SEATTLE PUBLIC UTILITIES
SEPA ENVIRONMENTAL CHECKLIST

A. BACKGROUND

A1. Name of proposed project:

Landsburg Forebay Cleaning

A2. Name of applicant:

Seattle Public Utilities

A3. Address and phone number of applicant and contact person:

Ulysses Hillard, Project Manager
Seattle Public Utilities
Utility Systems Management Branch
Seattle Municipal Tower, Suite 4900
P.O. Box 34018
Seattle, WA 98124-4018
206-386-1518

A4. Date checklist prepared:

February 7, 2012

A5. Agency requesting checklist:

Seattle Public Utilities (SPU)

A6. Proposed timing or schedule (including phasing, if applicable):

SPU would perform this maintenance work after the flood season ends, generally in the Spring or early Summer of each year. The exact timing of a cleaning operation in any particular year is based on numerous factors, including flow requirements in the Cedar River and salmon migration timing. A cleaning operation may be conducted as early as May 1 or as late as August 15 in any year. A typical cleaning operation requires approximately five days, with removal of accumulated sediment and debris occurring over approximately two days within that five day period.

A7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

SPU typically would perform this maintenance work every year, because high flows (i.e., weather-related events where flow in the Cedar River exceeds approximately 1,800 cfs as measured at the US Geological Survey gage 12117500 near Landsburg) deposit sediment each year in the forebay, afterbay, V-screen bay, and fish ladder.

A8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

NOAA Fisheries. December 8, 2010. Email from Matt Longenbaugh (NOAA Fisheries) to Cyndy Holtz (SPU Project Specifier). NOAA Fisheries confirming Incidental Take Permit (ITP) coverage for SPU's Landsburg Dam forebay cleaning.

Seattle Public Utilities. April 2000. Final Cedar River Watershed Habitat Conservation Plan (HCP).

Seattle Public Utilities. June 23, 2004. Memo from Michael Bonoff (Natural Resources Section, Seattle Public Utilities). Evaluation of Monitoring Data 1979-2004 and Recommendations for the Future.

Seattle Public Utilities. April 8, 2005. Memo to Larry Fisher (Area Habitat Biologist, Washington Department of Fish and Wildlife (WDFW)) from Daniel Basketfield (Senior Water Resources Engineer, SPU Water Management). Revised Description of Landsburg Forebay Cleaning Procedures, May, 2005 (Reference: Hydraulic Permit Approval of March 7, 2003, Log No. ST-F8318-01)

Seattle Public Utilities. February 28, 2008. Memo to Larry Fisher (Area Habitat Biologist, WDFW) from Daniel Enrico (Senior Civil Engineer, SPU Water Resources). Description of Landsburg Forebay Cleaning Procedures, (Reference: Hydraulic Permit Approval of April 21, 2005, Control No. 00000F8318-2).

US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). April 1999. Final Environmental Impact for the Cedar River Watershed Habitat Conservation Plan.

Hydraulic Project Approval (HPA) for Landsburg Forebay Cleaning (Control No.112333-2: issued March 29, 2009; expiring March 11, 2013).

HPA for Landsburg Forebay Cleaning (Control No.00000F83818-2: issued April 21, 2005; expired March 7, 2008).

Lands owned by the City of Seattle above Landsburg Dam (including the Landsburg Dam forebay) are managed under the 2000 Cedar River Watershed Habitat Conservation Plan (HCP) and its associated permits and agreements. The 1999 Final Environmental Impact Statement on the HCP (HCP-EIS) reviewed the issuance of Endangered Species Act (ESA) Incidental Take Permits (ITPs) for the HCP. The HCP-EIS was prepared by USFWS and NMFS (Services) under the National Environmental Policy Act (NEPA). The City of Seattle City Council adopted the Services' NEPA document as its State Environmental Policy Act (SEPA) environmental review document for entering into an Implementation Agreement with the Services and accepting the ITPs.

A9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

There are no such applications directly affecting the property.

A10. List any government approvals or permits that will be needed for your proposal, if known.

King County

- Shoreline Substantial Development Permit (Exemption)
- Clearing and Grading Permit
- Critical Areas Provisions (Exemption)

Washington Department of Fish and Wildlife

- Hydraulic Project Approval (Control No.112333-2: issued March 29, 2009; expiring March 11, 2013. A new HPA will be needed for forebay cleaning operations conducted after March 11, 2013.)

The project being evaluated in this SEPA Environmental Checklist is an annual maintenance activity. Because the proposed activities are similar from year to year, this Checklist attempts to describe the full range of annual work activities and the range of quantities and impacts such that a new Checklist would not need to be prepared each year. If the proposed activity and/or regulatory environment in any future year differs substantially from that described in this Checklist, then additional SEPA environmental review and documentation would be conducted at that time, as appropriate.

A11. Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

SPU operates a municipal water supply system that supplies drinking water to more than 1.3 million people in the central Puget Sound region. The major sources of this supply are two watersheds in the Cascade Mountains east of Seattle: the Cedar River Municipal Watershed and the South Fork Tolt River Municipal Watershed. Approximately 60 percent of the supply is from the Cedar River and is obtained just upstream of the Landsburg Diversion Dam.

The Landsburg Diversion Dam extends across the Cedar River and impounds just enough water to allow a portion to be diverted for drinking water. The Dam includes three radial arm (Tainter) gates and a tipping gate (the "downstream passage gate") that are used to control the depth of the impounded water. Once the impounded pool reaches a certain depth, water flows from the river into a series of manmade structures that are part of the water supply intake system, including a forebay, afterbay, V-screen bay, and other associated facilities (see vicinity and site maps in Attachments A and B). The remainder of this subsection describes these structures and the proposed work activities.

The forebay is the outermost intake structure and is comprised of two sections: a relatively shallow, unlined area immediately adjacent to the river (outer forebay), and a smaller, concrete-lined area that is deeper and further from the river (inner forebay). The outer forebay is separated from the river by a low, concrete sill. When the water level in the river is relatively low, this sill entirely isolates the forebay from river flows. Under ordinary operating conditions, the river level is high enough to submerge the sill, allowing a portion of the river flow to be diverted into the outer forebay. Water flows from the outer forebay to the inner forebay over a sill composed of I-beams that support fitted boards, which allow a portion of the incoming sediment to be retained in the outer forebay.

The sill separating the outer and inner forebays also is submerged under ordinary operating conditions. In the remainder of this document, the word "forebay", by itself, refers collectively to the outer and inner forebays.

Water from the forebay flows into a short channel that runs under a building called the screen house. (The screen house formerly housed rotating screens for removing debris but SPU removed these screens in order to prevent fish dying by being caught on the screens.) This channel transitions to a triangle-shaped uncovered enclosure called the “afterbay”. Water flows from the afterbay into a buried pipe that conveys the water to an uncovered enclosure with fine screens oriented in a “V” shape whose purpose is to prevent fish and debris from entering the water supply. These screens are called the “V-screens” and the uncovered enclosure is called the “V-screen bay”.

A fish ladder is located north of the river, adjacent to the Landsburg Diversion Dam, and enables migrating fish to swim past the Dam. The fish ladder water intake structure is located on the downstream side of the outer forebay, and the water return structure is located downstream of the Dam on the Cedar River.

High flow events deposit varying amounts of sediment and debris in the forebay, the afterbay, the V-screen bay, and the fish ladder. SPU must clean the forebay and these associated areas annually to ensure the water supply intake structure (i.e., the forebay, afterbay, and V-screen bay) and the fish ladder function properly. The total amount of deposited material removed varies based on the frequency and intensity of the previous year’s high flow events, but can be as little as approximately 150 cubic yards or up to approximately 1,200 cubic yards and averages approximately 650 cubic yards. SPU would convey this material to an area within the Landsburg facility north and west of the forebay called the “upland disposal site”.

Work would occur in the forebay, afterbay, V-screen bay, fish ladder, upland disposal site, and the road from the forebay to the upland sediment disposal site. Generally, the cleaning operation consists of the following steps:

- Forebay Dewatering: All of the Dam’s Tainter gates would be gradually raised and the Dam’s downstream passage gate would be slowly opened following SPU standard operating procedures such that rates of down-ramping (i.e., descending water levels) in the Cedar River would not exceed one inch per hour [as measured at the US Geological Survey streamflow gauging station “Cedar River below Diversion near Landsburg” (USGS gauging site no. 12117600)]. Opening the gates gradually lowers the water levels immediately upstream of the Dam and in the forebay and afterbay. Once the water level falls below the level of the concrete sill separating the Cedar River from the outer forebay, water remaining in the forebay would be allowed to gradually drain to the river through a drain in the floor of the inner forebay (called the forebay drain).

  The forebay drain empties into the Cedar River through an outfall downstream from the Dam and upstream of the fish ladder entrance. It remains closed most of the year and SPU typically only opens the valve during some high flow events and in advance of the forebay cleaning. SPU opens the valve gradually two or more days before the beginning of the main forebay cleaning operation, following a minimum 2-hour long

procedure whose specific purpose is to manage the levels of turbidity in the water that is released to the river.

Small quantities of turbid water inevitably flow through the drain into the Cedar River while it is open. The suspended sediment in the water that flows out of the forebay drain is composed entirely of material that settled in the inner forebay, i.e., it is material that originated as sediment suspended in the river and, had it not settled in the forebay, would have continued downstream. The quantities are small and mix rapidly enough that, as long as the forebay drain is opened slowly and river flow downramping is conducted in accordance with SPU standard procedures, turbidity would be no more than five (5) nephelometric turbidity units (NTU) above background levels within 300 feet downstream of the Dam. SPU demonstrated this in a 2004 evaluation of turbidity and settlable solids monitoring data from the past 14 years' forebay cleaning operations(SPU, June 23, 2004). A subsequent SPU memorandum dated April 8, 2005 used the 2004 memorandum as the basis for revising the forebay cleaning operation description to specify water quality monitoring as needed rather than as a mandatory procedure (Basketfield 2005). The WDFW accepted this revised description of the forebay cleaning operation in the HPA issued for forebay cleaning dated April 21,2005 (WDFW 2005) and again in the current HPA dated March 29, 2009 (WDFW 2009). Water quality would be monitored as required by the HPA in place at the time of the cleaning operation.

- Fish Rescue and Relocation: Fish capture operations would be conducted concurrent with dewatering in the forebay, afterbay, and V-screen bay to rescue fish retained in these structures as the pool recedes. SPU fisheries biology staff would collect these fish, which would be identified and counted, and then returned to the Cedar River downstream of the Landsburg Diversion Dam.

  In addition, there is a sand bar upstream of the Dam that typically becomes exposed during dewatering. Typically, best efforts will be made to conduct fish rescue on this sand bar taking into consideration employee safety.

- Afterbay and V-screen Bay Dewatering: The V-screen bay has two drains, one drains the portion of the bay upstream of the V-screens and one drains the portion downstream of the V-screens. Both drains empty into a pipe that carries drainage from the water system in the Cedar Sockeye Hatchery. This pipe drains into the river approximately 10 feet downstream of the furthest downstream Fish Ladder entrance (i.e., where fish enter the Fish Ladder and where water draining through the Fish Ladder empties into the river).

  Following the conclusion of forebay dewatering and after fish capture operations in the forebay, afterbay, and V-screen bay are completed, the remaining water in the afterbay and V-screen bay would be removed either by sucking the water up with vactor trucks or by allowing the water to drain out of the bay by opening the V-screen bay drains. This could happen prior to, during, or after removal of sediment in the forebay. The V-screen bay drains would be closed once water had drained out of the V-screen bay and prior to removal of sediment in the V-screen bay.
  The V-screen bay drains would typically be left shut but, if water from the V-screen

bays is allowed to drain via the V-screen bay drains, water quality would be monitored as required by the HPA in place at the time of the cleaning operation.

- Removal and Load-out of Sediment and Debris: Sediment and debris located in the forebay, afterbay, V-screen bay, and fish ladder would be removed, loaded onto dump trucks, and then transported to the upland disposal area. Material in the outer forebay would be removed using equipment such as a trackhoe excavator and rubber-tired front-end loader. Material in the inner forebay would typically be removed by a rubber-tired backhoe. Both the trackhoe and loader would typically empty loads into dump trucks. The dump trucks would rotate into the outer forebay as they load and then transport the material a short distance to the upland disposal area.

  After the loader and/or trackhoe have removed all large and coarse material, SPU staff with hand scrapers and hoses would push and wash material into piles that would be removed by suction hoses from vactor trucks stationed in access areas around the inner forebay. The same method would be used to remove material from the afterbay, V-screen bay, and fish ladder. The vactor trucks would transport all vactored material to the upland disposal area.

- Refill: The water level behind the Dam would be increased and the forebay refilled as soon as practicable after actual active cleaning of the forebay and other areas is complete – generally no later than two or three days after the day of active cleaning in the forebay. Specifically, the forebay drain would be closed, the Tainter gates would be gradually raised following SPU procedure to avoid rapid changes in streamflow, and the downstream passage gate would be returned to automatic operation.

Photographs of previous forebay cleaning operations are included as Attachment C.

A12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The Landsburg Diversion Dam and associated facilities are located at 28700 Southeast 252nd Place, King County, Washington, in Section 19, Township 22 North, Range 7 East, WM, King County, Washington. The project site is located on a City-owned parcel (1922079001) in unincorporated King County. Vicinity maps are included as Attachment A and site maps are included at Attachment B.

B. ENVIRONMENTAL ELEMENTS

B1. Earth

a. General description of the site: *[Check the applicable boxes]*

☒ Flat ☐ Rolling ☐ Hilly ☐ Steep Slopes ☐ Mountainous
☐ Other: (identify)

b. What is the steepest slope on the site (approximate percent slope)?

The forebay where SPU performs this maintenance work has a slope of approximately 0.5% or flatter. The steepest slope is along a short reach of the road to the upland disposal area where the slope is approximately 5%.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

The inner forebay is concrete-lined. No direct characterization of the material in the outer forebay is available but a geotechnical investigation that was completed as part of the Landsburg Master Plan, Dam Assessment, Final Technical Memorandum, dated January 1998 described the material in a boring near to and at the approximate depth of the outer forebay as being "silty fine to coarse gravel with sand" (SPU 1998 Appendix A Figure A-8). It is assumed that this material is overlain by typical river bottom material, i.e., silt, sand, and gravel, together with organic material (e.g., leaves, twigs, branches, and animal and insect carcasses), in varying sizes, amounts, and states of decomposition. The upland disposal area has well-drained silty and sandy loam soils.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe:

There are no surface indications or history of unstable soils in the immediate vicinity.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate the source of fill.

With each annual cleaning operation, a volume between approximately 150 and 1,200 cubic yards of accumulated material (sediment and debris) would be removed from the forebay and associated facilities and placed in the upland disposal area.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe:

Because the existing roads within the site are gravel, minor erosion could occur due to truck haul.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

There would be no change in existing impervious surfaces because no existing impervious surfaces would be demolished and no new impervious surfaces would be created.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

SPU proposes no measures to reduce or control erosion or other impacts to the earth because the work is performed on surfaces that are either concrete-lined (the inner forebay), drain to the inner forebay (the outer forebay), or are gravel-lined (the roads).

Because the sediments and debris deposited on the upland disposal area are typically saturated, SPU would delineate the boundaries of the area used for disposal in any particular year with silt fence to contain any erosion and sediment-laden decant water that may result from the dewatering of that material. Because soils on the upland disposal area are well-drained, most of the decant water is expected to infiltrate. Once the material has become sufficiently dry, SPU would remove the silt fence and grade the deposited sediment and debris out into a thinner layer and then seed it with grass to prevent future erosion.

B2. Air

a. What types of emissions to the air would result from the proposal [*e.g.*, dust, automobile, odors, industrial wood smoke, greenhouse gases (GHG)] during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

SPU would use equipment such as trackhoe excavators, backhoes, rubber-tired front-end loaders, dump trucks, and vactor trucks to remove and haul material to the upland disposal area from the forebay, afterbay, V-screen bay, and fish ladder. Vehicles would also be used to transport workers to and from the work locations. These activities would generate emissions due to the combustion of gasoline and diesel fuels.

The fish capture and return portion of the operation would require a supply of fresh water. SPU would use one or more electric pumps to pump this water from the source of that water to where it would be used. There would be no emissions resulting from operation of these pumps in the immediate area because they would be electric with electric power supplied by Puget Sound Energy (PSE). Depending on the ultimate source of the electricity used to power these pumps some of the electricity might be generated by means that would result in small GHG emissions. As a reference, 66.6% of the electric power PSE supplied to its customers was generated by means that result in GHG emissions according to the 2010 fuel mix for PSE published by the Washington State Department of Commerce.

Emissions during the maintenance work would include normal amounts of dust from hauling and exhaust from motorized equipment (that is, carbon monoxide, sulfur, and particulates) and are expected to be minimal, localized, and temporary. There would be no emission sources created as a result of this maintenance proposal. GHG emissions for each annual forebay cleaning operation are estimated to be 2.5 metric tons of carbon dioxide emission (MTCO2e). GHG emission calculations are included as Attachment D.

Summary of Greenhouse Gas (GHG) Emissions Per Each Forebay Cleaning Operation

Activity/Emission Type	GHG Emissions (pounds of CO_2e)[1]	GHS Emissions (metric tons of CO_2e)[1]
Buildings	0	0
Paving	0	0
Construction Activities (Diesel)	0	0
Construction Activities (Gasoline)	0	0
Long-term Maintenance (Diesel)	4,418	2
Long-term Maintenance (Gasoline)	1,106	0.50
Total GHG Emissions	5,524	2.5

[1] Note: 1 metric ton = 2,204.6 pounds of CO_2e. 1,000 pounds = 0.45 metric tons of CO_2e

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

There are no known off-site sources of emissions or odor that would affect this proposed project.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

No fugitive dust impacts would occur as all material removed and all material hauled and unloaded are wet throughout the duration of the maintenance work. Nevertheless, project staff would comply with regulatory requirements and be prepared to implement appropriate dust control measures as necessary.

Vehicular emissions associated with forebay cleaning would be short-term in nature. Measures to minimize vehicular emissions include:

- Proper vehicle maintenance.
- Minimizing vehicle and equipment idling.

B3. Water

a. Surface:

(1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If so, describe type and provide names. If appropriate, state what stream or river or water body it flows into.

The Cedar River is in the immediate vicinity of the proposed project. The Cedar River is a tributary of Lake Washington and ultimately flows to Puget Sound via the Lake Washington Ship Canal.

Some of the water used for the fish capture and return portion of the operation would likely originate from one or more springs that drain into one or more unnamed manmade ponds on the south bank of the river near the Landsburg Diversion Dam. The springs and ponds are perennial and are a source of water for the Cedar Sockeye Hatchery. An inventory of the springs and ponds from the final Cedar Sockeye Hatchery Environmental Impact Statement is included as Attachment E.

(**2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If so, please describe, and attach available plans.**

The project would require activity within 200 feet of the Cedar River, as described in Section A11.

In addition, the work may include water from the hatchery water supply system, some of which might be pumped from one or more manmade ponds adjacent to the south side of the river that capture and detain flow from springs in the hillside south of the river.

(3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands, and indicate the area of the site that would be affected. Indicate the source of fill material.

The total amount of sediment and debris removed varies based on the frequency and intensity of the previous year's high flow events, but can be as little as approximately 150 cubic yards per year or up to approximately 1,200 cubic yards per year.

(4) Will the proposal require surface water withdrawals or diversions? If so, give general description, purpose, and approximate quantities if known.

Some of the water used for the fish capture and return portion of the operation would likely originate from one or more springs that drain into one or more unnamed manmade ponds on the south bank of the river near the Landsburg Diversion Dam. Water used for the fish capture and return operations would be returned to the Cedar River downstream of the Landsburg Diversion Dam.

(5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

Coverage in the floodplain maps prepared by the Federal Emergency Management Agency stops downstream of Landsburg Diversion Dam, just beyond the project site. However, the extent of the 100-year floodplain associated with the Cedar River is known to extend across the lower portions of the forebay. The remainder of the work area is outside the 100-year floodplain.

(6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

One to two days before beginning to lower the water surface elevation upstream of the dam, the forebay drain would be opened slowly in three or more steps over a period of at least two hours, such that there would be minimal increase in turbidity in the river and the resulting flow stage variations at USGS gage 12117600 would occur at a rate of less than 1 inch per hour.

The upland disposal area is located more than 180 yards from the Cedar River and the Cedar River would receive no decant water from the removed material.

b. Ground:

(1) Will ground water be withdrawn, or will water be discharged to ground water? If so, give general description, purpose, and approximate quantities if known.

Water saturating the removed sediment and debris is expected to infiltrate into the well-drained soils of the upland disposal area as that sediment decants.

(2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (*e.g.*, domestic sewage; industrial, containing the following chemicals…; agricultural, *etc.*). Describe the general size of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No waste material would be discharged into the ground as a result of the proposed project.

c. Water Runoff (including storm water):

(1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Water saturating the removed sediments and debris would be the only source of runoff. Water entrained in these spoils is expected to infiltrate into the well-drained soils of the upland disposal area. Dispersion of any decant water that does not immediately infiltrate would flow northward no further than the adjacent forest and would not enter other waters.

(2) Could waste materials enter ground or surface waters? If so, generally describe.

No waste materials would enter the ground or surface waters during the proposed project.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Equipment would be operated and maintained in such a manner as to minimize the risk of an uncontrolled discharge of pollutants to the Cedar River. The following measures would be used to reduce or control impacts to surface water, groundwater, and runoff:

- Cleaning operations would at all times be conducted under the supervision and coordination of an assigned SPU Project Manager.
- SPU owns a rubber-tire backhoe that uses vegetable-derived hydraulic fluid. SPU would use this trackhoe and/or other similar earth moving vehicles whose hydraulics use vegetable-derived hydraulic fluid in the forebay to the greatest practicable extent.
- Any equipment that might come into contact with water that could drain into the Cedar River would be disinfected and sanitized. Equipment would be pressure-washed using hot water and bleach at SPU's cleaning facility at Cedar Falls prior to arriving at Landsburg. This would protect the City's municipal water supply and the Cedar River from invasive species, pathogens, etc.

- Ample amounts of spill cleanup material are at all times located on the project site within two enclosed trailers. Prior to the commencement of cleaning operations, project staff would check these stores to ensure they are fully stocked. In addition, multiple spill kits would be placed in locations near where motorized equipment would be used.
- SPU would schedule equipment mechanics to stand by in case equipment began to leak.
- SPU Spill Coordinator and outside response contractors would be available on an on-call basis using a 24 hour/ 7 day schedule throughout the sediment removal work.
- To minimize the effects on river turbidity and flow, the forebay drain would be opened slowly in three or more steps over a period of at least two hours.
- The boundaries of the area used for disposal in any particular year would be delineated with silt fence to contain any erosion and sediment-laden decant water that may result from the dewatering of that material. Because soils on the upland disposal area are well-drained, most of the decant water is expected to infiltrate. Once the material has become sufficiently dry, the silt fence would be removed and the deposited sediment and debris would be graded out into a thinner layer, and then seeded with grass to prevent future erosion.
- The Project Manager (or designee) would assure compliance with State of Washington water quality standards by monitoring turbidity as required by the HPA in place at the time of the cleaning operation.

B4. Plants

a. Types of vegetation found on the site: *[check the applicable boxes]*

☒ Deciduous trees:	☒ Alder	☒ Maple	☐ Aspen	☐ Other:
☒ Evergreen trees:	☒ Fir	☒ Cedar	☒ Pine	☒ Other: Hemlock
☒ Shrubs				
☒ Grass				
☐ Pasture				
☐ Crop or grain				
☐ Wet soil plants:	☐ Cattail	☐ Buttercup	☐ Bulrush	☐ Skunk cabbage
☐ Other: (identify)				
☐ Water plants**:**	☐ water lily	☐ eelgrass	☐ milfoil	☐ Other:
☐ Other types of vegetation:				

b. What kind and amount of vegetation will be removed or altered?

The locations where sediment and debris would be removed are not vegetated. The upland disposal area is vegetated with grass. Deposited sediments in that area would kill the grass, but the newly deposited sediments would be reseeded with new grass.

c. List threatened or endangered species known to be on or near the site.

The locations where work would occur are either not vegetated or are recently disturbed upland disposal areas. No listed or threatened plant species are known to be on or near the project site (HCP; HCP EIS).

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Deposited sediments in the upland disposal area would kill existing stands of non-native grass, but the newly deposited sediments would be reseeded with new grass.

B5. Animals

a. Birds and animals that have been observed on or near the site or are known to be on or near the site: *[check the applicable boxes]*

Birds:	☒ Hawk	☒ Heron	☒ Eagle	☒ Songbirds
☒ Other: Numerous other species (see Attachment F)				
Mammals:	☒ Deer	☒ Bear	☒ Elk	☒ Beaver
☒ Other: Numerous other species (see Attachment F)				
Fish:	☐ Bass	☒ Salmon	☒ Trout	☐ Herring
☐ Shellfish	☒ Other: Numerous other species (see Attachment F)			

b. List any threatened or endangered species known to be on or near the site:

The following species are listed as threatened species under the ESA (or are candidates for such listing), are known to occur in the Cedar River Municipal Watershed, and may be present in the forebay, afterbay, V-screen bay, and fish ladder areas:

- Steelhead Trout (O*ncorhynchus mykiss*)
- Coho (*Oncorhynchus kisutch*)
- Chinook (*Oncorhynchus tshawytscha)*

The following formerly listed species is known to occur in the Cedar River Municipal Watershed, but no nests are known to be within 300 feet of the proposed activity:

- Bald eagle (*Haliaeetus leucocephalus*)

The following species are listed as threatened under the ESA and are known to occur in the Cedar River Municipal Watershed. Periodic surveys for Northern spotted owl have not detected the species nesting in recent years anywhere in the Watershed. Marbled murrelets are known to use the Cedar River to navigate between their nesting habitat in the eastern portion of the Municipal Watershed and their foraging habitat in Puget Sound.

- Northern spotted owl (*Strix occidentalis caurina*)
- Marbled murrelet (*Brachyramphus marmoratus*).

c. Is the site part of a migration route? If so, explain.

The Cedar River Municipal Watershed lies within the Pacific Flyway, one of four major north-south migration routes in the Americas for migratory birds. Washington State is part of the Pacific Flyway. In addition, the Watershed is a route for many species of wildlife and fish. Additional information on the fish and wildlife species that use the Cedar River Municipal Watershed is found in the HCP and HCP EIS.

d. Proposed measures to preserve or enhance wildlife, if any:

The HCP covers the incidental take of all endangered or threatened aquatic species that would die as a result of the proposed project. The HCP functioned as an application for ITPs from the federal government that currently allow the City to continue operating in the Municipal Watershed if the conservation measures in the HCP are implemented. The HCP has been designed both to provide certainty for management of the City's drinking water supply and to protect and restore habitats of 83 species of fish and wildlife that could be affected by City operations. In return for extensive commitments to conservation and mitigation, this approved HCP permits the City to maintain its utility operations in the Municipal Watershed while simultaneously protecting all species addressed by the plan as required by the ESA.

Generally, the HCP is a 50-year, ecosystem-based plan that is intended to fulfill ESA requirements for all City operations in the Cedar River Municipal Watershed, including forebay cleaning. Sections 3.4 and 3.5 of the HCP describe the incidental take of listed species associated with activities described in the HCP, including the forebay cleaning work. Section 4 includes a detailed description of how the HCP mitigates for this permitted incidental take. In a December 8, 2010 email to SPU, NOAA Fisheries confirmed that their issued ITP to SPU covers Landsburg Dam forebay cleaning operations.

The proposed project would specifically include special measures to preserve fish. Fish capture operations would be conducted concurrent with dewatering in the forebay, afterbay, V-screen bay, and, if it can be done safely, on the sand bar upstream of the Dam in order to rescue fish retained at these locations as water elevations in the pool drop. SPU fisheries biology staff would collect fish and transfer them to open air holding tanks. Water temperature in the tanks would be continuously monitored and, if necessary, water of different temperatures would be added to the tanks to make sure that water temperatures in the tanks are in an appropriate range for fish health. The sources of this water would include the Cedar River and/or the springs on the north side of the river. SPU fisheries biology staff would identify, count, and then return these fish to the Cedar River downstream of the Landsburg Diversion Dam.

Inevitably, some numbers of aquatic species would die as a result of being stranded when water levels descend or by being caught in the material that SPU removes from the forebay. The number of aquatic species adversely affected by stranding would be managed by following the procedure SPU has developed for lowering water surface elevations in the forebay, which is specifically designed to be at a rate that minimizes stranding.

In addition, the timing of the proposed project attempts to strike an optimal balance between allowing escapement of Chinook fry to the river downstream of the Landsburg Diversion Dam and minimizing risk to the City of Seattle's water supply while the Landsburg diversion is out of service for cleaning (as the summer consumption season progresses and diversion demand increases).

B6 Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, *etc.*

The completed work would not result in any new facilities or any new energy needs.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

The proposed work would not affect the potential use of solar energy by adjacent properties.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

There are no proposed conservation features or proposed measures to reduce or control energy impacts.

B7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe:

Materials likely to be present during the proposed project would include gasoline and diesel fuel, vegetable-derived hydraulic fluid, high-purity mineral oil based hydraulic fluid, conventional oils, lubricants and engine coolant, and other chemical products. A spill of one of these chemicals could potentially occur during the maintenance work as a result of either equipment failure or worker error.

The facility also includes chlorination and fluoridation equipment and chemicals. This equipment could conceivably be accidentally damaged and cause a release of chlorine gas or a spill of aqueous fluorisilic acid.

(1) Describe special emergency services that might be required.

A confined space rescue team would be required if a worker were to be injured while working in the afterbay, fish ladder, or V-screen bay.

(2) Proposed measures to reduce or control environmental health hazards, if any:

SPU staff participating in forebay cleaning activities would undergo training specific to their tasks prior to beginning activity. That training would describe methods to prevent any possibility of damaging any of the chlorination or fluoridation equipment by avoiding the area where the equipment is located. In addition, the Landsburg Facilities project to be completed in fiscal year 2014 would replace the existing gaseous chlorine injection facility with a liquid hypochlorite addition facility. Once completed, this change would entirely eliminate the possibility of a gaseous chlorine release.

If any soils became contaminated by spills, SPU staff or a qualified contractor would excavate and dispose of the contaminated materials in a manner consistent with the level of contamination, in accordance with federal, state and local regulatory requirements.

SPU staff would also regularly inspect all equipment for leaks at hoses, mechanical joints, and hydraulic pistons.

As required by the Washington Department of Labor and Industries (WAC 296-843), SPU has prepared a Health and Safety Plan for this proposed project. The plan addresses employee training, use of protective equipment, contingency planning, and secondary containment of hazardous material. It also identifies measures to ensure construction worker safety and outlines emergency medical procedures and reporting requirements.

The project site is closed to the public and only SPU staff and other authorized personnel are allowed access.

b. Noise

(1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Noises that exist in the area would not affect the proposed project.

(2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Noise levels in the vicinity of the Landsburg Diversion Dam and associated facilities would increase during the proposed maintenance work, but those impacts would be temporary and localized.

(3) Proposed measures to reduce or control noise impacts, if any:

No measures are proposed to reduce or control noise impacts because the increase in noise would be temporary, typically limited to no more than two days per annual cleaning operation.

B8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

The Landsburg Diversion Dam and associated facilities are used by the City to divert water from the Cedar River for its municipal water supply system. The project site is closed to the public and only SPU staff and other authorized personnel are allowed access.

b. Has the site been used for agriculture? If so, describe.

The site has not been used for agriculture.

c. Describe any structures on the site.

The project site includes a diversion dam having three Tainter gates and one tipping gate (the "downstream passage gate"), and municipal water supply diversion works including a forebay, screenhouse, afterbay, V-screen bay, chlorination and fluoridation storage tanks and machinery, an operations control building, two crew office buildings, an elevated water tank, portable toilets, a fish ladder and sorting facility, and a diesel generator and tank for emergency power. The project site also includes a sockeye salmon hatchery and raceways for adult sockeye, as well as gravel roads and an upland disposal area for receiving sediment and debris generated by cleaning operations in these facilities.

d. Will any structures be demolished? If so, what?

The proposed activity is maintenance and would not demolish any structures.

e. What is the current zoning classification of the site?

The current zoning classification of the site is Forestry (*http://www.kingcounty.gov/operations/GIS/Maps/VMC/~/media/operations/GIS/maps/vmc/images/zoning_2004.ashx*).

f. What is the current comprehensive plan designation of the site?

The King County Comprehensive Plan designation of the parcel containing the project site is Forestry (*http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx).*

g. If applicable, what is the current shoreline master program designation of the site?

The Cedar River is considered a Shoreline of the State and is managed under King County's Shoreline Master Program. In the vicinity of this project site, the Cedar River is designated Forestry Shoreline (*http://www.kingcounty.gov/operations/GIS/Maps/iMAP.aspx).*

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

The Cedar River and adjacent riparian area are considered environmentally sensitive areas under King County's critical areas provisions.

i. Approximately how many people would reside or work in the completed project?

The proposed project would not result in any people residing or working in a completed project.

j. Approximately how many people would the completed project displace?

The proposed project would not displace any people.

k. Proposed measures to avoid or reduce displacement impacts, if any:

The proposed project would not displace any people.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The proposed project is maintenance on existing facilities and is considered compatible with existing and projected land uses.

B9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

The proposed project would result in no new housing units, residential or otherwise.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

The proposed project would not eliminate any housing units.

c. Proposed measures to reduce or control housing impacts, if any:

The proposed project would not result in any housing impacts.

B10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas? What is the principal exterior building material(s) proposed?

No structures would be constructed.

b. What views in the immediate vicinity would be altered or obstructed?

The proposed project would not alter or obstruct views.

c. Proposed measures to reduce or control aesthetic impacts, if any:

This proposed project would not result in any aesthetic impacts.

B11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

The proposed project would not produce any light or glare. Work is typically conducted during daylight hours, and there are lights on the Dam and at the Landsburg Facility. These would be turned on if necessary to complete the work in a safe and timely manner. In addition, SPU would bring in additional lighting if necessary to complete the work in a safe and timely manner.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

The proposed project would not produce any light or glare that would be a safety hazard or interfere with views.

c. What existing off-site sources of light or glare may affect your proposal?

No existing off-site sources of light or glare would affect this proposal.

d. Proposed measures to reduce or control light and glare impacts, if any:

The proposed project would not produce any light or glare that would be a safety hazard or interfere with views. Work is typically conducted during the day such that additional lighting is not required.

B12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

Landsburg Park, a kayak launch and skills course, and the terminus and parking lot for King County's Cedar River Trail are located near the Cedar River at its intersection with Landsburg Road Southeast (also known as Issaquah-Hobart Road). All of those facilities are more than 1,400 feet west of the project site.

b. Would the proposed project displace any existing recreational uses? If so, describe.

The Cedar River Municipal Watershed, including the project site, is closed to unsupervised public access. The proposed project would not alter flows in a way that would affect recreational activities such as kayaking. Down-ramping and up-ramping (i.e., increases in water levels) in the Cedar River would be conducted at very slow rates—no more than one (1) inch per hour.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

The proposed project would not alter flows in a way that would affect recreational activities such as kayaking. Down-ramping and up-ramping in the Cedar River would be conducted at very slow rates—no more than one (1) inch per hour.

B13. Historic and Cultural Preservation

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

The Landsburg Diversion Dam and associated facilities are included within the Landsburg Headworks Historical District (Smithsonian number 45DT00180), which is considered eligible for listing on national and state historical registers. The Dam, screenhouse, and two out-buildings are considered contributing elements to the historical value of the District.

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

There are no known landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site other than Dam, screenhouse, and out-buildings mentioned in (B)(13)(a).

c. Proposed measures to reduce or control impacts, if any:

The proposed project would not alter the contributing elements of the Landsburg Headworks Historical District. Also, because the proposed project would not excavate, remove, or otherwise modify undisturbed native soils or soil sediments, the likelihood of impacting archaeological or cultural resources is considered very low. However, should evidence of cultural remains, either historic or prehistoric, be encountered during cleaning operations, work in the immediate area would be suspended and the find would be examined and documented by a professional archaeologist. Decisions regarding appropriate mitigation and further action would be made at that time.

B14. Transportation

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

Access to the project site is via a key card-controlled gate that is closed to unsupervised public access. The gate is at the end of a parking lot accessible from Landsburg Road Southeast.

b. Is the site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

The project site is closed to unsupervised public access and is not currently served by public transit. The nearest transit stop is approximately three (3) miles from the project site at the corner of the Maple Valley Black Diamond Road Southeast and Southeast Kent Kangley Road.

c. How many parking spaces would be unavailable during project construction? How many spaces would the completed project have? How many would the project eliminate?

The proposed project would not create or displace any parking spaces available to the public.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

The proposed project would require no new roads, streets, or improvements to existing roads or streets. The work would use existing roads and ramps within the project site. These roads and ramps are closed to unsupervised public access.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

The work would not use or occur in the immediate vicinity of water, rail, or air transportation.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

The completed project would not use public roads and would not generate vehicular trips on any public roads.

g. Proposed measures to reduce or control transportation impacts, if any:

The proposed project would have no impacts on transportation and no measures to reduce or control transportation impacts are proposed.

B15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

The proposed project would not result in an increased need for public services. During cleaning operations, security services would be provided by SPU and the King County Sheriff's Office. Emergency response would be handled by Eastside Fire and Rescue.

b. Proposed measures to reduce or control direct impacts on public services, if any.

The proposed project would not result in an increased need for public services.

B16. Utilities

a. Check utilities available at the site, if any: *[check the applicable boxes]*

☐ None
☒ Electricity ☐ Natural gas ☒ Water ☒ Refuse service
☒ Telephone ☐ Sanitary sewer ☒ Septic system
☒ Other: fiber optic; cable

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

☒ **None**

No new utilities are proposed.

As part of each annual forebay cleaning operation SPU would shut down the Cedar River water supply intake for the duration of the operation, estimated to be approximately five days. Forebay cleaning would not result in interruption in municipal water supply because of the availability of other sources of supply and the numerous storage reservoirs throughout the water transmission system.

C. SIGNATURE

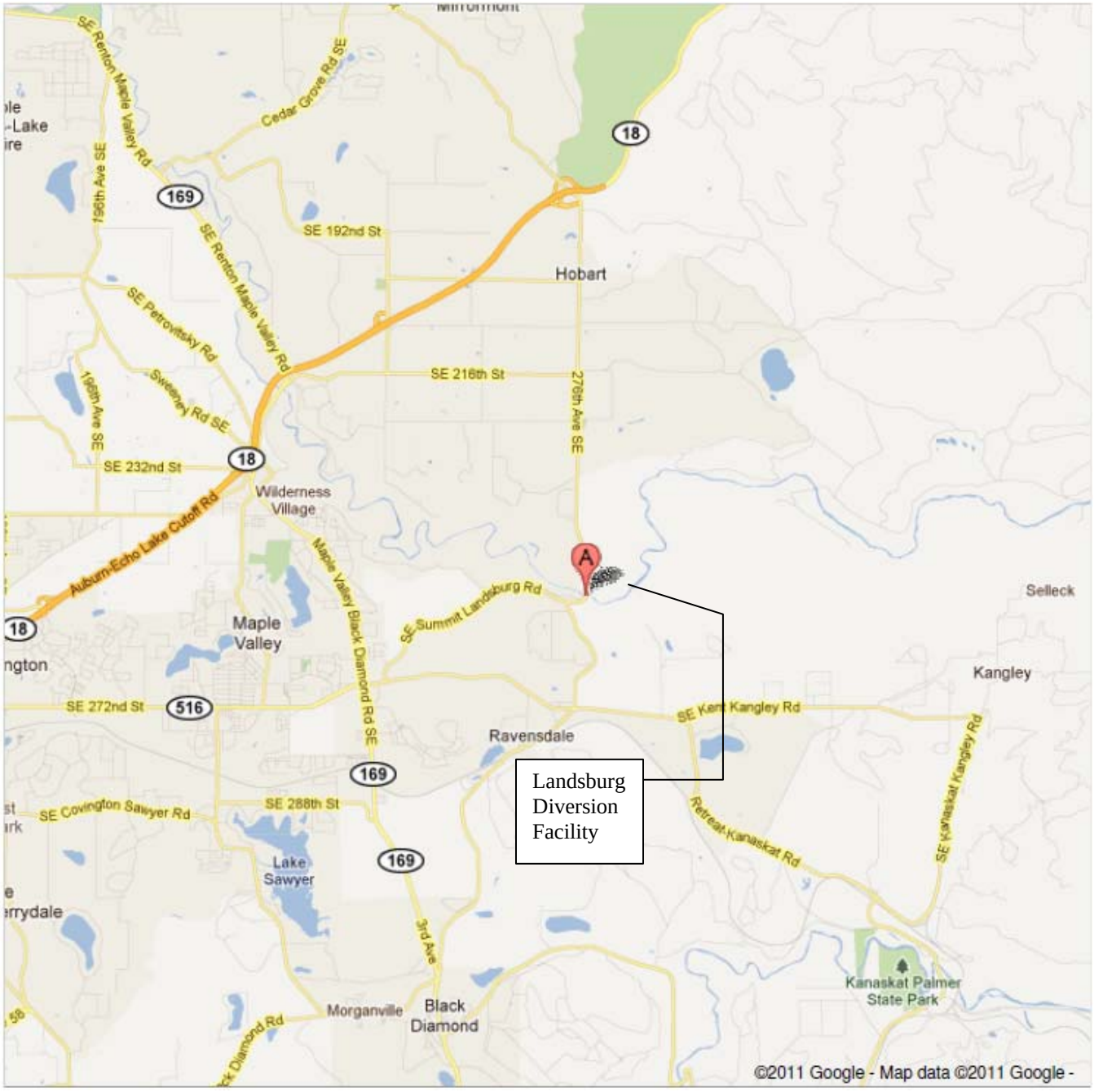
The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

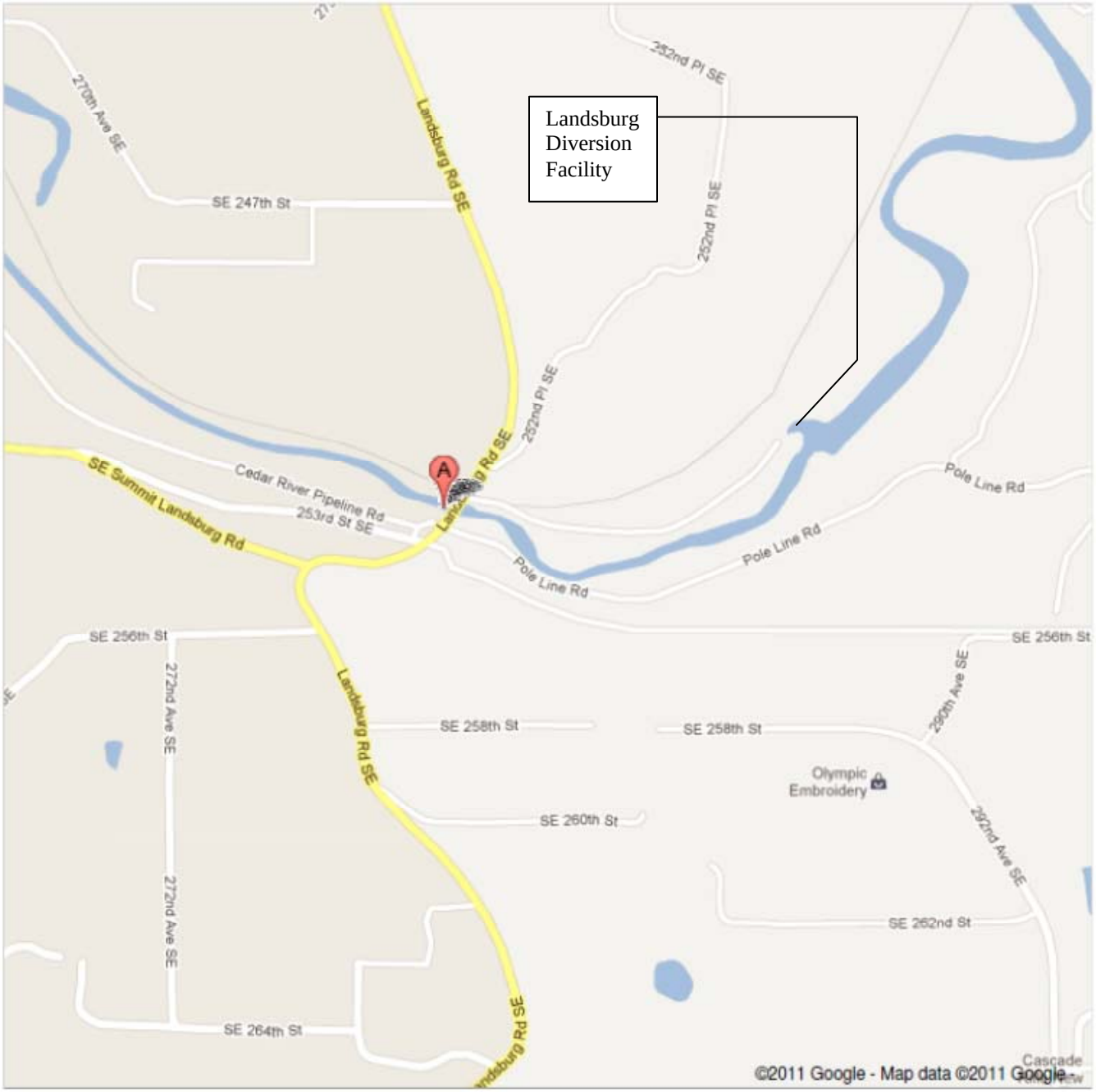
Signature: Ulysses Hillard Date: 2/7/2012

Ulysses Hillard
Project Manager

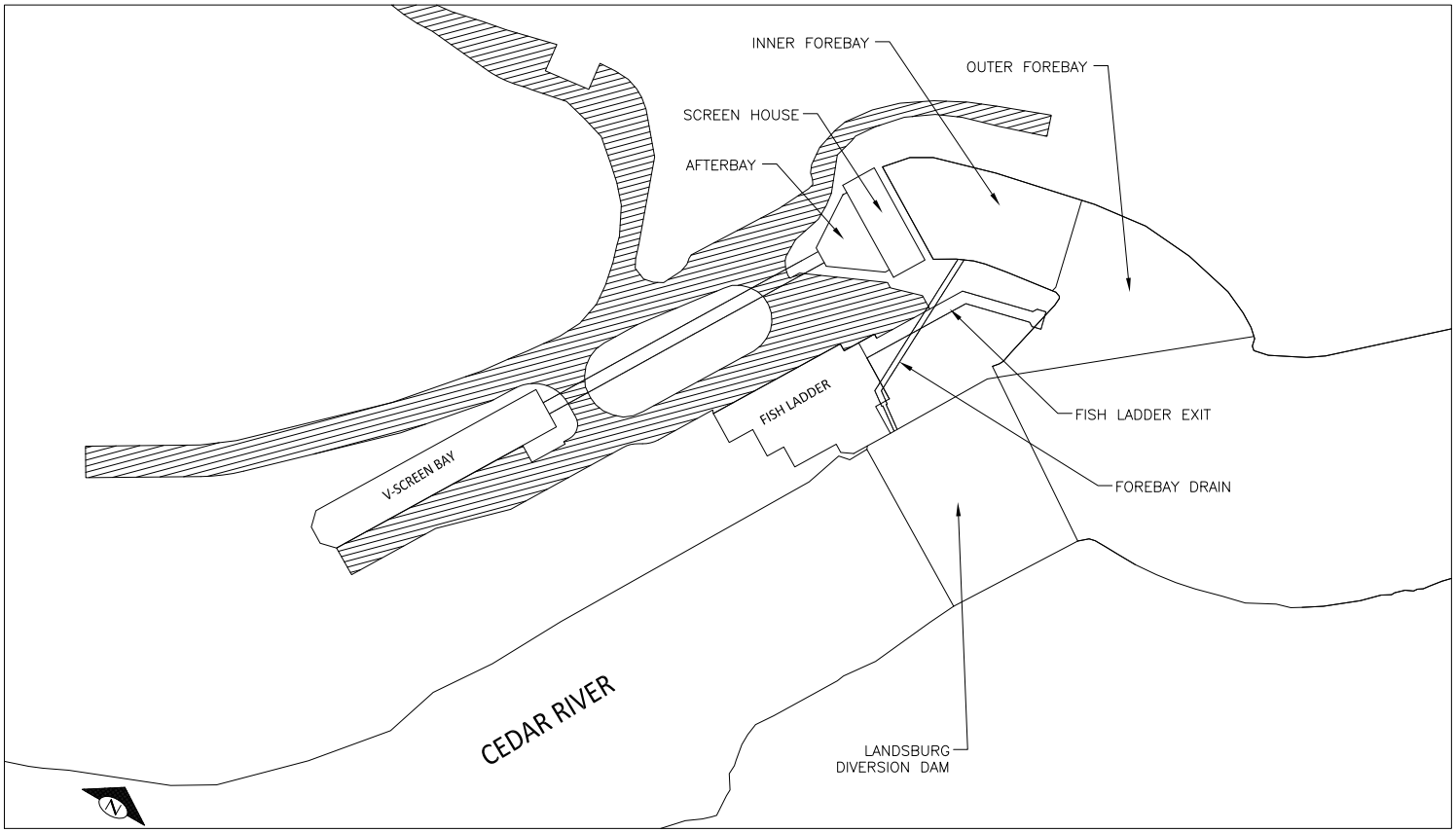
Attachment A – Vicinity Maps
Attachment B – Site Maps
Attachment C – Photographs
Attachment D – Greenhouse Gas Emissions Worksheet
Attachment E – Inventory of Springs and Ponds near Landsburg
Attachment F – List of Wildlife and Fish Species

Attachment A – Vicinity Maps




Landsburg Diversion Facility
A
270th Ave SE
SE 247th St
Landsburg Rd SE
252nd Pl SE
252nd Pl SE
Cedar River Pipeline Rd
253rd St SE
SE Summit Landsburg Rd
Landsburg Rd SE
Pole Line Rd
Pole Line Rd
Pole Line Rd
SE 256th St
SE 256th St
272nd Ave SE
SE 258th St
SE 258th St
260th Ave SE
Olympic Embroidery
Landsburg Rd SE
SE 260th St
292nd Ave SE
272nd Ave SE
SE 262nd St
SE 264th St
Landsburg Rd SE
Cascade View
©2011 Google - Map data ©2011 Google

Attachment B – Site Maps


INNER FOREBAY
OUTER FOREBAY
SCREEN HOUSE
AFTERBAY
FISH LADDER
V-SCREEN BAY
FISH LADDER EXIT
FOREBAY DRAIN
CEDAR RIVER
LANDSBURG
DIVERSION DAM
N

Attachment C – Photographs

Photo 1. Forebay in typical operations prior to cleaning.

Photo 2. Fish capture while dewatering forebay.

Photo 3. Captured fish in temperature-managed holding tank prior to identification, counting, and release.

Photo 4. Dewatered forebay prior to material removal.

Photo 5. Rubber tire front end loader transferring material to dump truck for haul to upland disposal area.

Photo 6. Upland disposal area prior to forebay cleaning.

Attachment D – Greenhouse Gas Emissions Worksheet

Section I: Buildings						
			Emissions Per Unit or Per Thousand Square Feet ($MTCO_2e$)			
Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Embodied	Energy	Transportation	**Lifespan Emissions ($MTCO_2e$)**
Single-Family Home	0		98	672	792	**0**
Multi-Family Unit in Large Building	0		33	357	766	**0**
Multi-Family Unit in Small Building	0		54	681	766	**0**
Mobile Home	0		41	475	709	**0**
Education		0.0	39	646	361	**0**
Food Sales		0.0	39	1,541	282	**0**
Food Service		0.0	39	1,994	561	**0**
Health Care Inpatient		0.0	39	1,938	582	**0**
Health Care Outpatient		0.0	39	737	571	**0**
Lodging		0.0	39	777	117	**0**
Retail (Other than Mall)		0.0	39	577	247	**0**
Office		0.0	39	723	588	**0**
Public Assembly		0.0	39	733	150	**0**
Public Order and Safety		0.0	39	899	374	**0**
Religious Worship		0.0	39	339	129	**0**
Service		0.0	39	599	266	**0**
Warehouse and Storage		0.0	39	352	181	**0**
Other		0.0	39	1,278	257	**0**
Vacant		0.0	39	162	47	**0**
					TOTAL Section I Buildings	**0**

Section II: Pavement						
						Emissions ($MTCO_2e$)
Pavement (sidewalk, asphalt patch)		0				0
Concrete Pad (50 $MTCO_2e$/1,000 sq. ft.)		0				**0**
					TOTAL Section II Pavement	**0**

Section III: Construction	
(See detailed calculations below)	**Emissions ($MTCO_2e$)**
TOTAL Section III Construction	**0**

Section IV: Operations and Maintenance	
(See detailed calculations below)	**Emissions ($MTCO_2e$)**
TOTAL Section IV Operations and Maintenance	**2.5**

TOTAL GREENHOUSE GAS (GHG) EMISSIONS ($MTCO_2e$)	**2.5**

Attachment D – Greenhouse Gas Emissions Worksheet, continued

Section III Construction Details		
Construction: Diesel		
Equipment	**Diesel (gallons)**	**Assumptions**
N/A	0	
Subtotal Diesel Gallons	0	
GHG Emissions in lbs CO_2e	0	22.2 lbs CO_2e per gallon of diesel
GHG Emissions in metric tons CO_2e	0	1,000 lbs = 0.45359237 metric tons

Construction: Gasoline		
Equipment	**Gasoline (gallons)**	**Assumptions**
N/A	0	
Subtotal Gasoline Gallons	0	
GHG Emissions in lbs CO_2e	0	19.4 lbs CO_2e per gallon of gasoline
GHG Emissions in metric tons CO_2e	0	1,000 lbs = 0.45359237 metric tons

Construction Summary		
Activity	**CO_2e in pounds**	**CO_2e in metric tons**
Diesel	0	0
Gasoline	0	0
Total for Construction	0	**0**

Section IV Long-Term Operations and Maintenance Details (per each annual cleaning operation)		
Operations and Maintenance: Diesel		
Equipment	**Diesel (gallons)**	**Assumptions**
Track-hoe excavator (1)	90	10 hours x 9 gallons/hour
Dump Trucks (4)	13	20 round-trips x 0.8-mile/round-trip ÷ 5 mpg x 4 trucks
Rubber-tire front-end Loader (1)	40	10 hours x 4 gallons/hour
Vactor trucks (2)	56	4 hours x 7 gallons/hour x 2 vactor trucks
Subtotal Diesel Gallons	199	
GHG Emissions in lbs CO_2e	4,418	22.2 lbs CO_2e per gallon of diesel
GHG Emissions in metric tons CO_2e	2.004	1,000 lbs = 0.45359237 metric tons

Operations and Maintenance: Gasoline		
Equipment	**Gasoline (gallons)**	**Assumptions**
Pick-up Trucks or Crew Vans (10)	57	1 day x 10 trucks/vans x 57-mile round-trip/day ÷ 10 mpg
Subtotal Gasoline Gallons	57	
GHG Emissions in lbs CO_2e	1,106	19.4 lbs CO_2e per gallon of gasoline
GHG Emissions in metric tons CO_2e	0.502	1,000 lbs = 0.45359237 metric tons

Operations and Maintenance: Generated Electricity		
Equipment	**Electricity (kWh)**	***Assumptions***
Water pump (1)	10	*5 hours x 2 kW (assuming ~600 gpm lifting ~10 ft at 60% efficiency)*
Subtotal Kilowatt-hours	10	
GHG Emissions in lbs CO_2e	8.4	*0.863 lbs CO_2e per kilowatt-hour of electricity*
GHG Emissions in metric tons CO_2e	0.004	*1,000 lbs = 0.45359237 metric tons*

Operations and Maintenance Summary		
Activity	**CO_2e in pounds**	**CO_2e in metric tons**
Diesel	4,418	2.004
Gasoline	1,106	0.502
Electricity	8	0.004
Total Operations and Maintenance	5,524	**2.508**

Table 2.3-1
Landsburg Springs

No.	Location / Description4	Existing Development / Current Use4
1	• Upstream of dam. Pump intake less than 50 feet south of the Cedar River. • Spring flow about 1.1 cfs2 (490 gpm).[1]	• A 5-hp pump is surface-mounted in a spring pool created behind sandbags. • Pipeline to interim hatchery. • Spring use is about 0.6 cfs (290 gpm).[3]
2 & 3	• Upstream of dam. Outfalls located less than 50 feet south of the Cedar River. • Diffuse, low flow, with poor accessibility. • Each spring has flow of about 0.2 cfs (100 gpm) for a total of about 0.4 cfs (200 gpm)[1].	• Each spring has a 12-inch diameter outfall to river; no other development. • Combined spring use is 0 cfs (0 gpm)[2].
4	• Upstream of dam. • Numerous seeps flow from several locations before combining in a small pool then flowing through a culvert under the existing access trail and discharging via a submerged culvert o the Cedar River. • Spring flow about 0.3 cfs (130 gpm)[1].	• Submerged outfall to river; no other development. • Spring use is 0 cfs (0 gpm) [2].
5 & 6	• Downstream of dam on a benched area above the interim hatchery about 150 feet south of the Cedar River. • Seeps above the springs are diffuse and boggy. • Flows of about 0.2 (100 gpm) and 0.06 cfs (30 gpm), respectively, for a total of 0.3 cfs (1350 gpm) [2].	• Sandbags placed perpendicular to the direction of flow to create pool. Each spring cistern pool has a vertical rectangular screen box with a 4-inch outlet pipe to the lower pool at the interim hatchery site. • Current combined spring use is less than 0.3 cfs (135 gpm) [3].
7 & 8	• Downstream of dam within 50 feet of the south bank of the Cedar River. • A large, complex system of flows that starts with two central seeps, 100 yards apart, on a steep bushy hillside. Surface flow increases towards the bottom of the slope combining into a small ditch that parallels the Cedar River. • Combined flow of about 0.9 cfs (400 gpm) [1].	• A main source for the interim hatchery. Water flows to trenches above the river where a wood stave main was previously located. • Combined spring use is less than 0.9 cfs (400 gpm) [3].
9	• Downstream of dam within 50 feet of the south bank of the Cedar River. • At the toe of an unstable hillside, relatively remote from other springs. • Flow rate of about 0.2 cfs (100 gpm).[1]	• None.
10	• Downstream of dam. Collection point within 50 feet of the river. • At the collection point, three smaller flows combine into single spring. • Flow rate of about 1.0 cfs (470 gpm).[1]	• Screened collection point with short horizontal pipes to a vertically mounted 5-hp pump, and pipeline. • Spring use is less than 1.0 cfs.[3]

Table 2.3-1
Landsburg Springs (Continued)

No.	Location / Description4	Existing Development / Current Use4
11	• Downstream of dam; within about 150 feet from the Cedar River. • Combined flow from Springs 11 and 12 is about 1.1 cfs (494 gpm). [2]	• Small sand bag cut-off dam and small cistern pool with an outlet pipe that is routed through a screen box. The outlet pipe continues as gravity feed pipe to the holding facility after combining with some of the piped flow from Spring #12. • Current combined use of springs 11 and 12 is less than 1.1 cfs (475 gpm). [3]
12	• Downstream of dam; within approximately 100 feet of the south bank of the Cedar River. • Combined flow with Spring 11—see Spring 11[1].	• Three-foot-deep spring pool created by a concrete cut-off dam. The pool is partially covered by a blue tarp, secured at water surface level. Three outlet pipes. One valved outlet pipe is mounted on the side of the concrete dam. One 3-inch PVC pipe collects water from the cistern, and one 3-inch PVC pipe collects water seeping below the cistern. These two pipes are routed through a common screen box and continue as a single gravity feed 6-inch PVC pipe to the interim holding facility. • Current use—see Spring 11
TOTAL CURRENT USE : Less than 3.9 cfs		

1. Flows taken from Shannon & Wilson, May 2002. Cedar River Fish Hatchery Report Spring Development Landsburg, Washington.
2. Tetra Tech/KCM, Inc. December 2001. Seattle Public Utilities Basis of Design Report Cedar River Sockeye Hatchery Draft.
3. WDFW, August, 2002. Personal communication with Interim Hatchery Staff.
4. Rounded to two significant digits.

Source: Seattle Public Utilities (2003), Cedar River Sockeye Hatchery Project Final Environmental Impact Statement, March 2003.

General Species Group	Specific Group	Common Name	Scientific Name	Native	Confirmed in CRMW[1]
Birds	Corvids	Steller's Jay	Cyanocitta stelleri	Y	Y
Birds	Corvids	American Crow	Corvus brachyrhynchos	Y	Y
Birds	Corvids	Common Raven	Corvus corax	Y	Y
Birds	Dippers	American Dipper	Cinclus mexicanus	Y	Y
Birds	Ducks	Mallard	Anas platyrhynchos	Y	Y
Birds	Ducks	Common Goldeneye	Bucephala clangula	Y	Y
Birds	Ducks	Bufflehead	Bucephala albeola	Y	Y
Birds	Ducks	Hooded Merganser	Lophodytes cucullatus	Y	Y
Birds	Ducks	Common Merganser	Mergus merganser	Y	Y
Birds	Ducks	Northern Shoveler	Anas clypeata	Y	Y
Birds	Finches	Pine Siskin	Carduelis pinus	Y	Y
Birds	Finches	Evening Grosbeak	Coccothraustes vespertinus	Y	Y
Birds	Flycatchers	Willow Flycatcher	Empidonax traillii	Y	Y
Birds	Flycatchers	Pacific-slope Flycatcher	Empidonax difficilis	Y	Y
Birds	Geese	Canada Goose	Branta canadensis	Y	Y
Birds	Grouse, Quail	Ruffed Grouse	Bonasa umbellus	Y	Y
Birds	Hawks	Osprey	Pandion haliaeetus	Y	Y
Birds	Hawks	Bald Eagle	Haliaeetus leucocephalus	Y	Y
Birds	Hawks	Red-tailed Hawk	Buteo jamaicensis	Y	Y
Birds	Herons	Great Blue Heron	Ardea herodias	Y	Y
Birds	Hummingbirds	Rufous Hummingbird	Selasphorus rufus	Y	Y
Birds	Kingfisher	Belted Kingfisher	Ceryle alcyon	Y	Y

[1] Cedar River Municipal Watershed

Birds	Kinglets, Thrushes	Golden-crowned Kinglet	Regulus satrapa	Y	Y
Birds	Kinglets, Thrushes	American Robin	Turdus migratorius	Y	Y
Birds	Kinglets, Thrushes	Varied Thrush	Ixoreus naevius	Y	Y
Birds	Owls	Great Horned Owl	Bubo virginianus	Y	Y
Birds	Owls	Northern Pygmy Owl	Glaucidium gnoma	Y	Y
Birds	Owls	Barred Owl	Strix varia	Y	Y
Birds	Owls	Northern Saw-whet Owl	Aegolius acadicus	Y	Y
Birds	Sparrows	Spotted Towhee	Pipilo maculatus	Y	Y
Birds	Sparrows	Song Sparrow	Melospiza melodia	Y	Y
Birds	Sparrows	White-crowned Sparrow	Zonotrichia leucophrys	Y	Y
Birds	Sparrows	Dark-eyed Junco	Junco hyemalis	Y	Y
Birds	Swallows	Violet-green Swallow	Tachycineta thalassina	Y	Y
Birds	Swallows	Barn Swallow	Hirundo rustica	Y	Y
Birds	Tanagers, Grosbeaks, Buntings	Western Tanager	Piranga ludoviciana	Y	Y
Birds	Tanagers, Grosbeaks, Buntings	Black-headed Grosbeak	Pheucticus melanocephalus	Y	Y
Birds	Tits, Nuthatches, Creepers	Black-capped Chickadee	Poecile atricapillus	Y	Y
Birds	Tits, Nuthatches, Creepers	Chestnut-backed Chickadee	Poecile rufescens	Y	Y
Birds	Tits, Nuthatches, Creepers	Common Bushtit	Psaltriparus minimus	Y	Y
Birds	Tits, Nuthatches, Creepers	Red-breasted Nuthatch	Sitta canadensis	Y	Y
Birds	Tits, Nuthatches, Creepers	Brown Creeper	Certhia americana	Y	Y
Birds	Troupials	Red-winged Blackbird	Agelaius phoeniceus	Y	Y
Birds	Vultures	Turkey Vulture	Cathartes aura	Y	Y
Birds	Warblers	Yellow Warbler	Dendroica petechia	Y	Y
Birds	Warblers	Black-throated Gray Warbler	Dendroica nigrescens	Y	Y
Birds	Warblers	Townsend's Warbler	Dendroica townsendi	Y	Y
Birds	Warblers	Common Yellowthroat	Geothlypis trichas	Y	Y

Birds	Warblers	Wilson's Warbler	Wilsonia pusilla	Y	Y
Birds	Waxwings	Cedar Waxwing	Bombycilla cedrorum	Y	Y
Birds	Woodpeckers	Downy Woodpecker	Picoides pubescens	Y	Y
Birds	Woodpeckers	Hairy Woodpecker	Picoides villosus	Y	Y
Birds	Woodpeckers	Northern Flicker	Colaptes auratus	Y	Y
Birds	Woodpeckers	Pileated Woodpecker	Dryocopus pileatus	Y	Y
Birds	Wrens	House Wren	Troglodytes aedon	Y	Y
Birds	Wrens	Winter Wren	Troglodytes troglodytes	Y	Y
Fish	Lampreys	Western Brook Lamprey	Lampetra richardsoni	Y	Y
Fish	Salmonids	Mountain Whitefish	Prosopium williamsoni	Y	Y
Fish	Salmonids	Coastal Cutthroat Trout	Oncorhynchus clarki clarki	Y	Y
Fish	Salmonids	Coho Salmon	Oncorhynchus kisutch	Y	Y
Fish	Salmonids	Rainbow Trout	Oncorhynchus mykiss	Y	Y
Fish	Salmonids	Steelhead Trout	Oncorhynchus mykiss	Y	Y
Fish	Salmonids	Sockeye Salmon	Oncorhynchus nerka	Y	Y
Fish	Salmonids	Chinook Salmon	Oncorhynchus tshawytscha	Y	Y
Fish	Sculpins	Torrent Sculpin	Cottus rhotheus	Y	Y
Fish	Sculpins	Riffle Sculpin	Cottus gulosus	Y	Y
Herpetiles	Frogs	Western Toad	Bufo boreas	Y	Y
Herpetiles	Frogs	Pacific Treefrog	Pseudacris regilla	Y	Y
Herpetiles	Frogs	Tailed Frog	Ascaphus truei	Y	Y
Herpetiles	Frogs	Northern Red-legged Frog	Rana aurora aurora	Y	Y
Herpetiles	Salamanders	Northwestern Salamander	Ambystoma gracile	Y	Y
Herpetiles	Salamanders	Long-toed Salamander	Ambystoma macrodactylum	Y	Y
Herpetiles	Salamanders	Pacific Giant Salamander	Dicamptodon tenebrosus	Y	Y
Herpetiles	Salamanders	Ensatina	Ensatina eschscholtzii	Y	Y
Herpetiles	Salamanders	Western Redback Salamander	Plethodon vehiculum	Y	Y
Herpetiles	Salamanders	Roughskin Newt	Taricha granulosa	Y	Y
Herpetiles	Snakes	Rubber Boa	Charina bottae	Y	N

Herpetiles	Snakes	Northwestern Garter Snake	Thamnophis ordinoides	Y	N
Herpetiles	Snakes	Common Garter Snake	Thamnophis sirtalis	Y	N
Mammals	Bats	Big Brown Bat	Eptesicus fuscus	Y	N
Mammals	Bats	Silver-haired Bat	Lasionycteris noctivagans	Y	N
Mammals	Bats	California Myotis	Myotis californicus	Y	N
Mammals	Bats	Long-eared Myotis	Myotis evotis	Y	N
Mammals	Bats	Little Brown Myotis	Myotis lucifugus	Y	Y
Mammals	Bats	Long-legged Myotis	Myotis volans	Y	N
Mammals	Bats	Yuma Myotis	Myotis yumanensis	Y	N
Mammals	Bear	Black Bear	Ursus americanus	Y	Y
Mammals	Beavers	Beaver	Castor canadensis	Y	Y
Mammals	Canids	Coyote	Canis latrans	Y	Y
Mammals	Cats	Cougar	Felis concolor	Y	Y
Mammals	Cats	Bobcat	Lynx rufus	Y	Y
Mammals	Deer, Bovids	Elk	Cervus elaphus	Y	Y
Mammals	Deer, Bovids	Black-tail (Mule) Deer	Odocoileus hemionus	Y	Y
Mammals	Moles	Shrew-mole	Neurotrichus gibsii	Y	Y
Mammals	Moles	Coast Mole	Scapanus orarius	Y	Y
Mammals	Moles	Townsend's Mole	Scapanus townsendii	Y	N
Mammals	Mtn Beavers	Mountain Beaver	Aplodontia rufa	Y	Y
Mammals	Mustelids	Short-tailed Weasel (Ermine)	Mustela erminea	Y	Y
Mammals	Mustelids	Long-tailed Weasel	Mustela frenata	Y	N
Mammals	Mustelids	Mink	Mustela vison	Y	Y
Mammals	Mustelids	Northern River Otter	Lontra canadensis	Y	Y
Mammals	Mustelids	Striped Skunk	Mephitis mephitis	Y	Y
Mammals	Mustelids	Western Spotted Skunk	Spilogale gracilis	Y	Y
Mammals	Opposum	Opposum	Didelphis marsupialis	N	Y
Mammals	Porcupines	Porcupine	Erethizon dorsatum	Y	Y
Mammals	Procyonids	Raccoon	Procyon lotor	Y	Y
Mammals	Rabbits	Snowshoe Hare	Lepus americanus	Y	Y

Mammals	Rats, Mice	Deer Mouse	Peromyscus maniculatus	Y	Y
Mammals	Rats, Mice	Keen's Deer Mouse	Peromyscus keeni	Y	Y
Mammals	Rats, Mice	Southern Red-backed Vole	Clethrionomys gapperi	Y	Y
Mammals	Rats, Mice	Long-tailed Vole	Microtus longicaudus	Y	N
Mammals	Rats, Mice	Creeping Vole	Microtus oregoni	Y	Y
Mammals	Rats, Mice	Townsend's Vole	Microtus townsendii	Y	N
Mammals	Rats, Mice	Pacific Jumping Mouse	Zapus trinotatus	Y	Y
Mammals	Rats, mice	Black rat	Rattus rattus	N	Y
Mammals	Shrews	Northern Water Shrew	Sorex palustris	Y	Y
Mammals	Shrews	Trowbridge's Shrew	Sorex trowbridgii	Y	Y
Mammals	Shrews	Vagrant Shrew	Sorex vagrans	Y	Y
Mammals	Squirrels	Townsend's Chipmunk	Tamias townsendii	Y	Y
Mammals	Squirrels	Douglas' Squirrel	Tamiasciurus douglasii	Y	Y
Mammals	Squirrels	Northern Flying Squirrel	Glaucomys sabrinus	Y	Y