



Seattle Public Utilities

SEPA ENVIRONMENTAL CHECKLIST

A. BACKGROUND

1. Name of proposed project, if applicable:

52nd Ave S Combined Sewer Overflow (CSO) Reduction Project and Mapes Creek Restoration Project

2. Name of applicant:

Seattle Public Utilities (SPU)

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

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4. Date checklist prepared:

February 9, 2012

5. Agency requesting checklist:

Seattle Public Utilities

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

Construction of the 52nd Ave S CSO Reduction Project and the Mapes Creek Restoration Project is expected to occur between 2013 – 2015 and last for approximately 7 to 8 months. In-water work to connect the new Mapes Creek stream channel to Lake Washington would occur within the July 16 – December 31 in-water work window.

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

There are no plans for future additions, expansion, or further activity related to either proposed project.

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

52nd Ave S CSO Reduction Project

- Phase I Environmental Site Assessment (HDR, 2011a)
- Noise Assessment (HDR, 2011b)
- Technical Memorandum (HDR, 2011c)
- Traffic Impacts Technical Memorandum (HDR, 2011d)
- Summary Report of Cultural Resource Record Search (HRA, 2011)
- Preliminary Geotechnical Evaluation (Shannon & Wilson, 2009)
- Temporary Erosion and Sedimentation Control Plan (to be prepared)
- Spill Prevention Control and Countermeasure Plan (to be prepared)

Mapes Creek Restoration Project

A Draft Integrated Detailed Project Report and Environmental Assessment (EA) was prepared for the Mapes Creek Restoration Project by the U.S. Army Corps of Engineers (Corps, 2011). The following work was included in the EA as appendices:

- Phase I Environmental Site Assessment
- 35% Design Drawings
- Preliminary Geotechnical Investigation
- Hydrology and Hydraulics Report
- 35% Design Analysis Report
- Draft Finding of No Significant Impact (FONSI) and 404(b)(1) Determination
- Assessment of Mapes Creek Habitat, Fish Passage, and Fish Species Composition and Distribution Report
- Endangered Species Act (ESA) Concurrence Letter from National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS)
- ESA Concurrence Letter from U.S. Fish and Wildlife Service (USFWS)
- Clean Water Act Section 404(b)(1) Analysis
- Washington State 401 Water Quality Certification and Coastal Zone Management Act Consistency Letter
- Coastal Zone Management Act Consistency Determination

The Corps summarized the findings of their cultural resource research in the EA report text.

9. 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 known pending applications for governmental approvals for other proposals directly affecting the properties covered by either proposed project. However, projects are either currently under construction, planned for the near term, or planned for an unknown time in the future. These projects are:

- Rainier Beach Community Center: A new community center and pool are currently being built at the same location as the existing community center on Rainier Avenue South, North of South Henderson Street, approximately 0.2 miles from the project proposals. The new community center is scheduled to open in the first quarter 2013. (Seattle, 2011c)

- Rainier Avenue South & 52nd Avenue South: Seattle Department of Transportation (SDOT), in partnership with the community, is proposing several projects to extend and improve pedestrian connection within the proposed project area. The improvements may include connecting the 52nd Avenue South Walkway (also known as the Mapes Creek-52nd Avenue South Walkway) to South Director Street; extending the existing path south to Rainier Avenue South; installing a pedestrian crosswalk, upgrading curb ramps and adding a signal at 52nd Avenue South and Rainier Avenue South; consolidating bus zones to the preferred pedestrian crossing location at 52nd Avenue South; and implementing the Mapes Creek-52nd Avenue South Walkway Master Plan recommendations (Underhill, 2008). The signal improvements at Rainier Avenue South and 52nd Avenue South are planned for early 2012. Timing of the other improvements is uncertain because of lack of funding (Seattle, 2011d).

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

U.S. Army Corps of Engineers (Corps)

- Nationwide Permit 27 – Aquatic Habitat Restoration, Establishment, and Enhancement Activities (authorized under Section 404 Clean Water Act and Section 10 Rivers and Harbors Act)

Washington State Department of Fish and Wildlife (WDFW)

- Hydraulic Project Approval

Washington Department of Ecology

- Section 401 Water Quality Certification
- Coastal Zone Management Act Consistency Determination
- National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit
- Engineering Report Approval

Seattle Department of Planning and Development

- Master Use Permit II – State Environmental Policy Act (SEPA)
- Shoreline Exemption
- Environmentally Critical Areas Exemption
- Grading Permit
- Building Permit

Seattle Department of Parks

- Revocable Use Permit and Right of Entry

Seattle Department of Transportation

- Street Use - Utility Major Permit

Seattle City Light

- Electric Service Approval

Seattle Design Commission

- Project Review

Public Health – Seattle & King County

- Health Permit (Air Gap)

King County Industrial Waste Program

- Industrial Waste Discharge Permit/Construction Dewatering Approval

King County Metro

- Construction Notification/Approval (Trolley Bus)

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project. 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.)

This checklist reviews two projects: the 52nd Ave CSO Reduction Project and the Mapes Creek Restoration Project. The locations of both projects are shown in Attachment A, Figure 1 – Vicinity Map.

The goal of the 52nd Ave S CSO Reduction Project is to reduce the number and volume of Combined Sewer Overflows (CSOs) from Basins 47S and 171 (see Figure 1). Planning for the 52nd Ave S CSO Reduction Project began in 2004 as part of the larger Henderson Area CSO Reduction effort and was led by SPU. SPU developed, screened, and evaluated CSO control alternatives and determined that the recommended alternative was to build a pipeline along 52nd Ave S and S Henderson St to convey combined sewage and stormwater to the Henderson Pump Station.

The goals of the Mapes Creek Restoration Project are to increase juvenile Chinook salmon rearing and migration habitat, provide environmental education and stewardship opportunities in an underserved area, and reverse some of the past environmental impacts caused by previous drainage projects. Planning for the Mapes Creek Restoration Project began in 2004 and was conducted by the Corps of Engineers. The Corps completed a draft Environmental Assessment for the project (Corps, 2011), which was publicly noticed on April 29, 2011, reviewed through May 28, 2011, and is cited throughout this checklist.

Given the overlapping project schedules and alignments, SPU plans to construct both projects in a single construction contract. Additional information follows, describing each project.

52nd Ave S CSO Reduction Project

During heavy rains, pipes that carry a combination of untreated stormwater and raw sewage can overflow into our waterways, threatening the quality of our creeks, lakes, rivers, and Elliott Bay. These overflows are called “Combined Sewer Overflows” or CSOs. The goal of the 52nd Ave S CSO Reduction Project is to reduce the number and total volume of CSOs from Basins 47S and 171 (see Figure 1) by constructing improvements to the combined sewer system. The major elements of the project are described below and shown in Attachment A, Figure 2 – Site Layout.

New Combined Sewer Pipe

An approximately 1,800-foot-long, 18-inch-diameter, combined sewer pipe would be installed to convey flows from SPU's existing CSO Facility 5 to the King County Henderson Pump Station. The new pipe would be located within public rights-of-way and begin at the intersection of Rainier Avenue South and 52nd Avenue South, extend north along 52nd Avenue South/52nd Avenue South Walkway to the intersection of 52nd Avenue South and South Henderson Street, where the pipe would turn east on South Henderson Street to the King County Henderson Pump Station, near the intersection of South Henderson Street and Seward Park Avenue South. Other features related to the new pipe include six maintenance holes, an above-ground electrical and controls cabinet, a motor-operated gate structure, and a flume (a device used to measure sewer flows located within the sewer).

CSO Facility 5 Modifications

Modifications to CSO Facility 5 are required to convey flow from the existing system to the new combined sewer. The modifications would consist of raising a weir (a structure in a maintenance hole used to control and measure sewage flows) to divert flows to the new combined sewer pipe. The modifications would take place within the existing right-of-way at the intersection of Rainier Avenue South and 52nd Avenue South.

Activities within Public Rights-of-Way

Several activities within public rights-of-way would occur as part of this project, including the following:

- Removal and post-construction replacement of asphalt pavement on 52nd Avenue South and the 52nd Avenue South Walkway.
- Removal and post-construction replacement of street lighting along the 52nd Avenue South Walkway near the north entrance.
- If needed, temporary poles may be placed to support the bus trolley lines outside the excavation area.
- Removal and replanting of street trees on both sides at the northern end of the 52nd Avenue South Walkway and on the south side of South Henderson Street. Replacement trees would be located to avoid affecting future access to the new pipelines.

Stormwater Improvements

The project would include either conventional stormwater management techniques (such as filter vaults) or Green Stormwater Infrastructure (GSI) to meet City of Seattle Stormwater Code requirements triggered by the quantity of replaced pollution-generating impervious surface (e.g., roadway). The proposed projects would replace approximately 9,000 square feet (sf) of pollution generating impervious surface, which exceeds the 5,000 sf threshold defined in SMC 22.803.040 Minimum Requirements for Source Controls for All Businesses and Public Entities and DR 17-2009, Vol. III Stormwater Flow Control and Water Quality.

GSI reduces runoff using infiltration, evapotranspiration, and stormwater reuse. Examples of GSI include trees, bioretention facilities, permeable pavement, green roofs, rainwater harvesting, and bioretention planters with underdrains (Seattle, 2011b).

Mapes Creek Restoration Project

The Mapes Creek Restoration Project would improve the function of the Lake Washington shoreline ecosystem as it relates to habitat for juvenile salmonids and other wildlife. The major elements of the project, from upstream to downstream, are described below and shown in Attachment A, Figure 2 – Site Layout.

Installation of a Dedicated Pipe for Mapes Creek

Mapes Creek would no longer enter the existing public storm drain, but would be routed into a new, dedicated, buried, 24-inch-diameter pipe that would convey Mapes Creek to the southwest corner of Be'er Sheva Park. The new pipe would begin where Mapes Creek currently enters the public storm drain, which is the maintenance hole at the southern terminus of the 52nd Avenue South Walkway. The new pipe would be approximately 1,600 feet long and would extend north under the 52nd Avenue South Walkway, east under South Henderson Street, cross Seward Park Avenue South, and discharge at the southwest corner of Be'er Sheva Park, which is owned and managed by the City of Seattle Department of Parks and Recreation. Other features associated with the pipe include a diversion structure at the upstream end (to divert excess flows to the existing stormwater system) and an energy dissipation system built into the downstream end (Corps, 2011).

Mapes Creek Mouth Daylighting and Stream Channel Creation in Be'er Sheva Park

At the southwest corner of Be'er Sheva Park, Mapes Creek would discharge into an approximately 375-foot-long channel that would meander through the park to its discharge point into Lake Washington. The channel would be approximately 8 to 10 feet wide and 3 feet deep. The channel banks would be bordered with emergent and woody plantings to create a riparian corridor along the stream. Native vegetation that meets both creek and park goals, such as trees and low shrubs, would be planted on both sides of the channel to provide overhanging vegetation for fish, to prevent pedestrian access and provide views through the park. Individual conifers could also be planted. Large and small woody debris would be placed in and along the channel to provide shade, cover, and channel complexity. A pedestrian bridge would be placed across the channel to maintain access from the parking lot to the interior of Be'er Sheva Park. This element of the project would create approximately 0.55 acres of creek and riparian habitat (Corps, 2011).

Improve Existing Shoreline Habitat

Native vegetation would be planted along approximately 270 lineal feet of the Lake Washington shoreline. The design goal is to create diverse habitat for juvenile Chinook salmon and other species by providing a combination of protective cover and open areas on the shoreline. Specific features would likely include woody debris structures that mimic natural tree falls and shoreline plantings to enhance the insect and detrital input to the system (Corps, 2011).

Site Development Restrictions Due to Grants and Funding Received in the Past

In 1979, the City of Seattle received funding from the National Park Service Urban Parks and Recreation Recovery (UPARR) grant program for improvements at Be'er Sheva Park. In 1972 and 2001, the City received funding from the Interagency Committee on Outdoor Recreation (IAC) for boat ramp and pier renovations at the Atlantic City Boat Ramp (located

immediately south of Be'er Sheva Park). Because the Mapes Creek Restoration Project would not impact the recreational uses at either site, the funding agencies determined that grant conversions (transfer of grant restrictions to an area not already encumbered by grant restrictions) or other mitigation measures are not required.

12. 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.

Both proposed projects are located in the Dunlap neighborhood of southern Seattle. They are in Section 35, Township 24 North, Range 4 East, W.M.

Attachment A, Figure 1 – Vicinity Map shows the location of the proposed projects. Figure 2 – Site Layout provides a site layout of elements for each project proposal. Figure 3 – Contractor Parking and Staging Areas indicates where contractor parking and staging may occur for both projects.

52nd Ave S CSO Reduction Project Area

The project begins at the intersection of Rainier Avenue South and 52nd Avenue South. From there the project extends north approximately 1,200 linear feet along 52nd Avenue South/52nd Avenue South Walkway to South Henderson Street, where the alignment turns east and runs approximately 600 linear feet to its termination point at the King County Henderson Pump Station, near the intersection of South Henderson Street and Seward Park Avenue South.

With the exception of construction staging and contractor offsite parking, the 52nd Ave S CSO Reduction Project is entirely within City of Seattle rights-of-way.

Mapes Creek Restoration Project Area

The project begins on 52nd Avenue South approximately 550 feet north of the intersection of 52nd Avenue South and Rainier Avenue South. From this point, the proposed pipe would extend approximately 700 feet north to the intersection of 52nd Avenue South and South Henderson Street. At the intersection, the pipe alignment would turn east toward the King County Henderson Pump Station for approximately 650 feet. The pipe would cross Seward Park Avenue South and enter Be'er Sheva Park, which is owned and managed by the City of Seattle Department of Parks and Recreation. The daylighted channel through Be'er Sheva Park would be approximately 375 feet long. All other project elements would occur within park boundaries or within the nearshore areas of the park (Corps, 2011).

Contractor Staging and Parking for Both Projects

SPU identified four potential locations for temporary contractor parking and staging (see Appendix A, Figure 3 – Contractor Parking and Staging Areas): Option A - the Safeway parking lot at 9262 Rainier Avenue South; Option B – the Saar’s Marketplace parking area at 9000 Rainier Avenue South; Option C – a vacant lot located between McDonald’s and the Hong Kong Restaurant at 9291 Rainier Avenue South; and Option D – the 52nd Ave S right-of-way. Viability of the private property options would depend on the willingness of property owners to allow these parcels to be used for contractor staging and parking. The contractor would select the option(s) at the time of construction based on a combination of factors, such as accessibility, availability, and space needs.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one):

Flat, rolling, hilly, steep slopes, mountainous,
other: _____

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

The existing grade along the alignment of the 52nd Ave S CSO Reduction Project and Mapes Creek Restoration Project is relatively flat, sloping downhill gradually from the south to the north at a grade ranging from less than 1 percent to 2.5 percent. The areas that could be used for contractor parking and staging also are relatively flat, with slopes less than 2 percent. In Be’er Sheva Park, elevations vary from approximately 18 to 29 feet. The average slope of the shoreline is 3 percent (Corps, 2011).

There are slopes of up to 54 percent immediately adjacent to and on both sides of the 52nd Avenue South Walkway where the embankment slopes down to two wetlands discussed in Section B.3.a.

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.

Based on surficial geologic mapping and nearby borings, the proposed pipeline alignments are likely underlain by 5 to 15 feet of soft to stiff silt and fill, which are underlain by dense sand and glacial till (Shannon & Wilson, 2009). Historically, this area was within the inundation zone of Lake Washington until construction of the Ship Canal in 1916 dropped the lake level 9 feet. As a result, much of the project area may contain fill (Corps, 2011).

Soil and geological studies of Be’er Sheva Park area have been documented by the Seattle Geological Mapping Project at the University of Washington. Based on this information, dominant soil types in Be’er Sheva Park and the immediate surrounding areas include silts, peats, sands, gravels, and mixes of all types. The Be’er Sheva Park shoreline is armored with cobbles placed in a band about 20 feet wide. Forty feet away from the Be’er Sheva Park shoreline, soil consists mostly of sand (Corp, 2011).

There is no agricultural or prime farmland in the vicinity of the project.

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

The City of Seattle Department of Planning and Development (DPD) online mapping does not show any steep slope critical areas in the vicinity of the project areas. There are no surface indications of unstable soil in the immediate vicinity of the projects. DPD has mapped the project areas as within a Liquefaction Zone and a Peat Settlement Prone area (Seattle, 2007) (see Attachment A, Figure 6).

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

Excavation, filling, and grading activities would occur during construction to create and backfill the trench for the proposed pipelines and associated structures, and create the channel for Mapes Creek in Be'er Sheva Park. A total of approximately 5,900 cubic yards (cy) of material would be excavated and approximately 3,230 cy of material would be placed as backfill for the projects. Estimated quantities of excavation for the pipeline trench/structures and channel are 3,570 cy and 2,330 cy, respectively. Backfill quantities placed for the pipeline and channel construction are estimated at 2,830 cy and 400 cy, respectively.

Excavated soil is not expected to be suitable for backfill. However, this will be evaluated further in design and during construction. Unsuitable material will be removed from the site for reuse on other projects or properly disposed at an approved location. The majority of backfill material is expected to be imported from commercial quarries located within 20 to 30 miles of the project areas.

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

Temporary erosion could occur during construction as a result of clearing, installation and removal of sediment control structures, soil stockpiles, truck traffic, final grading, and other construction activities. Soil temporarily exposed during construction could be eroded by stormwater.

No erosion impacts are anticipated during operation of the 52nd Ave S CSO Reduction Project.

Once the Mapes Creek project is completed, some of the natural geomorphic processes could occur in the proposed stream channel in Be'er Sheva Park, including erosion and deposition of stream sediments. Small amounts of stream sediment deposition and erosion are expected to occur because of upstream conditions in the Mapes Creek watershed. The creek does not typically carry a large sediment load into Lake Washington because of stable hydrology in the stream from undeveloped headwaters and because deposition of sediment occurs upstream of the project area in ponds in Kubota Gardens Park. The stable stream flow is also unlikely to significantly scour the stream bed and banks of the new channel.

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

Approximately 5 percent of the project areas is currently covered by impervious surfaces. The total area of both projects is approximately 150,000 sf and the area of existing impervious surface is approximately 8,000 sf. The impervious area would not change as a result of constructing the projects.

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

Measures would be implemented to control erosion both during and after construction, in compliance with the Washington Department of Ecology's NPDES Construction Stormwater General Permit and City of Seattle requirements.

Prior to any ground-disturbing construction activities, Temporary Erosion and Sedimentation Control (TESC) plans would be prepared for the proposed projects and implemented by the contractor. Best Management Practices (BMPs) appropriate for the activity and season would be identified in the TESC plans, implemented, monitored, and adjusted as needed to maintain their effectiveness throughout the construction period.

Specific measures to prevent, reduce, or control erosion are identified in Volume 2 Construction Stormwater Control Technical Requirements Manual (Seattle, 2009a) and may include the following:

- Limiting land-disturbing activities to the minimum area needed to construct the project.
- Employing temporary (e.g., straw mulch, plastic sheeting) and permanent (e.g., hydroseeding, pavement restoration) cover measures to protect disturbed areas.
- Inspecting TESC facilities daily and maintaining them for continued proper functioning.
- Keeping written records of weekly reviews of the TESC facilities during the wet season (October 1 to April 30) and of monthly reviews during the dry season (May 1 to September 30).
- Stabilizing exposed soil areas that would not be disturbed for two days during the wet season or seven days during the dry season with approved TESC methods (e.g., seeding, mulching, plastic covering, etc.).
- Constructing ditches or dikes to intercept and divert surface water runoff away from exposed soil in the construction areas to a sediment trap or pond.
- Stabilizing unsurfaced construction site entrances, roads, and parking areas used by construction traffic with rock pads to minimize erosion and tracking of sediment offsite.
- Taking preventive measures, such as watering and covering exposed soil, during summer months to minimize the wind transport of soil.

TESC inspection requirements are mandated by the approved construction SWPPP and TESC plans, and would be modified as necessary depending on site conditions. Once

permanent erosion control is in place (e.g., revegetating or repaving), no other erosion control measures would be required for the completed projects.

2. Air

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

Air quality issues associated with construction of the proposed projects could occur from fugitive dust emissions caused by clearing, excavation, uncovered stockpiles, and other construction activities. Localized increases in exhaust emissions from equipment and vehicle operation would occur during construction.

During wet weather, localized increases in odor may occur near the maintenance holes of the proposed combined sewer.

Greenhouse Gas Emissions

On December 3, 2007, the Seattle City Council adopted Ordinance 122574 that requires City departments to evaluate greenhouse gas (GHG) emissions as part of environmental review under SEPA. This project would generate greenhouse gas (GHG) emissions in three ways: construction material usage (embodied GHG through use of such materials as pipes, concrete, and asphalt), construction equipment usage, and O&M activity. Table 1 provides a summary of the GHG emissions carbon dioxide equivalent (CO₂e) by emission type; details are included in Attachment B. CO₂e is used to express the global warming potential of all greenhouse gases as an equivalent in CO₂ emissions. The life cycle of the project was assumed to be 100 years. One metric ton is equivalent to 2,205 pounds.

Table 1. Greenhouse Gas Emissions

Emission Type	Metric Tons CO₂e
Section I: Ductile Iron Pipe	74
Section II: Pavement (concrete, asphalt usage)	400
Section III: Construction Equipment	230
Section VI: Operations and Maintenance	11
Total	715
Notes:	
1. The duration of construction is assumed to be 150 work days (approximately 7 to 8 months).	
2. O&M GHG emission total is based on a 100-year operating life.	

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

There are no known offsite sources of emissions or odors that would affect either proposed project.

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

Construction

The Puget Sound Clean Air Agency (PSCAA) governs activities affecting air quality in King, Snohomish, Pierce, and Kitsap Counties and, thus, has jurisdiction over the project areas. As required by the PSCAA regulations, emissions would be controlled by using reasonably available control technologies (PSCAA, 2008) and City of Seattle construction requirements.

Fugitive dust impacts associated with construction of the proposed projects are not anticipated to be significant. Construction contractors would comply with regulatory requirements and implement appropriate dust control measures, as necessary. Measures to minimize fugitive dust emissions from construction of the projects would include the following:

- Spraying exposed soil and storage areas with water during dry periods.
- Covering exposed earthen stockpiles and loads of excavated material being transported from the site.

Vehicular emissions associated with construction are anticipated to be short-term in nature. Measures to minimize vehicular emissions would include the following:

- Requiring contractors to use best available control technologies.
- Performing proper vehicle maintenance.
- Minimizing vehicle and equipment idling.

Operation

For the 52nd Ave S CSO Reduction Project, air containing sewer gas compounds that cause nuisance odors would be localized near maintenance holes along the combined sewer. During wet weather, some odors may be present immediately around maintenance holes. These odors would be temporary, would occur over a short duration, and would not substantially impact air quality. No measures to reduce operational air quality are necessary or proposed because no substantial adverse impact to air quality would occur.

For Mapes Creek Restoration Project, no measures to reduce operational air quality impacts would be necessary or proposed because no adverse impacts to air quality would occur.

3. Water

a. Surface:

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

Several surface water bodies are located within the project areas. These include one stream (Mapes Creek), six wetlands, and Lake Washington. These water bodies are shown in Attachment A, Figure 5 – Critical Areas.

Mapes Creek

Mapes Creek, a tributary to Lake Washington, is conveyed under 52nd Avenue South/52nd Avenue South Walkway and under South Henderson Street via an 84-inch-diameter public storm drain. The storm drain discharges into Lake Washington through an outfall at Be'er Sheva Park.

The City of Seattle on-line critical areas maps show Mapes Creek as a Riparian Corridor (Appendix A – Figure 5). Per the Seattle Municipal Code (SMC), a Riparian Corridor is classified as a Fish and Wildlife Habitat Conservation Area and defined as the riparian watercourse of Type 2-5 waters, as defined in Washington Administrative Code (WAC) 222-16-031.

Wetlands

The City of Seattle on-line critical areas mapping tool (Seattle, 2007) shows two wetlands on privately-owned properties west of the 52nd Avenue South/52nd Avenue South Walkway; one is shown within the project area.

A detailed field review and delineation revealed that two wetlands occur within the project area, as follows (HDR, 2011c):

- Wetland 1 – An emergent wetland located at the toe of the 52nd Avenue South Walkway embankment, on the west side of the walkway. The wetland is approximately 1,680 square feet (0.04 acre) in size and is rated Category IV based on the 2008 Western Washington Wetland Rating Form.
- Wetland 2 – An emergent wetland located at the toe of the 52nd Avenue South Walkway embankment, on the east side of the walkway. The wetland is approximately 7,070 square feet (0.16 acre) in size and is rated Category IV based on the 2008 Western Washington Wetland Rating Form.

Wetland 1 appears to be connected to Wetland 2 by two culverts under the 52nd Avenue South Walkway. Wetland 2 drains to the 84-inch-diameter storm drain in the 52nd Avenue South Walkway that discharges to the outfall in Be'er Sheva Park (HDR, 2011c).

A marsh and a scrub/shrub wetland are located along the northern boundary of Be'er Sheva Park. Water runoff collects in these two areas, providing pool habitat for fish and wildlife and stormwater detention functions. They are currently fenced off to limit pedestrian access and maintain wetland function (Corps, 2011).

A restored wetland owned by Seattle Parks and Recreation (Parks) borders the east side of the Be'er Sheva Park wetland. Sound Transit restored this half-acre site during the summer 2004 as mitigation for expanding Interstate 405. Native tree, shrub, and herbaceous species were planted within an excavated depression, which was designed to hold water for detention and habitat creation purposes. Large, woody debris was installed along the shoreline to provide habitat for migrating salmonids. Parks maintains and monitors this site (Corps, 2011).

Lakes

Be'er Sheva Park borders Lake Washington.

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

Mapes Creek

Mapes Creek would be diverted from the existing public storm drain and put into a new, dedicated pipe that would discharge to a newly-constructed stream channel in Be'er Sheva Park. The new channel would be approximately 375 feet long, 8 to 10 feet wide, 3 feet deep, and discharge into Lake Washington. The channel banks would be planted to create a maintained riparian corridor along the stream and woody debris would be placed in and along the channel to provide shade, cover, and channel complexity. A pedestrian bridge would be constructed across the channel to maintain access from the parking lot to the interior of Be'er Sheva Park (Corps, 2011).

Wetlands

Installation of the proposed dedicated pipe for Mapes Creek and the combined sewer pipe would not require work in wetlands, wetland buffers, or streams. Work would occur within 200 feet of these waters (i.e., approximately 25 feet from the wetlands on the west side of the pipe alignments). Excavation of earth and removal of upland vegetation on the west side of the 52nd Avenue South Walkway would be required to install the proposed pipes (see item B.4.b. below for more information).

The proposed stream channel construction in Be'er Sheva Park would temporarily impact the wetland buffer; however, the affected areas would be restored following construction.

Lake Washington

Connecting the new stream channel to Lake Washington would require in-water work to construct the outlet. Construction would occur during the in-water work window (July 16 – December 31) and would require installation of a cofferdam or equivalent device to isolate the excavation of the outlet from waters of Lake Washington. Some

level of sump pumping and disposal of water would likely be necessary. Once the isolation structure is installed, work would occur within the dry behind the structure. In addition to isolation structures, floating filter blankets (e.g., turbidity curtains) would help control turbidity during construction and re-watering. The outlet work would be performed after Lake Washington summertime high water levels.

Additionally, the proposed stream channel would involve work along the shoreline of Lake Washington, above the ordinary high water mark (OHWM). Native vegetation would be planted along the existing shoreline (Corps, 2011).

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.

No fill or dredge material would be placed in or removed from the wetlands or streams along the proposed pipe alignments.

A new stream channel would be excavated in Be'er Sheva Park, removing material from a current upland area. Connecting the stream channel to Lake Washington would require excavation of approximately 325 cy of material below the OHWM of Lake Washington at the mouth of the new channel. Removed material would be disposed of off site at approved locations.

No fill or dredge material would be placed in or removed from the wetlands located in the project areas (HDR, 2011c; Corps, 2011).

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

No surface water withdrawals would occur.

As stated above, Mapes Creek flow would be rerouted from the existing 84-inch-diameter stormwater pipe into a new, 24-inch-diameter, dedicated pipe and a new stream channel. The new channel would be approximately 375 feet long, 8 to 10 feet wide and 3 feet deep, and discharge into Lake Washington. The creek channel would have an average slope of 0.0081 ft/ft to provide a stream discharge averaging less than 1.0 cubic feet per second (cfs) with velocities of approximately 1.0 feet/sec during the months of February to May (Corps, 2011).

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

Neither proposed project is located within the 100-year floodplain (King County, 2011).

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.

Dewatering water from construction of the combined sewer and dedicated Mapes Creek pipe would be collected and treated on site to meet surface water discharge standards prior to discharging to the existing storm drainage system located in 52nd

Avenue South, South Henderson Street, and Rainier Avenue South rights-of-way. Any construction process water or wastewater would be discharged to the sewer system in compliance with King County and SPU discharge regulations.

In Be'er Sheva Park, outlet construction, in-water habitat feature installation, bank stabilization, channel excavation, and the introduction of Mapes Creek water into the new channel have the potential to create discharges of turbid water into receiving waters. It is likely that some level of sump pumping and disposal of water would be necessary during construction of the channel outlet. Any dewatering activities would comply with BMPs to prevent turbidity and other pollutants from reaching surface water. A TESC plan would be prepared and BMPs would be implemented to reduce impacts to surface waters. In addition, these activities would be regulated by state-issued NPDES Permits (Corps, 2011).

b. Ground:

1) Will groundwater be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

Construction

Based on existing subsurface information, groundwater may be as shallow as 5 to 15 feet below the ground surface. Because of the anticipated excavation depths, temporary dewatering may be required. Dewatering water would be managed in accordance with the requirements of the NPDES Construction Stormwater General Permit.

Operation

After construction, neither project would withdraw groundwater or discharge water to groundwater, except within the stream channel section. Groundwater is expected to be shallow at Be'er Sheva Park. Mapes Creek water may interface with groundwater at the bottom of the new channel as the creek water flows from the pipe outlet to Lake Washington.

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

Waste material would not be discharged into the ground during construction or operation of either 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.**

Construction

The source of runoff during construction would be precipitation. Grading, the temporary loss of pavement or vegetative cover, and compaction of surface soils may affect surface water runoff and its direction of flow. Runoff would likely be collected using temporary collection trenches and pumped or conveyed by gravity to a central location for storage and treatment prior to discharge.

Water used for dust control would not be used in significant enough volumes during construction to generate runoff and is, therefore, not considered a source of flow that would require control and treatment.

On-site treatment would typically involve temporary storage (e.g., Baker-type tanks) to allow suspended solids and any other constituents to settle out so the water would meet state discharge requirements and comply with the City of Seattle's Director's Rule 16-2009 Construction Stormwater Control Technical Requirements Manual (Seattle, 2009a). Treated water would be pumped or drained by gravity to a permitted discharge location. This would typically be a maintenance hole or inlet connected to a nearby stormwater conveyance pipe located in the right-of-way that would ultimately discharge to Lake Washington. Erosion control measures would be applied during construction as noted in Section B.1.h.

Operation

After the projects are completed, runoff would flow to new bioretention cells or filter vaults located in the 52nd Avenue South right-of-way, east of the existing paved surface along the south portion of the alignment near Rainier Avenue South. The new runoff collection system would be designed to meet the City's water quality and quantity requirements per Seattle Department of Planning and Development Director's Rule 17-2009 (Seattle, 2009b). The collected flows would be treated and discharged to the existing storm drain system located along 52nd Avenue South and Rainier Avenue South that ultimately discharges to Lake Washington.

For the portion of the Mapes Creek Restoration Project in Be'er Sheva Park, runoff would flow into the newly-constructed stream channel and into Lake Washington.

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

Waste materials are not anticipated to enter the ground or surface waters during construction or operation of either project.

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

Construction

During construction, proposed measures by the contractor could include:

- Implementing a TESC Plan to address erosion control during and after construction (including directing runoff away from unstabilized soils, slowing runoff with structures, installing silt fences to catch particulates).
- Developing, implementing, and maintaining a Stormwater Pollution Prevention Plan (SWPPP) to minimize erosion and sediments from rainfall runoff at construction sites, and to reduce, eliminate, and prevent the pollution of stormwater.
- Developing, implementing, and maintaining a Spill Prevention Control Countermeasures Plan (SPCC) to manage toxic materials associated with construction activities (including a protocol for dealing with equipment leaks, disposal of oily wastes, cleanup of any spills, and proper storage of petroleum products and chemicals).
- Stabilizing exposed soils with vegetative cover or other erosion control treatment during and immediately following construction.

Construction of the channel outlet in Be'er Sheva Park would require installation of a cofferdam or an equivalent measure to isolate the excavation from Lake Washington. Isolation of the construction site could also be accomplished using Ecology blocks and a plastic liner, tilt-up frame barriers, or inflatable water barriers. In addition, construction stormwater BMPs would be implemented to the maximum extent practicable to preserve local water quality, especially with respect to turbidity effects. These BMPs would include surface stabilization and other erosion control measures, silt fence and other sediment control measures, and a thorough housekeeping and source-control program to prevent the generation or release of potential stormwater pollutants (Corps, 2011).

Most of the stream channel would be constructed "in the dry," but additional precautions would be made for construction activities along the shoreline and the final connection of the restored creek mouth to Lake Washington. Measures such as turbidity curtains would be used during construction activities along the lakeshore and when the stream channel initially receives flow from Mapes Creek. Work below the ordinary high water line would take place only during the in-water work window ("fish window"), designated by the WDFW, to minimize possible harm to local fish species (Corps, 2011).

Operations and Maintenance

For both construction and ongoing operations, equipment would be operated and maintained in such a manner as to minimize the risk of an uncontrolled discharge of pollutants.

For operation and maintenance of the completed 52nd Ave S CSO Reduction Project, spill kits would be available in vehicles that visit the site. Operations and maintenance personnel would be trained, at job-appropriate levels, to conduct their activities in a manner that minimizes the risk of spills.

4. Plants

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

deciduous tree: alder, maple, aspen, other: elm apple, cherry, oak, cottonwood

evergreen tree: fir, cedar, pine, other: spruce

shrubs: Scot's broom, Himalayan blackberry, cottonwood, various street shrubs

grass: mowed maintained grasses

pasture

crop or grain

wet soil plants: reed canarygrass, American brooklime, giant horsetail

water plants:

other types of vegetation: vetch, dandelion, hedge bindweed

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

The proposed projects would remove approximately 4,300 square feet of upland vegetation. This includes 2,275 square feet (700 feet by 3.25 feet) of upland vegetation along 52nd Avenue South Walkway and 2,033 square feet (581 feet by 3.5 feet) of upland vegetation along South Henderson Street. Upland vegetation to be removed includes grass areas along the 52nd Avenue South Walkway that are regularly mowed as part of maintenance for the walkway and landscaped vegetation along South Henderson Street.

As shown in Attachment A, Figure 4 – Tree Removal, approximately 17 small trees (2 to 4 inches in diameter) would be removed during construction along both sides of the 52nd Avenue South Walkway near the intersection of 52nd Avenue South and South Henderson Street. Along South Henderson Street, approximately four large trees (greater than 12 inches in diameter) would be removed during construction.

The alignment of the stream channel in Be'er Sheva Park would be adjusted as much as possible to avoid mature trees and reduce the number of trees overall that would need to be removed during grading. In the worst case, up to 20 trees could potentially be removed depending on the channel alignment and excavation requirements. These trees are primarily deciduous, non-native trees, such as elm. Native trees and shrubs would be planted along the riparian area of the stream and along the lake shoreline (see B.4.d below). Invasive species would be removed from the project area (Corps, 2011). Tree removal and replanting would be coordinated with and approved by Parks.

The project proposal is not expected to affect water plants. In-water work at the Lake Washington shoreline would occur within the upper three feet of maximum lake depth. Since the lake fluctuates 18 to 24 inches seasonally, vegetation does not grow in the upper 2 feet. In addition, winter wave action precludes establishment of aquatic vegetation near shore when the lake level is lower.

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

There are no known threatened or endangered plant species in the project area.

According to a review of the Washington Department of Natural Resources Natural Heritage Program, "Sections that Contain Natural Heritage Features, Current as of November 5, 2010" list, there are no documented natural heritage features in the same section as this project area. A specific database query was not made for this checklist, but it is extremely unlikely that the land that would be affected supports listed plant species (HDR, 2011c).

The latest listing (current as of December 15, 2010) from the USFWS website was also reviewed (USFWS, 2011). According to the website, Golden Paintbrush (*Castilleja levisecta*), listed as Threatened, was historically present in King County. This species is found in prairie habitats and dry, rocky areas with thin soils. Golden Paintbrush was not observed and is not likely to occur within the project area. The area does not provide the appropriate habitat and the area is regularly mowed and maintained (HDR, 2011c).

For the Mapes Creek Restoration Project, the Corps did not discover threatened or endangered plant species along the proposed pipe alignment or in Be'er Sheva Park (Corps, 2011).

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

Where the proposed projects overlap, vegetated areas disturbed by construction would be returned to the original configuration and replanted with grass or an appropriate upland seed mix.

Following construction, approximately 17 street trees (from the approved list of street trees) would be planted along 52nd Avenue South as part of right-of-way restoration associated with walkway restoration. The specific number of tree replacements in this area (52nd Avenue South Walkway) would be coordinated with the community, SDOT, and City arborist plus located to avoid conflicts with existing utilities.

Where the Mapes Creek project site does not overlap the 52nd Ave S CSO Reduction Project, mature trees would be protected to the greatest extent reasonably possible. Riparian plantings in the Be'er Sheva Park along the new stream channel would consist of native trees and shrubs that meet restoration objectives and visibility/safety needs. The planted area would create a 20- to 30-foot-wide buffer zone on each side of the channel, totaling approximately 0.17 acres. The landscape establishment period would be 2 years, to help ensure at least 80 percent survival and control encroachment of invasive species. A majority of the native riparian plantings would be installed by hand, or with the assistance of a small backhoe for minor excavations and handling of larger trees.

Below is a list of native plants that would likely be planted:

- Trees: Sitka spruce, Douglas fir, western red cedar, Oregon Ash
- Shrubs : Hazelnut, red osier dogwood, oceanspray, pacific ninebark, salmonberry, serviceberry, nootka rose, Indian plum, oceanspray, Oregon grape, vine maple, pacific willow, sitka willow
- Emergents: slough sedge, Baltic rush, hardstem bulrush

The riparian plantings would increase the habitat value of the site by creating additional opportunities for foraging, nesting, cover, and refuge for a wide variety of species (Corps, 2011).

5. Animals

a. Circle any birds and animals that have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other: osprey, waterfowl
mammals: deer, bear, elk, beaver, other: raccoon, opossum, eastern grey squirrel, rats, mice, nutria, otter, coyote
fish: bass, salmon, trout, herring, shellfish, other: steelhead, perch, carp, tench, sunfish, bullhead, bluegill
amphibians: turtles

Within the project area, an osprey nest was observed near the top of an existing telecommunications tower, approximately 70 feet west of the 52nd Avenue South Walkway. A single osprey was observed flying over the project area and landing on the tower during visits.

Be'er Sheva Park supports various bird species consisting of migrant and nesting passerines, raptors such as sharp-shinned hawk (*Accipiter striatus*) and Cooper's hawk (*Accipiter cooperii*), and waterfowl such as Canada goose (*Branta canadensis*) and various ducks. Waterfowl and shorebirds frequent the shoreline of the lake where they forage, loaf, and in some cases, nest. Reptiles and amphibians, except turtles, are apparently rare in this area due to the lack of supporting habitat features (Corps, 2011). Numerous turtles have been observed by Parks staff.

Native salmonids inhabit Lake Washington. Juvenile Chinook salmon (*Oncorhynchus tshawytscha*) have been observed as intermittently occupying shallow water habitat in close proximity to shoreline vegetation and near the boat ramp located in the parking lot to the south of the grassy area where the stream would be daylighted. Other salmonids present in Lake Washington include cutthroat trout (*O. clarkii*), rainbow trout and steelhead (*O. mykiss*), bull trout (*Salvelinus confluentus*), sockeye salmon (*O. nerka*), and coho salmon (*O. kisutch*). Numerous non-native fish that may be present in the project area include: smallmouth bass (*Micropterus dolomieu*) and largemouth bass (*Micropterus salmoides*), yellow perch (*Perca flavescens*), common carp (*Cyprinus carpio*), tench (*Tinca tinca*), pumpkinseed sunfish (*Lepomis gibbosus*), black bullhead (*Ameiurus melas*), and bluegill (*Lepomis macrochirus*) (Corps, 2011).

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

Three threatened species are known to exist in Lake Washington (Table 2, following page). These species are: bull trout (*Salvelinus confluentus*), Chinook salmon (Puget Sound Evolutionarily Significant Unit), and steelhead (Puget Sound Distinct Population Segment). Lake Washington is designated as critical habitat for two species, bull trout and Chinook salmon. In addition, WDFW has listed these three species on its Priority Habitat and Species List as having habitat in Lake Washington (Corps, 2011).

Table 2. Wildlife Species of Special Interest in Lake Washington

Common name (<i>Scientific Name</i>)	Federal	State Status
Bull trout (<i>Salvelinus confluentus</i>)	Threatened	Candidate
Chinook salmon (<i>Oncorhynchus tshawytscha</i>); Puget Sound ESU	Threatened	Candidate
Steelhead (<i>Oncorhynchus mykiss</i>); Puget Sound DPS	Threatened	None

Source: Corps, 2011.

Other species of special concern are listed as occurring in King County but have no supporting habitat features in the project areas, making their presences highly unlikely. These species are: Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), grizzly bear (*Ursus arctos* = *U. a. horribilis*), marbled murrelet (*Brachyramphus marmoratus*), and northern spotted owl (*Strix occidentalis caurina*) (Corps, 2011).

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

Both project areas lie within the Pacific Flyway, an avian migratory corridor consisting of the western coastal areas of South, Central, and North America (Pacific Flyway Council, 2011).

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

Proposed measures to preserve or enhance vegetation along the pipeline portions of both projects may serve to preserve or enhance wildlife use of the project areas. The restoration and re-vegetation of grassy areas along 52nd Avenue South and planting of trees along 52nd Avenue South and South Henderson Street would continue to provide some habitat for wildlife, such as songbirds.

Osprey and their nesting sites are not regulated by state or federal agencies and are not listed as a species of local importance in the Seattle Municipal Code. Furthermore, the location of the existing nest in an urbanized environment may indicate that the osprey has adapted to the urban environment and may be less sensitive to urban activities (HDR, 2011c). Therefore, mitigation measures are not proposed specifically related to the osprey or its nest.

The proposed stream channel for Mapes Creek would increase aquatic and riparian habitats that support fish, birds, amphibians, and other wildlife associated with Lake Washington and Be'er Sheva Park. Shallow water shoreline habitat would be created to provide refugia and rearing habitat for migrating juvenile Chinook salmon. The proposed 370 feet of stream channel would provide habitat for other salmonids and other aquatic species (Corps, 2011).

During stream channel outlet construction, the construction area would be isolated from Lake Washington to protect aquatic species. In addition, construction stormwater BMPs would be implemented to the maximum extent practicable to preserve local water quality, especially with respect to turbidity effects. These BMPs would include surface stabilization and other erosion control measures, silt fence and other sediment control

measures, and a thorough housekeeping and source-control program to prevent the generation or release of potential stormwater pollutants (Corps, 2011).

Most of the stream channel would be constructed “in the dry,” but additional precautions would be made for construction activities along the shoreline and the final connection of the channel mouth to Lake Washington. Measures such as turbidity curtains would be used during construction activities along the lakeshore and during the introduction of stream flows into the new stream channel. All work below the ordinary high water line would take place only during the in-water work window (“fish window”), designated by WDFW (i.e., July 16 – December 31), to minimize possible harm to local fish species (Corps, 2011).

6. Energy and Natural Resources

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

The 52nd Ave S CSO Reduction Project would require electricity to operate the mechanical and electrical equipment, instrumentation for the motor-operated gate, and overflow monitors for CSO Outfall 47. The electrical control cabinet would be located near the intersection of 52nd Avenue South and Rainier Avenue South.

Annual consumption for the project is estimated at 1,500 to 2,000 kilowatt hours under anticipated normal operating conditions. Variability in usage may occur depending on the number of CSO events that the completed facility must store and pump during a calendar year. During maintenance activities, fossil fuels would be used to power vehicles and equipment. Electrical energy may also be used to operate some maintenance equipment.

The Mapes Creek Restoration Project would not require energy to operate. During maintenance activities, fossil fuels would be used to power vehicles and equipment. Electrical energy may also be used to operate some maintenance equipment (Corps, 2011).

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

Neither proposed project would affect the 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:**

The control cabinet for the 52nd Avenue South Conveyance Project would be designed to meet the current energy code as required by the City of Seattle. Street and sidewalk lighting fixtures would be replaced, using the standards for energy efficiency prescribed by Seattle City Light standards.

Mitigation measures are not proposed for the Mapes Creek Restoration Project because impacts to energy are not anticipated to occur as a result of project operations.

7. Environmental Health

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

Soil and Groundwater Contamination

An evaluation to determine the presence or likely presence of any recognized environmental conditions (RECs) was conducted to document whether past or current activities could have led to the placement or release of hazardous substances that may affect construction of the projects (HDR, 2011a; Corps, 2011). The American Society for Testing and Materials (ASTM) Practice E 1527-05 defines a REC as: "The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the project site or into the ground, groundwater, or surface water of the project site. The term includes hazardous substances or petroleum products even under conditions of storage and use in compliance with local and state laws and regulations. The term is not intended to include *de minimus* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of regulatory governmental agencies. Conditions determined to be *de minimus* are not recognized environmental conditions."

A search of historical documents and site reconnaissance revealed no evidence of the presence of hazardous substances in the project area (Corps, 2011); however, the REC evaluations identified four RECs within 1,000 feet of the projects. These REC sites are located on Rainier Avenue South. Based on topography, surface water is unlikely to flow toward the project sites and, therefore, contamination from the four documented REC sites is unlikely to reach the project areas (Corps, 2011). Approximately 50 other sites that are outside the project areas and have a low to moderate risk of contaminating the project sites were documented in the HDR REC evaluation (HDR, 2011a).

SPU completed borings along the 52nd Avenue South alignment, including one near the reported three RECs at 52nd Avenue South and Rainier Avenue South. Slight hydrocarbon odors were noted at depth. A boring in the 52nd Avenue South Walkway and berm encountered strong hydrocarbon odors at the 10- to 15-foot depth below the top of the walkway and berm. SPU conducted additional field sampling and characterization work at these locations on January 12, 2012, to confirm if project excavations may encounter contamination. No contamination was detected in these borings.

Construction

Some risk of spills or leakage from heavy equipment would exist during construction as a result of equipment failure or worker error; however, this would not be greater than is normally associated with construction activities of this type. Materials of a hazardous nature that are typically present during construction and may spill or leak include gasoline and diesel fuels, hydraulic fluids, oils, lubricants, solvents, paints, and other

chemical products. Normal precautions would be taken when storing equipment, hazardous fuels, and other materials used in construction of the projects.

Operation

No environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste would result from operation of these projects.

1) Describe special emergency services that might be required.

Special emergency services would not be required for either proposed project beyond those occasionally required by other similar public facilities. These include police, fire, and emergency medical services.

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

Three sites are associated with fuel-related businesses and may have hydrocarbon contamination (HDR, 2011a) at the south end of 52nd Avenue South. A geotechnical boring encountered possible contaminated soil and groundwater approximately 5 to 10 feet below the proposed depth of excavation for the pipelines along the 52nd Avenue South Walkway. Proposed measures to reduce environmental health hazard during construction include advising the Contractor of possible contamination and following appropriate control, removal and disposal measures. Contaminated soil and groundwater, if encountered during construction, would be managed, removed and disposed of according to the appropriate regulatory requirements.

To protect against hazardous substance spills from routine equipment operation and maintenance activities during construction, the contractor would be required to provide an emergency response plan in accordance with the SPU spill prevention plan and know proper hazardous material storage, handling, and emergency procedures, including spill notification and response requirements.

In addition, BMPs would be used during construction. One source of appropriate BMPs is Ecology's *Stormwater Management Manual for Western Washington* (Ecology, 2005).

b. Noise

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

Existing noise in the area, such as vehicle traffic (primarily on South Henderson Street, 52nd Avenue South, and other local streets), boat traffic on Lake Washington, and other noise are typical of urban residential neighborhoods and commercial areas. This noise would not affect the projects during construction or when completed.

To characterize existing noise conditions, short-term noise monitoring (5 to 10 minutes at each location) was conducted at 5 sites along the project alignment. Existing noise levels were low because of low traffic volumes and the absence of

other major noise sources such as industrial facilities and construction equipment. Measured noise levels ranged from 53 decibels (dBA) to 65 dBA (HDR, 2011b).

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 site.

Construction

The Seattle Municipal Code (SMC 25.08) establishes limits on timing, levels, and durations of noise crossing property boundaries. Allowable maximum sound levels depend on the land use zoning designation of the noise source and the zoning designation of the receiving property. The SMC noise limits are shown in Table 3.

Table 3. Seattle Municipal Code Exterior Sound Levels (dBA)

District of Noise Source	District of Receiving Property		
	Residential Day/Night	Commercial Day	Industrial
Residential	55/45	57	60
Commercial	57/47	60	65
Industrial	60/50	65	70

The 52nd Ave S CSO Reduction Project would be located adjacent to areas that are zoned for single- and multi-family residential and neighborhood commercial. In residential zoning districts, construction noise would be allowed between the hours of 7 a.m. and 7 p.m. on weekdays and between 9 a.m. and 7 p.m. on weekends and legal holidays.

During construction, noise levels in the vicinity of the project area would temporarily increase due to the operation of heavy construction equipment (HDR, 2011b; Corps, 2011). Given the relatively low, existing noise levels in the project vicinity, noise generated by construction equipment would be noticeable at nearby businesses and residences. Depending on the nature of the construction activity, equipment operations could vary from intermittent to fairly continuous.

Exceedences of the noise limits shown in Table 3 during normal daytime construction hours are allowed for construction noise depending on the type of equipment being used and the duration of the exceedance. During daytime hours of construction, noise levels may exceed the limits by no more than:

- 25 dBA for certain types of equipment, including but not limited to crawlers, tractors, dozers, rotary drills and augers, loaders, power shovels, cranes, derricks, graders, off-highway trucks, ditchers, trenchers, compactors, compressors, and pneumatic-powered equipment;
- 25 dBA for portable equipment used in temporary locations in support of construction activities such as chainsaws, log chippers, lawn and garden maintenance equipment, and powered hand tools; or

- 15 dBA for power equipment used in temporary or periodic maintenance activities, including but not limited to lawnmowers, power hand tools, snow-removal equipment, and composters.

In addition, the sounds created by impulsive impact equipment, such as pavement breakers, pile drivers, jackhammers, or sandblasting tools, may exceed the sound level limits in Table 3 in any one hour by no more than the following:

- Leq (equivalent sound level) 90 dBA continuously;
- Leq 93 dBA for 30 minutes;
- Leq 96 dBA for 15 minutes; or
- Leq 99 dBA for 7 1/2 minutes.

To provide a relative comparison of potential construction noise impacts, FHWA's Roadway Construction Noise Model (FHWA 2006) was used to estimate noise levels at residences near the project alignment. The Roadway Construction Noise Model is a national model based on the noise calculations and construction equipment noise database compiled for the Central Artery/Tunnel project in Boston, Massachusetts (the "Big Dig"). The model estimates noise levels based on the distance from the construction site to the residence and on assumptions about the types of construction equipment being used and usage factor for each piece of equipment (that is, the percentage of time the equipment is operating at its highest power level).

For the proposed project, it was assumed that operating construction equipment would include equipment such as, but not limited to, dump trucks, excavators, chain saws, concrete mixer trucks, and asphalt pavers all operating at the same time (that is, it reflects the worst case construction conditions). In practice, not all of this equipment would be used in all locations and not continuously (for example, concrete mixers and asphalt pavers).

In addition, the project alignment would be located close to an existing multifamily residential development between 52nd Avenue South and Seward Park Avenue South. The nearest residential locations are within 50 to 75 feet of the trench. Construction noise would be similar at all locations, but somewhat higher on South Henderson Street where more equipment would likely be in use.

Table 4 (following page) shows the modeled noise levels assuming that the equipment described above would be operating simultaneously and continuously, which is not likely. Modeled construction noise levels on 52nd Avenue South at the apartment complex and residences nearest the construction site (that is, those units and homes within about 50 to 75 feet of the construction activity) would be approximately 77 dBA (the 25-foot difference in distance to individual receptors has no measurable effect on noise as perceived by people). Attenuation and screening would lower noise levels by 10 to 15 dBA or more at interior locations farther away from the construction activity.

Table 4. Modeled Construction Noise Levels

Receptor Locations	Distance to Receptor (feet)	LEQ (dBA)
1 Multifamily Residence – East Side of 52 nd Avenue South	50	77
2 Multifamily Residence – East Side of 52 nd Avenue South	50	77
3 Multifamily Residence – East Side of 52 nd Avenue South	50	77
4 Multifamily Residence – East Side of 52 nd Avenue South	50	77
5 Corner – 52 nd Avenue South/South Henderson Street	75	77
6 Residence – West Side of 52 nd Avenue South	75	77
7 Residence – West Side of 52 nd Avenue South	75	78
8 Apartment Complex – Corner of South Henderson Street/Seward Park Avenue South, south of existing pump station	130	76

As shown above it is unlikely the proposed project would result in exceedances of the construction noise limits established by the Seattle Municipal Code.

Operation

Operational noise impacts of the completed projects would be minimal. Most project elements are structures that would be buried. The natural sound attenuation properties of the ground would muffle noise emissions from underground project elements. Above-grade structures associated with the projects, such as the control box, and the creek channel would not be sources of noise during project operation.

Project maintenance activities (e.g., opening maintenance holes to inspect and check the diversion and outlet structures and occasional pipe cleaning) would be infrequent and likely occur only during daytime hours.

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

Construction

To reduce temporary noise impacts associated with construction activities, contractors would be required to comply with regulations relating to construction noise. The provisions of Seattle Municipal Code 25.08 Noise Control would be fully enforced while the project is under construction. The following measures would be incorporated into contract specifications to help reduce the effects of construction noise:

- Comply with approved hours of construction (between the hours of 7 a.m. and 7 p.m. on weekdays and between 9 a.m. and 7 p.m. on weekends and legal holidays).
- Conduct on-site noise monitoring to ensure compliance with the Seattle Municipal Code provisions, if necessary.
- Ensure that equipment has sound control devices that are at least as effective as those on the original equipment. No equipment with unmuffled exhaust would be allowed.
- Minimize idling time of equipment and vehicle operation.
- Implement appropriate additional noise control measures, as necessary, such as changing the location of stationary construction equipment, operating only the equipment needed to match the phase of construction, shutting off idling equipment, rescheduling construction activity, notifying adjacent residents in advance of construction work, or installing acoustic barriers around stationary sources of construction noise.
- Maintain the existing vegetation, where possible, to provide a vegetative buffer and visual screen to residences near the site.

Operation

Operation and routine maintenance activities would produce only minor, infrequent noise during daytime hours. Therefore, measures to reduce or control operational noise impacts are not proposed.

8. Land and Shoreline Use

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

The pipeline portions of the projects are located in a public right-of-way corridor along 52nd Avenue South/52nd Avenue South Walkway and South Henderson Street, and across Seward Park Avenue South. The uses adjacent to this corridor are generally characterized by single- and multi-family residences and light commercial areas to the west and south; school and a library to the north; and light commercial, residences, and recreational land uses to the east. The Lake Washington Apartments (a multi-building, multi-family housing complex) are located on the east and south side of the pipe alignment. The stream channel would be within Be'er Sheva Park, which is used for recreation, and north of the Atlantic City boat ramp and parking lot.

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

Based on historical aerial imagery, neither project area has been used for agriculture in recent history (HDR, 2011a).

c. Describe any structures on the site.

The project areas are located within city-owned right-of-way currently used for residential and commercial access, a pedestrian walkway along 52nd Avenue South, and Be'er Sheva Park. Structures outside Be'er Sheva Park are consistent with infrastructure

typical of urban residential streetscapes and include curb, gutter, sidewalks and lighting. On South Henderson Street in front of the Lake Washington Apartments, an existing fence encroaches into the right-of-way within the project area. Public art consisting of a circular concrete plaza surrounded by a low concrete wall decorated with embedded objects forms the northern entrance to the walkway on 52nd Avenue South.

Built structures within Be'er Sheva Park include restrooms, a playground, picnic tables, and a tennis court. The Atlantic City boat launch facilities and a parking lot are on the south side of Be'er Sheva Park.

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

No buildings would be demolished as part of these projects. Two sidewalk lights at the intersection of South Henderson Street and the 52nd Avenue South Walkway would be removed and replaced. Four pathway lights located along the 52nd Avenue South Walkway would be removed and replaced following construction. Curb, gutter, and sidewalks would be removed and restored after project construction. Public artwork located at the north entrance of the 52nd Avenue South Walkway would be removed and restored after project construction. A privately-owned fence located in the right-of-way of South Henderson Street would be removed and replaced or relocated, based on negotiations between the property owner and the Seattle Department of Transportation.

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

The projects are located within city-owned rights-of-way and a city-owned park. Current zoning of these area is Neighborhood Commercial 2-40 (NC2-40), Neighborhood Commercial 3-40 (NC3-40), Single-Family 5000 (SF 5000), and Lowrise 3 (LR3) (Seattle, 2007).

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

The current comprehensive plan designations of the project areas are Commercial/Mixed Use, Multi-Family Residential, and City-Owned Open Space (Seattle, 2010).

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

A portion of the Mapes Creek Restoration Project within Be'er Sheva Park is located within the 200-foot shoreline jurisdiction of Lake Washington. The Shoreline Master Program (SMP) designates this area as within a Conservancy Recreation environment (Seattle, 2007). See Attachment A, Figure 5, for the location of the shoreline environment. No other project features are regulated within SMP jurisdiction.

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

DPD online mapping indicates that there are several environmentally critical areas that occur in both project areas. These include a riparian corridor (consisting of piped Mapes Creek), wetlands, a liquefaction zone, and a peat settlement area (Seattle, 2007).

A field visit of the 52nd Ave S CSO Reduction Project area was conducted to identify what natural resources were present on site (HDR, 2011c). The following on-site critical areas were identified during the field visit:

- Two wetlands located adjacent to the walkway on 52nd Avenue South.
- One stream (Mapes Creek) designated as a culvert by the City, currently conveyed under 52nd Avenue South/52nd Avenue South Walkway via a storm drain pipe. Mapes Creek is within a riparian corridor that follows 52nd Avenue South, the walkway, and South Henderson Street (Seattle, 2007).

Two wetland areas are located in Be'er Sheva Park. The first is a marsh and scrub/shrub wetland located along the northern boundary of Be'er Sheva Park. The second, a restored wetland owned by Parks, borders the Be'er Sheva Park wetland to the east (Corps, 2011). Be'er Sheva Park also contains a Shoreline Habitat Buffer designated by the City (Seattle, 2007).

Attachment A, Figure 5, shows the SMP environment, shoreline habitat buffer, wetlands, and riparian corridor. Attachment A, Figure 6, shows the liquefaction zone and peat settlement area.

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

No one would reside in these project areas. Work on the completed projects would consist of periodic maintenance visits performed by City field operations and maintenance crews of two to three people typically for one or two hours. If repairs are required, these crews may be present on site for up to eight hours at a time.

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

People would be not be displaced by either project.

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

Measures to avoid or reduce displacements are not proposed because displacements are not anticipated to occur as a result of either project.

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

The projects would meet the requirements of the development standards established for the Neighborhood Commercial (NC2-40 and NC3-40), Single-Family 5000 (SF 5000), and Lowrise (LR3) zones they fall within. The proposed projects would mostly consist of buried structures and pipelines. Project planning has taken into consideration the current and future underground plans and projects of City departments and utility providers. Subgrade project elements would not restrict current or future above-ground land uses or plans. The completed above-grade features would be designed and constructed to blend into the surroundings while still maintaining the intended operational function. For these reasons, the project would not impact existing or projected land uses.

In addition, development and design of the Mapes Creek Restoration Project has been coordinated with the following agencies and entities to help ensure project compatibility with the goals and plans of these stakeholders: Washington Department of Fish and Wildlife, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Washington Department of Ecology, Washington Department of Archaeology and Historic Preservation, City of Seattle, and King County, Washington. The project complements the Watershed Resource Inventory Area 8 (WRIA8) regional salmon recovery strategy for Puget Sound Chinook (Corps, 2011).

9. Housing

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

Neither project would involve construction of housing units.

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

Housing units would not be eliminated as a result of either project.

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

Measures to reduce or control housing impacts are not proposed for either project.

10. Aesthetics

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

Most of the proposed project structures would be below grade. The control cabinet, approximately 5 feet high, would be the tallest element of the 52nd Ave S CSO Reduction Project. The cabinet would be located near the intersection of 52nd Avenue South and Rainier Avenue South.

The existing street lights along the 52nd Avenue South corridor are approximately 30 feet tall. The street lights would be temporarily removed and replaced following construction.

The proposed pedestrian bridge that would span the new stream channel in Be'er Sheva Park would be the tallest project element of the Mapes Creek Restoration Project. Based on preliminary design drawings, the bridge would be approximately 25 feet long and 6 to 8 feet wide, with railings on each side and supported at each end on concrete abutments (Corps, 2011). Bridge materials may consist of metal, wood, recycled plastic lumber or a combination of these materials. The bridge may be supported on pin piles or similar supports in lieu of concrete abutments. These details would be finalized during final design.

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

Construction

Development of the proposed projects would result in grading and construction activities that would temporarily alter the visual character of the project and surrounding areas. Construction activities would be visible from nearby residences, commercial areas, the surrounding streetscape within and adjacent to the project area, and the park. Those affected would include adjacent property owners, motorists, pedestrians, park users, and bicyclists traveling along or near the project corridor.

Operation

Along the street rights-of-way, no views would be significantly altered or obstructed by the completed 52nd Ave S CSO Reduction Project. Most project elements would be placed below grade. Removed street lighting fixtures would be replaced in kind, the public art that would be temporarily removed during construction would be restored, and trees subject to City of Seattle Tree Protection Regulations removed during construction would be replanted as stipulated in SMC 25.11. The small stature of the proposed above-ground control cabinet (10 feet long, 2 feet wide, and 5 feet tall) is not anticipated to alter or obstruct views.

Although visual elements in Be'er Sheva Park would change as a result of the completed Mapes Creek Restoration Project, visual quality would not be degraded. The project would replace a maintained lawnscapes with a natural meandering stream. The project would also install a small pedestrian footbridge over the stream that would maintain access between the parking lot and Be'er Sheva Park. These elements would add visual interest to the landscape that could be considered a positive improvement to aesthetics because of the more natural and native habitat visual appearance of the site (Corps, 2011).

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

The following measures would be implemented to reduce impacts caused by the project:

- Replacing lighting fixtures in kind.
- Restoring the public art at the north end of the pedestrian walkway.
- Replacing trees along the 52nd Avenue South Walkway and South Henderson Street in accordance with Section B.4.d.

In addition, native trees and shrubs would be replanted in Be'er Sheva Park based on input from the Parks Department. Disturbed areas would be replanted at the end of construction. Most of the shade trees in the stream channel portion of the Mapes Creek project would be preserved. Existing benches affected by construction in Be'er Sheva Park would be removed, stored, and reinstalled at the end of construction.

11. Light and Glare

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

Construction

Construction activities may temporarily introduce new sources of light and glare into the project area. Construction would occur between 7 a.m. and 7 p.m. on weekdays and 9 a.m. and 7 p.m. on weekends and legal holidays. As a result, construction-related light and glare impacts would be limited to portions of these times. Nighttime construction work, outside of the standard construction hours described above, is unlikely to occur but portions of the site may be illuminated at night for security purposes.

Operation

The project would involve removing and replacing existing path and sidewalk lights in kind. Therefore, the projects are not expected to produce more light or glare than existing conditions.

The other project elements would be underground or not emit light and, therefore, would not produce light or glare.

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

No light or glare from either finished project would be a safety hazard or interfere with views.

c. What existing offsite sources of light or glare may affect your proposal?

No offsite sources of light or glare would affect the construction or operation of either project.

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

To reduce impacts of construction lighting and glare to the surrounding receptors, the following measures would be taken:

- Installing hoods or shades on lighting so that the direct light of lamps would not result in glare when viewed from surrounding property or rights-of-way and would prevent the occurrence of sky glow.
- Directing lighting away from adjoining properties.
- Limiting the use of street lights to appropriate hours of the night, based on Seattle City Light requirements.
- Locating and aiming all construction-related nighttime security lighting away from adjacent sensitive receptors, and using the minimal wattage necessary to provide safety at the construction site.
- Following City of Seattle land use regulations related to light and glare.

12. Recreation

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

A paved pedestrian walkway is within the 52nd Avenue South right-of-way between South Fisher Place and South Henderson Street. Bicycle lanes are along the north (westbound) and south (eastbound) sides of South Henderson Street within the project vicinity.

The stream channel for the Mapes Creek Restoration Project would be located in Be'er Sheva Park, an area used for passive, active, and boating recreational activities. The park has a playground, open space, tennis court, and pathways. The Atlantic City boat ramp and parking lot are on the south side of Be'er Sheva Park. There are no other known recreational opportunities within the boundaries of the project areas.

Within the vicinity (0.5 mile) of the project areas, several designated, formal, and informal recreational areas exist. Table 4 provides the name and location of these recreational resources and their distance from the project area.

Table 3. Recreation Resources in the Vicinity of the Project Area

Name	Address/Location	Approximate Distance from Project Area (miles)
Sturtevant Ravine	South Roxbury Street and Rainier Avenue South	0.2 south
Fletcher Place	57th Avenue South and South Fletcher Street	0.3 southeast
Rainier Beach Play Field	8802 Rainier Avenue South	0.3 northwest
Chinook Beach Park	Rainier Avenue South/ South Ithaca Street	0.5 east
Pritchard Island Beach	8400 55th Avenue South	0.5 northeast
Lake Washington	Be'er Sheva Park	immediately adjacent
Rainier Beach Community Center	8825 Rainier Avenue South	750 feet west

Source: Seattle, 2011a

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

Construction

During construction, closure of 52nd Avenue South would require pedestrians and cyclists to temporarily discontinue use of the paved walkway along 52nd Avenue South and bicycle lanes along both sides of South Henderson Street.

The Rainier Beach Community Center, north and west of the intersection of South Henderson Street and Rainier Avenue South, is currently closed. Construction of a new community center and pool at this location is scheduled from November 2011 through late 2013 and expected to overlap construction of the projects in 2013-2015. In the interim, some activities were relocated to neighboring facilities and community centers. Activities were not relocated to the project area.

The community center is scheduled to open before the 52nd Ave S CSO Reduction Project and the Mapes Creek Restoration Project are completed. Because of its location relative to the project area, construction is not expected to affect recreational activities at the new community center except for temporary increases in traffic associated with construction.

The dedicated Mapes Creek pipeline would cross Seward Park Avenue South on the south side of South Henderson Street and Seward Park Avenue South intersection. During pipeline construction, Seward Park Avenue South at the crossing location would be partially closed for up to 5 days. Partial closure would be scheduled to avoid interrupting King County Metro trolley services, and may occur on off hours or weekends if necessary. Construction would restrict but not eliminate vehicle access to the Be'er Sheva Park entrance through the South Henderson Street and Seward Park Avenue South intersection. Users would also be able to reach the Be'er Sheva Park entrance via Rainier Avenue South and Seward Park Avenue South.

Construction of the outlet pipe and proposed stream channel would impact the use of Be'er Sheva Park. The channel alignment would cross the park between the existing play area to the north and the parking lot and restroom to the south. Depending on depth and location, the sewer and power service to the existing park restroom may need to be relocated (Corps, 2011). The portion of the park within construction limits would be closed to the public until the end of construction. However, park areas north and south of the construction zone will remain open, including the parking lot and boat launch.

Other recreational opportunities in the project vicinity would not be affected by the projects.

Operation

Operation of the project would have only minor impacts on recreational use of the walkway. Infrequent maintenance activities may require temporary closure of the walkway; however, this would likely not occur more than an average of one day per year.

Pedestrian use patterns in Be'er Sheva Park would likely be affected primarily because the proposed stream channel crosses the park between the existing playground to the north and the parking lot and restroom to the south. A proposed pedestrian footbridge over the channel would provide access across the stream channel. The stream channel and riparian area would replace grassy areas. The area is used for walking, unstructured play, and occasional picnicking. However, the use of the impacted area is seasonal because it is low lying and often unusable as the area does not drain well because of soil type and high groundwater level. The project may affect benches near the shoreline in the park, which will be retained and relocated to provide similar recreational experience. Any affected benches would be replaced in kind (Corps, 2011).

In 1979, the City of Seattle received funding from the National Park Service Urban Parks and Recreation Recovery (UPARR) grant program for improvements at Be'er Sheva Park. In 1972 and 2001, the City received funding from the Interagency Committee on Outdoor Recreation (IAC) for boat ramp and pier renovations at the Atlantic City Boat Ramp (located immediately south of Be'er Sheva Park). Because the Mapes Creek Restoration Project would not impact the recreational uses at either site, the funding agencies determined that grant conversions (transfer of grant restrictions to an area not already encumbered by grant restrictions) or other mitigation measures are not required.

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

Construction

During construction, pedestrian and bicycle traffic would be rerouted away from 52nd Avenue South and the south side of South Henderson Street onto a designated detour route on Rainier Avenue South and South Henderson Street west of the construction area. Advance public notice and signage would be provided for public notification of the closure of 52nd Avenue South, construction along South Henderson Street, temporary partial closure of Seward Park Avenue South and construction in Be'er Sheva Park.

Operation

No mitigation measures are proposed for the operation of the projects because only minor, infrequent, temporary impacts to recreation might occur.

In Be'er Sheva Park, a pedestrian footbridge bridge would be built over the new channel to allow continued access to park spaces. Daylighting Mapes Creek in the park would provide environmental education to visitors and serve as a park amenity. Benches removed during construction would be replaced in kind.

13. Historic and Cultural Preservation

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

A record search and windshield survey were conducted to identify the possibility of cultural resources existing within the 52nd Ave S CSO Reduction Project area. The results are documented in a summary report (HRA, 2011).

HRA researched the Washington State Department of Archaeology and Historical Preservation (DAHP) online database (WISAARD) for Historic Property Inventory (HPI) forms, archaeological sites, cultural resource survey reports, and cemetery records. In addition, WISAARD was searched for National Register of Historic Places (NRHP) and Washington Heritage Register (WHR) resources. Research also included a review of the City of Seattle Department of Neighborhoods (DON) list of historic districts and database of historic properties. To help determine whether the facilities that would be removed and/or replaced are over 25 years of age, HRA contacted Seattle City Light to find out the age of the light poles. The King County Parcel Viewer was also reviewed to

determine the age of the fence along South Henderson Street and the adjacent apartment complex. Historic nineteenth-century maps from the United States surveyor General (USSG), General Land Office (GLO) were reviewed for historic-period sites, features, or structures that may be extant in the Project area. Historic Sanborn Fire Insurance Maps were also reviewed for historic-period resources.

The records search did not find places or objects listed on, or proposed for, national, state, or local preservation registers on or next to the project area.

A cultural resources assessment was also performed as part of the Environmental Assessment (EA) for the Mapes Creek Restoration Project (Corps, 2011). A search of the archaeological and historic site records at DAHP, documented in the EA, indicated that no properties listed in the NRHP or the WHR are recorded in the Mapes Creek Restoration Project area.

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

The HRA research identified two places with ethnographic place names associated with the Duwamish Tribe, which is part of the Southern Coast Salish. The names were applied to the small creek that used to drain to Lake Washington through the north end of Be'er Sheva Park and for the former Pritchett Island, also north of Be'er Sheva Park. In addition, some reports suggest a winter village existed at Rainier Beach. The DAHP predictive model indicates that the project location lies within a high-risk area for encountering cultural resources because of environmental factors, such as its proximity to the native shoreline of Lake Washington. HRA's research was more focused than the DAHP predictive model, and the results indicate the area was low lying or possibly inundated before construction of the Hiram M. Chittenden Locks and the associated 9-foot lowering of the water level in Lake Washington in 1916. The project area has also been filled, graded, and modified during the historic modern times. As a result, there is a moderate to low likelihood of encountering prehistoric or historic archaeological resources within the project area, and further research and fieldwork are not warranted (HRA, 2011).

As part of the Corps EA, historic aerial photos and General Land Office survey maps were reviewed to identify potential areas where cultural resources could be present. These maps show that prior to the construction of the Hiram M. Chittenden Locks, much of the project area was inundated by the waters of Lake Washington (Corps, 2011). Recent studies completed for the replacement of State Route 520 floating bridge indicate that within historic times, the lake level may have been as much as 11 feet lower than previously thought, making the land within Be'er Sheva Park available for human use. However, since excavation for the proposed channel is shallow and the general area has been previously disturbed, there is a low likelihood of affecting cultural resources.

No landmarks or evidence of historic, archaeological, scientific, or cultural importance is specifically known within the project area.

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

No known archaeological, cultural, or historic resources are expected to be affected by this project. Other than the Mapes Creek channel restoration and the pedestrian bridge in Be'er Sheva Park and the electrical cabinet, all project components would be underground or at-grade in the case of maintenance hole covers. All project components would be constructed in paved areas or areas previously disturbed by fill, grading, utility installation, building and road construction, landscaping, and/or installation of irrigation systems and French drains. However, should evidence of cultural artifacts or human remains, either historic or prehistoric, be encountered during excavation, work in that 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.

14. Transportation

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

Existing Access

Attachment A, Figure 2 shows the site layout and access roads to the project area.

Several roads provide access to and from the project areas, including Rainier Avenue South, South Henderson Street, 52nd Avenue South, and Seward Park Avenue South. The nearest highway to the project area is Interstate 5, which is located approximately one mile to the west.

Construction

Construction of the proposed projects would require temporary closure of the 52nd Avenue South roadway and walkway. This would reduce but not eliminate access to the Safeway store because multiple, alternative access points exist. Pedestrian and bicycle traffic would be diverted around the 52nd Avenue South alignment between Rainier Avenue South and South Henderson Street. The Lake Washington Apartments have pedestrian access to the 52nd Avenue South Walkway through South Fisher Place (located east of the walkway). During construction along 52nd Avenue South and the 52nd Avenue South Walkway, this pedestrian access would be closed.

Construction of the projects along South Henderson Street would require temporary closure of bike lanes along both sides of the street and the south sidewalk and shoulder. Traffic may be shifted to the north (approximately 8 feet) along South Henderson Street using traffic cones and flaggers to allow additional area for construction trucks on the south side of South Henderson Street. The parking strip adjacent to Rainier Beach High School would need to be closed for parking during construction (approximately 21 street spaces). SPU's consultant (HDR) conducted an informal survey of on street parking to help assess the impact of temporarily eliminating parking along South Henderson Street during construction. The majority of Seward Avenue South, South Henderson Street, and Rainier Avenue South are not available for parking. Side streets have parking available that appears to be underutilized. The approximate distribution of available

parking is summarized below. The projects would temporarily eliminate less than 10% of the available parking in the area for a short period (i.e., up to 7 to 8 months).

Street Name	From	To	Total On-Street Parking Space (Approximate)
North-South Streets			
Rainier Ave S	Cloverdale Pl S	S Barton Pl	0
Seward Park Ave S	S Cloverdale St	Rainier Ave S	54
52 nd Ave S	Dead end	Rainier Ave S	48
East-West Streets			
S Henderson St	Seward Park Ave S	Rainier Ave S	21
S Director St	52 nd Ave S	Rainier Ave S	35
S Fisher Pl	52 nd Ave S	Rainier Ave S	19
Wabash Ave S	Seward Park Ave S	53rd Ave S	41
Hamlet Ave S	Seward Park Ave S	53rd Ave S	42
Total			260

Special accommodation would be required to maintain access when needed to the King County Henderson Pump Station. Users of the Atlantic City boat ramp may need to find alternate parking during peak use when this parking strip is not available as overflow parking.

Vehicle access to the existing apartment complex (Lake Washington Apartments) from South Henderson Street would need to be closed during most of the construction, which is anticipated to last approximately 7 to 8 months. This access location is currently closed and not used. Residents would also be restricted from using this as a pedestrian access. The apartment complex has two access points from the east on Seward Park Avenue South and South Fisher Place, which would not be affected by construction.

Attachment A, Figure 3 shows the locations of potential contractor parking and staging areas. The viability of Staging Options A, B, and C (i.e., private property options) would depend on successful negotiations between the contractor and private property owners.

Potential contractor parking and Staging Option B is located in a parking lot along South Henderson Street. Construction vehicles and equipment entering and leaving this area would temporarily impact traffic on South Henderson Street.

Potential contractor parking and staging options A, C, and D are located in a parking lot, vacant lot, and street right-of-way, respectively, along Rainier Avenue South. Construction vehicles and equipment entering and leaving these areas would temporarily impact traffic on Rainier Avenue South. The existing sidewalk on 52nd Avenue South on the north side of Rainier Avenue South may be temporarily closed during construction.

Construction of the Mapes Creek dedicated pipeline across the intersection of Seward Park Avenue South and South Henderson Street would result in temporary partial road closures for up to 5 days. This would affect traffic flow because South Henderson Street and Seward Park Avenue South are arterial streets that serve as vital links to the local neighborhood. The streets are a service corridor for public transit, including King County

Metro Transit's bus Routes 7, 32, 36, and 48 and experience periodic high traffic volumes including autos, pedestrians, bicycles, and school buses (Corps, 2011).

Operation

Once the project is built, access to and from the project areas would return to the pre-construction conditions.

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

King County Metro Transit's Route 7 trolley buses serve Rainier Avenue South and South Henderson Street. Bus stops are located on Rainier Avenue South west of 52nd Avenue South (west of the existing Safeway parking lot) and on South Henderson Street near the intersection of 52nd Avenue South.

King County Metro Transit's bus routes 7, 32, 36, and 48 make stops within a three-block radius of Be'er Sheva Park (Corps, 2011).

c. How many parking spaces would the completed project have? How many would the project eliminate?

Neither completed project would create or eliminate parking spaces.

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

No new roads, streets, or improvements to existing roads or streets would be required. After construction, pavement overlay would occur along 52nd Avenue South/52nd Avenue Walkway, South Henderson Street, Seward Park Avenue South, and the Be'er Sheva access road. Pavement overlay would be replaced to match the existing pavement sections in accordance with SDOT street restoration requirements.

SDOT is working with the Lake Washington Apartments owner to permit an encroachment along South Henderson Street. The property owner installed a path, fencing and landscaping with street right-of-way. The proposed projects would remove the path, fencing and landscaping. Upon completion of construction, SPU would coordinate restoration of this area with SDOT and the property owner, provided SDOT grants the property owner a street use permit. No new improvements would be required.

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

Portions of the Mapes Creek project occur within Lake Washington and in upland areas adjacent to the lake within Be'er Sheva Park. Lake Washington is used as a transportation corridor by commercial, industrial, and recreational vessels.

Other elements of either project would not occur within the immediate vicinity of water, rail, or air transportation corridors.

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

Construction

Impacts to traffic and access as a result of truck traffic are anticipated to occur during construction. A preliminary traffic study was conducted to estimate the potential traffic impacts to Rainier Avenue South and South Henderson Street during construction. The study showed that intersections within the area of the closures would operate at the acceptable Level of Service (LOS) "C" under the road closure conditions. LOS refers to the degree of congestion on a roadway or at an intersection, measured in average control delay. LOS C is a length of delay per vehicle of 20 to 35 seconds at signalized intersections and 15 to 25 seconds at unsignalized intersections (HDR, 2011d).

Construction traffic is not anticipated to disrupt vehicular traffic on South Henderson Street or Rainier Avenue South. With the exception of 52nd Avenue South adjacent to Safeway, all nearby roadways should operate at existing conditions. Construction activities would be phased so local access is maintained to residences and businesses near the project area. Construction traffic would not significantly impact the volumes on any nearby interstate highways (e.g., Interstate 5).

Project construction in 2013-2015 may overlap construction of the Rainier Beach Community Center, located 0.2 miles north of South Henderson Street on Rainier Avenue South. The community center is scheduled to open fall 2013 with construction closeout activities occurring during summer and fall 2013. Closeout of construction is not expected to cause a noticeable increase in traffic on South Henderson Street during the overlap period.

Table 5 shows a breakdown of anticipated construction trips by equipment type.

Table 4. Anticipated Construction Trips by Equipment Type

Equipment Type	Estimated Usage	Total Estimated Trips
Semi-Truck (Standard and Flatbed)	26 days, 1 trip per day	26
Excavation/Backfill Hauling (Dump Trucks, Mixed Single and Trailer)	88 days, 8 trips per day + 5 additional trips for landscaping	709
Service/Support/Trade Vehicles	150 days, 4 trips per day	600
Contractor Employee Vehicles	150 days, 8 trips per day	1,200
Total		2,535

Based on the information in Table 5, the total number of construction trips is estimated to be approximately 2,535. Not all of the trips described above would occur every day. The peak number of daily trips by construction traffic would occur during excavation and

backfilling of the trench for the combined pipe and is estimated at approximately 20 trips per day.

Assuming that an average dump truck with a 15 cy capacity would carry approximately 13 cy of material per trip, approximately 709 truck trips (approximately 454 truck trips for excavating, approximately 248 for backfilling, and approximately 5 additional trips for landscaping) would occur. During 88 days of excavating and backfilling activity, an average of 8 truckloads per day would occur from the site.

Construction worker traffic would vary throughout the project (8 to 15 contractor employees) and would consist of approximately 8 trips per day as workers park their vehicles at temporary parking areas near the project areas. It is assumed that some workers would carpool or use public transportation. The total peak volume anticipated for the project is approximately 20 trips per day (1 + 8 + 3 + 8 trips = 20 trips). The duration over which the identified construction worker trips could occur, as well as the parking impacts described above, would be approximately 150 days. This time frame is the anticipated duration of the construction contract.

Operation

Vehicular trips would be approximately twice per month for each project. The trips would be related to routine operation and maintenance activities and would occur during normal business hours.

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

Construction

The following transportation impact mitigation strategies would be used during project construction:

- Requiring the contractor to submit a traffic control plan detailing the haul route for construction traffic, and additional traffic control measures, such as warning signs and flaggers for bus, pedestrian, and bicycle traffic.
- Coordinating with King County Metro Transit and maintaining bus service during construction. Overhead power cables for King County Metro Transit's bus Route 7 are located above the eastbound lane of South Henderson Street and would remain in place. The guy wires supporting the cables are attached to the light poles that would temporarily be braced and supported during construction to maintain bus trolley cables.
- Keeping South Henderson Street and Rainier Avenue South open during construction. Traffic on South Henderson Street may be shifted to the north, but the existing number of lanes would be maintained throughout construction.
- Using flaggers to guide truck traffic entering and exiting the construction site and implement procedures to ensure queuing of truck traffic does not create congestion or backup on nearby intersections or roadways.
- Selecting truck entrance/exit points with turning radius requirements in mind to help ensure protected areas would not be impacted by truck traffic.

- Rerouting pedestrian and bicycle traffic along 52nd Avenue South/52nd Avenue South Walkway onto Rainier Avenue South, South Henderson Street, and Seward Park Avenue South.
- Providing advance public notice and signage of closures and detours.
- Adjusting traffic signal timing to account for additional turning movement volumes during road closures.
- Advising school districts, law enforcement, and fire/emergency service providers of construction dates in advance, and provide project schedule updates throughout the construction period.

Operation

Impacts to transportation, as a result of the completed project, are not anticipated to occur; therefore, mitigation measures are not proposed.

15. 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.**

Construction

During construction, law enforcement, emergency services, and fire response could potentially be delayed due to congestion, rerouting, or temporary road closures.

Operation

The completed projects would not result in an increased need for public services.

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

The following measures would be used to mitigate impacts to public services:

- Advising King County Metro Transit, school districts, and emergency service providers of construction dates in advance, and provide project schedule updates throughout the construction period.
- Providing construction schedules and impacts to roads to local papers or mail to area residents and local businesses, where appropriate.
- Identifying intersections/roadways of concern and address project impacts in a Traffic Control Plan.

6. Utilities

- a. Circle utilities currently available at the site:** electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, **other:** storm drainage, electric bus lines.

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 immediate vicinity which might be needed.

The completed projects would require the following utilities provided by those indicated:

- Electricity – Seattle City Light
- Combined Sewer and Drainage – SPU
- Communications – Century Link

Construction of approximately 1,800 feet of combined sewer for the 52nd Ave S CSO Reduction Project would send combined sewage from Rainier Avenue South to the King County Henderson Pump Station. In addition, approximately 1,600 feet of dedicated pipe for the Mapes Creek Restoration Project would be constructed along 52nd Avenue South and South Henderson Street to Be'er Sheva Park. The combined sewer and dedicated pipe would be constructed in the 52nd Avenue South and South Henderson Street rights-of-way. The dedicated pipe would also cross Seward Park Avenue South.

The following section describes conflicting utilities, additional utilities, and utility relocations that would be needed. SPU would coordinate with local utilities regarding facilities that may be impacted by construction.

Underground Utilities

- Electricity exists in the vicinity of 52nd Avenue South and would require connections to the controls cabinet and motor-operated gate located near the intersection of 52nd Avenue South and Rainier Avenue South. Connection to the controls cabinet could be either below grade or above-grade on a power pole. Connection to the motor-operated gate would be below grade via conduit. Power (480 volt / 3-phase) is available at the intersection of 52nd Avenue South and Rainier Avenue South and extends the entire length of the 52nd Avenue South.
- Communications conduits would be installed between the flume, motor-operated gate, and controls cabinet. SPU would coordinate establishing communication service with Century Link to provide communication to the SPU Operation Center located in downtown Seattle.
- An existing 8-inch-diameter waterline on the south end of 52nd Avenue South would be relocated for approximately 230 feet along the proposed combined sewer alignment.
- The project may require relocation of two 8-inch-diameter storm drain catch basin laterals and a water main at the southwest corner of the intersection of South Henderson Street and Seward Park Avenue South.
- The proposed dedicated pipe for the Mapes Creek alignment avoids conflicts with major crossing utilities. Based on their actual field location and operational status, it may be necessary to remove or relocate a pair of 14-inch-diameter force mains (noted as “abandoned” on record drawings) from the King County Henderson Street Pump Station. Because of clearances, the dedicated pipe for Mapes Creek would likely require measures (e.g., foam blocks or concrete encasement) to provide a buffer between the dedicated pipe for Mapes Creek and the two 20-inch-diameter King County Henderson Street Pump Station force mains (Corps, 2011).

- In Be'er Sheva Park, a sewer line and underground power line that serve the boat ramp and restroom may need to be relocated and attached to the underside of the new pedestrian bridge that would cross the open stream channel (Corps, 2011).

Overhead Utilities and Street Lighting

The pipelines are located in an urban street corridor with overhead power lines and street lighting. There are overhead bus lines along South Henderson Street and on Seward Park Avenue South for electric bus service. While the proposed alignment avoids permanent relocation of overhead utilities, construction may require temporary shoring of poles or relocation of overhead utilities to facilitate construction activities (Corps, 2011). SPU would coordinate with King County Metro to de-energize or temporarily relocate the electric trolley lines.

C. SIGNATURE

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

Signature: 
Kathleen Robertson, PE, Project Manager, Seattle Public Utilities

Date Submitted: February 9, 2012

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Attachment A – Figures

Figure 1 – Vicinity Map

Figure 2 – Site Layout

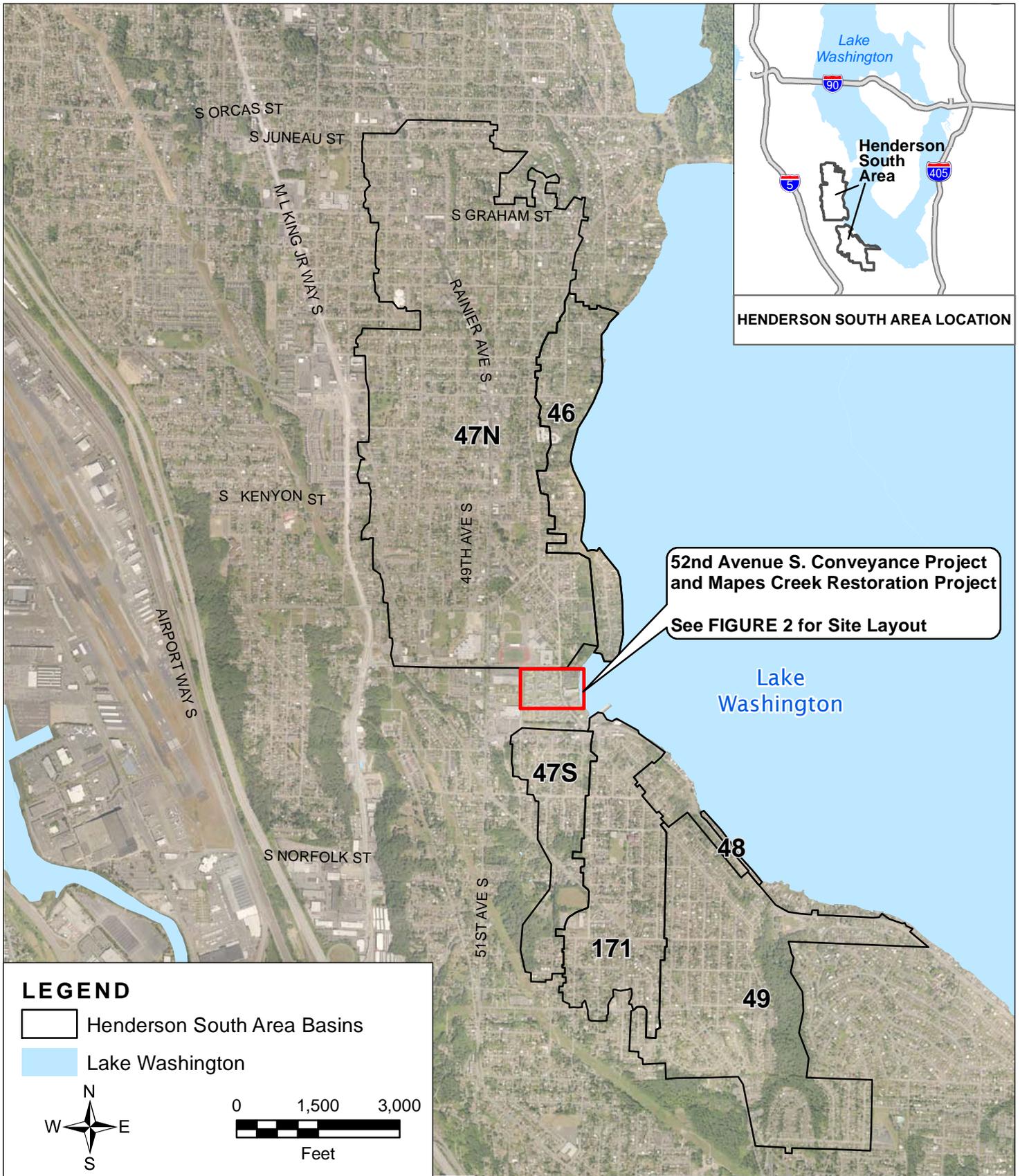
Figure 3 – Contractor Parking and Staging Areas

Figure 4 –Tree Removal

Figure 5 – Critical Areas

Figure 6 – Critical Areas

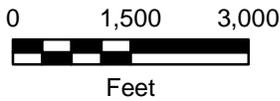
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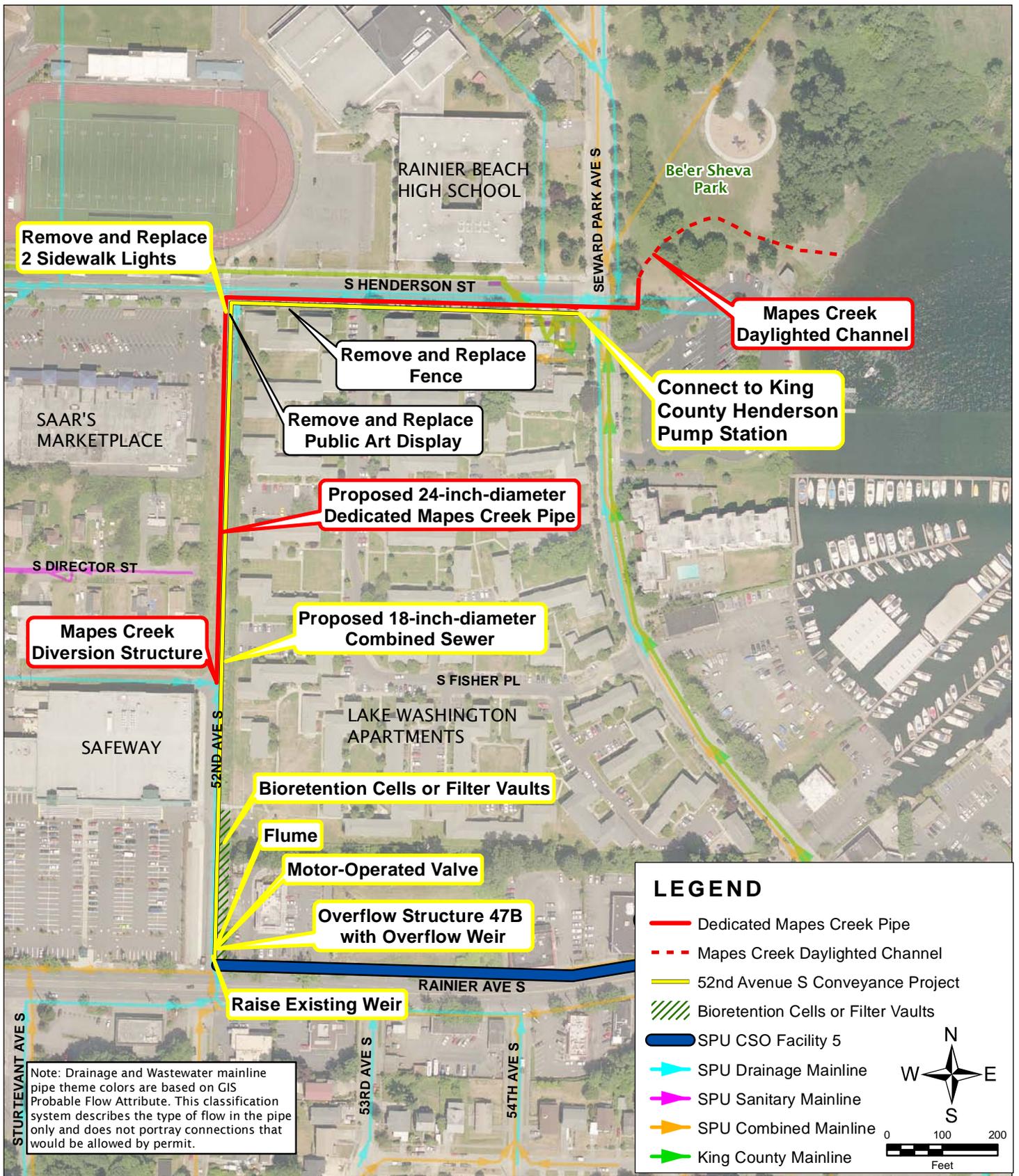


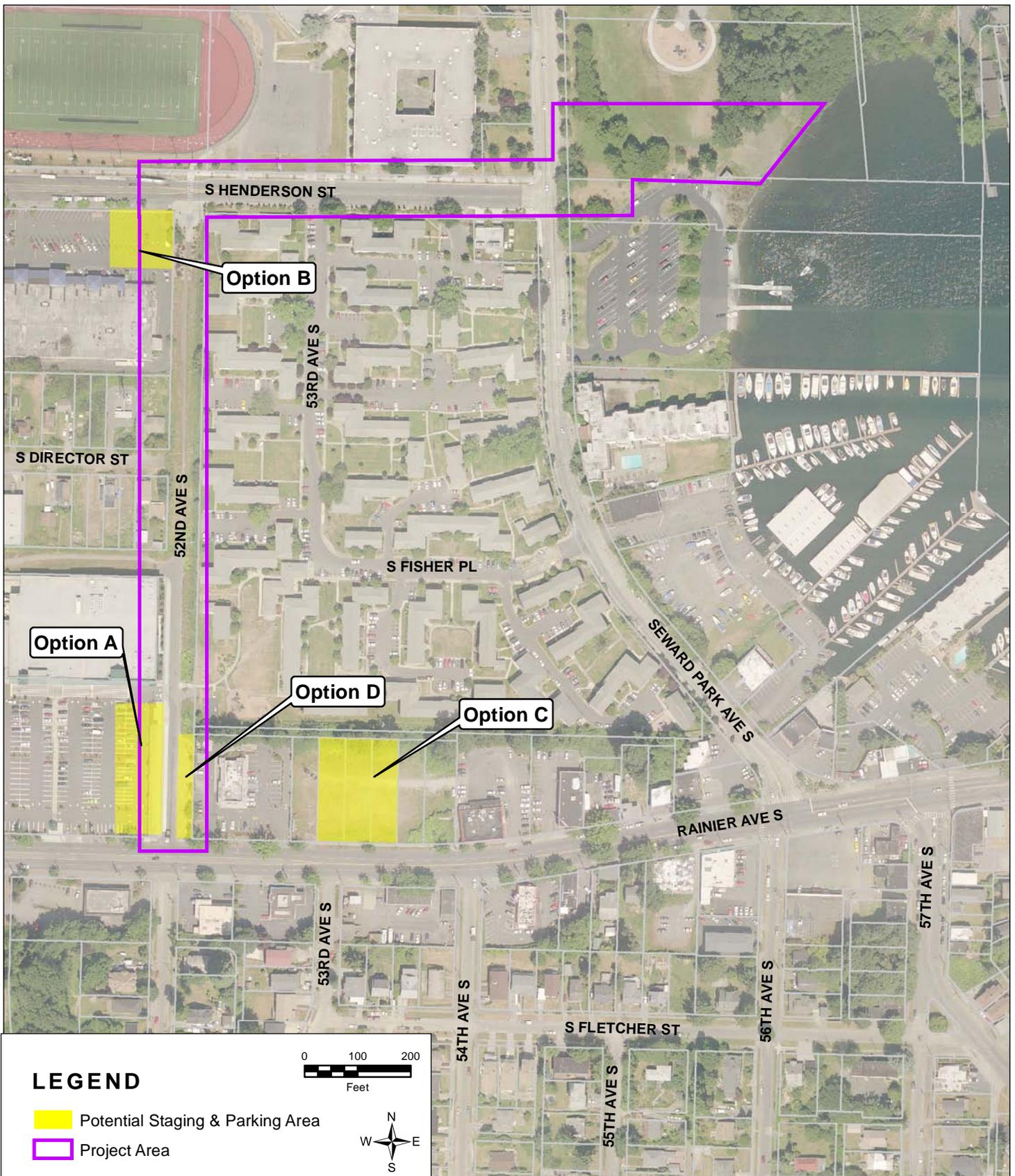
52nd Avenue S. Conveyance Project
and Mapes Creek Restoration Project
See FIGURE 2 for Site Layout

LEGEND

-  Henderson South Area Basins
-  Lake Washington

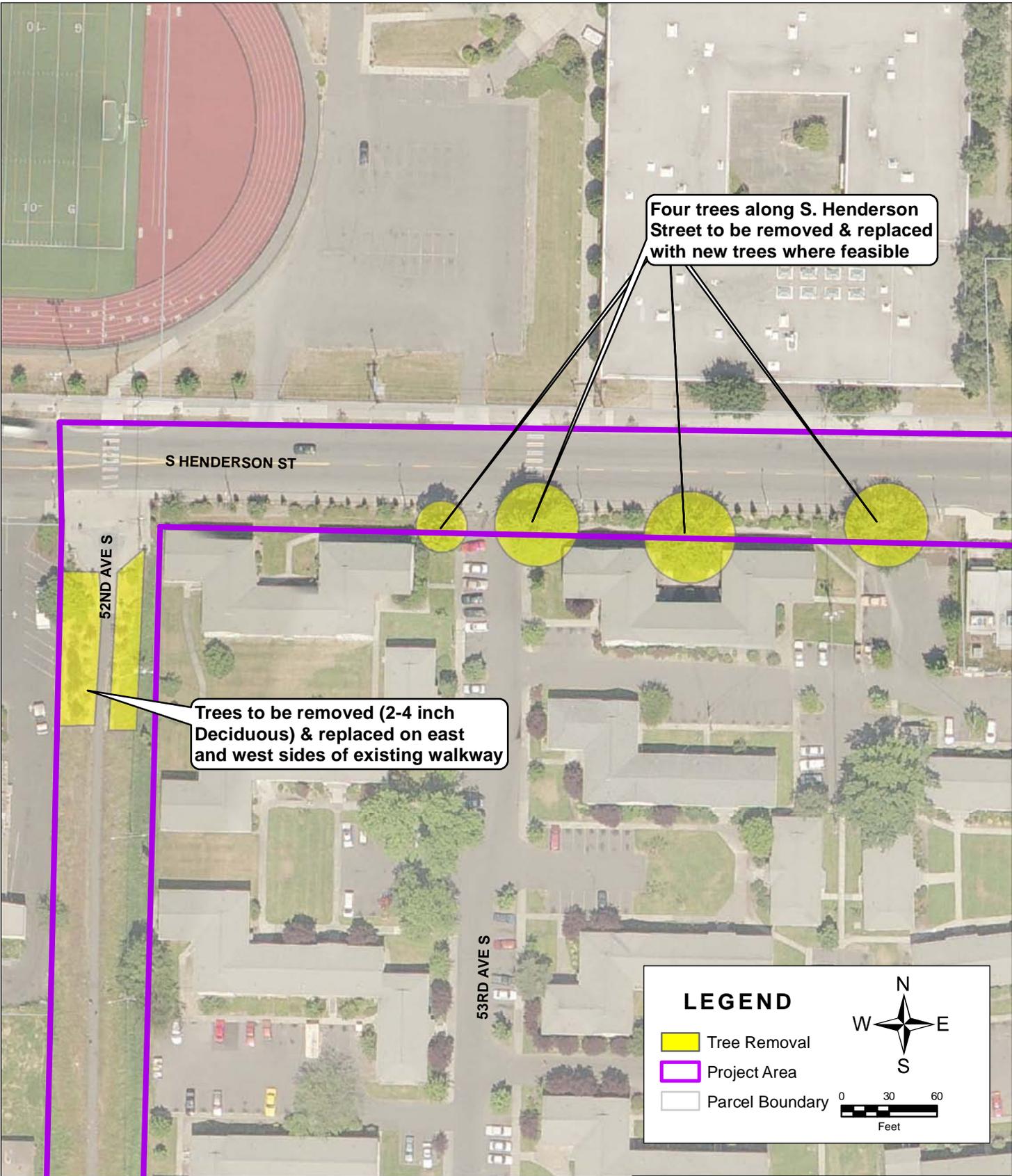


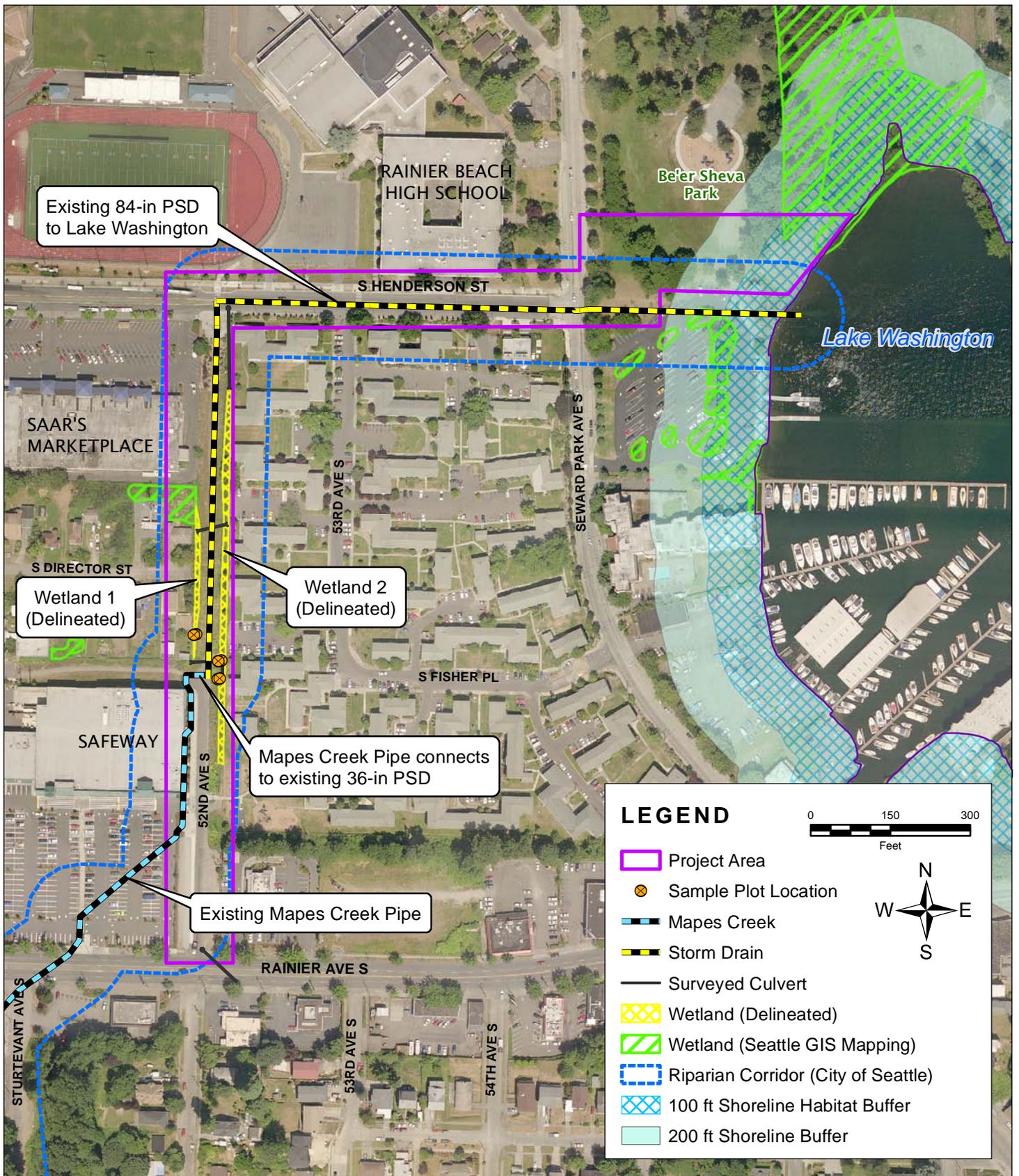


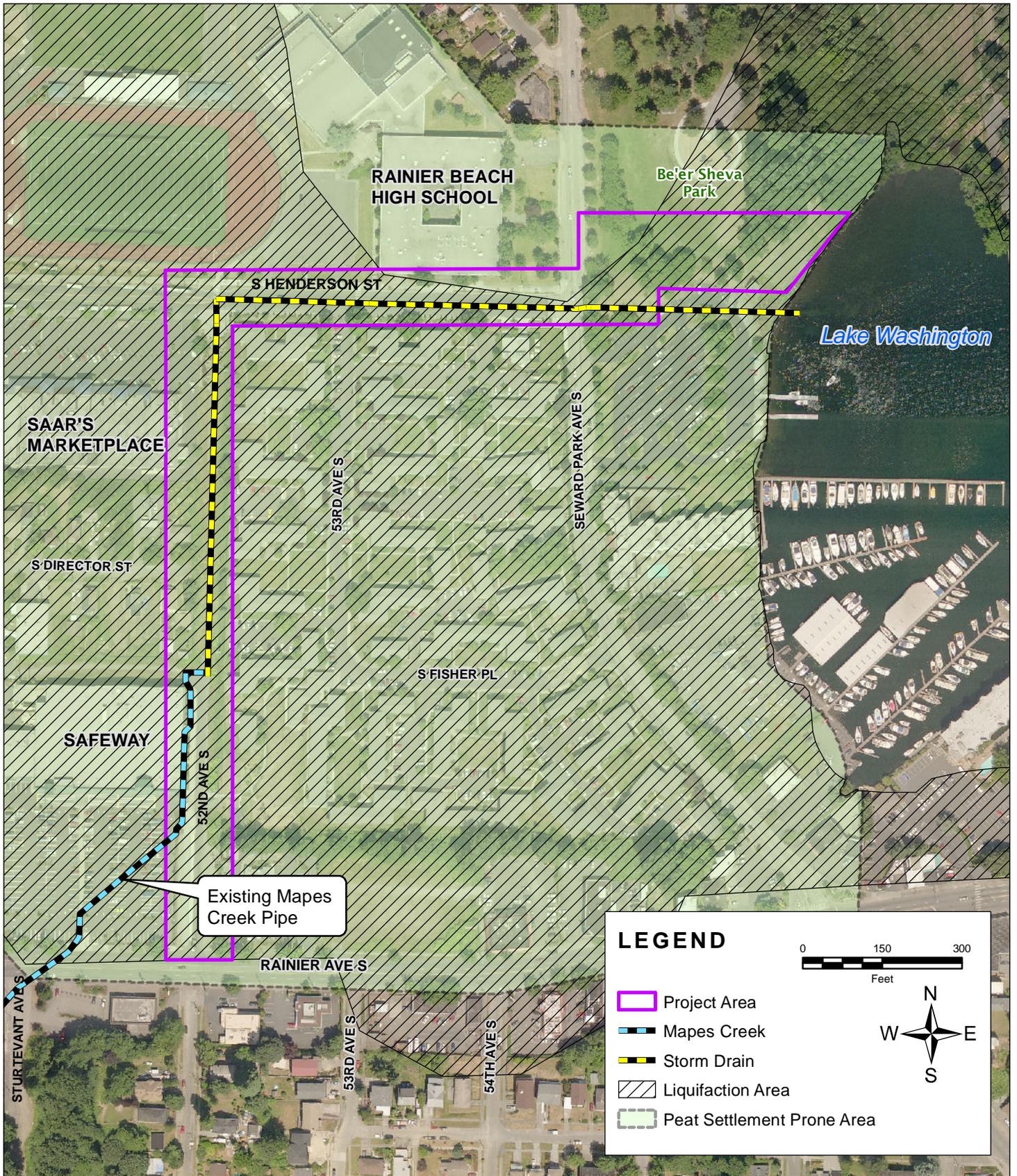


**POTENTIAL CONTRACTOR
PARKING AND STAGING
AREAS**

FIGURE 3







Attachment B – Greenhouse Gas Calculations

**Basin 47S/171 - 52nd Avenue South Conveyance Project and Mapes Creek Restoration Project
Attachment B -- Greenhouse Gases Emissions Worksheet**

Section I: Buildings						
Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO ₂ e)			Lifespan Emissions (MTCO ₂ e)
			Embodied	Energy	Transportation	
Single-Family Home			98	672	792	0
Multi-Family Unit in Large Building			33	357	766	0
Multi-Family Unit in Small Building			54	681	766	0
Mobile Home			41	475	709	0
Education			39	646	361	0
Food Sales			39	1541	282	0
Food Service			39	1994	561	0
Health Care Inpatient			39	1938	582	0
Health Care Outpatient			39	737	571	0
Lodging			39	777	117	0
Retail (Other than Mall)			39	577	247	0
Office			39	723	588	0
Public Assembly			39	733	150	0
Public Order and Safety			39	899	374	0
Religious Worship			39	339	129	0
Service			39	599	266	0
Warehouse and Storage			39	352	181	0
Other			39	1278	257	0
Vacant			39	162	47	0
*18" Diversion Sewer						31.4
*24" Mapes Creek Diversion Pipe						42.7
TOTAL Section I Buildings						74
*See Note 1 Below						
Section II: Pavement						
			Multiplier (MTCO ₂ e/1,000 sf)			Emissions (MTCO ₂ e)
						0
Pavement (sidewalk, asphalt patch)		8	50			400
TOTAL Section II Pavement						400
Section III: Construction						
(See detailed calculations below)						Emissions (MTCO ₂ e)
TOTAL Section III Construction						230
Section IV: Operations and Maintenance						
(See detailed calculations on previous page)						Emissions (MTCO ₂ e)
TOTAL Section IV Operations and Maintenance						11
TOTAL GREENHOUSE GAS (GHG) EMISSIONS FOR PROJECT (MTCO₂e)						715
<p>*Note 1: Embodied emissions of ductile iron are based on a per ton shipped weight of ductile iron. Refer to http://www.thefreelibrary.com (article: Metalcasting's carbon footprint: lawmakers are talking seriously about reducing greenhouse gases, but what does that mean for metalcasters?) The project will use approximately 1,800 feet of 18-inch ductile iron pipe. 18-inch-diameter ductile iron Class 350 pipe weighs 1,400 pounds/ 20 feet of pipe x 1,800 feet of pipe = 126,000 lbs or 63 tons (US). Given the amount of CO₂ per ton of ductile iron (0.55 tons (US) per ton of ductile iron) the ductile iron pipe material will contribute approx. 34.7 tons (US) or approx. 31.4 metric tons of CO₂. Assume 1 ton = 0.9071847 metric ton</p> <p>24-inch diameter ductile iron Class 350 pipe weighs 2,200 lbs/20 feet of pipe x 1,555 feet of pipe = 171,050 lbs or 85 tons (US). Given the amount of CO₂ per ton of ductile iron (0.55 tons (US) per ton of ductile iron) the ductile iron pipe material will</p>						

**Basin 47S/171 - 52nd Avenue South Conveyance Project and Mapes Creek Restoration Project
Attachment B -- Greenhouse Gases Emissions Worksheet**

Section III: Construction Details			
Construction: Diesel			
Equipment	Diesel (gallons)	Assumptions	
Semi Truck (Standard Engine w/ Flatbed)	260	26 days * 1 round trip/day * 50 miles/round trip * (1/5 miles/gallon)	
Dump Truck (w/ Pup Trailer)	7,090	(88 days * 8 round trips/day + 5 round trips) * 50 miles/round trip * (1/5 miles/gallon)	
Service/Work Truck/Van, Standard	2,500	150 days * 4 round trip/day * 50 miles/round trip * (1/12 miles/gallon)	
Two Excavators, Wheel Mounted Hydraulic, 164HP	6,960	2 Excavators * 75 days * 8 hr/day * 5.8 gallon/hr	
Front End Loader, GP, 4X4, 165HP	1,960	50 days * 8 hr/day * 4.9 gallons/hr	
Asphalt Paver, 48 HP	600	5 days * 8hr/day * 15 gal/hr	
Asphalt Roller, RD 27-120	80	5 days * 8hr/day * 2 gal/hr	
Subtotal Diesel Gallons	19,450		
GHG Emissions in lbs CO₂e	431,790	22.2 lbs CO ₂ e per gallon of diesel	
GHG Emissions in metric tons CO₂e	195.86	1,000 lbs = 0.45359237 metric tons	
Construction: Gasoline			
Equipment	Gasoline (gallons)	Assumptions	
Construction Worker Personal Vehicles	4,000	150 days * 8 round trip/day * 50 miles/round trip * (1/15 miles/gallon)	
Subtotal Gasoline Gallons	4,000		
GHG Emissions in lbs CO₂e	77,600	19.4 lbs CO ₂ e per gallon of gasoline	
GHG Emissions in metric tons CO₂e	35.20	1,000 lbs = 0.45359237 metric tons	
Construction Summary			
Activity	CO ₂ e in pounds	CO ₂ e in metric tons	
Diesel	431,790	195.86	
Gasoline	77,600	35.20	
Total for Construction	509,390	230	Note: Value rounded to nearest 10
Section IV: Long-Term Operations and Maintenance Details			
Operations and Maintenance: Diesel			
Equipment	Diesel (gallons)	Assumptions	
Subtotal Diesel Gallons	0		
GHG Emissions in lbs CO₂e	0	22.2 lbs CO ₂ e per gallon of diesel	
GHG Emissions in metric tons CO₂e	0.00	1,000 lbs = 0.45 metric tons	
Operations and Maintenance: Gasoline			
Equipment	Gasoline (gallons)	Assumptions	
O&M Crew Vehicles	1,200	100 years * 24 trips/year * 0.5 gal/trip	
Subtotal Gasoline Gallons	1,200		
GHG Emissions in lbs CO₂e	23,280	19.4 lbs CO ₂ e per gallon of gasoline	
GHG Emissions in metric tons CO₂e	10.56	1,000 lbs = 0.45 metric tons	
Operations and Maintenance Summary			
Activity	CO ₂ e in pounds	CO ₂ e in metric tons	
Diesel	0	0.00	
Gasoline	23,280	10.56	
Total for Operations and Maintenance	23,280	11	Note: Value rounded to nearest 1
Assumptions For Construction Vehicle Trips and Usage:			
Semi Truck: 26 Trips (includes 6 trips to deliver heavy equipment, 2 trips to deliver maintenance holes and flume, 12 trips to deliver ductile iron pipe, 6 trips to remove heavy equipment)			
Dump Truck: 709 trips (includes 704 trips for excavation and fill materials and 5 trips for clearing and replacing landscaping)			
Service/Work Truck/Van: 600 trips (includes 4 trips per day)			
Excavator Usage: 1,200 hours (includes 2 Excavators, 75 days, 8 hrs per day)			
Front End Loader Usage: 400 hours (includes 1 Front End Loader, 50 days, 8 hours/day)			
Asphalt Paver Usage: 40 hours (includes 1 Asphalt Paver, 5 days, 8 hours per day)			
Asphalt Roller Usage: 40 hours (includes 1 Asphalt Roller, 5 days, 8 hours per day)			
Contractor Worker Personal Vehicles: 1,200 Trips (includes 150 days, 8 trips per day)			
Total Vehicle Trips: 1517 Trips			