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City of Longview
Mint Farm Regional Water
Treatment Plant
Part 3
Preliminary Design Report
Environmental Permitting

March 2010

Prepared for
City of Longview
1525 Broadway
Longview, WA 98632

K/J Project No. 0997003

Table of Contents

<i>List of Tables</i>	<i>iv</i>
<i>List of Figures</i>	<i>iv</i>
<i>List of Appendices</i>	<i>iv</i>
Section 1: NEPA Process	1-1
1.1 EPA Requirements.....	1-1
1.1.1 Process.....	1-1
Section 2: NEPA EID Outline	2-1
2.1 EID and the Public Process.....	2-2
Section 3: Project Purpose and Need	3-1
3.1 Project Background.....	3-1
3.1.1 Conclusion	3-1
3.2 Purpose and Need	3-2
Section 4: Project Description	4-1
4.1 Mint Farm Regional Water Treatment Plant	4-1
4.2 Transmission Main	4-3
4.3 Project Cost and Funding.....	4-3
Section 5: DRAFT NEPA Environmental Information Document (EID).....	5-1
5.1 Existing Site Conditions.....	5-1
5.1.1 Environmental Site Assessment.....	5-2
5.2 Project and Alternatives	5-3
5.2.1 Project Impacts	5-3
5.2.1.1 Preferred Alternative	5-3
5.2.1.2 Alternative Not Selected.....	5-3
5.2.1.3 No Action Alternative.....	5-3
5.3 Wetlands.....	5-4
5.3.1 Existing Conditions.....	5-4
5.3.2 Project Impacts	5-4
5.3.2.1 Preferred Alternative	5-4
5.3.2.2 Alternative Not Selected.....	5-5
5.3.2.3 No Action Alternative.....	5-5
5.4 Air Quality	5-5
5.4.1 Existing Conditions.....	5-5
5.5 Noise.....	5-5

Table of Contents (cont'd)

5.5.1	Existing Conditions.....	5-5
5.5.2	Project Impacts	5-6
5.5.2.1	Preferred Alternative	5-6
5.5.2.2	Alternative Not Selected	5-6
5.5.2.3	No Action Alternative.....	5-6
5.6	Threatened and Endangered Species	5-6
5.6.1	Existing Conditions.....	5-6
5.6.2	Project Impacts	5-6
5.6.2.1	Preferred Alternative	5-6
5.6.2.2	Alternative Not Selected.....	5-7
5.6.2.3	No Action Alternative.....	5-7
5.7	Agricultural Lands	5-7
5.7.1	Existing Conditions.....	5-7
5.7.2	Project Impacts	5-7
5.7.2.1	Preferred Alternative	5-7
5.7.2.2	Alternative Not Selected.....	5-7
5.7.2.3	No Action Alternative.....	5-7
5.8	Recreational or Scenic Resources	5-8
5.8.1	Existing Conditions.....	5-8
5.8.2	Project Impacts	5-8
5.8.2.1	Preferred Alternative	5-8
5.8.2.2	Alternative Not Selected.....	5-8
5.8.2.3	No Action Alternative.....	5-8
5.9	Archaeological and Historical Resources	5-8
5.9.1	Existing Conditions.....	5-8
5.9.2	Project Impacts	5-9
5.9.2.1	Preferred Alternative	5-9
5.9.2.2	Alternative Not Selected.....	5-9
5.9.2.3	No Action Alternative.....	5-9
5.10	Drinking Water	5-9
5.10.1	Existing Conditions.....	5-9
5.10.2	Project Impacts	5-9
5.10.2.1	Preferred Alternative	5-9
5.10.2.2	Alternative Not Selected.....	5-10
5.10.2.3	No Action Alternative.....	5-10
5.11	Floodplain Impacts.....	5-10
5.11.1	Existing Conditions.....	5-10
5.11.2	Project Impacts	5-10
5.11.2.1	Preferred Alternative	5-10
5.11.2.2	Alternative Not Selected.....	5-11
5.11.2.3	No Action Alternative.....	5-11
5.12	Commercial Uses.....	5-11
5.12.1	Existing Conditions.....	5-11
5.12.2	Project Impacts	5-11

Table of Contents (cont'd)

	5.12.2.1 Preferred Alternative	5-11
	5.12.2.2 Alternative Not Selected	5-11
	5.12.2.3 No Action Alternative	5-11
5.13	Land Uses	5-12
5.13.1	Existing Conditions	5-12
5.13.2	Project Impacts	5-12
	5.13.2.1 Preferred Alternative	5-12
	5.13.2.2 Alternative Not Selected	5-12
	5.13.2.3 No Action Alternative	5-12
5.14	Geology and Soils	5-12
5.14.1	Existing Conditions	5-12
5.14.2	Project Impacts	5-13
	5.14.2.1 Preferred Alternative	5-13
	5.14.2.2 Alternative Not Selected	5-13
	5.14.2.3 No Action Alternative	5-13
5.15	Parks and Public Lands	5-14
5.15.1	Existing Conditions	5-14
5.15.2	Project Impacts	5-14
	5.15.2.1 Preferred Alternative	5-14
	5.15.2.2 Alternative Not Selected	5-14
	5.15.2.3 No Action Alternative	5-14
5.16	Environmental Justice and Tribal Communities	5-14
5.16.1	Existing Conditions	5-14
5.16.2	Project Impacts	5-15
	5.16.2.1 Preferred Alternative	5-15
	5.16.2.2 Alternative Not Selected	5-15
	5.16.2.3 No Action Alternative	5-15
5.17	Conclusions	5-15
5.17.1	Project Impacts	5-15
	5.17.1.1 Preferred Alternative	5-15
	5.17.1.2 Alternative Not Selected	5-16
	5.17.1.3 No Action Alternative	5-16
	References	i

Table of Contents (cont'd)

List of Tables

- 1 Sites Within the Mint Farm Well Field Source Area Identified During the Phase I and II Environmental Site Assessment
- 2 Source Areas Potentially Affected by Sites in Vicinity of the Mint Farm

List of Figures

- 1 Vicinity Map
- 2 Site Plan
- 3 Water Treatment Plant Site
- 4 Water Service Area
- 5 Wetland Mitigation Site

List of Appendices

- A FEMA Floodplain Firmette
- B Geotechnical Report
- C NOAA Fisheries News Release
- D City of Longview Zoning, Comprehensive Plan, and Critical Area Map
- E Public Involvement and Interagency Coordination Documentation
- F Wetland Documentation
- G List of Preparers

Section 1: NEPA Process

The permitting application process begins when the project is at approximately 30% design, which ensures sufficient information is available to evaluate the impact of the potential project on the environment. This project is funded by a special appropriation grant from the Environmental Protection Agency (EPA) and with State Revolving Funds through the Department of Health (DOH). According to the guidance document provided by Mike Lehner, of the EPA, the following specific guidelines are applicable to the National Environmental Policy Act (NEPA) documentation for the special appropriation grants.

1.1 EPA Requirements

A NEPA Document for EPA special appropriation grants should:

- Provide a full project description and identify the potential environmental impacts of the proposed project.
- Describe the purpose and need of the project, which discloses the deficiency the project is correcting (often called the P&N).
- Describe the project details, including construction phases, the facility operator, the planning area, and planning period, and include a map.
- Describe the design parameters, including pipe length, size, location, design criteria, and major processes.
- Describe project costs, including funding from EPA and all other sources.

1.1.1 Process

This project requires an Environmental Information Document (EID) to support the Environmental Assessment (EA). For the EPA special appropriation grants, the applicant should provide to EPA an EID describing the details of the project, project purpose and need, the existing environment, and any existing drinking water systems affected by the project. The EPA will review the EID for their EA and issue a Finding of No Significant Impact (FONSI).

The EID also provides information on the environmental impacts of the project, including mitigation, any public outreach, and reasonable alternatives, including the no action alternative. The EID is then used by EPA to develop the EA and supports the issuing of the FONSI. Often the local agency will adopt the NEPA document to support the threshold environmental determination under the State Environmental Policy Act (SEPA). This is allowed under the Washington State Administrative Code (WAC) Chapter 197-11-610.

Section 2: NEPA EID Outline

The NEPA EID should provide the following information to assist with EPA's environmental review:

1. The Purpose and Need (P&N) for the project, which describes the project and why it is needed.
2. A project description that includes a project summary and planning area description; identifies any significant environmental impacts; describes the project's ability to address the P&N; and includes project costs. An 8.5 x 11-inch map, suitable for black and white reproduction, should be included. For linear projects, more than one map may be needed.
3. Reviews the existing baseline conditions that may be affected by the project. Baseline information on the environment should be discussed in proportion to the potential impact to the existing environmental resource. Baseline data includes:
 - a. wetlands
 - b. air quality and noise impacts
 - c. threatened and endangered species
 - d. prime or unique agricultural lands
 - e. scenic, recreational, archeological, or historic resources
 - f. drinking water sources
 - g. wild and scenic rivers
 - h. receiving streams
 - i. floodplain impacts
 - j. commercial uses
 - k. land uses
 - l. geology and soils
 - m. parklands and other public lands
 - n. environmental justice communities and tribal communities.
4. An alternative analysis should be conducted, reviewing all considered alternatives, including the no action alternative. This analysis includes a comparison of the alternatives, identifies the preferred alternative, and states why it is the preferred alternative. Information can include present worth, annual cost comparisons, reliability and maintenance of the alternative, significant environmental effects, and any constraining factors.
5. Discuss environmental impacts and proposed mitigation measures for each reasonable alternative for each of the areas listed in the baseline conditions. This section should describe all impacts, including beneficial and adverse impacts. The section would also include identification of which environmental resources are not in the project area and, therefore, are not impacted by the project. Environmental impacts should include a discussion of direct, indirect, and cumulative impacts. Lastly, the grant applicant should

discuss mitigation measures designed to reduce or eliminate adverse environmental impacts.

6. Provide documentation on interagency coordination and consultation activities, including letters sent to the tribes, coordination between local agencies (such as neighboring cities), and coordination with the county agency. Identify any Trustees (tribes) or stakeholders that need to be involved in the project. For this particular project the State of Washington Department of Health is taking lead on the Section 106 process.
7. Document all public participation conducted as part of the planning process, including dates of public meetings and stakeholder meetings, summaries of the public meetings, and copies of the public meeting notices and announcements. Also, include any public comments on the project from the meetings. If there are opposing comments, the applicant should provide a response or resolution to the issue raised during the public meeting or public comment period.
8. Provide a list of preparers, including the names, qualifications, and professional expertise of the people primarily responsible for preparing the EID and the section(s) they prepared.
9. List of references that were used for preparing the EID.

2.1 EID and the Public Process

The City of Longview (City) and Kennedy/Jenks Consultants (Kennedy/Jenks) have reviewed several alternatives for this project. The information for the EID section of the NEPA document relies on input from the City and stakeholders on the purpose and need, information provided from the public meetings, information gained in the field from the cultural resources assessment, and information being compiled on the listed baseline conditions categories a through n. As part of the public process, categories a through n can be screened at a public meeting, to determine those areas that are important to the public. Those areas determined to be important should be reviewed in depth in the EID.

Section 3: Project Purpose and Need

An essential part of developing the EID is to provide a purpose and need for the project, describing what deficiency the project is addressing and how the deficiency is being corrected. As part of the process, the City and stakeholders should review and provide additional input for the purpose and need.

3.1 Project Background

The City's Regional Water Treatment Plant (RWTP) was originally constructed in 1945, and underwent capacity expansions in 1960 and 1980 and a regulatory upgrade in 1998. The plant experiences regular mechanical and structural failures due to age and increasingly poor raw water quality. The concrete has deteriorated to the point that regular leaks in the walls of the settling basins and multi-media filters can no longer be patched. Three of the eight filter basins have failed catastrophically since 2007, requiring complete replacement of all parts of the filter, including the concrete floor, underdrains, and filter media.

Sediment in the Cowlitz River increased dramatically following the eruption of Mount St. Helens in 1980. To capture the bulk of the sediment before it reached the Cowlitz River, the U.S. Army Corps of Engineers (USACE) constructed a sediment retention structure (SRS) on the Toutle River. In 1998, the SRS reached its capacity and the volume of sediment washing down the Cowlitz River increased substantially. Heavier sediment settles out in front of the RWTP intake structure, building sandbars, which form quickly, shift unpredictably, and threaten to leave the intake dry during periods of low water. Lighter sediment remains in suspension and is carried into the plant by the raw water pumps. All four intake pumps failed in just seven years (less than three years of run time per pump) due to the increased sediment wear and plugging, and the intake screens fail regularly due to the weight of accumulated sediment.

Poor river conditions and aged facilities limit the treatment production capacity of the plant throughout the year. In the summer, maximum daily demand regularly exceeds reliable plant capacity, and by 2011, the RWTP will be deficient in both its reliable capacity and maximum production capacity. During a winter storm event in 2006, 10,000 pounds per day (lbs/day) of silt was carried into the plant, dropping the production rate to 5 MGD in order to meet drinking water quality standards. Given the average daily demand of 6.1 MGD, this deficiency constitutes a real public threat to underserved residential, commercial, and industrial customers.

3.1.1 Conclusion

In 2005, the City and Cowlitz County PUD began investigating alternatives to improve the reliability of its water supply and meet the needs of a growing community. The first alternative considered was repair and replacement of existing equipment to improve sediment removal and extend the life of the plant. However, even with minor upgrades, maximum production capacity would be limited to 15 MGD and would not provide capacity for growth or meet the community's future needs.

The second alternative considered was major rehabilitation and expansion of the existing RWTP and Cowlitz River intake structure. Construction cost and schedule are substantial because of

the need to maintain operation of the plant and meet water demand throughout construction. But without a feasible means to constrain or mitigate the volume of sediment being carried down the Cowlitz River, this alternative is not operationally or economically viable.

After extensive testing and evaluation, the best solution is to construct a new groundwater supply and water treatment facility, which will provide a reliable and increased supply of high-quality drinking water to a growing community at the lowest possible cost. Constructing a new groundwater supply system relieves the RWTP from potential regulatory infractions and required upgrades related to surface waters; safeguards the water supply from the increasing sediment problems in the Cowlitz River; improves the ecological habitat on the Cowlitz River and reduces potential impacts to the water supply due to threatened or endangered species; and provides new facilities which can better address current and future water quality standards.

Several Mint Farm Industrial Park (Mint Farm) properties were considered and a small northern site was proposed in the original conceptual plan. Extensive subsurface investigation to characterize the aquifer indicated the deep aquifer was more productive and more thoroughly confined to the south. A site roughly 600 feet (ft) north of Industrial Way and 1,200 ft west of the eastern boundary of the Mint Farm was selected following consideration of several available sites. The location proved capable of supporting multiple wells, each producing approximately 4,000 gallons per minute (gpm), and allows connections to the existing distribution system without impact to the Mint Farm mitigated wetland site.

3.2 Purpose and Need

The City and Cowlitz County PUD jointly own the RWTP on the Cowlitz River and propose to replace it with a new groundwater supply and greensand filtration plant, due to the antiquated, deteriorated, and malfunctioning condition of the existing plant, and due to conditions in the river that threaten the water supply and treatment plant. The project is imperative to the health and safety of all 47,500 customers served by the RWTP because it replaces a failing single source of supply from the Cowlitz River with multiple groundwater wells and treatment facilities, which will meet or exceed the requirements of the Safe Drinking Water Act.

Based on drawings provided by Kennedy/Jenks, dated November 30, 2009, structures for the proposed Longview RWTP are anticipated to consist of two backwash storage tanks (with the potential to add an additional backwash storage tank to the north in the future), an office treatment building, a filter pipe gallery building (with the potential to add on to the north), and nine pressure filter tanks (with the potential to add three more). The proposed plant layout is provided on Figure 2, Site Plan.

Most of the proposed improvements will be constructed near the existing site grade. Depending on the selected foundation support method used for the project, the base of the backwash storage tanks may be located below existing site grades. The project will create approximately 1.8 acres of impervious surface on the 10-acre site.

The combined backwash storage tanks are anticipated to be approximately 130 ft long by 84 ft wide (two tanks). If a third backwash storage tank is added, the size of the combined backwash storage tanks would be approximately 130 ft long by 125 ft wide. It is anticipated that the backwash storage tanks will be supported by a mat foundation.

To reduce impacts on the sewer and the Three Rivers Regional Wastewater Treatment Plant, waste washwater alternatives were considered to remove solids from backwash water and recovering that water by recycling it to the head of the plant. Alternatives that were considered included: multi-stage membrane thickening; gravity settling; an aboveground tank; or a conventional concrete tank constructed below grade. The recommendation from the Basis of Design Report is to provide an aboveground tank to hold the waste washwater, allowing the solids to settle out (Kennedy/Jenks 2009a). The tank would be mounted on a mat foundation to evenly distribute the aboveground tank weight. This option is recommended since it will reduce potential impacts to the Three Rivers Regional Wastewater Treatment Plant.

The filter pipe gallery building is anticipated to be about 132 ft long by 27 ft wide. If it is expanded, the length of the filter pipe gallery building could increase to 204 ft. The proposed office/treatment building is currently envisioned to be about 84 ft long by 73 ft wide. It is anticipated that both the filter pipe gallery building and office/treatment building will be supported by a mat foundation with an average bearing pressure of about 1,000 pounds per square foot (psf).

Nine pressure filter tanks (with the potential to add three more) will be constructed to the west of the filter pipe gallery. The filter tanks will be approximately 40 ft long and have a 12-ft diameter. They will be supported by an approximate 10-ft-wide by 35-ft-long mat foundation with a pedestal on each end to support the filter tanks.

Six wells are planned for the southern portion of the 10-acre site. A well house, each approximately 32 ft long and 13 ft wide, will be installed adjacent to the proposed well. We understand that each well house will be supported by a mat foundation with an average bearing pressure of less than 1,000 psf. Three dewatering geotubes will be constructed in the northeastern corner of the property.

Paved access roads and paved parking areas will be constructed around the perimeter of the water treatment plant. Gravel access roads will be provided to each of the proposed well heads and the area around the filter tanks and dewatering Geotubes™ will also be covered in gravel.

Yard piping will lead from the water wells that will be constructed to the south to the water treatment plant. After leaving the plant, the treated water will travel in a 30-inch ductile iron transmission main towards the Weyerhaeuser Railroad right-of-way (ROW). At that point, the transmission main alignment turns towards the north and travels between the existing mitigation wetlands and Weyerhaeuser Railroad ROW.

It is anticipated that the invert elevation of the 30-inch-diameter transmission main will be approximately 6 ft below the existing site grades and that 3 feet of cover will be provided. The space between the side of the pipe and the trench sidewalls is anticipated to be between about 1½ to 2 ft.

The treatment process includes nine greensand filters and various chemical systems (hypochlorite, sodium hydroxide, fluorosilicic acid) with metering pumps and storage tanks. Ancillary processes include a blowoff/plant drain pump station, two air scour blowers, two backwash storage tanks, two backwash return pumps, two backwash waste pumps, three Geotubes™, a bladder surge tank, a standby generator, a new transformer, and all other mechanical, electrical, and instrumentation required to make a complete and operable facility.

4.2 Transmission Main

A new transmission main is proposed to connect the Mint Farm RWTP to the existing distribution system and reservoir. Approximately 6,000 ft of 30-inch ductile iron pipe is proposed for the transmission main. Additionally, a 12-inch spur from the 30-inch water main will connect with a water main running along Weber Avenue.

The 30-inch transmission main alignment generally heads east from the RWTP, to the Weyerhaeuser Railroad ROW, then north between the ROW and the mitigated wetland to a connection with an existing 20-inch-diameter main. The northern terminus of the 30-inch transmission main is anticipated to be the 20-inch-diameter main, which is located near the intersection of Olive Way and Ocean Beach Highway. The transmission main traverses mostly undeveloped areas, and there are few utility crossings and interferences anticipated for the project. When following the railroad tracks, the transmission main will be installed just outside of the toe of the railroad tracks, within the Weyerhaeuser ROW, between a gas main and the mitigated wetland. Utility crossings are anticipated at Weber Avenue. The transmission main is shown on Figure 2.

4.3 Project Cost and Funding

The Basis of Design Report (Kennedy/Jenks 2009a) Section 10 provides a detailed estimate of the probable costs. The estimated probable costs shown in Table 31 from Section 10 of the Basis of Design Report are included here to provide the information required as part of the NEPA Review.

Additionally, the project funding will consist of:

Public Works Trust Fund Pre-Construction Loan	\$840,000
Federal Earmark (2 EPA STAG Grants)	\$956,000
DWSRF Loan (1% interest)	\$8,000,000
Revenue Bonds (4.5% interest)	\$23,370,000
Cowlitz PUD (14.3% Ownership)	\$5,534,000
Total	\$38,700,000

Section 5: DRAFT NEPA Environmental Information Document (EID)

The EID requires the applicant to describe any special or sensitive areas within the project site and the existing conditions. If the project impacts any of these sensitive areas, the applicant must provide mitigation for the impacts. Sensitive areas reviewed for this project include Wetlands, Air Quality, Noise, Threatened and Endangered Species, Agricultural Lands, Recreational or Scenic Resources, Archaeological and Historical Resources, Drinking Water Sources, Flood Plain Impacts, Commercial Uses, Land Uses, Geology and Soils, Parklands and Public Lands, and Environmental Justice and Tribal Communities. Sensitive areas eliminated from this review include Wild and Scenic Rivers, as there are no listed wild and scenic rivers in the project area.

5.1 Existing Site Conditions

The City lies along the north bank of the Columbia River in southwestern Washington. The Mint Farm site came into being during the 1980s, when the Pacific Northwest economy was in what many referred to as a recession, and the eruption of Mount St. Helens devastated the area socially and economically (City of Longview, Mint Farm website 2009). The timber industry, which had long been the mainstay of the City's economy, was facing significant reductions in harvesting, compounding the lack of employment opportunities within the region. Although many opinions promoted the need for economic diversity, there was a reluctance to risk venture capital during such difficult times. The need for reducing dependency on timber-related business was evident.

After nearly a decade of unsuccessfully encouraging industrial land development, it became obvious that the investment capital would have to come from the community. With this vision, the City decided to assume the role of "developer," creating the Mint Farm Industrial Park, a public/private partnership. The Mint Farm Industrial Park is in the western portion of the City and consists of 335 acres of developable property and approximately 100 acres of public open space and public ROWs. Until about 1975, the site was used for agricultural operations, including mint and grass farming.

The selected project site had several isolated wetlands on the property. As part of the Mint Farm project, the City did obtain all the necessary permits for filling and grading of 25 acres of wetlands and drainage swales under USACE Permit #1998-4-00832. The City also provided two advanced mitigation sites on the property to mitigate for filling of the various smaller wetlands, mostly on the southern portion of the site (Figure 5 and Appendix E).

The new RWTP will be located in the Mint Farm Industrial Park, in Section 31 of Township 8 North, Range 2 West. The proposed wellfield site is located on an almost 10-acre parcel at 1155 Weber Avenue.

As part of the review for floodplains, Federal Emergency Management Agency (FEMA) data was obtained for the area. The existing 10-acre parcel is approximately 10 ft above mean sea level (MSL) and the surrounding area is relatively flat. According to FEMA, the area is protected

from flooding by existing levees and dikes. Due to the levees and dikes, the majority of the area is shown as Zone X (area protected from flooding) on the FEMA maps, with a small ditch area shown as Zone A (an area subject to flooding), per FEMA Flood Map Community Panel 5300340005 D (map revised December 20, 2001). However, the area marked as Zone A on the FEMA map was a drainage ditch that has been filled by the City and is no longer a drainage ditch; therefore, this area is no longer subject to flooding.

The proposed transmission main alignment will generally head east from the new RWTP (approximately 1,000 ft), to a Weyerhaeuser Railroad ROW, then north (approximately 6,000 ft) between the ROW and the mitigated wetland to a connection with an existing 20-inch-diameter main.

5.1.1 Environmental Site Assessment

A Phase I/II Environmental Site Assessment (ESA) was conducted by Kennedy/Jenks for the Mint Farm site as part of the due diligence for constructing facilities for developing a new groundwater source and water treatment plant (Kennedy/Jenks 2009b). Recognized environmental conditions (RECs) reported in the Phase I ESA include: 1) the removal of a leaking underground storage tank in 1989 and the subsequent onsite treatment of total petroleum hydrocarbon (TPH) impacted soil to concentrations below the detection limit; 2) a junk yard operated on the Mint Farm site, which was cited in 1992 for operating without a license under “unsanitary conditions;” and 3) the Mint Farm site was used for agricultural activities prior to 1975 and operations may have included the use of pesticides.

As part of the Phase II ESA activities, soil and groundwater samples were collected from the northern (11 soil borings) and southern (9 soil borings) portions of the Mint Farm site. Arsenic and chromium were detected in soil in both the northern and southern portions of the Mint Farm site at concentrations above Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method B cleanup levels based on unrestricted land use for both direct contact and leaching to groundwater, but below statewide background concentrations. In addition, dieldrin was detected above the direct contact cleanup level in one shallow soil sample (0-6 inches) on the southern portion of the Mint Farm site, but below the cleanup level in a deeper soil sample at the same location. In the northern portion of the Mint Farm site, diesel- and residual-range TPHs, aldrin, dieldrin, arsenic, lead, and manganese concentrations were reported in some groundwater samples to exceed their respective comparison levels. In the southern portion of the site, the concentration of manganese in one groundwater sample exceeded the comparison level. It was reported that elevated turbidity in the groundwater samples taken at boring locations may be the reason for the chemical compounds being detected in the groundwater (Kennedy/Jenks 2009b).

Based on the summary of the Phase I/II ESA activities and conclusions presented in the Kennedy/Jenks preliminary design report, the effects of the identified RECs are likely limited to shallow soil and groundwater and would not likely effect deeper sources of groundwater that will be used as source water for the proposed water treatment plant (Kennedy/Jenks 2009b). However, due to historical operations at the Mint Farm site, including storage of petroleum products, operation of a junk yard, and possible pesticide use, procedures should be in place to address any evidence (i.e., visual or olfactory) of potentially hazardous material encountered in soil or groundwater during any excavation or construction within the Mint Farm site.

5.2 Project and Alternatives

5.2.1 Project Impacts

5.2.1.1 Preferred Alternative

Other alternatives and sites were reviewed for locating the new RWTP. This particular site was selected based on many factors, including a cost comparison of trying to rehabilitate the existing 60 year old RWTP and the review of other site locations for the new RWTP.

Under the preferred alternative, the wellheads and the treatment plant are in a location that is suitable for drawing water from the deep groundwater aquifer. The treatment plant will be located away from the mitigated wetlands and there will be no impacts to the mitigated wetland sites. In addition, the water distribution pipeline alignment (transmission main) has been selected to avoid impacting the wetlands and their associated buffers. Construction work will include protective fencing to ensure equipment and trenching occurs outside the mitigated wetland site and the associated buffer.

The estimated water need has been calculated to be approximately 17 MGD. Based on the information on the deep aquifer characteristics, this need can be met by building the new treatment plant in this location. This preferred alternative meets the purpose and need for the project.

5.2.1.2 Alternative Not Selected

Another alternative considered was to locate the plant at the northern end of the site by the existing electrical plant. As part of this study, Kennedy/Jenks did extensive research on site suitability based on aquifer characteristics. The aquifer was not suitable for use at the northern portion of the Mint Farm. Additionally, this alternative would have required the water pipeline alignment to be placed underneath the mitigated wetland area to minimize wetland impacts, which would require temporary dewatering at the mitigation site.

5.2.1.3 No Action Alternative

The no action alternative would be to repair and upgrade the existing RWTP. Under the no action alternative, and as stated in the purpose and need, there would be substantial cost to maintain and upgrade the existing 60 year old RWTP, there would be no increase in capacity to meet the future need of the community, and there would be risks to water quality, including the potential for flood-induced water quality degradation, and the inability to meet the current daily water needs of the community.

As part of the upgrades required for maintaining the existing water treatment plant, in-water work would be required on the intake structures in the Cowlitz River. The Cowlitz River has threatened salmon species and is critical habitat for Coho salmon. Any work in the Cowlitz River requires substantial permitting to comply with regulations under the Shoreline Management Act, Hydraulic Project Approval (HPA) requirements, the Clean Water Act, and the Endangered Species Act (ESA).

Due to the age of the existing plant (60 years), the continual sediment buildup in the Cowlitz River, the cost to maintain and rehabilitate the existing plant, the unpredictable mechanical failures due to the silt buildup, the limitations on capacity, the regulatory requirements, and other factors (see Basis of Design Report, Section 4.3, Kennedy/Jenks 2009a), the City did not consider this a viable alternative.

Additionally, since the no action alternative would only provide upgrades and maintenance to the existing facility and would not provide any additional capacity, the no action alternative cannot meet the purpose and need for the project.

5.3 Wetlands

5.3.1 Existing Conditions

As part of the Mint Farm project, the City did obtain all the necessary permits for filling and grading of 25 acres of wetlands and drainage swales under the USACE Permit #1998-4-00832. The City also provided two advanced mitigation sites on the property to mitigate for filling of the various smaller wetlands at the southern portion of the site. One mitigated wetland is on the northwestern portion of the Mint Farm site, just south of the 38th Avenue entrance, and the other mitigated wetland is along the eastern edge of the site and extends approximately mid-site to the northern end of the site (Figure 4).

The wetland mitigation sites are monitored every six months to ensure all the provisions outlined in the *Final Wetland Assessment, Compensatory Mitigation Plan, and Performance Monitoring Program*, dated September 15, 2000, and subsequently formalized in the *Wetland Mitigation And Site Grading Improvements Plan Sheets*, dated May 26, 2006, are complied with by the City.

The compensatory wetland mitigation sites are in the central eastern and western portions of the Mint Farm site. Over two years, the compensatory work has created a total of 29 acres of wetland and enhanced 22 acres of wetland area. The sites have been monitored and are still being monitored as part of the mitigation plan. Habitat Technologies is actively monitoring the site and the City has the monitoring plans on file.

5.3.2 Project Impacts

5.3.2.1 Preferred Alternative

The preferred alternative RWTP buildings and structures on the 10-acre parcel will not impact the existing wetland or associated buffer since the location is a substantial distance from the mitigated wetland site. A portion of the transmission main (approximately 4,500 linear ft) will be outside of, but adjacent to, the mitigated wetland and associated buffer. However, during construction, protective fencing and best management practices (BMPs) will be used to prevent any equipment or materials from entering the buffer or wetland during pipe trenching and installation.

The Washington State Department of Fish and Wildlife (WDFW) may require authorization for this work under a HPA, which is applied for using the Joint Aquatics Resource Permit

Application (JARPA). An HPA is required anytime work occurs on, over, in, or adjacent to a water of the state. The definition of water of the state includes mitigated wetlands. Since there will not be any in-water work, it is anticipated the project will not require Section 404/401 permits under the Clean Water Act (CWA) and provided the transmission main installation remains outside of the wetland and the associated buffer, the project should not require wetland development permits.

5.3.2.2 Alternative Not Selected

The alternative at the northern portion of the site would have required the transmission main to be directionally drilled underneath the existing mitigated wetland site at the eastern portion of the Mint Farm. Although the directional drill method would be used to minimize wetland impacts, dewatering for this type of directional drill could still temporarily impact the mitigated wetland site.

5.3.2.3 No Action Alternative

The rehabilitation of the existing RWTP does not have any environmental impact on any of the mitigated wetlands on the Mint Farm site.

5.4 Air Quality

5.4.1 Existing Conditions

The project is not a source of emissions during operation. Additionally, the project is not located in an area identified by Ecology as being elevated in particulate, ozone, or carbon monoxide. According to an Ecology website, the only area in Washington State not in attainment is the Puyallup Valley, Wapato Hills area in Puget Sound, over 70 miles north of the project site (Ecology 2010).

During construction, any emissions from construction equipment will be temporary and localized and will be mitigated through the use of approved construction BMPs, including watering the site during dry periods to minimize the amount of dust particles.

Since the RWTP operates on electricity and the generator is for emergencies, the plant operation will not increase air emissions in the area. The only time there would be emissions is during operation of the emergency generator. All of the alternatives would have minimal, if any, impact on the air quality; therefore, this level of analysis for air quality should be sufficient for scoping and the NEPA environmental review.

5.5 Noise

5.5.1 Existing Conditions

The project and the alternatives are all located in manufacturing zones and have significant separation from sensitive noise receptors. Sensitive noise receptors include hospitals, schools, nursing homes, etc. The project itself should not generate significant amounts of noise from

general operations on the site. Noise generated from other operations adjacent to or near the RWTP should not have an impact on plant operations.

5.5.2 Project Impacts

5.5.2.1 Preferred Alternative

Temporary construction noise will occur; however, the preferred alternative is over 4,000 ft away from schools and other sensitive noise receptors. It is anticipated the construction will occur during day time hours and therefore the project will have minimum disruption to the residential residences in the area. Therefore, the preferred alternative should not impact adjacent sensitive noise receptors.

5.5.2.2 Alternative Not Selected

The alternative at the northern end of the Mint Farm site is just over 3,000 ft from the Faith Family Christian Center. There would be no noise impacts to the sensitive noise receptor.

5.5.2.3 No Action Alternative

The existing plant is in operation and is within 500 ft of Catlin Elementary School in the Kelso School district. However, given the distance and the type of equipment operating at the existing RWTP, this alternative should not have noise impacts to the elementary school.

5.6 Threatened and Endangered Species

5.6.1 Existing Conditions

The existing RWTP is located adjacent to the Cowlitz River and has intake structures within the Cowlitz River. The project area, including the existing RWTP and the proposed new RWTP, are located in Water Resource Inventory Areas (WRIA) 25 and 26. According to WDFW Priority Habitats and Species Maps (PHS Maps), there is a State priority fish presence both in the Columbia River, which is located approximately $\frac{3}{4}$ mile southwest of the Mint Farm, and in the Cowlitz River, which is located adjacent to the existing RWTP (WDFW 2010).

Current ESA listings for *threatened* fish species in the Columbia River include Chinook Salmon, Coho Salmon, Chum Salmon, and Steelhead (NOAA 2009). Proposed for listing is the Pacific Smelt (*Thaleichthys pacificus*). In 2007, the Cowlitz Indian Tribe petitioned NOAA's Fisheries Service to list (under the ESA) the fish populations in Washington, Oregon, and California (NOAA 2009). It is anticipated that Pacific Smelt may be listed as early as spring of 2010.

5.6.2 Project Impacts

5.6.2.1 Preferred Alternative

The proposed new RWTP will be located approximately $\frac{3}{4}$ mile northeast of the Columbia River. Due to the distance from the river, construction and operation of the proposed RWTP will not impact threatened species located in the Cowlitz or Columbia Rivers.

5.6.2.2 Alternative Not Selected

The location of the alternative not selected is located greater than ¾ mile northeast of the Columbia River; therefore, construction of this alternative would not impact threatened species located in the Cowlitz or Columbia Rivers.

5.6.2.3 No Action Alternative

If the new proposed RWTP were not built, repairs or system modifications to the current RWTP would be necessary. Based on the Draft Basis of Design Report, there would be a need to repair existing intake structures located in the Cowlitz River (Kennedy/Jenks 2009a). Intake repairs could result in impacts to State priority and threatened fish species in the Cowlitz River. Additionally, Pacific Smelt may be listed as a federally threatened species under the ESA in spring 2010, which would add to the existing permitting challenges for working on the intake structures.

5.7 Agricultural Lands

5.7.1 Existing Conditions

According to the United States Department of Agriculture National Resource Conservation Service (NRCS) Web Soil Survey, the Mint Farm is located on land rated as “Prime Farmland if drained and either protected from flooding or not frequently flooded during the growing season” (NRCS 2010). The site was used for farming in the past; however, since the 1980s, the site has been planned for use as an industrial park. The City has zoned the area as Manufacturing District 2 (M-2) and the comprehensive plan designation is Heavy Industrial; therefore, the intended use of the site is industrial, not agricultural.

5.7.2 Project Impacts

5.7.2.1 Preferred Alternative

The proposed location for the preferred alternative is in an industrial park, in an area zoned for industrial uses; therefore, there will be no impacts to agricultural lands.

5.7.2.2 Alternative Not Selected

The location of the alternative not selected is in an industrial park, in an area zoned for industrial uses; therefore, there would be no impacts to agricultural lands.

5.7.2.3 No Action Alternative

Since the existing plant is already built, there would be no impacts to agricultural lands.

5.8 Recreational or Scenic Resources

5.8.1 Existing Conditions

The proposed locations for the preferred alternative and the alternative not selected are within the Mint Farm site. With the exception of the two wetland mitigation sites located within the Mint Farm, there are no recreational or scenic resources in the vicinity of these locations.

The existing RWTP is located on the western bank of the Cowlitz River. The Cowlitz River provides both recreational and scenic resources to the region.

5.8.2 Project Impacts

5.8.2.1 Preferred Alternative

Impacts from construction activities or facility operations will not occur within the wetland buffers located in the Mint Farm; therefore, there would be no direct impacts to recreational or scenic resources. However, construction of a new RWTP at this location would allow for the existing RWTP facility (adjacent to the Cowlitz River) to be decommissioned and demolished, thereby improving the potential for recreational and scenic resources on the Cowlitz River.

5.8.2.2 Alternative Not Selected

Impacts from construction activities would occur within the wetland buffers located in the Mint Farm with this alternative. Although the directional drill method would be used to minimize wetland impacts, dewatering for this type of directional drill could still impact the mitigated wetland site.

5.8.2.3 No Action Alternative

If a new RWTP was not constructed, the existing RWTP would continue operating. Due to mechanical failures associated with high solids loading, modifications to the facility would be required. Facility and system modifications would likely impact recreational uses on the Cowlitz River. However, if the RWTP were removed, this could indirectly enhance the existing recreation uses on the Cowlitz River.

5.9 Archaeological and Historical Resources

5.9.1 Existing Conditions

Prior to this project, the Mint Farm site was surveyed for historic and archaeological resources. Additionally, the specific area for the proposed RWTP and the transmission main were surveyed by archaeologists in December 2009. The work consisted of researching historic documents, including information at the Department of Archaeology and Historic Preservation and reviewing the area maps. During the site visit, subsurface testing was conducted by digging 46 shovel probes at the proposed RWTP site and along the alignment of the transmission main. Material from each shovel probe was screened through a ¼ inch mesh. A Cultural Assessment has been

prepared for the project. That document is not subject to public disclosure; however, allowed information is summarized below.

5.9.2 Project Impacts

5.9.2.1 Preferred Alternative

The research showed there are four properties within a 1-mile radius that are listed on the National Historic Register and the Washington State Historic Register. None of these sites will be impacted by the proposed project. During the site investigation, no cultural resources were identified from any of the shovel probes; however, there is an archaeological site within a 1-mile radius of the Mint Farm. The Columbia River and the Cowlitz River are known to be areas used for fishing and hunting by several Northwest tribes. Therefore, it is recommended that archaeological monitoring of all ground disturbing construction activities be done during the construction of the RWTP.

5.9.2.2 Alternative Not Selected

This area was not reviewed as part of the archaeological work; however, the site would also be in close proximity to the historic and archaeological site. Additionally, the area would also be in close proximity to areas known to be used for fishing and hunting by Northwest tribes.

5.9.2.3 No Action Alternative

The existing treatment plant is very close to the Cowlitz River and draws surface water from the Cowlitz River. The Cowlitz River was used for fishing by the tribes. Additionally, in 2007, the Cowlitz Indian Tribe petitioned NOAA's Fisheries Service to list the Pacific Smelt under the ESA (NOAA 2009). Smelt (also referred to as Eulachon) were historically an important fish to the tribes. Therefore, the continued use of the existing RWTP may be hampered due to the listing of several fish species in the Cowlitz River, including Pacific Smelt.

5.10 Drinking Water

5.10.1 Existing Conditions

Drinking water for the City is currently provided by the existing RWTP at the northern end of the City. Mechanical failures at the facility due to high solids loading from source water in the Cowlitz River has reduced the production of treated water during the winter season to 5 MGD at times. That production volume is lower than the City's average daily demand for water during the winter season.

5.10.2 Project Impacts

5.10.2.1 Preferred Alternative

Based on the Draft Basis of Design Report, forecasted drinking water demand for the region is expected to be approximately 17 MGD by the year 2029 (Kennedy/Jenks 2009a). The proposed RWTP would be designed to meet forecasted water demand projections. The current

proposal is to use a greensand filtration treatment, per the Basis of Design Report. This method is a proven treatment process for iron, manganese, and arsenic in groundwater. The drinking water will meet or exceed all current federal, state, and local standards for drinking water.

5.10.2.2 Alternative Not Selected

Extensive research was performed to determine if placement of the proposed RWTP at the alternative location not selected would be feasible. Based on this research, it was concluded that this site would not be suitable based on aquifer characteristics.

5.10.2.3 No Action Alternative

If a new RWTP was not constructed, continued operation of the existing RWTP would be necessary. Continuing to use Cowlitz River surface water will require high solids removal, disinfection, and compliance with state and federal rules for surface water treatment. Additionally, operation of the existing RWTP would result in using source water that continues to be silt-laden, thereby plugging the intake system, resulting in higher maintenance costs, limitations on capacity, risk of flood-induced water quality degradation, and risk of contamination with contaminants of emerging concern (CECs).

5.11 Floodplain Impacts

5.11.1 Existing Conditions

The existing 10-acre parcel within the Mint Farm has an elevation of approximately 10 ft above MSL with relatively flat topography. The area is protected from flooding by existing levees and dikes, and due to the levees, is shown as Zone X and Zone A on the FEMA Flood Map Community Panel 5300340005 D (FEMA 2001, Appendix A). The ditch area designated as Zone A on the FEMA map was filled by the City during the site development phase. The City of Longview Critical Area Map (Appendix D) shows the area as being outside the flood zone.

5.11.2 Project Impacts

5.11.2.1 Preferred Alternative

The site for the RWTP is mostly located within the area designated as Zone X. Additionally, regulations are in place for stormwater flow control (quantity) at the site. The City's Stormwater Manual (March 2009) provides minimum design standards for erosion and stormwater control. In this case, the site is within the drainage boundary for the Consolidated Diking Improvement District #1 (CDID #1). This district is exempt from flow control since the run-off from the Mint Farm is conveyed via Ditch 10 or Ditch 12 to a regional stormwater facility on Industrial Way, west of the Mint Farm site. For water quantity, a fee is required in lieu of the onsite detention facility. Section 7.3.2 of the Basis of Design report provides detailed information on the requirements (Kennedy/Jenks 2009a).

For water quality, this requirement will be complied with by installing a stormwater swale in a landscaped strip along the site's frontage with Weber Avenue. The swale will be designed to comply with Section 2.2.7 of the City's Stormwater Manual.

5.11.2.2 Alternative Not Selected

The alternative site would have also complied with requirements in the City's Stormwater Manual. The location of that site would have also been in the area designated as Zone X.

5.11.2.3 No Action Alternative

The rehabilitation of the existing RWTP should not have impacts to existing flood areas. The Critical Area Map (Appendix D) shows the area as being outside the flood zone and FEMA Flood Map Community Panel 5300340005 D (Appendix A) shows the area as Zone X and within the CDID #1.

5.12 Commercial Uses

5.12.1 Existing Conditions

The only commercial uses in the vicinity of the Mint Farm are located east of the location at the northern terminus of the proposed 30-inch transmission main (located near the intersection of Olive Way and Ocean Beach Highway).

5.12.2 Project Impacts

5.12.2.1 Preferred Alternative

The proposed RWTP will be a benefit to commercial uses in the City. Construction of the proposed RWTP will ensure that the City's projected water demands will be met through the year 2029.

There would be no adverse impacts to commercial uses in the City from operation of the proposed RWTP, and any construction activities that occur adjacent to commercial areas (near the intersection of Olive Way and Ocean Beach Highway) will be temporary.

5.12.2.2 Alternative Not Selected

As described above, construction of the proposed RWTP will be beneficial to commercial uses; however, due to aquifer conditions, this site is not technically feasible.

5.12.2.3 No Action Alternative

There would be no direct impacts to commercial uses; however, due to operational issues, the existing RWTP cannot regularly meet the City's average daily water demand in the winter season, which could have a detrimental impact on commercial uses in the future.

5.13 Land Uses

5.13.1 Existing Conditions

The City zoning designation for the Mint Farm site is Manufacturing District 2 (M-2). The proposed site is located in an area that is designated M-2, and all land adjacent to the proposed site is also designated M-2. Land designated for residential use, Suburban-Residential (S-R) and Residential 1 (R-1) is located approximately ¼ mile east of the preferred alternative project location and is currently developed with single-family dwellings.

The existing RWTP is located along the western bank of the Cowlitz River in an area that has an S-R zoning designation, is surrounded by single-family residential dwellings, and is also within 200 ft of the designated shoreline of the Cowlitz River.

5.13.2 Project Impacts

5.13.2.1 Preferred Alternative

The Mint Farm site is designated M-2. The proposed land use as a water treatment facility is consistent with surrounding land uses, the City's zoning designations, and the City's comprehensive plan. Single-family residential dwellings are located approximately ¼ mile east of the proposed site; however, due to the proximity and the nature of the treatment facility, it is not likely to have adverse impacts to residential dwellings.

5.13.2.2 Alternative Not Selected

As stated above, the Mint Farm site is designated M-2; therefore, the proposed land use as a water treatment facility is consistent with surrounding land uses and the City's zoning designations.

5.13.2.3 No Action Alternative

The existing RWTP would continue to operate on the western bank of the Cowlitz River. There would be no additional impacts to land uses; however, necessary facility upgrades may require in-water work in the Cowlitz River, which could potentially impact Cowlitz River uses.

5.14 Geology and Soils

5.14.1 Existing Conditions

Geologic and soil information for the project area is summarized in this section based on the *Draft Geotechnical Report, Longview Regional Water Treatment Plant, Longview, Washington* (Geotech Report; Appendix B), prepared by Landau Associates in December 2009 (Landau Associates 2009).

Near-surface deposits in the project area are mapped as alluvium. Deposits defined as alluvium typically consist of younger, unconsolidated, stratified units of silt, sand, and gravel. In some areas, alluvium may contain interbeds of peat and organic silt. The site is located near the

confluence of the Columbia and Cowlitz Rivers, and the alluvium was likely transported and deposited by both rivers. The alluvial unit is typically very soft/loose to stiff/medium dense, has low to moderate shear strength, and depending on its composition, can be moderately compressible.

At the Mint Farm site, alluvial deposits consist primarily of fine-grained silts with abundant organics and varying plasticity. Elsewhere at the Mint Farm site, coarse-grained alluvial deposits are more prevalent. Due to the fine-grained alluvium encountered within 15 to 17 ft of the ground surface, the site is potentially susceptible to liquefaction.

According to the Draft Hydrogeologic Characterization Report (Kennedy/Jenks 2009c), there are two distinct groundwater systems at the site. In addition to the deep aquifer, there is a shallow system ranging from 5 ft to 10 ft below ground surface (BGS) that is strongly influenced by the CDID drainage canals.

5.14.2 Project Impacts

5.14.2.1 Preferred Alternative

The proposed lot for the new RWTP is currently undeveloped and covered with grass. The project is anticipated to require 7,200 cubic yards (CY) of excavated material. If possible, 3,300 CY of excavated material will be reused for trench backfill, with the potential to haul off 3,900 CY of material to an approved disposal site (unless it can be used as backfill). It is anticipated that the project will require imported material to supplement any excavated material that cannot be reused on site. Soil loss could occur directly from disturbance or indirectly from wind or water erosion. To mitigate soil loss, all appropriate BMPs will be implemented during construction, according to state and local guidelines. Refer to Appendix B for a copy of the Geotech Report.

As stated in the Geotech Report, the use of Geopiers™ installed to about 20 ft BGS could be used to reduce the risk of liquefaction-induced total and differential settlement of structures supported at grade. If deep foundations are used to support the proposed improvements, they would need to extend below the lowest potentially liquefiable soil layer.

Additionally, due to the shallow groundwater, it is anticipated that dewatering will be required during construction of the RWTP and the transmission main.

5.14.2.2 Alternative Not Selected

The proposed lot for the alternative not selected is also located within the Mint Farm with geologic and soil conditions very similar to those described above in Section 5.13.2.1.

5.14.2.3 No Action Alternative

In the no action alternative, no new RWTP would be constructed; therefore, there would be no impacts to geology or soils at the Mint Farm.

5.15 Parks and Public Lands

5.15.1 Existing Conditions

The proposed locations for the preferred alternative and the alternative not selected are within the Mint Farm site. The Mint Farm consists of 335 acres of developable property and approximately 100 acres of public open space and public ROWs. With the exception of the public open space located in the Mint Farm, there are no public lands or parks in the vicinity of the proposed locations. In addition, the current RWTP is not located in the vicinity of any parks; however, it is located adjacent to, and on the western bank of, the Cowlitz River.

5.15.2 Project Impacts

5.15.2.1 Preferred Alternative

The proposed location of the preferred alternative is located on developable portions of the Mint Farm site, which is designated for industrial uses. The proposed project will not impact the public open space portions of the Mint Farm. There are no other parks or public lands near the proposed location of the preferred alternative; therefore, no impacts to parks or public lands are anticipated.

5.15.2.2 Alternative Not Selected

The proposed location of the alternative not selected is located on developable portions of the Mint Farm, which is designated for industrial uses. However, this alternative would have required the transmission main alignment to be placed underneath the mitigated wetland area to avoid any significant wetland impacts. There are no other parks or public lands near the proposed location of the alternative not selected; therefore, no other impacts to parks or public lands would be expected.

5.15.2.3 No Action Alternative

There are no parks or public lands near the current RWTP; therefore, there would be no impacts to parks or public lands if mechanical repairs or system upgrades to the facility were required.

5.16 Environmental Justice and Tribal Communities

5.16.1 Existing Conditions

The proposed new RWTP will ensure that the City's average daily water demands are met through at least the year 2029. The proposed project will provide clean water to meet the current and future needs of the community; therefore, the project is a benefit to the entire community. The new RWTP is proposed to be constructed in an area zoned for industrial/manufacturing uses and does not displace existing residences.

5.16.2 Project Impacts

5.16.2.1 Preferred Alternative

Due to the community-wide benefits of the proposed new RWTP, and due to the proposed location the new RWTP in an industrially zoned area, there will be no adverse effects to tribal communities, minorities, and economically challenged groups.

5.16.2.2 Alternative Not Selected

Due to the community-wide benefits of the proposed new RWTP, and due to the proposed location the new RWTP in an industrially zoned area, there will be no adverse effects to tribal communities, minorities, and economically challenged groups.

5.16.2.3 No Action Alternative

There is the potential for adverse affect to the entire population, including tribal communities, minorities, and economically challenged groups, since the current and future demand for clean drinking water would not be met by the existing RWTP. Additionally the Cowlitz River, where the existing RWTP draws surface water, is considered usual and accustomed fishing and hunting grounds for local tribes, including the Cowlitz Indian Tribe.

5.17 Conclusions

5.17.1 Project Impacts

In very general terms, the project purpose and need is to provide a reliable source of clean drinking water for the 47,500 customers served by the City and the Cowlitz County PUD. The need is based on the failing existing RWTP and the sediment conditions in the Cowlitz River that threaten the water supply and lead to mechanical failures within the existing RWTP.

5.17.1.1 Preferred Alternative

The preferred alternative provides a new groundwater supply with a reliable filtration system and replaces a single source of water supply with multiple groundwater wells to meet the water needs of the community. The site for the RWTP is in an area zoned for this type of use, will not impact the wetland mitigation site or its associated buffer, and will comply with all the applicable City codes (zoning, building, stormwater, etc.) and the Mint Farm covenants. Additionally, there are no listed endangered species within the new RWTP location. The RWTP will provide drinking water that meets or exceeds current federal and state standards.

The preferred alternative will meet the current water demand and will meet the future clean drinking water needs of the community. Therefore, the preferred alternative meets the purpose and need of the project.

5.17.1.2 Alternative Not Selected

The alternative not selected was also located within the Mint Farm; however, the construction would have had minor impacts to the existing wetland mitigation site by requiring a directional drill under the mitigated wetland for the transmission main. Additionally, the aquifer at this location is not suitable for use. Therefore, the alternative not selected does not meet the purpose and need for the project.

5.17.1.3 No Action Alternative

The existing RWTP is failing due to the age (60 years) of the plant and the continual intake of sediments from the Cowlitz River, causing mechanical failures and water quality problems. There is no feasible way to constrain or mitigate the volume of sediment being carried down the Cowlitz River.

Additionally, in-water work, which would be required for any upgrades and repairs to the system, could potentially impact listed endangered species. The existing RWTP is in the Cowlitz River, which supports listed ESA species. Additionally, the Cowlitz River supports Pacific Smelt, which the Cowlitz Tribe of Indians petitioned for listing under the ESA in 2007, and the smelt may be added to the list of ESA fish species within the Cowlitz River. Any work to the existing RWTP will require extensive permitting, including local permits for shoreline work, state permits from Ecology and WDFW, federal permits for in-water work from the USACE, coordination with the Cowlitz Indian Tribe, and a Biological Assessment for fish species listed under the ESA.

The no action alternative does not meet the purpose of providing a reliable source of clean drinking water. Additionally, the existing RWTP would be very expensive to rehabilitate, would require extensive permitting to retrofit and maintain, and would still only provide a single source for clean drinking water. The removal of the existing RWTP could provide aesthetic and recreation opportunities, eliminates the need to constantly obtain permits for in-water work, and ultimately removes some man-made structures from the Cowlitz River. Not only would continued use of the RTWP not meet the purpose and need, there are potential environmental impacts associated with the continued use of the existing RWTP.

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Tables

Table A: Sites Within the Mint Farm Well Field Source Area Identified During the Phase I and II Environmental Site Assessment

Site Name ^(a)	Site Address	Site Contact/Phone Number	Map Identification ^(b)	Regulatory Listing ^(c)	Potential Source Identification
Mint Farm Energy Center, Mint Farm Generation, LLC	1200 Prudential Boulevard	Joey Henderson/(425)-457-5835	1	SPILLS, NPDES RCRA SQG, VCP,	Industrial Facility
Flexible Foam Products, Inc., Prudential Steel Chinook Ventures, Inc., Reynolds Aluminum, Reynolds Metals, Longview Aluminum	1205 Prudential Boulevard	Julie Miller or Mark Daily/(360)- 575-8844	2	CSCSL NFA, FINDS, NPDES	Industrial Facility
	4029 Industrial Way	Barry Oliver/(360)-636-8248	3	CERCLIS NFRAP, RCRA LQG, UST, CSCSL NFA, MANIFEST,	Industrial Facility
Weyerhaeuser Company, Weyerhaeuser Plywood Mill	3401 Industrial Way	Brian Wood/(360)-425-2150 Department of Ecology, Southwest Region	4	SHWS (CSCSL), ICR, SPILLS, RCRA LQG, INST CONTROL, MANIFEST, AIRS (EMI), HAZNET	Industrial Facility
Longview Substation	3600 Industrial Way	Department of Ecology, Southwest Region	5	UST, LUST, ICR	UST
Astro Gasoline, Washington Way Market	3357 Washington Way	Department of Ecology, Southwest Region	6	UST, LUST, ICR	UST
Millers Market	3132 Washington Way	Department of Ecology, Southwest Region	7	UST, LUST, ICR	UST

Notes:

Solvay Interlox Chemical
JM Huber

SITE DOES NOT APPEAR ON ANY LISTS, BUT IS ADJACENT TO WELLFIELD
SITE DOES NOT APPEAR ON ANY LISTS, BUT IS ADJACENT TO WELLFIELD

(a) Site information provided in this table is based on a search of available environmental records conducted by Environmental Database Resources, Inc. (EDR, enquiry number 2456126.2s, 31 March 2009). The EDR search was conducted as part of the Draft Phase I and II Environmental Site Assessment, Mint Farm Well Field, Longview, Washington (Kennedy/Jenks Consultants, 13 July 2009). Information from the EDR search was also used in the preparation of the Draft Addendum to the Phase I and II Environmental Site Assessment, Mint Farm Well Field (Kennedy/Jenks Consultants, 17 December 2009).

(b) See accompanying map for Site locations.

(c) Database listings are as follows:

SPILLS: Spills reported to the Spill Prevention, Preparedness, and Response Division

NPDES: National Pollution Discharge Elimination System

RCRA SQG: Resource Conservation and Recovery Act Small Quantity Generator

VCP: Voluntary Cleanup Program

CSCSL NFA: Confirmed and Suspected Contaminated Sites List - No Further Action

FINDS: Facility Index System

CERCLIS NFRAP: Comprehensive Environmental Response, Compensation, and Liability Information System Archived

RCRA LQG: Resource Conservation and Recovery Act Large Quantity Generator

UST: Underground Storage Tank

MANIFEST: Hazardous Waste manifest Information

SHWS (CSCSL): State Hazardous Waste Sites (Confirmed and Suspected Contaminated Sites List)

ICR: Remedial Action Report received by the Department of Ecology

INST CONTROL: Institutional Controls

AIRS (EMI): Washington Emissions Data System (Emissions Inventory Data)

HAZNET: Hazardous Waste Network

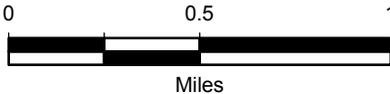
LUST: Leaking Underground Storage Tank

Table B: Source Areas Potentially Affected by Sites in Vicinity of the Mint Farm

Site Name	Map Identification	Source Areas Potentially Affected by Site
Mint Farm Energy Center, Mint Farm Generation, LLC	1	6-Month
Flexible Foam Products, Inc., Prudential Steel	2	6-Month, 1-Year
Chinook Ventures, Inc., Reynolds Aluminum, Reynolds Metals, Longview Aluminum	3	6-Month, 1-Year, 5-Year
Weyerhaeuser Company, Weyerhaeuser Plywood Mill	4	6-Month, 1-Year, 5-Year, 10-Year
Longview Substation	5	1-Year
Astro Gasoline, Washington Way Market	6	6-Month
Millers Market	7	5-Year

Figures

DRAFT



Data Source: ESRI 2008

Y:\Projects\133009\Mapdocs\Fig1.mxd 8/26/2009



Longview Regional
Water Treatment Plant
Longview, Washington

Vicinity Map

Figure
1

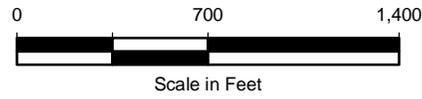
Y:\Projects\133009\Mapdocs\020\Revised\Fig2-Site Plan.mxd 2/18/2010 NAD 1983 StatePlane Washington South FIPS 4602 Feet



DRAFT

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Data Source: Cowlitz County; ESRI Image Server; Kenedy/Jenks 2009

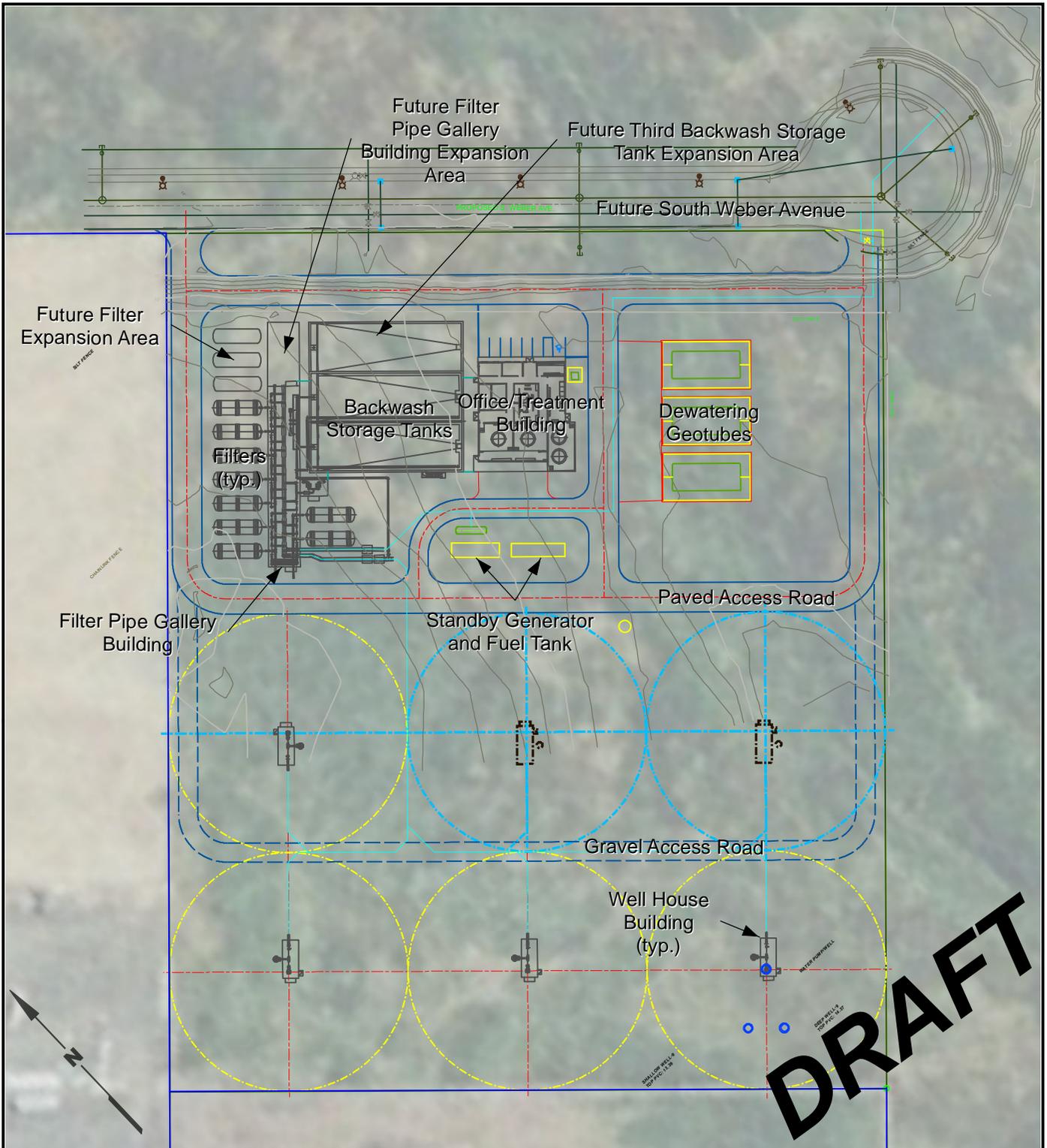


Longview Regional
Water Treatment Plant
Longview, Washington

Site Plan

Figure
2

Y:\Projects\133009\Mapdocs\020\Revised\Fig3-Treatmentplant.mxd 2/11/2010 NAD 1983 StatePlane Washington South FIPS 4602 Feet



Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Scale in Feet

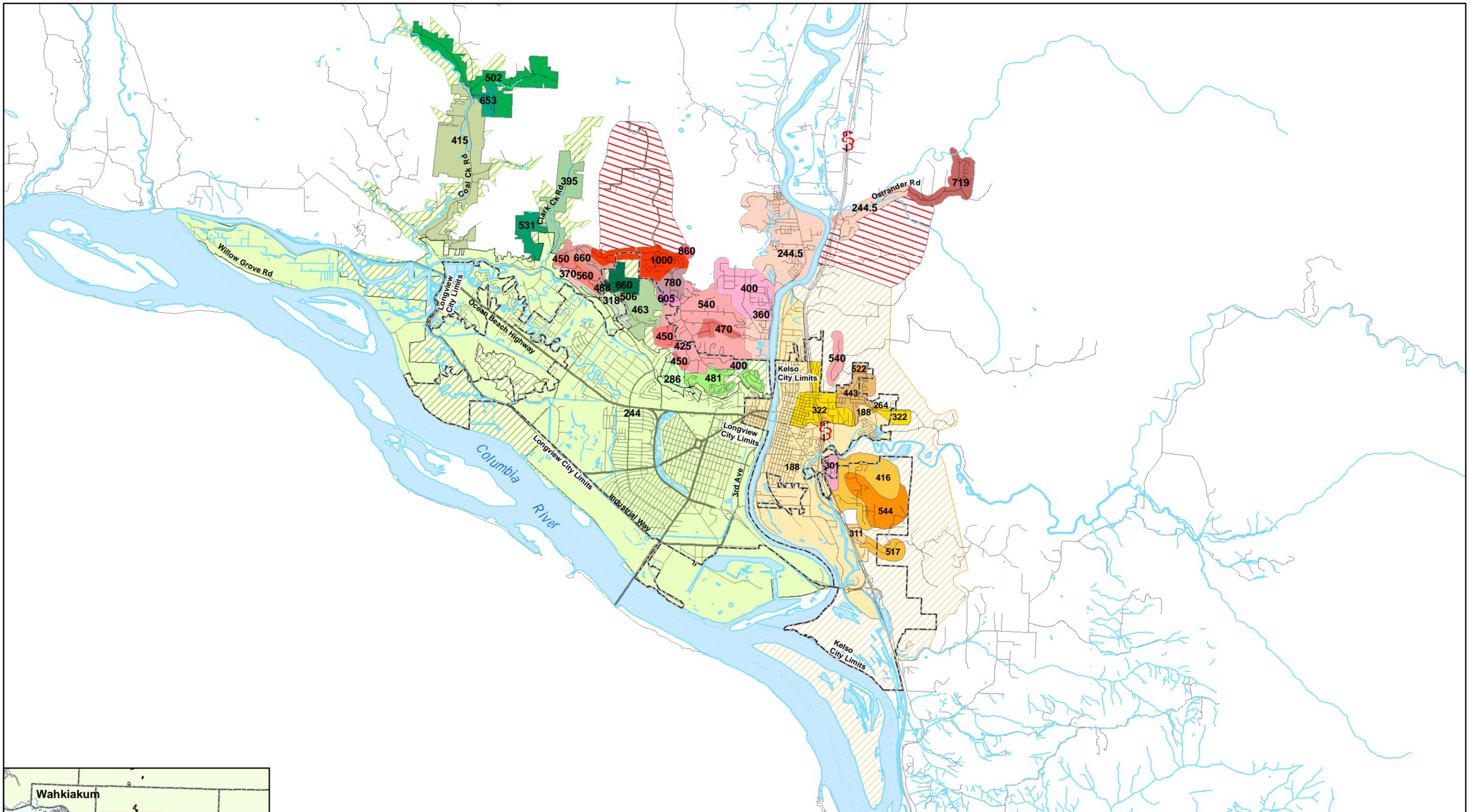
Data Source: Cowlitz County; ESRI Image Server; Kenedy/Jenks 2009



Longview Regional
Water Treatment Plant
Longview, Washington

**Site Plan -
Water Treatment Plant Site**

Figure
3



*This map is for information purposes only. Data was compiled from multiple sources. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication on this map. All locations are approximate.



	Cowlitz PUD Service Area ■ Pressure Zone Shading ▨ Future Service Area	City Limits
	Longview Service Area ■ Pressure Zone Shading ▨ Future Service Area	
	Kelso Service Area ■ Pressure Zone Shading ▨ Future Service Area	

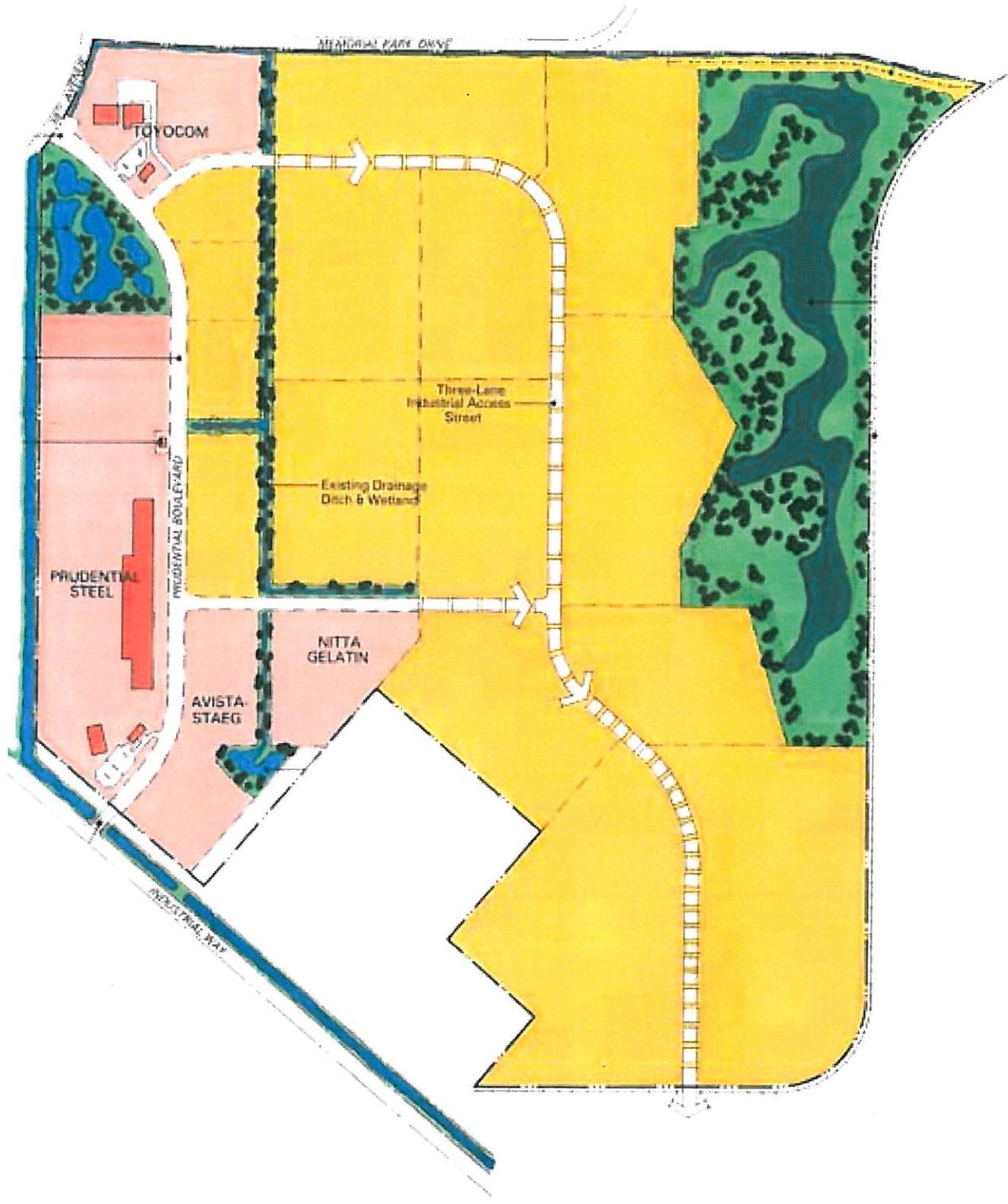
Kennedy/Jenks Consultants

Longview - Kelso
Comprehensive Water Plan
Washington

Service Area Overview

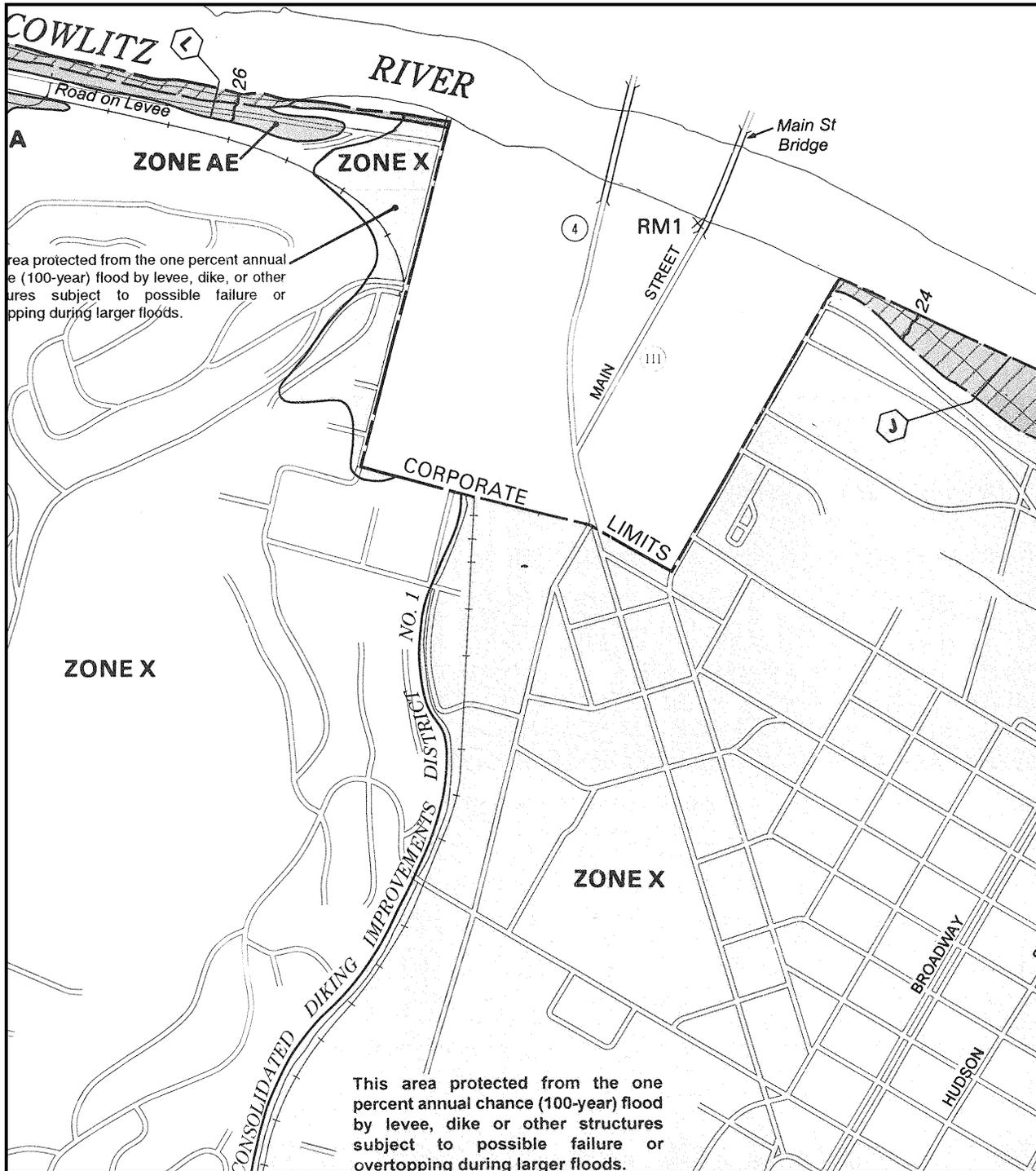
K/J 0498005.00

FIGURE 1-1



Appendix A

FEMA Floodplain Firmette



To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program.



APPROXIMATE SCALE IN FEET



NATIONAL FLOOD INSURANCE PROGRAM

**FIRM
FLOOD INSURANCE RATE MAP**

CITY OF
LONGVIEW,
WASHINGTON
COWLITZ COUNTY

ONLY PANEL PRINTED

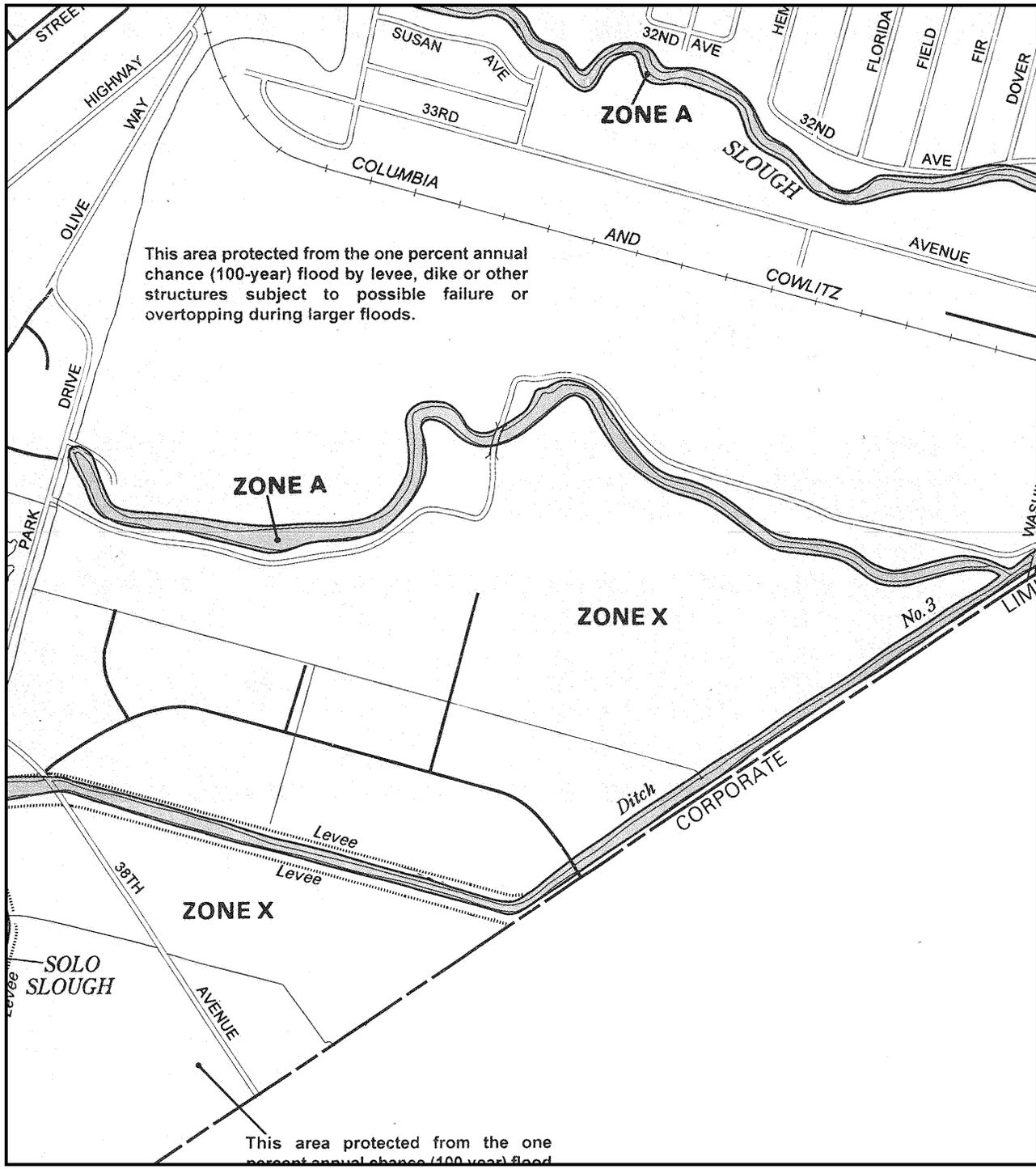
COMMUNITY-PANEL NUMBER
5300340005 D

MAP REVISED:
DECEMBER 20, 2001



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program



APPROXIMATE SCALE IN FEET
 1000 0

NATIONAL FLOOD INSURANCE PROGRAM

**FIRM
 FLOOD INSURANCE RATE MAP**

CITY OF
 LONGVIEW,
 WASHINGTON
 COWLITZ COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
 5300340005 D

MAP REVISED:
 DECEMBER 20, 2001



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix B

Geotechnical Report

Geotechnical Report issued under
separate cover.

To be included at a later date.

Appendix C

NOAA Fisheries News Release



WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

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Emergency Rule Changes

Emergency Rule Changes can be found on the appropriate regulation pages.

- Sport Fishing
- Big Game Hunting
- Waterfowl & Upland Game

Shellfishing Health Advisories & Beach Closures

Are you looking for the latest shellfishing health advisories and beach closures? Are you worried about mercury contamination in fish and shellfish? Check out the following Washington Department of Health websites.

- Marine Biotoxin Bulletin
Beach closures due to red tide and other marine toxins
- Fish Facts for Healthy Nutrition
- Local Fish Advisories

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December 24, 2009

Contact: Brad James (WDFW), 360-906-6716

Public meeting set in Kelso on smelt fishing prospects

OLYMPIA – The Washington Department of Fish and Wildlife (WDFW) has scheduled a public meeting Wednesday, Jan. 6 in Kelso to discuss prospects for smelt fisheries on the Cowlitz River and other tributaries to the Columbia River in 2010.

The meeting will be held from 6-8 p.m. on the third floor of the Cowlitz County Administration Building at 207 4th Ave. N. in Kelso.

As in recent years, state fishery managers are predicting low returns of Pacific smelt in 2010. In addition, NOAA Fisheries has proposed listing the species as "threatened" under the federal Endangered Species Act (ESA). A final decision on the proposed listing is expected in March.

"Fishery managers are thinking long and hard about what kind of smelt fishery – if any – makes sense in light of the proposed ESA listing," said Bill Tweit, WDFW Columbia River policy leader. "Before we begin making those decisions, we'd like to hear what the public has to say."

Earlier this month, representatives of WDFW and the Oregon Department of Fish and Wildlife agreed on restrictive sport and commercial smelt-fishing seasons for the Columbia River, but delayed decisions about the Cowlitz River and other tributaries.

Sport fishing for smelt on the mainstem Columbia River will be open seven days per week starting Jan. 1, although anglers catch very few fish there. The ongoing commercial fishery will be restricted to Mondays and Thursdays starting Jan. 1 through March 31.

Columbia River smelt are part of a designated West Coast population that extends from the Mad River in northern California to northern British Columbia. A scientific review by NOAA Fisheries found that this stock is declining throughout its range, mostly due to changes in ocean conditions.



NOAA

**NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION**
UNITED STATES DEPARTMENT OF COMMERCE



Contact: Brian Gorman
206-526-6172

FOR IMMEDIATE RELEASE
Mar. 12, 2009

NOAA's Fisheries Service Proposes Listing Pacific Smelt as Threatened Species
Little Fish Was Once Abundant from California to British Columbia

NOAA's Fisheries Service said today it is proposing to list Pacific smelt as threatened under the Endangered Species Act. Final action on the proposal could come as soon as a year from now.

Pacific smelt, known officially as eulachon and sometimes called candlefish or Columbia River smelt, are small ocean-going fish that historically ranged from northern California to the Bering Sea in Alaska. They return to rivers to spawn in late winter and early spring. Recreational fishers catch smelt in dip nets, and typically fry and eat them whole.

Smelt are a culturally significant species to native tribes, traditionally representing a seasonally important food source and a valuable trade item. Columbia River smelt were first described by Meriwether Lewis in 1806 during the Corps of Discovery; he lauded the fatty fish for their excellent taste.

A team of biologists from NOAA's Fisheries Service and two other federal agencies concluded that there are at least two Pacific smelt distinct population segments on the West Coast. The one at issue extends from the Mad River in Northern California north into British Columbia. Should these fish eventually be listed for federal protection, prohibitions against harming them would apply only to Pacific smelt in U.S. waters or to U.S. citizens on the high seas, even though the population extends into Canada.

The Cowlitz Indian tribe in Washington petitioned NOAA's Fisheries Service in 2007 to list the fish populations in Washington, Oregon and California. The tribe's petition described severe declines in smelt runs along the entire Pacific Coast, with possible local extinctions in California and Oregon.

The agency's scientific review found that this smelt stock is declining throughout its range. Further declines are expected as climate change affects the timing of spring flows in Northwest rivers. Those flows are critical to successful Pacific smelt spawning. Additionally, the agency's review concluded that Pacific smelt are particularly vulnerable to being caught in shrimp fisheries in the United States and Canada, since the areas occupied by shrimp and smelt often overlap.

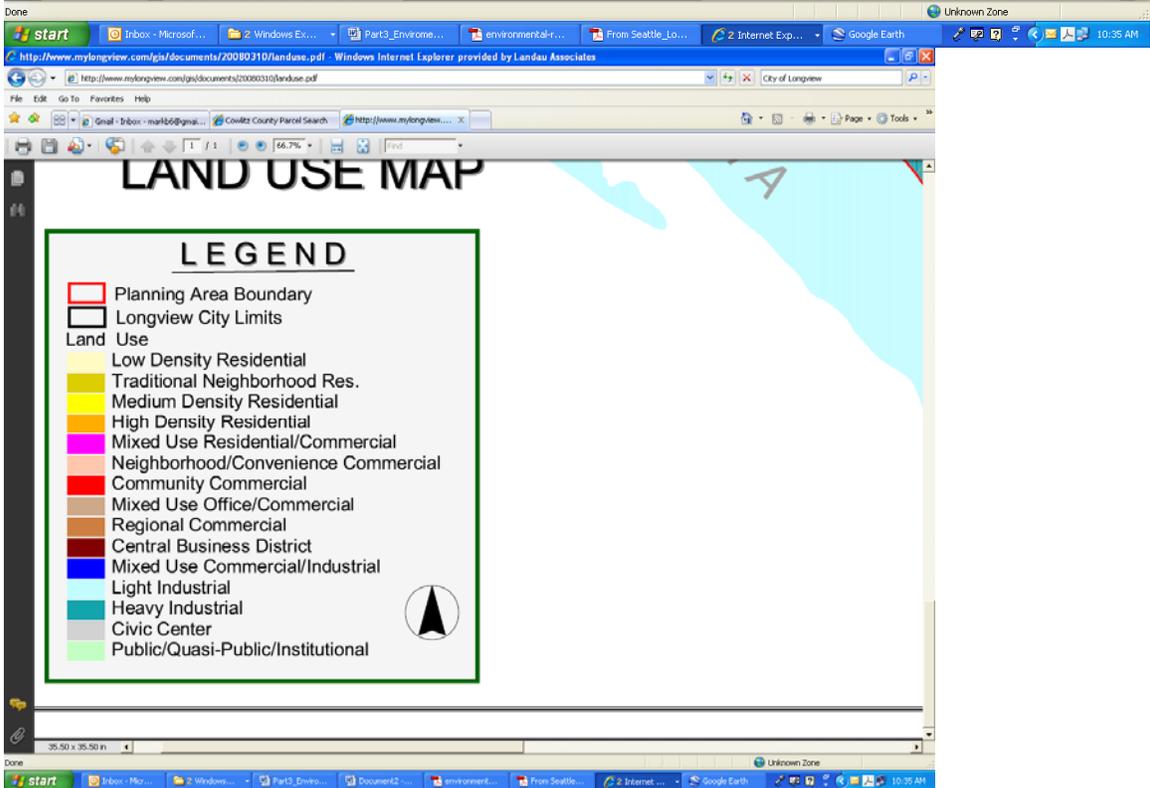
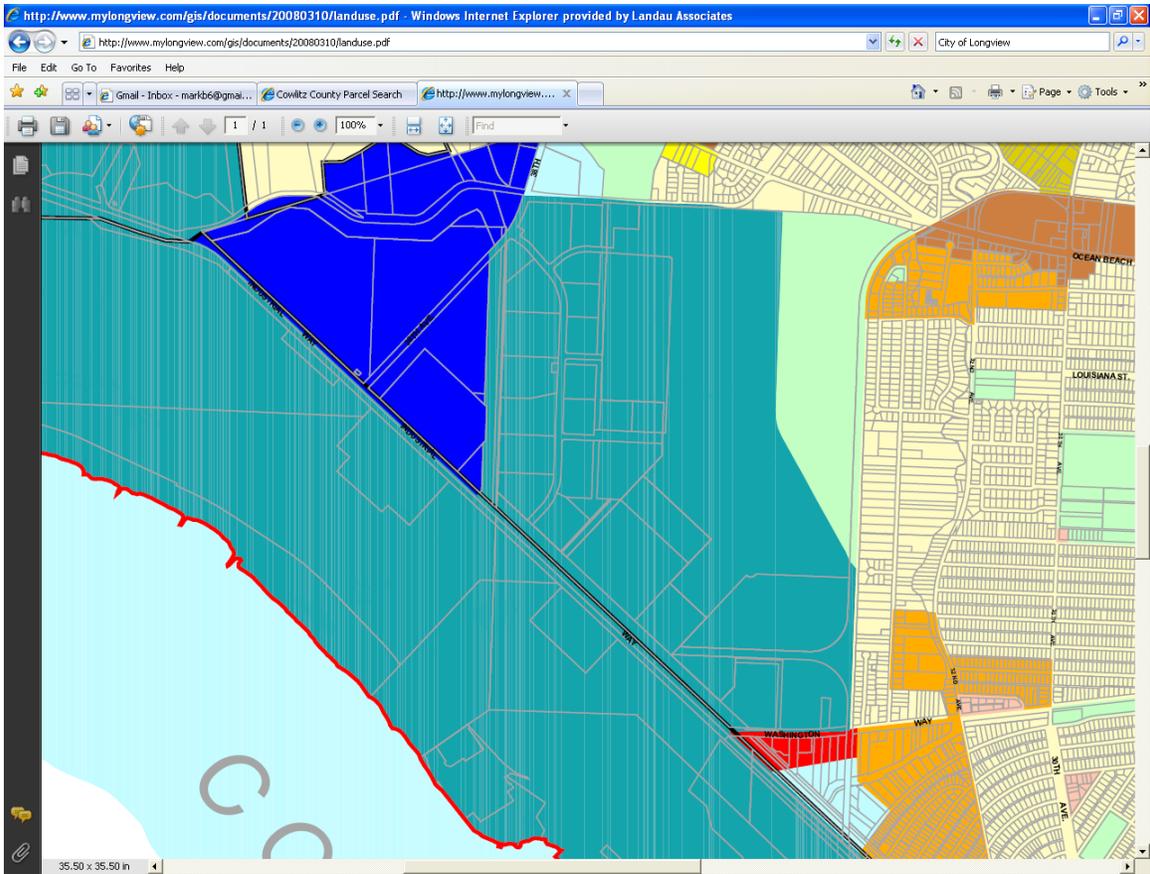
The agency said other threats to the fish include water flow in the Klamath and Columbia river basins and bird, seal and sea lion predation, especially in Canadian streams and rivers.

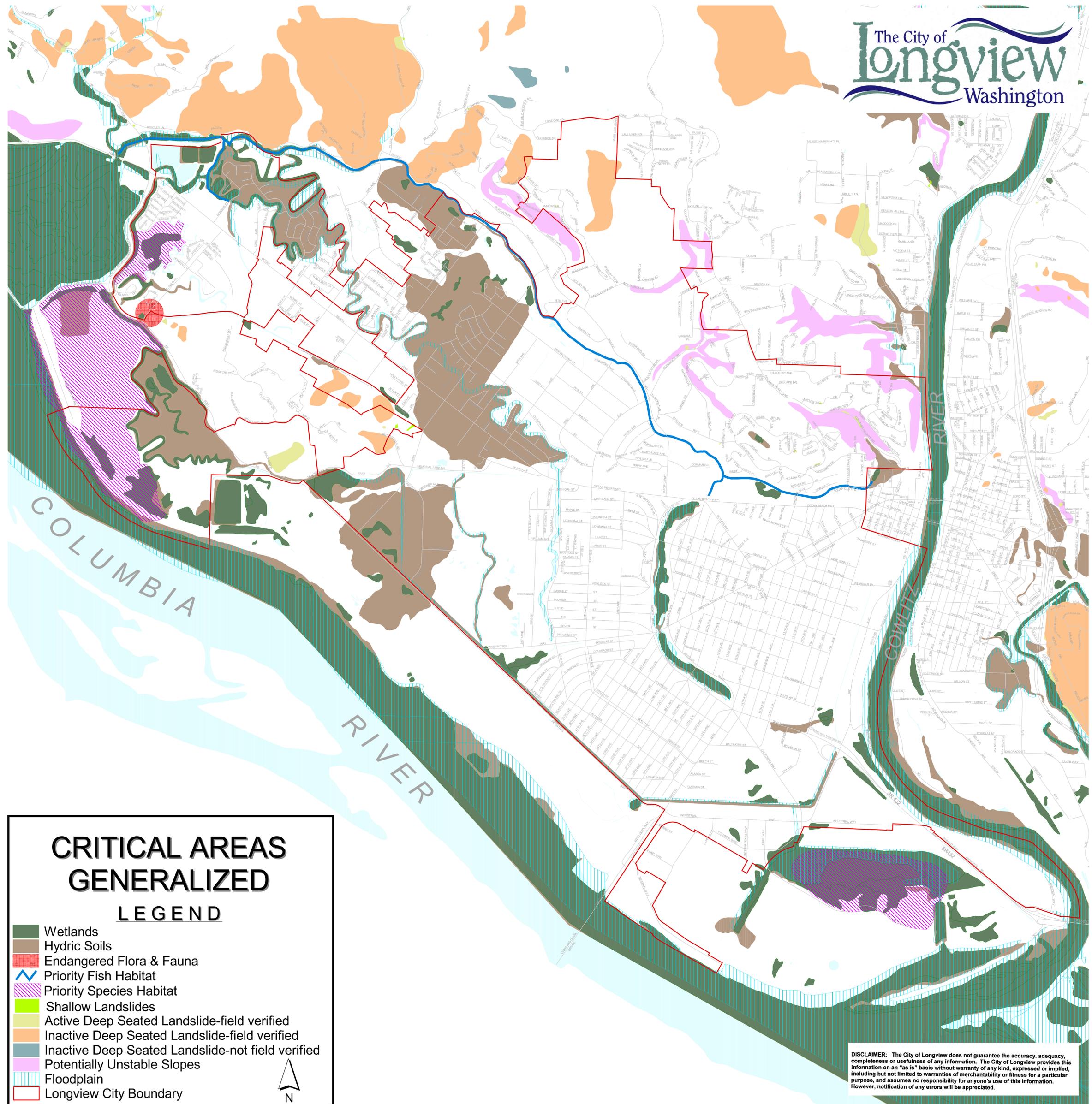
The agency will take public comment on the proposal, and gather further scientific information on the species, the reasons for its decline and possible efforts to restore its numbers.

See the Web at <http://www.nwr.noaa.gov/Other-Marine-Species/Eulachon.cfm> for more information.

Appendix D

City of Longview Zoning, Comprehensive Plan, and Critical Area Map





CRITICAL AREAS GENERALIZED LEGEND

- Wetlands
- Hydric Soils
- Endangered Flora & Fauna
- Priority Fish Habitat
- Priority Species Habitat
- Shallow Landslides
- Active Deep Seated Landslide-field verified
- Inactive Deep Seated Landslide-field verified
- Inactive Deep Seated Landslide-not field verified
- Potentially Unstable Slopes
- Floodplain
- Longview City Boundary



DISCLAIMER: The City of Longview does not guarantee the accuracy, adequacy, completeness or usefulness of any information. The City of Longview provides this information on an "as is" basis without warranty of any kind, expressed or implied, including but not limited to warranties of merchantability or fitness for a particular purpose, and assumes no responsibility for anyone's use of this information. However, notification of any errors will be appreciated.

Appendix E

Public Involvement and Interagency Coordination Documentation



P.O. Box 128
Longview, WA 98632-7080
www.ci.longview.wa.us

February 1, 2010

Aleceia Tilley
Office of Drinking Water
Washington State Department of Health
P.O. Box 47822
Olympia, WA 98504-7822

**RE: IDENTIFICATION OF THE AREA OF POTENTIAL EFFECTS
FOR THE LONGVIEW REGIONAL WATER TREATMENT PLANT PROJECT
LONGVIEW, WASHINGTON**

Dear Ms. Tilley:

In accordance with Section 106 of the National Historic Preservation Act of 1966 and implementing regulations 36 CFR Part 800, and to assist the Department of Health in notifying the appropriate consultation agencies of changes relating to the aforementioned improvements, this letter contains the full updated project description and all necessary information to fully identify the Area of Potential Effects (APE).

PROJECT DESCRIPTION

An attached map of the Study Area has been provided to illustrate the APE for the undertaking and following discussion (see attached APE map). The proposed construction of the Longview Regional Water Treatment Plant (RWTP) includes:

- construction of an approximately 1-mile-long water distribution system
- two backwash storage tanks with a future tank planned
- an office/treatment building
- filter gallery building
- nine pressure filter tanks with the potential to add an additional three
- four groundwater production wells with the potential to add two for a total of six
- four well houses
- sludge drying beds

SITE DESCRIPTION

The Longview RWTP project area is located in Sections 30 and 31 of Township 8 North, Range 2 West within the City of Longview on a 10-acre site located in the south-central portion of the Mint Farm Industrial Park (Figure 1). Industrial facilities and commercial businesses are located in the vicinity of the project area. The project area is dominated by Caples silty clay loam, which has a typical stratigraphic profile of silty clay loam (0 to 60 inches below ground surface [BGS]). A small portion of Snohomish silty clay loam is also located in the project area and has a typical stratigraphic profile of silty clay loam (0 to 18 inches BGS) over muck and mucky peat (18 to 60 cm BGS).

AREA OF DISTURBANCE

The proposed Longview RWTP will consist of constructing an approximately 1-mile-long water distribution system and the multi-component treatment facility described above. The proposed water distribution system pipe will be 30 inches in diameter and will be installed at a depth of approximately 6 feet below ground surface (BGS). The pipe alignment will go east from the RWTP, to the Weyerhaeuser railroad right-of-way (ROW), then head north between the existing mitigation wetlands and the Weyerhaeuser railroad ROW. The northern terminus of the 30-inch force main is anticipated to be the 20-inch diameter main, which is located near the intersection of Olive Way and Ocean Beach Highway. In addition, a 12-inch spur from the 30-inch water main will connect with a water main running along Weber Avenue.

The backwash storage tanks will be constructed adjacent to each other and their total footprint will be approximately 130 feet long by 84 feet wide for two tanks. If a third backwash storage tank is added, the footprint will increase to 130 feet long by 125 feet wide. Depending on the selected foundation support, the base of the backwash storage tanks may be located below existing site grade with the deepest portion of the backwater storage tanks disturbing soil to approximately 10 feet BGS at their deepest point and 6 feet BGS at their shallowest end.

The filter gallery building will be approximately 132 feet long by 27 feet wide, with possible expansion to 204 feet long. The bottom of excavation for the filter gallery will be approximately 5 feet BGS. The office/treatment building footprint will be approximately 84 feet long by 73 feet wide and its foundation will be constructed on an excavation extending to a depth of approximately 5 feet BGS.

The pressure filter tanks will be approximately 40 feet long with a 12-foot diameter, and will be supported by a 10-foot-wide by 35-foot-long mat foundation. The pressure filter tanks' proposed depth of ground disturbance will be approximately 5 feet BGS. The groundwater production wells will be drilled to an approximate depth of 375 feet BGS. A well housing will be constructed for each groundwater well

and will measure approximately 32 feet long by 13 feet wide, with the foundation excavated to a depth of 5 feet BGS. The sludge drying beds will be constructed to a depth of 10 feet BGS.

In addition, paved access roads and paved parking areas will be constructed around the perimeter of the water treatment plant. Proposed area and depth of ground disturbance the construction of the access roads and paved parking areas will cover approximately 0.8 acre and be constructed to 2 feet BGS, respectively.

VISIBLE AND AUDIBLE DISTURBANCES

The proposed Longview RWTP project will include the construction a new water treatment facility in the project area. In addition, during the construction and implementation of the proposed Longview RWTP, heavy equipment used may result in a temporary increase in the ambient noise level in the project area during the construction of the Longview RWTP.

CONSTRUCTION OF STAGING AREAS AND DETOUR ROUTES

The Longview RWTP project will be constructed within the Mint Farm Industrial Park. Unpaved, temporary staging areas to accommodate construction trailers, onsite equipment and laydown areas will be located outside of well protection areas in the proposed location of the dewatering beds, an area approximately 130 feet long by 125 feet wide, during construction of most of the facilities

PREVIOUSLY RECORDED CULTURAL RESOURCES AND LOCAL LANDMARKS

A Landau Associates cultural resources specialist conducted a records search for the project area at the Department of Archaeology and Historic Preservation (DAHP), and reviewed cultural resource site forms, reports, National Register of Historic Places (National Register) nomination forms, and historic property inventory forms. Several cultural resource surveys have been conducted within a one-mile vicinity of the project area. One archaeological site is located approximately 0.60 miles southwest of the project area. The site is an ethnographically known Native American cemetery that was located atop Mount Coffin. The exact location of Mount Coffin is unknown as historically the site was destroyed by the removal of the mountain for gravel.

Four properties listed on the National Register and the Washington Heritage Register (WHR) are located within a one-mile vicinity of the project area and include the J.D. Tennant house, the Robert Alexander High School, Lake Sacajawea Park, and the Longview Community Church.

CONCLUSIONS

No National Register or WHR structures are located on or adjacent to the project area. The construction of this project will not create visible impacts to historic properties due to the construction of structures associated with the RWTP in the project area. No audible impacts should occur to the surrounding area beyond those incurred temporarily during construction. Currently, the city of Longview is conducting a cultural resource assessment.

Please do not hesitate to contact me at 360.442.5206 if you have questions or concerns.

Sincerely,

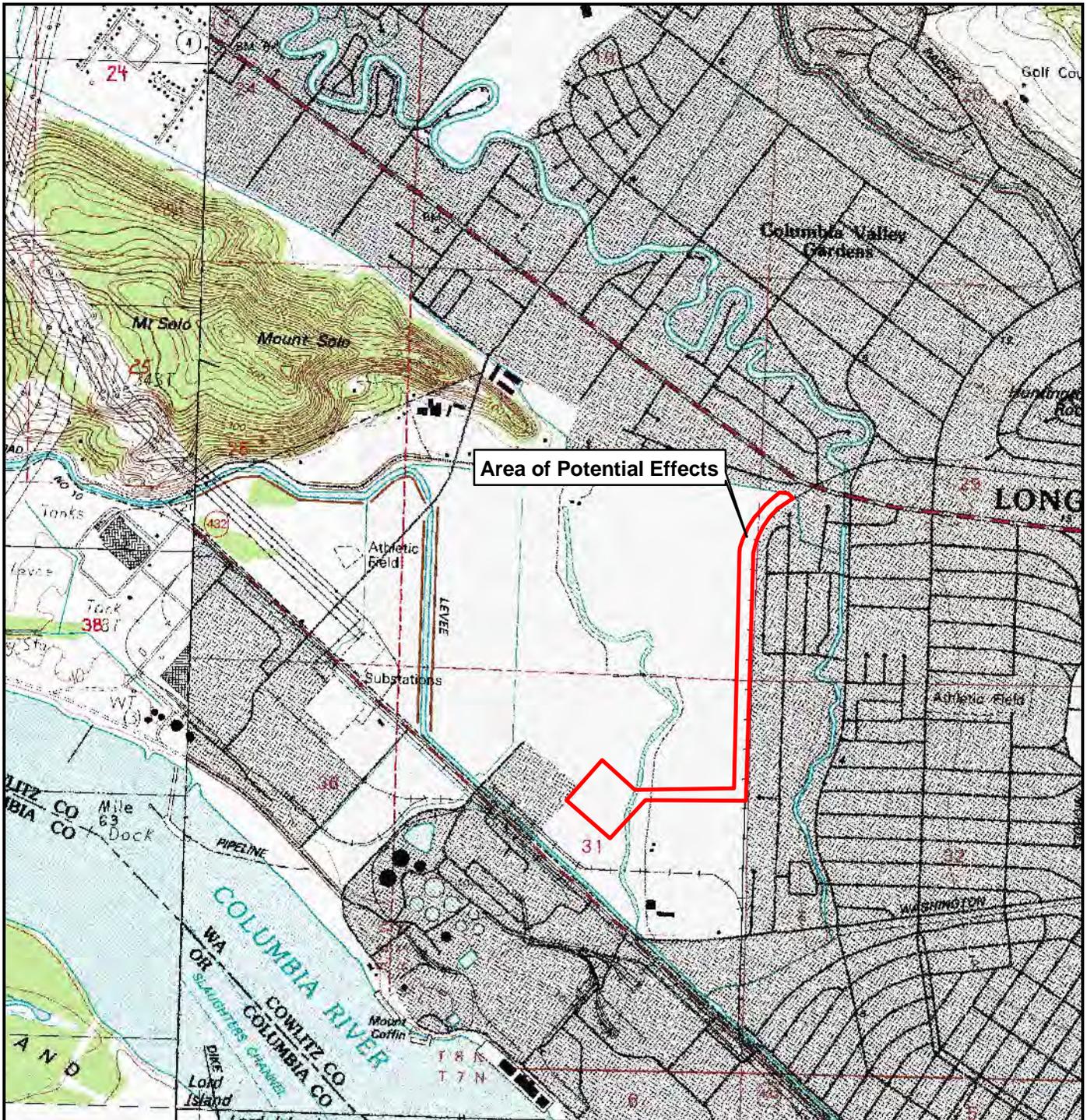
A handwritten signature in black ink that reads "Amy Blain". The signature is written in a cursive style with a large, looping initial "A".

Amy Blain, P.E.

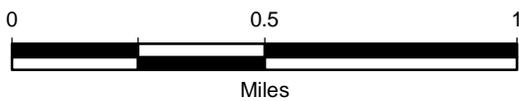
Civil Engineer

Attachments

Figure 1: Area of Potential Effects Map



Y:\Projects\133009\Mapdocs\0301\Fig1.mxd 1/6/2010



Data Source: ESRI 2008



City of Longview
Regional Water Treatment Plant
Longview, Washington

Area of Potential Effects Map

Figure
1



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Outage info and PUD news



WATER CUSTOMERS

Cowlitz PUD owns the water system that provides service to 3,800 customers in the outlying areas north and east of Longview and Kelso, including Columbia Heights, Beacon Hill, Lexington, Sunset Terrace, Cedar Gates, Ostrander/Woodbrook, Cowlitz Gardens and Williams-Finney. The PUD is also a partner (with the City of Longview) in the Longview Regional Water Treatment Plant (RWTP), located in West Kelso. The RWTP serves nearly all our water customers.

WATER SYSTEM TRANSFERRING TO BEACON HILL SEWER DISTRICT

In January 2008, under a new inter-local agreement, the PUD began the process of transferring its water system to Beacon Hill Sewer District. BHSD is now handling day-to-day maintenance and installations and will soon be processing bills and payments. About 80% of our water customers also have BHSD sewer service.

The goal of the PUD and BHSD is to provide a safe and dependable supply of drinking water. Our water is tested regularly through a certified laboratory and we are glad to report it meets or exceeds state and federal standards. State and federal regulators routinely monitor our compliance and testing protocols to assure that we deliver safe drinking water to you.

EVERY DROP COUNTS!

Living in a community surrounded by trees, mountains, and rivers, it might seem far-fetched to consider our water supply ever running low. But that's exactly what's happening down here in Shelton. Helens is clogging the RWTP intake facilities. When customer demand for water is low in the winter (200 gallons a day in the typical home), the RWTP can keep up. But in the summer, that demand climbs to 400 gallons a day. Our water supply becomes vulnerable when you couple increased water use with the silt problem, and a 60-year old treatment plant that has experienced filter failures.

The long-term fix is possibly a new City of Longview groundwater supply at the Mint Farm. But the best case scenario for completion of such a plant is three years away.

WHAT WE'RE DOING TO PREPARE

The City of Longview has adopted a four-stage water emergency plan and Cowlitz PUD/BHSD has also developed a four-step plan to encourage customers to reduce their water usage. It includes:

- » **An aggressive public notice campaign asking for voluntary reductions** This includes updates posted at this website, in our monthly newsletter and the local media.
- » **Direct communication with large users**
- » **A water rate surcharge which will take effect if a Stage 2 emergency is declared by the City of Longview**
 - » Residential:
 - Current rates for the first 500 cubic feet of water used per month
 - 50% surcharge for the next 500 cubic feet per
 - 100% surcharge for all water used over 1,000 cubic feet per month
 - » Nonresidential:
 - Average consumption for January, February, and March 2007 = Base Use
 - 50% surcharge for first 25% over base use in a month
 - 100% surcharge for balance of water used

http://cowlitzpud.org/water_customers.php

2/10/2010

Use
 -50% surcharge for first 25% over base use in a month
 -100% surcharge for balance of water used

http://cowlitzpud.org/water_customers.php

2/10/2010

1 cubic foot of water = 7.48 gallons

A "month" is based on the 30-day period (approximate) between meter readings.

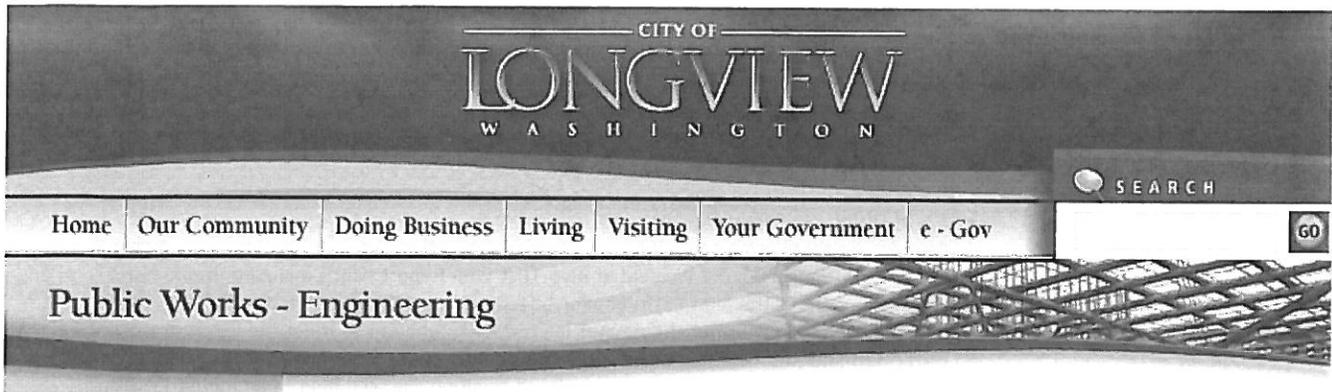
- » **Installation of flow restrictors depending on the level of the emergency and customer response to voluntary reductions and surcharge**

We'll notify PUD/BHSD customers via the Longview Daily News, local radio announcements and on this website if the temporary rate structures above go into effect in response to a water emergency. If you use water for non-essential needs during a water emergency (watering, washing cars, filling swimming pools, etc.) your monthly water billing will likely rise considerably over what you normally expect.

Please use water wisely at all times, especially during the summer and when we experience hot weather.

If you have any questions about our water service, please contact BHSD at (360) 636-3860, Cowlitz PUD at (360) 423-2210 or email: customercomments@cowlitzpud.org.

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[:: Water Operations](#)

[:: Water Quality Report 2008](#)

[:: Water Treatment Plant](#)

[:: Water Supply Project](#)

Mint Farm Groundwater Project

- [11-21-2009 - Project Map](#)
A concept map showing the basic site layout for the new water treatment plant and proposed well field.
- [11-21-2009 - Vicinity Map](#)
A concept map showing the basic site layout for the new water treatment plant and proposed well field.
- [10-31-2009 Monitoring Well Location Map](#)
A map showing the locations of the deep and shallow monitoring wells in and around the perimeter of the Mint Farm Industrial Park.
- [09-04-2009 Deep Monitoring Wells Construction Well Logs](#)
A detailed record of the geologic formation of deep monitoring wells DW-1 through DW-9 based on visual inspection of the cuttings produced during drilling and physical measurement made by instruments lowered into the hole (E-Log).
- [09-02-2009 Mint Farm Groundwater Granular Media Study Report](#)
The results of a 5-week pilot study using generic equipment to treat raw water pumped from the Prudential Blvd test well and determine whether iron, manganese and arsenic could be successfully removed using three types of conventional granular media.
- [05-02-2009 Mint Farm Groundwater Pilot Study Protocol](#)
The plan developed for the pilot study which describes the pilot study equipment and how it will be operated, establishes goals for the treated water quality, identifies the oxidants which will be used, and outlines the sampling and analysis plan for the raw water and treated water.
- [04-28-2009 Water Quality Sampling and Analysis Protocol](#)
A plan describing where and how three different types of samples will be collected – soil samples from the Mint Farm Industrial Park, groundwater samples from the Mint Farm aquifer (deep and shallow), and other potential surface water sources (Cowlitz and Columbia Rivers). Also describes what each type of sample will be tested for based on current regulation, emerging contaminants which may be regulated in the future and unregulated contaminants common to historical and industrial activity in and around the Mint Farm.
- [04-03-2009 Shallow Monitoring Well Construction Report](#)
A summary of the drilling activity for the construction of the first set of shallow monitoring wells. Provides the location, drillers well report, construction details and geologic log for wells SW-1 through SW-7.
- [05-05-2008 - GSI Environmental Review](#)
A third party environmental review of the area near the proposed well field in the Mint Farm looking for existing potential contaminant sources due to industrial and commercial operations, and existing wells with poor surface seals. The report evaluates the potential risk of contamination to the deep aquifer from those potential sources.

- [01-09-2008 Columbia River Water Quality Report](#)
Laboratory report with results of the analysis of untreated water samples collected from the Columbia River. Reports raw data from analysis of inorganic compounds (IOC's), volatile compounds (VOC's), synthetic organics compounds (SOC's), herbicides and some unregulated contaminants.
- [12-14-2007 - GSI Peer Review](#)
Provides a second opinion of the groundwater evaluation provided by Robinson, Noble & Saltbush in their 01-2007 Prudential Blvd Test Well Report which included preliminary conclusions about the Mint Farm aquifer based on the original test well. The GSI peer review focuses on whether the aquifer is productive enough to meet the City's projected water demand and whether that supply can be sustained. Also provides discussion of the basic groundwater quality and issues related to siting the well field in an industrial area.
- [01-2007 PRUDENTIAL BLVD TEST WELL & WATER QUALITY DATA](#)
A summary of the construction of the Prudential Blvd test well (formerly Weber Ave test well) which was the first exploratory well drilled in the Mint Farm. Describes the drilling, construction, testing, geology, hydrogeology and water quality at this location.

Questions and Comments? Please [email the Project Manager](#).

<p>OTHER RELATED DOCUMENTS</p> <ul style="list-style-type: none"> • 02-2006 - Mint Farm Industrial Park CC&R's • 10-2005 - Water Master Plan Update • Utility Projects <p>Frequently Asked Questions:</p> <ol style="list-style-type: none"> 1. Where does the groundwater come from? 2. How long will the groundwater supply last? 3. How do I know the groundwater won't become contaminated? 4. What is in the groundwater? 5. What will the groundwater taste like? 6. Will the groundwater stain my laundry and household fixtures? 7. Why not re-build the existing water treatment plant? 8. What's wrong with staying in the Cowlitz River? 9. Why not move the water supply intake to a better location on the Cowlitz River or Columbia River? 10. How much will the new groundwater supply cost? 11. When will the new water plant be finished? 	<p>Contact Us</p> <p>1525 Broadway Longview, WA 98632</p> <p>Phone: 360.442.5200 Fax: 360.442.5953 Hours: 8 a.m. to 5 p.m. Monday through Friday Closed Legal Holidays</p>
--	--





REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

Regulatory Branch

FEB -6 2001

City of Longview
Post Office Box 128
Longview, Washington 98632

Reference: 1998-4-00832
Longview, City of

Gentlemen and Ladies:

Enclosed is a Department of the Army permit which authorizes performance of the work described in your referenced application.

You are cautioned that any change in the location or plans of the work will require submittal of a revised plan to this office for approval prior to accomplishment. Deviation from approved plans may result in imposition of criminal or civil penalties.

Your attention is drawn to General Condition 1 of the permit which specifies the expiration date for completion of the work. You are requested to notify this office of the date the work is completed.

Sincerely,

A handwritten signature in cursive script that reads "Thomas F. Mueller".

Thomas F. Mueller
Chief, Regulatory Branch

Enclosure

DEPARTMENT OF THE ARMY PERMIT

Permittee: Longview, City of

City of Longview

Permit No: 1998-4-00832

Post Office Box 128

Longview, Washington 98632

Issuing Office: Seattle District

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the U.S. Army Corps of Engineers (Corps) having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: Fill and grade 25.35 acres of wetlands and drainage swales for the construction of the second phase of what is now a two-phase industrial/business park and perform mitigation in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit. (Provide land ready for industrial development within the city of Longview).

Project Location: In wetlands and drainage swales adjacent to the Columbia River within the city of Longview, Washington.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on FEB - 6 2006. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least 1 month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in accordance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification to this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.
4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.
5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.
6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

7. After a detailed and careful review of all the conditions contained in this permit, the permittee acknowledges that, although said conditions were required by the Corps, nonetheless the permittee agreed to those conditions voluntarily to facilitate issuance of the permit; the permittee will comply fully with all the terms of all the permit conditions.

Special Conditions:

a. You must provide a copy of the permit transmittal letter, the permit form, and drawings to all contractors performing any of the authorized work.

b. The City of Longview, as the applicant and developer of this project, agrees to be solely responsible for complying with all terms and conditions of this permit, regardless of future ownership changes of all or parts of the proposed industrial/business park. This includes, but is not limited to, implementation of the revised 16 June 2000 project plans, the revised 15 September 2000 Mitigation Plan, the revised 20 February 2000 Biological Evaluation (BE) and the Supplemental BEs dated 1 May and 14 June 2000.

c. Implementation of the 15 September 2000 revised Mitigation Plan, including the preparation and submittal of the required mitigation monitoring reports shall be the sole responsibility of the City of Longview. All reports must be submitted to Seattle District, Regulatory Branch.

d. The City of Longview shall construct all mitigation in three successive construction seasons following permit issuance.

e. A status report on the mitigation construction, including as-built drawings, shall be submitted by the City of Longview to the Regulatory Branch, Corps of Engineers, 13 months from the date of permit issuance. Subsequent status reports are required every six months for a period of 10 years.

f. The placement of fill material into wetlands for the development of specific parcels of land for future tenants/purchasers shall only occur as tenants/purchasers are obtained. The advanced filling of wetlands for unspecified site development is not allowed under the terms of this permit. For this reason, the permit shall be valid for a period of 5 years from the date of issuance.

g. The mitigation site, including the 22.5 acres of enhanced wetlands and the 29.2 acres of wetlands to be restored as mitigation for work authorized by this permit shall not be made the subject of a future individual or general Department of the Army permit application for fill or other development, except for the purposes of enhancing or restoring the mitigation associated with this project. In addition, a description of the mitigation site identified on sheet 13 of the 16 June 2000 revised project drawings, the 15 September 2000 revised Mitigation Plan, as approved, and any subsequent permit mitigation area revisions, shall be recorded with the Registrar of Deeds or other appropriate official charged with the responsibility for maintaining records to or interest in real property. Proof of this documentation must be provided to the Corps of Engineers, Seattle District within 60 days of issuance of this permit.

h. Landscaping requirements for individual lots for Phase II shall be raised to 15 percent of the site area (e.g., no more than 85 percent impervious surface).

i. A professional archaeologist shall be on-site to monitor for the presence of archaeological resources during all ground disturbing construction within the Phase 2 development including the wetland mitigation area. The archaeological monitoring plan prepared by BOAS, Inc. dated January 2001 must be implemented in its entirety.

j. A summary report of the findings of the archaeological monitoring or status report must be submitted to the Corps of Engineers, Seattle District, Regulatory Branch (Corps) within 13 months of permit issuance.

k. If human remains or archaeological resources are encountered during construction, all ground disturbing activities shall cease in the immediate area and the permittee shall immediately (within one business day of discovery) notify the Corps. The permittee shall perform any work required by the Corps in accordance with Section 106 of the National Historic Preservation Act and Corps regulations.

Further Information:

1. Congressional Authorities. You have been authorized to undertake the activity described above pursuant to:
 - () Section 10 of the Rivers and Harbor Act of 1899 (33 U.S.C. 403).
 - (X) Section 404 of the Clean Water Act (33 U.S.C. 1344).
 - () Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).
2. Limits of this authorization.
 - a. This permit does not obviate the need to obtain other Federal, State, or local authorization required by law.
 - b. This permit does not grant any property rights or exclusive privileges.
 - c. This permit does not authorize any injury to the property or rights of others.
 - d. This permit does not authorize interference with any existing or proposed Federal project.
3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:
 - a. Damages to the permitted project or uses thereof as a result of other permitted activities or from natural causes.
 - b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
 - c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
 - d. Design or construction deficiencies associated with the permitted work.
 - e. Damage claims associated with any future modification, suspension, or revocation of this permit.
4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require include, but are not limited to, the following:

- a. You fail to comply with the terms and conditions of the permit.
- b. The information provided by you in support of your application proves to have been false, incomplete, or inaccurate (See 4 above).
- c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

X Edwin R. [Signature]
City of Longview

X 2-6-01
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

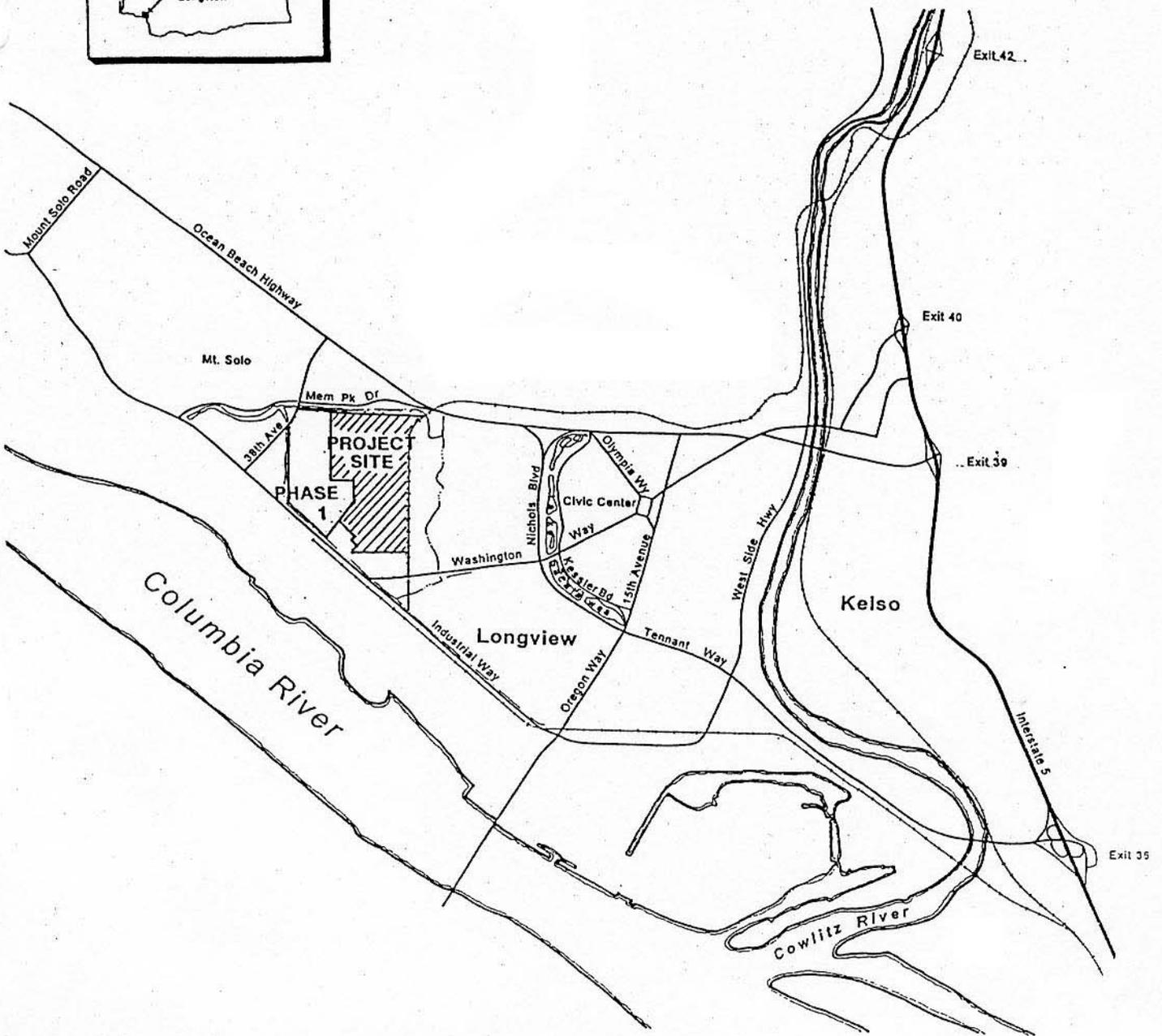
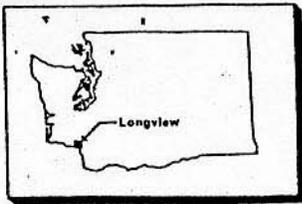
for Ralph H. Graves
RALPH H. GRAVES
Colonel, Corps of Engineers
District Engineer

2-6-01
(DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEEE)

(DATE)



PROPOSAL IS PHASE TWO OF THE MINTFARM INDUSTRIAL PARK
 LOCATED AT INDUSTRIAL WAY AND PRUDENTIAL BLVD,
 APPROX. 2 MILES WEST OF OREGON WAY
 SITE IS WITHIN CITY OF LONGVIEW

LAT. 46 08' 15" LONG. 122 58' 45"

SITE DRAINED BY PUMPED DISCHARGE, DRAINAGE DISTRICT #1

PHASE 1 WAS AUTHORIZED BY DEPT. OF THE ARMY PERMIT NO. 1996-4-00177

VICINITY PLAN

APPLICATION #98-4-00832

PURPOSE: To provide land ready for industrial
 development within the City of Longview

PROPOSED FILL IN: Wetlands adjacent to
 Columbia River

DATUM: N.G.V.D. of 1929=O.O'

AT: City of Longview

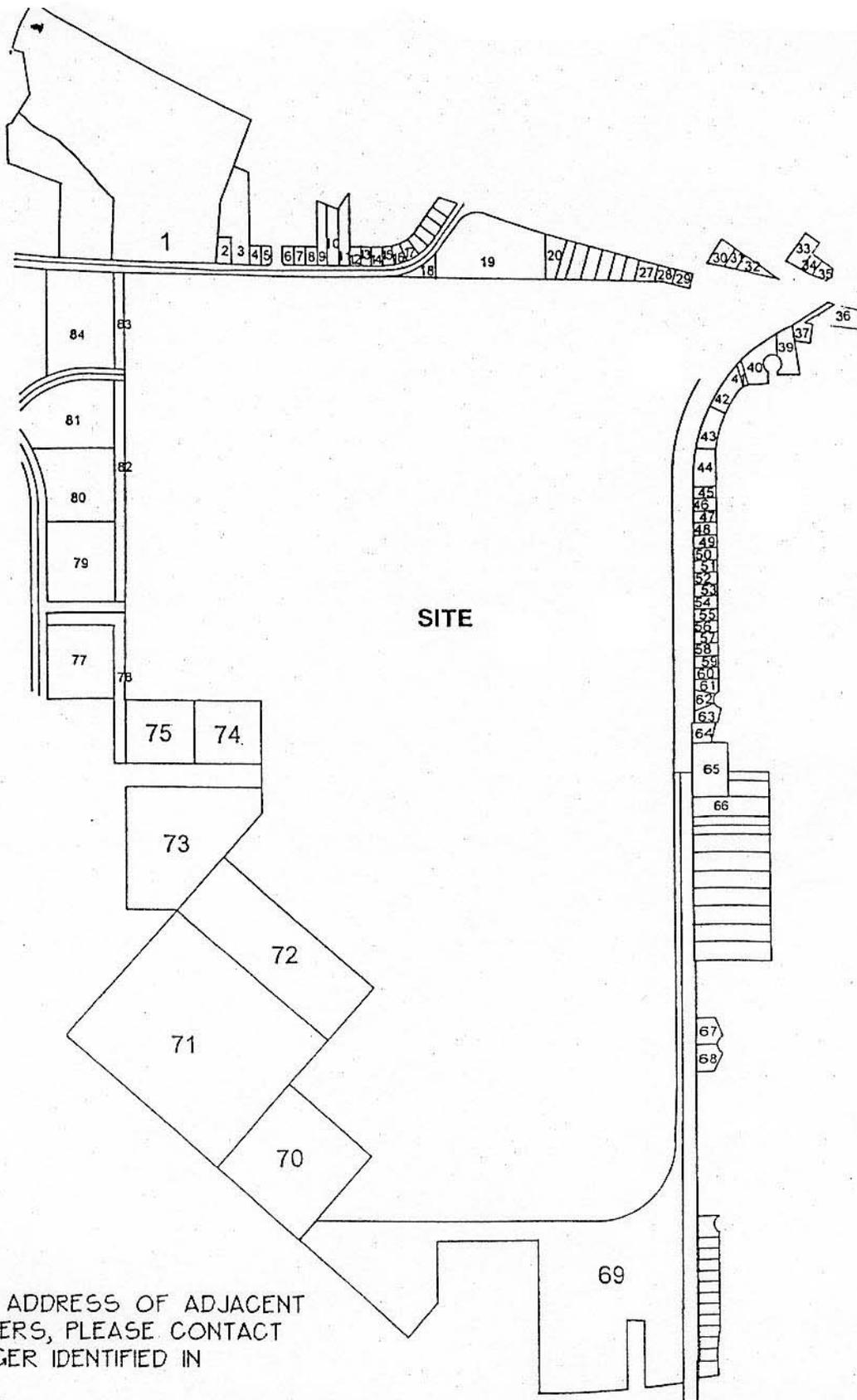
COUNTY: Cowlitz, WA

ADJ. PROPERTY OWNERS: See Sheet 2 of 15

APPLICATION BY: City of Longview

DATE: August 30, 1999 Reissued: June 2, 2000

SHEET 1 OF 15



NOTE:
 FOR NAME AND ADDRESS OF ADJACENT
 PROPERTY OWNERS, PLEASE CONTACT
 PROJECT MANAGER IDENTIFIED IN
 PUBLIC NOTICE.

ADJACENT PROPERTY OWNERS

PURPOSE: To provide land ready for industrial
 development within the City of Longview
DATUM: N.G.M.D. of 1929=0.0'

ADJ. PROPERTY OWNERS: See note above

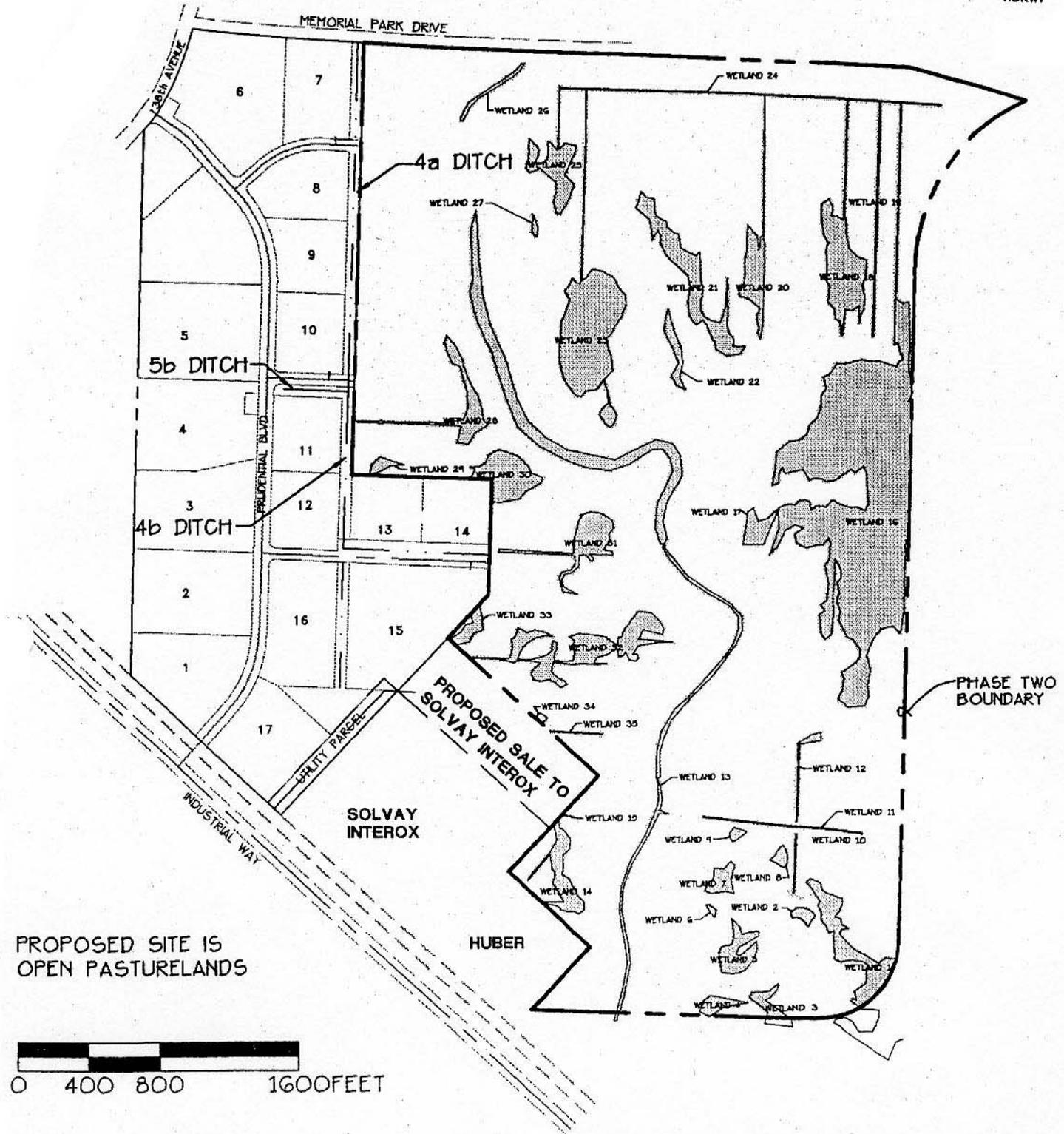
DATE: August 30, 1999 Reissued: June 2, 2000

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to
 Columbia River

AT: City of Longview
COUNTY: Cowlitz, WA
APPLICATION BY: City of Longview

SHEET 2 OF 15



EXISTING WETLANDS

PURPOSE: To provide land ready for industrial development within the City of Longview
 DATUM: N.G.V.D. of 1929=O.O'

ADJ. PROPERTY OWNERS: See Sheet 2 of 15

DATE: August 30, 1999 Reissued: June 2, 2000

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to Columbia River

AT: City of Longview
 COUNTY: Cowlitz, WA
 APPLICATION BY: City of Longview

SHEET 3 OF 15

WETLAND AREA	USFWS CLASSIFICATION	DOE WETLAND CATEGORY	SIZE IN SQUARE FEET	SIZE IN ACRES
1	PEM1Cd	4	71,485 sqft	1.64 acres
2	PEM1E	4	6,442 sqft	0.15 acres
3	PEM1Ed	4	13,752 sqft	0.32 acres
4	PEM1Ed	4	13,820 sqft	0.32 acres
5	PEM1E	4	35,311 sqft	0.81 acres
6	PEM1Ed	4	1,755 sqft	0.04 acres
7	PEM1Ed	4	16,924 sqft	0.39 acres
8	PEM1E	4	6,332 sqft	0.15 acres
9	PEM1E	4	4,201 sqft	0.10 acres
10	PEM1Ex	4	1,117 sqft	0.03 acres
11	PEM1Cx	4	6,890 sqft	0.16 acres
12	PEM1Ed	4	6,502 sqft	0.15 acres
13	PEM1Cdh	3	192,119 sqft	4.41 acres
14	PEM1Ed	4	42,189 sqft	0.97 acres
15	PEM1Ed	4	234 sqft	0.01 acres
16	PEM1Cd	3	782,631 sqft	17.97 acres
17	PEM1Ed	4	21,671 sqft	0.50 acres
18	PEM1Ed	3	89,300 sqft	2.05 acres
19	PEM1Ex	4	9,190 sqft	0.21 acres
20	PEM1Ed	4	46,264 sqft	1.06 acres
21	PEM1Ed	3	88,877 sqft	2.04 acres
22	PEM1Ed	4	15,941 sqft	0.37 acres
23	PEM1Cd	3	184,813 sqft	4.24 acres
24	PEM1Cx	4	22,207 sqft	0.51 acres
25	PEM1Ed	4	48,177 sqft	1.11 acres
26	PEM1Ed	4	8,421 sqft	0.19 acres
27	PEM1E	4	2,309 sqft	0.05 acres
28	PEM1Ed	4	42,722 sqft	0.98 acres
29	PEM1Ed	4	7,176 sqft	0.16 acres
30	PEM1Cd	4	62,239 sqft	1.42 acres
31	PEM1Ed	4	52,376 sqft	1.20 acres
32	PEM1Ed	3	113,993 sqft	2.61 acres
33	PEM1Ed	4	14,642 sqft	0.34 acres
34	PEM1Ed	4	1,903 sqft	0.04 acres
35	PEM1Ex	4	1,554 sqft	0.04 acres
4a	PEM1Ex	4	27,750 sqft	0.64 acres
4b	PEM1Ex	4	13,800 sqft	0.32 acres
5b	PEM1Ex	4	6,525 sqft	0.15 acres

WETLAND TYPES

PURPOSE: To provide land ready for industrial development within the City of Longview

DATUM: N.G.M.D. of 1929=O.O'

ADJ. PROPERTY OWNERS: See Sheet 2 of 15

DATE: August 30, 1999 Revised: June 2, 2000

APPLICATION #98-4-00832

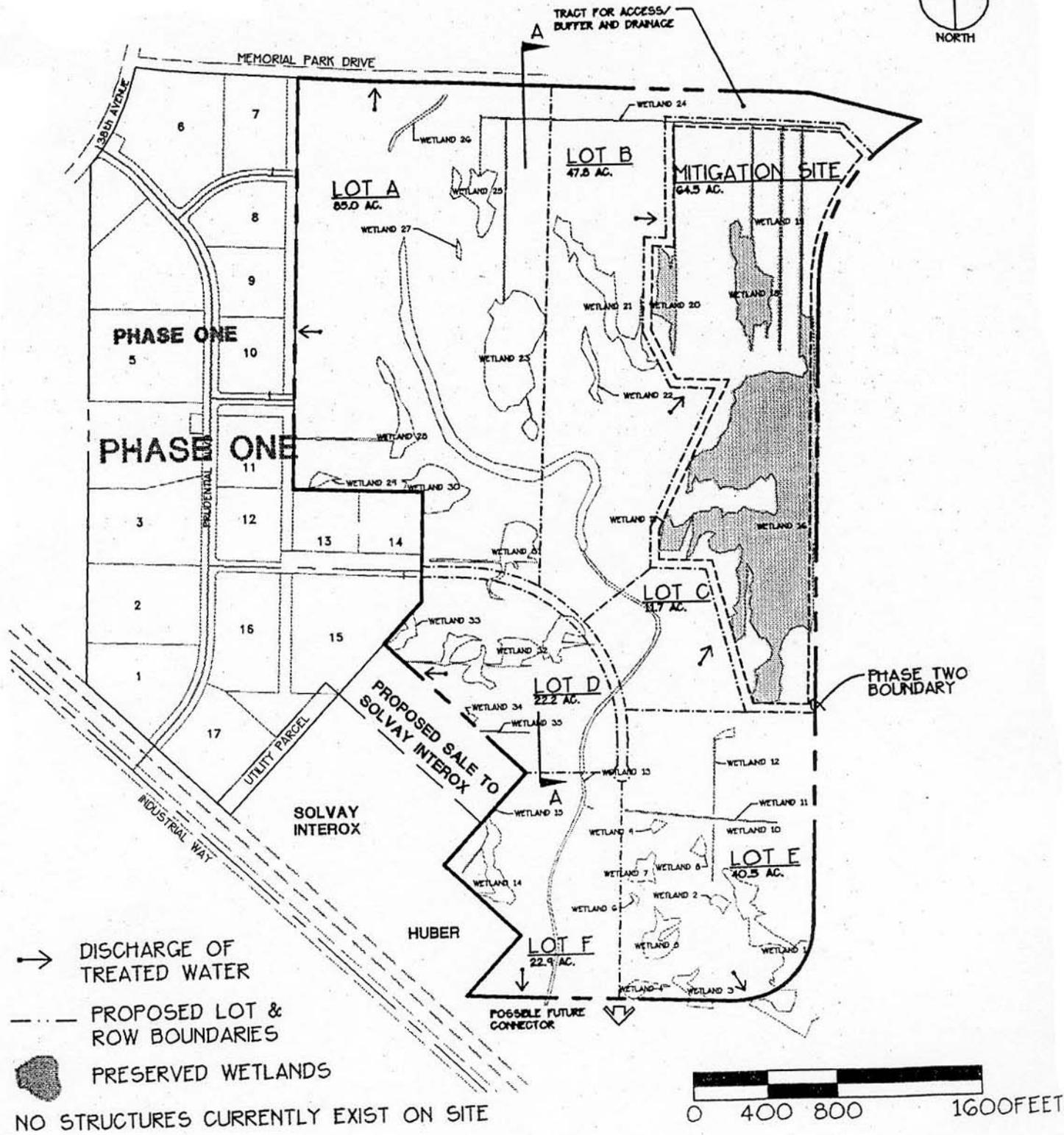
PROPOSED FILL IN: Wetlands adjacent to Columbia River

AT: City of Longview

COUNTY: Cowlitz, WA

APPLICATION BY: City of Longview

SHEET 4 OF 15



PROPOSED DEVELOPMENT PLAN

APPLICATION #98-4-00832

PURPOSE: To provide land ready for industrial development within the City of Longview
 DATUM: N.G.V.D. of 1929=0.0'

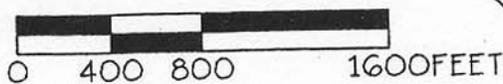
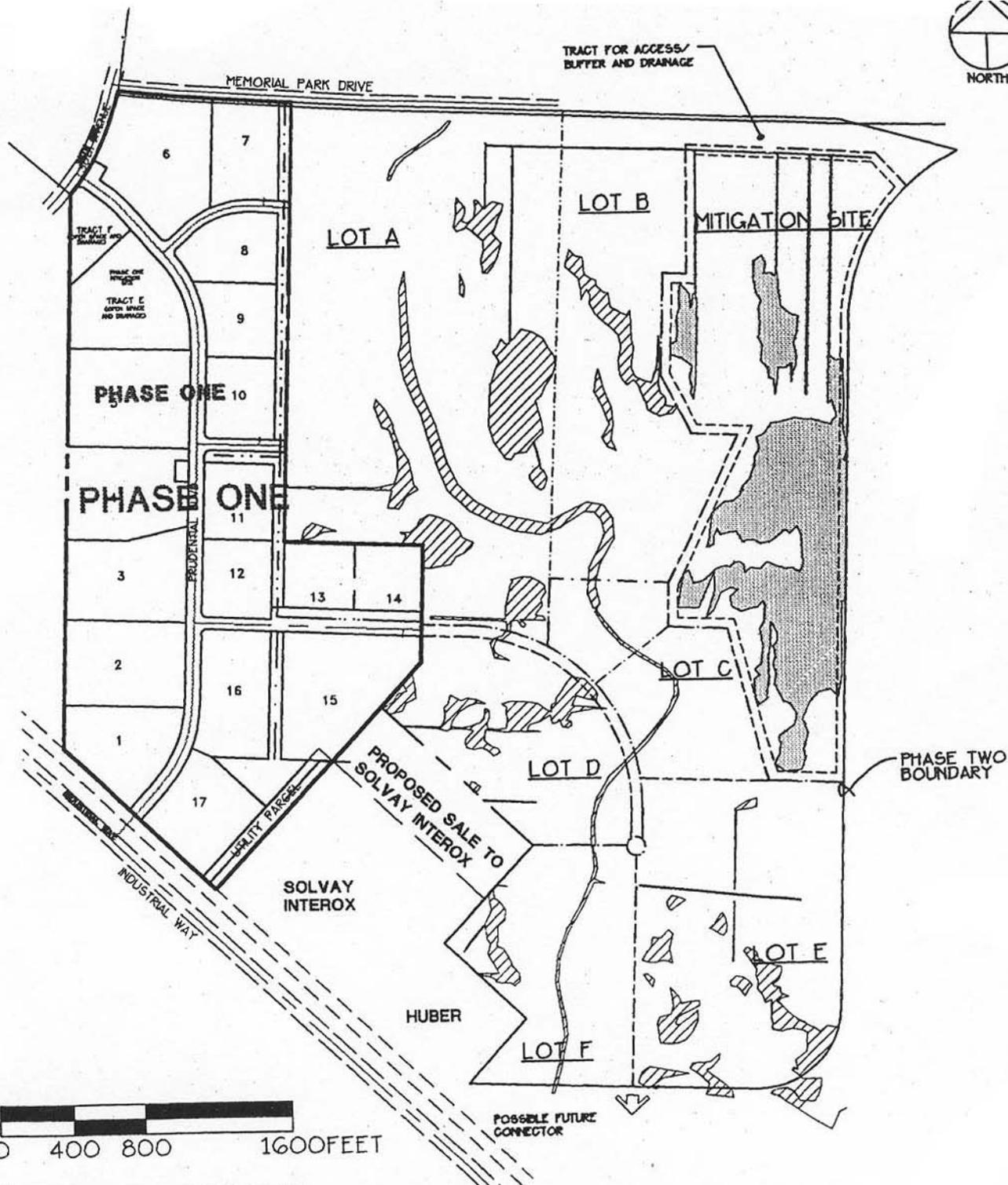
PROPOSED FILL IN: Wetlands adjacent to Columbia River

ADJ. PROPERTY OWNERS: See Sheet 2 of 15

AT: City of Longview
 COUNTY: Cowlitz, WA
 APPLICATION BY: City of Longview

DATE: August 30, 1999 Reissued: June 2, 2000

SHEET 5 OF 15



- PRESERVED WETLANDS
FOR DESCRIPTIONS OF EXIST. WETLANDS, SEE SHEET 7 OF 15
- PROPOSED FILL AREAS (25.9 ACRES)

PROPOSED WETLANDS FILL

PURPOSE: To provide land ready for industrial development within the City of Longview
 DATUM: N.G.M.D. of 1929=O.O.
 ADJ. PROPERTY OWNERS: See Sheet 2 of 15
 DATE: August 30, 1999 Reissued: June 2, 2000

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to Columbia River
 AT: City of Longview
 COUNTY: Cowlitz, WA
 APPLICATION BY: City of Longview
 SHEET 6 OF 15

	USFWS CLASSIFICATION	DOE WETLAND CATEGORY	SIZE IN SQUARE FEET	FILL FOR FUTURE DEVELOPMENT (SF)	PRESERVE (SF)
1	PEM1Cd	4	71,485 sqft	71,485 sqft	
2	PEM1E	4	6,442 sqft	6,442 sqft	
3	PEM1Ed	4	13,752 sqft	13,752 sqft	
4	PEM1Ed	4	13,820 sqft	13,820 sqft	
5	PEM1E	4	35,311 sqft	35,311 sqft	
6	PEM1Ed	4	1,755 sqft	1,755 sqft	
7	PEM1Ed	4	16,924 sqft	16,924 sqft	
8	PEM1E	4	6,332 sqft	6,332 sqft	
9	PEM1E	4	4,201 sqft	4,201 sqft	
10	PEM1Ex	4	1,117 sqft	1,117 sqft	
11	PEM1Cx	4	6,890 sqft	6,890 sqft	
12	PEM1Ed	4	6,502 sqft	6,502 sqft	
13	PEM1Cdh	3	192,119 sqft	192,119 sqft	
14	PEM1Ed	4	42,189 sqft	42,189 sqft	
15	PEM1Ed	4	234 sqft	234 sqft	
16	PEM1Cd	3	782,631 sqft		782,631 sqft
17	PEM1Ed	4	21,671 sqft		21,671 sqft
18	PEM1Ed	3	89,300 sqft		89,300 sqft
19	PEM1Ex	4	9,190 sqft		9,190 sqft
20	PEM1Ed	4	46,264 sqft		46,264 sqft
21	PEM1Ed	3	88,877 sqft	88,877 sqft	
22	PEM1Ed	4	15,941 sqft	15,941 sqft	
23	PEM1Cd	3	184,813 sqft	184,813 sqft	
24	PEM1Cx	4	22,207 sqft	12,214 sqft	9,993 sqft
25	PEM1Ed	4	48,177 sqft	48,177 sqft	
26	PEM1Ed	4	8,421 sqft	8,421 sqft	
27	PEM1E	4	2,309 sqft	2,309 sqft	
28	PEM1Ed	4	42,722 sqft	42,722 sqft	
29	PEM1Ed	4	7,176 sqft	7,176 sqft	
30	PEM1Cd	4	62,239 sqft	62,239 sqft	
31	PEM1Ed	4	52,376 sqft	52,376 sqft	
32	PEM1Ed	3	113,993 sqft	113,993 sqft	
33	PEM1Ed	4	14,642 sqft	14,642 sqft	
34	PEM1Ed	4	1,903 sqft	1,903 sqft	
35	PEM1Ex	4	1,554 sqft	1,554 sqft	
4a	PEM1Ex	4	27,750 sqft	27,750 sqft	
4b	PEM1Ex	4	13,800 sqft		13,800 sqft
5b	PEM1Ex	4	6,525 sqft		6,525 sqft

Total Proposed Fill

1,104,180 sqft
25.35 ac.

WETLAND IMPACTS

PURPOSE: To provide land ready for industrial development within the City of Longview
 DATUM: N.G.M.D. of 1929=0.0'

ADJ. PROPERTY OWNERS: See Sheet 2 of 15

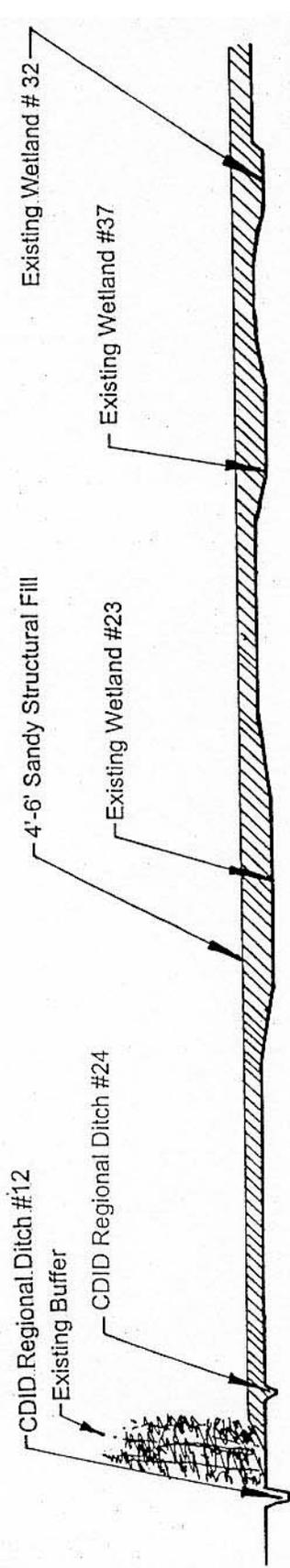
DATE: August 30, 1999 Revised: June 2, 2000

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to Columbia River

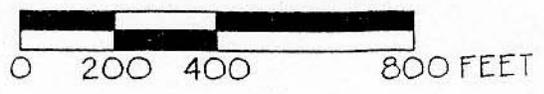
AT: City of Longview
 COUNTY: Cowlitz, WA
 APPLICATION BY: City of Longview

SHEET 7 OF 15



Section A- Proposed Fill (see Sheet 5)
 Horizontal Scale- 1"=400'
 Vertical Scale- 1"=40' 10:1 Exaggeration

Note: Existing trees are not to scale.



PROPOSED FILL

PROPOSE: To provide land ready for industrial development within the City of Longview
 DATUM: N.G.M.D. of 1929=O.O'
 ADJ. PROPERTY OWNERS: See Sheet 2 of 15
 DATE: August 30, 1999 Reissued: June 2, 2000

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to Columbia River
 AT: City of Longview
 COUNTY: Cowlitz, WA
 APPLICATION BY: City of Longview
 SHEET 8 OF 15

MITIGATION SUMMARY
PHASE TWO- THE MINT FARM INDUSTRIAL PARK
CITY OF LONGVIEW, COWLITZ COUNTY, WASHINGTON

Phase Two of the Mint Farm Industrial Park project site is approximately 300 acres in size and comprises the central and eastern portions of the approximately 435 acre site commonly referred to as the "Mint Farm". Phase One, the western approximately 125 acres of the "Mint Farm," is owned by the City of Longview and is presently being developed into the first part of this overall industrial park facility. The services, utilities, infrastructure, and associated roadways planned and developed as a part of Phase One have been sized to support and facilitate the Phase Two development. Phase One was authorized by Department of the Army Permit Number 1996-4-00177.

An assessment of the Phase Two project area was completed between 1996 and 1999. This assessment resulted in the identification of 35 wetland areas totaling 47.8 acres onsite. This assessment program included an evaluation of the functions and value ratings for each identified area.

The Preferred Action Alternative will unavoidably impact 25.35 acres of onsite wetland area. As compensation for this unavoidable impact a total of 22.5 acres of existing onsite wetland will be restored/enhanced and a total of 29.2 acres of new wetland area will be created onsite. This scenario will provide a wetland area replacement ratio of better than 1.5 to 1 (replacement to modified) and a wetland restoration ratio of 3.0 to 1.0 (restored to modified). In addition, this scenario will increase diversity of plant communities and wildlife habitats available within the project site while creating a single contiguous wetland and associated buffer area. To assure that the wetland creation/restoration project successfully meets the established performance criteria a ten-year monitoring program will be undertaken. This monitoring program includes contingency provisions should any of the performance criteria not be met.

TOTAL AMOUNT OF ONSITE WETLAND	TOTAL AMOUNT OF WETLAND UNAVOIDABLY IMPACTED	TOTAL AMOUNT OF WETLAND BEING CREATED ONSITE	TOTAL AMOUNT OF WETLAND BEING RESTORED/ENHANCED ONSITE	TOTAL AMOUNT OF AREA ESTABLISHED ONSITE AS A PART OF THE MITIGATION PROGRAM (WETLAND AND BUFFER)
47.8 acres	25.4 acres	29.2 acres	22.5 acres	66-67 acres

MITIGATION SITE CHARACTERISTICS

Existing Conditions: The site selected for the compensatory mitigation area has managed for agricultural activities for several decades. These activities have not been abandoned and an actively managed and actively grazed pasture plant community presently dominates the project site.

Mitigation Site Hydrology: Onsite assessments have identified that the majority of the area does not exhibit ponded surface water into the growing season, though these areas do appear ponded for short periods during seasonal storm events. The onsite wetlands exhibit a seasonally flooded water regime. Such seasonal flooding appears to be prolonged by the invert elevations of culverts

MITIGATION SUMMARY

PURPOSE: To provide land ready for industrial development within the City of Longview
DATUM: N.G.M.D. of 1929=0.0'
ADJ. PROPERTY OWNERS: See Sheet 2 of 15
DATE: August 30, 1999 Revised: June 2, 2000

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to Columbia River
AT: City of Longview
COUNTY: Cowlitz, WA
APPLICATION BY: City of Longview
SHEET 9 OF 15

installed within the ditches and the level of surface water within the adjacent regional drainage ditch system. The onsite wetlands are generally dry, but often saturated to near the surface, from early to mid-summer through fall.

While the upland portions of the proposed mitigation site is somewhat drier than other areas within Phase Two, the difference is based on elevational differences of only a couple feet. These areas are intricately intermixed with associated wetlands which comprise one-third of the proposed mitigation site. Site grading and augmentation of flows from stormwater conveyance systems will effectively provide the hydrology necessary to support the proposed wetlands mitigation habitats. We estimate drainage from approximately 200 acres can be directed to and through the mitigation site, after pre-treatment in wet ponds at the site's periphery.

Mitigation Site Vegetation: Seeded and invasive grasses and herbs dominate the plant community identified within the selected mitigation area. Himalayan blackberry is also invading this area, primarily in the higher areas. The onsite plant community is actively managed for the production of pasture for domestic livestock. Such management actions include the mowing of invasive weeds and shrubs, and the maintenance of the field ditches.

The northern boundary of the project area, immediately north of the selected mitigation area, is dominated by a band of Douglas fir trees. These trees were densely planted to provide a screen between the project area and the single family residential area north of the project site.

Mitigation Site Soils: Onsite assessment defined the soil characteristics within the proposed mitigation site as hydric in character. Soil texture was silty loam, silty clay loam, and peaty loam. Faint and very weak redoximorphic features were present (i.e. mottles, concretions). Past onsite land uses have included clearing, plowing, seeding, and ditching and appeared to have acted to influence the hydric character of the soil within the selected mitigation wetland area.

The hydric character of the soils within the proposed mitigation areas will benefit the establishment of a viable wetland community once wetland hydrology is reestablished. Existing surface soils within the project area will be used to recontour the final grading of the created mitigation areas.

DETAILED DESCRIPTION OF THE COMPENSATORY MITIGATION PLAN

1. As compensation for the unavoidable modification of onsite wetlands approximately 29.2 acres of compensatory mitigation wetland area will be created and will be directly connected to the proposed stormwater management facilities (Sheet 11). In addition, 22.5 acres of existing wetlands will be preserved and enhanced.
2. The compensatory wetland will be created within an area presently dominated by active agricultural pasturage. The existing vegetation community within the area selected for wetland mitigation is dominated by seeded and invasive grasses and herds. Invasive shrubs (i.e. Himalayan blackberry) are also present within this existing community.

The mitigation wetland will be created through the excavation of specific onsite areas and surface water input controls as a part of the onsite stormwater management plan. The approach will closely follow that employed in mitigating for wetland losses due to Phase One development. By suggestion of both COE and DOE staff, permanent open water features will not be created. This mitigation area will be hydrologically connected to the adjacent regional drainage system via a direct surface water connection. In addition, the selected location for the mitigation wetland will

MITIGATION SUMMARY

PURPOSE: To provide land ready for industrial development within the City of Longview
DATUM: N.G.M.D. of 1929=0.0'
ADJ. PROPERTY OWNERS: See Sheet 2 of 15
DATE: August 30, 1999

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to Columbia River
AT: City of Longview
COUNTY: Cowlitz, WA
APPLICATION BY: City of Longview

Revised: June 2, 2000

SHEET 10 OF 15

allow movement of wildlife into adjacent habitats without the need to cross a substantial development (i.e. paved roadway). Site specific excavation will focus on the creation of a mixed and structurally complex plant community. Following excavation of the mitigation area, hydric soils taken from onsite will be relocated into the excavated area and contoured to form desired wetland elevations. The relocation of existing hydric soils will help assure wetland creation success through the use of appropriate soils. These soils will contain the wetland plants, roots, and seeds to help establish a wetland plant community.

3. The selected plant communities to be planted within the compensatory wetland area will contain a mixture of native emergent, shrub, and trees species common to the local area. Characteristics of several wetland and upland habitats will be targeted by the regrading and planting activities (see Sheets 14 and 15). The selected species will increase species diversity and wildlife habitats (i.e. feeding, nesting, cover), while also enhancing the local and downstream water quality through increased biofiltration. As with hydrologic design, the planting approach will closely follow that employed in mitigating for wetland losses due to Phase One development.
4. The City of Longview proposes a construction schedule that provides most of the mitigation ahead of the associated wetland filling. The City is committed to constructing all of the necessary mitigation in three successive construction seasons. The first phase will include sufficient mitigation to offset fills required to construct initial project infrastructure occurring during the same construction season. The size of that initial mitigation as well as the subsequent phases will also each be sufficient to pre-mitigate for impacts of subsequent filling on individual development pads. The intent is to delay filling of those pads to the extent possible consistent with limitations to the length of permit issued by the Corps.

Onsite planting will be undertaken in two parts. This phased approach will allow for the better establishment of selected communities and place particular attention on the ability of a particular species to survive once planted. Those species more tolerant of direct sunlight at initial planting (i.e. Oregon ash, rose, snowberry) will be planted during the first planting phase. Those species less tolerant of direct sunlight at initial planting (i.e. Western red cedar, Pacific ninebark) will be planted during the second planting phase. As presently proposed, the second planting phase will be undertaken at the end of the second year following mitigation site development. The actual timing for the second planting will be dependent upon the results noted during the first and second year monitoring and the overall success of the first planting.

5. A protective buffer along the restored and enhanced wetland and along the retained existing onsite wetlands will be established as a part of this plan. The buffer area will average in excess of 75 feet. These buffer areas will be planted with a mixture of native shrubs and trees and will serve to protect the created wetland areas while also providing additional wildlife habitat and plant species diversity. The establishment of native trees and shrubs will also assist in the control of reed canarygrass through shading.
6. Water quality facilities will be located adjacent to, and outside of, the new wetland complex. These facilities will provide a source of hydrology with surface waters entering the created wetland at established surface elevations following biofiltration. As with Phase One, several two-celled wet ponds will treat and retard stormwater prior to release into the wetland complex. Final site grading will assure that the passage of surface water does not become concentrated and result in localized erosion. Wetland hydrology will also be provided by the movement of groundwater onsite and from the direct connection to the adjacent regional drainage system.

MITIGATION SUMMARY

PURPOSE: To provide land ready for industrial development within the City of Longview
DATUM: N.G.M.D. of 1929=O.O'

ADJ. PROPERTY OWNERS: See Sheet 2 of 15

DATE: August 30, 1999 Revised: June 2, 2000

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to
Columbia River

AT: City of Longview

COUNTY: Cowlitz, WA

APPLICATION BY: City of Longview

SHEET 11 OF 15

7. The created wetland and buffer, once established, will not be mowed or regularly maintained.
8. Temporary and long-term erosion control measures along the proposed buffer edge will be implemented. This includes seeding with appropriate grasses and the use of silt fencing during the period prior to the establishment of adequate buffer vegetation.
9. Invasive weed species will be removed from within the created/restored wetland and buffer areas. This will include the efforts to remove Himalayan blackberry during initial wetland and buffer creation, as well as continued removal during the established monitoring period. Special emphasis will be placed on the potential growth of reed canarygrass within the restored wetland and enhanced buffer areas. Removal methods for reed canarygrass will be implemented should onsite monitoring determine that reed canarygrass has become greater than 10% of the aerial coverage over the site. The grass species selected for initial site seeding have been noted to exhibit success on similar wetland creation/restoration projects to deter the establishment of reed canarygrass.
10. The diversity of wildlife habitats provided by the wetland and buffers will be enhanced by additional means. Such enhancement will include the placement of logs, stumps, and upright snags. These large woody debris habitat features will be placed at a density no less than 5 per acre.
11. Monitoring of the created wetland and buffer areas for a ten year period will occur to assure that the restoration of the wetland and buffers successfully meets the GOAL of the mitigation plan. Onsite monitoring will include the formulation of reports which will be provided to the involved agencies. These reports will identify such project elements as the monitoring methods and observations, use of the areas by wildlife, notations about invasive plant species, the need for potential remedial actions, plant community establishment, plant growth and general health, site hydrology characteristics, and photo documentation of the site at consistent locations. This monitoring will include a contingency plan to remedy created features which do not meet the project's GOAL.
12. The wetland and buffer restoration and enhancement plan allows for the implementation of educational opportunities which can potentially be integrated into the Mint Farm Industrial Park and the City of Longview School District. In addition, short term and long term monitoring allows scientific evaluation of wetland mitigation procedures and plant/wildlife responses to habitat manipulations.

MITIGATION SUMMARY

PURPOSE: To provide land ready for industrial development within the City of Longview
 DATUM: N.G.M.D. of 1929=0.0'

ADJ. PROPERTY OWNERS: See Sheet 2 of 15

DATE: August 30, 1999

Revised: June 2, 2000

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to
 Columbia River

AT: City of Longview

COUNTY: Cowlitz, WA

APPLICATION BY: City of Longview

SHEET 12 OF 15

ENHANCED EXISTING WETLANDS	APPROX. AREA (SF)	APPROX. AREA (AC)
Emergent Habitat	450,500	10.3
Scrub/Shrub Habitat	413,500	9.5
Forested Wetlands Habitat	115,400	2.7
Total Enhanced Existing	979,400	22.5
NEWLY CONSTRUCTED WETLANDS		
Emergent Habitat	424,800	9.8
Scrub/Shrub Habitat	453,800	10.4
Forested Wetlands Habitat	135,200	3.1
Forested Uplands Habitat	257,900	5.9
Total Newly Constructed	1,271,700	29.2
BUFFER	645,000	14.8
TOTAL MITIGATION SITE		66.5

MITIGATION SITE TABULATION

APPLICATION #98-4-00832

PURPOSE: To provide land ready for industrial development within the City of Longview
 DATUM: N.G.M.D. of 1929=0.0'

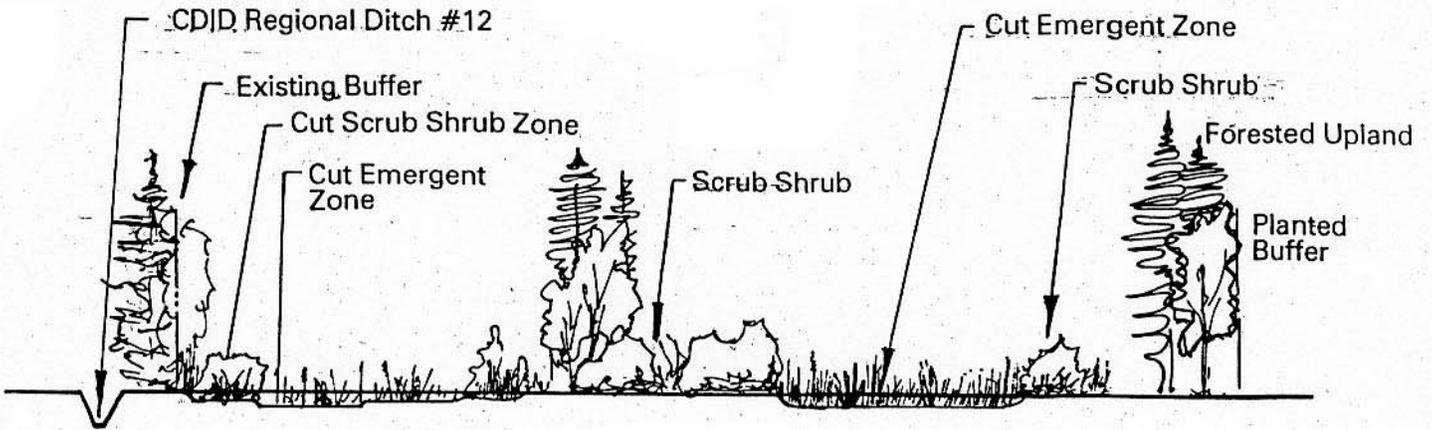
PROPOSED FILL IN: Wetlands adjacent to Columbia River

ADJ. PROPERTY OWNERS: See Sheet 2 of 15

AT: City of Longview
 COUNTY: Cowlitz, WA
 APPLICATION BY: City of Longview

DATE: August 30, 1999. Revised: June 2, 2000

SHEET 14 OF 15

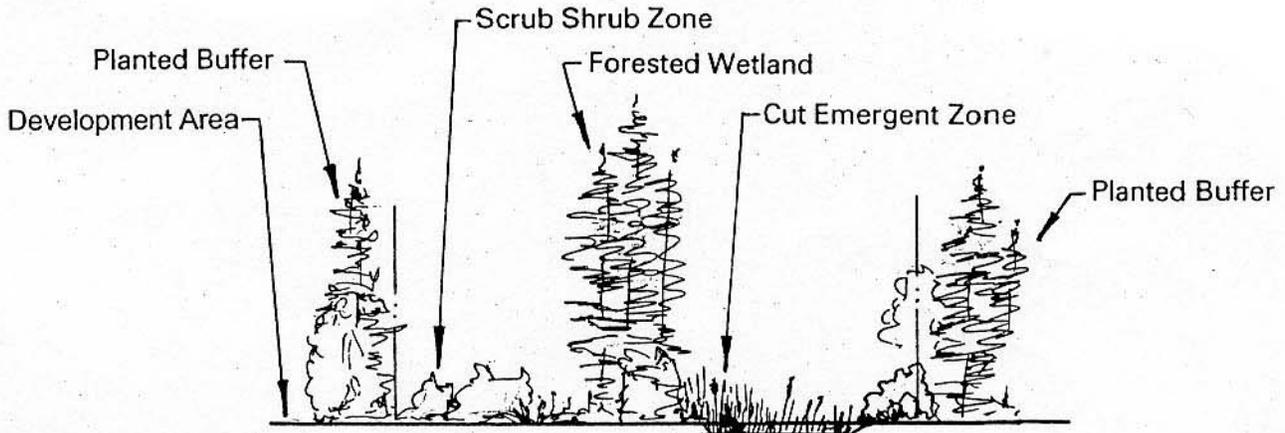


Section B- Mitigation Area

Horizontal Scale- 1"=300'

Vertical Scale- 1"=30' 10:1 Exaggeration

Note: Plantings are not to scale.

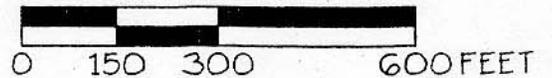


Section C- Mitigation Area

Horizontal Scale- 1"=300'

Vertical Scale- 1"=30' 10:1 Exaggeration

Note: Plantings are not to scale.



MITIGATION SECTIONS

PURPOSE: To provide land ready for industrial development within the City of Longview
 DATUM: N.G.M.D. of 1929=0.0'

ADJ. PROPERTY OWNERS: See Sheet 2 of 15

DATE: August 30, 1999 Revised: June 2, 2000

APPLICATION #98-4-00832

PROPOSED FILL IN: Wetlands adjacent to Columbia River

AT: City of Longview

COUNTY: Cowlitz, WA

APPLICATION BY: City of Longview

SHEET 15 OF 15



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

December 4, 2000

CERTIFIED MAIL

Mr Don Cardon
City Of Longview
PO Box 128
Longview WA 98632

RE: Order #1998-4-00832 Water Quality Certification for Construction of an industrial/business park in wetlands adjacent to the Columbia River (River Mile 64) at Longview, Cowlitz County, Washington.

Dear Mr Cardon:

The request for certification for proposed work in and adjacent to the Columbia River has been reviewed. On behalf of the State of Washington, we certify that the proposed work, as conditioned by the enclosed Order, will comply with applicable provisions of Sections 301, 302, 303, 306 and 307 of the Clean Water Act, as amended, and other appropriate requirements of State law. This letter also serves as the State response to the Corps of Engineers.

This certification is subject to the conditions contained in the enclosed Order. If you have any questions, please contact Helen Pressley at (360) 407-6926. Written comments can be sent to her at the Department of Ecology, Southwest Regional Office, PO Box 47775, Olympia WA 98504-7775 or at hpre461@ecy.wa.gov. The enclosed Order may be appealed by following the procedures described in the Order.

Sincerely,

Gale Blomstrom
Section Supervisor
Shorelands and Environmental
Assistance Program

GB:hp:bl
Enclosure

cc: Jim Green - Corps of Engineers
David Hepp, Huitt-Zollars

REGULATORY BRANCH

RECEIVED
DEC 7 2000
10:10 AM
D

**IN THE MATTER OF GRANTING)
A WATER QUALITY)
CERTIFICATION TO)
City of Longview)
in accordance with 33 U.S.C. 1341)
FWPCA § 401, RCW 90.48.260)
and WAC 173-201A)**

ORDER #1998-4-00832
Construction of an
industrial/business park in wetlands
adjacent to the Columbia River
(River Mile 64) at Longview,
Cowlitz County, Washington.

TO: City of Longview
PO Box 128
Longview WA 98632-7080

ATTN: Mr Don Cardon:

A Public Notice for issuance of a water quality certification from the State of Washington has been distributed for the above-referenced project pursuant to the provisions of 33 U.S.C. 1341 (FWPCA § 401). The proposed project involves the construction of an industrial/business park in 25.35 acres of wetlands adjacent to the Columbia River, (River Mile 64) at Longview, Cowlitz County, Washington in order to provide land ready for industrial development within the City of Longview.

Other Approvals/Permits:

MDNS #E 2000-25 issued by the City of Longview on September 25, 2000.

Water quality conditions of the above permits and approvals shall be considered conditions of this Order.

AUTHORITIES:

In exercising authority under 33 U.S.C. 1341 and RCW 90.48.260, Ecology has investigated this application pursuant to the following:

1. Conformance with applicable water quality-based, technology-based, and toxic or pretreatment effluent limitations as provided under 33 U.S.C. Sections 1311, 1312, 1313, 1316, and 1317 (FWPCA Sections 301, 302, 303, 306, and 307);
2. Conformance with the state water quality standards as provided for in Chapter 173-201A WAC authorized by 33 U.S.C. 1313 and by Chapter 90.48 RCW, and with other appropriate requirements of state law; and,
3. Conformance with the provision of using all known, available and reasonable methods to prevent and control pollution of state waters as required by RCW 90.48.010.

WATER QUALITY CERTIFICATION CONDITIONS: In view of the foregoing and in accordance with 33 U.S.C. 1341, 90.48.260 RCW and Chapter 173-201A WAC, certification is granted to City of Longview (applicant) subject to the following conditions:

A. No Further Impairment of Existing Water Quality:

A1. Certification of this proposal does not authorize the applicant to exceed applicable state water quality standards (173-201A WAC), including the state sediment quality standards (173-204 WAC). Furthermore, nothing in this certification shall absolve the applicant from liability for contamination and any subsequent cleanup of surface waters or sediments occurring as a result of project construction or operations.

A2. The Columbia River (Waterbody Segment Number WA-CR-1010, a Class A water of the state) is on the current 303(d) list of impaired waterbodies for exceeding water quality standards for sediments, dissolved gasses, PCB-1254, Arsenic, 4,4'-DDE, Dieldrin, Bis-2-(ethylhexyl) phthalate, Temperature, Dissolved Oxygen, pH, and Fecal Coliform. This project shall not result in further exceedances of those standards, and will be out of compliance with this certification if discharges from the project exceed limits for those contaminants identified in 173-201A-030(2) WAC and/or 173-201A-040 WAC.

This project will be out of compliance with this certification if discharges from the project exceed limits established in 173-201A-030(1) WAC and/or 173-201A-040 WAC.

B. Temporary Modification of Water Quality Standards:

B1. Project construction, operation, and maintenance shall be done in compliance with WAC 173-201A. This certification does not authorize a modification of standards above those established in WAC 173-201A.

C. Mitigation, Monitoring, and Contingency Conditions: Project mitigation shall be constructed and maintained as described in the City of Longview Mint Farm Industrial Park Phase II Final Alternatives Analysis and Compensatory Mitigation Plan as prepared by Huitt-Zollars and Habitat Technologies dated September 15, 2000 as amended with the following additions and clarifications:

C1. Mitigation construction will be implemented in two phases beginning in the summer of 2001. The report mentions that the creation of 12 acres of created wetland and enhancement of approximately 9 acres of wetland will take place in the summer of 2001. The second phase of the mitigation will be implemented during the summer of 2002 and will focus on the creation of 17+ acres of creation and 13+ acres of enhancement. This condensed phased approach is agreeable and alleviates our immediate concerns with the construction schedule.

C2. The mitigation report lists numerous items to be completed or overseen by the wetland biologist for the project. This includes inspection of plant material before planting, being on-site during mitigation construction, monitoring & maintenance, and report documentation. Other "management" responsibilities will be required of the project wetland biologist. Our concerns are met as long as the Final Compensatory Wetland Report stipulations are followed.

C3. Previous mowing of the buffer area took place in the mitigation area for Phase I impacts. This type of situation shall be avoided at the Phase II site. The report now states that the buffer area will not be mowed or regularly maintained. Proper signage and fencing shall also be adhered to. All planting and maintenance of the buffer area will be completed with full oversight by the project's wetland biologist.

C4. Stormwater treatment: Onsite treatment of stormwater is required, as necessary, for each individual tenant. Regional treatment and control as well as individual BMP's shall be required. No untreated stormwater shall enter any wetland area. All stormwater shall be treated using Best Management Practices prior to release into the created and retained wetland systems. In addition, all process water shall be discharged to the city sanitary sewer system and not directed into any of the wetland systems.

C5. Hydrology, proposed topography, and expected water depths and duration: Concerns have been raised about the feasibility of measuring specific performance criteria in relation to ponded conditions of the created wetland areas and when these measurements would take place. Also associated with that is the concern that appropriate plant communities are proposed at correct elevations throughout the mitigation area.

The mitigation plan now identifies the methods to measure the hydrology of the wetland area where standing water is proposed. However, a more specific hydrology-monitoring schedule is required. The monitoring schedule shall be submitted for Ecology approval no later than January 31, 2001. The plan mentions that the ponded area will be flagged as well as the outer wetland edge during the first, third, fifth and ninth years following construction. These two areas would then be compared to determine if the 80% coverage at a 6" depth is met. Clarification is needed on the time period over which these measurements shall be taken. This information shall be submitted on or before January 31, 2001.

To accompany the survey location of the water level, a crest gage shall be placed appropriately within the created wetland area to measure water depth. The monitoring period with the crest gage shall begin by early March 2001. Survey location of the ponded water area shall be completed by the middle of April 2001. Finalized topographic surveys will also be required for the created wetland areas as soon as final grading work is completed but before planting takes place.

C6. Goals, Objectives and Criteria: Ecology identified concerns regarding invasive exotic vegetation remaining in the wetland area after construction, hydrologic monitoring of ponded areas, lack of performance criteria for emergent vegetation, and buffer success. These items have been addressed in the monitoring report. However, proper management and oversight will be required to ensure that the mitigation plan is followed.

C7. The property owner shall grant Ecology access to the mitigation areas for inspection during the 10 year monitoring period or until mitigation success has been achieved.

C8. Contingency measures and additional monitoring of the mitigation may be required by Ecology if wetland monitoring reveals that performance measures are not being met.

C9. Any changes to the mitigation plan or monitoring requirements must be approved by Ecology.

C10. As Built and Monitoring Reports: a detailed "as built" report shall be prepared for construction. The "as-built" report shall show any variances from the final mitigation plan. The "as-built" shall be the baseline document used for all future monitoring of the mitigation project. Contents of the "as-built" shall include but not be limited to:

- (1) comments from a wetland specialist present on site during mitigation construction;
- (2) final site plan topography (both site plan view and typical sections) which clearly indicates the mitigation site boundary;
- (3) photographs of the area taken from permanent photo points;
- (4) the installed planting scheme showing densities, sizes, and approximate locations of plants as well as plant sources and time of planting; and
- (5) an analysis of any changes to the mitigation plan that occurred during construction.
- (6) Mitigation efforts shall be monitored by a qualified wetland specialist for compliance with the performance standards referenced in the mitigation plan. Within 60 days of each monitoring event, two copies of the monitoring report shall be prepared by the wetland specialist and submitted to Ecology's SW Regional Office. If the results of monitoring indicate that contingency measures are needed, the monitoring report shall include a detailed description of actions taken to rectify the deficiencies.

Two copies of each report shall be sent to Ecology's Federal Permit Coordinator at the Southwest Regional Office, P.O. Box 47775, Olympia, WA 98504-7775.

C11. The primary purpose of a wetland mitigation plan is to protect, in perpetuity, the functions and values of the wetland mitigation site. Minimum acceptable mitigation shall consist of protection in perpetuity of the habitat and wetland functions and values associated with the wetland, along with the rights and restrictions necessary to ensure that habitat and wetland functions and values continue. The most common means for preserving a mitigation site involves a deed restriction or a conservation easement.

An example of a deed restriction acceptable to the department is provided in Enclosure 1. Once finalized, the deed restriction shall be filed with the Cowlitz County assessor's office with a copy provided to the department, ATTN: Helen Pressley.

2) Enforcement. To monitor the successful accomplishment of the deed restrictions placed on the mitigation site, the following actions may be taken by the department:

- 1) To enter upon the mitigation site at reasonable times and upon reasonable notification to the owner in order to monitor compliance with and otherwise enforce the terms of the deed restrictions.
- 2) To prevent any activity on or use of the mitigation site that is inconsistent with the deed restrictions and to require restoration of such areas or features of the site if damaged by any inconsistent activity or use.
- 3) To recover any costs incurred by the department in enforcing the terms of the deed restriction, including without limitation, costs of the suit and attorneys' fees and any costs

D. Construction Conditions:

- D1. All construction debris shall be properly disposed of on land so that it cannot enter the waterway or cause water quality degradation to state waters.
- D2. All excess excavated material shall be disposed of above the 100-year floodplain and shall be contained so as to prevent its re-entry into waters of the state.
- D3. Erosion control devices (e.g., filter fences, hay bales, etc.) suitable to prevent exceedances of state water quality standards shall be in place before starting project construction and shall be maintained throughout construction.
- D4. At the completion of construction, hydroseeding may be done to stabilize slopes and soils until other required planting is completed. Hydroseed mix shall consist of native, non-invasive, or annual plant species only.
- D5. Wash water containing oils, grease, or other hazardous materials resulting from wash down of equipment or working areas shall not be discharged into state waters except as authorized by an NPDES or state waste discharge permit.

E. Emergency/Contingency Measures:

- E1. Any in-water work that is out of compliance with the provisions of this Order, or any discharge of oil, fuel, or chemicals into state waters, including wetlands, or onto land with a potential for entry into state waters, is prohibited. If these occur, the operator shall immediately take the following actions:

- a) Cease operations.
- b) Assess the cause of the water quality problem and take appropriate measures to correct the problem and/or prevent further environmental damage.
- c) In the event of a discharge of oil, fuel, or chemicals into state waters, or onto land with a potential for entry into state waters, containment and cleanup efforts shall begin immediately and be completed as soon as possible, taking precedence over normal work. Cleanup shall include proper disposal of any spilled material and used cleanup materials.

E2. Spills into state waters, spills onto land with a potential for entry into state waters, or other significant water quality impacts, shall be reported immediately to Ecology's Southwest Regional Spill Response Office at (360) 407-6300.

E3. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be maintained and stored properly to prevent spills into state waters, including wetlands.

E4. Toxic conditions resulting in distressed or dying fish (including dissolved oxygen levels below 5.0 mg/L) are not allowed. If these conditions exist, construction shall cease immediately and the applicant or the contractor shall contact Ecology's Southwest Regional Spill Response Office at (360) 407-6300.

E5. Construction monitoring: During and immediately after project construction, the applicant or contractor shall visibly monitor the area for distressed or dying fish. If water quality exceedances are observed outside the dilution zone, in-water work shall cease immediately and the applicant or the contractor shall contact Ecology's Southwest Regional Spill Response Office at (360) 407-6300.

General Conditions:

- 1) This Order does not authorize direct, indirect, permanent, or temporary impacts to waters of the state or related aquatic resources, except as specifically provided for in conditions of this Order.
- 2) For purposes of this Order, the term "Applicant" shall mean APPLICANT NAME and its agents, assigns, and contractors.
- 3) This certification does not exempt and is conditioned upon compliance with other statutes and codes administered by federal, state, and local agencies.
- 4) The Applicant shall construct and operate the project in a manner consistent with the project description contained in the Public Notice for certification, or as otherwise approved by Ecology.
- 5) The Applicant shall reapply with an updated application for certification if five years elapse between the date of the issuance of this Order and the beginning of construction and/or discharge for which the federal license or permit is being sought.

- 6) The Applicant shall reapply with an updated application if the information contained in the Public Notice is voided by subsequent submittals to the federal agency. Any future action at this project location, emergency or otherwise, that is not defined in the public notice, or has not been approved by Ecology, is not authorized by this Order. All future actions shall be coordinated with Ecology for approval prior to implementation of such action.
- 7) The Applicant shall provide access to the project site upon request by Ecology personnel for site inspections, monitoring, necessary data collection, or to ensure that conditions of this Order are being met.
- 8) Copies of this Order and all related permits, approvals, and documents shall be kept on the project site and readily available for reference by the project managers, construction managers and foremen, other employees and contractors of the Applicant, and state agency personnel.
- 9) The Applicant shall ensure that all appropriate supervisors and contractors at the project site and mitigation sites have read and understand relevant conditions of this Order and all permits, approvals, and documents referenced in this Order. The Applicant shall provide to Ecology a signed statement from each supervisor and contractor that they have read and understand the conditions of this Order and the above-referenced permits, plans, documents and approvals. These statements shall be provided to Ecology no less than 7 days before construction begins at the project or mitigation sites. The Applicant shall also provide a similar signed statement to Ecology from each new supervisor or contractor hired or assigned after the project begins within 30 days of hiring.
- 10) Ecology retains continuing jurisdiction to make modifications hereto through supplemental Order, if it appears necessary to further protect the public interest.
- 11) Any person who fails to comply with any provision of this Order shall be liable for a penalty of up to ten thousand dollars (\$10,000) per violation for each day of continuing noncompliance.
- 12) Any person aggrieved by this Order may obtain review thereof by appeal. The Applicant can appeal up to 30 days after receipt of the permit, and all others can appeal up to 30 days from the postmarked date of the permit. The appeal must be sent to the Washington Pollution Control Hearings Board, P.O. Box 40903, Olympia, WA 98504-0903. Concurrently, a copy of the appeal must be sent to the Department of Ecology, Shorelands and Environmental Assistance Program, P.O. Box 47600, Olympia, WA 98504-7600. These procedures are consistent with the provisions of Chapter 43.21B RCW and the rules and regulations adopted thereunder.

Dated 4 Dec. 2000 at Lacey, Washington

Gale Blomstrom

Gale Blomstrom, Section Supervisor
Shorelands and Environmental Assistance Program
Department of Ecology – Southwest Regional Office

ENCLOSURE I

This enclosure provides a sample deed restriction that meets Ecology's definition of a public utility.

Sample Deed Restriction for Public Utility

Description of Property

Legal Description

Minimum Terms, Conditions, and Restrictions

The purpose of this deed restriction is to ensure that the property and development located on the parcel meet the minimum standards for public utility use. The restriction shall be enforceable against the property and any subsequent owners. The restriction shall be enforceable against the property and any subsequent owners. The restriction shall be enforceable against the property and any subsequent owners.

The following activities are prohibited on the property:

- 1. Construction of any building or structure.
- 2. Construction of any paved area or driveway.
- 3. Construction of any utility structure.
- 4. Construction of any other structure.
- 5. Construction of any other structure.
- 6. Construction of any other structure.
- 7. Construction of any other structure.
- 8. Construction of any other structure.
- 9. Construction of any other structure.
- 10. Construction of any other structure.

The restriction shall be enforceable against the property and any subsequent owners. The restriction shall be enforceable against the property and any subsequent owners. The restriction shall be enforceable against the property and any subsequent owners.

ENCLOSURE 1

This enclosure provides a sample deed restriction that meets Ecology's requirements for use restriction of a mitigation site by a public entity.

Sample Deed Restriction for Public Entity

Description of Property:

[legal description]

Mutual Terms, Conditions, and Restrictions:

- *) Purpose: The purpose of this deed restriction is to assure that the Property will be retained forever in its natural open space condition and to prevent any use of the Property that will significantly impair or interfere with the conservation values of the Property. Owners or assigns intend that this deed restriction will confine the use of the Property to such activities. A further purpose of this deed restriction is to provide wildlife habitat and wetland functions and values intrinsic to the Property.
- *) Prohibited Uses: Any activity on, or use of the Property inconsistent with the purpose of this deed restriction is prohibited. The following activities and uses are expressly prohibited:
 - a) Subdivision and residential development.
 - b) Commercial, industrial, or agricultural development and/or use.
 - c) Alteration of the land surface or water bodies.
 - d) Timber harvest or the removal of vegetation, except for cutting down hazard trees or limbs or the removal of non-native invasive species. Downed hazard trees and woody debris and standing woody debris shall be left on the property.
 - e) Mineral development.
 - f) Waste disposal.
- *) Reserved Rights: The Owners reserve unto themselves, and assigns, all rights accruing from their ownership of the Property, including the right to engage in or permit or invite others to engage in all uses of the Property that are not expressly prohibited herein and are not inconsistent with the purpose of this deed restriction.

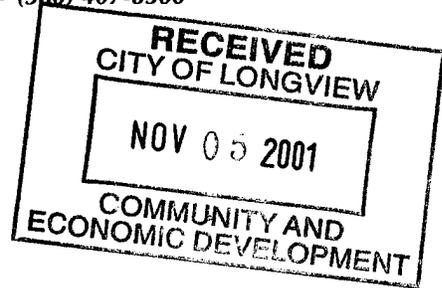


STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

November 2, 2001

Mr. David Hepp
Huitt-Zollars
814 E Pike St
Seattle WA 98122-3893

Mr. Don Cardon
City Of Longview
PO Box 128
Longview WA 98632



Dear Mr. Hepp and Mr. Cardon:

RE: Requested Amendment to Order #1998-4-00832 Water Quality Certification for
Construction of an industrial/business park in wetlands adjacent to the Columbia River
(River Mile 64) at Longview, Cowlitz County, Washington

This letter is in response to your June 28, 2001 request to amend the above-referenced water quality certification issued by the Department of Ecology (Ecology) on December 4, 2000. That certification included a two-phase schedule for construction of the mitigation site. My apologies for the lengthy response period.

You have requested that the certification be amended to allow construction of the full improvements in 2002, rather in the two phases as stated in the certificate. This request is more fully described in your letter dated June 28, 2001.

By this letter, Ecology amends the original certification to allow the installation of all mitigation during 2002. All other conditions of the certification remain in effect. Please contact me at (360) 407-6926 or at hpre461@ecy.wa.gov if you have any questions.

Sincerely,

Helen Pressley
Federal Permit Coordinator
Southwest Regional Office

HP:dn

cc: Corps of Engineers, Seattle Regulatory Branch
Brad Murphy, Ecology
Yvonne Oliva, Ecology

Original is in Exec.





STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

November 23, 2005

REGISTERED MAIL
RB 253 008 409 US

City of Longview
ATTN: Mr. Bob Gregory
PO Box 128
Longview, WA 98632-7080

Dear Mr. Gregory:

RE: Second Amendment to Section 401 Water Quality Certification Order No. 1998-4-00832 to construct Phase 2 of the Mint Farm Industrial/Business Park in wetlands adjacent to the Columbia River (River Mile 64) at Longview, Cowlitz County, Washington.

Enclosed is the second amendment to Order No. 1998-4-00832. The purpose of this amendment is to grant an extension of the 401 Water Quality Certification to coincide with the extension of the U.S. Army Corps of Engineers permit. On October 4, 2005, the Department of Ecology (Ecology) received a written request for a time extension of Water Quality Certification Order Number 1998-4-00832 issued to the City of Longview on December 4, 2000, and as amended on December 2, 2001. The authorized work is to construct the second phase of a two-phase industrial/business park, construct drainage swales, and perform wetland mitigation adjacent to the Columbia River within the City of Longview, Cowlitz County, Washington.

In response to this request, Ecology is amending Order No. 1998-4-00832 to extend the 401 Water Quality Certification to February 6, 2007. The conditions of your original authorization and subsequent first amendment remain in full force and effect except the time limit for completion. No further time extensions will be authorized under this permit.

It is the responsibility of the applicant to assure that all parties involved with this project receive and review this Amendment. All correspondence relating to this document should be directed to Lori Ochoa at Department of Ecology, P.O. Box 47775, Olympia, Washington 98504-7775. If you have any questions concerning the content of this document, please call Lori Ochoa, at 360-407-6926.

Sincerely,

Perry J Lund, Unit Supervisor
Shorelands and Environmental Assistance Program
Southwest Regional Office

PJL:LO:dn
Enclosure

cc: Jim Green, Corps of Engineers
Jeff Cameron, Public Works Director
John Brickley, Community Development Director
Robert Martin, Weyerhaeuser



**STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY**

**IN THE MATTER OF GRANTING)
A WATER QUALITY)
CERTIFICATION TO)
The City of Longview)
in accordance with 33 U.S.C. 1341)
FWPCA § 401, RCW 90.48.260,)
RCW 90.48.120 and WAC 173-201A)**

**ORDER # 1998-4-00832
SECOND AMENDMENT
Construct Phase 2 of the Mint Farm
Industrial/Business Park in wetlands adjacent to
the Columbia River (River Mile 64) at Longview,
Cowlitz County, Washington.**

TO: City of Longview
ATTN: Mr. Robert Gregory
PO Box 128
Longview, Washington 98632

ATTN: Mr. Gregory

This amendment is issued under the provisions of Chapter 90.48 RCW and Chapter 173-201A WAC.

Administrative Order No. 1998-4-00832, dated December 4, 2000 and as amended on November 2, 2001, is hereby amended as follows:

1. General Condition 5 that read:
 - 5). The Applicant shall reapply with an updated application for certification if five years elapse between the date of the issuance of this Order and the beginning of construction and/or discharge for which the federal license or permit is being sought.

Is replaced as follows:

- 5). The Applicant shall reapply with an updated application for certification if construction has not begun by February 6, 2007.

No other conditions or requirements of Order No. 1998-4-00832 are hereby affected by this amendment.

You have the right to appeal this amendment to the Pollution Control Hearings Board. Pursuant to chapter 43.21B RCW, your appeal must be filed with the Pollution Control Hearings Board, and served on the Department of Ecology, within thirty (30) days of the date of your receipt of this document.

To appeal this amendment, your notice of appeal must contain a copy of the Ecology amendment you are appealing.

Your appeal must be filed with:

The Pollution Control Hearings Board
4224 -6th Avenue SE, Row Six, Bldg 2
P.O. Box 40903
Lacey, Washington 98504-0903

Your appeal must also be served on:

The Department of Ecology
Appeals Coordinator
P.O. Box 47608
Olympia, Washington 98504-7608

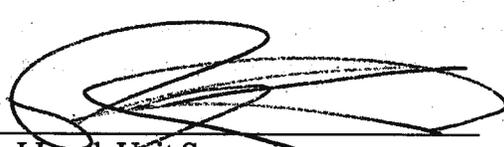
In addition, please send a copy of your appeal to:

Loree' Randall
Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

For additional information: Environmental Hearings Office Website: <http://www.eho.wa.gov>

Your appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21B.320. These procedures are consistent with Ch. 43.21B RCW.

Dated this 23 day of NOVEMBER, 2005 at Lacey, Washington.



Perry J Lund, Unit Supervisor
Shorelands and Environmental Assistance Program
Department of Ecology – Southwest Regional Office

Appendix F

Wetland Documentation

HABITAT TECHNOLOGIES

October 17, 2007

Mr. Josh Johnson, PE
@ City of Longview Street/Stormwater Manager
@ City of Longview
1525 Broadway
Longview, Washington 98632

**MINT FARM 2 – WETLAND MITIGATION PROGRAM
YEAR-TWO (2009) MONITORING REPORT
US Army Corps of Engineers Reference Number 1998-4-00832
WDOE Water Quality Certification Order #1998-4-00832**

Dear Mr. Johnson,

Pursuant to the provisions outlined in the *FINAL WETLAND ASSESSMENT, COMPENSATORY MITIGATION PLAN, AND PERFORMANCE MONITORING PROGRAM* dated September 15, 2000 and subsequently formalized in the *WETLAND MITIGATION AND SITE GRADING IMPROVEMENTS* plan sheets dated May 26, 2006 Habitat Technologies has completed the year-two (2009) monitoring assessment to evaluate the compensatory mitigation program undertaken to meet the requirements of the Seattle District US Army Corps of Engineers Reference Number 1998-4-00832 and the Washington State Department of Ecology Water Quality Certification Order #1998-4-00832. The overall mitigation program is a specific element in the development of the second phase of the City of Longview Mint Farm Industrial Park.

COMPENSATORY MITIGATION PROGRAM

The compensatory wetland mitigation program has been developed and implemented to ensure that there shall be "**no net loss**" of wetland acreage, functions, or value associated with the development of Phase Two of the Mint Farm Industrial Park. Phase Two of the Mint Farm Industrial Park project site is approximately 310 acres in size and comprises the central and eastern portions of the approximately 435 acre site commonly referred to as the "Mint Farm." Phase One, the western approximately 125 acres of the "Mint Farm," is also owned by the City of Longview and is presently well underway in its development into Phase One of the Mint Farm Industrial Park.

The project design documents and the final mitigation detailed plans have been developed in conjunction with oversight review and comment provided by the Seattle District US Army Corps of Engineers, the Washington Department of Ecology, and the City of Longview. The final mitigation design focused on the creation of three, bermed cells leading from south to north. The cells were formed through the re-contouring of the mitigation area. Hydrology patterns within these cells were designed to be supported by seasonal stormwater runoff directed into the cells through the created

**wetlands, streams, fisheries, wildlife – mitigation and permitting solutions 09012
P.O. Box 1088, Puyallup, Washington 98371
voice 253-845-5119 fax 253-841-1942 habitattech@qwestoffice.net**

stormwater facilities associated with the developed uplands, seasonal high ground water levels, and surface water outlet control for each cell. Each cell was further designed to provide seasonal ponding at levels suitable to support and sustain selected areas dominated by mixed tree and shrubs plant communities, mixed shrub plant communities, and emergent plant communities. Following the creation of the cells the mitigation area was planted with a variety of native species and enhanced through the placement of a variety of habitat features.

GOAL OF THE MITIGATION PROGRAM

The **GOAL** of the Compensatory Mitigation Program is to fully compensate for the required, unavoidable modifications to onsite wetlands which are identified as “*Waters of the United States*” and “*Waters of the State.*” Full compensation shall be provided through the creation of new wetland and the restoration and enhancement of existing degraded onsite wetland. In addition, the Compensatory Mitigation Program includes the development of a native growth buffer along the onsite wetlands which shall be retained and enhanced as a part of the Compensatory Mitigation Program.

To establish whether the defined project GOAL has been met a series of **OBJECTIVES** and **PERFORMANCE CRITERIA** have been established to apply to the compensatory mitigation program.

Objective A. Site design shall focus on excavation and final surface elevations within the created and restored wetland areas to establish an early growing season (March - April) water regime dominated by at least 6 inches of standing water over 80% of the created wetland area.

Performance Criteria: The created and restored wetland areas shall exhibit an early growing season (March - April) water regime of at least 6 inches of standing water over 80% of the wetland adequate to meet the established criteria for wetland hydrology as defined within the 1987 Manual and the Wash. Manual.

Objective B. The compensatory mitigation wetland area shall exhibit emergent, scrub/shrub, and sapling tree vegetation classes within ten years following initial planting (palustrine, emergent - scrub/shrub, seasonally flooded - PEMC, and PSSC).

Performance Criteria:

- a). At the end of the first year following initial (Year 1 Planting) planting 100% of the planted trees and shrubs and 50% of the emergents planted shall be alive.
- b). As defined by Canopy Coverage Method sampling (0.25 m² plot frame) the emergent plant community within the restored and created wetland areas shall exhibit an 80% coverage within ten years following initial planting. As

defined by specific measurements of aerial coverage within the identified representative sample plots the scrub/shrub and sapling vegetation class shall exhibit 75% aerial coverage within ten years following initial planting.

The identified canopy coverage criteria to be applied at the end of the fall monitoring period for each sample year for the emergent community and the shrub/sapling tree community (combined planted and natural recruitment) are identified as:

MONITORING YEAR	EMERGENT COMMUNITY	SHRUB AND SAPLING COMMUNITY
1 year after planting	25% minimum cover	10% minimum cover
2 years after planting	50% minimum cover	15% minimum cover
3 years after planting	80% minimum cover	25% minimum cover
4 years after planting	80% minimum cover	35% minimum cover
6 years after planting	80% minimum cover	45% minimum cover
8 years after planting	80% minimum cover	55% minimum cover
10 years after planting	80% minimum cover	75% minimum cover

Objective C. The established protective buffer around the compensatory mitigation wetland area shall exhibit scrub/shrub and sapling vegetation classes within ten years following initial planting.

Performance Criteria:

- a). At the end of the first year following initial (Year 1 Planting) planting 100% of the planted trees and shrubs and 50% of the emergents planted shall be alive.
- b). As defined by specific measurements of aerial coverage within the identified representative sample plots within the protective buffer the scrub/shrub and sapling vegetation class shall exhibit 75% aerial coverage within ten years following initial planting. The identified canopy coverage criteria to be applied at the end of the fall monitoring period for each sample year for the shrub/sapling tree community (combined planted and natural recruitment) are identified as:

MONITORING YEAR	SHRUB AND SAPLING COMMUNITY
1 year after planting	10% minimum cover
2 years after planting	15% minimum cover
3 years after planting	25% minimum cover
4 years after planting	35% minimum cover
6 years after planting	45% minimum cover
8 years after planting	55% minimum cover
10 years after planting	75% minimum cover

Objective D. The compensatory mitigation wetland area shall provide nesting and cover habitat for a minimum of eight (8) passerine birds and three (3) waterfowl species common to the area within ten years.

Performance Criteria:

- a). The use of the compensatory mitigation wetland area (both created and retained) by passerine, waterfowl, and other wildlife species common to the project area shall be documented through direct observations and photo documentation. The diversity of plant species being installed within the created and restored wetlands has been identified to use native trees, shrubs, and emergents that provide a wide diversity of habitat types (i.e. food, nesting opportunity, cover) and habitat structural diversity.

Objective E. The buffer areas shall provide nesting and cover habitat for (8) passerine birds and three (3) mammal species common to the area within ten years.

Performance Criteria:

- a). The use of the established protective buffer area by passerine birds and other wildlife species common to the project area shall be documented through direct observations and photo documentation. The diversity of plant species being installed within the protective buffer has been identified to use native trees, shrubs, and emergents that provide a wide diversity of habitat types (i.e. food, nesting opportunity, cover) and habitat structural diversity.

IMPLEMENTATION CONCLUSIONS

Implementation of the compensatory wetland mitigation program was begun during the late summer of 2006 and completed during the summer of 2007. During the implementation of this program Habitat Technologies provided construction oversight. Upon the completion of implementation actions Habitat Technologies established 28 sample plots to be used to evaluate overall plant survival and establishment. In addition, three (3) staff gages were installed upstream of the control weirs for the created wetland cells. Habitat Technologies identified the following findings, observations, and conclusions during the implementation process:

- A preconstruction, team meeting was held on August 9, 2006 to review the overall intent of the mitigation program and to assign initial site development tasks.
- Immediately following the preconstruction team meeting the project team reviewed the mitigation project site and identified the project work areas. The outer boundary of the mitigation project site was identified by survey and protective silt fencing was installed around the entire perimeter.

- Immediately following the placement of the protective silt fencing the project team removed the existing invasive vegetation from the work areas. The removed vegetation (i.e. blackberries, Scots broom, and iris) was taken off the mitigation area and disposed within the identified soil disposal site located to the west of the mitigation area.
- Prior to the start of the re-contouring of the mitigation area the project team established representative elevation points. These established points were utilized throughout the mitigation process to ensure that the design criteria were being met.
- Initial site re-contouring began with the creation of the upland berm along the western side of the mitigation area. Following the establishment of this berm the mitigation area was staked for grading. Preliminary planning had identified that the wetland mitigation area would be constructed in phases as the adjacent properties were developed as a part of the Mint Farm Industrial Park. However, at the selection of the project proponent the entire mitigation area was created as a single project.
- The creation of the mitigation area was completed generally from east to west. Throughout this process onsite elevations were continuously monitored and staked to ensure that the design criteria were being met. Removed soils were conveyed to the soil disposal areas to the west and southeast of the mitigation area. The soil disposal areas were located within areas of the future Mint Farm Industrial Park.
- Initial mitigation planning identified that the wetland areas would be over excavated and then refilled to match the final contour with clear topsoil suitable to support native vegetation. However, following an assessment of the exposed soil surface Habitat Technologies determined that the exposed soil was suitable to support native vegetation. As such, the over excavation and refilling process was not required to meet the design criteria.
- As the creation of the mitigation area progressed from east to west a variety of habitat features were installed following final site grading. These habitat features included standing snags, stumps, downed logs, and log piles. The placement of these habitat features was completed at the direction of Habitat Technologies and habitat features were identified to meet the design criteria. In addition, as a result of the removal of danger trees within the area offsite to the north a number of additional habitat features were available and were placed within the mitigation area.
- As the creation of the mitigation area progressed from east to west the project team installed the control weirs at the outlet of each cell. As a part to this installation particular emphasis was placed on ensuring that the height of each weir was accurate and that the weir would not move significantly. Initial site design identified that each weir would be “notched” as a part of the installation. However, at the direction of Habitat Technologies the notch was **not** created within each weir at the

time of installation. Instead, the notch shall be installed (if required) following an assessment of winter, spring, and early summer surface water elevations during 2008 and 2009. Should hydrology pattern monitoring suggest a need to raise a weir elevation additional wood shall be added to the weir as required.

- As the creation of the mitigation area progressed from east to west the project team seeded the exposed soil within the wetland and wetpond with the identified emergent seed mix and the buffer area with the identified clover/grass seed mix.
- As the creation of the mitigation area progressed from east to west the project team began to plant selected areas. Initial planting focused on the berm along the eastern portion of the mitigation area. Plant installation began in January 2007 and continued through May 2007. With the exception of a few species that were not available the mitigation area was planted with the species that met the design criteria. Prior to installation Habitat Technologies inspected the plants and found them to be in good health and to meet the design criteria.
- Upon the completion of the planting actions Habitat Technologies established 28 vegetation monitoring plots. Each plot was composed of a 30-foot radius circle that originated at a tagged metal fence post. The location of these vegetation monitoring plots are shown of the attachment.
- Upon the completion of the planting actions Habitat Technologies installed a staff gage directly upstream of the control weir for each created wetland cells. The top of each staff gage was surveyed as a part of the final implementation graphic. Reading from each staff gage shall be taken during the monitoring program to assess water surface elevations and perhaps to define whether or not a modification to any of the weirs would be required.
- During the planting actions an irrigation system was installed throughout the mitigation area. This irrigation system was activated during the summer of 2007.
- Upon the completion of the planting actions the outer boundary of the compensatory mitigation area was posted with informational signs to help reduce potential adverse human intrusions.
- Throughout the implementation of the compensatory mitigation program Habitat Technologies photo documented onsite actions and site conditions. Representative photos are attached to this implementation report.
- A variety of wildlife was observed within the mitigation area during the implementation process.

YEAR-ONE (2008) MONITORING PROGRAM

Onsite monitoring was completed from the late winter (2007-2008) through the early fall of 2008. Onsite monitoring actions included the assessment of surface water levels within each of the created cells, an assessment of plant survival and establishment within the created wetland and associated buffer areas, and observations of wildlife utilization of the mitigation area.

2008 HYDROLOGY MONITORING

During the late winter (2007-2008) through the early fall of 2008 Habitat Technologies monitored hydrology patterns within the compensatory wetland mitigation area. Monitoring included documenting surface water levels at established staff gages located directly upstream of the control outlet weir for each created wetland cell and general meandering observations of seasonal surface water inundation and soil saturation. The results of the staff gage observations are provided in Appendix A.

2008 HYDROLOGY CONCLUSIONS

- As observed during the late winter and spring of 2008 all three cells of the mitigation area exhibited either inundation or saturation at the surface to the outer boundary of the created wetland areas.
- Areas of seasonal inundation were present within all three cells throughout the summer and early fall of 2008. In addition, many areas remained saturated to the surface throughout the summer and early fall of 2008. The extent of inundation throughout the summer and early fall of 2008 generally matched the areas identified for the establishment of emergent vegetation plant communities within the created wetland areas.
- The present level of the control weir for each of the created cells was identified as adequate to allow seasonal ponding or saturation to the surface throughout the created wetland areas. From late winter through the middle of May 2008 surface water was passing over all three weirs. Surface water continued to pass over the northern and central weirs through the first week of June 2008. By mid-June 2008 surface water was no longer passing over any of the weirs.
- No modification of the existing weir elevations or structures (i.e. notching) appeared necessary throughout the 2008 monitoring period.
- As observed through the late winter and spring of 2008 the weirs did not leak around the edges. The most southern stormwater pond weir leading into the southern cell exhibited a small leak at the base during the late winter of 2008. Habitat Technologies repaired this small leak through the placement of a small amount of clean clay at the base of the weir boards.

2008 VEGETATION MONITORING

The general character of the plant communities establishing within the mitigation area was assessed during a number of meandering visits completed starting in the fall of 2007 and continuing through the early fall of 2008. Specific plant community assessment was completed at the 28 established sample plot locations on May 10 and September 22, 2008. General plant community establishment was also evaluated during the hydrology monitoring visits noted above. Documented plant counts for each established sample plot are provided in Appendix B.

- As documented at the 28 established sample plots the combined survival of all plants installed during the implementation period through the end of the first full growing season was approximately 90%. These combined survival counts included initially installed plants and the establishment of volunteer desirable native species. Because of the basal spreading of the two species roses initially planted the formal counts of roses was combined into a single grouping. For future monitoring the establishment of a single grouping for willows is also recommended.
- Overall plant community establishment exhibited good success through the early fall of 2008. Observed plant mortality was generally similar between species and no particular species exhibited general failure.
- In addition to the generally limited mortality typically observed immediately following initial planting there appeared to be two primary reasons for plant mortality through the fall of 2008. The first reason appeared to be the completion of initial buffer planting within a few areas during the summer of 2007 and prior to the implementation of the irrigation system. As such, these buffer plants became stressed by the fall of 2007 and did not survive.

The second reason appeared to be associated with initial planting locations and the observed late winter through early spring 2008 hydrology patterns. For example, a few plants more typically associated with non-wetland hydrology were initially planted within or immediately adjacent to areas that exhibited wetland hydrology patterns. These plants included the occasional Oregon grape, vine maple, or Douglas fir planted in outer edge of the created wetland areas or at the edge between the created wetland and the adjacent upland buffer. As a second example, a few plants more typically associated with seasonal soil saturation were initially planted within areas that remained inundated throughout the late winter and early spring of 2008. A number of Sitka spruce, Western red cedar, hawthorne, and crabapple plants were initially planted within the created wetland areas in areas believed to be inundated only for short periods of time during the winter. However, very minor elevation differences throughout the created wetland resulted in a longer period of inundation. Where possible Habitat Technologies was able to relocate a number of these plants into adjacent

wetland areas that did not exhibited long term inundation between the late winter and early spring of 2008.

During the late spring of 2008 a number of plants were identified as dead within areas that had been managed by the application of herbicides. The herbicides were used to control the establishment of non-native invasive within the buffer areas (i.e. yellow-flag iris, thistle, blackberries, Scots broom). However, a minor amount of overspray appeared to hit the desirable species.

- Many of the initially planted species were beginning to spread and produce fruit/seeds (i.e. roses, black twinberry, Indian plum, Pacific ninebark, and red flowering currant) during the 2008-growing season.
- Throughout much of the created wetland area the live stake willows exhibited exceptional leader growth during the 2008-growing season.
- Those portions of the created wetland that were not inundated through early June 2008 exhibited a mixed variety of emergent species. Throughout much of this non-inundated wetland area aerial coverage of emergent species exceeded 85% at the end of the 2008-growing season. Those areas of inundation throughout the 2008-growing season also exhibited a variety of emergent species and aerial coverage greater than 45%. Observed emergent species included seeded and non-seeded sedge, rush, and grasses. In addition, a wide variety of herbs were also becoming established throughout the created wetland and buffer areas.
- The establishment of emergent species within the protective buffer area also exceeded an 85% aerial coverage through the 2008-growing season. Observed emergent species included seeded and non-seeded grasses, and a wide variety of herbs.
- Volunteer shrub and seedling tree species were becoming well established within the wetland and buffer areas. Observed species included black cottonwood, red alder, willows, Douglas spiraea, and rose.
- Non-native invasive species were present within the mitigation area. However, these species did not appear to be adversely impacting the establishment of the more desirable species through the 2008-growing season.
- Many planted were also identified as impacted by wildlife. In particular, rabbits and rodents appeared to exhibit a selective affection for Oregon grape and Canada geese were noted to heavily graze the emergent plant communities.
- The outer boundary of the created wetland areas within each cell was identified and flagged during the fall of 2008. The identified wetland edge was consistent with the initial construction documents.

2008 WILDLIFE OBSERVATIONS

General observations of wildlife utilization of the mitigation area were completed as a part of the assessments of hydrology patterns and plant community establishment between the fall of 2007 through the fall of 2008. These observations documented a wide variety of wildlife species utilizing the habitats provided by the mitigation area for feeding, cover, brood rearing, and nesting. A list of these species is provided in Appendix C.

The mitigation area provided habitats for a wide variety of waterfowl during the 2008-growing season. A number of migratory waterfowl flocks ranging from only a few individuals to several hundred individuals were observed within the mitigation area. At least three species of waterfowl (Canada goose, common mallard, and blue-winged teal) and a number of passerine species (i.e. tree swallow, violet green swallow, song sparrow, red winged blackbird, Brewer's blackbird, march wren, common snipe, American coot) were also observed nesting and rearing young within the mitigation area during the 2008-growing season. Many other wildlife species were also noted within the mitigation area during the 2008-growing season (both as migrants and residents).

Pacific treefrog and bullfrog tadpoles were observed within the mitigation area during the 2008-growing season.

Wildlife utilization of the habitat features was also observed throughout the 2008-growing season. These features (both standing snags and downed logs) were used for perching, feeding, and cover.

YEAR-TWO (2009) MONITORING PROGRAM

Onsite monitoring for "year-two" completed from the late winter (2008-2009) through the early fall of 2009. Onsite monitoring actions mimicked the actions undertaken during "year-one" which included the assessment of surface water levels within each of the created cells, an assessment of plant survival and establishment within the created wetland and associated buffer areas, and observations of wildlife utilization of the mitigation area. In addition, Habitat Technologies also coordinated the supplemental planting program prior to the start of the 2009-growing season as recommended at the end of the "year-one" monitoring program.

SUPPLEMENTAL PLANTING PROGRAM

Pursuant to the recommendations of the Year-One (2008) annual monitoring report a supplemental planting program was undertaken prior to the start of the 2009-growing season to replace those native trees and shrubs that did not survive the first growing season following initial planting. As a part of the supplemental planting program Habitat Technologies met with the planting contractor prior to onsite planting to clearly outline

the planting areas and the mixture of native trees and shrubs to be planted within the areas. In addition, Habitat Technologies was able to inspect all of the supplemental planting materials prior to installation. Based on this inspection all of the supplemental planting materials (more than 6,000 native trees and shrubs) were identified in good health and to meet the identified sizes and numbers.

During the supplemental planting Habitat Technologies visited the project site and met with the planting contractor to ensure that the native trees and shrubs were being placed in the appropriate locations and at the appropriate spacing. At the completion of the supplemental planting all waste materials were removed by the planting contractor from the project site.

As identified during and at the completion of the supplemental planting, the actions taken were consistent with the program description and the actions should help establish viable plant communities throughout the mitigation area.

2009 HYDROLOGY MONITORING

From January 2009 through September 2009 Habitat Technologies monitored hydrology patterns within the compensatory wetland mitigation area. Monitoring was completed consistent with the actions taken during the “year-one” monitoring period which included documenting surface water levels at established staff gages located directly upstream of the control outlet weir for each created wetland cell and general meandering observations of seasonal surface water inundation and soil saturation. The results of the staff gage observations are provided in Appendix A.

2009 HYDROLOGY CONCLUSIONS

- As observed during the “year-two” monitoring period all three cells of the mitigation area exhibited either inundation or saturation at the surface to the outer boundary of the created wetland areas throughout the majority of the 2009-growing season.
- Areas of permanent inundation were present within all three cells throughout the 2009-growing season. During the late summer of 2009 those areas of permanent inundation did not exceed 18 to 24 inches in ponded water depth. In addition, many areas remained saturated to the surface throughout the 2009-growing season. The extent of inundation and saturation throughout the 2009-growing season generally matched the observations noted during the 2008-growing season. Those areas identified for the establishment of emergent vegetation plant communities within the created wetland areas exhibited the longest period of inundation.
- As with the 2008-growing season the present level of the control weir for each of the created cells was identified as adequate to allow seasonal ponding or

saturation to the surface throughout the created wetland areas during the 2009-growing season. However, within the southern portion of the southern cell (in the areas of Sample Plots #7 and #8) seasonal hydrology patterns during the late summer through early fall of 2009 appeared drier than observed during the 2008-growing season. While this southern portion exhibited seasonal hydrology adequate to create and sustain wetland conditions the lack of late growing season water appeared to allow for the establishment of non-desirable plant species more typical of non-wetland site conditions. The lack of irrigation through the majority of the 2009-growing season appeared to be the primary reason for the establishment of non-desirable plant species.

- As with the observations of the 2008 monitoring period, no modification of the existing weir elevations or structures (i.e. notching) appeared necessary throughout the 2009 monitoring period.
- As observed through the late winter and spring of 2009 the weirs did not leak around the edges. In addition, the staff gages were still usable at the end of the 2009-growing season.

2009 VEGETATION MONITORING

The general character of the plant communities establishing within the mitigation area was assessed during a number of meandering visits completed starting in January 2009 and continuing through September 2009. Specific plant community assessments were completed at the 28 established sample plot locations on May 26 and September 21, 2009. General plant community establishment was also evaluated during the hydrology monitoring visits noted above. Documented plant counts for each established sample plot are provided in Appendix B.

- As documented at the 28 established sample plots the combined survival of all plants installed during the implementation period, together with the plants installed as a part of the supplemental planting and desirable volunteer plants through the end of the year-two full growing season was approximately 85%. Because of the basal spreading of the two species roses initially planted the formal counts of roses was combined into a single grouping. In addition, the willows and the Oregon grape were also combined into a single grouping for documentation.
- Within those areas identified to exhibit less than 80% survival the primary reason appeared associated with the lack of irrigation during the majority of the 2009-growing season. The lack of irrigation appeared hardest on those plants installed as a part of the supplemental planting program. Plant mortalities were also higher in those areas generally associated with buffers or the higher elevation wetland areas.

- It is also important to note that a potential factor in overall plant mortality may be attributed to the seasonal hot and dry period during the summer of 2009 which set records.
- Overall plant community establishment exhibited good success through the 2009-growing season throughout many areas. As documented in 2008 and again in 2009 observed plant mortality was generally similar between species and no particular species exhibited general failure.
- Many of the planted species were spreading and producing fruit/seeds (i.e. roses, black twinberry, Indian plum, Pacific ninebark, and red flowering currant) during the 2009-growing season.
- Throughout much of the created wetland area the live stake willows exhibited exceptional leader growth during the 2009-growing season.
- As with the 2008-growing season those portions of the created wetland that were not inundated through early June 2009 exhibited a mixed variety of emergent species. Throughout much of this non-inundated wetland area aerial coverage of emergent species exceeded 95% at the end of the 2009-growing season. Those areas of inundation throughout the 2009-growing season also exhibited a variety of emergent species and aerial coverage greater than 50%. Observed emergent species included seeded and non-seeded sedge, rush, and grasses. In addition, a wide variety of herbs were also becoming established throughout the created wetland and buffer areas.
- The establishment of emergent species within the protective buffer area also exceeded a 95% aerial coverage through the 2009-growing season. Observed emergent species included seeded and non-seeded grasses, and a wide variety of herbs.
- Volunteer shrub and seedling tree species were becoming well established within the wetland and buffer areas. Observed species included Western paper birch, black cottonwood, red alder, willows, Douglas spiraea, and rose.
- Non-native invasive species were present within the mitigation area. However, with the exception of a few areas these species did not appear to be adversely impacting the establishment of the more desirable species through the 2009-growing season. Non-native invasive species were appearing to impact the establishment of desirable species within the southern portion of the southern cell and within the buffer areas along the southern and eastern portions of the mitigation area. Scots broom in particular was becoming established along the buffer. Reed canarygrass, iris, and blackberries were also present.
- Many planted were also identified as impacted by wildlife. In particular, rabbits and rodents appeared to exhibit a selective affection for Oregon grape and

willows while Canada geese and other waterfowl were noted to heavily graze the emergent plant communities.

- The outer boundary of the created wetland areas within each cell was identified and flagged during the fall of 2008. As observed during the 2009-growing season this identified wetland edge continued to be consistent with the initial construction documents.

2009 WILDLIFE OBSERVATIONS

General observations of wildlife utilization of the mitigation area were completed as a part of the assessments of hydrology patterns and plant community establishment from January 2009 through the September 2009. These observations noted during the 2009-growing season were similar with prior observations and documented a wide variety of wildlife species utilizing the habitats provided by the mitigation area for feeding, cover, brood rearing, and nesting. A list of these species is provided in Appendix C.

The mitigation area once again provided habitats for a wide variety of waterfowl during the 2009-growing season. A number of migratory waterfowl flocks ranging from only a few individuals to several hundred individuals were observed within the mitigation area. Three species of waterfowl (Canada goose, common mallard, and blue-winged teal) and a variety of passerine species (i.e. tree swallow, violet green swallow, song sparrow, red winged blackbird, Brewer's blackbird, march wren, house sparrow, barn swallow, and purple finch) were also observed nesting and rearing young within the mitigation area during the 2009-growing season. Many other wildlife species were also noted within the mitigation area during the 2009-growing season (both as migrants and residents).

Pacific treefrog, red legged frogs, and bullfrogs (tadpoles and adults) were observed within the mitigation area during the 2009-growing season.

Wildlife utilization of the habitat features was observed throughout the 2009-growing season. These features (both standing snags and downed logs) were used for perching, feeding, and cover. Many of the downed habitat features were also well utilized by a variety of rodents and other wildlife species.

REVIEW OF ESTABLISHED PERFORMANCE CRITERIA

Upon the completion of the YEAR-TWO (2009) monitoring program the following review of the established performance criteria was undertaken.

Objective A. Site design shall focus on excavation and final surface elevations within the created and restored wetland areas to establish an early growing season

(March - April) water regime dominated by at least 6 inches of standing water over 80% of the created wetland area.

Performance Criteria: The created and restored wetland areas shall exhibit an early growing season (March - April) water regime of at least 6 inches of standing water over 80% of the wetland adequate to meet the established criteria for wetland hydrology as defined within the 1987 Manual and the Wash. Manual.

Year-Two Observations: As documented by onsite assessment the created wetland areas exhibited inundation during the late winter and early growing season of 2009. As also noted in 2008, observed inundation patterns generally exceeded six (6) inches of depth well into early May 2009. In addition, areas of inundation were once again noted throughout the 2009-growing season.

Conclusion: The onsite wetland areas exhibited seasonal hydrology patterns adequate to meet the established criteria for wetland hydrology as defined within the 1987 Manual and the Wash. Manual. **This Performance Criterion was MET during the 2009-growing season.**

Objective B. The compensatory mitigation wetland area shall exhibit emergent, scrub/shrub, and sapling tree vegetation classes within ten years following initial planting (palustrine, emergent - scrub/shrub, seasonally flooded - PEMC, and PSSC).

Performance Criteria:

a). At the end of the first year following initial (Year 1 Planting) planting 100% of the planted trees and shrubs and 50% of the emergents planted shall be alive.

Year-Two Observations: As documented in the “year-one” monitoring report supplemental planting was required to meet the 100% survival criteria for trees and shrubs.

Conclusion: Supplemental Planting was completed prior to the start of the 2009-growing season. The number of trees and shrubs required for supplemental planting was defined within the “year-one” monitoring report. **As such, this Performance Criterion has been MET.**

b). As defined by Canopy Coverage Method sampling (0.25 m² plot frame) the emergent plant community within the restored and created wetland areas shall exhibit an 80% coverage within ten years following initial planting. As defined by specific measurements of aerial coverage within the identified

representative sample plots the scrub/shrub and sapling vegetation class shall exhibit 75% aerial coverage within ten years following initial planting.

The identified canopy coverage criteria to be applied at the end of the fall monitoring period for each sample year for the emergent community and the shrub/sapling tree community (combined planted and natural recruitment) are identified as:

MONITORING YEAR	EMERGENT COMMUNITY	SHRUB AND SAPLING COMMUNITY
1 year after planting	25% minimum cover	10% minimum cover
2 years after planting	50% minimum cover	15% minimum cover
3 years after planting	80% minimum cover	25% minimum cover
4 years after planting	80% minimum cover	35% minimum cover
6 years after planting	80% minimum cover	45% minimum cover
8 years after planting	80% minimum cover	55% minimum cover
10 years after planting	80% minimum cover	75% minimum cover

Year-Two Observations: As documented by onsite assessment sapling trees and shrub plant community exhibited an aerial coverage greater than 25% at the end of the 2009-growing season. The emergent plant community had become well established and exhibited an aerial coverage greater than 95% in the areas not total inundated throughout the end of the 2009-growing season, and greater than 50% in those areas inundated throughout the at the end of the 2009-growing season.

Conclusion: This Performance Criterion has been MET for Year-Two.

Objective C. The established protective buffer around the compensatory mitigation wetland area shall exhibit scrub/shrub and sapling vegetation classes within ten years following initial planting.

Performance Criteria:

- a). At the end of the first year following initial (Year 1 Planting) planting 100% of the planted trees and shrubs and 50% of the emergents planted shall be alive.

Year-One Observations: As documented by onsite assessment overall survival of initially planted trees and shrubs was approximately 90% at the end of the 2008-growing season. The emergent plant community had become well established and included a wide variety of grasses and herbs.

Year-Two Observations: Supplemental planting completed prior to the start of the 2009-growing season has ensured that this Performance Criteria is MET.

- b). As defined by specific measurements of aerial coverage within the identified representative sample plots within the protective buffer the scrub/shrub and sapling vegetation class shall exhibit 75% aerial coverage within ten years following initial planting.

The identified canopy coverage criteria to be applied at the end of the fall monitoring period for each sample year for the shrub/sapling tree community (combined planted and natural recruitment) are identified as:

MONITORING YEAR	SHRUB AND SAPLING COMMUNITY
1 year after planting	10% minimum cover
2 years after planting	15% minimum cover
3 years after planting	25% minimum cover
4 years after planting	35% minimum cover
6 years after planting	45% minimum cover
8 years after planting	55% minimum cover
10 years after planting	75% minimum cover

Year-Two Observations: As documented by onsite assessment sapling trees and shrub plant community exhibited an aerial coverage greater than 25% at the end of the 2009-growing season. The emergent plant community had become well established.

Conclusion: This Performance Criterion has been MET for Year-Two.

Objective D. The compensatory mitigation wetland area shall provide nesting and cover habitat for a minimum of eight (8) passerine birds and three (3) waterfowl species common to the area within ten years.

Performance Criteria:

- a). The use of the compensatory mitigation wetland area (both created and retained) by passerine, waterfowl, and other wildlife species common to the project area shall be documented through direct observations and photo documentation. The diversity of plant species being installed within the created and restored wetlands has been identified to use native trees, shrubs, and emergents that provide a wide diversity of habitat types (i.e. food, nesting opportunity, cover) and habitat structural diversity.

Year-Two Observations: The wetland portion of the mitigation area provided habitats for a wide variety of waterfowl during the 2009-growing season. A number of migratory waterfowl flocks ranging from only a few individuals to several hundred individuals were observed within the mitigation area. At least three species of waterfowl and a number of passerine species were also observed nesting and rearing young within the mitigation area during the 2009-growing season. Many other wildlife species were also noted nesting and rearing young within the mitigation area during the 2009-growing season.

Conclusion: This Performance Criterion has been MET for Year-Two.

Objective E. The buffer areas shall provide nesting and cover habitat for (8) passerine birds and three (3) mammal species common to the area within ten years.

Performance Criteria:

- a). The use of the established protective buffer area by passerine birds and other wildlife species common to the project area shall be documented through direct observations and photo documentation. The diversity of plant species being installed within the protective buffer has been identified to use native trees, shrubs, and emergents that provide a wide diversity of habitat types (i.e. food, nesting opportunity, cover) and habitat structural diversity.

Year-Two Observations: The established protective buffer area portion of the mitigation area provided habitats for a wide variety of wildlife during the 2008-growing season. A number of passerine species and a few mammal species were also observed nesting within the buffer areas during the 2009-growing season.

Conclusion: This Performance Criterion has been MET for Year-Two.

YEAR-TWO (2009) – RECOMMENDATIONS

Based on the observations completed through the 2009-growing season the following recommendations are suggested to ensure the overall success of the mitigation program.

1. No additional planting appears required at this time to meet the established performance criteria. Many of the plants are spreading well and forming dense, multi-stem clumps. In addition, a number of volunteer, desirable species are becoming established within the wetland and buffer areas.

2. No modification of the existing weirs appears required. Observed hydrology patterns presently ensures that 100% of the created wetland area meets the wetland hydrology criteria established within the *Corps of Engineers Wetland Delineation Manual* (1987 Manual) and the *Washington State Wetlands Identification and Delineation Manual* (Wash Manual).
3. Control actions are required to ensure that non-native invasive species do not adversely impact the establishment of desirable species. The actions begun during the summer of 2009 should continue to remove invasive shrubs - primarily Scots broom - prior to the spring of 2010. The Scots broom should be pulled out and taken offsite for proper disposal. Control actions should also continue through the 2010-growing season to limit the establishment of Scots broom, blackberries, iris, and reed canarygrass.
4. The existing irrigation system needs minor repair and should be utilized during the 2010-growing season.

MONITORING AND MAINTENANCE

As outlined in the project approval documents a **ten-year monitoring program** has begun to ensure the success of the wetland mitigation program as defined by the established performance criteria above.

MONITORING YEAR	HYDROLOGY MONITORING	VEGETATION MONITORING	ANNUAL REPORT
YEAR 1	Completed	Completed	Completed herein
YEAR 2	Completed	Completed	Completed herein
YEAR 3	once a week between the first of February and the end of June, and once a month between the first of July and the end of January	SPRING on or about April 15, 2010 FALL on or about Sept. 15, 2010 FLAG WETLAND EDGE	report due Oct. 1, 2010
YEAR 4		SPRING on or about April 15, 2011 FALL on or about Sept. 15, 2011	report due Oct. 1, 2011
YEAR 6		SPRING on or about April 15, 2013 FALL on or about Sept. 15, 2013 FLAG WETLAND EDGE	report due Oct. 1, 2013

YEAR 8		SPRING on or about April 15, 2015 FALL on or about Sept. 15, 2015	report due Oct. 1, 2015
YEAR 9		FLAG WETLAND EDGE	Fall 2016
YEAR 10		SPRING on or about April 15, 2017 FALL on or about Sept. 15, 2017	FINAL REPORT DUE Oct. 1, 2017

LESSONS LEARNED

The undertaking of a compensatory mitigation program of this size carries with it several items which fall into the category of “lessons learned.” As noted in prior monitoring and during the “year-two” monitoring these lessons include:

1. The initial excavation to create the wetland areas required extensive onsite verification and re-verification of proposed site contours. This means very close coordination between the onsite implementation team and the onsite biologist.

2. The creation of this wetland mitigation program required the placement of control weirs at the outlet of the three wetland cells and at the outlets of the various stormwater facilities located adjacent to the wetland cells. Initial site planning identified specific elevations and the final notching of outlet of the three wetland cells as a part of the initial installation. The final notching of these weirs was designed to control water surface elevations a matter of a few inches. However, during installation and at the direction of Habitat Technologies the final notching of these weirs was not completed. Instead, the final notching of these weirs was put on hold pending an evaluation of the early growing season hydrology patterns within the created wetland cells. If the fine-tuning of the weirs was identified as required then such fine-tuning would be completed by Habitat Technologies following the assessment of hydrology patterns. As defined during the 2008-growing season and again during the 2009-growing season no modification to the outlet weirs for the three wetland cells was required. The elevation of the present outlet weirs allows seasonal inundation throughout the majority of the created wetland areas and saturation throughout the created wetland areas. A minor modification of the weir elevation at the very southern end of the southern cell may be required once adjacent land development begins. At present the level of the outlet weir for the southern cell is at the same level as the outlet weir of the southern stormwater pond leading into the southern cell.

3. The implementation of the planting program also required close coordination between the planting contractor and the onsite biologist for the initial planting and the 2009 supplemental planting. This coordination allowed for the selection of alternative species and the identification of planting areas consistent with created hydrology patterns. The initial planting plan identified the placement of coniferous trees within areas that would remain inundated well into the spring. As such, onsite planting located these coniferous trees within small topographic mounds and into wetland areas that would not remain inundated well into the spring. This onsite modification did not require a major change in the planting plan – just a fine-tuning of the planting plan.
4. The initial planting of some of the buffer areas was completed during the summer and fall of 2007 – prior to the installation of the irrigation system. Since these buffer areas exhibited higher mortality than other buffer areas it has been shown as important to have irrigation available when planting is completed during the summer and fall.
5. Prior to the implementation of this mitigation program the mitigation area was dominated by a number of invasive species - in particular yellow flag iris, reed canarygrass, blackberries, and Scots broom. However, initial site planning identified the removal of the plants along with the first approximately 12 inches of soil from the project area. This removed material was placed outside of the project area. This action appeared very effective to limit the presence of these invasive species from the mitigation area through the 2008-growing season. However, as noted during the 2009-growing season invasive species were becoming established within the mitigation area and starting to impact the establishment of desirable plant species.

Based on the 2009-growing season observations as more intense invasive species control program is required and the control program should begin during the late winter through the early summer. In particular, the control program should be completed prior to the onsite of seeds by the invasive species.

6. Ongoing removal and management of invasive species was identified as a part of the overall project plan. The actions implemented during the 2008-growing season and to some extent during the 2009-growing season have focused on specific spot-spraying of herbicides and hand removal of invasive species. However, it is important that the planting contractor and the onsite biologist review the application process and clearly define which species are to be addressed.
7. While overall survival of all initially installed plants is generally good. Onsite assessment has identified that some species appear just to do better in some areas than other species – for no readily apparent reason. As such, it is important to coordinate all future supplemental planting actions (if required) to place plants in areas where they are doing good rather than strict compliance to the initial planting plan.

Thank you for allowing Habitat Technologies the opportunity to assist with your project. Please contact me at 253-845-5119 with any questions or need for additional assistance.

Sincerely,

Thomas D. Deming

APPENDIX “A”

2008 and 2009 Hydrology Monitoring Data

2008 Water Level Measurements as Established Staff Gages

DATE	NORTH GAGE	CENTRAL GAGE	SOUTH GAGE
26 JAN 08	1.3	1.1	0.9
16 FEB 08	1.3	1.1	0.9
23 FEB 08	1.4	1.2	1.0
1 MAR 08	1.3	1.0	0.6
8 MAR 08	1.1	0.9	0.4
15 MAR 08	1.1	1.1	0.5
22 MAR 08	1.5	1.0	0.5
30 MAR 08	1.7	1.1	0.6
5 APR 08	1.5	1.1	0.5
12 APR 08	1.4	1.0	0.4
19 APR 08	1.4	1.0	0.4
26 APR 08	1.2	1.0	0.4
3 MAY 08	1.2	1.0	0.2
10 MAY 08	1.1	1.0	0.2
25 MAY 08	1.2	1.1	0.3
8 JUN 08	1.1	1.0	0.2
21 JUL 08	0.5	Dry to base	Dry to base
24 AUG 08	Dry to base	Dry to base	Dry to base
22 SEP 08	Dry to base	Dry to base	Dry to base

Staff gage reading in inches

2009 Water Level Measurements as Established Staff Gages

DATE	NORTH GAGE	CENTRAL GAGE	SOUTH GAGE
29 JAN 09	1.6	1.0	0.5
19 FEB 09	1.45	0.9	0.3
3 MAR 09	1.5	1.0	0.6
13 MAR 09	1.6	1.0	0.4
22 MAR 09	1.6	1.0	0.5
29 MAR 09	1.6	1.0	0.5
5 APR 09	1.5	1.1	0.5
13 APR 09	1.4	1.0	0.5
20 APR 09	1.4	1.0	0.4
26 APR 09	1.2	1.0	0.4
2 MAY 09	1.2	1.0	0.3
9 MAY 09	1.2	1.0	0.3
17 MAY 09	1.0	1.0	0.3
26 MAY 09	0.7	0.9	0.2
6 JUN 09	1.1	0.7	0.2
15 JUN 09	1.1	0.7	0.2
26 JUN 09	1.1	0.4	0.2
12 JUL 09	0.5	0.2	0.1
24 AUG 08	Dry at base	0.2	Dry at base
21 SEP 09	Dry at base	Dry at base	Dry at base

Staff gage reading in inches

APPENDIX "B"

Vegetation Sample Plot Plant Counts

PLOT #1 – BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	4	4	3	4	3
Western red cedar (THP) <i>Thuja plicata</i>	1	1	1	1	1
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	1	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	1	1
Western crabapple (PYF) <i>Pyrus fusca</i>	0	0	0	0	0
Pacific Willow (SAL) <i>Salix lasiandra</i>	0	0	0	0	3
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	4	4	4	4	4
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	26	23	19	19	20
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	28	27	28	28	33
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	2	2	2	2	2
Black twinberry (LOI) <i>Lonicera involucrata</i>	0	0	0	0	0
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	0	0	0	6	5
Oceanspray (HOD) <i>Holodiscus discolor</i>	9	8	6	6	5
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	2	2	3	3	5
Pacific wax myrtle (MRC) <i>Mryica californica</i>	1	1	3	2	2
Indian plum (OEC) <i>Oemleria cerasiformis</i>	4	2	2	3	7
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	5	4	4	4	4
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	1	1	1	1	1
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	14	12	12	12	11
Thimbleberry (RUP) <i>Rubus parviflorus</i>	8	7	9	11	11
Salmonberry (RUS) <i>Rubus spectabilis</i>	2	2	1	0	1
TOTAL (% survival)	113	102 (90%)	101 (89%)	108 (96%)	120 (106%)

2009 many plants eaten by rabbits/rodents

PLOT #2 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	3	2	2	2	2
Sitka spruce (PIS) <i>Picea sitchensis</i>	4	4	3	3	4
Oregon ash (FRL) <i>Fraxinus latifolia</i>	1	1	1	1	1
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	12	12
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	0	0
Western crabapple (PYF) <i>Pyrus fusca</i>	3	3	1	3	2
Pacific Willow (SAL) <i>Salix lasiandra</i>	82	79	23	63	82
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	3	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	18	17	17	16	22
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	12	12	7	14	14
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	0	0	0	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	1	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	4	4	7	4	4
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	9	8	7	10	9
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	1	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	27	26	22	13	13
TOTAL (% survival)	167	156 (93%)	140 (84%)	142 (85%)	166 (99%)

Many spiraea and black cottonwood starts. Salmonberry and rose exhibit basal re-growth 2008
 2009 many birch starts, willows and rose spreading well. Many plants browsed by wildlife
 2009 – 60% to70% aerial coverage by shrubs and saplings.

PLOT #3 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	3	3	3	2	3
Sitka spruce (PIS) <i>Picea sitchensis</i>	1	1	1	1	1
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	1	1	1	1	1
Western birch (BEP) <i>Betula papyrifera</i>	0	0	4	15	28
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	2	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	2	2	1	3	3
Western crabapple (PYF) <i>Pyrus fusca</i>	4	4	1	4	4
Pacific Willow (SAL) <i>Salix lasiandra</i>	65	60	62	56	63
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	2	0	0	2	2
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	15	13	12	17	15
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	5	5	4	5	5
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	6	6	6	6	6
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	8	8	8	6	6
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	21	18	10	9	8
TOTAL (% survival)	133	118 (89%)	115 (86%)	128 96%	146 110%

2008 - Many spiraea and black cottonwood starts. Salmonberry and rose exhibit basal re-growth. Seedling paper birch starts.

2009 many birch starts, willows and rose spreading well. Many plants browsed by wildlife

PLOT #4 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	5	5	5	5	5
Sitka spruce (PIS) <i>Picea sitchensis</i>	2	2	2	2	2
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	10	16	20
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	0	0
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	2	2	1	2	2
Western crabapple (PYF) <i>Pyrus fusca</i>	7	7	6	6	7
Pacific Willow (SAL) <i>Salix lasiandra</i>	67	64	71	60	66
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	1	1
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	16	16	14	21	18
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	11	11	8	10	13
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	13	12	13	13	12
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	3	3	3	2	2
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	19	17	14	8	12
TOTAL (% survival)	145	139 (96%)	147 (101%)	146 100%	160 110%

Western paper birch and willow starts – 2008

2009 many birch starts, willows and rose spreading well. Many plants browsed by wildlife

PLOT #5 – WETLAND-BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	1	1	1	1	1
Western red cedar (THP) <i>Thuja plicata</i>	4	4	4	4	4
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	1	1	1	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	1	1	1	1	1
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	1	1
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	3	3	2	2	2
Western crabapple (PYF) <i>Pyrus fusca</i>	2	2	2	2	2
Pacific Willow (SAL) <i>Salix lasiandra</i>	54	53	64	58	63
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	6	4	4	2	3
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	11	9	2	3	3
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	18	18	17	18	21
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	4	4	3	3	4
Black twinberry (LOI) <i>Lonicera involucrata</i>	12	12	7	11	11
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	14	8	6	2	2
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	13	13	14	21	21
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	1	2	2
Indian plum (OEC) <i>Oemleria cerasiformis</i>	3	3	3	3	3
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	1	1	1	1	1
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	1	1	1	1	1
Thimbleberry (RUP) <i>Rubus parviflorus</i>	5	2	4	4	4
Salmonberry (RUS) <i>Rubus spectabilis</i>	1	1	2	1	1
TOTAL (% survival)	154	141 (92%)	140 (91%)	143 93%	152 99%

2008 One Sitka spruce re-located from flooded depression, Oregon grape heavily grazed by rabbits/rodents

2009 – rose and red osier clumps present and spreading

PLOT #6 – BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	4	4	4	4	4
Western red cedar (THP) <i>Thuja plicata</i>	2	2	2	3	3
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	0	0
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	2	2	2	1	3
Western crabapple (PYF) <i>Pyrus fusca</i>	0	0	0	1	1
Pacific Willow (SAL) <i>Salix lasiandra</i>	11	10	14	14	13
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	5	5	3	5	4
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	33	31	12	12	12
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	22	21	21	22	28
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	10	10	11	5	3
Black twinberry (LOI) <i>Lonicera involucrata</i>	0	0	0	7	5
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	0	0	0	3	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	6	6	4	6	6
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	5	5	4	10	6
Pacific wax myrtle (MRC) <i>Mryica californica</i>	5	5	5	4	3
Indian plum (OEC) <i>Oemleria cerasiformis</i>	5	3	5	8	8
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	7	7	5	5	4
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	1	1	2	2	2
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	5	4	6	8	6
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	5	13	15
Salmonberry (RUS) <i>Rubus spectabilis</i>	0	0	0	1	1
TOTAL (% survival)	123	116 (94%)	105 (85%)	134 109%	127 103%

2008 Oregon grape heavily grazed by rabbits and rodents
 2009 thimbleberry and rose spreading well, plants grazed by wildlife

PLOT #7 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	0	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	1	2	2
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	1	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	0	0
Western crabapple (PYF) <i>Pyrus fusca</i>	4	4	5	6	6
Pacific Willow (SAL) <i>Salix lasiandra</i>	67	67	93	90	73
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	7	7	12	14	14
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	13	13	11	9	11
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	4	3	3	4	6
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	20	19	20	15	15
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	18	15	12	7	10
TOTAL (% survival)	133	125 (94%)	158 (119%)	148 111%	138 104%

2008 Many willow starts

2009 – willows heavily grazed by wildlife

PLOT #8 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	0	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	2	2	3
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	1	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	0	0
Western crabapple (PYF) <i>Pyrus fusca</i>	6	6	5	3	4
Pacific Willow (SAL) <i>Salix lasiandra</i>	100	98	112	47	61
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	10	10	10	7	11
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	20	19	14	12	8
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	10	7	6	0	1
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	20	20	23	14	11
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	1	1	1
Salmonberry (RUS) <i>Rubus spectabilis</i>	15	11	13	9	13
TOTAL (% survival)	181	171 (94%)	187 (103%)	96 54%	114 63%

2008 Many willow starts

2009 many willows dead from grazing. Area drier than 2008. Scots broom present and spreading.

PLOT #9 – BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	4	1	2	4	4
Western red cedar (THP) <i>Thuja plicata</i>	2	1	2	2	2
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	1	1	1	1	1
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	0	0
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	1	1	1	1	1
Western crabapple (PYF) <i>Pyrus fusca</i>	0	0	0	0	0
Pacific Willow (SAL) <i>Salix lasiandra</i>	0	0	3	3	3
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	1	1	1	2	1
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	16	11	12	15	10
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	32	31	26	28	34
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	5	5	3	7	4
Black twinberry (LOI) <i>Lonicera involucrata</i>	0	0	0	0	0
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	0	0	0	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	5	3	1	1	1
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	2	2	4	2	4
Pacific wax myrtle (MRC) <i>Mryica californica</i>	3	3	2	3	3
Indian plum (OEC) <i>Oemleria cerasiformis</i>	6	3	9	5	6
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	5	5	4	5	5
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	2	2	2	2	2
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	5	5	2	3	3
Thimbleberry (RUP) <i>Rubus parviflorus</i>	9	3	3	3	3
Salmonberry (RUS) <i>Rubus spectabilis</i>	0	0	0	4	3
TOTAL (% survival)	99	78 (78%)	78 (78%)	91 93%	90 91%

2008 Good basal growth on rose

2009 rose spreading well. Heavy growth areas of Scots broom, iris, and blackberry present.

PLOT #10 – BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	2	2	2	2	3
Western red cedar (THP) <i>Thuja plicata</i>	3	1	3	3	3
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	2	2	2
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	0	0
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	2	2	2	1	1
Western crabapple (PYF) <i>Pyrus fusca</i>	0	0	0	0	0
Pacific Willow (SAL) <i>Salix lasiandra</i>	0	0	0	0	0
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	3	1	1	1	1
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	15	12	12	14	12
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	31	28	28	32	30
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	3	3	2	7	3
Black twinberry (LOI) <i>Lonicera involucrata</i>	0	0	0	0	0
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	0	0	0	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	6	4	3	2	2
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	0	0	0	0	0
Pacific wax myrtle (MRC) <i>Mryica californica</i>	2	2	2	3	3
Indian plum (OEC) <i>Oemleria cerasiformis</i>	11	8	8	8	6
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	5	4	4	10	9
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	2	2	2	2	2
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	7	7	7	7	6
Thimbleberry (RUP) <i>Rubus parviflorus</i>	4	0	3	1	5
Salmonberry (RUS) <i>Rubus spectabilis</i>	0	0	0	0	0
TOTAL (% survival)	96	76 (79%)	81 (84%)	95 99%	88 92%

2008 Thimbleberry re-growth

2009 grazed by wildlife, starting heavy growth of Scots broom and reed canarygrass

PLOT #11 – WETLAND – BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	1	1	1	1	1
Western red cedar (THP) <i>Thuja plicata</i>	0	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	1	1
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	1	0	0	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	1	1	1	1	1
Western crabapple (PYF) <i>Pyrus fusca</i>	4	3	3	4	4
Pacific Willow (SAL) <i>Salix lasiandra</i>	69	64	73	60	68
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	12	12	12	12	12
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	5	5	5	4	6
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	0	0	0	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	21	16	20	10	11
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	1	1	1
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	1	1	1	0	0
TOTAL (% survival)	115	103 (89%)	117 (102%)	95 83%	106 92%

2008 and 2009 Emergent community 100% soft rush

PLOT #12 – BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	5	4	5	6	5
Western red cedar (THP) <i>Thuja plicata</i>	2	1	1	1	1
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	1	1	1
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	0	0
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	0	0
Western crabapple (PYF) <i>Pyrus fusca</i>	0	0	0	0	0
Pacific Willow (SAL) <i>Salix lasiandra</i>	0	0	0	0	0
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	2	2	1	2	2
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	33	27	22	30	28
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	26	26	23	23	34
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	3	3
Black twinberry (LOI) <i>Lonicera involucrata</i>	0	0	0	0	0
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	0	0	0	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	1	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	0	0	0	0	0
Pacific wax myrtle (MRC) <i>Mryica californica</i>	3	2	3	2	2
Indian plum (OEC) <i>Oemleria cerasiformis</i>	7	5	7	6	9
Black currant (RIL) <i>Ribes lacustre</i>	1	1	1	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	11	11	10	17	10
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	3	2	3	2	1
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	15	12	7	3	1
Thimbleberry (RUP) <i>Rubus parviflorus</i>	5	2	2	2	4
Salmonberry (RUS) <i>Rubus spectabilis</i>	0	0	0	9	2
TOTAL (% survival)	113	95 (84%)	87 (77%)	107 95%	103 91%

2009 limited irrigation impacted survival of recently installed plants

PLOT #13 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	1	0	1	1	1
Western red cedar (THP) <i>Thuja plicata</i>	0	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	1	1	1
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	0	0
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	0	0
Western crabapple (PYF) <i>Pyrus fusca</i>	4	4	4	4	5
Pacific Willow (SAL) <i>Salix lasiandra</i>	81	80	95	65	62
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	4	1	1	1	1
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	14	14	12	8	8
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	8	8	7	7	6
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	5	3	3	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	14	14	15	15	16
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	1
Salmonberry (RUS) <i>Rubus spectabilis</i>	3	3	3	2	2
TOTAL (% survival)	134	127 (95%)	142 (106%)	104 78%	103 77%

2008 Many willow starts

2009 limited irrigation impacted survival of recently installed plants, many plants eaten by wildlife

PLOT #14 – BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	4	4	4	4	3
Western red cedar (THP) <i>Thuja plicata</i>	3	3	3	3	3
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	1	0	0	1	1
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	0	0
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	1	1	1	1	1
Western crabapple (PYF) <i>Pyrus fusca</i>	1	1	1	1	1
Pacific Willow (SAL) <i>Salix lasiandra</i>	9	4	4	4	4
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	2	2	1	2	2
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	21	20	7	13	8
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	44	41	44	43	50
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	6	6	5	5	4
Black twinberry (LOI) <i>Lonicera involucrata</i>	2	2	2	2	2
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	0	0	0	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	6	2	4	6	5
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	0	0	0	0	0
Pacific wax myrtle (MRC) <i>Mryica californica</i>	3	3	3	1	1
Indian plum (OEC) <i>Oemleria cerasiformis</i>	6	5	4	3	3
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	6	6	3	14	10
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	2	2	1	1	1
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	5	5	5	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	7	2	5	8	9
Salmonberry (RUS) <i>Rubus spectabilis</i>	0	0	0	0	0
TOTAL (% survival)	129	109 (84%)	97 (75%)	112 87%	108 84%

2008 Oregon grape eaten by rabbits and rodents

2009 limited irrigation impacted survival of recently installed plants, many plants eaten by wildlife

PLOT #15 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	0	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	1	1	1	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	0	0
Western crabapple (PYF) <i>Pyrus fusca</i>	3	3	3	2	2
Pacific Willow (SAL) <i>Salix lasiandra</i>	43	43	50	41	50
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	6	6	9	6	13
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	12	12	16	15	16
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	11	8	6	1	1
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	20	20	21	17	17
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	7	6	4	0	0
TOTAL (% survival)	103	99 (96%)	110 (107%)	83 81%	100 97%

2008 Many willow starts

2009 dense soft rush, twinberry doing well and forming clumps, many plants eaten by wildlife

PLOT #16 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	0	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	2	4	2
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	1	1	2	2	2
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	2	6
Western crabapple (PYF) <i>Pyrus fusca</i>	4	4	3	3	3
Pacific Willow (SAL) <i>Salix lasiandra</i>	101	93	91	82	90
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	10	10	11	11	11
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	13	12	10	10	6
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	12	12	8	2	2
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	21	21	18	13	12
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	6	5	4	3	3
TOTAL (% survival)	168	158 (94%)	149 (89%)	132 78%	137 82%

Free water at or above surface throughout summer and early fall 2008
2009 many plants eaten by wildlife

PLOT #17 – WETLAND - BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	2	2	2	2	2
Western red cedar (THP) <i>Thuja plicata</i>	1	1	1	2	1
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	1	1	2	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	1	1	1	1
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	1	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	1	1	1	1	1
Western crabapple (PYF) <i>Pyrus fusca</i>	2	2	2	1	1
Pacific Willow (SAL) <i>Salix lasiandra</i>	54	51	50	47	42
Sitka willow (SAS) <i>Salix sitchensis</i>	0	0	0	0	0
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	14	11	7	11	6
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	20	19	18	23	22
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	5	5	4	4	5
Black twinberry (LOI) <i>Lonicera involucrata</i>	5	5	4	6	5
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	2	1	1	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	12	12	10	9	7
Pacific wax myrtle (MRC) <i>Mryica californica</i>	2	2	2	1	1
Indian plum (OEC) <i>Oemleria cerasiformis</i>	5	4	3	5	5
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	1	1	1	3	3
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	4	4	4	1	1
Thimbleberry (RUP) <i>Rubus parviflorus</i>	5	1	1	1	1
Salmonberry (RUS) <i>Rubus spectabilis</i>	4	4	4	0	0
TOTAL (% survival)	140	128 (91%)	119 (85%)	119 85%	105 75%

Western birch relocated, Free water at or above surface throughout summer and early fall 2008
2009 limited irrigation impacted survival of recently installed plants, many plants eaten by wildlife

PLOT #18 – BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	0	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	1	0	3	3	2
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	0	0
Western crabapple (PYF) <i>Pyrus fusca</i>	7	7	3	3	3
Pacific Willow (SAL) <i>Salix lasiandra</i>	92	89	94	89	85
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>	0	0	0	0	0
Nootka rose (RON) <i>Rosa nutkana</i>	17	14	14	14	12
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	14	12	14	12	8
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	16	15	12	2	2
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	20	18	20	15	13
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	14	9	6	3	3
TOTAL (% survival)	181	164 (91%)	166 (92%)	141 80%	128 71%

2009 limited irrigation impacted survival of recently installed plants, many plants eaten by wildlife

PLOT #19 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	0	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	1	0	1	0	0
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	1	1	1	1	1
Western crabapple (PYF) <i>Pyrus fusca</i>	9	3	6	6	5
Pacific Willow (SAL) <i>Salix lasiandra</i>	72	67	78	71	67
Sitka willow (SAS) <i>Salix sitchensis</i>					
Western crabapple (PYF) <i>Pyrus fusca</i>	0	0	0	0	0
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	10	8	9	7	7
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	26	24	22	1	2
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	12	8	8	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	22	22	22	17	18
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	0	0	0	0	0
TOTAL (% survival)	153	133 (87%)	147 (96%)	103 67%	100 65%

2008 Ponded all winter and spring, Free water at surface throughout summer and early fall
 2009 same hydrology as 2008. Too wet for PHC, LOI, RON, and PYF. Dense soffrush by fall.

PLOT #20 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	2	1	1	1	1
Sitka spruce (PIS) <i>Picea sitchensis</i>	1	1	1	2	2
Oregon ash (FRL) <i>Fraxinus latifolia</i>	1	1	1	1	1
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	1	1	1
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	3	5	5
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	1	1	1	2	2
Western crabapple (PYF) <i>Pyrus fusca</i>	7	6	6	2	1
Pacific Willow (SAL) <i>Salix lasiandra</i>	67	65	61	57	51
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>	0	0	0	0	0
Nootka rose (RON) <i>Rosa nutkana</i>	9	9	9	7	4
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	11	11	9	10	8
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	9	8	8	2	1
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	18	18	17	14	13
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	1	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	8	5	5	2	2
TOTAL (% survival)	135	126 (93%)	123 (91%)	106 78%	92 68%

2009 limited irrigation impacted survival of recently installed plants, many plants very stressed

PLOT #21 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	2	2	2	2	1
Sitka spruce (PIS) <i>Picea sitchensis</i>	2	2	2	2	2
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	1	1	2	4	2
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	1	1	1
Western crabapple (PYF) <i>Pyrus fusca</i>	3	3	3	1	3
Pacific Willow (SAL) <i>Salix lasiandra</i>	64	53	58	63	63
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	1	1	1	1	1
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	17	17	14	15	8
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	17	17	12	9	5
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	11	10	8	1	1
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	14	14	12	13	10
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	9	7	6	3	3
TOTAL (% survival)	141	127 (90%)	121 (88%)	115 82%	100 71%

2008 NOT saturated to surface through summer – good place for mixed forested wetland
 2009 limited irrigation impacted survival of recently installed plants, many plants very stressed

PLOT #22 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	1	1	1	1	1
Western red cedar (THP) <i>Thuja plicata</i>	0	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	1	1
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	1	1	2
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	1	1	2	3	3
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	2	2	2	2	2
Western crabapple (PYF) <i>Pyrus fusca</i>	8	8	7	4	4
Pacific Willow (SAL) <i>Salix lasiandra</i>	49	45	61	57	48
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	1	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	4	4	3	3	3
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	23	22	21	15	15
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	13	13	15	13	13
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	6	5	5	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	22	22	22	20	17
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	1	1
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	5	4	4	1	2
TOTAL (% survival)	134	127 (94%)	145 (108%)	122 91%	112 84%

2008 NOT saturated to surface through summer – good place for mixed forested wetland
 2009 limited irrigation impacted survival of recently installed plants, many plants very stressed

PLOT #23 – WETLAND - BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	MAY 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	1	0	0	0	0
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	1	1	1	1	1
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	1	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	2	2	2	2	2
Western crabapple (PYF) <i>Pyrus fusca</i>	1	1	1	2	2
Pacific Willow (SAL) <i>Salix lasiandra</i>	36	32	36	24	19
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	5	5	5	2	2
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	4	3	3	3	2
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	12	12	11	10	6
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	2	2	2	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	10	10	9	9	7
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	11	8	8	2	1
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	14	13	12	10	6
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	4	3	4	2	1
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	2	2
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	3	0	1	2	1
Salmonberry (RUS) <i>Rubus spectabilis</i>	0	0	0	0	0
TOTAL (% survival)	106	92 (87%)	96 (90%)	72 68%	53 50%

2009 limited irrigation impacted survival of recently installed plants, many plants very stressed

PLOT #24 – WETLAND - BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	2	1	1	1	1
Western red cedar (THP) <i>Thuja plicata</i>	1	0	1	1	1
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	1	1	1	1	1
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	1	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	1	1	1	1	1
Western crabapple (PYF) <i>Pyrus fusca</i>	5	4	4	4	3
Pacific Willow (SAL) <i>Salix lasiandra</i>	53	50	52	37	36
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	1	1
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	10	9	8	9	7
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	15	15	15	10	13
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	5	5	4	2	2
Black twinberry (LOI) <i>Lonicera involucrata</i>	4	4	4	1	0
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	2	1	1	0	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	12	12	11	9	12
Pacific wax myrtle (MRC) <i>Mryica californica</i>	3	3	3	1	2
Indian plum (OEC) <i>Oemleria cerasiformis</i>	5	2	3	3	3
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	7	6	6	2	2
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	1	1	1	1	1
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	7	5	4	3	1
TOTAL (% survival)	134	120 (90%)	121 (90%)	88 66%	88 66%

2009 limited irrigation impacted survival of recently installed plants, many plants eaten by wildlife

PLOT #25 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	2	2	2	2	1
Sitka spruce (PIS) <i>Picea sitchensis</i>	1	1	1	1	1
Oregon ash (FRL) <i>Fraxinus latifolia</i>	2	2	2	1	1
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	1	1
Western birch (BEP) <i>Betula papyrifera</i>	0	0	1	1	1
Black hawthorne (CRD) <i>Crataegus douglasii</i>	1	1	1	2	2
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	3	3	3	3	3
Western crabapple (PYF) <i>Pyrus fusca</i>	6	6	6	7	4
Pacific Willow (SAL) <i>Salix lasiandra</i>	69	65	72	67	55
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	0	0	0	0	0
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	12	12	12	11	14
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	11	11	12	14	11
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	6	6	6	8	5
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	17	16	18	17	17
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	1	1	1
Salmonberry (RUS) <i>Rubus spectabilis</i>	10	7	6	7	5
TOTAL (% survival)	140	132 94%	143 102%	143 102%	122 87%

2009 many plants eaten by wildlife

PLOT #26 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	7	3	3	1	1
Sitka spruce (PIS) <i>Picea sitchensis</i>	3	1	3	3	2
Oregon ash (FRL) <i>Fraxinus latifolia</i>	1	1	1	1	1
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	0	0
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	2	2	2	2	2
Western crabapple (PYF) <i>Pyrus fusca</i>	3	2	3	2	2
Pacific Willow (SAL) <i>Salix lasiandra</i>	69	64	64	58	54
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	2	0	1	1	1
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	10	9	12	13	11
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	8	8	7	6	8
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	3	3	3	2	2
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	14	14	16	14	12
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	13	9	8	5	5
TOTAL (% survival)	135	116 (86%)	123 (91%)	108 80%	101 75%

PLOT #27 – BUFFER PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	4	1	1	3	3
Western red cedar (THP) <i>Thuja plicata</i>	1	1	1	2	2
Sitka spruce (PIS) <i>Picea sitchensis</i>	1	1	1	1	1
Oregon ash (FRL) <i>Fraxinus latifolia</i>	0	0	0	0	0
Big leaf maple (ACM) <i>Acer macrophyllum</i>	1	1	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	1	1	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	0	0	0	1	1
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	0	0	0	0	0
Western crabapple (PYF) <i>Pyrus fusca</i>	0	0	0	1	1
Pacific Willow (SAL) <i>Salix lasiandra</i>	0	0	0	0	0
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	11	11	7	8	4
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	41	36	22	17	18
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	28	26	30	36	48
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	1
Black twinberry (LOI) <i>Lonicera involucrata</i>	0	0	0	5	2
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	0	0	0	4	0
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	1	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	0	0	3	4	6
Pacific wax myrtle (MRC) <i>Mryica californica</i>	4	4	4	3	3
Indian plum (OEC) <i>Oemleria cerasiformis</i>	11	7	4	2	2
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	4	4	3	3	3
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	4	4	4	3	3
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	4	4	3	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	0	0	0	0	0
Salmonberry (RUS) <i>Rubus spectabilis</i>	0	0	0	0	1
TOTAL (% survival)	115	101 (88%)	83 (72%)	94 82%	99 86%

2008 Plants eaten by rabbits and rodents, Roses spreading well

2009 limited irrigation impacted survival of recently installed plants, many plants eaten by wildlife

PLOT #28 – WETLAND PLANT COMMUNITY

COMMON NAME SCIENTIFIC NAME	JULY 2007	MAY 2008	SEPT 2008	JUNE 2009	SEPT 2009
Douglas fir (PSM) <i>Pseudotsuga menziesii</i>	0	0	0	0	0
Western red cedar (THP) <i>Thuja plicata</i>	3	3	3	3	3
Sitka spruce (PIS) <i>Picea sitchensis</i>	0	0	0	0	0
Oregon ash (FRL) <i>Fraxinus latifolia</i>	2	2	2	2	2
Big leaf maple (ACM) <i>Acer macrophyllum</i>	0	0	0	0	0
Western hemlock (TSH) <i>Tsuga heterophylla</i>	0	0	0	0	0
Red alder (ALR) <i>Alnus rubra</i>	0	0	0	0	0
Western birch (BEP) <i>Betula papyrifera</i>	0	0	0	0	0
Black hawthorne (CRD) <i>Crataegus douglasii</i>	2	2	3	2	2
Quaking aspen (POP) <i>Populus tremuloides</i>	0	0	0	0	0
Black cottonwood(POT) <i>Populus trichocarpa</i>	3	3	3	3	3
Western crabapple (PYF) <i>Pyrus fusca</i>	6	6	6	4	3
Pacific Willow (SAL) <i>Salix lasiandra</i>	55	51	58	59	34
Sitka willow (SAS) <i>Salix sitchensis</i>					
Vine maple (ACC) <i>Acer circinatum</i>	3	3	2	2	2
Tall Oregon grape(BEA) <i>Berberis aquifolium</i>	0	0	0	0	0
Oregon grape (BEN) <i>Berberis nervosa</i>					
Nootka rose (RON) <i>Rosa nutkana</i>	15	13	12	17	7
Wild rose (ROG) <i>Rosa gymnocarpa</i>					
Snowberry (SYA) <i>Symphoricarpus albus</i>	0	0	0	0	0
Black twinberry (LOI) <i>Lonicera involucrata</i>	5	5	4	6	9
Pacific ninebark(PHC) <i>Physocarpus capitatus</i>	12	11	10	7	3
Oceanspray (HOD) <i>Holodiscus discolor</i>	0	0	0	0	0
Red-osier dogwood (COS) <i>Cornus stolonifera</i>	18	17	20	19	17
Pacific wax myrtle (MRC) <i>Mryica californica</i>	0	0	0	0	0
Indian plum (OEC) <i>Oemleria cerasiformis</i>	0	0	0	0	0
Black currant (RIL) <i>Ribes lacustre</i>	0	0	0	0	0
Red flowering currant(RIS) <i>Ribes Sanguineum</i>	0	0	0	0	0
High bush cranberry (VIE) <i>Viburnum edule</i>	0	0	0	0	0
Hazelnut (COC) <i>Corylus cornuta</i>	0	0	0	0	0
Serviceberry (AMA) <i>Amelanchier alnifolia</i>	0	0	0	0	0
Thimbleberry (RUP) <i>Rubus parviflorus</i>	7	3	3	2	2
Salmonberry (RUS) <i>Rubus spectabilis</i>	12	11	8	8	7
TOTAL (% survival)	143	130 (91%)	134 (94%)	134 94%	94 67%

2008 Seedling cottonwood present

APPENDIX “C”

Wildlife Observed Onsite

Wildlife Observed (Summer 2006 through early fall 2009)

COMMON NAME	SCIENTIFIC NAME	COMMENTS
Tree swallow	<i>Tachycineta bicolor</i>	Common, feeding, nesting
Violet green swallow	<i>Tachycineta thalassina</i>	Common, feeding, nesting
Barn swallow	<i>Hirundo rustica</i>	Common, feeding
Song sparrow	<i>Melospiza melodia</i>	Common, feeding, nesting
Dunlin	<i>Calidris alpina</i>	Un-common, feeding
American crow	<i>Corvus brachynchos</i>	Common, feeding
American robin	<i>Turdus migratorius</i>	Common, feeding
Dark eyed junco	<i>Junco hyemalis</i>	Common, feeding
Black capped chickadee	<i>Parus atricapillus</i>	Common, feeding
Northern flicker	<i>Colaptes auratus</i>	Common, feeding
Red tailed hawk	<i>Buteo jamaicensis</i>	Common, feeding
Turkey vulture	<i>Cathartes aura</i>	Early spring migrate
Northern harrier	<i>Circus cyaneus</i>	Common, feeding
Great blue heron	<i>Ardea herodias</i>	Common, feeding
Red winged blackbird	<i>Agelaius phoeniceus</i>	Common, feeding, nesting
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	Common, feeding, nesting
Marsh wren	<i>Cistothorus palustris</i>	Common, feeding, nesting
House sparrow	<i>Passer domesticus</i>	Common, feeding
Rock dove	<i>Columbia livia</i>	Common, feeding
American crow	<i>Corvus brachynchos</i>	Common, feeding
Northern flicker	<i>Colaptes auratus</i>	Common, feeding
Mourning dove	<i>Zenaida macroura</i>	Common, feeding
American goldfinch	<i>Carduelis tristis</i>	Common, feeding
Common yellowthroat	<i>Geothlypis trichas</i>	Common, feeding
Common snipe	<i>Gallinago gallinago</i>	Common, feeding, nesting
Brown headed cowbird	<i>Molothrus ater</i>	Common, feeding
Western kingbird	<i>Tyrannus verticalis</i>	Common, feeding
Killdeer	<i>Charadrius vociferus</i>	Un-common, feeding
Pied-billed grebe	<i>Podilymbus podiceps</i>	Un-common, feeding
Western grebe	<i>Aechmophorus occidentalis</i>	Un-common, feeding
Gull	<i>Larus spp.</i>	Common, feeding
American coot	<i>Fulica americana</i>	Un-common, feeding
American bittern	<i>Botaurus lentiginosus</i>	Un-common, feeding
Common mallard	<i>Anas platyrhynchos</i>	Common, feeding, nesting
Trumpeter swan	<i>Cygnus buccinator</i>	Early spring migrate, resting, feeding
Canada goose	<i>Branta canadensis</i>	Common, feeding, nesting Resident and migrant
Northern shoveler	<i>Anas clypeata</i>	Early spring migrate, resting, feeding
Blue-winged teal	<i>Anas discors</i>	Common, feeding, nesting

		Resident and migrant
Green-winged teal	<i>Anas crecca</i>	Early spring migrate, resting, feeding
Cinnamon teal	<i>Anas cyanoptera</i>	Early spring migrate, resting, feeding
Northern pintail	<i>Anas acuta</i>	Early spring migrate, resting, feeding. Also observed in June 2008
American widgeon	<i>Anas americana</i>	Early spring migrate, resting, feeding.
Bufflehead	<i>Bucephala albeola</i>	Common, feeding
Belted kingfisher	<i>Ceryle alcyon</i>	Common, feeding
Osprey	<i>Pandion haliaetus</i>	Un-common, feeding
American kestrel	<i>Falco sparverius</i>	Un-common
American coot	<i>Fulica americana</i>	Common, feeding, nesting
Great blue heron	<i>Ardea herodias</i>	Common, feeding
Double crested cormorant	<i>Phalacrocorax auritus</i>	Un-common, feeding
Black tailed deer	<i>Odocoileus hemionus</i>	Un-common, feeding, rearing
Coyote	<i>Canis latrans</i>	Common, feeding, rearing
Raccoon	<i>Procyon lotor</i>	Common, feeding
Eastern cottontail	<i>Sylvilagus floridanus</i>	Common, feeding, rearing
Deer mouse	<i>Peromyscus maniculatus</i>	Common, feeding, nesting
Vole	<i>Microtus spp.</i>	Common, feeding, nesting
Muskrat	<i>Ondatra zibethicus.</i>	Common, feeding
Long tailed weasel	<i>Mustela frenata.</i>	Un-common, feeding
Pacific treefrog	<i>Hyla regilla</i>	Common, breeding, rearing
Red-legged frog	<i>Rana aurora</i>	Common, breeding, rearing
Common garter snake	<i>Thamnophis sirtalis</i>	Common
Bullfrog	<i>Rana catesbeiana</i>	Common, breeding, rearing

Appendix G

List of Preparers

APPENDIX G - List of Preparers

Mark Brunner, Landau Associates, Senior Staff Planner, BA University of Washington, 2007

Anthony Katsaros, AICP, Landau Associates, Associate Planner, MA University of Washington, 1992

Theresa Turpin, Landau Associates, Associate Environmental Planner, BA Pacific Lutheran University, 1986