



Seattle Public Utilities

SEPA ENVIRONMENTAL CHECKLIST

A. BACKGROUND

A1. Name of proposed project, if applicable:

Henderson Basin 45 Combined Sewer Overflow (CSO) Reduction Project

A2. Name of applicant:

Seattle Public Utilities (SPU)

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

Kathleen Robertson, PE, Project Manager
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A4. Date checklist prepared:

March 26, 2012

A5. Agency requesting checklist:

Seattle Public Utilities

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

Construction is expected to occur between 2015 and 2017, and last for approximately 18 months.

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

SPU does not currently have plans for future additions, expansion, or further activity related to this proposal.

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

The following reports/studies have been or will be prepared:

Environmental Review (HDR, 2012a)
Noise Assessment (HDR, 2012b)
Traffic Analysis (HDR, 2012c)
Phase I Environmental Site Assessment (HDR, 2012d)
Cultural Resources Inventory (HRA, 2012)
Preliminary Geotechnical Evaluation (Shannon & Wilson, 2009)
Henderson Basin Preliminary Design Subsurface Explorations (Shannon & Wilson, 2011)
Construction Stormwater & Erosion Control Plan (to be prepared)
Spill Prevention Control and Countermeasure Plan (to be prepared)
Traffic Control Plan (to be prepared)

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

SPU is not aware of any pending governmental approvals of other proposals directly affecting the property covered by this proposal.

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

The following reviews, approvals, and permits are anticipated for this project:

- Washington Department of Ecology
- Engineering Report Approval
 - NPDES Construction Stormwater General Permit
- Seattle Department of Planning and Development
- Type V Council Land Use Decision – Concept Approval for City Facility
 - Master Use Permit II – SEPA Conditioning Approval
 - Master Use Permit – Shoreline Substantial Development Permit
 - Grading Permit
 - Building Permit
 - Electrical Permit
 - Plumbing Permit
 - Mechanical Permit
- Seattle Department of Parks and Recreation
- Revocable Permit to Use or Occupy Park Property (Revocable Use Permit)

Seattle Design Commission

- Project Review

Seattle Department of Transportation

- Street Use Permit
- Street Improvement Permit

Public Health – Seattle & King County

- Health Permit (Air Gap)

King County

- Industrial Waste Discharge Permit

Puget Sound Clean Air Agency

- Air Quality Permit

A11. 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.)

Sewers in the project area carry raw sewage away from the neighborhood so it can be treated at King County's West Point and South treatment plants before being discharged to Puget Sound. When it rains, these same sewers also carry untreated stormwater from neighborhood roofs, foundation drains and some streets. During heavy rains, if the amount of raw sewage and untreated stormwater exceeds the sewer system capacity, the system overflows into Lake Washington. These overflows are called "Combined Sewer Overflows", or CSOs, and they are a public health and environmental concern. The goal of the Henderson Basin 45 CSO Reduction Project is to reduce the number and volume of these sewage overflows from the project area.

A vicinity map is included as Attachment 1. The proposed improvements are described below and shown in Attachments 2 and 3. The area that would be affected by construction is outlined on Attachments 2 and 4 and called the Construction Impact Area.

During storm events, as the sewer system starts to reach its capacity, the excess sewage and stormwater would be diverted into an underground storage tank. Once the storm event is over, pumps would return the sewage and stormwater to the sewer system. Major project elements would include:

- An approximately 200,000 gallon underground storage tank, together with an associated underground facility vault that would house electrical, mechanical and odor control equipment. The storage tank and facility vault would be located on a residential parcel at 5560 South Holly Street. SPU plans to purchase the parcel and demolish the existing house in order to construct the tank and vault. The tank would be approximately 50

- feet wide, 72 feet long, and 24 feet deep. The facility vault would be approximately 50 feet wide, 28 feet long, and 12 feet deep.
- An above-ground electrical cabinet and air intake vents for the facility vault. These also would be located on the residential parcel. The vents would be approximately 2 feet high, 3 feet long, and 3 feet wide. The electrical cabinet would be approximately 6 feet high and may be up to 6 feet long and 2 feet wide.
 - An above-ground air exhaust vent for the facility vault and an odor control vent for the storage tank. These vents could be located on the residential parcel or within street rights-of-way and farther from adjacent residences. The air exhaust vent may be approximately 2 feet high, 3 feet long, and 3 feet wide. The odor control vent would be of similar size, but may be flush with the ground surface or approximately 2 feet high.
 - A new underground diversion structure near the South Holly Street and 57th Avenue South intersection. During heavy rain, this structure would direct excess sewage and stormwater from the sewer and into the underground storage tank, until the tank fills.
 - Approximately 75 feet of underground 12-inch-diameter pipe (referred to as “gravity line”) to divert flow from an existing maintenance hole at South Holly Street and 57th Avenue South to the underground storage tank.
 - Approximately 450 to 500 feet of underground 10-inch-diameter pipe (referred to as “gravity pressure pipe”) in the 57th Avenue South right-of-way, from South Holly Street to a new maintenance hole located downstream of Pump Station 10 near the Lake Washington shoreline.
 - Sump pumps in the storage tank and two approximately 30-foot-long, 6-inch-diameter underground pipes (referred to as “force mains”) to convey flow from the storage tank to the existing sewer along South Holly Street.
 - Modifications to the existing combined sewer piping and a control structure (labeled “NPDES 45B” on Attachment 2) near Pump Station 10 in the street right-of-way.
 - Possibly a new underground 12-inch-diameter odor control duct in the 57th Avenue South right-of-way between the tank’s facility vault and Pump Station 10, to help reduce potential odors at the pump station.
 - Stormwater treatment facilities to meet City of Seattle Stormwater Code requirements.
 - New sidewalk along the west side of 57th Avenue South, between the existing sidewalk that ends at the north side of the residential parcel and South Holly Street, with curb ramps.
 - Landscaping and pavement restoration.
 - Temporary construction staging area, possibly along South Warsaw Street in the right-of-way and including a small part of the adjacent Martha Washington Park. Prior to utilizing Martha Washington Park for construction staging, trees within the area would be surveyed and marked for protection as identified by the City and Seattle Department of Parks and Recreation arborists.

Other elements may include a fence on two sides or more of the residential parcel, a retaining wall, and new driveway access with removable bollards for tank and vault maintenance activities. Alternate configurations without a new driveway access and bollards are also being considered.

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

The proposed project is located in the northwest quarter of Section 26, Township 24 North, Range 4 East, W.M.

The new storage tank and facility vault would be constructed in a residential zoned property located at 5560 South Holly Street (Parcel Number 1102001113) (see Attachments 1 and 2). The legal description from the King County Assessor's information is:

BRIGHTON BEACH E 92 FT OF S 70 FT

Part of the proposed contractor staging area may be located on Martha Washington Park (Parcel Number 1102001300), which is owned and managed by Seattle Parks and Recreation for a variety of active and passive uses. The legal description from King County Assessor's information is:

BRIGHTON BEACH & 2ND CLASS SH LDS ADJ ALL BLOCKS 19-20-21
& 2ND CL SH LDS ADJ

Contractor staging area also may be located in public right-of-way on South Warsaw Street. The new diversion sewers and force mains would extend into South Holly Street and 57th Avenue South rights-of way. There are no parcel numbers or legal descriptions associated with street rights-of way.

B. ENVIRONMENTAL ELEMENTS

B1. 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 maximum slope at the proposed storage tank and facility vault site is approximately 13%. Along the new pipe alignment, 57th Avenue South slopes approximately 11% from S Holly Street down to Lake Washington.

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

The near-surface geology of the storage tank and facility vault site is expected to be Vashon Till, consisting of very dense to hard silt, sand, clay, and gravel, with scattered cobbles and boulders and lenses and stringers of sand and gravel. (Shannon & Wilson, 2009; Shannon & Wilson, 2011).

Subsurface conditions near Lake Washington by Pump Station 10 consist of lake deposits that are generally very soft to stiff, silt and clay with lenses and layers of sand and peat.

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.

There are no steep slope or known landslide critical areas in the vicinity of the project (Seattle, 2010a). There are no surface indications of unstable soils in the immediate vicinity of the project.

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

Soil disturbing activities such as excavation, grading, and filling would occur during construction of the new storage tank and facility vault and associated pipes and ducts. Construction of the new storage tank and facility vault would excavate and remove approximately 5,200 cubic yards of native soil, and add approximately 800 cubic yards of imported fill. Construction of the new pipes along 57th Avenue South would excavate and remove approximately 2,300 cubic yards of native soil, and add approximately 2,200 cubic yards of imported fill.

Fill materials would be obtained from a State-licensed purveyor of such materials. Excavated materials unsuitable for use on site would be disposed of at an approved offsite disposal location or used as fill at sites permitted for filling and grading.

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

Temporary erosion could occur during construction from clearing, demolition, excavation, stockpiling soil, final grading and other earthwork activities. Erosion would be minimized using best management practices.

No erosion impacts are anticipated during operation of the proposed project.

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

Project construction will result in a net increase of impervious area of approximately 200 square feet. The new impervious area would consist of a sidewalk extension in the 57th Avenue South right-of-way, from the north end of the storage tank and facility vault site to South Holly Street.

The percent of each site covered by impervious surfaces is summarized in Table 1.

Table 1. Impervious Surface Coverage by Site

Site	Approximate Existing Impervious Coverage	Approximate Impervious Coverage After Construction
Storage tank and facility vault Site (residential parcel at 5560 South Holly Street)	60%	60%
Proposed contractor staging area (South Warsaw Street right-of-way)	56%	56%
Proposed contractor staging area (the service road in Martha Washington Park)	11%	up to 11% (see note)
57 th Avenue South and South Holly Street rights-of-way (within the limits of proposed pipeline construction)	40%	42% (includes new sidewalk extension)

Note: The Seattle Department of Parks and Recreation may replace the service road in Martha Washington Park with grass or enhance the area with native plants once construction is completed.

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

A Construction Stormwater & Erosion Control Plan (CSECP) would be prepared and implemented by the contractor. Best Management Practices (BMPs) as identified in the City of Seattle’s Stormwater Code SMC 22.800 – 22.808, Director’s Rule: 2009-004 SPU/16-2009 DPD and Volume 2

Construction Stormwater Control Technical Requirements Manual would be used to manage stormwater runoff, construction disturbance, and erosion as needed during construction.

B2. 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 project 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 could occur during construction.

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 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 2 summarizes the GHG emissions carbon dioxide equivalent (CO₂e) by emission type; details are included in Attachment 5. CO₂e is used to express the global warming potential of all greenhouse gases as an equivalent in CO₂ emissions.

Table 2. GHG Emissions by Emission Type

Emission Type	Metric Tons CO ₂ e
Section I: Buildings	8,033
Section II: Pavement	350
Section III: Construction	563
Section IV: Operations and Maintenance	15
Total	8,961
Notes:	
<ol style="list-style-type: none"> 1. Construction is assumed to be 540 work days (approximately 18 months) 2. Lifespan of the project based on 100 years 3. One metric ton is equivalent to 2,205 pounds 	

Other Emissions – Treated Air

The project would include odor control equipment such as a carbon scrubber vessel, odor control fan, and mist eliminator to treat foul air from the storage tank and possibly from the Pump Station 10 wet well. Treated air would be discharged through an at- or above-grade exhaust on the storage tank and facility vault site or nearby within the street right-of-way and farther from adjacent residences. Odors are not expected except possibly when the odor control system is being serviced, which is expected to occur twice a year for up to three to four hours each time. Such odors are expected to be short-term and minor.

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 the project.

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

During construction, impacts to air quality would be reduced and controlled through implementation of standard federal, state, and local emission control criteria and City of Seattle construction practices. These would include requiring contractors to use best available control technologies, proper vehicle maintenance, and minimizing vehicle and equipment idling.

After construction, nuisance odors from the storage tank would be treated by routing the air through a carbon-based odor control system and then discharging the clean air through an exhaust vent near or at finished grade. The odor control exhaust vent may be located on the storage tank and facility vault site or in the street right-of-way farther from adjacent residences. During semi-annual odor control system maintenance, some odors may be present immediately around the odor control facility for a few hours.

B3. Water

a. Surface:

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

Surface water bodies or wetlands do not exist on the project site.

Lake Washington is approximately 40 feet east of the proposed construction impact area where the pipes will be modified near Pump Station 10. The U.S. Army Corps of Engineers (USACE) maintains the normal low and high lake levels at approximately +16.7 feet during winter and +18.7 feet NAVD 88 (HDR, 2009). The Cedar and Sammamish Rivers flow into Lake Washington. Lake Washington discharges into Lake Union via the Lake Washington Ship Canal.

A lake-fringe wetland exists approximately 280 feet east of the proposed construction impact area (Seattle, 2011a). (See Attachment 4). The mapped wetland corresponds to a shoreline restoration project site that was completed in 2005 (Seattle, 2005).

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.

No project work will occur in or over Lake Washington or the lake-fringe wetland. Approximately 125 feet of new gravity pressure pipe down 57th Avenue South will extend into the 200-foot shoreline jurisdiction of Lake Washington (see Attachment 4).

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 surface waters or wetlands in the project area.

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

No surface water withdrawals or diversions are required for the project.

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

The project is not within a 100-year floodplain.

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

The project would not discharge waste materials to surface waters.

b. Ground:

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

The completed project would not withdraw groundwater or discharge water to groundwater. Existing geotechnical information (Shannon & Wilson, 2009) indicates excavations for construction would extend below the groundwater table, likely requiring dewatering. Water withdrawn during dewatering would be managed in accordance with the requirements of the NPDES Construction Stormwater General Permit.

- 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 the 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.**

The primary source of surface runoff would be stormwater. During construction, surface water run-on and runoff would be managed in accordance with the City of Seattle's Director's Rule 16-2009. Treated water would be pumped or drained by gravity to a permitted discharge location. Erosion control measures would be utilized to minimize mobilization of sediment by stormwater runoff.

Water used for dust control would not be expected to generate runoff.

After construction, runoff would be collected, treated as required, and discharged to the existing storm drain system located in 57th Avenue South. New runoff collection and treatment facilities 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, 2009). The design would include Green Stormwater Infrastructure (GSI), if feasible, or more conventional stormwater treatment

such as stormwater treatment vaults if GSI is not feasible. 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

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

No significant amounts of waste materials would enter the ground or surface waters during construction or operation of the proposed project. The storage tank would be constructed of concrete that can develop “shrinkage cracks” as concrete hardens. These cracks are typically hairline size through which negligible amounts of groundwater may seep into the tank and negligible amounts of sewage could potentially seep out of the tank when it contains sewage.

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

No adverse impacts to surface, ground, or runoff water are anticipated. BMPs, as identified in the City of Seattle’s Stormwater Code SMC 22.800 – 22.808, Director’s Rule: 2009-004 SPU/16-2009 DPD, and Volume 2 Construction Stormwater Control Technical Requirements Manual, would be used to control erosion and sediment transport from the project site during construction. Water quality treatment would be implemented as necessary to improve the quality of intercepted stormwater flows from adjacent impervious surfaces. The contractor would develop and implement a Construction Stormwater and Erosion Control Plan (CSECP), including a Stormwater Pollution Prevention Plan (SWPPP) and Spill Prevention and Countermeasures Plan (SPCP) to reduce the potential for sediment, waste materials, construction-related leaks and spills to contaminate surface, ground, and runoff water.

O&M personnel would be trained to conduct maintenance activities in a manner that minimizes the risk of spills.

B4. Plants

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

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

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

shrubs

grass: Mowed grass as part of Martha Washington Park

pasture

- crop or grain
- wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other willow
- water plants: water lily, eelgrass, milfoil, other
- other types of vegetation Himalayan blackberry, English ivy

Existing vegetation at the storage tank and facility vault site consists of mowed grass, ornamental shrubs, and a row of approximately 20 large columnar evergreen shrubs near the southwestern corner of the property.

Vegetation in the proposed contractor staging area in Martha Washington Park consists of mowed grasses that are regularly maintained. Maple trees and ornamental cherry trees are present along the perimeter of the staging area.

Mowed grasses and some ornamental shrubs adjoin the curbs of South Warsaw Street, South Holly Street and 57th Avenue South. One Deodar cedar tree adjoins 57th Avenue South on the west side of the street. Ornamental viburnum shrubs surround Pump Station 10 near the end of the new gravity pressure pipe.

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

The proposed project would remove approximately 6,300 square feet of grass, several shrubs and approximately 20 large evergreen shrubs at the storage tank and facility vault site and in the 57th Avenue South right-of-way. The root system of a large Deodar cedar located on the west side of 57th Avenue South may be impacted by construction. Construction is not expected to affect trees in Martha Washington Park or other trees along 57th Avenue South.

The staging area in Martha Washington Park would disturb approximately 17,200 square feet of grass.

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

According to a review of the Washington Department of Natural Resources Natural Heritage Program, "Sections that Contain Natural Heritage Features, Data Current as of November 4, 2011" list (WDNR, 2012), no documented threatened or endangered plant species, rare plants or rare plant communities are on or near the project site.

According to the U.S. Fish and Wildlife Service (USFWS, 2012) website, Western Washington Fish and Wildlife Office, 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 on the project

site because the site does not provide the appropriate habitat and because the area is regularly mowed and maintained.

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

At the storage tank and facility vault site, approximately 5,800 square feet would be planted with a combination of drought tolerant, native shrubs and groundcover, and pavement grids that allow grass to grow through. Temporary irrigation systems would be used during the plant establishment period (typically 1 to 2 years) to reduce plant mortality.

The non-paved portion of the 57th Avenue South and South Warsaw Street rights-of-way would be replanted with grass. A city arborist would assess the condition and potential impacts of construction on the Deodar cedar in the 57th Avenue South right-of-way before construction begins. SPU would try to adjust the pipe alignment to avoid damaging the tree's root system and require the contractor to protect the tree during construction. If the Deodar cedar should be significantly impacted by construction and requires removal, SPU would replace it.

The proposed contractor staging area in Martha Washington Park may be replaced with grass or native plantings that enhance the park. Landscape restoration in Martha Washington Park would be coordinated with the Seattle Department of Parks and Recreation.

B5. 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, ducks, Canada geese, crows, woodpeckers, loons, grebes, cormorants, merganser
mammals: deer, bear, elk, beaver, other: Nutria, small mammals
fish: bass, salmon, trout, herring, shellfish, other: _____

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

Listed species and designated critical habitat that may occur within the project area were identified from species lists on the NOAA Fisheries website (NOAA Fisheries, 2012) and the USFWS website (USFWS, 2012) and a review of the Seattle Biological Evaluation (Seattle, 2011c). There are no known occurrences of listed threatened or endangered species in the project area.

The project area is near Lake Washington, which has Chinook salmon (*Oncorhynchus tshawytscha*), steelhead (*Oncorhynchus mykiss*), and bull trout (*Salvelinus confluentus*). Adult Chinook salmon and steelhead migrate

through Lake Washington to spawning tributaries. Adult bull trout use Lake Washington for foraging. Juvenile Chinook salmon and steelhead utilize the nearshore as they migrate out of Lake Washington to Puget Sound. Lake Washington is also designated critical habitat for Chinook salmon and bull trout.

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

Lake Washington is a migration route for salmon. The Puget Sound basin lies within the Pacific Flyway, a major travel route for waterfowl and songbirds as they access breeding habitats in Canada and Alaska in the summer and wintering areas further south during the winter. Lake Washington attracts large flocks of American widgeon, Common coot, Canada geese and songbirds that feed and rest in the area during migration.

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

The proposed project would not disturb existing mature vegetation in Martha Washington Park that may currently provide some level of wildlife habitat. Vegetation to be removed from the storage tank and facilities vault site and along South Holly Street and 57th Avenue South are not native and provide a limited amount of habitat support. Replanting disturbed vegetated areas with in-kind or native plant species would help preserve or enhance existing wildlife. Replanting within Martha Washington Park would be coordinated with the Seattle Department of Parks and Recreation.

During construction, the contractor would prepare and implement a Construction Stormwater & Erosion Control Plan (CSECP) to reduce the potential for erosion, sediment discharges and construction-related leaks and spills into surface, ground, and runoff water and offsite. The measures the contractor would implement would preserve or enhance existing wildlife in the project area, including endangered species in Lake Washington.

The completed project would improve water quality within Lake Washington, which would benefit wildlife.

B6. Energy and Natural Resources

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

The completed project would require electricity at the facility vault to operate lights and mechanical equipment, such as sump pumps, the odor control fan, ventilation units, instrumentation and some maintenance equipment.

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

The project would not 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 facility vault would be designed to meet the current energy code as required by the City of Seattle.

B7. Environmental Health

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

A Phase I Environmental Site Assessment (HDR, 2012d) conducted for the project did not find any recognized environmental conditions related to hazardous substances that would be expected to affect construction of the project.

Lead-based paint may be encountered during demolition of the residence at 5560 South Holly Street, which was reportedly constructed in 1957. There is a low probability of encountering materials that contain asbestos or lead-based paint in the buried remains of a former school building in Martha Washington Park.

Some risk of spills or leakage of fuel, hydraulic fluid, oil, lubricants, solvents, paints, and other chemical products from heavy equipment would exist during construction as a result of equipment failure or worker error. Normal precautions would be taken when storing equipment, hazardous fuels, and other materials used in construction of the project.

Chemicals used at the completed project facilities typically would include cleaning supplies for washing work surfaces and industrial solvents for cleaning electrical and mechanical machinery. Lubricants would be used on mechanical equipment. Activated carbon would be used as filter media in the odor control scrubber and replaced annually.

1) Describe special emergency services that might be required.

The project will not require special emergency services, either during or after construction. Typical emergency services for fire and medical

incidences would be provided by the City of Seattle Fire Department.
Security needs can be met by the City of Seattle Police Department.

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

In accordance with the Washington Department of Labor and Industries (WAC 296-843), the contractor would submit a Health and Safety Plan before the construction commences.

The contractor would be required to implement BMPs to prevent or control environmental health hazards. Contaminated soil and groundwater, lead paint, asbestos or other hazardous material, if encountered during construction, would be managed and disposed of in accordance with applicable regulatory requirements. The contractor would be required to provide an emergency response plan, have spill response materials on hand, and know proper hazardous materials storage, handling, and emergency procedures, including proper spill notification and response (SPCC Plan).

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 is low, consisting of vehicle traffic, boat traffic on Lake Washington, and other noise typical of urban residential neighborhoods and passive parks. To characterize existing noise conditions, short-term (10-minute) noise monitoring was conducted at ten locations in the vicinity of the project site. Noise levels ranged from 36 decibels (dBA) to 54 dBA. This level noise would not affect the project during construction or operation. (HDR, 2012b)

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.

The primary source of noise created by the project would be during construction. The Seattle Municipal Code (SMC 25.08) establishes limits on timing, levels, and durations of noise crossing property boundaries. For the project vicinity, which is an area zoned single-family residential, the limit is 55 dBA during the day and 45 dBA at night. The SMC allows temporary increases in the noise limits depending on the type of equipment being used and the duration of the exceedance. During daytime construction hours, noise levels may exceed the limits by no more

than 25 dBA for construction equipment, such as excavators and bulldozers. For jackhammers, pavement breakers and similar equipment, the SMC allows increases up to 90 dBA for continuous operation to 99 dBA for 7 1/2 minutes.

Federal Highway Administration's (FHWA)'s Roadway Construction Noise Model (FHWA, 2006) was used to estimate noise levels at residences and park locations near the storage tank and facility vault site and pipeline alignments. The model results indicate construction noise levels would typically range from about 56 dBA to 78 dBA. Noise levels would be highest at residences immediately adjacent to construction activities. At greater distances, other homes and intervening vegetation would reduce noise levels. The noise analysis concluded that the proposed project is unlikely to exceed the SMC construction noise limits. (HDR, 2012b). (HDR, 2012b)

The project is located in an area zoned single-family residential. The SMC limits noise from construction activities to between 7 a.m. and 7 p.m. during the week and 9 a.m. and 7 p.m. on weekends and legal holidays. For this project, construction would typically occur between 7 am and 6 pm on weekdays, except for emergencies that may occur before or after those times.

After construction, noise impacts from the completed project are anticipated to be below SMC limits, and primarily associated with periodic inspection and maintenance activities. Permanent noise-generating equipment would be buried underground. Air vent intake and exhaust ports for the facility vault and the odor control exhaust vent would be fitted with duct silencers and vibration dampeners to provide additional noise attenuation.

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

Contractors would be required to comply with noise limits established in SMC 25.08, including muffling equipment as necessary. The provisions of SMC 25.08 would be enforced while the project is under construction and during operation, except for emergencies.

B8. Land and Shoreline Use

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

The storage tank and facility vault site is a single-family parcel with an existing residence. Adjacent properties to the south, west and north are also single-family residences. Martha Washington Park is located across the street.

The pipeline portions of the project are located in public right-of-way along South Holly Street and 57th Avenue South. Adjacent land uses are single-family residential and recreational.

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

The land occupied by the proposed project facilities has not been used for agriculture in recent history.

c. Describe any structures on the site.

The above-ground structures consist of a single-family house, which was constructed in 1957 on the proposed storage tank and facility vault site, and Pump Station 10 at the end 57th Avenue South.

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

The single-family residence on the proposed storage tank and facility vault site would be demolished. No other structures would be demolished for the project.

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

The current zoning classification of the storage tank and facility vault site is Single Family (SF) 7200. The current zoning classification of Martha Washington Park is SF 9600 (King County, 2011).

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

The current comprehensive plan future land use designations are Single Family Residential for the storage tank and facility vault site and City-Owned Open Space for Martha Washington Park (Seattle, 2010b).

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

The Shoreline Master Program (SMP) designation for 57th Avenue South street end is Conservancy Recreation north of the road centerline, and Urban Residential south of the road centerline. A portion of the gravity pressure pipe would extend into shoreline jurisdiction. Conservancy Recreation allows construction of utility lines, such as pipelines.

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

The 57th Avenue South street end is within the 100-foot shoreline habitat buffer (Seattle, 2011c, 2012a). The new gravity pressure pipe in 57th Avenue South right-of-way would extend approximately 30 to 50 feet into this buffer.

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

During construction, an average of 10 construction workers would be working on site, with up to 20 workers during peak periods of construction activity.

People will not reside in the completed project. Typically, two or three-person crews would visit the completed project for a few hours a day on a monthly basis to perform inspection and maintenance activities. Crews may be at the site for longer hours to respond to infrequent emergencies, if these occur.

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

The project would displace two people who currently rent the existing single-family residence on the proposed storage tank and facility vault site.

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

The project would limit displacement impacts by constructing the storage tank and facility vault on one parcel. SPU offers renters relocation assistance and benefits if the occupants remain tenants until SPU actually purchases the property, in accordance with SMC 20.84.

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

The proposed project is compatible with existing and projected land uses and plans.

B9. Housing

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

The project would not provide housing units.

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

One middle-income, single-family housing unit would be demolished or possibly relocated, if a buyer is interested.

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

Measures to reduce housing impacts include designing the facility to fit on one parcel so that only one housing unit needs demolishing and providing relocation benefits to the renters per SMC 20.84. In addition, the house may be offered for sale for possible relocation.

B10. Aesthetics

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

Most of the proposed structures would be below grade. Above-ground components consist of air intake and exhaust vents (approximately 2 feet tall), an odor control exhaust vent (approximately 2 feet tall), a box housing a reduced pressure backflow assembly (approximately 2 feet tall), and an electrical cabinet (approximately 6 feet tall).

The site may have a retaining wall ranging from 2 to 7 feet in height around the north, west, and south sides of the tank site. A 3.5-foot-high fence would be installed along the top of the retaining wall as a protective barrier if it exceeds 30 inches in height. If a retaining wall is not built or does not exceed 30- inches in height, a fence would likely be built along the property line on the west and north sides to help screen the site from adjacent residences. The style of fencing would be coordinated with the adjacent property owners.

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

Construction activities would temporarily alter or obstruct views from adjacent properties and Martha Washington Park.

The completed project would not obstruct views. Demolition of the existing residence and construction of the proposed project would alter the view by creating mostly open space with a few fairly small above-ground structures, as described in Section A11.

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

The completed project creates approximately 5,800 square feet of open space. Measures to reduce or control aesthetic impacts would include landscaping with drought tolerant, native vegetation to help screen above-ground features; using sculpted concrete for retaining wall faces, residential style fencing, grasscrete for vehicular access on the storage tank site; and restoring grassy areas in Martha Washington Park disturbed by construction staging.

B11. Light and Glare

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

Construction of the project is expected to occur during daylight hours and should not require lighting.

The completed project would not produce any visible light or glare because the facility would be below-grade. Security lighting is not proposed. If SPU needs to add security lighting at a later date because of illicit activity, it would be shielded and directed down to avoid creating glare impacts.

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

No light or glare from the 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 either the construction or operation of the project.

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

The project would not produce light and glare impacts, so no measures are proposed.

B12. Recreation

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

Martha Washington Park is located between Lake Washington, 57th Avenue South and south of South Warsaw Street. Pritchard Island Beach and Beer

Sheva Parks are located along the Lake Washington shoreline approximately 1 mile and 1.4 miles, respectively south of the project area. Seward Park is located along Lake Washington approximately one-half mile to the north. The Seattle Department of Parks and Recreation owns and manages these parks for a variety of active and passive uses (Seattle, 2012b). In addition, pedestrians, joggers and bicyclists use the public streets and sidewalks.

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

Construction of the project would temporarily reduce street parking, restrict access along South Warsaw Street and use a portion of Martha Washington Park for construction staging. Additional discussion of traffic and transportation impacts during construction can be found in Section B14.g.

SPU is proposing to construct a CSO storage facility in nearby Seward Park at the same time and as part of the same construction contract as the proposed project. During construction, cumulative impacts on recreation would occur from the partial closure of Martha Washington Park concurrent with the partial closure of Seward Park. Construction activities would result in temporary reduction of available parking, intermittent street closures, and temporary loss of access to a portion of adjacent shoreline. Park users may seek recreational opportunities elsewhere, temporarily increasing usage of other parks.

The completed project would not displace existing recreational uses in the project vicinity. Street parking and the proposed construction staging area in Martha Washington Park would be restored to pre-project conditions upon completion of construction.

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

During project construction, proposed measures to reduce temporary impacts on recreation would include:

- Coordinating with the Seattle Department of Parks and Recreation regarding maintenance and recreational activities at Martha Washington Park.
- Providing advance public notification and signage of temporary street and park area closures.
- Restoring the construction staging area to pre-project conditions following construction.

B13. Historic and Cultural Preservation

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

A single-family residence on South Holly Street built in 1928 is near the storage tank and facility vault site. This building may be eligible for the Seattle Landmark Register, King County and Local Landmarks List and/or National Register of Historic Places (HRA, 2012).

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

Two shovel probes excavated in the proposed construction staging area in Martha Washington Park encountered potential historic-period cultural materials including brick, colorless glass, and porcelain fragments three to four inches below the ground surface. None of the artifacts was diagnostic with regard to time or function. Archaeologists noted the presence of a paved service road in the staging area, which is also visible on a 1936 aerial photograph. A grove of fruit trees is adjacent to this area. No remnants were visible on the ground surface of the residence and outlying buildings used by former juvenile court judge Everett T. Smith from about 1889 to 1920 or buildings for the Martha Washington School for Girls, which were used from about 1921 until the early 1970s..

Of the six buildings within or near the project area and Pump Station 10 that were assessed, only the single-family residence noted in Section B13.a (above) was identified for further consideration. The residence is a Tudor Revival design featuring an unusual use of a textured-style of brickwork that reflects early twentieth-century ideas about craftsmanship and home design. Owners altered the original house, including adding a covered patio and deck to the south side and replacing wood-framed with metal-sash windows.

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

The completed project would not have an adverse impact on Martha Washington Park or the residence on South Holly Street that may be eligible for listing on national, state or local registers. Surface restoration of the storage tank and facility vault site would be designed to maintain the residential character of the neighborhood.

During construction, the service road observed in Martha Washington Park would likely be used for access to the proposed construction staging area. Measures to reduce or control potential disturbance of shallow subsurface artifacts in this area would include use of rubber-tired or low-pressure track

equipment and not allowing excavation. However, as part of restoration after construction, the Seattle Department of Parks and Recreation may require replacing the service road with grass and native plantings. If restoration activities involve excavation, a professional archaeologist would be consulted and appropriate action taken. This could include being present during any changes and recording and documenting any findings in accordance with regulations.

Should evidence of cultural artifacts or human remains be encountered during excavation, work within the immediate area would be suspended and the find examined and documented by a professional archaeologist. Decisions regarding appropriate mitigation and further action would be made at that time, including coordination with appropriate tribal, local, and state authorities.

B14. 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.**

Access to the project site would be via 57th Avenue South and South Holly Street (see Attachment 2, Figure 2). The project site is approximately one-half mile south of South Orcas Street, one-half mile north of South Othello Street, one-half mile east of Rainier Avenue South, 3.5 miles south of I-90 and 1.5 miles east of I-5.

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

Public transit does not currently serve the project site. The nearest public transit stop is approximately 660 feet from the project site at South Holly Street and Seward Park Avenue South.

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

The completed project would have up to two parking spaces on the storage tank and facility vault site for SPU operations and maintenance staff. No public parking spaces would be created or eliminated.

Pipeline construction would temporarily close off two parking spaces at the street end near Pump Station 10, including one Americans with Disabilities Act (ADA) space. These would be restored after construction. An additional 47 parking spaces may be temporarily eliminated as a result of construction activities along 57th Avenue South, South Holly Street and South Warsaw Street.

HDR conducted an informal survey of on-street parking to help assess the impact of temporarily eliminating parking along 57th Avenue South, South Warsaw Street, and South Holly Street during construction. As summarized in Table 3 (following page), a total of 281 on-street parking spaces are available in the vicinity of the project. On average, approximately half the parking spaces on South Holly Street and the majority of parking spaces along South Warsaw Street and 57th Avenue South are available. Of the 281 spaces, 49 (approximately 17%) would be closed intermittently during construction, primarily near the South Holly Street and 57th Avenue South intersection, along 57th Avenue South from the storage tank and facility vault site to the street end near Pump Station 10 and along Warsaw Street, east of 57th Avenue. In addition, some parking spaces may be used during the work day by construction workers.

Table 3. Basin 45 - Available On-Street Parking Spaces

Street Name	From	To	Total On-Street Parking Spaces (Approximate)
North-South Streets			
57th Avenue South	Seward Park Avenue South	Dead end	68
56th Avenue South	South Holly Street	Dead end	18
Holly Terrace South	South Holly Street	Dead end	18
Hampton Road South/South Oaklawn Place	South Eddy Street	Dead end	40
East-West Streets			
South Eddy Street	Dead end	57th Avenue South	41
South Morgan Street	57th Avenue South	Seward Park Avenue South	20
S Morgan Place	Cul-de-sac	57th Avenue South	16
Unnamed Street	57th Avenue South	Dead end	11
South Warsaw Street	Dead end	57th Avenue South	32
South Holly Street	57th Avenue South	Seward Park Avenue South	17
Total			281

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

The project will not require any new roads, streets, or improvements to existing roads or streets. After construction, damaged roads and streets will be restored to preconstruction conditions.

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

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

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

The maximum number of vehicular trips per day would occur during construction and is expected to have the greatest impact on local streets between interstate highways (e.g., I- 5 and I-90) and the project. Construction traffic would not significantly impact traffic volumes on the interstate highways. Approximately 8,814 vehicle trips are expected over an 18-month construction period, as shown in Table 4.

Table 4. Anticipated Construction Trips

Equipment Type	Total Estimated Trips
Truck Trips (e.g., semi trucks, dump trucks, concrete pumper trucks)	1,690
Service Work Truck and Van Trips	1,644
Contractor Employee Vehicles	5,480
Total	8,814

The number of Contractor Employee Vehicles assumes some workers would carpool or use public transportation.

The peak number of daily trips by construction traffic is estimated at 24 trips per day and expected to occur during excavation and backfilling of the storage tank and concrete delivery. The peak number of contractor employee vehicle trips at this time would be approximately 15 trips per day, for a total peak volume of 39 trips per day.

The completed project would generate approximately one vehicle trip four times per year during normal business hours, except for emergencies. The trips would be for routine operation and maintenance activities.

The Seward Park CSO Reduction project would be constructed at the same time and as part of the same construction contract as this project. During construction, there would be cumulative impacts from increased traffic along common haul routes, damage to roadways, and construction vehicles disturbing pedestrians and cyclists.

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

The completed project would not impact transportation; therefore, mitigation measures are not proposed.

To reduce or control transportation impacts from this project and potential cumulative effects associated with simultaneous construction of the Seward Park CSO Reduction project, the contractor would be required to comply with SDOT policies and the conditions of the project's street use permit regarding temporary road and lane closures. The contractor would prepare and implement a traffic control plan detailing the haul routes for construction traffic and traffic control measures, including:

- Phasing construction to maintain emergency services and local access to homes, parks and businesses and limit lane and road closures.
- Using flaggers and other methods to manage traffic queuing and vehicles entering and exiting the construction site.
- Providing advance public notice and signage of temporary closures or road restrictions.
- Posting warning signs and flaggers for bus, pedestrian, and bicycle traffic.
- Providing signage at the park regarding driving routes that would avoid construction traffic with the same information posted on the SPU and Seattle Department of Parks and Recreation websites.

B15. Public Services

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

The project would not result in an increased need for public services when complete or during construction.

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

During construction, the project would be required to accommodate emergency access for residences along South Holly Street, South Warsaw Street and 57th Avenue South when these are temporarily closed for construction. Closures and access would comply with SDOT policies and the conditions in the project's street use permit.

No measures would be required for the completed project.

B16. Utilities

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

SPU would construct approximately 500 feet of combined sewer as part of this project within the 57th Avenue South and South Holly Street rights-of-way. SPU may also need to relocate existing side sewers and waterlines within the proposed construction impact area, which could temporarily disrupt service to nearby residences. Construction activities would be typical of pipe installation.

Existing overhead electrical (Seattle City Light) and communications (Century Link) utilities on the north side of South Holly Street and west side of 57th Avenue South would be buried to the next overhead pole adjacent to the storage tank and facility vault site. Burying the utilities may result in temporary disruptions in service to residences in the vicinity.

SPU would coordinate with local utilities regarding their facilities and residents regarding service disruptions caused by project construction.

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

Date: *March 26, 2012*

REFERENCES

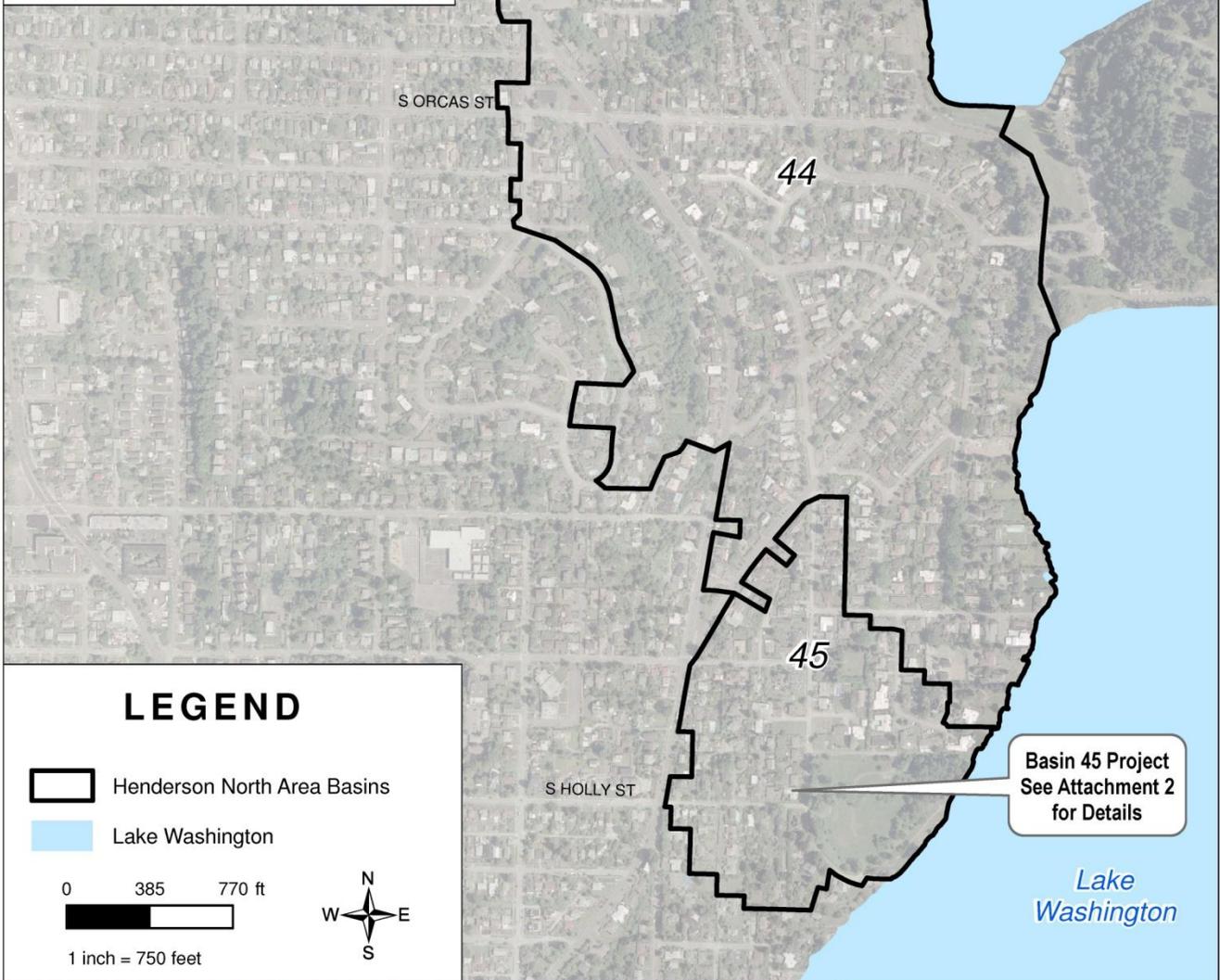
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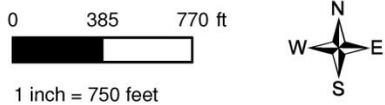


HENDERSON NORTH AREA LOCATION



LEGEND

-  Henderson North Area Basins
-  Lake Washington

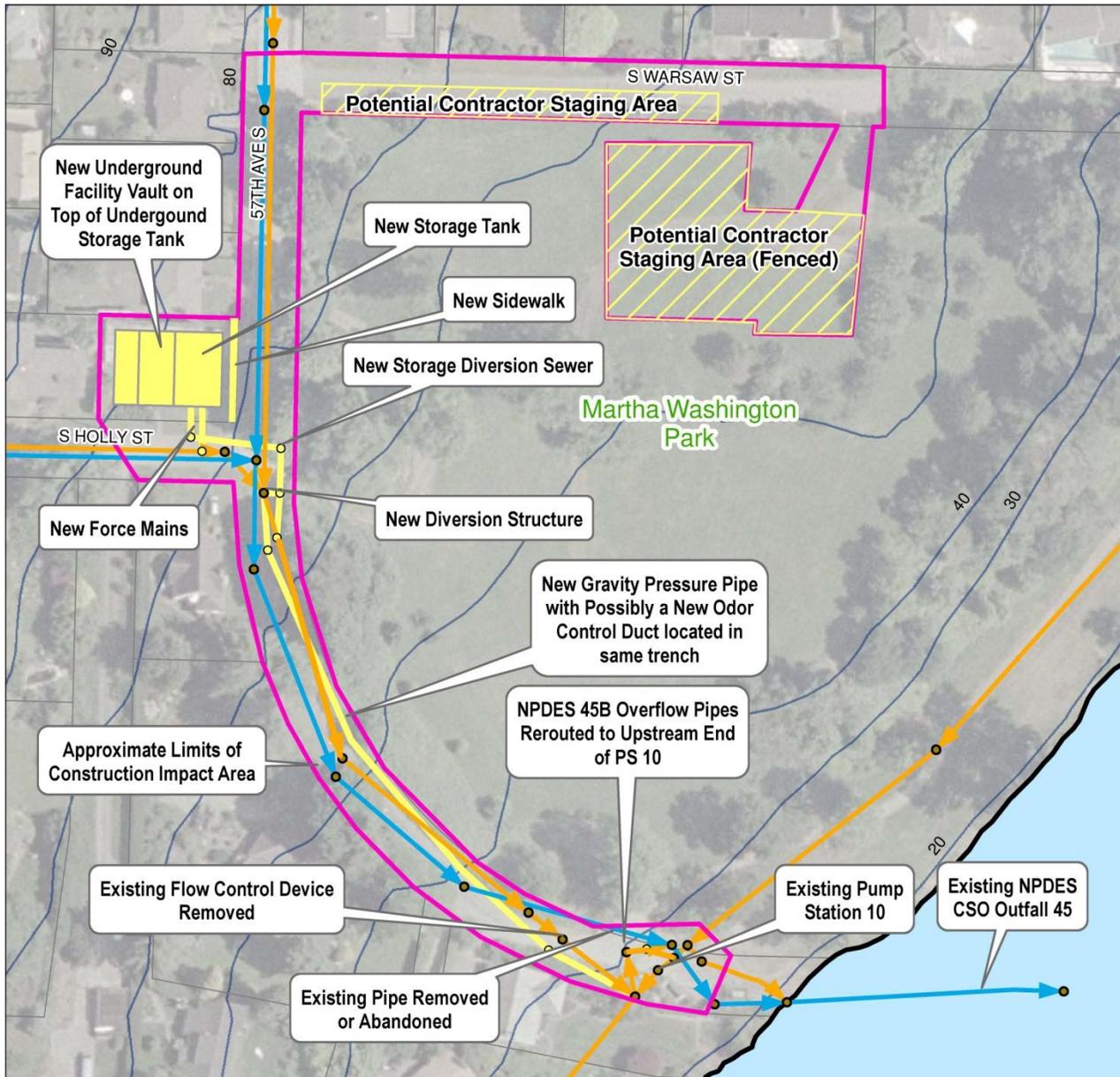


Basin 45 Project
See Attachment 2
for Details



**Henderson Basin 45 CSO Reduction Project
SEPA Checklist**

VICINITY MAP

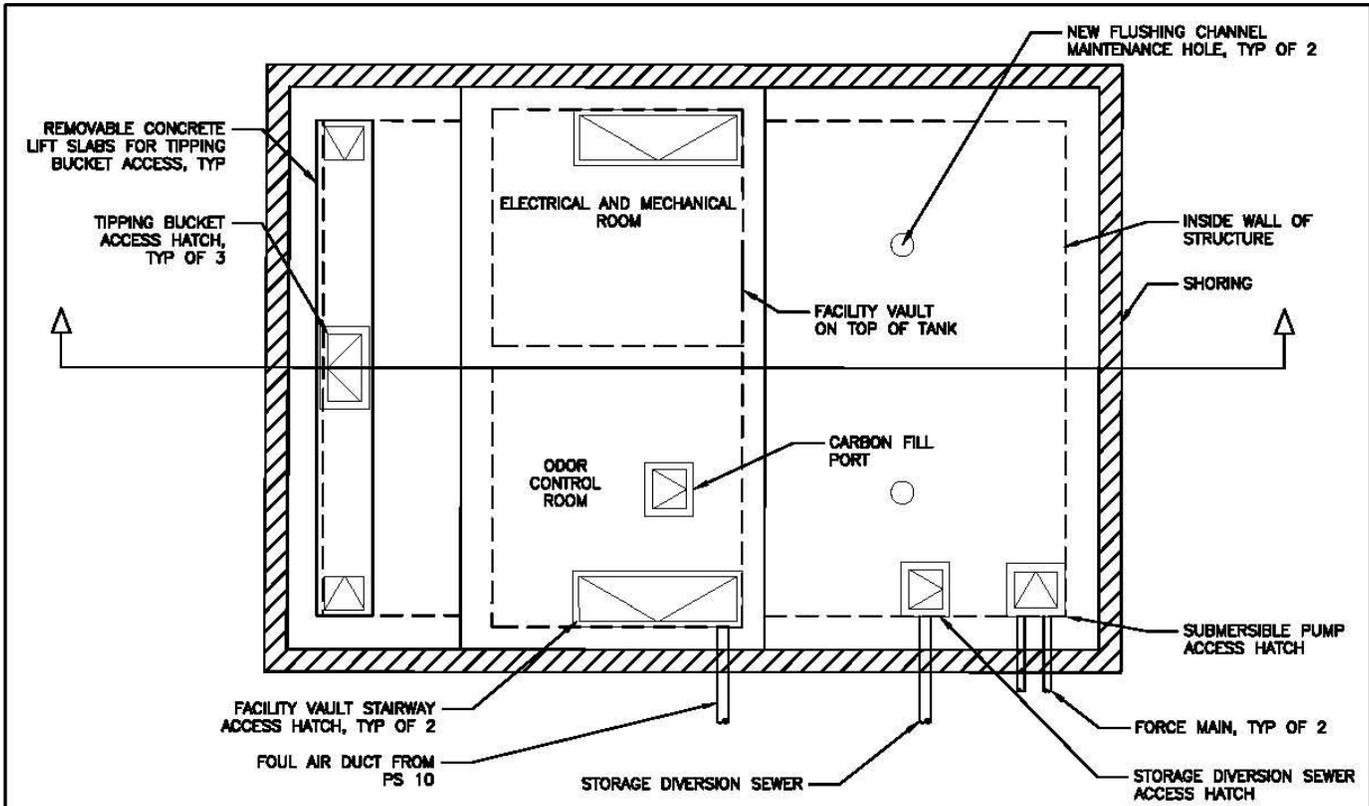


LEGEND

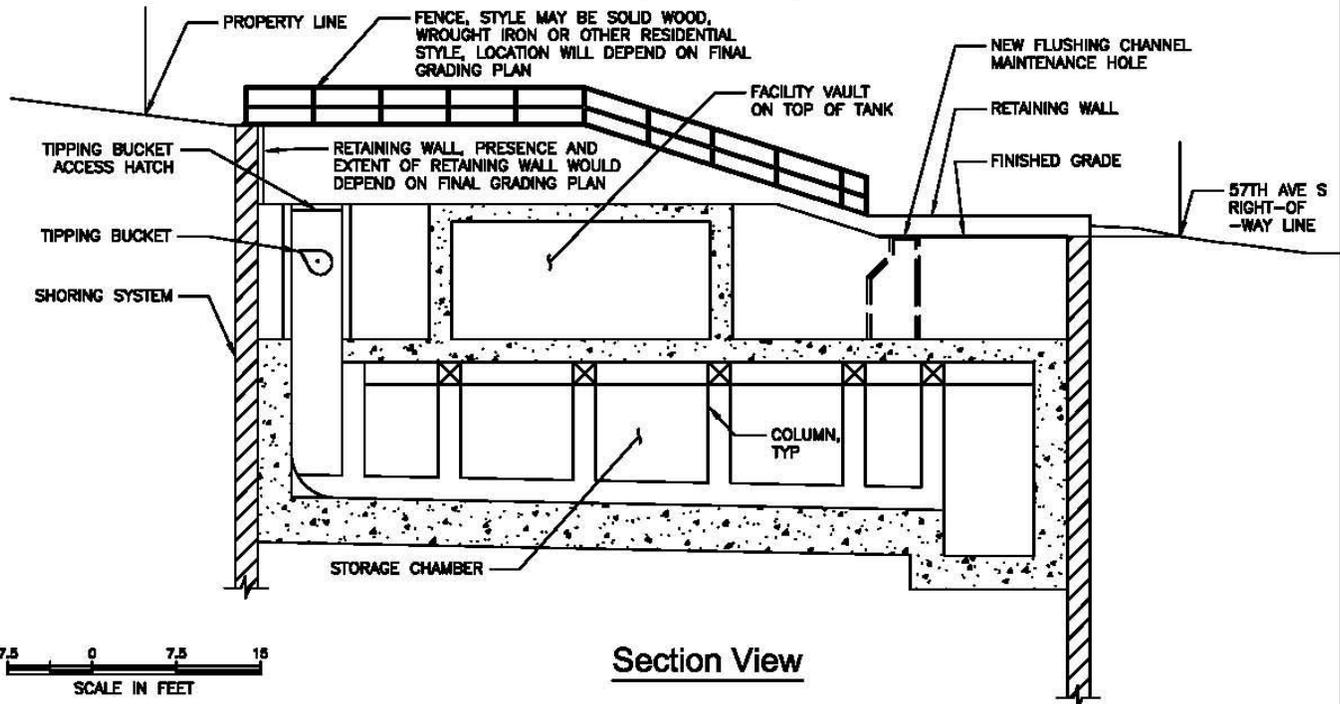
- | | |
|-------------------------|---------------------------|
| Basin 45 New Facilities | Contractor Staging Area |
| Basin 45 New MHs | 20-ft Contours |
| Basin 45 New Conveyance | Construction Impact Areas |
| SPU Combined Mainline | Parcel Boundary |
| SPU Drainage Mainline | Lake Washington |
- 0 50 100 ft

 1 inch = 100 feet

Note: Drainage and Wastewater mainline pipe theme colors are based on GIS Probable Flow Attribute. This classification system describes the type of flow in the pipe only and does not portray connections that would be allowed by permit.



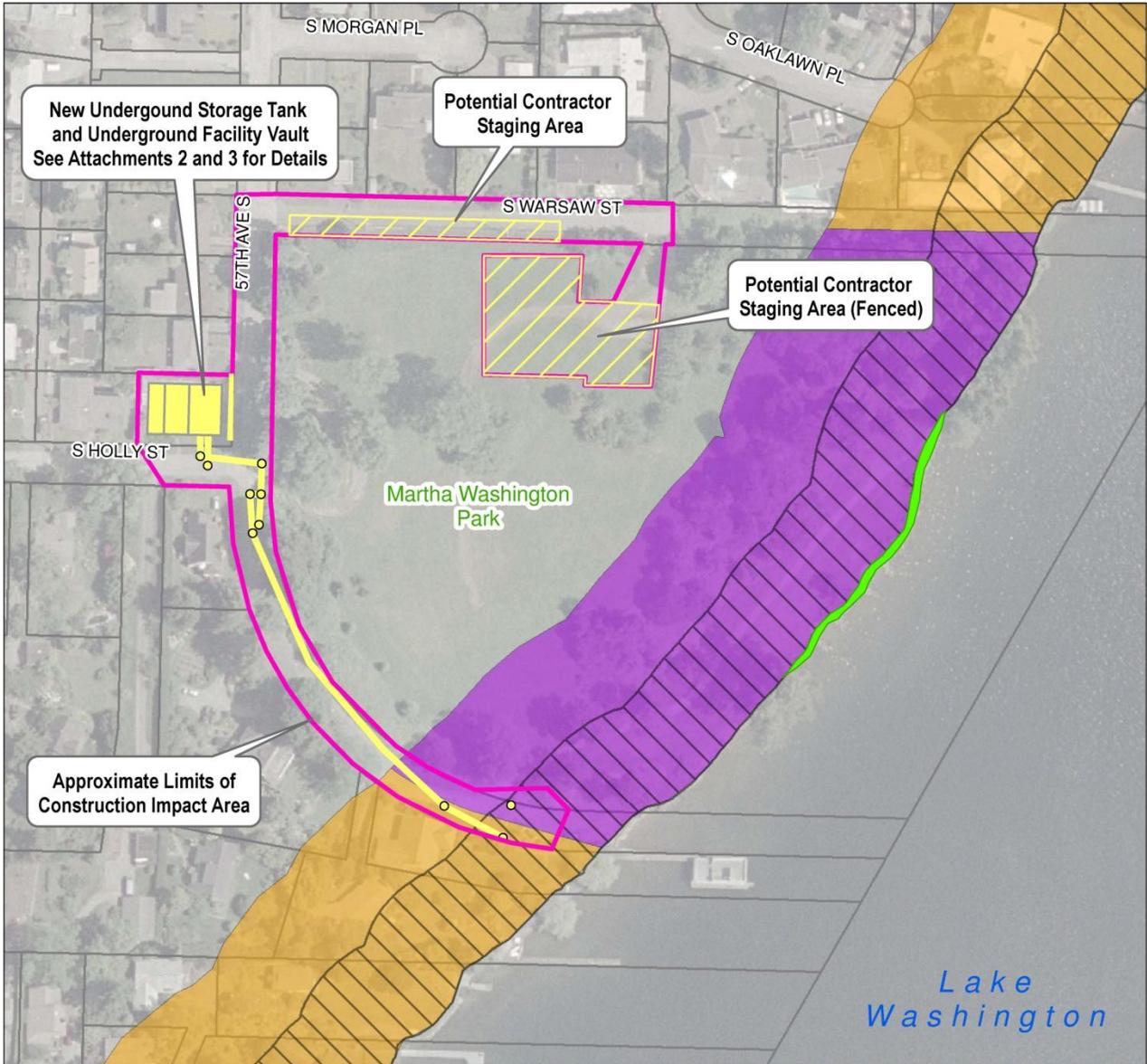
Plan View 



7.5 0 7.5 15
SCALE IN FEET

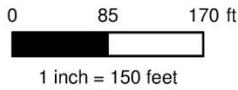
Section View

NOTE: ALL DIMENSIONS ARE PRELIMINARY AND ARE SUBJECT TO CHANGE DURING SUBSEQUENT PHASES OF DEVELOPMENT.



LEGEND

-  ECA 100 ft Shoreline Habitat Buffer
-  200 ft Shoreline Environment Designation: Conservancy Recreation
-  200 ft Shoreline Environment Designation: Urban Residential
-  Wetland
-  Basin 45 New Facilities
-  Basin 45 New Conveyance
-  Contractor Staging Area
-  Construction Impact Area
-  Parcel Boundary



**Henderson Basin 45 CSO Reduction Project
Attachment 5 -- Greenhouse Gas 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		5.10	39	1278	257	8030
Vacant			39	162	47	0
* 8" Diversion Sewer						3
TOTAL Section I Buildings						8,033
* See Note 1 Below						
Section II: Pavement						
						Emissions (MTCO ₂ e)
Pavement (sidewalk, asphalt patch)		6				300
Concrete Pad		1				50
TOTAL Section II Pavement						350
*See Note 2 Below						
Section III: Construction						
(See detailed calculations below)						Emissions (MTCO ₂ e)
TOTAL Section III Construction						563
Section IV: Operations and Maintenance						
(See detailed calculations below)						Emissions (MTCO ₂ e)
TOTAL Section IV Operations and Maintenance						15
TOTAL GREENHOUSE GAS (GHG) EMISSIONS FOR PROJECT (MTCO₂e)						8,961
*Note 1: Embodied emissions of ductile iron are based on a per ton shipped weight of ductile iron. Refer to http://www.thefreelibrary.com/Metalcasting's+carbon+footprint%3A+lawmakers+are+talking+seriously...-a0179569 825 The project will use approximately 450 feet of 8-inch ductile iron pipe. 8-inch ductile iron Class 350 pipe weighs 24.32 pounds per foot of pipe x 450 feet of pipe = 10,944 lbs or 5.5 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 3 tons (US) or 2.75 metric tons of CO2 to the Basin 45 CSO Reduction Project.						
*Note 2: Calculation for Section II: 50 MTCO2e/1000 sq.ft. of pavement at depth of 6 inches.						

**Henderson Basin 45 CSO Reduction Project
Attachment 5 -- Greenhouse Gas Emissions Worksheet**

Section III: Construction Details			
Construction: Diesel			
Equipment	Diesel (gallons)	Assumptions	
Semi Truck (Standard Engine w/ Flatbed)	4,000.0	80 days * 5 round trip/day * 50 miles/round trip ÷ 5 miles/gallon	
Semi Truck (Standard Engine w/ Flatbed)	1,800.0	90 days * 2 round trip/day * 50 miles/round trip ÷ 5 miles/gallon	
Dump Truck (w/ Pup Trailer)	9,000.0	50 days * 18 round trip/day * 50 miles/round trip ÷ 5 miles/gallon	
Misc Heavy Trucking (Equipment)	500.0	50 days * 1 round trip/day * 50 miles/round trip ÷ 5 miles/gallon	
Concrete Truck, Standard Rear Barrel, or equal	1,600.0	20 days * 8 round trip/day * 50 miles/round trip ÷ 5 miles/gallon	
Concrete Pump, Trailer Mounted, 60HP	448.0	20 days * 8 hr/day * 2.8 gallons/hr	
Service/Work Truck/Van, Standard	6,850.0	548 days * 3 round trip/day * 50 miles/round trip ÷ 12 miles/gallon	
Drill Rig, Truck Mounted, Vertical, 115HP	172.0	5 days * 8 hr/day * 4.3 gallons/hr	
Drill Rig, Crane Mounted, Vertical, 190HP	456.0	10 days * 8 hr/day * 5.7 gallons/hr	
Excavator, Wheel Mounted Hydraulic, 164HP	5,568.0	120 days * 8 hr/day * 5.8 gallons/hr	
Front End Loader, GP, 4X4, 165HP	1,960.0	50 days * 8 hr/day * 4.9 gallons/hr	
Crane, Lattice Boom, 200ft, 260HP	7,560.0	90 days * 8 hr/day * 10.5 gallons/hr	
Subtotal Diesel Gallons	39914.0		
GHG Emissions in lbs CO₂e	886090.8	22.2 lbs CO ₂ e per gallon of diesel	
GHG Emissions in metric tons CO₂e	401.9	1,000 lbs = 0.45359237 metric tons	
Construction: Gasoline			
Equipment	Gasoline (gallons)	Assumptions	
Construction Worker Personal Vehicles	18,266.7	548 days * 10 round trip/day * 50 miles/round trip ÷ 15 miles/gallon	
Subtotal Gasoline Gallons	18,266.7		
GHG Emissions in lbs CO₂e	354,373.3	19.4 lbs CO ₂ e per gallon of gasoline	
GHG Emissions in metric tons CO₂e	160.7	1,000 lbs = 0.45359237 metric tons	
Construction Summary			
Activity	CO ₂ e in pounds	CO ₂ e in metric tons	
Diesel	886090.8	401.9	
Gasoline	354373.3	160.7	
Total for Construction	1240464.1	563	Note: Value rounded to nearest whole number
Section IV: Long-Term Operations and Maintenance Details			
Operations and Maintenance: Diesel			
Equipment	Diesel (gallons)	Assumptions	
Operations and Maintenance Trucks	1,333	100 years * 4 trips/year * 50 miles/round trip ÷ 15 miles/gallon	
Subtotal Diesel Gallons	1333.3		
GHG Emissions in lbs CO₂e	29600.0	22.2 lbs CO ₂ e per gallon of diesel	
GHG Emissions in metric tons CO₂e	13.4	1,000 lbs = 0.45359237 metric tons	
Operations and Maintenance: Gasoline			
Equipment	Gasoline (gallons)	Assumptions	
Operations and Maintenance Crew Vehicles	200	100 years * 4 trips/year * 0.5 gal/trip	
Subtotal Gasoline Gallons	200.0		
GHG Emissions in lbs CO₂e	3880.0	19.4 lbs CO ₂ e per gallon of gasoline	
GHG Emissions in metric tons CO₂e	1.8	1,000 lbs = 0.45359237 metric tons	
Operations and Maintenance Summary			
Activity	CO ₂ e in pounds	CO ₂ e in metric tons	
Diesel	29,600.0	13.4	
Gasoline	3,880.0	1.8	
Total for Operations and Maintenance	33,480.0	15	Note: Value rounded to nearest whole number
Note: Due to rounding, performing the calculations may not return the exact results shown. ☐			