank armoring is no longer functioning as intended. Restoration of the creek bank with bioengineering and plantings of native species is also part of the project (see the previous Action, above and the following action, below).

Water Resource	WDOE Type	City of Kirkland Type	CoK Buffer Width	
Juanita Creek	1	A	75 ft	

Action: Lay back steep bank, place jute netting, and plant with live willow stakes	Applicable Code: 90.120
Code Compliance:	**Rationale:**
Planning Official approval is required prior to stream rehabilitation. The Planning Official may permit or require the applicant or property owner to restore and maintain a stream and/or its buffer by removing material detrimental to the stream and its surrounding area such as debris, sediment, or vegetation. The Planning Official may also permit or require the applicant to restore a stream or its buffer through the addition of native plants and other habitat features.	Stream meander south of the existing pedestrian footbridge is softened to reduce stream velocities. The bank is reinforced with jute netting to prevent erosion and planted with live stakes to increase streambank stability.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Juanita Creek Buffer	1	A	75 ft	

Action: Crushed rock path in buffer	Applicable Code: 90.60; 90.90
Code Compliance:	**Rationale:**
Essential improvements to accommodate required vehicular, pedestrian, or utility access to the subject property may be located within those portions of stream buffers, which are measured toward culverts from culvert openings. 90.90: 5. Minor Improvements – Minor improvements may be located within the sensitive area buffers specified in subsection (1) of this section. These minor improvements shall be located within the outer one-half of the sensitive area buffer, except where approved stream crossings are made. The Planning Official shall approve a proposal to construct a minor	The crushed rock path provides pedestrian circulation within Juanita Beach Park. In addition, it provides access to viewpoints around the proposed oxbow marsh. The path has been sited to minimize conversion of sensitive environments and will direct pedestrian flow to minimize trampling in sensitive areas. To avoid adverse effects on water quality, storm water runoff, or erosion, the contractor(s) will be required to follow the project TESC Plan, to

improvement within a sensitive area buffer if: a. It will not adversely affect water quality; b. It will not adversely affect fish, wildlife, or their habitat; c. It will not adversely affect drainage or storm water detention capabilities; d. It will not lead to unstable earth conditions or create erosion hazards or contribute to scouring actions; and e. It will not be materially detrimental to any other property in the area of the subject property or to the City as a whole, including the loss of significant open space or scenic vistas.	comply with the King County 1998 Surface Water Design Manual, and to implement multiple other temporary and permanent Best Management Practices (BMPs). The paths will be located on stable ground and will be set back from any water edge so there will be no scouring or erosion hazard. The paths will be an asset to the City and neighboring properties by allowing visitors to enjoy the scenic qualities of the park while at the same time, directing the movement of visitors through the park and reducing the trampling impacts on sensitive areas.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Juanita Creek Buffer	**I**	**A**	**75 ft**	

Action: Planting native meadow and tree species in riparian buffer	**Applicable Code: 90.60; 90.100**
Code Compliance:	**Rationale:**
90.100: b. Buffers may be decreased through buffer enhancement. The applicant shall demonstrate that through enhancing the buffer (by removing invasive plants, planting native vegetation, installing habitat features such as downed logs or snags, or other means) the reduced buffer will function at a higher level than the standard existing buffer. A buffer enhancement plan shall at a minimum provide the following: (1) a map locating the specific area of enhancement; (2) a planting plan that uses native species, including groundcover, shrubs, and trees; and (3) a monitoring and maintenance program prepared by a qualified professional consistent with the standards specified in KZC 90.55(4). Buffers may not be reduced at any point by more than one-third of the standards in KZC 90.90(1).	Native plant installations provides significant habitat for birds and amphibians. In addition, native plant installations will provide critical refuge for salmonid species.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland A	**III**	**III**	**50 ft w/10' bldg setback**	

Action: No Actions to take place in Wetland A or buffers	**Applicable Code: N/A**
Code Compliance:	**Rationale:**
N/A	N/A

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland B	III	III	50 ft w10' bldg setback	

Action: Excavation to build Oxbow Marsh and enhance with low flow wetland	Applicable Code: 90.55; 90.65
Code Compliance:	**Rationale:**
90.55: 4. Compensatory Mitigation – All approved impacts to regulated wetlands require compensatory mitigation so that the goal of no net loss of wetland function, value, and acreage may be achieved. Mitigation shall be implemented through the creation of wetlands (from non-wetland areas) or through the restoration of wetlands (from uplands that were formerly wetlands). 90.65: Planning Official approval is required prior to wetland restoration. The Planning Official may permit or require the applicant or property owner to restore and maintain a wetland and/or its buffer by removing material detrimental to the area, such as debris, sediment, or vegetation. The Planning Official may also permit or require the applicant to restore a wetland or its buffer through the addition of native plants and other habitat features.	The proposed work would fill 0.03 acres of Wetland B. The project will provide mitigation for the total 0.43 acres of combined impacts to Wetlands B, and E (Category III wetlands) by constructing the 0.44 acre Oxbow Marsh, rehabilitating 0.20 acres of Wetland E, and enhancing 0.11 acres of Wetland B. The created marsh would reestablish native vegetation, provide valuable fish and wildlife habitat, improve water quality, and restore the type of habitat historically associated with the Lake Washington shoreline. The rehabilitation of Wetland E will consist of restoring hydrology and planting native species within the wetland. In total, 0.65 acres of compensatory wetland mitigation will be provided for the 0.43 acres of impact, which represents a mitigation ratio of 1.5:1 with a 1:1 ratio for wetland creation and a 0.5:1 ratio for rehabilitation/enhancement. This ratio meets the City code requirements for compensatory mitigation for Category III wetlands.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland C	**III**	**III**	**50 ft w/10' Bldg setback**	

Action: Excavation to build Oxbow Marsh and Enhance with open water wetland	**Applicable Code: 90.20**
Code Compliance:	**Rationale:**
90.20: Activities affecting Type 3 wetlands that are 1,000 square feet or less in any of the primary basins, or affecting Type 3 wetlands that are 2,500 square feet or less in any of the secondary basins.	The proposed work would fill 0.006 acres of Wetland C. KZC 90.20 General Exceptions does not require compensatory mitigation for impacts to wetlands under the size of 1,000 square feet within primary basins. Wetland C is only 329 sf in size and is therefore exempt from the wetland mitigation requirements of 90.55.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland D	**III**	**III**	**50 ft w/10' bldg setback**	

Action: No Actions to take place in Wetland D or its buffers	**Applicable Code: N/A**
Code Compliance:	**Rationale:**
N/A	N/A

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland E	IV	III	50 ft w/10' bldg setback	

Action: Fill for Promenade pathway and Community Commons	Applicable Code: 90.55; 90.70
90.55: a. It will not adversely affect water quality; b. It will not adversely affect fish, wildlife, or their habitat; c. It will not have an adverse effect on drainage and/or storm water detention capabilities; d. It will not lead to unstable earth conditions or create an erosion hazard or contribute to scouring actions; a. Type 3 Wetlands: In primary basins, the modification shall not affect more than 50 percent of the wetland on the subject property 90.70: The City may develop access through a wetland and its buffer in conjunction with a public park	Fill in Wetland E is required to construct the proposed commons and promenade pathway in Juanita Beach Park. The Commons provide the public with an area to enjoy the shoreline as consistent with CoK comprehensive planning. The promenade has been sited to minimize conversion of sensitive environments and will direct pedestrian flow to minimize trampling in sensitive areas. To avoid adverse effects on water quality, storm water runoff, or erosion, the contractor(s) will be required to follow the project TESC Plan, to comply with the King County 1998 Surface Water Design Manual, and to implement multiple other temporary and permanent BMPs. The project will result in actual fill (grading and/or fill) of 11,632 sf (0.25 acres) and paper fill of 5,574 sf (0.12 acres) for a total of 17,527 sf (0.40 acres) of impact in Wetland E per CoK Code. This represents 47% the total area of the 0.88–acre Wetland E. The project will provide mitigation for the total 0.43 acres of combined impacts to Wetlands B, and E (Category III wetlands) by constructing the 0.44 acre Oxbow Marsh, rehabilitating 0.20 acres of Wetland E, and enhancing 0.11 acres of Wetland B. The created marsh would reestablish native vegetation, provide valuable fish and wildlife habitat, improve water quality, and restore the type of habitat historically associated with the Lake Washington shoreline. The enhancement of Wetland E will consist of native plantings in the area directly in front of the Community Commons. In total, 0.65 acres of compensatory wetland mitigation will be provided for the 0.43 acres of impact, which represents a mitigation ratio of 1.5:1 for creation and 0.5:1 for enhancement, with the majority of the mitigation in wetland creation.

Code Compliance:			Rationale:	
Water Resource	**WDOE Category**	**City of Kirkland Type**	**CoK Buffer Width**	
Wetland E	**IV**	**III**	**50 ft w/10' bldg setback**	

Action: Fill for Boardwalk	Applicable Code: 90.55; 90.70
Code Compliance:	**Rationale:**
90.55: a. It will not adversely affect water quality; b. It will not adversely affect fish, wildlife, or their habitat; c. It will not have an adverse effect on drainage and/or storm water detention capabilities; d. It will not lead to unstable earth conditions or create an erosion hazard or contribute to scouring actions; a. Type 3 Wetlands: In primary basins, the modification shall not affect more than 50 percent of the wetland on the subject property 90.70: The City may develop access through a wetland and its buffer in conjunction with a public park.	Fill in Wetland E is required to construct the boardwalk, which has been sited to minimize conversion of sensitive environments and will direct pedestrian flow to minimize trampling in sensitive areas. To avoid adverse effects on water quality, storm water runoff, or erosion, the contractor(s) will be required to follow the project TESC Plan, to comply with the King County 1998 Surface Water Design Manual, and to implement multiple other temporary and permanent BMPs. The project will result in actual fill (grading and/or fill) of 11,632 sf (0.27 acres) and paper fill of 5,574 sf (0.12 acres) for a total of 17,526 sf (0.40 acres) of impact in Wetland E per CoK Code. This represents 47% the total area of the 0.88–acre Wetland E. The project will provide mitigation for the total 0.43 acres of combined impacts to Wetlands B, and E (Category III wetlands) by constructing the 0.44 acre Oxbow Marsh rehabilitating 0.2 acres of Wetland E, and enhancing 0.11 acres of Wetland B. The created Oxbow marsh would reestablish native vegetation, provide valuable fish and wildlife habitat, improve water quality, and restore the type of habitat historically associated with the Lake Washington shoreline. The enhancement of Wetland E will consist of native plantings in the area directly in front of the Community Commons. In total, 0.65 acres of compensatory wetland mitigation will be provided for the 0.43 acres of impact, which represents a mitigation ratio of 1.5:1 with a 1:1 ration for creation and a 0.5:1 ratio for rehabilitation and enhancement.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland E	III	III	50 feet with 10' bldg setback	

Action: Paper fill in Wetland E	Applicable Code: 90.55
Code Compliance:	**Rationale:**
90.55: a. It will not adversely affect water quality; b. It will not adversely affect fish, wildlife, or their habitat; c. It will not have an adverse effect on drainage and/or storm water detention capabilities; d. It will not lead to unstable earth conditions or create an erosion hazard or contribute to scouring actions; a. Type 3 Wetlands: In primary basins, the modification shall not affect more than 50 percent of the wetland on the subject property 90.70: The City may develop access through a wetland and its buffer in conjunction with a public park.	The 5,574 square feet of 'paper fill' in Wetland E is required to allow park visitors to continue using this lawn portion of the wetland. Park visitors have used this portion of Wetland E for many decades. The area of paper fill will have no grading, no fill, no paving or any other construction activity. The area will remain in lawn. The paper fill is necessary because without claiming this area as paper fill, the park department would have to protect this portion of the wetland with buffer and fencing, and visitors will not be able to use this area for passive recreation. There is strong regional demand for family recreation areas and Juanita Beach Park serves this important need. This portion of Wetland E is located near the bathhouse and beach, facilitating parental supervision of children. To avoid adverse effects on water quality, storm water runoff, or erosion, the contractor(s) will be required to follow the project TESC Plan, to comply with the King County 1998 Surface Water Design Manual, and to implement multiple other temporary and permanent BMPs. The project will result in actual fill (grading and/or fill) of 11,952 sf (0.27 acres) and paper fill of 5,574 sf (0.12 acres) for a total of 17,526 sf (0.4 acres) of impact in Wetland E per CoK Code. This represents 45% the total area of the 0.88-acre Wetland E. The project will provide mitigation for the total 0.43 acres of combined impacts to Wetlands B, and E (Category III wetlands) by constructing the 0.44 acre Oxbow Marsh, rehabilitating 0.20 acres of Wetland E, and enhancing 0.11 acres of Wetland B. The created marsh would reestablish native vegetation, provide valuable fish and wildlife habitat, improve water quality, and restore the type of habitat historically associated with the Lake Washington shoreline. The rehabilitation of Wetland E will consist of restoring hydrology and planting native species within the wetland. In total, 0.65 acres of compensatory wetland mitigation will be provided for the 0.43 acres of impact, which represents a mitigation ratio of 1.5:1 with a 1:1 ratio for wetland creation and a 0.5:1 ratio for rehabilitation/enhancement. This ratio meets the City code requirements for compensatory mitigation for Category III wetlands.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland E	IV	III	50 ft w/10' bldg setback	

Action: Fill for chips in play area (future phase)	Applicable Code: 24.05.070
Code Compliance:	**Rationale:**
h. Fill material does not contain organic or inorganic material that would be detrimental to water quality or fish and wildlife habitat;	Fill in Wetland E shall be required for future placement of chips in the playground area. There is strong regional demand for family recreation areas and Juanita Beach Park serves this important need. The Park's popular playground is conveniently located near the bathhouse and beach, facilitating parental supervision of children. The installation of chips will increase the safety of the play space and preserve water quality by reducing the potential for runoff and soil loss from the high-traffic play area. The project will result in actual fill (grading and/or fill) of 11,952 sf (0.27 acres) and paper fill of 5,574 sf (0.12 acres) for a total of 17,526 sf (0.4 acres) of impact in Wetland E per CoK Code. This represents 45% the total area of the 0.88-acre Wetland E. The project will provide mitigation for the total 0.43 acres of combined impacts to Wetlands B, and E (Category III wetlands) by constructing the 0.44 acre Oxbow Marsh, rehabilitating 0.20 acres of Wetland E, and enhancing 0.11 acres of Wetland B. The created marsh would reestablish native vegetation, provide valuable fish and wildlife habitat, improve water quality, and restore the type of habitat historically associated with the Lake Washington shoreline. The rehabilitation of Wetland E will consist of restoring hydrology and planting native species within the wetland. In total, 0.65 acres of compensatory wetland mitigation will be provided for the 0.43 acres of impact, which represents a mitigation ratio of 1.5:1 with a 1:1 ratio for wetland creation and a 0.5:1 ratio for rehabilitation/enhancement. This ratio meets the City code requirements for compensatory mitigation for Category III wetlands.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland E	IV	III	50 ft w/10' bldg setback	

Action: Restore wetland vegetation with native plantings	Applicable Code: 90.55; 90.65
Code Compliance:	**Rationale:**
90.55: Compensatory mitigation as wetland enhancement (that is, the improvement of existing wetlands) shall also be allowed. 90.55: On-site mitigation is presumed to be preferable to off-site mitigation. 90.65: The Planning Official may also permit or require the applicant to restore a wetland or its buffer through the addition of native plants and other habitat features.	The project will result in actual fill (grading and/or fill) of 11,952 sf (0.27 acres) and paper fill of 5,574 sf (0.12 acres) for a total of 17,526 sf (0.4 acres) of impact in Wetland E per CoK Code. This represents 45% the total area of the 0.88–acre Wetland E. The project will provide mitigation for the total 0.43 acres of combined impacts to Wetlands B, and E (Category III wetlands) by constructing the 0.44 acre Oxbow Marsh, rehabilitating 0.20 acres of Wetland E, and enhancing 0.11 acres of Wetland B. The created marsh would reestablish native vegetation, provide valuable fish and wildlife habitat, improve water quality, and restore the type of habitat historically associated with the Lake Washington shoreline. The rehabilitation of Wetland E will consist of restoring hydrology and planting native species within the wetland. In total, 0.65 acres of compensatory wetland mitigation will be provided for the 0.43 acres of impact, which represents a mitigation ratio of 1.5:1 with a 1:1 ratio for wetland creation and a 0.5:1 ratio for rehabilitation/enhancement. This ratio meets the City code requirements for compensatory mitigation for Category III wetlands.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width
Wetland E	IV	III	50 ft w/10' bldg setback

Action: Restore hydrology with treated stormwater from rain gardens	Applicable Code: 90.55; 90.65
Code Compliance:	**Rationale:**
90.55: Compensatory mitigation as wetland enhancement (that is, the improvement of existing wetlands) shall also be allowed. 90.55: On-site mitigation is presumed to be preferable to off-site mitigation. 90.65: The Planning Official may also permit or require the applicant to restore a wetland or its buffer through the addition of native plants and other habitat features.	Treated storm water will be directed to Wetland E via water quality swales enhanced with native plantings. Hydrological functions of Wetland E will be improved by directing treated storm water from the parking lot to Wetland E for storage and additional filtration.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width
Wetland E Buffers	IV	III	50 ft w/10' bldg setback

Action: In Phase I - Promenade path and stage in buffer	Applicable Code: 90.45; 90.70
Code Compliance:	**Rationale:**
90.45: 5. Minor Improvements – Minor improvements may be located within the sensitive area buffers specified in subsection (1) of this section. These minor improvements shall be located within the outer one-half of the sensitive area buffer. a. It will not adversely affect water quality; b. It will not adversely affect fish, wildlife, or their habitat; c. It will not adversely affect drainage or storm water detention capabilities; d. It will not lead to unstable earth conditions or create erosion hazards or contribute to scouring actions; 90.70: The City may develop access through a wetland and its buffer in conjunction with a public park.	Some grading and fill is required in the buffer of Wetland E to construct the proposed promenade pathway and stage in Juanita Beach Park. The promenade has been sited to minimize conversion of sensitive environments and will direct pedestrian flow to minimize trampling in sensitive areas. The stage will provide a dramatic venue for public events. To avoid adverse effects on water quality, storm water runoff, or erosion, the contractor(s) will be required to follow the project TESC Plan, to comply with the King County 1998 Surface Water Design Manual, and to implement multiple other temporary and permanent BMPs. The project will result in 7,415 sf (0.17 acres) of combined impact to Wetland E buffers for buffer reduction, paving, and excavation for construction of the promenade, stage, community commons, crushed rock path, boardwalk, water quality swales, and the future path and playchip area. The project will provide mitigation for the impacts to Wetland E buffers by enhancing 9,802 sf (0.22 acres) of Wetland E buffer with native plantings.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland E Buffer	**IV**	**III**	**50 ft w/10' bldg setback**	

Action: Future Phase – Chips in play area in buffer	**Applicable Code: 24.05.070**
Code Compliance:	**Rationale:**
h. Fill material does not contain organic or inorganic material that would be detrimental to water quality or fish and wildlife habitat;	Fill in Wetland E shall be required for future placement of chips in the playground area. There is strong regional demand for family recreation areas and Juanita Beach Park serves this important need. The Park's popular playground is conveniently located near the bathhouse and beach, facilitating parental supervision of children. The installation of chips will increase the safety of the play space and preserve water quality by reducing the potential for runoff and soil loss from the high-traffic play area. The project will result in 7,415 sf (0.17 acres) of combined impact to Wetland E buffers for construction of the promenade, stage, community commons, crushed rock path, boardwalk, water quality swales, and the future path and playchip area. The project will provide mitigation for the impacts to Wetland E buffers by enhancing 9,802 sf (0.22 acres) of Wetland E buffer with native plantings.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland E Buffer	**IV**	**III**	**50 ft w/10' bldg setback**	

Action: In Phase I remove picnic shelter from buffer; In Phase I remove concrete pad from buffer; In Future phase, remove bathhouse from buffer	**Applicable Code: 90.45; 90.65**
Code Compliance:	**Rationale:**
90.45: 2. Buffer Setback – Structures shall be set back at least 10 feet from the designated or modified wetland buffer. 90.65: Planning Official approval is required prior to wetland restoration. The Planning Official may permit or require the applicant or property owner to restore and maintain a wetland and/or its buffer by removing material detrimental to the area, such as debris, sediment, or vegetation.	Several structures including a picnic shelter, a concrete pad, and a bathhouse are located within the buffer for Wetland E. The proposed project would include removal of the picnic shelter and concrete pad (totaling 1,032 sf) under Phase I, and the bathhouse (2,816 sf) under a future phase. Removal of these impervious surfaces would enhance Wetland E's hydrologic functionality. Removal of the structures would also eliminate these potential pedestrian destinations and thereby decrease foot traffic through Wetland E and its buffer.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Wetland F	**III**	**1**	**100 ft**	

Action: None	**Applicable Code:**
Code Compliance	**Rationale**
N/A	N/A

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Oxbow Marsh	**III**	**1**	**100 ft**	

Action: Create a new Oxbow Marsh habitat with channel, weirs, and native species- marsh habitat portion.	**Applicable Code: 90.55; 90.65**
Code Compliance:	**Rationale:**
90.55: Compensatory mitigation as wetland enhancement (that is, the improvement of existing wetlands) shall also be allowed. 90.55: 4. Compensatory Mitigation – All approved impacts to regulated wetlands require compensatory mitigation so that the goal of no net loss of wetland function, value, and acreage may be achieved. Mitigation shall be implemented through the creation of wetlands (from non-wetland areas) or through the restoration of wetlands (from uplands that were formerly wetlands). 90.65: Planning Official approval is required prior to wetland restoration. The Planning Official may permit or require the applicant or property owner to restore and maintain a wetland and/or its buffer by removing material detrimental to the area, such as debris, sediment, or vegetation. The Planning Official may also permit or require the applicant to restore a wetland or its buffer through the addition of native plants and other habitat features.	The proposed marsh would reestablish native vegetation, provide valuable fish and wildlife habitat, improve water quality, and restore the type of habitat historically associated with the Lake Washington shoreline.

Water Resource	WDOE Category	City of Kirkland Type	CoK Buffer Width	
Oxbow Marsh	**III**	**1**	**100 ft**	

Action: Create a planted riparian buffer for new off-channel habitat. Buffer is based on a 100-foot wide riparian buffer, combined with the Juanita Creek Buffer.	**Applicable Code: 90.55; 90.65**
Code Compliance:	**Rationale:**
90.55: Compensatory mitigation as wetland enhancement (that is, the improvement of existing wetlands) shall also be allowed. 90.55: 4. Compensatory Mitigation – All approved impacts to regulated wetlands require compensatory mitigation so that the goal of no net loss of wetland function, value, and acreage may be achieved. Mitigation shall be implemented through the creation of wetlands (from non-wetland areas) or through the restoration of wetlands (from uplands that were formerly wetlands). 90.65: Planning Official approval is required prior to wetland restoration. The Planning Official may permit or require the applicant or property owner to restore and maintain a wetland and/or its buffer by removing material detrimental to the area, such as debris, sediment, or vegetation. The Planning Official may also permit or require the applicant to restore a wetland or its buffer through addition of native plants and other features.	The proposed marsh would reestablish native vegetation, provide valuable fish and wildlife habitat, improve water quality, and restore the type of habitat historically associated with the Lake Washington shoreline.

MUCKLESHOOT INDIAN TRIBE
Fisheries Division
39015 - 172nd Avenue SE • Auburn, Washington 98092-9763
Phone: (253) 939-3311 • Fax: (253) 931-0752

August 24, 2009

RECEIVED
AUG 26 2009
_____ AM _____ PM
PLANNING DEPARTMENT
BY_____

Mr. Eric Shields
Director
Department of Planning and Development
City of Kirkland
123 Fifth Avenue
Kirkland, WA 98033-6189

RE: Juanita Beach Park Phase 1 Redevelopment Project, SEP09-00007, Determination of Non-Significance

Dear Mr. Shields:

The Muckleshoot Indian Tribe Fisheries Division has reviewed the threshold determination, environmental checklist; JARPA Permit application (updated April 2009); Attachment A to the JARPA application (April 2009); permit drawings (April 2009); 2009 Addendums to 2008 Wetland and Ordinary High Water Mark Determination Report, 2008 Wetland and Stream Mitigation Plan, and 2008 Biological Assessment; and the Updated Impact and Mitigation Tables. This project is within the Tribe's Usual and Accustomed Fishing Area. We are offering the following comments in the interest of protecting and/or restoring the Muckleshoot Indian Tribe's fisheries resources.

As we noted in our April 13 2006 letter in response to the Master Plan for Juanita Beach Park, the redevelopment of Juanita Beach Park represents a unique opportunity to restore fish habitat at Juanita Creek and Lake Washington. The City should carefully review the proposed actions in the proposed master plan and chose those that will fully restore fish habitat along the Lake Washington and Juanita Creek; not just serve as mitigation for impacts associated with the developed portions of the park such as trails, parking lots, etc. For example, the sediment inputs in Juanita Creek should be managed by eliminating them at the source or providing sufficient stormwater treatment, not by dredging the stream delta. Restoration should also occur in Juanita Creek as part of this project beyond the minor bank setback project proposed. Our specific comments to this proposal are attached for your review and consideration.

ATTACHMENT 10

We appreciate the opportunity to review and comment on this proposal. Please let me know if you have any questions or would like to meet to discuss these comments.

Thank you,

Karen Walter
Watersheds and Land Use Team Leader

Cc: Erin Legge, USACOE
Randy McIntosh, NMFS
Ginger Holser, WDFW, Region 4
Alisa Bieber, WDFW, Region 4
Rebekah Padgett, WDOE, NW Region

The following comments are based on information in the environmental checklist and the April 2009 project drawings.

1. Lakefront promenade

The project proposes to develop a 14 foot wide concrete Lakefront Promenade that will connect with the existing over-water pedestrian pier. In conjunction with this Promenade, a Plaza (stage) and Seat walls will all be built within 200 feet of Lake Washington. To offset these impacts, 1616 square feet of shoreline will be replanted with native species and 2120 square feet of biofiltration swale will be constructed to treat stormwater. Additional lakeshore plantings should be included as part of this project along Lake Washington west of the existing pedestrian pier and continuing along both sides of Juanita Creek.

2. Proposal to Relocate Parking Lot

Per the checklist, the existing parking lot will be demolished and a new parking lot constructed further from the Lake Washington shoreline. The checklist implies that existing trees will be removed as part of this work, but fails to identify which trees will be removed and their proximity to Juanita Creek. Any tree that is equal to or greater than 4 inches in diameter and within 200 feet of Juanita Creek that will be removed for the parking lot, or any other aspect of Phase I, should be placed back into Juanita Creek as partial mitigation for the potential temporal loss of future wood recruitment necessary to create and maintain instream fish habitat.

3. Stormwater Treatment for Parking Lot and Lawn

The project proposes to develop rain gardens and water quality swales to treat stormwater. Some of the treated stormwater will be routed to Wetland 3 to augment its hydrology. The rest will be treated and discharged to Lake Washington. These structures should be maximized to treat all of the stormwater generated from the site using enhanced water quality treatment options. The facilities should also be monitored to ensure their effectiveness and the results sent to the Muckleshoot Indian Tribe Fisheries Division in addition to the regulatory agencies.

4. Proposed Juanita Oxbow Marsh

Fish Passage

The proposed Oxbow Marsh to be constructed adjacent to Juanita Creek and within portions of Wetlands B and C will likely be an improvement over existing conditions. However, we have some concerns with this proposal based on the April 2009 drawings. As part of the Marsh, two weirs (Weir A and B) will be constructed to regulate water levels within Juanita Creek and the entrance to the Oxbow Marsh. As designed, these weirs may limit the passage for juvenile salmon to reach upstream areas as needed. The design for these weirs are based on a 6 inch trout and the resulting flow velocities at the various water elevations can exceed juvenile salmon swimming speeds based on current research (e.g. Bell, 1973 and 1991; Katapodis 1992). These weirs should be monitored over the life of the project to ensure that these fish passage weirs are not an impediment to upstream fish passage for adult and juvenile salmon. It is not apparent how fish passage at the weirs will be monitored per the monitoring plan. Finally, a contingency plan needs to be developed and funded should these weirs become a fish passage problem in the future.

Wood passage
As designed, the two weirs do not appear to be capable of passing wood to downstream areas. The project should relocate any wood that threatens the integrity of the weirs to downstream areas of Juanita Creek in order to avoid a loss of instream wood.

Sediment Forebay of Marsh
The environmental checklist and other documents note that the constructed forebay below the diversion weir (Weir B) will be maintained over time to avoid sediment accumulation in the marsh and downstream areas. In responses to concerns raised a review letter from the Watershed Company (January 16, 2009), the design team responded that sediments would be vactored from the 50'x 20' forebay when sediments are greater than 9 inches above the as-built grade settling zone over a five-year period, to be measures approximately 25 feet downstream of the diversion weir. The performance standard would also allow the removal of localized sedimentation in the marsh that might disrupt fish passage or contribute to fish stranding.

We are concerned that by including a forebay allowing for sediment deposition and regular maintenance that the project's mitigation measures will be limited due to the continual disturbance to the marsh and Juanita Creek that will arise every time maintenance is needed. Equipment access will be needed; therefore, the forebay will not be able to grow trees or other vegetation that provide shade. Inwater sediments will be removed, fish will need to be removed, and water diverted every time maintenance is needed. As we noted in our comments to the Master Plan, upstream sediment sources and stormwater should be managed before the marsh is built to avoid the regular disturbance of the Oxbow Marsh proposed as mitigation.

Pathways along Oxbow Marsh and Juanita Creek
Figure 4A shows a series of pathways crossing over and within areas that could be restored with native plants to benefit the Oxbow Marsh, Juanita Creek, and Lake Washington shoreline. We recommend that the most southern pathway that allows people access along western property line to Juanita Creek be removed from the project and this area fully revegetated so that adult and juvenile salmon have a vegetated zone free from human disturbance. People would still have access to views of the Oxbow Marsh and Juanita Creek via the two new bridges.

Oxbow Marsh Design
In Figures 7 and 8, there are nine pieces of wood shown to be placed along the marsh banks. None of this wood is shown in the low flow channel to be created within the marsh to benefit juvenile fish. The project needs to be redesigned to add a substantial amount of wood, including rootwads, into the low flow channel of the oxbow marsh to create instream habitat for juvenile salmon. We can provide recommendations for this redesign work.

5. Juanita Creek, Riparian and Wetland Rehabilitation
We appreciate the project's proposal to remove concrete debris, and set the left bank, placing jut netting and live stakes for bank stabilization for 2900 square feet on Juanita Creek. The project should be revised

by removing riprap along Juanita Creek below the new pedestrian bridge, and using bioengineering methods to restore the stream banks. In addition, large woody debris should be added to Juanita Creek using trees that need to be removed for Phase 1 improvements as discussed above. Wood is needed as mitigation for the loss of riparian restoration opportunities due to the new bridge, the rock path in buffers, as well as fill associated with Weir A. Furthermore, the regulated stream buffer should be restored to the fullest extent possible during Phase 1. Finally, the quantities of the planting plan for the Oxbow Marsh and Juanita Creek are lacking from the project drawings. The mitigation table indicates 1.3 acres of riparian buffer for the Oxbow Marsh and Juanita Creek, but it is unclear how these numbers were derived based on Figure 9. Figure 9 suggests that there will be open areas that are not revegetated, we are concerned that the regulated buffers are not being restored (less the pathways) as part of Phase 1. Since the riparian plantings are a mitigation measure for some of the project impacts, the detailed plans should be provided to the Tribal Fisheries Division and the regulatory agencies for review.

6. Monitoring

In addition to the comments made above regarding monitoring issues, the project be conditioned to require that all monitoring reports be sent to the Muckleshoot Indian Tribe Fisheries Division.

References

Bell, M. C. 1991. Fisheries handbook of engineering requirements and biological criteria. Fish Passage Development and Evaluation Program, U.S. Army Corps of Engineers, Sacramento District.

Katopodis, C. 1992. Introduction to fishway design. Freshwater Institute, Central and Arctic Region, Department of Fisheries and Ocean. Working Document.

CITY OF KIRKLAND
Department of Parks & Community Services
505 Market Street, Suite A, Kirkland, WA 98033 425.587.3300
www.ci.kirkland.wa.us

MEMORANDUM

To: Janice Soloff, Planning and Community Development

From: Michael Cogle, Park Planning Manager

Date: September 2, 2009

Subject: Response to Muckleshoot Indian Tribe Fisheries Division Comments to SEPA Determination: Juanita Beach Redevelopment Project SEP09-00007

We appreciate the opportunity to respond to the comments provided to the Planning and Community Department by Karen Walter, Watersheds and Land Use Team Leader of the Muckleshoot Indian Tribe Fisheries Division in her letter dated August 24, 2009. We have previously met with Ms. Walter on two separate occasions at the project site to describe our goals and design intent and to understand the needs of the Muckleshoot Indian Tribe relative to Juanita Beach Park redevelopment. Our proposal has in no small part been shaped by our prior discussions with Ms. Walter.

We have some more detailed drawings to pass on to the Tribe as requested in their letter. (We are unsure of which graphics were forwarded to the Tribe along with the SEPA). Please note that the City has limited funds to complete the work in this phase and that contracts are in place with the State that specify the elements that need to be constructed as a requirement of grant contracts. This limits the amount of work that can be done in the stream during this phase of park redevelopment. We thank the Tribe for their comments and have been able to incorporate most of the changes or additions to the design as requested.

Our specific responses:

1. Lakefront Promenade
We propose additional plantings along the creek as requested – see enclosed plan.

2. Proposal to Relocate Parking Lot
As requested, we propose to place back trees cut in the 200 foot buffer along Juanita Creek.

3. Stormwater Treatment for Parking Lot and Lawn
The parking lots were re-designed with the intent of setting paved areas back from the shore and improving water quality as much as the budget will allow. A huge percentage of the project budget has gone into this effort. Other water quality improvement projects are identified in the master plan and will be implemented as budget becomes available.

Per Ecology's municipal stormwater permit, stormwater treatment requirements apply (only) to the new impervious surface and converted pervious surfaces, and the project is exempt from

ATTACHMENT 11

enhanced treatment stormwater requirements because it drains directly to Lake Washington, which is on the "Basic Treatment Receiving Waters" list (Ecology 2005, Appendix V-A). Nevertheless, the rain gardens and bio-infiltration swales are designed to treat the entire areas tributary to them, and they also qualify as enhanced treatment measures per the Ecology stormwater manual. In this way, the stormwater treatment plan goes beyond minimum permit requirements. Future phases will be able to address stormwater treatment in areas not addressed in Phase I (for instance, the west side of the existing parking area).

4. Proposed Juanita Oxbow Marsh

(Fish Passage)

The weir design was modified to improve fish passage and was represented in the April submittal documents.

The weirs have been lowered since initial permit materials were developed several months ago. Design analysis of the control weir and diversion weir addressed fish passage design (a technical memorandum supporting the design can be provided if necessary). The log control weir is based on standard Washington State Department of Fish and Wildlife cross-weir design, and should easily support fish passage. The diversion weir can be adaptively managed by removing stop logs during spring to maximize opportunities for fish passage.

We have provided stop logs on the weir to serve as a contingency plan in the event passage becomes an issue after construction. The weir diversion could be limited through adaptive management.

Monitoring of the weir by the City to ensure fish passage is working will take place and reports can be furnished to the Tribe.

(Wood Passage)

We don't believe that wood passage will be a significant issue as woody debris will be able to float over the low-rise weir structures in larger events. We agree that any wood debris threatening the integrity of the weir structures should be moved around the structures if possible. The City will manage the weir as requested.

(Sediment Forebay of Marsh)

The forebay is provided to limit maintenance to a small area.

As the project applicant, the Parks and Community Services Department has limited ability to manage upstream sediment sources and stormwater issues outside of the park property. We are aware that the City of Kirkland has completed several stabilization projects along Juanita Creek in recent years, with more anticipated in the future. It should also be noted that the likely source of considerable sediment within the creek lies outside Kirkland's corporate limits (i.e. in unincorporated King County).

(Pathways along Oxbow Marsh and Juanita Creek)

The western pathway along the creek can be eliminated as requested by the Tribe.

(Oxbow Marsh Design)
The logs in the marsh can be relocated to place them closer to the low flow channel as requested. An additional 5 logs and 3 root wads will also be provided – see plan provided.

5. Juanita Creek, Riparian and Wetland Rehabilitation

We have provided a revised planting plan and plant list. Plant quantities are still being developed as Construction Documents move forward, but should be available before the end of this month.

The attached detail also shows the slope lay back along the creek with associated bio-engineering as requested. The master plan identifies additional work along the creek in future phases.

6. Monitoring

All monitoring reports can be sent to the Tribe as requested.

Please let me know if you would like clarification or require any further information.

Attachments

Cc: Jim Brennan, J.A. Brennan Associates
Desiree Douglass, Douglass Consulting

2009 Addendum to 2008 Juanita Beach Park Wetland & Stream Mitigation Plan

Design Team Response:

- The JA Brennan design team revised the existing conditions plans to indicate a 75-foot buffer around Juanita Creek.

3. Respond to comment on performance standards:

"The performance standards section needs revision. First year survival for all planted species should be 100% acknowledging that the standard can be met either by survival or first-year warranty replacement. All references to survival of species should be for native plant species. Similarly, all references to percent cover should allow desirable native volunteer vegetation to count towards each percentage goal. Due to the complexity and size of the plan combined with replanting and/ or substitution, tracking of percent survival beyond the second year is difficult and not very meaningful to the success of the site. Survival standards in year three and beyond are not needed."

"Birdsfoot trefoil should also be included in the list of invasive weeds to be managed at below 10% cover."

Design Team Response:

- The Mitigation Plan has been revised to indicate 100% survivability of *all* native plant species will be required at the end of Year 1. Noted that survival only includes native plant species. The revised performance standards for the wetland mitigation is provided below.
- Survival standards for Year 1 and beyond have been removed with an emphasis on monitoring for diversity and percent cover for all Years beyond Year 1.
- Birdsfoot trefoil has been added to the list of invasive weeds to be managed below 10% cover. A revised invasive weeds plant list is provided below.

Revised Performance Standards

Performance standards have been established that correspond to the stated mitigation goals. These standards are the primary factors that will be used to judge the success of the mitigation project. While specific performance criteria provide important benchmarks and will help to direct maintenance and contingency efforts, the mitigation goals must also be considered when evaluating mitigation success. The performance standards are as follows:

- YEAR 1: 100% of at least three species of planted native trees and 100% of at least four species of planted native shrubs will survive after the first year following planting and will cover at least 15% of the areas in the Lake Washington shoreline designated for planting native species. The 100% survival rate can be met by survival with one-year warranty plantings for any missing native trees and shrubs.
- YEAR 1: 100% of at least three species of planted native trees and 100% of at least four species of planted native shrubs will survive after the first year following planting and will cover at least 15% of the Oxbow Marsh, Wetlands B and C, (palustrine forested and scrub-shrub [PFO/PSSC]), and the Juanita Creek/wetland buffer areas. The 100% survival rate can be met by survival with one-year warranty plantings for any missing native trees and shrubs.
- YEAR 1: 100% of at least four species of native emergent and grass species will survive after the first year following planting and will cover at least 40% of the Oxbow Marsh, Wetlands B and C (PFO/PSSC), and the Juanita Creek/wetland buffer areas. The 100% survival rate can be met by survival with one-year warranty plantings for any missing emergent and grass species.
- YEAR 1: 100% of at least four species of native emergent and grass species will survive after the first year following planting and will cover at least 60% of the restoration palustrine emergent (PEM)

wetland meadow areas in Wetland E and the planted Wetland E buffers. The 100% survival rate can be met by survival with one-year warranty plantings for any missing emergent and grass species.

- YEAR 3: At least three species of planted native trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 30% of the areas in the Lake Washington shoreline designated for planting native species.
- YEAR 3: At least three species of planted native trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 30% of the Oxbow Marsh, Wetlands B and C, (palustrine forested and scrub-shrub [PFO/PSSC]), and the Juanita Creek/wetland buffer areas.
- YEAR 3: At least four species of native emergent and grass species will survive after five years after planting and will cover at least 50% of the Oxbow Marsh, Wetlands B and C (PFO/PSSC), and the Juanita Creek/wetland buffer areas.
- YEAR 3: At least four species of native emergent and grass species will survive after the first year following planting and will cover at least 70% of the palustrine emergent (PEM) wetland meadow areas in Wetland E and the planted Wetland E buffers.
- YEARS 5 and 7: At least three species of planted native trees and at least four species of planted native shrubs will survive after five and seven years after planting and will cover at least 35% of the areas in the Lake Washington shoreline designated for planting native species.
- YEARS 5 and 7: At least three species of planted native trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 35% of the Oxbow Marsh, Wetlands B and C, (palustrine forested and scrub-shrub [PFO/PSSC]), and the Juanita Creek/wetland buffer areas.
- YEAR 5: At least four species of native emergent and grass species will survive after five years after planting and will cover at least 60% of the Oxbow Marsh, Wetlands B and C (PFO/PSSC), and the Juanita Creek/wetland buffer areas.
- YEAR 5: At least four species of native emergent and grass species will survive after the first year following planting and will cover at least 80% of the palustrine emergent (PEM) wetland meadow areas in Wetland E and the planted Wetland E buffers.
- YEAR 10: At least three species of native planted trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 50% of the areas in the Lake Washington shoreline designated for planting native species.
- YEAR 10: At least three species of planted native trees and at least four species of planted native shrubs will survive after five years after planting and will cover at least 50% of the Oxbow Marsh, Wetlands B and C, (palustrine forested and scrub-shrub [PFO/PSSC]), and the Juanita Creek/wetland buffer areas.
- YEAR 10: At least four species of native emergent and grass species will survive after five years after planting and will cover at least 50% of the Oxbow Marsh, Wetlands B and C (PFO/PSSC), and the Juanita Creek/wetland buffer areas.
- YEAR 10: At least four species of native emergent and grass species will survive after the first year following planting and will cover at least 90% of the palustrine emergent (PEM) wetland meadow areas in Wetland E and the planted Wetland E buffers.
- ALL YEARS: Annually monitor the installation to ensure integrity of the weir structures and stream stabilization measures. Repair and/or replant marsh habitat and stream stabilization measures as

necessary. Remove or modify any debris that threatens the integrity of the weir structures or stream stabilization measures.

- ALL YEARS: Inspect annually and after significant storm events (greater than 0.5 inches precipitation over 24 hours) the settling zone upstream of the marsh. Remove sediment in the settling zone as necessary to provide no more than 9 inches of sedimentation above the as-built grade settling zone over a five-year period, measured approximately 25 feet downstream of the diversion weir. In the marsh, remove or modify any localized sedimentation that might disrupt fish passage or contribute to fish stranding.
- YEARS 1, 3, and 5: During the January through June period, conduct juvenile fish monitoring by installing a fyke net or other methods to assess the extent and pattern of fish use of the marsh. Fyke net will be installed near downstream end of marsh, and monitored during two discreet 24-hour periods each month.
- ALL YEARS: Annually during the January through June period, observe flow characteristics in marsh and creek when Juanita Creek is at or above the expected median flow rate for the month when the observation is made. Remove or modify debris or sediment that disrupts a continuous hydraulic connection between the marsh and Juanita Creek. The continuous hydraulic connection should include a stream path through the marsh from the diversion weir to mouth, with no pools disconnected from the marsh channel.ALL YEARS: Invasive weeds (identified below) will not comprise more than 10 percent of the vegetation cover during any monitoring year, with the exception of purple loosestrife (*Lythrum salicaria*) and Japanese knotweed (*Polygonum cuspidatum*), for which there is a zero tolerance standard (0% cover in any year). Other invasive weeds include:

Poison Hemlock (*Conium maculatum*)
Himalayan blackberry (*Rubus procerus*)
Evergreen blackberry (R. *laciniatus*)
Scot's broom (*Cytisus scoparius*)
Reed canarygrass (*Phalarus arundinacea*)
Climbing nightshade (*Solanum dulcamara*)
Field morning-glory (*Convolulus arvensis*)
Burdock (*Arctium minus*)
Knapweed (*Centaurea* spp.)
Canada thistle (*Cirsium arvense*)
Bull thistle (*C. vulgare*)
Teasel (*Dipsacus sylvestris*)
St. John's wort (*Hypericum perforatum*)
Russian thistle (*Salsola kali*)
Tansy ragwort (*Senecio jacobaea*)
Common tansy (*Tanacetum vulgare*)
Birdsfoot trefoil (*Lotus corniculatis*)

4. Respond to comments on monitoring schedule:

"No schedule was shown for the monitoring plan. Note that KZC 90.554.c requires two site visits in each of the required five monitoring years. The first visit is typically a maintenance review in the spring; the summer or fall visit contains the bulk of the fieldwork."

Design Team Response:

- A schedule has been included in Section 8.10 Monitoring Plan. See revised text below.

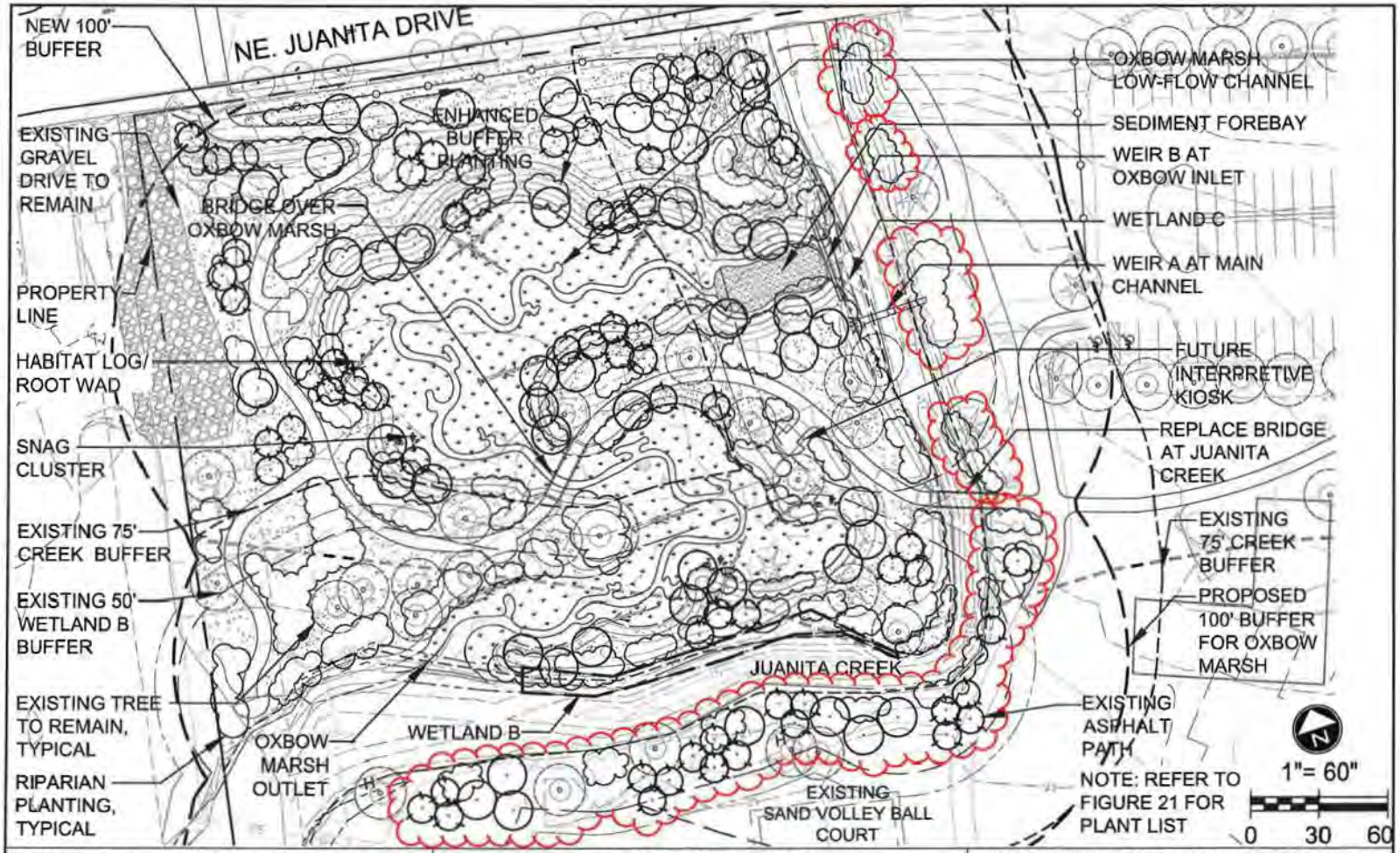
2009 Addendum to 2008 Juanita Beach Park Wetland & Stream Mitigation Plan

Revised 8.10 Monitoring Plan

Mitigation monitoring shall be conducted by a qualified person for a ten-year period on Years 1, 3, 5, 7, and 10. Year 1 will begin one year from the date the USACE accepts the as-built drawings for the mitigation plan construction. Year 1 will also serve as the one-year warranty inspection. A qualified person could include the mitigation designer or a qualified wetland biologist. Each year monitoring will be conducted twice – once in the spring between April 1 and May 30th and in the fall between September 1 and October 31st. Monitoring will assess the following parameters:

1. Function of control structures, hydrology and flows at Oxbow Marsh;
2. Sedimentation at Oxbow Marsh;
3. Fish use, passage and stranding issues at Oxbow Marsh;
4. Native vegetation establishment (percent survival and cover, vigor, and diversity);
5. Control of invasive species;
6. Wildlife observations;
7. Photographic ground points;
8. Human encroachment, including trampling, vandalism, and trash dumping;
9. Success relative to Performance Standards; and
10. Contingency Plan.

The monitoring results will be related to the performance standards and, if warranted, recommendations shall be made based on these findings to assure mitigation success. Monitoring reports will be submitted to the Seattle District USACE Regulatory Branch, the Muckleshoot Tribe, WDOE, WDFW, and the City of Kirkland by December 31st of each monitoring year.



PURPOSE: Develop a lakefront promenade with seating walls, stream enhancements and park enhancements to improve swimming beach water quality.

DATUM: Horizontal NAD 83(91)
Vertical NAVD 88

ADJACENT PROPERTY OWNERS: See Figure 25

LATTITUDE: 47°42'18.45"N
LONGITUTE: 122°12'46.92"W

CITY OF KIRKLAND
PARKS AND RECREATION DEPARTMENT

JUANITA BEACH PARK PHASE 1 DEVELOPMENT

REFERENCE #: NWS-2008-1222-NO ADDRESS: 9703 NE Juanita Dr Kirkland, WA 98034

FIGURE 9 OF 25: OXBOW MARSH PLANTING PLAN

PROPOSED: JUANITA BEACH PARK PHASE 1 DEVELOPMENT
IN: CITY OF KIRKLAND
AT: NE JUANITA DRIVE
COUNTY OF: KING STATE: WA
APPL. BY: CITY OF KIRKLAND PARKS
DATE: NOVEMBER 2008
REVISED: APRIL 2009 & JUNE 2009

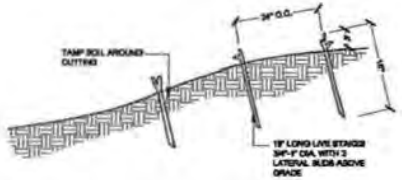
PREPARED BY:
J.A. BRENNAN ASSOCIATES, PLLC

GENERAL NOTES:

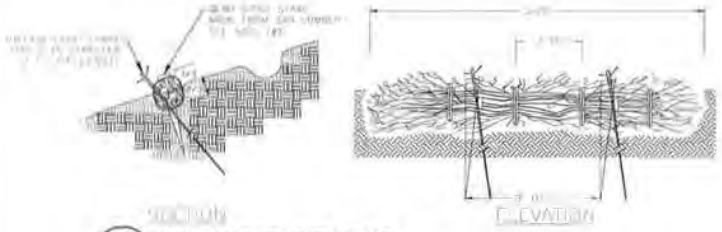
1. EROSION CONTROL BLANKET SHALL BE PROLANDA 3BOD-DCF-30 OR EQUAL, SECURED PER MANUFACTURER'S INSTRUCTIONS. SEE SPECIFICATIONS. SEE SITE PLAN SHEETS 4 AND 5 FOR LIMITS OF BLANKET COVERAGE. SEE DETAIL THIS SHEET FOR EROSION CONTROL BLANKET INSTALLATION DETAIL.
2. HAND PLACED RIPRAP IS COMPRISED OF "HAND PLACED RIPRAP-ON-SITE MATERIAL" AND "HAND PLACED RIPRAP". SOURCE OF HAND PLACED RIPRAP SHALL BE SALVAGED ON-SITE MATERIAL COMBINED WITH IMPORTED RIPRAP MATERIAL AS PER SPECIAL PROVISIONS TO STANDARD SPECIFICATIONS.
3. HAND PLACED RIPRAP LARGER THAN 2 FOOT DIAMETER SHALL BE BURIED AT TOE OF SLOPE AS DIRECTED BY FIELD ENGINEER.
4. REFER TO LANDSCAPE PLAN FOR PLANTING PLAN AND FOR LIMITS OF UPLAND PLANTINGS, CREEK EDGE PLANTINGS, AND EMERGENT PLANTINGS.
5. GEOTEXTILE FOR SOIL SEPARATION SHALL BE MIRAFI MODEL 180N NONWOVEN POLYPROPYLENE GEOTEXTILE OR EQUAL.
6. EXISTING CONCRETE SLABS SHALL BE REMOVED FROM BANK AND DISPOSED OFF-SITE.
7. EXPOSED FACE OF ROCK TOE PROTECTION SHALL BE MADE SMOOTH AS POSSIBLE AND SHALL BE CONSTRUCTED AT A 1.5(H):1(V) SLOPE.

WILLOW FASCINE INSTALLATION NOTES:

1. CONSTRUCT FASCINE OF WILLOW OR WILLOW-TYPE STOCK 1/2-IN TO 2-IN IN DIAMETER AND 5-FT TO 10-FT LONG. CUTTINGS SHOULD BE FROM AN AREA SIMILAR TO THE INSTALLATION SITE IN SOIL, CLIMATE, AND LOCATION. CUTTINGS SHOULD BE FREE OF DISEASE, ROT, OR INSECT INFESTATION.
2. HARVEST AND INSTALL WILLOW FASCINES DURING THE DORMANT SEASON. SOAK CUTTINGS IN WATER FOR 1-14 DAYS JUST PRIOR TO INSTALLATION.
3. ASSEMBLE FASCINES BY STAGGERING CUTTINGS IN A UNIFORM BUNDLE 6IN-12IN DIAMETER AND 5FT-20FT LONG, DEPENDING ON SITE CONDITIONS AND HANDLING CAPABILITIES. VARY THE ORIENTATION OF CUTTINGS, ALTERNATING THE BUTT-ENDS OF THE CUTTINGS. FORM TAPERED ENDS ON EACH FASCINE BUNDLE. TIE SECURELY WITH NATURAL TWINE EVERY 12-15 INCHES ALONG BUNDLE LENGTH.
4. EXCAVATE TRENCH 2/3 FASCINE BUNDLE DIAMETER. FASCINE TRENCHES SHOULD BE PARALLEL TO SLOPE CONTOURS. INSTALL EROSION CONTROL FABRIC IF SPECIFIED. IF MULTIPLE FASCINE ROWS ARE SPECIFIED, INSTALL WORKING FROM BOTTOM OF THE SLOPE TO THE TOP.
5. PLACE FASCINE BUNDLES IN THE TRENCH SUCH THAT 2/3 OF BUNDLE IS BELOW FINISH GRADE. SECURE BUNDLES WITH DEAD STOUT STAKES AND/OR LIVE STAKES EVERY 3FT O.C. TOP OF STAKES SHOULD BE FLUSH WITH TOP OF FASCINE BUNDLES.
6. DEAD STOUT STAKES MAY BE CONSTRUCTED BY SAWING 2X4 LUMBER STOCK ON THE DIAGONAL. DEAD STOUT STAKES SHOULD BE 2FT LONG FOR FASCINE INSTALLATION ON CUT SLOPES, AND 3FT LONG FOR FASCINE INSTALLATION ON FILL SLOPES.
7. TYPICAL LIVE STAKES ARE 2IN DIAMETER AND 3FT LONG. INSTALL LIVE STAKES AS SPECIFIED ON PLANTING PLAN, WITH SPACING OF 3FT O.C.
8. TO HELP ENSURE ADEQUATE SOIL TO STEM CONTACT, WASH LOOSE SOIL INTO THE TRENCH AND AROUND THE CUTTINGS, OR SLIGHTLY TAMP MOIST SOIL INTO AND AROUND THE SIDES OF THE FASCINE. DO NOT COVER FACINES ENTIRELY.



A LIVE STAKE PLANTING DETAIL
NOT TO SCALE



B WILLOW FASCINE DETAIL
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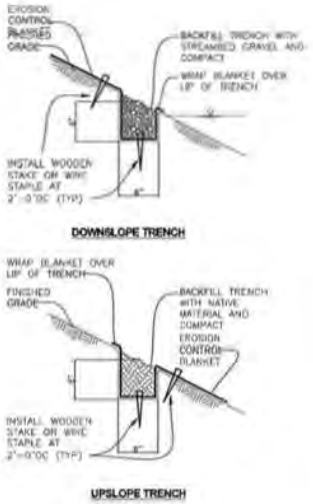

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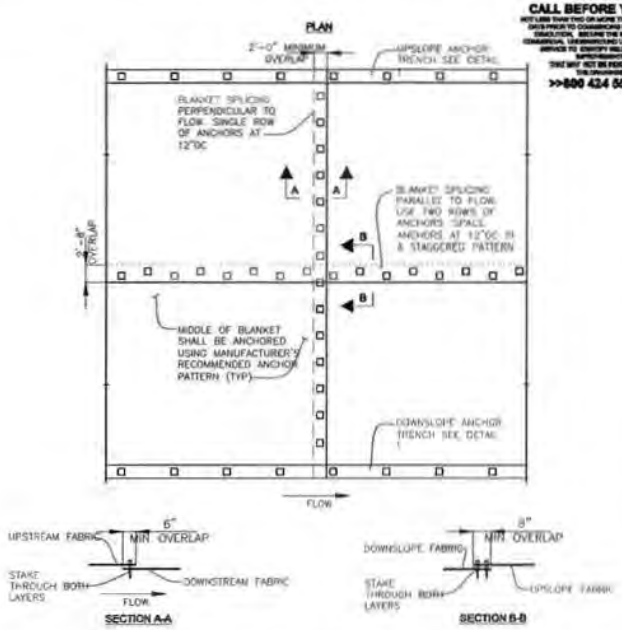

D EROSION CONTROL BLANKET DETAIL
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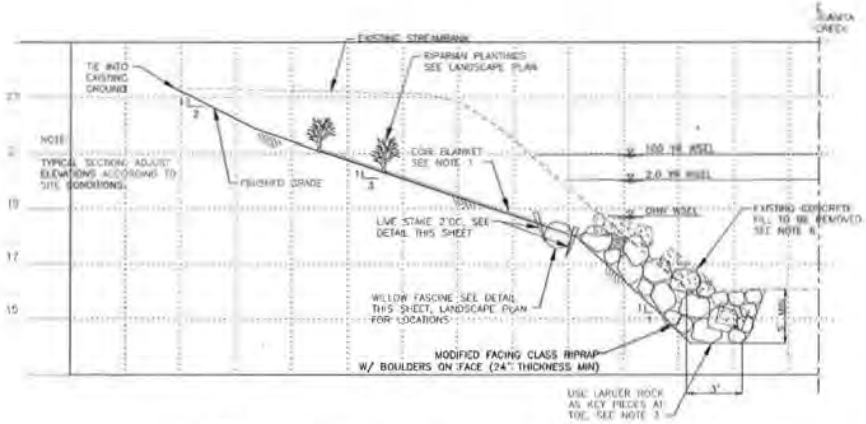

E STREAM BANK STABILIZATION
NOT TO SCALE

ONE INCH
AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

>>>>CAUTION<<<<
CALL BEFORE YOU DIG!
>>800 424 5555<<

PROJECT: JUANITA BEACH PARK PHASE 1

TITLE: STREAMBANK STABILIZATION

j.a. brennan
ASSOCIATES INC
108 S King Street, Suite 200
Seattle, WA 98104
t 206.583.0620 f 206.583.0623
www.jabrennan.com

TETRA TECH, INC.

REVISION:	
DATE:	DESCRIPTION:

SCALE: AS SHOWN
DATE:
DRAWN BY:
DESIGNED BY:
APPROVED BY:
CAD FILE NO.

SHEET NO.
C-2
OF X SHEETS

JUANITA BEACH PARK PHASE 1

WETLANDS & BUFFERS PLANT LIST (04-06-09 REVISED 06-15-09)

UPLAND RIPARIAN BUFFER

LARGE TREES DECIDUOUS

BOTANICAL NAME	COMMON NAME
ACER MACROPHYLLUM	BIG LEAF MAPLE
BETULA PAPYRIFERA	PAPER BIRCH/CANOE BIRCH
FRAXINUS LATIFOLIA	OREGON ASH
POPULOUS TREMULOIDES	QUAKING ASPEN
POPULUS TRICHOCARPA	BLACK COTTONWOOD

SMALL TREES DECIDUOUS

BOTANICAL NAME	COMMON NAME
ACER CIRCINATUM	VINE MAPLE
BETULA OCCIDENTALIS	WATER BIRCH
CORYLUS CORNUTA	HAZELNUT
CRATAEGUS DOUGLASII	DOUGLAS HAWTHORN
PRUNUS EMARGINATA	BITTER CHERRY
SALIX LUCIDA SSP. LASIANDRA	PACIFIC WILLOW

LARGE CONIFER

BOTANICAL NAME	COMMON NAME
ABIES GRANDIS	GRAND FIR
PICEA SITCHENSIS	SITKA SPRUCE
PSEUDOTSUGA MENZIESII	DOUGLAS FIR
THUJA PLICATA	WESTERN RED CEDAR
TSUGA HETEROPHYLLA	WESTERN HEMLOCK

LIVESTAKE (24"-36" O.C.

BOTANICAL NAME	COMMON NAME
CORNUS STOLONIFERA	RED TWIG DOGWOOD
SALIX SITCHENSIS	SITKA WILLOW

GRASSES / NON FLOWERING PLANTS

BOTANICAL NAME	COMMON NAME
DESCHAMPSIA CAESPITOSA	TUFTED HAIRGRASS
EQUISETUM HYEMALE	FALL SCOURING RUSH

LARGE SHRUBS

BOTANICAL NAME	COMMON NAME
AMELANCHIER CANADENSIS	SERVICEBERRY
CORNUS STOLONIFERA	RED TWIG DOGWOOD
HOLODISCUS DISCOLOR	OCEANSPRAY
MAHONIA AQUIFOLIUM	TALL OREGON GRAPE
OEMLARIA CERASIFORMIS	INDIAN PLUM
RIBES SANGUINEUM	RED FLOWERING CURRANT
RUBUS SPECTABILIS	SALMONBERRY
SALIX HOOKERIANA	HOOKER'S WILLOW
SALIX SITCHENSIS	SITKA WILLOW
SAMBUCUS RACEMOSA	RED ELDERBERRY

SMALL SHRUBS

BOTANICAL NAME	COMMON NAME
GAULTHERIA SHALLON	SALAL
LONICERA INVOLUCRATA	BLACK TWINBERRY
MAHONIA NERVOSA	LOW OREGON GRAPE
MAHONIA REPENS	CREEPING MAHONIA
RIBES BRACTEOSUM	STINK CURRANT
RIBES SANGUINEUM	RED FLOWERING CURRANT
ROSA NUTKANA	NOOTKA ROSE
ROSA PISOCARPA	CLUSTERED WILD ROSE
ROSA WOODSII	WOOD'S ROSE
RUBUS PARVIFLORUS	THIMBLEBERRY
SYMPHORICARPOS ALBUS	SNOWBERRY
VACCINIUM OVATUM	EVERGREEN HUCKLEBERRY
VACCINIUM PARVIFOLIUM	RED HUCKLEBERRY

WETLAND PLANTS

TREES & SHRUBS

BOTANICAL NAME	COMMON NAME
CORNUS STOLONIFERA	RED TWIG DOGWOOD
FRAXINUS LATIFOLIA	OREGON ASH
LONICERA INVOLUCRATA	BLACK TWINBERRY
SALIX HOOKERIANA	HOOKER'S WILLOW
SALIX LUCIDA SSP. LASIANDRA	PACIFIC WILLOW
SALIX SITCHENSIS	SITKA WILLOW

WETLAND PLANTS - DEEP MARSH (AT OXBOW MARSH LOW FLOW CHANNEL)

BOTANICAL NAME	COMMON NAME
POTAMOGETON NATANS	FLOATING BROWN-LEAF
POLYGONUM AMPHIBIUM	WATER SMARTWEED
SCIRPUS ACUTUS	HARDSTEM BULRUSH
SCIRPUS VALIDUS	SOFSTEM BULRUSH
SPARGANIUM EURYCARPUM	BROADFRUIT BUREED

WETLAND SEED MIX - EMERGENT MARSH (AT OXBOW MARSH)

BOTANICAL NAME	COMMON NAME
CAREX OBNUPTA	SLOUGH SEDGE
CAREX STIPATA	SAW BEAKED SEDGE
ELEOCHARIS PALUSTRIS	CREEPING SPIK RUSH
JUNCUS TENUIS	SLENDER RUSH
SCIRPUS MICROCARPUS	SMALL-FRUITED BULRUSH

WETLAND SEED MIX - WET MEADOW (AT OXBOW MARSH & WETLAND E)

BOTANICAL NAME	COMMON NAME
CAREX OBNUPTA	SLOUGH SEDGE
DESCHAMPSIA CAESPITOSA	TUFTED HAIRGRASS
FESTUCA RUBRA	RED FESCUE
GLYCERIA OCCIDENTALIS	WESTERN MANNGRASS
JUNCUS ENSIFOLIUS	DAGGER LEAF RUSH
SCIRPUS MICROCARPUS	SMALL FRUITED BULRUSH

UPLAND SEED MIX (INCLUDE MEADOW AREA AT OXBOW MARSH)

BOTANICAL NAME	COMMON NAME
ELYMUS GLAUCUS	BLUE WILDRYE
BROMUS CARINATUS	CALIFORNIA BROME
FESTUCA RUBRA RUBRA	NATIVE RED FESCUE
DESCHAMPSIA CAESPITOSA	TUFTED HAIRGRASS
AGROPYRON RIPARIUM	STREAMBANK WHEATGRASS

Note: Seed shall be applied at a rate of 18.55 pounds per acre. No noxious weeds will be permitted. The seed mixture shall be no less than 98% pure, and shall have a minimum germination rate of 90%. Hydroseed or broadcast seed as conditions dictate.

BIOSWALE SEED MIX (WATER QUALITY SWALE)

BOTANICAL NAME	COMMON NAME
FESTUCA RUBRA	NATIVE RED FESCUE
DESCHAMPSIA CAESPITOSA	TUFTED HAIRGRASS
GLYCERIA OCCIDENTALIS	WESTERN MANNAGRASS

PURPOSE: Develop a lakefront promenade with seating walls, stream enhancements and park enhancements to improve swimming beach water quality.

DATUM: Horizontal NAD 83(91)
Vertical NAVD 88

ADJACENT PROPERTY OWNERS: See Figure 25

LATTITUDE: 47°42'18.45"N
LONGITUTE: 122°12'46.92"W

CITY OF KIRKLAND
PARKS AND RECREATION DEPARTMENT

JUANITA BEACH PARK PHASE 1 DEVELOPMENT

REFERENCE #: NWS-2008-1222-NO ADDRESS: 9703 NE Juanita Dr Kirkland, WA 98034

FIGURE 21 OF 25: MITIGATION PLANT LIST

PROPOSED: JUANITA BEACH PARK PHASE 1 DEVELOPMENT
IN: CITY OF KIRKLAND
AT: NE JUANITA DRIVE
COUNTY OF: KING STATE: WA
APPL. BY: CITY OF KIRKLAND PARKS
DATE: NOVEMBER 2008
REVISED: APRIL 2009 & JUNE 2009

PREPARED BY:
J.A. BRENNAN ASSOCIATES, PLLC